An Efficient Container Packing Method for Determining Package Locations Considering Delivery Constraints

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Seth T. Hostetler

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by

SETH T. HOSTETLER

has been approved for

the Department of Industrial and Systems Engineering

and the Russ College of Engineering and Technology by

Dale T. Masel

Associate Professor of Industiral and Systems Engineering

Dennis Irwin

Dean, Russ College of Engineering and Technology

ABSTRACT

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Logistics companies rely on efficient unloading methods to reduce operating costs. This thesis describes a heuristic method to efficiently pack a given set of rectangular packages orthogonally within a given container (delivery truck). The packages are placed within the container based upon a largest caving degree rule, which maximizes the surface area that touches previously placed objects or the container sides. The resulting heuristic produces an efficient method to pack a set of objects while minimizing the total operating costs, which is the total unloading costs plus a penalty cost for packages not loaded within their assigned container. In addition, a look-ahead feature is evaluated to determine its effectiveness to the improvement of the original algorithm.

Approved: _____

Dale T. Masel

Associate Professor of Industiral and Systems Engineering

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1 INTRODUCTION

1.1 Background

Many researchers have focused on the problem of increasing packing efficiencies for various applications. Most of these researchers have concentrated their efforts on the two-dimensional rectangular packing problem [1] [2]. This problem can be described as fitting many relatively smaller rectangles within a given rectangular boundary. These smaller rectangles are placed within the boundary based on the problem assumptions and constraints, such as orthogonal placement, fixed rotation, or adjacency to other previously placed rectangles. This problem can be related to many different applications such as pallet packing, glass and metal cutting, very large scale floor layouts, etc.

Other research efforts have focused on the three-dimensional aspect of packing [3-22]. This type of problem is similar to the rectangular packing problem in methodology, yet provides for a much more complex problem, given that a third dimension must be considered. When packing three dimensionally, constraints other than those used for two-dimensional packing must be considered, such as the effect of gravity on the boxes which are packed. An efficient methodology for the three dimensional packing problem is useful for increasing space and cost efficiencies when packing shipping containers, creating electronic component cases, loading aircraft, and other applications.

1.2 Motivation

Being in the age of e-commerce, the delivery of packages to individual consumers is becoming a very important part of our lives. The consumers want their packages delivered in a timely fashion. The distributors would like to do this as efficiently as possible. Not only does this mean creating the best routes for the drivers to follow, in an effort to minimize the total distance traveled, but it also means packing the delivery trucks as efficiently as possible. The greater the space utilization that these companies, such as UPS, can achieve for their trucks, the lower their costs will be. The cost savings can be attributed to many aspects of the process including labor costs, decreased capital costs (fewer trucks needed), and decreased overhead costs. Another important reduction will be in the amount of fuel used. Not only will the company decrease expenses by spending less on fuel, but the reduced fuel usage will lead to decreased emissions from the trucks, which will benefit the surrounding environments.

The problem with the current research is that little focuses on packing methods when delivery sequence constraints are imposed on the packing order. The amount of research that has been done on the three dimensional packing problem, in any context, is also limited. There is much opportunity for research to be performed concerning the three dimensional packing problem, especially when delivery constraints are imposed.

The research to be completed involves optimizing the packing order for three-dimensional packing, while also taking space utilization into account. As stated previously, some research has been completed by other researchers on how to efficiently

solve three-dimensional packing problems [3-22]. Very few of these researchers have factored delivery constraints into their models though.

The research has produced and verified a methodology which efficiently packs rectangular packages into a delivery truck of a given size. Not only does this methodology need to determine the location and orientation of the packages to allow packages to be accessible when their delivery time comes due, it must also utilize the available space as efficiently as possible. This problem type directly relates to final consumer delivery operations for companies such as UPS, FedEx, DHL, etc.

1.3 Objective

In order to solve this complex problem given the volume, orientation, and delivery constraints, a step-by-step heuristic method was implemented. This problem has been shown to be NP-hard (nondeterministic polynomial-time hard), meaning that all possibilities for solving this problem cannot be solved in reasonable time, so the optimal solution to this problem cannot be guaranteed. Since this is the case, different approaches can be taken to find near-optimal solutions. Heuristic methods, which are deterministic in nature, will produce the same result each time the method is used for the same data set. Non-deterministic methods, such as genetic algorithms or simulated annealing, can also be used, but will not guarantee the same solution output each time that the method is used for the same data set.

For the research to be performed the heuristic method presented in [10] was expanded to include delivery constraints. This method involves using a caving degree heuristic to find

a packing location that allows the package to be packed so that it touches as much area of previously packed boxes as possible. A look-ahead scheme was also implemented to allow for better packing efficiencies. If a package must be packed out of the given order, a cost will be applied to account for the cost of moving other packages to access the buried package. The heuristic was tested and verified to evaluate whether it is giving efficient solutions. If needed the models used to create the solutions will be modified to more fully describe the three-dimensional problem. The performance measures for these models are the total cost incurred including both operating and unloading costs, with a minimization objective, while also trying to minimize the number of containers needed to fulfill the delivery requirements.

The ultimate outcome to be achieved from the research done will be to create a computer based heuristic which is able to take a list of packages, their sizes, delivery dates or times, orientation restrictions, etc. and create the optimal packing solution, which outputs the packing order and container locations. By creating a program which outputs the solution, this allows many others to be able to utilize the outcomes of the research. If the research was only developed as a mathematical model, many industry users might feel overwhelmed by the solution equations. But, by creating a program where the user is asked for a list of simple inputs for each package, many package delivery companies and other industries could be able to benefit from the research performed.

The following section describes the various types of 3D packing problems and various methodologies that previous research has used to solve these problems. Also discussed are the types of data sets that the methods can be applied to.

2 LITERATURE REVIEW

Research focusing on the three-dimensional container packing problem (3D-CPP) has built off the research previously done to solve the one-dimensional and two-dimensional packing problems (2D-CPP). The techniques used to find solutions for these problems have been extended to include three dimensions. The 2D-CPP has been proven to be NP-hard (nondeterministic polynomial-time hard), which means that the optimal solution cannot be proven to be found in reasonable time [11]. Given that the 2D-CPP is NP-hard, it can be determined that the 3D-CPP is also NP-hard. This means that there has been no optimal solution for the three-dimensional container packing problem [13].

The 3D container packing problem packing has many factors which can influence the solutions which can be found [5]. These factors include, but are not limited to, the following:

- Package size
- Package orientation
- Package weight
- Package density
- Package availability
- Package loading sequence

Many different techniques have been used to create solutions to the 3D-CPP. These have included global optimization techniques which attempt to search the entire data set for the most near-optimal solution, and also local optimization techniques which find near-

optimal solutions in a much shorter time but without knowledge on the goodness of the optimality of the solution. These techniques have been used on a variety of 3D-CPP problem types which are described in section 2.2. Section 2.1 describes various techniques used in solving the three-dimensional packing problem as it relates to palletization.

2.1 Palletization Problems

Palletization problems involve placing boxes on a pallet for shipment [5]. While these problems are not identical to the three-dimensional container packing problem, the methods used to determine the best solutions can also be applied to the container packing problems. The two problem types are also similar in the constraints which affect the possible solutions, including package orientation, weight, size, etc.

Palletization objectives include maximization of pallet volume utilization, reduction in pallet loading time, satisfaction of customer's demand, maximization of loading stability, and reduction in the work-in-process space [3]. These objectives are used to determine the overall effectiveness of the solutions created by the models.

Morabito and Morales proposed an effective heuristic solution to the manufacturer's pallet loading (MPL) problem [19]. The MPL problem is unique from other palletization problems because all of the boxes to be placed on the pallet are identical. Abdou and El-Marsy have proposed two separate heuristic methods in [3, 4], which provide near optimal, practical solutions to the general three-dimensional palletization problem with non-identical boxes to be placed on the pallets.

The first method uses a mix of layered and stacking palletization procedures in an attempt to reach maximum volumetric utilization [4]. This proposed heuristic provides near optimal solutions for weakly heterogeneous palletization problems.

The second method extends the first heuristic algorithm to include rules for stability and demand requirements [3]. This heuristic also provides near-optimal solutions.

2.2 Container Packing Problem Types

The 3D-CPP, also referred to as the three-dimensional cutting and packing problem, involves placing a set of rectangular objects orthogonally into a larger rectangular container with fixed dimensions. This problem can be generally classified into three categories as defined by Lim et al.: bin-packing problems, knapsack loading problems, and container-packing problems [14]. Wascher et al. categorized the general 3D-CPP into six more specific problems which provide further understanding of the problem [21]. These six categories are:

1. *Identical Item Packing Problem*

   This problem is described as assigning the largest possible number of small, identical objects to a given, limited set of large objects.

2. *Placement Problem*

   This problem category is defined as placing a set of small objects, which are weakly heterogeneous, into a given, limited set of large objects. The objective of this problem is to maximize the number of small objects placed within the large objects, or in other words, minimize the unused space.

3. *Knapsack Problem*

   This category is characterized by a strongly heterogeneous set of small objects which are then assigned to a given set of large objects. The objective of this problem is to maximize the number of small items that can be placed into the limited amount of space given by the larger items.

4. *Open Dimension Problem*

   An open dimension problem involves one or more large objects with one dimension that is variable. These larger objects must completely accommodate the entire set of the smaller objects. The larger objects should be the minimum possible size required. Li and Cheng provide a more detailed description of the three-dimensional packing problem with one variable dimension [23].

5. *Cutting Stock Problem*

   This problem involves allocating a set of weakly heterogeneous small items to a set of large objects which are fixed in all dimensions and may or may not be identical. The large objects should be of minimum size.

6. *Bin Packing Problem*

   This problem is similar to the cutting stock problem, except that the set of small objects to be assigned is strongly heterogeneous. The objective, again, is to minimize the total size of the larger objects. Li and Cheng provide a more detailed description of the three-dimensional packing problem with one variable dimension [23].

The problem being studied for this thesis most closely relates to problem types 2 and 3, the placement problem and the knapsack problem. For the purpose of this study the data used will most closely resemble the placement problem as it consists of weakly heterogeneous objects being placed into a larger fixed dimension object. Section 2.3 describes some of the various problem solving techniques that have been used to solve the 3D-CPP.

2.3 Problem Solving Approaches

The problem types discussed in section 2.2 have been studied using a variety of techniques and data sets. These techniques can be classified into two separate categories: global optimization techniques and local optimization techniques. Global optimization techniques include, but are not limited to, tree-search algorithms, branch and bound algorithms, simulated annealing, and genetic algorithms. Local optimization techniques focus on heuristic algorithms. Data used to test these techniques has been homogeneous (all identical packages), weakly heterogeneous (low variety of packages), and strongly heterogeneous (high variety of packages).

2.3.1 Global Optimization Techniques

Global optimization techniques attempt to search the entire problem data set solution space for the optimal solution [24]. By attempting to search the entire solution space it can be said that the optimal solution was found; however this can be a very time consuming process and generally requires large processing capabilities for computational techniques. Li et al. proposed a distributed global optimization method for packing

problems to deal with the large amount of time and computational resources required [12]. Their method involves dividing the original problem into many sub-problems and solving each sub-problem on individual computers, which are connected by a network. While this proved to be an effective method it is not always feasible or efficient for use with all global optimization techniques. These global optimization techniques can be classified into two different types, deterministic and probabilistic.

Deterministic algorithms can be used if a clear relationship exists between the characteristics of the possible solutions and their utility for a given problem. These algorithms efficiently explore the solution space to find the optimal solution. Probabilistic algorithms are more common than deterministic algorithms. Probabilistic algorithms do not search the entire solution space because the complexity of the problem generally yields this infeasible. These algorithms explore the probable solution spaces for a near-optimal solution to the problem. Presented in Figure 1 is the taxonomy of global optimization algorithms, which is given for reference. The application of a few of these techniques, which are shown in gray in the figure, is further discussed in this section.

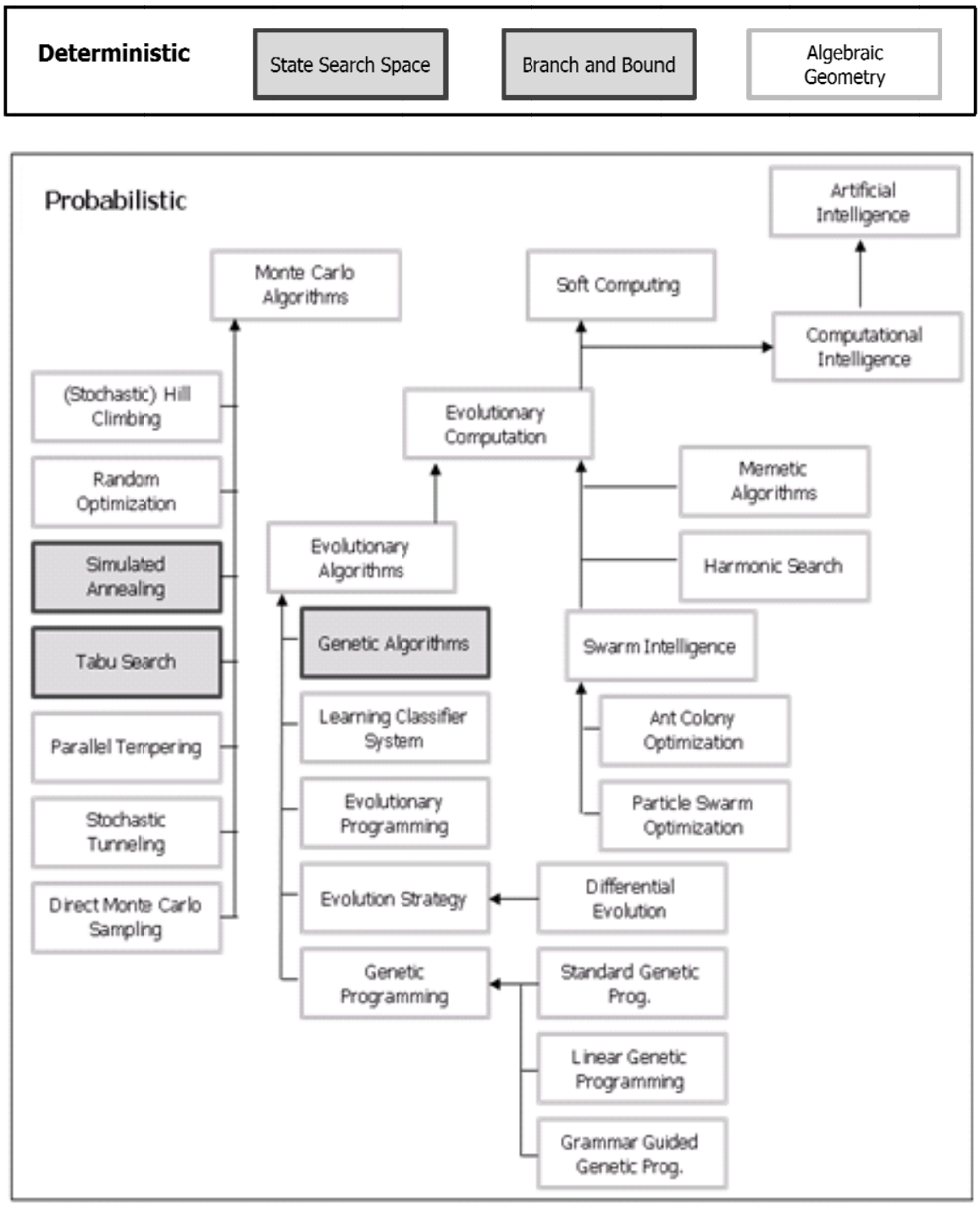

Figure 1. The taxonomy of global optimization algorithms (adapted from [24]).

2.3.1.1 Genetic Algorithms

Gehring and Bortfeldt developed a genetic algorithm to solve the container loading problem [9]. This algorithm was applied to the problem of loading a strongly heterogeneous set of boxes into a single container. This problem considered five constraints: orientation, fragility, weight, stability, and balance. The solution consisted of a two-step method with the first step using a greedy algorithm to create tower sets and the second step was to use a genetic algorithm to cover the floor of the container with these towers. This method produced acceptable results for container loading problems where simple stability requirements are sufficient.

Yeung and Tang [22] presented a hybridization of a heuristic algorithm and a genetic algorithm, which guarantees that all packages in the container are stable. For this hybridization, the heuristic determines the appropriate height that the packages can be placed without becoming unstable, and then the genetic algorithm is used to find the placement sequence of the packages. This has proven to be both an effective and efficient solution to the 3D-CPP.

2.3.1.2 Simulated Annealing

Simulated annealing was used by Jin et al. [11] to solve the three-dimensional container packing problem. The research performed included considerations for practical constraints found in most real-life situations, including loading stability, flexible packing patterns and fixed unloading orders. A heuristic was used to create an initial packing sequence and then simulated annealing was used to find the global optimal solution after

a large enough number of state transitions have been performed. This study showed that the simulated annealing meta-heuristic is an effective solution to the 3D-CPP.

2.3.1.3 Tabu Search Algorithms

Lodi et al. described the use of a subordinate heuristic within a tabu search metaheuristic to solve the three-dimensional bin packing problem [16]. This heuristic packs the items by layers, with the height of each layer effectively being the height of the tallest item within that layer. These layers are created by sorting the items into bins of as similar heights as possible. A tabu search heuristic from a previously found two-dimensional bin packing problem is then applied to each layer created to find the optimal solution. This method was proven to be effective by producing comparable results to a well performing branch and bound method for solving the same data set.

A tabu search algorithm (TSA) also used for solving the container loading problem has also been proposed by Bortfedt et al. [6]. This meta-heuristic uses a hierarchical structure with three modules. The first module is a basic heuristic which performs the loading of the container. The middle module uses several phases of the same but differently configured TSAs to create the solution sequences used to do the loading in the first module. The final module also uses TSAs to perform the final search for the best solution. The TSAs in the third module are of different configuration, which cooperate with each other through the exchange of best solutions from each path with the other TSAs. This parallel tabu search algorithm technique shows limited improvement over non-parallel tabu search algorithm techniques.

2.3.1.4 Branch and Bound

The previous three sections have all focused on examples of probabilistic techniques to solve the three-dimensional packing problem. It is also possible to use deterministic methods to solve this problem. An example of this is given by Martello et al. [17] where a branch and bound method is used to solve the three-dimensional bin packing problem.

2.3.1.5 Tree Search Algorithm

Another technique used to solve the three-dimensional packing problem is a tree search algorithm. This technique is used by Pisinger [20] to address the knapsack container loading problem. The heuristics used involve a special focus on a wall-building approach, in which a container is filled in layers across the depth of the container, and also uses a backtracking step to improve the quality of the solution. To create the layers used in the wall-building approach a tree-search algorithm is used to find the set of layer depths which result in the best filling of the container. This tree-search algorithm approach, along with the backtracking step, is able to fill more than 95% of the total volume for large-sized instances. In comparison to previous approaches, this is a significant improvement.

Brunetta and Gregoire [7] also used a tree search algorithm to solve the three-dimensional packing problem. They extended the tree search algorithm proposed by Pisinger [20] and also the work on the palletization problem by Morabito and Morales [19] to create an efficient algorithm for solving large three-dimensional packing problems.

2.3.2 Local Optimization Techniques

Local optimization techniques generally use heuristic algorithms to determine a solution to the three dimensional packing problem. By using heuristic algorithms to create the packing sequence it is not known whether the optimal solution has been determined, but rather it can be said that a near optimal solution has been found. Using local optimization techniques allows for simpler algorithms and decreased processing times, while still providing a good solution. For most practical applications, a near-optimal solution that is produced in a reasonable time is sufficient [8].

2.3.2.1 Heuristic Algorithms

Mohanty et al. proposed a heuristic technique based on the fractional knapsack problem which accounts for boxes of different sizes into a given set of different-sized containers [18]. The objective of the heuristics used was not to maximize the volume utilization of the packed containers, but rather to maximize the total value of the contents in the container. The algorithm proposed performed very well with random problems. When the container dimensions and the box dimensions coincided well, there were obviously better results. Future work on this algorithm includes variations in the box dimensions and shapes, box orientation, and weight restrictions.

A multi-faced buildup technique has been proposed by Lim et al. [13]. This technique is unique from most other three-dimensional packing problem solutions in that it does not use a layer-building or wall-building approach. This technique incorporates both of these techniques in an attempt to optimize the volume utilization of the containers. The

heuristics proposed do include restrictions for certain constraints, such as orientation restrictions. The heuristic given in the work of Lim et al. improves upon the current best results on data tested from the OR-Library [25]. The algorithm proposed also presents a look-ahead scheme which considers more than one package at a time to help to determine the best packing sequence.

2.3.2.2 Visualization Techniques

While many papers describing the current research include developing or improving methodologies for solving the three-dimensional packing problem, most do not include methodologies for visualizing the techniques proposed in real-world settings. To address this issue Chien and Deng [8] developed a computational procedure for packing boxes within a container along with a container packing support system to facilitate the determination and visualization of the packing pattern. This container packing support system is capable of flexibility in determining the container packing patterns. The procedure developed does not try to achieve an optimal solution for the problem; rather it finds a near-optimal solution within a reasonable time, which is adequate for practical applications. The programming language used for this procedure is Matlab.

2.3.2.3 Caving Degree Method

Huang and He [10] proposed a heuristic algorithm to solve the three-dimensional packing problem using a method which they referred to as the "largest caving degree." This procedure assumes no constraints on the orientation of the packages. This method is a local optimization technique which differs from the basic methods of wall building and

layering. This methodology states that a package should always occupy a corner, or even a cave. These corners or caves are created by the bounding walls of the container along with the surfaces of the packages which have already been packed into the container. By packing in this manner the packages should be packed as closely as possible.

The objective of this procedure is to maximize the total volume of the packages placed within the container. The methodology provides three criteria for determining if the solution found is feasible:

1. Each item must be packed completely within the container.
2. There is no overlapping between any of the two items.
3. Each item is placed parallel to the surfaces of the container.

The problem formulation given in [10] begins with a given container with dimensions (L, W, H) and a set of n items S=[(l_1, w_1, h_1)… (l_n, w_n, h_n)]. The three dimensions of item *i* are given by the variables l_i, w_i, and h_i. All variables are positive integers. The lower-left-near corner of the container to be packed is equivalent to the origin of the Cartesian reference frame; which, in turn, makes the upper-right-far corner of the container equal to the coordinates (L, W, H). Whether an item *i* is packed into the container is denoted by $\delta_i \in \{0,1\}$. If item *i* has been packed, let (x_{i1}, y_{i1}, z_{i1}) and (x_{i2}, y_{i2}, z_{i2}) denote the coordinates of its lower-left-near corner and upper-right-far corner respectively. Formulation of the problem is then equal to:

$$\max \sum_{i=1}^{n} l_i w_i h_i \delta_i \qquad \textbf{Eq. 1}$$

Subject to:

1) $(x_{i2} - x_{i1}, y_{i2} - y_{i1}, z_{i2} - z_{i1}) \in \{(l_i, w_i, h_i), (w_i, l_i, h_i), (l_i, h_i, w_i), (h_i, l_i, w_i), (h_i, w_i, l_i), (w_i, h_i, l_i)\}$;
2) $\max(\max(x_{i1}, x_{j1}) - \min(x_{i2}, x_{j2}), \max(y_{i1}, y_{j1}) - \min(y_{i2}, y_{j2}), \max(z_{i1}, z_{j1}) - \min(z_{i2}, z_{j2})) \delta_i \delta_j \geq 0$;
3) $0 \leq x_{i1} < x_{i2} \leq L, 0 \leq y_{i1} < y_{i2} \leq W, 0 \leq z_{i1} < z_{i2} \leq H$;
4) $\delta_i \in \{0,1\}$;

where $i, j = 1, 2, \ldots, n$, $i \neq j$.

The six orientations of each item i are given as (l_i, w_i, h_i), (w_i, l_i, h_i), (l_i, h_i, w_i), (h_i, l_i, w_i), (h_i, w_i, l_i), and (w_i, h_i, l_i); their corresponding orientation number is given as one thru six respectively. It is also important to note that constraints 1, 2, and 3 correspond to the three criteria for a feasible solution.

Huang and He [10] went on to describe the algorithm. The main concept of the algorithm is to always do a Real Corner Occupying Action (RCOA) with the largest caving degree. A RCOA is defined as "an action that places an item at a corner where three orthogonal surfaces meet." The largest caving degree value is able to judge how close a packing item is to other surfaces of items already packed into the container.

This section has described various methods that can be used to solve the 3D-CPP including palletization techniques, global optimization techniques, and local optimization techniques. It has also been shown how these methods have been applied to

homogeneous data, weakly heterogeneous data and strongly heterogeneous data. Section 3 describes the adaptation of one of these techniques, the caving degree method [10], to the 3D-CPP when considering delivery constraints.

3 METHODOLOGY

The previous work of Huang and He [10] has been adapted to solve the three-dimensional container packing problem (3D-CPP) with constraints placed on package orientation, package stability, and the order in which packages can be packed due to delivery requirements. The proposed heuristic does not attempt to maximize the volume utilization of the container; rather the heuristic attempts to minimize the total cost of delivering the items. The unloading cost is incurred if a package is inaccessible at delivery time and a penalty cost is incurred if a package cannot be placed within the packing container it is assigned to due to volume considerations.

It is assumed for this research that the packing order of the objects to be placed within the container is given. The objects will be placed in sequential order, which is given by the packing order. The orientation of the packages is given, based on the location of the packing labels, and no rotation is allowed. When packages are placed they must be stable, which is defined as the package having greater than 50% of its base supported.

3.1 Problem Formulation

The packing set, S, contains the n items from the packing sequence which, based on purely volume considerations with no dimensional constraints, can fit within the given container. Each item in set S is defined by (l_i, w_i, h_i). Huang and He [10] go on to define the problem formulation as follows.

These items are to be packed into a container having dimensions (L, W, H), which is oriented on the Cartesian coordinate system. It is assumed that the lower-left-near corner

of the container is located at the origin, having the coordinates (0, 0, 0), and the upper-right-corner is located at the coordinates (L, W, H). Thus, given the set of n items, S, if item i has been packed, let (x_{i1}, y_{i1}, z_{i1}) and (x_{i2}, y_{i2}, z_{i2}) denote the coordinates of the item's lower-left-near corner and upper-right-far corner respectively.

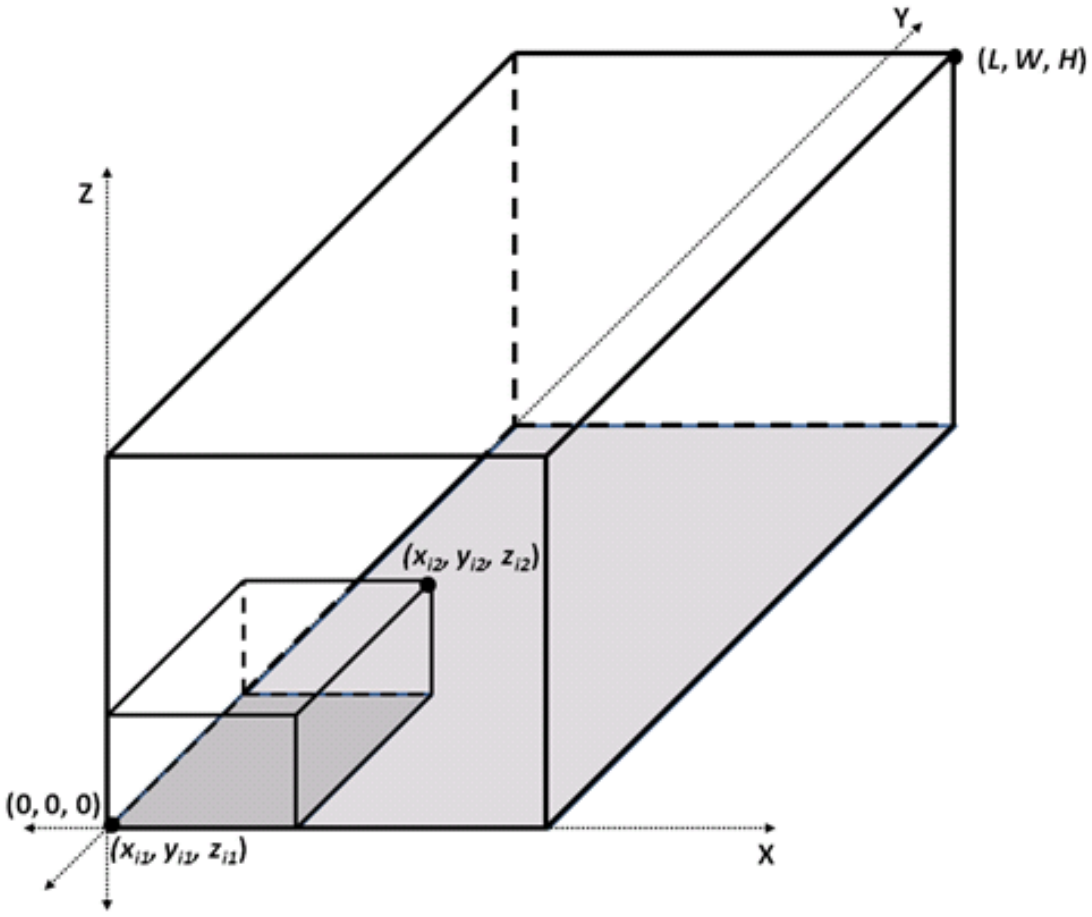

Figure 2. Coordinate system showing container and package orientation.

The problem formulation is then given as:

$$\max\left(\sum_{i=1}^{n}\left(\delta_i\tau_i - (\theta_i + (1-\delta_i)\rho_i)\right)\right) \quad \textbf{Eq. 2}$$

where,

δ_i = 0 if item *i* is unpacked; = 1 if item *i* is packed

τ_i = value of item *i*

θ_i = unloading cost of item *i*

ρ_i = penalty cost of item *i*

Subject to:

1) $\delta_i \in \{0,1\}$;
   - Item *i* must either be packed or not.
2) $(x_{i2} - x_{i1}, y_{i2} - y_{i1}, z_{i2} - z_{i1}) = (l_i, w_i, h_i)$;
   - Item *i* must be packed parallel to the surface of the container.
3) $\max\left(\max(x_{i1}, x_{i1}) - \min\left(x_{i2}, x_{j2}\right), \max(y_{i1}, y_{i1}) -\right.$

   $\min$ *yi2*, *yj2*, $\max$ *zi1*, *zj1*$-\min$ *zi2*, *zj2* $\delta i \delta j \geq 0$;
   - There is no overlapping between any of the two items
4) $0 \leq x_{i1} < x_{i2} \leq L, 0 \leq y_{i1} < y_{i2} \leq W, 0 \leq z_{i1} < z_{i2} \leq H$;
   - Each item must be packed completely within the container

In Equation 2, the variable τ_i, which is the value of item *i*, refers to the revenue generated for the company by the delivery of item *i*. This value will be unique for each company

based on the amount that they charge customers for the delivery of packages. This will also vary from package to package based on size and weight differences.

3.2 Basic Algorithm Description

Huang and He [10] provided an algorithm which places packages into a container in a position that maximizes the caving degree of the package. They stated that "the main idea of our algorithm is to always do a Real Corner Occupying Action (RCOA) with the largest caving degree." The caving degree of a package is a value that examines how close that package is to other previously packed items.

This algorithm provides the basic framework for the research to be performed. Huang and He attempted to pack a set of given three-dimensional objects into a container of given size. They do not consider any orientation constraints, other than that the package must be placed orthogonally to the restrictive surfaces of the packing container. Also, no constraints are placed on the order in which the packages may be placed; the package that best fits the available packing locations is chosen from the set of available packages. Sections 3.2.1 and 3.2.2 describe the work of Huang and He in more detail.

3.2.1 Algorithm Definitions

In this section the necessary algorithm definitions of Huang and He are described in detail [10].

1) Real Corner: This is an available, empty space formed by the surfaces of three other items, either previously packed items or the surfaces of the packing

container. These items, given the constraints of the problem, must be orthogonal to each other.

2) Real Corner Occupying Action (RCOA): This occurs when a package is placed into a Real Corner.

3) Distance of Two Items: The distance between two items is defined as the Minkowski distance between the point sets of each item.

The distance between item *i* and item *j* is :

$$\boldsymbol{d_{ij} = dx_{ij} + dy_{ij} + dz_{ij}} \qquad \textbf{Eq. 3}$$

where,

$$dx_{ij} = \max\left(\left|x_{ic} - x_{jc}\right| - \frac{l_i + l_j}{2}, 0\right)$$

$$dy_{ij} = \max\left(\left|y_{ic} - y_{jc}\right| - \frac{w_i + w_j}{2}, 0\right)$$

$$dz_{ij} = \max\left(\left|z_{ic} - z_{jc}\right| - \frac{h_i + h_j}{2}, 0\right)$$

and (x_{ic}, y_{ic}, z_{ic}), (x_{jc}, y_{jc}, z_{jc}) are the central coordinates of item *i* and item *j* respectively.

4) Paste Number (k_i): This is the number of surfaces of an item, which was packed with a Real Corner Occupying Action, that are touching the surfaces of other objects. Each of these surfaces is referred to as a paste surface, and $k_i \in \{3, 4, 5, 6\}$.

5) Paste Ratio (p_i): The total pasted area, or total area that is touching other surfaces, divided by the total surface area of package *i*. $p_i \in (0, 1]$.

6) Distance of a RCOA (d_i): This is defined as the minimum distance between the item to be packed and other previously placed items contained in a sub-space that is bounded by the container walls, Ω, when the packing item was placed by a RCOA. The space Ω is the space that is enclosed by extending the pasted surfaces of the packed item to the sides of the container to form a sub-volume within the packing container. An item or container surface is considered to be in space Ω if it intersects or is adjacent to the space, and it does not touch the item that is packed. Then, the distance of a RCOA is defined as:

$$\boldsymbol{d_i} = \begin{cases} \min(\boldsymbol{d_{ij}})\ \forall\, \boldsymbol{j} \in \boldsymbol{\Omega}; & \boldsymbol{k}=\{3,4,5\} \\ 0; & \boldsymbol{k}=6 \end{cases} \qquad \textbf{Eq. 4}$$

7) Caving Degree (C_i): This is used for items packed using a RCOA to evaluate the proximity of the packed item with previously placed items and container surfaces. The optimal caving degree is the largest one found. The caving degree is defined as:

$$\boldsymbol{C_i} = \boldsymbol{\mu}(\boldsymbol{k_i} + \boldsymbol{p_i}) - \frac{\boldsymbol{d_i}}{\sqrt[3]{\boldsymbol{l_i w_i h_i}}}, \boldsymbol{\mu} = \max(\boldsymbol{L}, \boldsymbol{W}, \boldsymbol{H}) \qquad \textbf{Eq. 5}$$

3.2.2 Packing Procedure

Huang and He [10] provided a framework from which to build the packing procedure. Their work involved a method which is performed recursively examining each package contained in the set of unpacked items, for the item that has the largest caving degree based on the available RCOAs. Their method allows each item to be checked in all size allowable orientations. The item which has the largest caving degree is then packed.

The focus of the work performed within this paper is examining the effectiveness of the caving degree methodology with the constraints that are imposed because of delivery sequences and unloading costs. First, in the packing procedure presented here, only one orientation for each item is considered. This is because each item must be packed on its bottom with the packing label facing outward (toward the unloading person).

The second deviation from the Huang and He procedure is that the packages must be examined in the order given, which is the delivery order in reverse. By examining only one item at a time, it is ensured that each package will be accessible when it comes time to delivery that package. This means that at each step in the process only one package is examined for each of the available RCOAs. Relaxation of this constraint will be considered later in this thesis.

This packing procedure is performed until either all items contained in the packing set, *S*, have been packed, or no more items can be packed within the container boundaries.

3.2.3 Tiebreaker System

If an item has identical caving degree values for two or more RCOAs, the following tiebreakers should be employed, in the order given:

1) The RCOA with the minimum y-coordinate should be chosen.
2) The RCOA with the minimum z-coordinate should be chosen.
3) The RCOA with the minimum x-coordinate should be chosen.

3.2.4 Basic Algorithm

To begin a packing container with constraining sides given by (L, W, H) is placed with the lower-left-near corner at the origin of a Cartesian coordinate system. The packages from the allowable set, S, are then placed within the container in the packing order given. The first item is packed in the lower-left-near corner. The procedure is then performed recursively, evaluating each subsequent item for all available Real Corner Occupying Action locations. A list of available corners is updated after each item is packed. The procedure continues until all items have been packed or the next item to be packed cannot be placed within the boundaries of the container. Also, no package will be placed in a position which does not support greater than 50% of the bottom of the package. This is done to help ensure stability of the packages.

The following algorithm has been modified from the work of Huang and He [10] to include orientation, stability, and delivery constraints.

Algorithm B_0:

1. Begin with a container denoted by (L, W, H) and a packing item list with each item denoted by (l_i, w_i, h_i).
2. Place the first package to be packed in the lower-left-near corner (0, 0, 0).
3. Remove the item placed from the packing item list and add it to the used item list.
4. Identify all real corners within the container. Add to the available real-corner list.
5. Evaluate all real-corners for the next item to be packed.
    a. Check for size constraints.

   b. Check for stability constraints.
   c. Compute the caving degree for all feasible real-corners (see Eq. 5).
6. If no feasible solutions exist, stop.
7. If feasible solutions are present, place the next item to be packed in the real-corner that provides a feasible solution, with the greatest caving degree.
   a. If more than one real-corner has the greatest caving degree, choose the real-corner based on the tie-breaker system.
8. Remove the item placed from the packing item list and add it to the used item list.
9. Update the real-corner list by adding new real-corners formed and removing the real-corner(s) used.
10. Repeat steps 5-9 until no packages remain on the packing item list, or stop at step 6.

The output of this algorithm should produce:

- A list of packed items in the used item list, each with coordinates of its lower-left-near and upper-right-far corners
- Penalty costs incurred
- Container volume utilization

3.3 Implementation of Look-Ahead Feature

After the algorithm was tested and proved to be an efficient heuristic, the procedure was expanded to implement a look-ahead feature. This scheme determined the best package to place next within the next *m*-number of packages given in the delivery sequence. For

the purpose of the research performed the look-ahead feature will be tested using 5-package and 10-package look-ahead schemes.

It is important to recognize that this scheme looks at the next *m*-number of packages based on the original packing item list, not the available item list. No package, with packing sequence number *n*, can be placed before the item with packing order number *n-m* is placed. This constraint on the algorithm prevents items from being placed too far out of the original order, which helps to keep the unloading costs minimal.

The following algorithm has been modified from Algorithm B_0 to include the look-ahead feature.

Algorithm B_1:

1. Begin with a container denoted by (L, W, H) and a packing item list with each item denoted by (l_i, w_i, h_i).
2. Place the first package to be packed in the lower-left-near corner (0, 0, 0).
3. Remove the item placed from the packing item list and add it to the used item list.
4. Identify all real corners within the container. Add to the available real-corner list.
5. Evaluate all real-corners for all items n to (n + (m-1)) which are still present on the packing item list, where m is equal to the number of packages to be considered for the look-ahead feature and n is equal to the lowest package number present on the packing item list.
    a. Check for size constraints.
    b. Check for stability constraints.

c. Compute the caving degree for all feasible real-corners (see Eq. 5).

6. If no feasible solutions exist, stop.
7. If feasible solutions are present, place the item which provides the greatest caving degree in the real-corner with the greatest caving degree.
    a. If more than one item or real-corner has the greatest caving degree, choose the real-corner based on the tie-breaker system.
8. Remove the item placed from the packing item list and add it to the used item list.
9. Update the real-corner list by adding new real-corners formed and removing the real-corner(s) used.
10. Repeat steps 5-9 until no packages remain on the packing item list, or stop at step 6.

The output of this algorithm should produce:

- A list of packed items in the used item list, each with coordinates of its lower-left-near and upper-right-far corners
- Cost incurred, including unloading costs and penalty costs
- Container volume utilization

3.3.1 Tiebreaker System with Look-Ahead Feature

The look-ahead feature also requires that an additional tie-breaker be included. The amended tie-breaker system is shown below:

1) The RCOA with the minimum y-coordinate should be chosen.
2) The RCOA with the minimum z-coordinate should be chosen.

3) The RCOA with the minimum x-coordinate should be chosen.

4) The RCOA with the minimum packing order item number should be chosen.

4 RESULTS

4.1 Description of Testing

In order to evaluate the effectiveness of the heuristic presented, the algorithm was tested against twenty data sets included in the OR-Library [25], namely the first twenty benchmark problems called THPACK7. With the information gained from this experimentation more accurate comparison can be made between the algorithm presented within this paper and the work of Lin and Yu [15]. Each data set contains, on average, 130 packages of twenty different sizes. The twenty sizes used are shown in Table 1: *List of Package Type Dimensions*, while Table 2: *List of Packing Set Data* is a summary data table of the twenty sets of data.

Table 1: *List of Package Type Dimensions*

Type	Length (cm)	Width (cm)	Height (cm)	Volume (cm^3)
1	70	90	63	396,900
2	78	84	28	183,456
3	85	94	39	311,610
4	76	80	54	328,320
5	50	69	45	155,250
6	57	70	37	147,630
7	61	94	54	309,636
8	44	92	29	117,392
9	53	72	37	141,192
10	43	89	27	103,329
11	44	91	28	112,112
12	76	78	68	403,104
13	61	84	33	169,092
14	40	107	39	166,920
15	75	114	69	589,950
16	55	57	48	150,480
17	57	99	47	265,221
18	66	92	44	267,168
19	48	73	42	147,168
20	46	99	39	177,606

Table 2: *List of Packing Set Data*

Set Number	**Total Number of Packages**	**Total Volume of Packages (cm^3)**
1	117	29,451,164
2	129	29,389,341
3	126	30,033,026
4	153	30,088,733
5	126	29,977,458
6	156	29,740,318
7	109	30,006,602
8	119	30,049,665
9	129	29,893,870
10	135	30,046,972
11	143	30,000,679
12	146	30,067,231
13	172	29,787,791
14	119	30,014,869
15	117	30,082,774
16	118	30,039,301
17	125	29,671,725
18	103	30,014,474
19	135	29,696,459
20	130	29,975,490

Using a random number generator the desired packing sequence of the items in each set was found. The items were then packed following the algorithm rules into a container with dimensions (given in centimeters) 233x587x220. These dimensions for the container were given in the problem set data from the OR-Library.

To be able to efficiently test the large data sets used, the algorithm was implemented in Microsoft Excel using VBA using macros to perform the algorithm recursively. The

larger data sets could be handled in a reasonable amount of time using this computation method.

4.2 Results Using No Look-Ahead Feature

First, the algorithm was tested without the look-ahead feature. The results are shown in Table 3: Results of Testing Using No Look-Ahead Feature. Included in the results table is a penalty cost factor, which is the cost associated with having to run one or more additional trucks to complete the delivery list requirements. The appropriate cost that this factor would be multiplied by is unique to each company and dependent upon their individual costs and the amount of volume that can be filled within a truck. The penalty cost factor equation is given in Equation 6.

$$\frac{\sum_{i=1}^{n}((1-\delta_i)v_i)}{V} \qquad \textbf{Eq. 6}$$

where,

δ_i = 0 if item *i* is unpacked; = 1 if item *i* is packed

v_i = volume of item *i*

V = total volume of the container

Table 3: Results of Testing Using No Look-Ahead Feature

Set Number	Number of Packages	Utilization	Penalty Cost Factor
1	46	38.2%	0.60
2	51	44.6%	0.53
3	54	43.7%	0.56
4	64	42.1%	0.58
5	59	44.6%	0.55
6	52	33.8%	0.65
7	39	36.5%	0.63
8	53	41.9%	0.58
9	64	48.9%	0.50
10	37	28.7%	0.71
11	40	30.4%	0.69
12	48	35.7%	0.64
13	67	37.3%	0.62
14	46	35.5%	0.64
15	57	50.7%	0.49
16	40	34.6%	0.65
17	59	45.4%	0.53
18	49	51.0%	0.49
19	41	31.3%	0.67
20	62	46.0%	0.54
Minimum	37	28.7%	0.49
Average	**51.4**	**40.0%**	**0.59**
Maximum	67	51.0%	0.71
Standard Deviation	9.28	6.8%	0.07

In comparison to the work of Lin and Yu [15], who also proposed an algorithm for the packing of items into a given container with zero unloading costs, the algorithm presented has performed relatively well. Both algorithms produced packing solutions with zero unloading costs, although the average utilization rate of 40.04% found here is slightly lower than the 42.18% average utilization found in the work of Lin and Yu. It

should be noted that the two algorithms compared were tested against the same twenty benchmark data sets, but not necessarily with the same randomly generated packing order.

4.3 Results Using the Look-Ahead Feature

To be able to evaluate the effectiveness of the look-ahead feature proposed, the same twenty data sets used for the previous testing were tested using the look-ahead feature. The data was tested using 5-package and 10-package look-ahead schemes. The results of the 5-package look-ahead testing are presented in Table 4.

Included in the results table is an unloading cost factor, which is the cost associated with having to move one or more packages to be able to access the needed package. The appropriate cost that this factor would be multiplied by is unique to each company and dependent upon their individual labor costs. The unloading cost factor is equal to the number of packages located in the space either in front of or above the package that needs to be delivered. This cost factor is not included in the results table for the initial algorithm (with no look-ahead feature), as it was equal to zero for all sets, making it irrelevant.

Table 4: *Results of Testing Using 5-Package Look-Ahead Feature*

Set Number	Number of Packages	Utilization	Penalty Cost Factor	Unloading Cost Factor
1	43	34.7%	0.63	7
2	34	29.8%	0.68	7
3	55	44.8%	0.55	7
4	74	49.3%	0.51	18
5	65	49.4%	0.50	19
6	23	14.1%	0.85	6
7	53	48.0%	0.52	10
8	58	45.3%	0.55	7
9	45	34.7%	0.65	13
10	53	39.2%	0.61	8
11	59	43.0%	0.57	14
12	55	38.8%	0.61	10
13	61	33.2%	0.66	10
14	43	31.1%	0.69	8
15	60	52.6%	0.47	11
16	40	32.8%	0.67	10
17	74	56.1%	0.43	18
18	45	43.8%	0.56	8
19	52	40.0%	0.59	16
20	54	41.0%	0.59	10
Minimum	23	14.1%	0.43	6
Average	**52.3**	**40.1%**	**0.59**	**10.85**
Maximum	74	56.1%	0.85	19
Standard Deviation	12.48	9.6%	0.09	4.11

The third series of testing performed tested the data sets using a 10-package look-ahead scheme.

Table **5** presents the results of this testing.

Table 5: *Results of Testing Using 10-Package Look-Ahead Feature*

Set Number	Number of Packages	Utilization	Penalty Cost Factor	Unloading Cost Factor
1	54	44.9%	0.53	22
2	66	54.3%	0.43	23
3	63	51.2%	0.49	23
4	38	27.2%	0.73	16
5	63	47.5%	0.52	23
6	80	48.9%	0.50	27
7	52	45.7%	0.54	16
8	41	30.4%	0.69	15
9	67	51.1%	0.48	27
10	58	42.0%	0.58	23
11	51	36.0%	0.64	16
12	32	21.3%	0.79	10
13	75	40.6%	0.58	17
14	42	29.3%	0.70	13
15	60	52.3%	0.48	22
16	48	41.8%	0.58	16
17	67	50.2%	0.48	28
18	42	42.9%	0.57	12
19	55	40.9%	0.58	18
20	48	36.0%	0.64	20
Minimum	32	21.3%	0.43	10
Average	**55.1**	**41.7%**	**0.58**	**19.4**
Maximum	80	54.3%	0.79	28
Standard Deviation	12.72	9.2%	0.10	5.19

The look-ahead feature implemented attempts to produce improved volume utilization of the container by allowing an unloading cost to be incurred. Again, this unloading cost

factor is related to the additional labor required to move packages which restrict access to the package which needs to be delivered at that specific time. By incurring this additional cost the penalty cost associated with that set of packages should be reduced by at least an equivalent cost to deem the look-ahead feature practical and reasonable.

To evaluate the usefulness of the look-ahead feature proposed the twenty data sets were tested using a 5-package look-ahead scheme and also a 10-package look-ahead scheme. For all of the testing schemes, the twenty data sets were tested in the same order, which was randomly generated for the original testing. The results of both of these series of testing are compared against each other and also to the original results found using no look-ahead feature. Table 6 presents a summary of the volume utilization results for the three series of testing, while Figure 3 shows a boxplot comparison of the data.

Table 6: *Comparison of Volume Utilization Results Using Look Ahead Feature*

Utilization	**No Look-Ahead**	**5-Package Look-Ahead**	**10-Package Look-Ahead**
Minimum	28.7%	14.1%	21.3%
Average	**40.0%**	**40.1%**	**41.7%**
Maximum	51.0%	56.1%	54.3%
Standard Deviation	6.8%	9.6%	9.2%

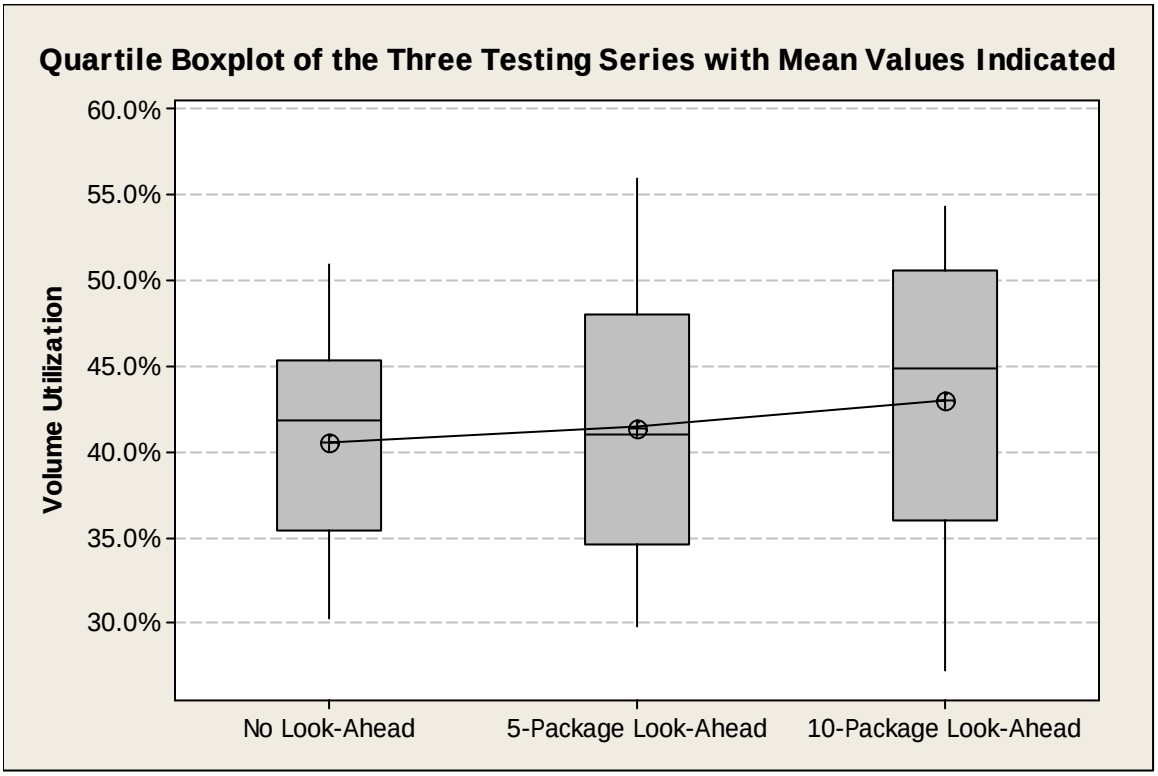

Figure 3 Chart comparing volume utilization results using look-ahead feature.

As can be seen in Table 6 and Figure 3 the volume utilization achieved using either look-ahead scheme is not significantly greater and for some problem sets, the look-ahead actually resulted in a reduction in the utilization. The 5-package look-ahead scheme only has an average volume utilization increase of 0.1%. The 10-package scheme also only has a nominal increase of 1.7%. Given the small increase in volume utilization it does not appear that look-ahead feature provides much additional benefit compared to the original algorithm using no look-ahead feature. This becomes more evident as the penalty cost factors and unloading cost factors are considered, which are discussed in the following section, Section 4.3.1.

4.3.1 Impact of the Penalty Cost Factor and Unloading Cost Factor

While the volume utilization of the container is an important factor, it is also important to consider the costs associated with each set. To analyze and compare the three different packing schemes, two different costs are compared. The first is the penalty cost factor of the packing method. The penalty cost factor is a function of the total volume of the packages which were not able to be packed within the container using the proposed packing method. The lower the penalty cost factor the less it will cost to deliver the remaining packages.

The other cost considered is the unloading cost of the packages placed within the container. This is the cost to retrieve the package to be delivered at the time it is to be delivered. If no packages obstruct the access to the package this cost is equal to zero, as is the case when no look-ahead feature is implemented. If the package is not accessible at delivery time, the unloading cost factor goes up by increments of one for each package that must be moved to be able to access the needed package.

It is important to note that the penalty cost factor and the unloading cost factor cannot be directly compared. This is because the penalty cost factor relates to the cost of running one or more additional trucks and would be multiplied by a much larger cost component than that of the unloading cost. The unloading cost factor would be multiplied by a cost component that relates only to the additional labor that would be needed to move just one package. These costs are presented in the form of cost factors, or multipliers, as this cost component would be unique to each company and the decision making could be different

based on the different cost components used. The penalty cost factor results are shown in Table 7, while the unloading cost results are given in Table 8.

Table 7: *Comparison of Penalty Cost Factor Results Using Look Ahead Feature*

Penalty Cost Factor	**No Look-Ahead**	**5-Package Look-Ahead**	**10-Package Look-Ahead**
Minimum	0.49	0.43	0.43
Average	**0.59**	**0.59**	**0.58**
Maximum	0.71	0.85	0.79
Standard Deviation	0.07	0.09	0.10

Table 8: *Comparison of Unloading Cost Factor Results Using Look Ahead Feature*

Unloading Cost Factor	**No Look-Ahead**	**5-Package Look-Ahead**	**10-Package Look-Ahead**
Minimum	0.0	6.0	10.0
Average	**0.0**	**10.9**	**19.4**
Maximum	0.0	19.0	28.0
Standard Deviation	0.0	4.1	5.2

As was seen previously, the look-ahead feature achieved only a small increase in volume utilization, so it is understandable that the penalty cost factors also have minimal change. This is because the penalty cost is directly related to the volume of the packages that were not placed within the container.

When considering the unloading cost incurred with each packing method it can be seen that as the number of packages used in the look-ahead feature increases, so does the unloading cost. So, while the unloading costs are increasing, the penalty cost factor does not seem to be decreasing proportionately to offset this added expense. Given this information, it can be concluded that the look-ahead feature does not provide the appropriate benefit to be considered efficient.

4.4 Trends based on Package Assortment

In an attempt to determine what caused some sets to perform better than others the package assortment of the sets was evaluated. For the evaluation, the three best performing sets and the three worst performing sets were identified (performance based on volume utilization). The packing list for each set was then cut off after *n* number of packages, where *n* is equal to the smallest number of packages that were able to be packed within the container for any of the sets. Next, the number of packages of each type, or size, was found. These values (the number of each package type) were then averaged for the three sets in each of the two categories. Finally, the package types were sorted based on volume from smallest to largest and the average data for each package type for the best and the worst performing sets were plotted and trendlines were determined for both categories.

This evaluation was performed for each of the three packing methods. The goal of this analysis is to determine if there is a relationship between package size and the quantity of each package type within the set. The evaluation of the three best and three worst performing sets for each testing series are shown in Figure 4, Figure 5, and Figure 6.

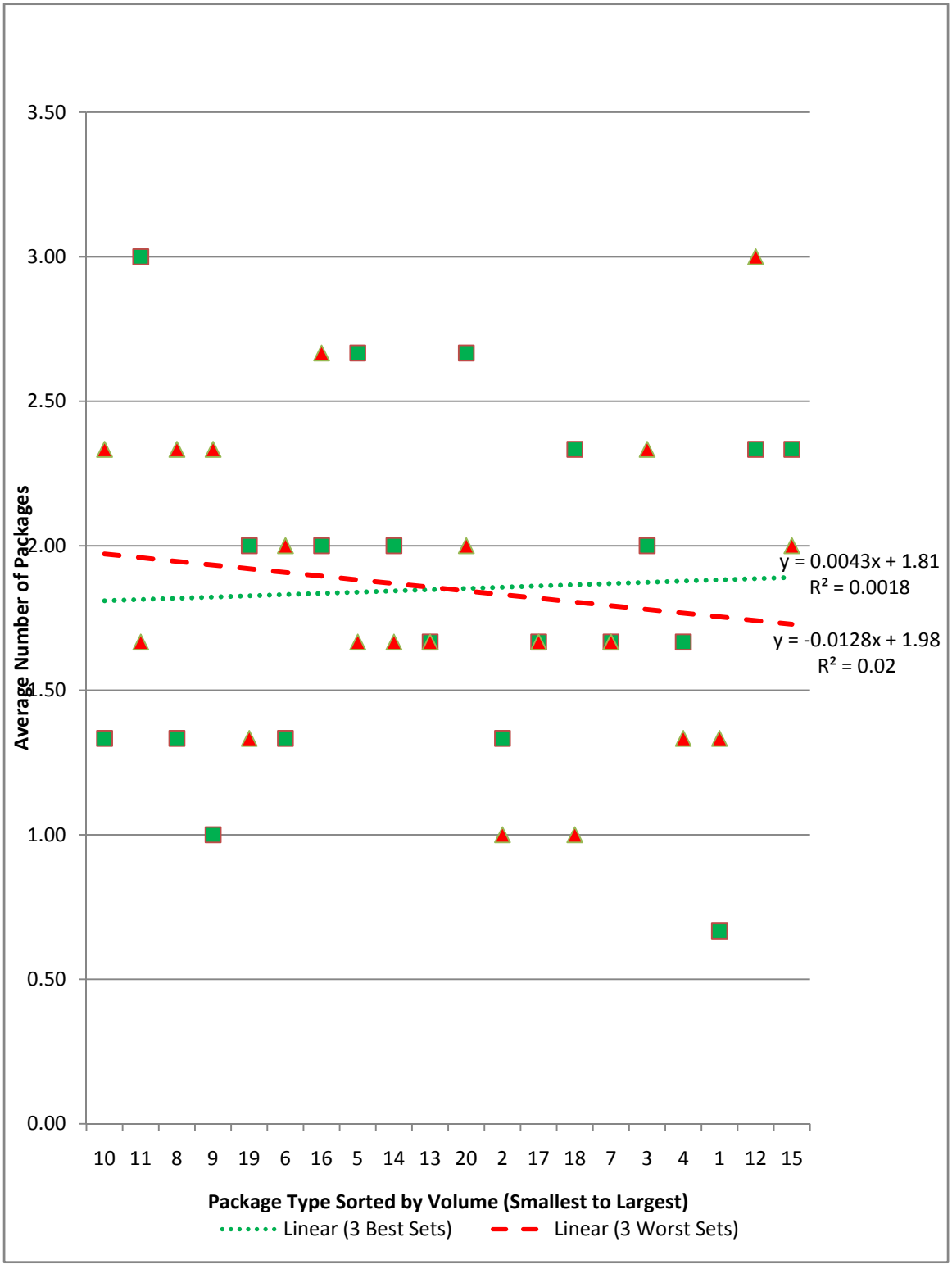

Figure 4. Comparison of 3 best and 3 worst performing sets with no look-ahead.

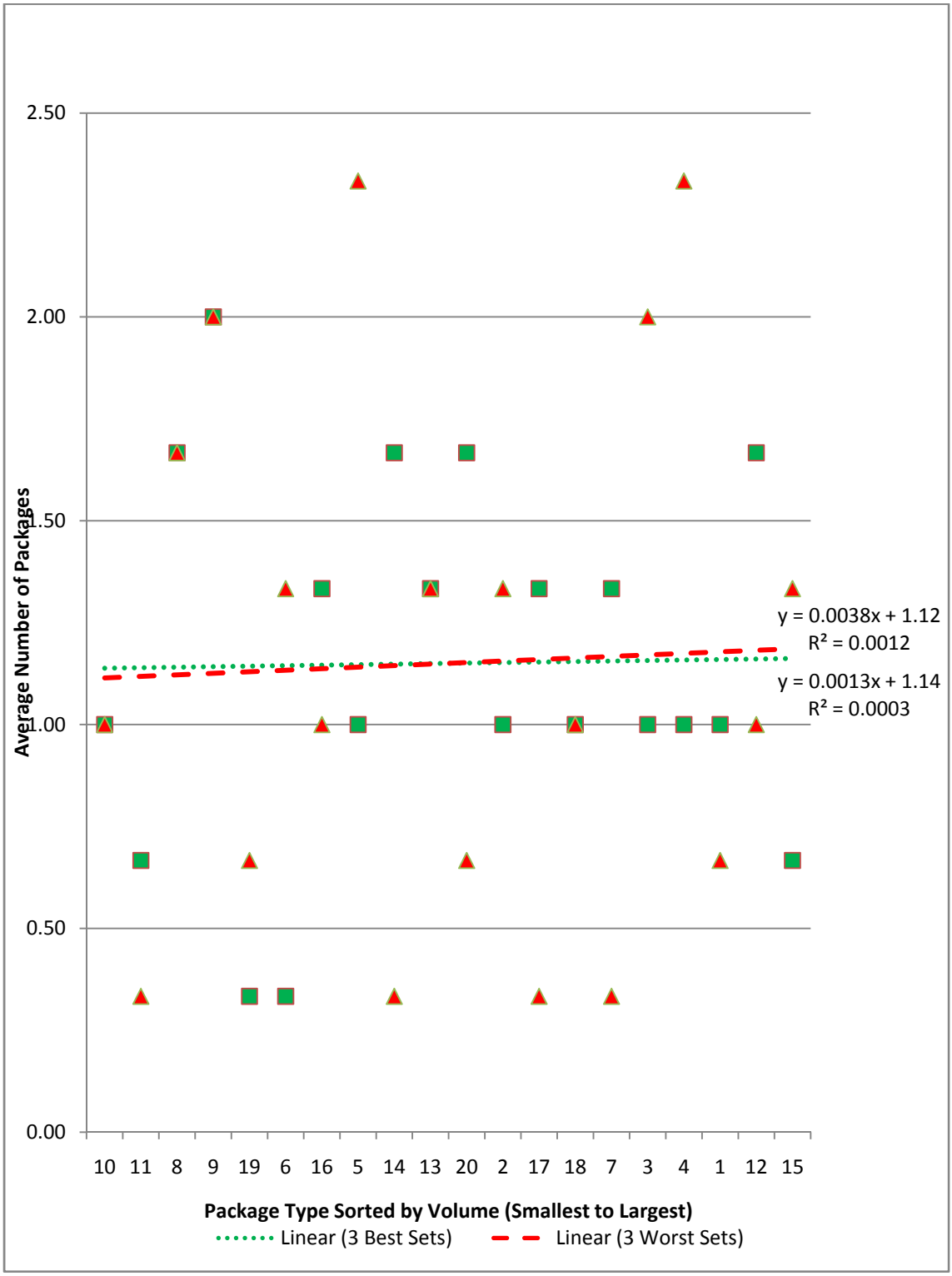

Figure 5. Comparison of 3 best and 3 worst performing sets with 5-pkg. look-ahead.

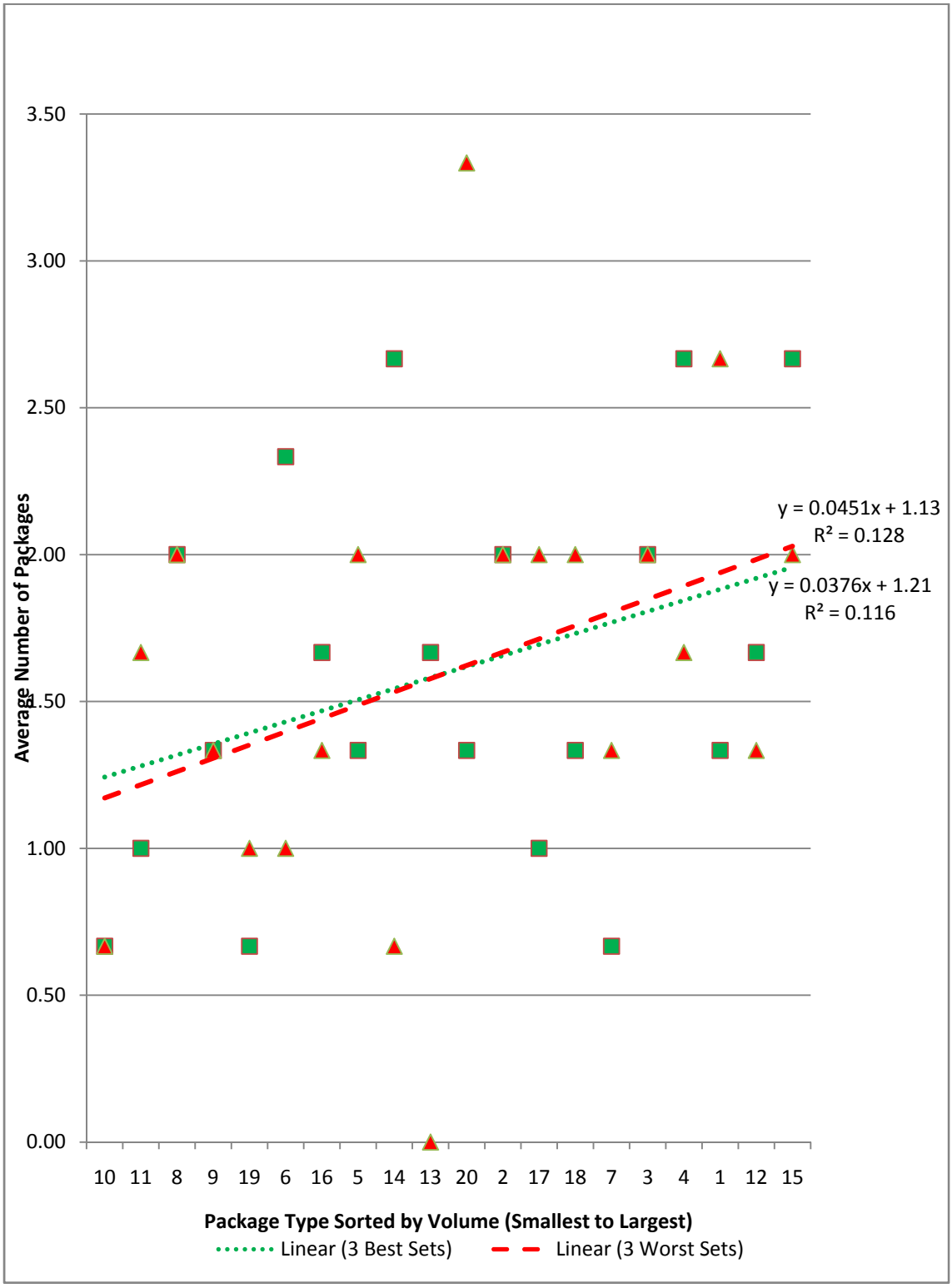

Figure 6. Comparison of 3 best and 3 worst performing sets with 10-pkg. look-ahead.

In comparing the three charts presented, there does not appear to be a relationship between the package volume and the package assortment which affects the performance of the algorithm for the given set. The R^2 values form each of the six trendlines generated are below 0.3, which indicates that there is no relationship between the package volume and the average quantity of packages in the grouped sets. Given that there is no discernible relationship between the two factors, it cannot be stated that the package assortment affects the performance of the sets.

4.5 Packing List Order Influence on the Results

The final series of testing performed was on the three best and three worst performing data sets using no look-ahead feature. This testing was done to determine if the order of the packages on the packing list affect the outcome of the tests. To do this the first *n* packages in each of the six data sets were re-randomized using a random number generator, where *n* is equal to the number of packages that were able to be packed in the first series of testing. The remaining packages on the packing list remained the same and the testing was performed again. The results of this series of testing are shown in Table 9.

Table 9: *Comparison of Testing Using No Look-Ahead Feature and Re-Randomized Data*

		Number of Packages		Utilization		Penalty Cost Factor	
	Set Number	Previous	New	Previous	New	Previous	New
3 Previous Best Sets	**9**	40	64	48.9%	31.6%	0.50	0.68
	15	44	57	50.7%	40.4%	0.49	0.60
	18	34	49	51.0%	33.2%	0.49	0.67
3 Previous Worst Sets	**10**	49	37	28.7%	36.9%	0.71	0.63
	11	55	40	30.4%	39.7%	0.69	0.60
	19	41	41	31.3%	31.3%	0.67	0.67
	Minimum	34	37	28.7%	31.3%	0.49	0.60
	Average	**43.8**	**48.0**	**40.1%**	**35.5%**	**0.59**	**0.64**
	Maximum	55	64	51.0%	40.4%	0.71	0.68
	Standard Deviation	7.36	10.70	11.1%	4.1%	0.11	0.04

It can be seen that the packing order does influence the performance of the algorithm. This is shown by two of the previously worst performing sets improving their volume utilization with the re-randomized data sets. Also, the three best performing sets show significant decreases in their volume utilization rates.

5 CONCLUSIONS

5.1 Summary

Many companies, especially logistics companies, rely on efficient packing and unloading methods to reduce the operating costs of package delivery. Currently there is little research that considers the problem of packing a three-dimensional container with packages that have individual delivery times associated. Several methods have been used to attempt to solve the three-dimensional container packing problem with no delivery constraints, including both local optimization techniques and global optimization techniques. This creates a good basis to form a natural extension from previous research to include delivery constraints.

This thesis described an efficient heuristic method to place a given set of rectangular packages orthogonally within a given container (delivery truck). The items found on the packing list were initially placed within the container in the order given following the heuristic procedure. The heuristic algorithm is based upon a largest caving degree rule, originally presented by [10], which maximizes the surface area that touches previously placed objects or the container sides. This is done by placing items only at corners that have been created by either the container walls or other previously placed items.

The testing was performed on twenty benchmark data sets from the OR-Library, specifically the first twenty data sets from the THPACK7 set. Testing was performed on this data so that comparisons could be made between the algorithm proposed here and the work of Lin and Yu [15], who provide the only other available research on three dimensional container packing with delivery constraints. The algorithm was

implemented in a computer program to run the tests. This program was created in Microsoft Excel using VBA macros.

In addition to the heuristic algorithm presented, a look-ahead feature is also proposed as an extension of the work. When placing items in the container, the look-ahead feature does not consider just the next package on the packing list; rather the look-ahead feature considers the next *n* number of packages on the list, where *n* is either 5 or 10 for the purposes of the testing that was done. The look-ahead feature allows packages to be placed out of order up to *n* number of packages out of order. The look-ahead feature does create some unloading costs as access to some packages may be restricted when they are to be delivered.

The proposed algorithm, without the look-ahead feature, is an effective heuristic at producing a packing solution that incurs zero unloading costs. The method is able to find a solution that is comparable to the best current method. This provides a useful method for home delivery companies to perform their packing with, as it ensures that all packages are available when the delivery for each item comes due. This can be useful as it could decrease the labor costs and decrease delivery time.

The look-ahead feature does not increase volume utilization significantly enough to offset the additional unloading costs that are incurred. It does not appear that this feature would be worth implementing in practical situations in its current form, given the additional unloading cost incurred and also the additional computational time required.

5.2 Application and Practical Considerations

The use of this heuristic in real-world settings could be beneficial to many companies, although there are some considerations that would have to be taken into account before practical implementations could be performed. Initially the company would provide the packing item lists based on the delivery routing that has already been determined. From this packing item list, the algorithm would be applied to find the optimal packing locations. The companies would have to provide the cost data so that decisions could be made to determine if the look-ahead feature provides a better option. The penalty cost would be the additional cost incurred to run one or more additional trucks. The unloading costs would be the additional labor associated with having to move the packages which are restricting the access to the package that needs to be delivered.

One of the practical considerations that would need to be addressed before implementation would how to handle packages that cannot be delivered at the point they are scheduled to be. This would most likely be caused by the addressee is not available to sign for the package, so it must be kept and delivered another time. Another important consideration is to ensure that the reach zone that the delivery person is required to work within does not break any ergonomic rules.

5.3 Future Improvements

The largest improvement to the algorithm that can be made would be to adjust the heuristic procedure to allow packages to be packed in locations that are not corners. This is especially evident in Figure 7, which is a representative picture of the floor space of the container from testing on data set 6 using a 5-package look-ahead method. It can be seen

that there is a lot of open floor space that the next package could be placed, but the algorithm stops since the package cannot feasibly be placed at any one of the corner locations.

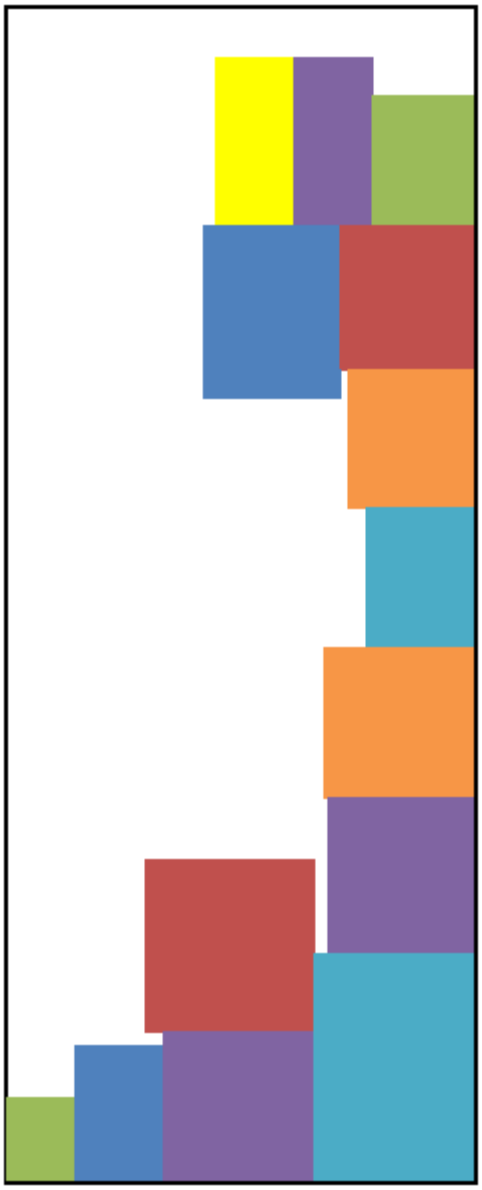

Figure 7. Set 6 Floor Layout 5-Package Look-Ahead Method.

Another future improvement would be to implement more realistic stability assumptions in the model. This would include allowing some packages to rest on an even surface. As an example, this would be used if two previously placed items only differ in the z-dimension by a centimeter or two, a package could feasibly be placed on top of these packages even though less than 50% of the base of that package would be supported by either of the previously placed packages. This could be especially useful at higher levels in the container, when further packages would not be placed upon the non-orthogonal package.

Lastly, it would be good to implement a rule set that prevents the packages from being placed too far forward before space in the back of the container is filled. This would help to ensure that reach issues with the delivery person are not of concern. This would most likely have to be implemented after rule sets allowing packages to be placed not in corners are implemented.

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7 APPENDIX A: PROGRAMMING CODE IMPLEMENTED USING VBA IN MICROSOFT EXCEL

```
Option Explicit
Option Base 1

'Declaration of variables used within the program

Dim StartTime As Date           'Start time of the procedure
Dim EndTime As Date             'End time of the procedure
Dim ProcessingTime As Double

Dim ColumnLetters As String

Dim CL As Double                'Container length
Dim CW As Double                'Container width
Dim CH As Double                'Container height

Dim CLDefault As Long           'Default container length
Dim CWDefault As Long           'Default container width
Dim CHDefault As Long           'Default container height

Dim CLwSW As Long               'Container length with side walls
Dim CWwBW As Long               'Container width with back wall
Dim CHwFT As Long               'Container height with floor and top

Dim TW As Long                  'Total width of container in worksheet.
                                '(Total number of worksheet rows needed for the
                                'container.)  Used only for worksheet purposes.
Dim WallRow As Long             'Row number for container walls.
                                'Used only for worksheet purposes.

Dim x As Double                 'x dimension of item n
Dim y As Double                 'y dimension of item n
Dim z As Double                 'z dimension of item n

Dim i As Integer                'Incrementing variable for the x dimension
Dim j As Integer                'Incrementing variable for the y dimension
Dim k As Integer                'Incrementing variable for the z dimension

Dim RCOAx As Integer            'x coordinate of the RCOA
Dim RCOAy As Integer            'y coordinate of the RCOA
Dim RCOAz As Integer            'z coordinate of the RCOA
Dim RCOAd As Integer            'Direction the Real Corner faces.  See the
                                'RealCorners sub procedure for a legend
                                'describing the integer values.

Dim RCx As Integer
Dim RCy As Integer
Dim Rcz As Integer

Dim PasteNum As Integer         'Paste Number
Dim PasteRat As Double          'Paste Ratio
Dim dRCOA As Integer            'Distance of a RCOA
Dim CavingDeg As Double         'Caving Degree
Dim Mu As Integer               'Largest dimension of container

Dim SetNum As Integer           'Set number to be tested. (1-20)
Dim ItemNum As Integer          'Item number being tested (1-n)

Dim OrderArray() As Variant     'Array which gives the order of the items to be
                                'packed.  Given from the data sheet.
Dim TypeArray() As Variant      'Array which specifies the type of item to be
                                'packed.  Given from the data sheet.
Dim LengthArray() As Variant    'Array which gives the length of the item to be
```

```
                                'packed.  Given from the data sheet.
Dim WidthArray() As Variant     'Array which gives the width of the item to be
                                'packed.  Given from the data sheet.
Dim HeightArray() As Variant    'Array which gives the height of the item to be
                                'packed.  Given from the data sheet.
Dim QtyArray() As Variant       'Array which specifies the total number of
                                'items of each type to be packed.  Given from
                                'the data sheet.
Dim VolumeArray() As Variant    'Array which gives the volume of the item to be
                                'packed.  Given from the data sheet.
Dim RandArray() As Variant      'Array which specifies the random number
                                'assigned to each item.  This was used in
                                'creating the packing order of the items.
                                'Given from the data sheet.

Dim RCOAxArray() As Integer     'Array which stores the x dimension of the Real
                                'Corners found.
Dim RCOAyArray() As Integer     'Array which stores the y dimension of the Real
                                'Corners found.
Dim RCOAzArray() As Integer     'Array which stores the z dimension of the Real
                                'Corners found.
Dim RCOAdArray() As Integer     'Array which stores the integer direction of
                                'the corner.  See the RealCorners sub procedure
                                'for a legend describing the integer values.

Dim ValRCOAxArray() As Integer  'Array which stores the x dimension of the
                                'valid Real Corners found.
Dim ValRCOAyArray() As Integer  'Array which stores the y dimension of the
                                'valid Real Corners found.
Dim ValRCOAzArray() As Integer  'Array which stores the z dimension of the
                                'valid Real Corners found.
Dim ValRCOAdArray() As Integer  'Array which stores the integer direction of
                                'the corner.  See the RealCorners sub procedure
                                'for a legend describing the integer values.

Dim RCOAcnt As Integer          'Total number of Real Corners in array

Dim RC As Integer               'Individual Real Corner being tested
                                'Incrementing variable
Dim ValRCcnt As Integer         'Total number of valid Real Corners found
Dim StabCnt As Integer          'Number of cells supporting an item
Dim BaseArea As Integer         'Total area of the base of an item

Dim PRcnt As Double             'Total number of cells for paste ratio
Dim CurPRcnt1 As Integer         'Value of current PR counter
Dim CurPRcnt2 As Integer         'Value of current PR counter
Dim CurPRcnt As Integer         'Value of current PR counter
Dim CurPasteNum As Integer
Dim SurfaceArea As Double       'Total  surface area of the item

Dim CellA As Integer            'Cell used in finding Real Corners
Dim CellB As Integer            'Cell used in finding Real Corners
Dim CellC As Integer            'Cell used in finding Real Corners
Dim CellD As Integer            'Cell used in finding Real Corners
Dim CellE As Integer            'Cell used in finding Real Corners
Dim CellF As Integer            'Cell used in finding Real Corners

Dim ItemCell As Integer         'Cell variable used in checking size constraint

Dim ItemCellB As Integer
Dim ItemCellT As Integer
Dim ItemCellL As Integer
Dim ItemCellR As Integer
Dim ItemCellN As Integer
Dim ItemCellF As Integer

Dim SizeCell As Integer         'Cell variable used in checking size constraint
Dim StabCell As Integer         'Cell variable used in checking stability cons.
```

```
Dim FillCell As Integer

Dim PackageNum As Integer
Dim TouchItemArray() As Integer
Dim NumPackages As Integer
Dim Check As String
Dim NumItems As Integer

Dim IC As Integer               'Variable to increment through distance check

Dim dItem As Integer
Dim Maxdi As Integer
Dim MaxdItem As Integer
Dim MaxPasteNum As Integer
Dim MaxPasteRat As Double

Dim NumUsedItems As Integer

Dim UIPOArray() As Integer
Dim UInArray() As Integer
Dim UIlArray() As Integer
Dim UIwArray() As Integer
Dim UIhArray() As Integer
Dim UIRCxArray() As Integer
Dim UIRCyArray() As Integer
Dim UIRCzArray() As Integer
Dim UIRCdArray() As Integer
Dim UICavDegArray() As Double
Dim UIx1Array() As Integer
Dim UIy1Array() As Integer
Dim UIz1Array() As Integer
Dim UIx2Array() As Integer
Dim UIy2Array() As Integer
Dim UIz2Array() As Integer
Dim UIVolArray() As Double
Dim UIPNArray() As Integer
Dim UIPRArray() As Double
Dim UIDistArray() As Integer
Dim UIdItemArray() As Integer
Dim UIPenCostArray() As Integer

'Item i = used item
'Item j = item being placed
Dim di As Integer
Dim dxij As Integer
Dim dyij As Integer
Dim dzij As Integer
Dim xic As Integer
Dim xjc As Integer
Dim yic As Integer
Dim yjc As Integer
Dim zic As Integer
Dim zjc As Integer
Dim li As Integer
Dim lj As Double
Dim wi As Double
Dim wj As Double
Dim hi As Integer
Dim hj As Integer

Dim dxij1 As Integer
Dim dyij1 As Integer
Dim dzij1 As Integer
Dim dxij2 As Integer
Dim dyij2 As Integer
Dim dzij2 As Integer
```

```
Dim MindRCOA As Integer

Dim RCToUse As Integer
Dim MaxCavingDeg As Double

Dim ItemCount As Integer
Dim ItemLoop As Integer

Dim LRNCorner As Integer

Dim NUI As Integer

Dim LANum As Integer
Dim n As Integer
Dim ItemNumToUse As Integer
Dim RCThisItem As Integer
Dim OldValRCcnt As Integer
Dim nItem As Integer

Dim Num As Integer
Dim MaxM As Integer
Dim m As Integer
Dim CurPenCost As Integer
Dim NewPenCost As Integer

Dim TempRange As Range
Dim TempArray() As Long

Dim Ans As Integer              'Used to record user's responses

'Error messages
Const MsgError1 As String = "The value entered is not a valid set number."
Const MsgError2 As String = "The value must be an integer 1-20."
Const MsgError3 As String = _
    "Please enter a valid number or press cancel to exit the procedure."
Const MsgExit As String = "Are you sure you want to exit the program?"
Const MsgGoOn As String = "Do you want to continue?"

'Message box variables
Dim MsgTime1 As String
Dim MsgTime2 As String
Dim MsgValidate As String

Dim MsgValidate3 As String
Dim MsgValidate4 As String
Dim MsgValidate5 As String
Dim MsgCavingDeg As String
Dim MsgRCToUse As String



Sub Main()

ItemLoop = 1

    Call GetSetNum
        If SetNum = 0 Then Exit Sub
    Call GetLANum
        If LANum = 0 Then Exit Sub
    Call SetContainerDim

    'Store the starting time
    StartTime = Timer

    Call CreateNewSheet
    Call FormatContainer
    Call CreateFloor
    Call CreateWalls
```

```
    Call CreateTop
    Call DataIntoArrays
    Call FirstItem
Do
    Call RealCorners

    nItem = 0

NextnItem:
    nItem = nItem + 1

    For n = 1 To NumUsedItems
        If nItem = UInArray(n) Then GoTo NextnItem
    Next n

    ItemNum = nItem

    Do
        For n = 1 To NumUsedItems
            If ItemNum = UInArray(n) Then GoTo SkipUsedItem
        Next n

        Call CheckConstraints
            If ValRCcnt = 0 And (ItemNum = (nItem + LANum - 1) _
                Or ItemNum = ItemCount) Then GoTo EndSub
        Call EvalRCOA

SkipUsedItem:

        ItemNum = ItemNum + 1

    Loop Until ItemNum > (nItem + LANum - 1) Or ItemNum > ItemCount

    If ValRCcnt = 0 Then GoTo EndSub

    Call PlaceItem

    ItemLoop = ItemLoop + 1

Loop Until ItemLoop > ItemCount

EndSub:

    Call CalculatePenaltyCost

'Get ending time
EndTime = Timer
ProcessingTime = EndTime - StartTime

    Call CreateResultsSheet
    Call OutputResults

ThisWorkbook.Close savechanges:=True

'Display processing time
'MsgTime1 = "Total Processing Time = "
'MsgTime2 = Format((EndTime - StartTime), "0.0")
'MsgBox MsgTime1 & MsgTime2, vbOKOnly, "Total Processing Time For Set " &
SetNum
End Sub


Sub GetSetNum()
'Sub to get set number to be tested

'Looping point if invalid input
Retry:
```

```
'Ask user for set number to test
SetNum = Val(InputBox( _
    "Please enter the set number to test.  (Must be an integer 1-24.)", _
    "Test Data Set Number Input", "Enter Here"))

If SetNum = 0 Then
    Ans = MsgBox(MsgExit, vbYesNo, "Please Confirm")
    Select Case Ans
        Case vbYes
            SetNum = 0
            GoTo EndSub
        Case vbNo
            GoTo Retry
    End Select
End If

'Error catching if not a valid set number 1-24
If SetNum < 1 Or SetNum > 24 Then
    Ans = MsgBox(MsgError1 & vbCrLf & MsgError2 & vbCrLf & MsgError3, _
        vbRetryCancel + vbExclamation, "Invalid Input!")
    Select Case Ans
        Case vbRetry
            GoTo Retry
        Case vbCancel
            Ans = MsgBox(MsgExit, vbYesNo, "Please Confirm")
                Select Case Ans
                    Case vbYes
                        SetNum = 0
                        GoTo EndSub
                    Case vbNo
                        GoTo Retry
                End Select
    End Select
End If



'Cancel point if invalid input
EndSub:

End Sub



Sub GetLANum()
'Sub to get look-ahead number to be tested

'Looping point if invalid input
Retry:

'Ask user for look-ahead number to test
LANum = Val(InputBox( _
    "Please enter the number of items to look-ahead for the test.  " & _
    "(Must be an integer 1-10.)", "Test Look-Ahead Number Input", "Enter
Here"))

If LANum = 0 Then
    Ans = MsgBox(MsgExit, vbYesNo, "Please Confirm")
    Select Case Ans
        Case vbYes
            LANum = 0
            GoTo EndSub
        Case vbNo
            GoTo Retry
    End Select
End If

'Error catching if not a valid look-ahead number 1-10
```

```
If LANum < 1 Or LANum > 10 Then
    Ans = MsgBox(MsgError1 & vbCrLf & MsgError2 & vbCrLf & MsgError3, _
        vbRetryCancel + vbExclamation, "Invalid Input!")
    Select Case Ans
        Case vbRetry
            GoTo Retry
        Case vbCancel
            Ans = MsgBox(MsgExit, vbYesNo, "Please Confirm")
                Select Case Ans
                    Case vbYes
                        LANum = 0
                        GoTo EndSub
                    Case vbNo
                        GoTo Retry
                End Select
    End Select
End If



'Cancel point if invalid input
EndSub:

End Sub



Sub SetContainerDim()

'Set the default dimensions of the container
CLDefault = 233
CWDefault = 587
CHDefault = 220

'Sub to get the container dimensions to be used

'Looping point if invalid X dimension
RetryX:

'Ask user for X dimension of container
CL = Val(InputBox( _
    "Please enter the X dimension of the container.  " & _
    "(Must be an integer > 0.)", "Container X Dimension Input", "Enter Here"))

If CL = 0 Then
    Ans = MsgBox(MsgExit, vbYesNo, "Please Confirm")
    Select Case Ans
        Case vbYes
            CL = CLDefault
            GoTo EndSub
        Case vbNo
            GoTo RetryX
    End Select
End If

'Error catching if not a valid dimension
If CL < 1 Then
    Ans = MsgBox(MsgError1 & vbCrLf & MsgError2 & vbCrLf & MsgError3, _
        vbRetryCancel + vbExclamation, "Invalid Input!")
    Select Case Ans
        Case vbRetry
            GoTo RetryX
        Case vbCancel
            Ans = MsgBox(MsgExit, vbYesNo, "Please Confirm")
                Select Case Ans
                    Case vbYes
                        CL = CLDefault
                        GoTo EndSub
```

```
                    Case vbNo
                        GoTo RetryX
                End Select
    End Select
End If

'Looping point if invalid Y dimension
RetryY:

'Ask user for Y dimension of container
CW = Val(InputBox( _
    "Please enter the Y dimension of the container.  " & _
    "(Must be an integer > 0.)", "Container Y Dimension Input", "Enter Here"))

If CW = 0 Then
    Ans = MsgBox(MsgExit, vbYesNo, "Please Confirm")
    Select Case Ans
        Case vbYes
            CW = CWDefault
            GoTo EndSub
        Case vbNo
            GoTo RetryY
    End Select
End If

'Error catching if not a valid dimension
If CW < 1 Then
    Ans = MsgBox(MsgError1 & vbCrLf & MsgError2 & vbCrLf & MsgError3, _
        vbRetryCancel + vbExclamation, "Invalid Input!")
    Select Case Ans
        Case vbRetry
            GoTo RetryY
        Case vbCancel
            Ans = MsgBox(MsgExit, vbYesNo, "Please Confirm")
                Select Case Ans
                    Case vbYes
                        CW = CWDefault
                        GoTo EndSub
                    Case vbNo
                        GoTo RetryY
                End Select
    End Select
End If

'Looping point if invalid Y dimension
RetryZ:

'Ask user for Z dimension of container
CH = Val(InputBox( _
    "Please enter the Z dimension of the container.  " & _
    "(Must be an integer > 0.)", "Container Z Dimension Input", "Enter Here"))

If CH = 0 Then
    Ans = MsgBox(MsgExit, vbYesNo, "Please Confirm")
    Select Case Ans
        Case vbYes
            CH = CHDefault
            GoTo EndSub
        Case vbNo
            GoTo RetryZ
    End Select
End If

'Error catching if not a valid dimension
If CH < 1 Then
    Ans = MsgBox(MsgError1 & vbCrLf & MsgError2 & vbCrLf & MsgError3, _
        vbRetryCancel + vbExclamation, "Invalid Input!")
    Select Case Ans
```

```
        Case vbRetry
            GoTo RetryZ
        Case vbCancel
            Ans = MsgBox(MsgExit, vbYesNo, "Please Confirm")
                Select Case Ans
                    Case vbYes
                        CH = CHDefault
                        GoTo EndSub
                    Case vbNo
                        GoTo RetryZ
                End Select
    End Select
End If


'Test box to ensure working properly
Dim MsgTest As String
MsgTest = "Length (X) = " & CL & vbCrLf & "Width (Y) = " & CW & vbCrLf & _
    "Height (Z) = " & CH & vbCrLf & "Set Number = " & SetNum & vbCrLf & _
    "Look-Ahead Number = " & LANum
MsgBox MsgTest, vbOKCancel, "IS THIS OK?"

CLwSW = CL + 2
CWwBW = CW + 1
CHwFT = CH + 2

'Cancel point if invalid input
EndSub:

End Sub



Sub CreateNewSheet()

    Dim oSheet As Worksheet
    Dim vRet As Variant

    On Error GoTo ErrHandler

    'creating a new excel worksheet called RawData
    Set oSheet = Worksheets.Add
    With oSheet
        .Name = "Container" & SetNum
        .Cells(1.1).Select
        .Activate
    End With
    Exit Sub

ErrHandler:

    'if error due to duplicate worksheet detected
    If Err.Number = 1004 Then
        'display an options to user
        vRet = MsgBox("Worksheet called 'Container" & SetNum & "' already " & _
            "exists, click OK to continue creating new Worksheet and " & _
            "delete the old one, or click Cancel to go to the old sheet.", _
            vbOKCancel, "Duplicate Worksheet")

        If vRet = vbOK Then
            'delete the old worksheet
            Application.DisplayAlerts = False
            Worksheets("Container" & SetNum).Delete
            Application.DisplayAlerts = True

            'rename and activate the new worksheet
            With oSheet
                .Name = "Container" & SetNum
```

```
                .Cells(1.1).Select
                .Activate
            End With
        Else
            'cancel the operation, delete the new worksheet
            Application.DisplayAlerts = False
            oSheet.Delete
            Application.DisplayAlerts = True
            'activate the old worksheet
            Worksheets("Container" & SetNum).Activate
        End If

    End If

End Sub


Sub FormatContainer()

' Set formatting for the container

ActiveWindow.Zoom = 10

'*************************************************************************
****************************************
'******************************
'**************************************************
Columns("A:IA").Select

Selection.ColumnWidth = 2

'Color Top in Worksheet
Selection.FormatConditions.Add Type:=xlCellValue, Operator:=xlEqual, _
    Formula1:="=1001"
    Selection.FormatConditions(Selection.FormatConditions.Count) _
    .SetFirstPriority
    With Selection.FormatConditions(1).Interior
        .PatternColorIndex = xlAutomatic
        .Color = 13551615
        .TintAndShade = 0
    End With
    Selection.FormatConditions(1).StopIfTrue = False

'Color Floor in Worksheet
Selection.FormatConditions.Add Type:=xlCellValue, Operator:=xlEqual, _
    Formula1:="=1002"
    Selection.FormatConditions(Selection.FormatConditions.Count) _
    .SetFirstPriority
    With Selection.FormatConditions(1).Interior
        .PatternColorIndex = xlAutomatic
        .Color = 13551615
        .TintAndShade = 0
    End With
    Selection.FormatConditions(1).StopIfTrue = False

'Color Near Wall in Worksheet
Selection.FormatConditions.Add Type:=xlCellValue, Operator:=xlEqual, _
    Formula1:="=1003"
    Selection.FormatConditions(Selection.FormatConditions.Count) _
    .SetFirstPriority
    With Selection.FormatConditions(1).Interior
        .PatternColorIndex = xlAutomatic
        .Color = 13551615
        .TintAndShade = 0
    End With
    Selection.FormatConditions(1).StopIfTrue = False

'Color Left Wall in Worksheet
```

```
Selection.FormatConditions.Add Type:=xlCellValue, Operator:=xlEqual, _
    Formula1:="=1004"
    Selection.FormatConditions(Selection.FormatConditions.Count) _
    .SetFirstPriority
    With Selection.FormatConditions(1).Interior
        .PatternColorIndex = xlAutomatic
        .Color = 13551615
        .TintAndShade = 0
    End With
    Selection.FormatConditions(1).StopIfTrue = False

'Color Right Wall in Worksheet
Selection.FormatConditions.Add Type:=xlCellValue, Operator:=xlEqual, _
    Formula1:="=1005"
    Selection.FormatConditions(Selection.FormatConditions.Count) _
    .SetFirstPriority
    With Selection.FormatConditions(1).Interior
        .PatternColorIndex = xlAutomatic
        .Color = 13551615
        .TintAndShade = 0
    End With
    Selection.FormatConditions(1).StopIfTrue = False

Selection.FormatConditions.Add Type:=xlCellValue, Operator:=xlEqual, _
    Formula1:="=1"
    Selection.FormatConditions(Selection.FormatConditions.Count) _
    .SetFirstPriority
    With Selection.FormatConditions(1).Interior
        .PatternColorIndex = xlAutomatic
        .ThemeColor = xlThemeColorAccent1
        .TintAndShade = 0
    End With
    Selection.FormatConditions(1).StopIfTrue = False

Selection.FormatConditions.Add Type:=xlCellValue, Operator:=xlEqual, _
    Formula1:="=2"
    Selection.FormatConditions(Selection.FormatConditions.Count) _
    .SetFirstPriority
    With Selection.FormatConditions(1).Interior
        .PatternColorIndex = xlAutomatic
        .ThemeColor = xlThemeColorAccent2
        .TintAndShade = 0
    End With
    Selection.FormatConditions(1).StopIfTrue = False

Selection.FormatConditions.Add Type:=xlCellValue, Operator:=xlEqual, _
    Formula1:="=3"
    Selection.FormatConditions(Selection.FormatConditions.Count) _
    .SetFirstPriority
    With Selection.FormatConditions(1).Interior
        .PatternColorIndex = xlAutomatic
        .ThemeColor = xlThemeColorAccent3
        .TintAndShade = 0
    End With
    Selection.FormatConditions(1).StopIfTrue = False

Selection.FormatConditions.Add Type:=xlCellValue, Operator:=xlEqual, _
    Formula1:="=4"
    Selection.FormatConditions(Selection.FormatConditions.Count) _
    .SetFirstPriority
    With Selection.FormatConditions(1).Interior
        .PatternColorIndex = xlAutomatic
        .ThemeColor = xlThemeColorAccent4
        .TintAndShade = 0
    End With
    Selection.FormatConditions(1).StopIfTrue = False

Selection.FormatConditions.Add Type:=xlCellValue, Operator:=xlEqual, _
```

```
    Formula1:="=5"
    Selection.FormatConditions(Selection.FormatConditions.Count) _
    .SetFirstPriority
    With Selection.FormatConditions(1).Interior
        .PatternColorIndex = xlAutomatic
        .ThemeColor = xlThemeColorAccent5
        .TintAndShade = 0
    End With
    Selection.FormatConditions(1).StopIfTrue = False

Selection.FormatConditions.Add Type:=xlCellValue, Operator:=xlEqual, _
    Formula1:="=6"
    Selection.FormatConditions(Selection.FormatConditions.Count) _
    .SetFirstPriority
    With Selection.FormatConditions(1).Interior
        .PatternColorIndex = xlAutomatic
        .ThemeColor = xlThemeColorAccent6
        .TintAndShade = 0
    End With
    Selection.FormatConditions(1).StopIfTrue = False

Selection.FormatConditions.Add Type:=xlCellValue, Operator:=xlEqual, _
    Formula1:="=7"
    Selection.FormatConditions(Selection.FormatConditions.Count) _
    .SetFirstPriority
    With Selection.FormatConditions(1).Interior
        .PatternColorIndex = xlAutomatic
        .ThemeColor = xlThemeColorAccent1
        .TintAndShade = 0
    End With
    Selection.FormatConditions(1).StopIfTrue = False

Selection.FormatConditions.Add Type:=xlCellValue, Operator:=xlEqual, _
    Formula1:="=8"
    Selection.FormatConditions(Selection.FormatConditions.Count) _
    .SetFirstPriority
    With Selection.FormatConditions(1).Interior
        .PatternColorIndex = xlAutomatic
        .ThemeColor = xlThemeColorAccent2
        .TintAndShade = 0
    End With
    Selection.FormatConditions(1).StopIfTrue = False

Selection.FormatConditions.Add Type:=xlCellValue, Operator:=xlEqual, _
    Formula1:="=9"
    Selection.FormatConditions(Selection.FormatConditions.Count) _
    .SetFirstPriority
    With Selection.FormatConditions(1).Interior
        .PatternColorIndex = xlAutomatic
        .ThemeColor = xlThemeColorAccent3
        .TintAndShade = 0
    End With
    Selection.FormatConditions(1).StopIfTrue = False

Selection.FormatConditions.Add Type:=xlCellValue, Operator:=xlEqual, _
    Formula1:="=10"
    Selection.FormatConditions(Selection.FormatConditions.Count) _
    .SetFirstPriority
    With Selection.FormatConditions(1).Interior
        .PatternColorIndex = xlAutomatic
        .ThemeColor = xlThemeColorAccent4
        .TintAndShade = 0
    End With
    Selection.FormatConditions(1).StopIfTrue = False

Selection.FormatConditions.Add Type:=xlCellValue, Operator:=xlEqual, _
    Formula1:="=11"
    Selection.FormatConditions(Selection.FormatConditions.Count) _
```

```
    .SetFirstPriority
    With Selection.FormatConditions(1).Interior
        .PatternColorIndex = xlAutomatic
        .ThemeColor = xlThemeColorAccent5
        .TintAndShade = 0
    End With
    Selection.FormatConditions(1).StopIfTrue = False

Selection.FormatConditions.Add Type:=xlCellValue, Operator:=xlEqual, _
    Formula1:="=12"
    Selection.FormatConditions(Selection.FormatConditions.Count) _
    .SetFirstPriority
    With Selection.FormatConditions(1).Interior
        .PatternColorIndex = xlAutomatic
        .ThemeColor = xlThemeColorAccent6
        .TintAndShade = 0
    End With
    Selection.FormatConditions(1).StopIfTrue = False

Selection.FormatConditions.Add Type:=xlCellValue, Operator:=xlEqual, _
    Formula1:="=13"
    Selection.FormatConditions(Selection.FormatConditions.Count) _
    .SetFirstPriority
    With Selection.FormatConditions(1).Interior
        .PatternColorIndex = xlAutomatic
        .ThemeColor = xlThemeColorAccent1
        .TintAndShade = 0
    End With
    Selection.FormatConditions(1).StopIfTrue = False

Selection.FormatConditions.Add Type:=xlCellValue, Operator:=xlEqual, _
    Formula1:="=14"
    Selection.FormatConditions(Selection.FormatConditions.Count) _
    .SetFirstPriority
    With Selection.FormatConditions(1).Interior
        .PatternColorIndex = xlAutomatic
        .ThemeColor = xlThemeColorAccent2
        .TintAndShade = 0
    End With
    Selection.FormatConditions(1).StopIfTrue = False

Selection.FormatConditions.Add Type:=xlCellValue, Operator:=xlEqual, _
    Formula1:="=15"
    Selection.FormatConditions(Selection.FormatConditions.Count) _
    .SetFirstPriority
    With Selection.FormatConditions(1).Interior
        .PatternColorIndex = xlAutomatic
        .ThemeColor = xlThemeColorAccent3
        .TintAndShade = 0
    End With
    Selection.FormatConditions(1).StopIfTrue = False

Selection.FormatConditions.Add Type:=xlCellValue, Operator:=xlEqual, _
    Formula1:="=16"
    Selection.FormatConditions(Selection.FormatConditions.Count) _
    .SetFirstPriority
    With Selection.FormatConditions(1).Interior
        .PatternColorIndex = xlAutomatic
        .ThemeColor = xlThemeColorAccent4
        .TintAndShade = 0
    End With
    Selection.FormatConditions(1).StopIfTrue = False

Selection.FormatConditions.Add Type:=xlCellValue, Operator:=xlEqual, _
    Formula1:="=17"
    Selection.FormatConditions(Selection.FormatConditions.Count) _
    .SetFirstPriority
    With Selection.FormatConditions(1).Interior
```

```
        .PatternColorIndex = xlAutomatic
        .ThemeColor = xlThemeColorAccent5
        .TintAndShade = 0
    End With
    Selection.FormatConditions(1).StopIfTrue = False

Selection.FormatConditions.Add Type:=xlCellValue, Operator:=xlEqual, _
    Formula1:="=18"
    Selection.FormatConditions(Selection.FormatConditions.Count) _
    .SetFirstPriority
    With Selection.FormatConditions(1).Interior
        .PatternColorIndex = xlAutomatic
        .ThemeColor = xlThemeColorAccent6
        .TintAndShade = 0
    End With
    Selection.FormatConditions(1).StopIfTrue = False

Selection.FormatConditions.Add Type:=xlCellValue, Operator:=xlEqual, _
    Formula1:="=19"
    Selection.FormatConditions(Selection.FormatConditions.Count) _
    .SetFirstPriority
    With Selection.FormatConditions(1).Interior
        .PatternColorIndex = xlAutomatic
        .ThemeColor = xlThemeColorAccent1
        .TintAndShade = 0
    End With
    Selection.FormatConditions(1).StopIfTrue = False

Selection.FormatConditions.Add Type:=xlCellValue, Operator:=xlEqual, _
    Formula1:="=20"
    Selection.FormatConditions(Selection.FormatConditions.Count) _
    .SetFirstPriority
    With Selection.FormatConditions(1).Interior
        .PatternColorIndex = xlAutomatic
        .ThemeColor = xlThemeColorAccent2
        .TintAndShade = 0
    End With
    Selection.FormatConditions(1).StopIfTrue = False

'
''Test box to ensure working properly
'Dim MsgTest As String
'MsgTest = "Is the container formatted properly? "
'MsgBox MsgTest, vbYesNo, "Is this correct?"

End Sub

'Legend for Container Surface Numbers
'Bottom = 1001
'Top = 1002
'Near Wall = 1003
'Left Wall = 1004
'Right Wall = 1005

Sub CreateFloor()

'*************************************************************************
**************************************
'****************************
'************************************************
Worksheets("Container" & SetNum).Range("A1" & ":IA" & (CWwBW)).Value = 1001

End Sub


Sub CreateWalls()
```

```
'Dim Msg1 As String
'Msg1 = CL & ", " & CW & ", " & CH
'MsgBox Msg1, vbOKCancel, "Are these values correct?"

'Determine the total width of all cross-section combined
TW = (((CWwBW) * (CHwFT)) + 1)

'Dim MsgTW As String
'MsgTW = TW
'MsgBox MsgTW, vbYesNo, "Is this value correct?"

'Fill container side wall cells with 999's
With Worksheets("Container" & SetNum)
    .Range("A1:A" & TW).Value = 1004
'*************************************************************************
****************************************
'******************************
'**************************************************
    .Range("IA1:IA" & TW).Value = 1005
End With

'Fill container back wall cells with 999's
WallRow = 1

Do
'*************************************************************************
****************************************
'******************************
'**************************************************
    Worksheets("Container" & SetNum).Range("A" & WallRow & ":IA" & WallRow) _
    .Value = 1003
    WallRow = (WallRow + (CWwBW))
Loop While WallRow < TW

End Sub



Sub CreateTop()
'*************************************************************************
****************************************
'******************************
'**************************************************
Worksheets("Container" & SetNum).Range("A" & (TW - (CWwBW)) & ":IA" & TW) _
.Value = 1002

End Sub



Sub DataIntoArrays()
'Sub to read data into arrays

'FOR TESTING ONLY
'SetNum = 21

'Read data ranges into cooresponding arrays
OrderArray = Worksheets("Set" & SetNum).Range("Order").Value
TypeArray = Worksheets("Set" & SetNum).Range("Type").Value
LengthArray = Worksheets("Set" & SetNum).Range("Length").Value
WidthArray = Worksheets("Set" & SetNum).Range("Width").Value
HeightArray = Worksheets("Set" & SetNum).Range("Height").Value
QtyArray = Worksheets("Set" & SetNum).Range("Qty").Value
VolumeArray = Worksheets("Set" & SetNum).Range("Volume").Value
RandArray = Worksheets("Set" & SetNum).Range("Rand").Value

ItemCount = Worksheets("Set" & SetNum).Range("Order").Count
```

```
''Test box to ensure working properly
'Dim MsgTest As String
'Dim MsgCount As String
'MsgTest = "Is the set number being passed properly? " & SetNum
'MsgCount = "This is the number of items found: " & ItemCount
'MsgBox MsgTest, vbYesNo, "Is this correct?"

End Sub


Sub FirstItem()

NumUsedItems = 0
ItemNum = 1

'Get first package info
x = LengthArray(ItemNum, 1)
y = WidthArray(ItemNum, 1)
z = HeightArray(ItemNum, 1)

'Dim MsgDim As String
'MsgDim = "Length = " & x & vbCrLf & "Width = " & y & vbCrLf & "Height = " & z
'MsgBox MsgDim, vbOKCancel, "IS THIS OK?"

'Fill first package cells cells with 1's

i = 1
j = 1
k = 1

Do
'    Do
'        Do
'            With Worksheets("Container" & SetNum)
'                .Range("A" & ((CWwBW * (k + 1)) + 1)).Offset(-j, i).Value = 1
'            End With
'            j = j + 1
'        Loop Until j > y
'        i = i + 1
'        j = 1
'    Loop Until i > x
'
'    j = 1
'    i = 1

    ReDim TempArray(1 To y, 1 To x)

    Set TempRange = Worksheets("Container" & SetNum) _
        .Range(Cells(((CWwBW * (k + 1) + 1) - y), (2)), _
            Cells(((CWwBW * (k + 1))), (x + 1)))

    Application.ScreenUpdating = False

    For j = 1 To y
        For i = 1 To x
            TempArray(j, i) = ItemNum
        Next i
    Next j

    TempRange.Value = TempArray

    k = k + 1
Loop Until k > z

ReDim UIPOArray(1)
ReDim UInArray(1)
ReDim UIlArray(1)
ReDim UIwArray(1)
```

```
ReDim UIhArray(1)
ReDim UIRCxArray(1)
ReDim UIRCyArray(1)
ReDim UIRCzArray(1)
ReDim UIRCdArray(1)
ReDim UICavDegArray(1)
ReDim UIx1Array(1)
ReDim UIy1Array(1)
ReDim UIz1Array(1)
ReDim UIx2Array(1)
ReDim UIy2Array(1)
ReDim UIz2Array(1)
ReDim UIVolArray(1)
ReDim UIPNArray(1)
ReDim UIPRArray(1)
ReDim UIDistArray(1)
ReDim UIdItemArray(1)
ReDim UIPenCostArray(1)

UIPOArray(1) = 1
UInArray(1) = ItemNum
UIlArray(1) = x
UIwArray(1) = y
UIhArray(1) = z
UIRCxArray(1) = 0
UIRCyArray(1) = 0
UIRCzArray(1) = 0
UIRCdArray(1) = 0
UICavDegArray(1) = 0
UIx1Array(1) = 0
UIy1Array(1) = 0
UIz1Array(1) = 0
UIx2Array(1) = x
UIy2Array(1) = y
UIz2Array(1) = z
UIVolArray(1) = (x * y * z)
UIPNArray(1) = 0
UIPRArray(1) = 0
UIDistArray(1) = 0
UIdItemArray(1) = 0
UIPenCostArray(1) = 0

NumUsedItems = NumUsedItems + 1

LRNCorner = 0

'Dim MsgValidate1 As String
'Dim MsgValidate2 As String
'MsgValidate1 = "Is this working?"
'MsgValidate2 = Worksheets("Container" & SetNum).Range("E580").Value
'MsgBox MsgValidate1 & MsgValidate2, vbYesNo, "Is this correct?"

EndSub:

End Sub


Sub RealCorners()

RCOAcnt = 0
NumPackages = 1
ItemNum = 1

'Set inital RCOA array sizes to 1. (Clears old values.)
ReDim RCOAxArray(1)
ReDim RCOAyArray(1)
ReDim RCOAzArray(1)
ReDim RCOAdArray(1)
```

```
'If Lower, Right, Near corner is empty add to RC array.
If LRNCorner = 0 Then
    RCOAxArray(1) = CL
    RCOAyArray(1) = 0
    RCOAzArray(1) = 0
    RCOAdArray(1) = 2

    RCOAcnt = RCOAcnt + 1
End If

'***LEGEND***
'This legend describes the directions in which corners can be facing
'- Facing Back = Facing away from the origin, the far side, the container door
'- Facing Forward = Facing towards the origin, the near side, back wall
'- Facing Right = Facing away from the origin
'- Facing Left = Facing towards the origin
'- Facing Down = Facing towards the container floor
'- Facing Up = Facing towards the container ceiling
'***End Legend***

'***LEGEND***
'This legend describes the integers used to denote the directions in which
'   corners are facing
'1. Facing Back, Right, and Up
'2. Facing Back, Left, and Up
'3. Facing Forward, Right, and Up
'4. Facing Forward, Leftt, and Up
'5. Facing Back, Right, and Down
'6. Facing Back, Left, and Down
'7. Facing Forward, Right, and Down
'8. Facing Forward, Leftt, and Down
'***End Legend***

Do

'Get the used package info
x = UIlArray(ItemNum)
y = UIwArray(ItemNum)
z = UIhArray(ItemNum)
RCx = UIx1Array(ItemNum)
RCy = UIy1Array(ItemNum)
Rcz = UIz1Array(ItemNum)

i = 1
j = 1
k = 1

Do
    Do

    'Right Side ======================================================================
        'Left Side, Open Right (This is the item placed)
        CellA = Worksheets("Container" & SetNum) _
            .Range("A" & ((CWwBW * ((k + Rcz) + 1)) + 1)) _
            .Offset((-RCy - j), (x + RCx)).Value

        'Front Side, Open Back (This is the back wall)
        CellB = Worksheets("Container" & SetNum) _
            .Range("A" & ((CWwBW * ((k + Rcz) + 1)) + 1)) _
            .Offset(((-RCy - j) + 1), ((x + RCx) + 1)).Value

        'Bottom Side, Open Up (This is the floor)
        CellC = Worksheets("Container" & SetNum) _
            .Range("A" & ((CWwBW * (k + Rcz)) + 1)) _
            .Offset(((-RCy - j)), ((x + RCx) + 1)).Value

        'This is the RCOA.  Must = 0.
```

```
    CellD = Worksheets("Container" & SetNum) _
        .Range("A" & ((CWwBW * ((k + Rcz) + 1)) + 1)) _
        .Offset(((-RCy - j)), ((x + RCx) + 1)).Value

    'Back Side, Open Front (This is the forward item)
    CellE = Worksheets("Container" & SetNum) _
        .Range("A" & ((CWwBW * ((k + Rcz) + 1)) + 1)) _
        .Offset(((-RCy - j) - 1), ((x + RCx) + 1)).Value

    'Top Side, Open Down (This is an item on top)
    CellF = Worksheets("Container" & SetNum) _
        .Range("A" & ((CWwBW * ((k + Rcz) + 2)) + 1)) _
        .Offset(((-RCy - j)), ((x + RCx) + 1)).Value

    'Check for corner facing Back, Right, and Up
    If CellA <> 0 And CellB <> 0 And CellC <> 0 And CellD = 0 Then
        RCOAx = (RCx + x)
        RCOAy = ((CWwBW - (CWwBW - (RCy + j))) - 1)
        RCOAz = ((Rcz + k) - 1)
        RCOAd = 1

        Call AddToArray
    End If

    'Check for corner facing Forward, Right, and Up
    If CellA <> 0 And CellC <> 0 And CellD = 0 And CellE <> 0 _
        And CellE <> 1003 Then

        RCOAx = (RCx + x)
        RCOAy = ((CWwBW - (CWwBW - (RCy + j))))
        RCOAz = ((Rcz + k) - 1)
        RCOAd = 3

        Call AddToArray
    End If

    'Check for corner facing Back, Right, and Down
    If CellA <> 0 And CellB <> 0 And CellF <> 0 And CellD = 0 Then
        RCOAx = (RCx + x)
        RCOAy = ((CWwBW - (CWwBW - (RCy + j))) - 1)
        RCOAz = ((Rcz + k))
        RCOAd = 5

        Call AddToArray
    End If

    'Check for corner facing Forward, Right, and Down
    If CellA <> 0 And CellF <> 0 And CellD = 0 And CellE <> 0 _
        And CellE <> 1003 Then

        RCOAx = (RCx + x)
        RCOAy = ((CWwBW - (CWwBW - (RCy + j))))
        RCOAz = ((Rcz + k))
        RCOAd = 7

        Call AddToArray
    End If

'Left Side ======================================================================
    'Right Side, Open Left (This is the item placed)
    CellA = Worksheets("Container" & SetNum) _
        .Range("A" & ((CWwBW * ((k + Rcz) + 1)) + 1)) _
        .Offset((-RCy - j), (RCx + 1)).Value

    'Front Side, Open Back (This is the back wall)
    CellB = Worksheets("Container" & SetNum) _
        .Range("A" & ((CWwBW * ((k + Rcz) + 1)) + 1)) _
        .Offset(((-RCy - j) + 1), ((RCx + 1) - 1)).Value
```

```
    'Bottom Side, Open Up (This is the floor)
    CellC = Worksheets("Container" & SetNum) _
        .Range("A" & ((CWwBW * (k + Rcz)) + 1)). _
        Offset(((-RCy - j)), ((RCx + 1) - 1)).Value

    'This is the RCOA.  Must = 0.
    CellD = Worksheets("Container" & SetNum) _
        .Range("A" & ((CWwBW * ((k + Rcz) + 1)) + 1)) _
        .Offset(((-RCy - j)), ((RCx + 1) - 1)).Value

    'Back Side, Open Front (This is the forward item)
    CellE = Worksheets("Container" & SetNum) _
        .Range("A" & ((CWwBW * ((k + Rcz) + 1)) + 1)) _
        .Offset(((-RCy - j) - 1), ((RCx + 1) - 1)).Value

    'Top Side, Open Down (This is an item on top)
    CellF = Worksheets("Container" & SetNum) _
        .Range("A" & ((CWwBW * ((k + Rcz) + 2)) + 1)) _
        .Offset(((-RCy - j)), ((RCx + 1) - 1)).Value

    'Check for corner facing Back, Left, and Up
    If CellA <> 0 And CellB <> 0 And CellC <> 0 And CellD = 0 Then
        RCOAx = (RCx + i) - 1
        RCOAy = ((CWwBW - (CWwBW - (RCy + j))) - 1)
        RCOAz = ((Rcz + k) - 1)
        RCOAd = 2

        Call AddToArray
    End If

    'Check for corner facing Forward, Left, and Up
    If CellA <> 0 And CellC <> 0 And CellD = 0 And CellE <> 0 _
        And CellE <> 1003 Then

        RCOAx = (RCx + i) - 1
        RCOAy = ((CWwBW - (CWwBW - (RCy + j))))
        RCOAz = ((Rcz + k) - 1)
        RCOAd = 4

        Call AddToArray
    End If

    'Check for corner facing Back, Left, and Down
    If CellA <> 0 And CellB <> 0 And CellF <> 0 And CellD = 0 Then
        RCOAx = (RCx + i) - 1
        RCOAy = ((CWwBW - (CWwBW - (RCy + j))) - 1)
        RCOAz = ((Rcz + k))
        RCOAd = 6

        Call AddToArray
    End If

    'Check for corner facing Forward, Left, and Down
    If CellA <> 0 And CellF <> 0 And CellD = 0 And CellE <> 0 _
        And CellE <> 1003 Then

        RCOAx = (RCx + i) - 1
        RCOAy = ((CWwBW - (CWwBW - (RCy + j))))
        RCOAz = ((Rcz + k))
        RCOAd = 8

        Call AddToArray
    End If

    j = j + 1
Loop Until j > y
```

```
    j = 1
    k = k + 1
Loop Until k > z

j = 1
i = 1
k = 1

Do
    Do

    'Far Side ======================================================================
        'Right Side, Open Left (This is an item to the right)
        CellA = Worksheets("Container" & SetNum) _
            .Range("A" & ((CWwBW * ((k + Rcz) + 1)) + 1)) _
            .Offset(((-RCy - y) - 1), ((RCx + i) + 1)).Value

        'Front Side, Open Back (This is the item placed)
        CellB = Worksheets("Container" & SetNum) _
            .Range("A" & ((CWwBW * ((k + Rcz) + 1)) + 1)) _
            .Offset(((-RCy - y)), ((RCx + i))).Value

        'Bottom Side, Open Up (This is the floor)
        CellC = Worksheets("Container" & SetNum) _
            .Range("A" & ((CWwBW * (k + Rcz)) + 1)) _
            .Offset(((-RCy - y) - 1), ((RCx + i))).Value

        'This is the RCOA.  Must = 0.
        CellD = Worksheets("Container" & SetNum) _
            .Range("A" & ((CWwBW * ((k + Rcz) + 1)) + 1)) _
            .Offset(((-RCy - y) - 1), ((RCx + i))).Value

        'Left Side, Open Right (This is an item to the left)
        CellE = Worksheets("Container" & SetNum) _
            .Range("A" & ((CWwBW * ((k + Rcz) + 1)) + 1)) _
            .Offset(((-RCy - y) - 1), ((RCx + i) - 1)).Value

        'Top Side, Open Down (This is an item on top)
        CellF = Worksheets("Container" & SetNum) _
            .Range("A" & ((CWwBW * ((k + Rcz) + 2)) + 1)) _
            .Offset(((-RCy - y) - 1), ((RCx + i))).Value

        'Check for corner facing Back, Left, and Up
        If CellA <> 0 And CellB <> 0 And CellC <> 0 And CellD = 0 Then
            RCOAx = (RCx + i)
            RCOAy = (CWwBW - (CWwBW - (RCy + y)))
            RCOAz = ((Rcz + k) - 1)
            RCOAd = 2

            Call AddToArray
        End If

        'Check for corner facing Back, Right, and Up
        If CellB <> 0 And CellC <> 0 And CellD = 0 And CellE <> 0 Then
            RCOAx = (RCx + i) - 1
            RCOAy = (CWwBW - (CWwBW - (RCy + y)))
            RCOAz = ((Rcz + k) - 1)
            RCOAd = 1

            Call AddToArray
        End If

        'Check for corner facing Back, Left, and Down
        If CellA <> 0 And CellB <> 0 And CellF <> 0 And CellD = 0 Then
            RCOAx = (RCx + i)
            RCOAy = (CWwBW - (CWwBW - (RCy + y)))
            RCOAz = ((Rcz + k))
            RCOAd = 6
```

```
            Call AddToArray
        End If

        'Check for corner facing Back, Right, and Down
        If CellB <> 0 And CellF <> 0 And CellD = 0 And CellE <> 0 Then
            RCOAx = (RCx + i) - 1
            RCOAy = (CWwBW - (CWwBW - (RCy + y)))
            RCOAz = ((Rcz + k))
            RCOAd = 5

            Call AddToArray
        End If

    'Near Side ==================================================================
        'Right Side, Open Left (This is an item to the right)
        CellA = Worksheets("Container" & SetNum) _
            .Range("A" & ((CWwBW * ((k + Rcz) + 1)) + 1)) _
            .Offset(((-RCy - 1) + 1), ((RCx + i) + 1)).Value

        'Back Side, Open Front (This is the item placed)
        CellB = Worksheets("Container" & SetNum) _
            .Range("A" & ((CWwBW * ((k + Rcz) + 1)) + 1)) _
            .Offset(((-RCy - 1)), ((RCx + i))).Value

        'Bottom Side, Open Up (This is the floor)
        CellC = Worksheets("Container" & SetNum) _
            .Range("A" & ((CWwBW * (k + Rcz)) + 1)) _
            .Offset(((-RCy - 1) + 1), ((RCx + i))).Value

        'This is the RCOA.  Must = 0.
        CellD = Worksheets("Container" & SetNum) _
            .Range("A" & ((CWwBW * ((k + Rcz) + 1)) + 1)) _
            .Offset(((-RCy - 1) + 1), ((RCx + i))).Value

        'Back Side, Open Front (This is an item to the left)
        CellE = Worksheets("Container" & SetNum) _
            .Range("A" & ((CWwBW * ((k + Rcz) + 1)) + 1)) _
            .Offset(((-RCy - 1) + 1), ((RCx + i) - 1)).Value

        'Top Side, Open Down (This is an item on top)
        CellF = Worksheets("Container" & SetNum) _
            .Range("A" & ((CWwBW * ((k + Rcz) + 2)) + 1)) _
            .Offset(((-RCy - 1) + 1), ((RCx + i))).Value

        'Check for corner facing Forward, Left, and Up
        If CellA <> 0 And CellB <> 0 And CellC <> 0 And CellD = 0 Then
            RCOAx = (RCx + i)
            RCOAy = (CWwBW - (CWwBW - (RCy + 1)) - 1)
            RCOAz = ((Rcz + k) - 1)
            RCOAd = 4

            Call AddToArray
        End If

        'Check for corner facing Forward, Right, and Up
        If CellB <> 0 And CellC <> 0 And CellD = 0 And CellE <> 0 Then
            RCOAx = (RCx + i) - 1
            RCOAy = (CWwBW - (CWwBW - (RCy + 1)) - 1)
            RCOAz = ((Rcz + k) - 1)
            RCOAd = 3

            Call AddToArray
        End If

        'Check for corner facing Forward, Left, and Down
        If CellA <> 0 And CellB <> 0 And CellF <> 0 And CellD = 0 Then
            RCOAx = (RCx + i)
```

```
            RCOAy = (CWwBW - (CWwBW - (RCy + 1)) - 1)
            RCOAz = ((Rcz + k))
            RCOAd = 8

            Call AddToArray
        End If

        'Check for corner facing Forward, Right, and Down
        If CellB <> 0 And CellF <> 0 And CellD = 0 And CellE <> 0 Then
            RCOAx = (RCx + i) - 1
            RCOAy = (CWwBW - (CWwBW - (RCy + 1)) - 1)
            RCOAz = ((Rcz + k))
            RCOAd = 7

            Call AddToArray
        End If

        i = i + 1
    Loop Until i > x

    i = 1
    k = k + 1
Loop Until k > z

j = 1
i = 1
k = 1

Do
    Do

    'Top Side ========================================================================
        'Right Side, Open Left (This is an item to the right)
        CellA = Worksheets("Container" & SetNum) _
            .Range("A" & ((CWwBW * ((z + Rcz) + 2)) + 1)) _
            .Offset(((-RCy - j)), ((RCx + i) + 1)).Value

        'Back Side, Open Front (This is an item on the near side)
        CellB = Worksheets("Container" & SetNum) _
            .Range("A" & ((CWwBW * ((z + Rcz) + 2)) + 1)) _
            .Offset(((-RCy - j) + 1), ((RCx + i))).Value

        'Bottom Side, Open Up (This is the item placed)
        CellC = Worksheets("Container" & SetNum) _
            .Range("A" & ((CWwBW * ((z + Rcz) + 1)) + 1)) _
            .Offset(((-RCy - j)), ((RCx + i))).Value

        'This is the RCOA.  Must = 0.
        CellD = Worksheets("Container" & SetNum) _
            .Range("A" & ((CWwBW * ((z + Rcz) + 2)) + 1)) _
            .Offset(((-RCy - j)), ((RCx + i))).Value

        'Left Side, Open Right (This is an item to the left)
        CellE = Worksheets("Container" & SetNum) _
            .Range("A" & ((CWwBW * ((z + Rcz) + 2)) + 1)) _
            .Offset(((-RCy - j)), ((RCx + i) - 1)).Value

        'Front Side, Open Back (This is an item on the far side)
        CellF = Worksheets("Container" & SetNum) _
             .Range("A" & ((CWwBW * ((z + Rcz) + 2)) + 1)) _
             .Offset(((-RCy - j) - 1), ((RCx + i))).Value

        'Check for corner facing Back, Left, and Up
        If CellA <> 0 And CellB <> 0 And CellC <> 0 And CellD = 0 Then

            RCOAx = (RCx + i)
            RCOAy = ((CWwBW - (CWwBW - (RCy + j))) - 1)
            RCOAz = ((Rcz + z))
```

```
            RCOAd = 2

            Call AddToArray
        End If

        'Check for corner facing Back, Right, and Up
        If CellB <> 0 And CellC <> 0 And CellD = 0 And CellE <> 0 Then
            RCOAx = (RCx + i) - 1
            RCOAy = ((CWwBW - (CWwBW - (RCy + j))) - 1)
            RCOAz = ((Rcz + z))
            RCOAd = 1

            Call AddToArray
        End If

        'Check for corner facing Forward, Right, and Up
        If CellA <> 0 And CellF <> 0 And CellC <> 0 And CellD = 0 _
            And CellF <> 1003 Then

            RCOAx = (RCx + i)
            RCOAy = ((CWwBW - (CWwBW - (RCy + j))))
            RCOAz = ((Rcz + z))
            RCOAd = 3

            Call AddToArray
        End If

        'Check for corner facing Forward, Left, and Up
        If CellF <> 0 And CellC <> 0 And CellD = 0 And CellE <> 0 _
            And CellF <> 1003 Then

            RCOAx = (RCx + i) - 1
            RCOAy = ((CWwBW - (CWwBW - (RCy + j))))
            RCOAz = ((Rcz + z))
            RCOAd = 4

            Call AddToArray
        End If

    'Bottom Side ================================================================
        'Right Side, Open Left (This is an item to the right)
        CellA = Worksheets("Container" & SetNum) _
            .Range("A" & ((CWwBW * ((1 + Rcz))) + 1)) _
            .Offset(((-RCy - j)), ((RCx + i) + 1)).Value

        'Back Side, Open Front (This is an item on the near side)
        CellB = Worksheets("Container" & SetNum) _
            .Range("A" & ((CWwBW * ((1 + Rcz))) + 1)) _
            .Offset(((-RCy - j) + 1), ((RCx + i))).Value

        'Top Side, Open Down (This is the item placed)
        CellC = Worksheets("Container" & SetNum) _
            .Range("A" & ((CWwBW * ((1 + Rcz) + 1)) + 1)) _
            .Offset(((-RCy - j)), ((RCx + i))).Value

        'This is the RCOA.  Must = 0.
        CellD = Worksheets("Container" & SetNum) _
            .Range("A" & ((CWwBW * ((1 + Rcz))) + 1)) _
            .Offset(((-RCy - j)), ((RCx + i))).Value

        'Left Side, Open Right (This is an item to the left)
        CellE = Worksheets("Container" & SetNum) _
            .Range("A" & ((CWwBW * ((1 + Rcz))) + 1)) _
            .Offset(((-RCy - j)), ((RCx + i) - 1)).Value

        'Front Side, Open Back (This is an item on the far side)
        CellF = Worksheets("Container" & SetNum) _
             .Range("A" & ((CWwBW * ((1 + Rcz))) + 1)) _
```

```
             .Offset(((-RCy - j) - 1), ((RCx + i))).Value

        'Check for corner facing Back, Right, and Down
        If CellA <> 0 And CellB <> 0 And CellC <> 0 And CellD = 0 Then
            RCOAx = (RCx + i)
            RCOAy = ((CWwBW - (CWwBW - (RCy + j))) - 1)
            RCOAz = ((Rcz + k) - 1)
            RCOAd = 5

            Call AddToArray
        End If

        'Check for corner facing Back, Left, and Down
        If CellB <> 0 And CellC <> 0 And CellD = 0 And CellE <> 0 Then
            RCOAx = (RCx + i) - 1
            RCOAy = ((CWwBW - (CWwBW - (RCy + j))) - 1)
            RCOAz = ((Rcz + k) - 1)
            RCOAd = 6

            Call AddToArray
        End If

        'Check for corner facing Forward, Right, and Down
        If CellA <> 0 And CellF <> 0 And CellC <> 0 And CellD = 0 _
            And CellF <> 1003 Then

            RCOAx = (RCx + i)
            RCOAy = ((CWwBW - (CWwBW - (RCy + j))))
            RCOAz = ((Rcz + k) - 1)
            RCOAd = 7

            Call AddToArray
        End If

        'Check for corner facing Forward, Left, and Down
        If CellF <> 0 And CellC <> 0 And CellD = 0 And CellE <> 0 _
            And CellF <> 1003 Then

            RCOAx = (RCx + i) - 1
            RCOAy = ((CWwBW - (CWwBW - (RCy + j))))
            RCOAz = ((Rcz + k) - 1)
            RCOAd = 8

            Call AddToArray
        End If

        i = i + 1
    Loop Until i > x

    i = 1
    j = j + 1
Loop Until j > y

j = 1
i = 1
k = 1

ItemNum = ItemNum + 1

Loop Until ItemNum > NumUsedItems

'This ends checking for All Real Corners

''Currently for testing purposes only
''Need to output a list of All Real Corners Found
'    If NumUsedItems > 4 Then
'        MsgValidate3 = "Coordinates of the Real Corner (x, y, z, d): "
```

```
'        MsgValidate4 = "(" & RCOAxArray(RCOAcnt) & ", " & RCOAyArray(RCOAcnt)
& ", " _
'        & RCOAzArray(RCOAcnt) & ", " & RCOAdArray(RCOAcnt) & ")"
'        MsgValidate5 = "RCOAcnt = " & RCOAcnt
'        MsgBox MsgValidate3 & MsgValidate4 & vbCrLf & MsgValidate5, vbYesNo, _
'        "Is this correct?"
'    End If

'*************************************************************************
'Initializing info for next sub

'For testing purposes only
'ItemNum = 1
'ItemNum = NumUsedItems + 1

'Set valid RCOA array sizes to 1. (Clears old values.)
ReDim ValRCOAxArray(1)
ReDim ValRCOAyArray(1)
ReDim ValRCOAzArray(1)
ReDim ValRCOAdArray(1)

ValRCcnt = 0
OldValRCcnt = 0
RCToUse = 0

MaxCavingDeg = 0

End Sub


Sub CheckConstraints()

'Sub procedure to check that the next package placed does not violate the
'constraints.

'Get next package info
x = LengthArray(ItemNum, 1)
y = WidthArray(ItemNum, 1)
z = HeightArray(ItemNum, 1)

'Dim MsgDim As String
'MsgDim = "Length = " & x & vbCrLf & "Width = " & y & vbCrLf & "Height = " & z
'MsgBox MsgDim, vbOKCancel, "IS THIS OK?"

RC = 1
OldValRCcnt = ValRCcnt

'Check for constraint violations

'This begins the check of all Real Corners

Do
    RCOAx = RCOAxArray(RC)
    RCOAy = RCOAyArray(RC)
    RCOAz = RCOAzArray(RC)
    RCOAd = RCOAdArray(RC)

    BaseArea = x * y

'    If NumUsedItems > 4 Then
''    FOR TESTING PURPOSES ONLY!!!!!!!
'        MsgValidate3 = "Coordinates of the Real Corner (x, y, z, d): "
'        MsgValidate4 = "(" & RCOAx & ", " & RCOAy & ", " _
'        & RCOAz & ", " & RCOAd & ")"
'        MsgValidate5 = "RC = " & RC
'        MsgBox MsgValidate3 & MsgValidate4 & vbCrLf & MsgValidate5, vbYesNo, _
'        "Begining the Check of All Real Corners"
'    End If
```

```
    i = 1
    j = 1
    k = 1

    'Check for size constraint violations
    Do
        Do
            Do
                Call ChooseRCOAdSize

                'For testing purposes only!!!
'                If NumUsedItems > 4 Then
'                If SizeCell <> 0 Then
'                Dim MsgCase As String
'                MsgCase = "This is the case tested: " & RCOAd
'                MsgValidate = "Is an item causing a size violation?"
'                MsgBox MsgValidate & vbCrLf & MsgCase, vbYesNo, "Is this
correct?"
'                End If
'                End If

                If SizeCell <> 0 Then GoTo Invalid

                i = i + 1
            Loop Until i > x
            i = 1
            j = j + 1

        Loop Until j > y
        i = 1
        j = 1
        k = k + 1
    Loop Until k > z

    'END Size Check

    i = 1
    j = 1
    k = 1

    'Check for stability constraints
    Do
        Do
            Call ChooseRCOAdStab

                If StabCell <> 0 Then
                    StabCnt = StabCnt + 1
                End If

            i = i + 1
        Loop Until i > x

        i = 1
        j = j + 1
    Loop Until j > y

        'For testing purposes only!!!
'        If NumUsedItems > 4 Then
'        If StabCnt < (BaseArea / 2) Then
'            MsgCase = "This is the case tested: " & RCOAd
'            MsgValidate = "Is an item causing a stability violation?"
'            MsgBox MsgValidate & vbCrLf & MsgCase, vbYesNo, "Is this correct?"
'        End If
'        End If

    If StabCnt < (BaseArea / 2) Then GoTo Invalid
```

```
    'End Stability Check

    ValRCcnt = ValRCcnt + 1

    'Redimension Valid RCOA Array
    ReDim Preserve ValRCOAxArray(1 To ValRCcnt)
    ReDim Preserve ValRCOAyArray(1 To ValRCcnt)
    ReDim Preserve ValRCOAzArray(1 To ValRCcnt)
    ReDim Preserve ValRCOAdArray(1 To ValRCcnt)

    'Add corner to valid RCOA Array
    ValRCOAxArray(ValRCcnt) = RCOAx
    ValRCOAyArray(ValRCcnt) = RCOAy
    ValRCOAzArray(ValRCcnt) = RCOAz
    ValRCOAdArray(ValRCcnt) = RCOAd

Invalid:

    StabCnt = 0
    RC = RC + 1

Loop Until RC > RCOAcnt


''Testing purposes only
'If ItemLoop > 13 Then
'    MsgValidate3 = "Coordinates of the valid Real Corner (x, y, z): "
'    MsgValidate4 = "(" & ValRCOAxArray(ValRCcnt) & ", " &
ValRCOAyArray(ValRCcnt) _
'        & ", " & ValRCOAzArray(ValRCcnt) & ")"
'    MsgValidate5 = "ValRCcnt = " & ValRCcnt
'    MsgBox MsgValidate3 & MsgValidate4 & vbCrLf & MsgValidate5, vbYesNo, _
'    "Ending the Check of All Real Corners"
'End If

End Sub


Sub EvalRCOA()


''For testing purposes only
'ItemNum = 1
'
'ItemNum = ItemNum + 1

'Get next package info
x = LengthArray(ItemNum, 1)
y = WidthArray(ItemNum, 1)
z = HeightArray(ItemNum, 1)

If ValRCcnt > OldValRCcnt Then
    RCThisItem = OldValRCcnt + 1
    Else:
    RCThisItem = OldValRCcnt
    Exit Sub
End If

RCOAx = ValRCOAxArray(RCThisItem)
RCOAy = ValRCOAyArray(RCThisItem)
RCOAz = ValRCOAzArray(RCThisItem)
RCOAd = ValRCOAdArray(RCThisItem)

i = 1
j = 1
k = 1

ReDim TouchItemArray(1)
```

```
TouchItemArray(1) = 0

'*************************************************************************
'Begin Caving Degree Component Calculations:

PasteNum = 0
PRcnt = 0
CurPRcnt = 0
NumItems = 0
NumPackages = 1
PackageNum = 0
SurfaceArea = (((x * y) + (x * z) + (y * z)) * 2)
CavingDeg = 0
CurPRcnt1 = 0
CurPRcnt2 = 0

'***LEGEND***
'This legend describes the integers used to denote the sides of the item
'1. Check Bottom of item
'2. Check Top of item
'3. Check Left side of item
'4. Check Right side of item
'5. Check Near side of item
'6. Check Far side of item
'***End Legend***

'Begin Paste Ratio and Surface Calculations
'Begin Paste Ratio Calculations

Start:

RCOAx = ValRCOAxArray(RCThisItem)
RCOAy = ValRCOAyArray(RCThisItem)
RCOAz = ValRCOAzArray(RCThisItem)
RCOAd = ValRCOAdArray(RCThisItem)

    'Count Bottom of item placed

    i = 1
    j = 1
    k = 1

    Do
        Do
            Call ChooseRCOAd

            If ItemCellB <> 0 Then
                CurPRcnt1 = CurPRcnt1 + 1
                ItemCell = ItemCellB
                Call TouchCheck
            End If

            If ItemCellT <> 0 Then
                CurPRcnt2 = CurPRcnt2 + 1
                ItemCell = ItemCellT
                Call TouchCheck
            End If

            i = i + 1
        Loop Until i > (x)

        i = 1
        j = j + 1
    Loop Until j > (y)

    If CurPRcnt1 > 0 Then
        CurPasteNum = CurPasteNum + 1
    End If
```

```
    If CurPRcnt2 > 0 Then
        CurPasteNum = CurPasteNum + 1
    End If

    PRcnt = CurPRcnt1 + CurPRcnt2

    CurPRcnt1 = 0
    CurPRcnt2 = 0

        'Only for testing purposes!!!!!!!!!!
'        Dim MsgValidate1111 As String
'        Dim MsgPasteNum2 As String
'        MsgValidate1111 = "This is the PRcnt: " & PRcnt
'        MsgPasteNum2 = "This is the Paste Number: " & CurPasteNum
'        MsgBox MsgValidate1111 & vbCrLf & MsgPasteNum2, vbYesNo, "BOTTOM"



    'Count Left Side of item placed
    i = 1
    j = 1
    k = 1

    Do
        Do
            Call ChooseRCOAd
'                   For Testing Purposes Only!
'                   If ItemCell = 1004 Then
'                   Dim Msg1004 As String
'                   Msg1004 = "It is finding the left wall"
'                   MsgBox Msg1004, vbOKOnly, "Checking for the left wall"
'                   End If

            If ItemCellL <> 0 Then
                CurPRcnt1 = CurPRcnt1 + 1
                ItemCell = ItemCellL
                Call TouchCheck
            End If

            If ItemCellR <> 0 Then
                CurPRcnt2 = CurPRcnt2 + 1
                ItemCell = ItemCellR
                Call TouchCheck
            End If

            j = j + 1
        Loop Until j > (y)

        j = 1
        k = k + 1
    Loop Until k > (z)

    If CurPRcnt1 > 0 Then
        CurPasteNum = CurPasteNum + 1
    End If

    If CurPRcnt2 > 0 Then
        CurPasteNum = CurPasteNum + 1
    End If

    PRcnt = PRcnt + CurPRcnt1 + CurPRcnt2

    CurPRcnt1 = 0
    CurPRcnt2 = 0

        'Only for testing purposes!!!!!!!!!!
'        Dim MsgPasteNum As String
```

```
'        MsgValidate1111 = "This is the PRcnt: " & PRcnt
'        MsgPasteNum = "This is the Paste Number: " & CurPasteNum
'        MsgBox MsgValidate1111 & vbCrLf & MsgPasteNum, vbYesNo, "LEFT"


    'Count Near Side of item placed
    i = 1
    j = 1
    k = 1

    Do
        Do

            Call ChooseRCOAd

            If ItemCellN <> 0 Then
                CurPRcnt1 = CurPRcnt1 + 1
                ItemCell = ItemCellN
                Call TouchCheck
            End If

            If ItemCellF <> 0 And ItemCellF <> 1003 Then
                CurPRcnt2 = CurPRcnt2 + 1
                ItemCell = ItemCellF
                Call TouchCheck
            End If

            i = i + 1
        Loop Until i > (x)

        i = 1
        k = k + 1
    Loop Until k > (z)

    If CurPRcnt1 > 0 Then
        CurPasteNum = CurPasteNum + 1
    End If

    If CurPRcnt2 > 0 Then
        CurPasteNum = CurPasteNum + 1
    End If

    PRcnt = PRcnt + CurPRcnt1 + CurPRcnt2

    PasteNum = CurPasteNum

    CurPRcnt1 = 0
    CurPRcnt2 = 0

        'Only for testing purposes!!!!!!!!!!
'        MsgValidate1111 = "This is the PRcnt: " & PRcnt
'        MsgPasteNum = "This is the Paste Number: " & CurPasteNum
'        MsgBox MsgValidate1111 & vbCrLf & MsgPasteNum, vbYesNo, "NEAR"


    CurPRcnt = 0
    CurPasteNum = 0

    PasteRat = (PRcnt / SurfaceArea)


'    'Only for testing purposes!!!!!!!!!!
'    Dim MsgPRcnt As String
'    Dim MsgSurfaceArea As String
''    Dim MsgPasteNum As String
'    Dim MsgPasteRatio As String
'    Dim MsgPasteRatioVal As String
'    MsgPRcnt = "This is the PRcnt: " & PRcnt
```

```
'    MsgSurfaceArea = "This is the SurfaceArea: " & SurfaceArea
'    MsgPasteNum = "This is the Paste Number: " & PasteNum
'    MsgPasteRatio = "This is the Paste Ratio: "
'    MsgPasteRatioVal = Format(PasteRat, "0.000")
'    MsgBox MsgSurfaceArea & vbCrLf & MsgPRcnt & vbCrLf & MsgPasteNum & vbCrLf
_
'        & MsgPasteRatio & MsgPasteRatioVal, vbYesNo, "Correct?"

    NumItems = 0
    PackageNum = 0
    ReDim TouchItemArray(1)
    TouchItemArray(1) = 0

    'End Paste Ratio and Surface calculations


    'Begin Distance Calculations

    If CW >= CL And CH Then
        Mu = CW
        Else:
            If CL >= CH Then
                Mu = CL
                Else: Mu = CH
            End If
    End If

    MindRCOA = Mu
    dRCOA = MindRCOA
    dItem = 0

    'IC = ItemCheck
    IC = 1
    'Item i = used item
    'Item j = item being placed

    Do
        xic = (UIx1Array(IC) + UIx2Array(IC)) / 2
        yic = (UIy1Array(IC) + UIy2Array(IC)) / 2
        zic = (UIz1Array(IC) + UIz2Array(IC)) / 2
        li = UIlArray(IC)
        wi = UIwArray(IC)
        hi = UIhArray(IC)

        lj = x
        wj = y
        hj = z

        Select Case RCOAd

        Case 1
            xjc = (RCOAx + (RCOAx + x)) / 2
            yjc = (RCOAy + (RCOAy + y)) / 2
            zjc = (RCOAz + (RCOAz + z)) / 2

            If UIx2Array(IC) >= ValRCOAxArray(RCThisItem) And UIy2Array(IC) >=
_
                ValRCOAyArray(RCThisItem) And UIz2Array(IC) >=
ValRCOAzArray(RCThisItem) Then

                Call DistCalc

                If (dxij + dyij + dzij) <> 0 Then
                    dRCOA = dxij + dyij + dzij
                    dItem = IC
                End If
            End If
```

```
            If (CL - (RCOAx + x)) < dRCOA And (CL - (RCOAx + x)) <> 0 Then
                dRCOA = (CL - (RCOAx + x))
                dItem = 1005
            End If

'            'Removing this allows the door to not be included in distance
'            'calculations
'            If (CW - (RCOAy + y)) < dRCOA And (CW - (RCOAy + y)) <> 0 Then
'                dRCOA = (CW - (RCOAy + y))
'            End If

            If (CH - (RCOAz + z)) < dRCOA And (CH - (RCOAz + z)) <> 0 Then
                dRCOA = (CH - (RCOAz + z))
                dItem = 1002
            End If


        Case 2
            xjc = (RCOAx + (RCOAx - x)) / 2
            yjc = (RCOAy + (RCOAy + y)) / 2
            zjc = (RCOAz + (RCOAz + z)) / 2

            If UIx1Array(IC) <= ValRCOAxArray(RCThisItem) And UIy2Array(IC) >=
_
                ValRCOAyArray(RCThisItem) And UIz2Array(IC) >=
ValRCOAzArray(RCThisItem) Then

                Call DistCalc

                If (dxij + dyij + dzij) <> 0 Then
                    dRCOA = dxij + dyij + dzij
                    dItem = IC
                End If
            End If

            If (RCOAx - x) < dRCOA And (RCOAx - x) <> 0 Then
                dRCOA = (RCOAx - x)
                dItem = 1004
            End If

            If (CH - (RCOAz + z)) < dRCOA And (CH - (RCOAz + z)) <> 0 Then
                dRCOA = (CH - (RCOAz + z))
                dItem = 1002
            End If

        Case 3
            xjc = (RCOAx + (RCOAx + x)) / 2
            yjc = (RCOAy + (RCOAy - y)) / 2
            zjc = (RCOAz + (RCOAz + z)) / 2

            If UIx2Array(IC) >= ValRCOAxArray(RCThisItem) And UIy1Array(IC) <=
_
                ValRCOAyArray(RCThisItem) And UIz2Array(IC) >=
ValRCOAzArray(RCThisItem) Then

                Call DistCalc

                If (dxij + dyij + dzij) <> 0 Then
                    dRCOA = dxij + dyij + dzij
                End If
            End If

            If (CL - (RCOAx + x)) < dRCOA And (CL - (RCOAx + x)) <> 0 Then
                dRCOA = (CL - (RCOAx + x))
            End If

            If (RCOAy - y) < dRCOA And (RCOAy - y) <> 0 Then
                dRCOA = (RCOAy - y)
```

```
            End If

            If (CH - (RCOAz + z)) < dRCOA And (CH - (RCOAz + z)) <> 0 Then
                dRCOA = (CH - (RCOAz + z))
            End If

        Case 4
            xjc = (RCOAx + (RCOAx - x)) / 2
            yjc = (RCOAy + (RCOAy - y)) / 2
            zjc = (RCOAz + (RCOAz + z)) / 2

            If UIx1Array(IC) <= ValRCOAxArray(RCThisItem) And UIy1Array(IC) <=
_
                ValRCOAyArray(RCThisItem) And UIz2Array(IC) >=
ValRCOAzArray(RCThisItem) Then

                Call DistCalc

                If (dxij + dyij + dzij) <> 0 Then
                    dRCOA = dxij + dyij + dzij
                End If
            End If

            If (RCOAx - x) < dRCOA And (RCOAx - x) <> 0 Then
                dRCOA = (RCOAx - x)
            End If

            If (RCOAy - y) < dRCOA And (RCOAy - y) <> 0 Then
                dRCOA = (RCOAy - y)
            End If

            If (CH - (RCOAz + z)) < dRCOA And (CH - (RCOAz + z)) <> 0 Then
                dRCOA = (CH - (RCOAz + z))
            End If

        Case 5
            xjc = (RCOAx + (RCOAx + x)) / 2
            yjc = (RCOAy + (RCOAy + y)) / 2
            zjc = (RCOAz + (RCOAz - z)) / 2

            If UIx2Array(IC) >= ValRCOAxArray(RCThisItem) And UIy2Array(IC) >=
_
                ValRCOAyArray(RCThisItem) And UIz1Array(IC) <=
ValRCOAzArray(RCThisItem) Then

                Call DistCalc

                If (dxij + dyij + dzij) <> 0 Then
                    dRCOA = dxij + dyij + dzij
                End If
            End If

            If (CL - (RCOAx + x)) < dRCOA And (CL - (RCOAx + x)) <> 0 Then
                dRCOA = (CL - (RCOAx + x))
            End If

'            'Removing this allows the door to not be included in distance
'            'calculations
'            If (CW - (RCOAy + y)) < dRCOA And (CW - (RCOAy + y)) <> 0 Then
'                dRCOA = (CW - (RCOAy + y))
'            End If

            If (RCOAz - z) < dRCOA And (RCOAz - z) <> 0 Then
                dRCOA = (RCOAz - z)
            End If

        Case 6
            xjc = (RCOAx + (RCOAx - x)) / 2
```

```
            yjc = (RCOAy + (RCOAy + y)) / 2
            zjc = (RCOAz + (RCOAz - z)) / 2

            If UIx1Array(IC) <= ValRCOAxArray(RCThisItem) And UIy2Array(IC) >=
_
                ValRCOAyArray(RCThisItem) And UIz1Array(IC) <=
ValRCOAzArray(RCThisItem) Then

                Call DistCalc

                If (dxij + dyij + dzij) <> 0 Then
                    dRCOA = dxij + dyij + dzij
                End If
            End If

            If (RCOAx - x) < dRCOA And (RCOAx - x) <> 0 Then
                dRCOA = (RCOAx - x)
            End If

'            'Removing this allows the door to not be included in distance
'            'calculations
'            If (CW - (RCOAy + y)) < dRCOA And (CW - (RCOAy + y)) <> 0 Then
'                dRCOA = (CW - (RCOAy + y))
'            End If

            If (RCOAz - z) < dRCOA And (RCOAz - z) <> 0 Then
                dRCOA = (RCOAz - z)
            End If

        Case 7
            xjc = (RCOAx + (RCOAx + x)) / 2
            yjc = (RCOAy + (RCOAy - y)) / 2
            zjc = (RCOAz + (RCOAz - z)) / 2

            If UIx2Array(IC) >= ValRCOAxArray(RCThisItem) And UIy1Array(IC) <=
_
                ValRCOAyArray(RCThisItem) And UIz1Array(IC) <=
ValRCOAzArray(RCThisItem) Then

                Call DistCalc

                If (dxij + dyij + dzij) <> 0 Then
                    dRCOA = dxij + dyij + dzij
                End If
            End If

            If (CL - (RCOAx + x)) < dRCOA And (CL - (RCOAx + x)) <> 0 Then
                dRCOA = (CL - (RCOAx + x))
            End If

            If (RCOAy - y) < dRCOA And (RCOAy - y) <> 0 Then
                dRCOA = (RCOAy - y)
            End If

            If (RCOAz - z) < dRCOA And (RCOAz - z) <> 0 Then
                dRCOA = (RCOAz - z)
            End If

        Case 8
            xjc = (RCOAx + (RCOAx - x)) / 2
            yjc = (RCOAy + (RCOAy - y)) / 2
            zjc = (RCOAz + (RCOAz - z)) / 2

            If UIx1Array(IC) <= ValRCOAxArray(RCThisItem) And UIy1Array(IC) <=
_
                ValRCOAyArray(RCThisItem) And UIz1Array(IC) <=
ValRCOAzArray(RCThisItem) Then
```

```
                Call DistCalc

                If (dxij + dyij + dzij) <> 0 Then
                    dRCOA = dxij + dyij + dzij
                End If
            End If

            If (RCOAx - x) < dRCOA And (RCOAx - x) <> 0 Then
                dRCOA = (RCOAx - x)
            End If

            If (RCOAy - y) < dRCOA And (RCOAy - y) <> 0 Then
                dRCOA = (RCOAy - y)
            End If

            If (RCOAz - z) < dRCOA And (RCOAz - z) <> 0 Then
                dRCOA = (RCOAz - z)
            End If

        End Select

'            'Only for testing purposes!!!!!!!!!!
'            Dim MsgdItems As String
'            MsgdItems = "This is the Item Checked: " & UInArray(IC)
'            MsgBox MsgdItems, vbYesNo, "Correct?"

        If dRCOA > 0 And dRCOA < MindRCOA Then
            MindRCOA = dRCOA

'            'Why is this here?
'            RCToUse = RC

        End If

        IC = IC + 1
    Loop Until IC > NumUsedItems

'            'Only for testing purposes!!!!!!!!!!
'            Dim MsgdRCOA As String
'            MsgdRCOA = "This is the dRCOA: " & dRCOA
'            MsgBox MsgdRCOA, vbYesNo, "Correct?"

    di = MindRCOA

'   COMPUTE THE CAVING DEGREE

'        'Only for testing purposes!!!!!!!!!!
'        Dim MsgMu As String
'        Dim MsgPasteRat As String
'        Dim Msgdi As String
'        Dim Msglj As String
'        Dim Msgwj As String
'        Dim Msghj As String
'        MsgMu = "This is Mu: " & Mu
'        MsgPasteNum = "This is PasteNum: " & PasteNum
'        MsgPasteRat = "This is PasteRat: " & PasteRat
'        Msgdi = "This is di: " & di
'        Msglj = "This is lj: " & lj
'        Msgwj = "This is wj: " & wj
'        Msghj = "This is hj: " & hj
'        MsgBox MsgMu & vbCrLf & MsgPasteNum & vbCrLf & MsgPasteRat & vbCrLf &
_
'            Msgdi & vbCrLf & Msglj & vbCrLf & Msgwj & vbCrLf & Msghj, _
'            vbYesNo, "Correct?"

    CavingDeg = (Mu * (PasteNum + PasteRat)) - (di / ((lj * wj * hj) ^ (1 /
3)))
```

```
        'Only for testing purposes!!!!!!!!!!
'        MsgCavingDeg = "This is the Caving Degree: " & CavingDeg
'        MsgRCToUse = "This is the RC tested: " & RC
'        MsgBox MsgCavingDeg & vbCrLf & MsgRCToUse, vbYesNo, "Correct?"


    If CavingDeg > MaxCavingDeg Then
        MaxCavingDeg = CavingDeg
        Maxdi = di
        MaxdItem = dItem
        MaxPasteNum = PasteNum
        MaxPasteRat = PasteRat
        RCToUse = RCThisItem
        CavingDeg = 0
        ItemNumToUse = ItemNum

        'Only for testing purposes!!!!!!!!!!
        MsgCavingDeg = "This is the max Caving Degree: " & MaxCavingDeg
        MsgRCToUse = "This is the RC to use: " & RCToUse
'        MsgBox MsgCavingDeg & vbCrLf & MsgRCToUse, vbYesNo, "Correct?"
    End If

    'Tiebreaker System
    If CavingDeg = MaxCavingDeg Then
        If RCOAy = ValRCOAyArray(RCToUse) Then
            If RCOAz = ValRCOAzArray(RCToUse) Then
                If RCOAx = ValRCOAxArray(RCToUse) Then
                    If ItemNum < ItemNumToUse Then

                        MaxCavingDeg = CavingDeg
                        Maxdi = di
                        MaxdItem = dItem
                        MaxPasteNum = PasteNum
                        MaxPasteRat = PasteRat
                        RCToUse = RCThisItem
                        CavingDeg = 0
                        ItemNumToUse = ItemNum

                        GoTo EndTiebreaker
                    Else
                        GoTo EndTiebreaker
                    End If
                Else
                    If RCOAx = ValRCOAxArray(RCToUse) Then

                        MaxCavingDeg = CavingDeg
                        Maxdi = di
                        MaxdItem = dItem
                        MaxPasteNum = PasteNum
                        MaxPasteRat = PasteRat
                        RCToUse = RCThisItem
                        CavingDeg = 0
                        ItemNumToUse = ItemNum

                        GoTo EndTiebreaker
                    End If
                End If
            Else
                If RCOAz < ValRCOAzArray(RCToUse) Then

                    MaxCavingDeg = CavingDeg
                    Maxdi = di
                    MaxdItem = dItem
                    MaxPasteNum = PasteNum
                    MaxPasteRat = PasteRat
                    RCToUse = RCThisItem
                    CavingDeg = 0
```

```
                    ItemNumToUse = ItemNum

                    GoTo EndTiebreaker
                Else
                    GoTo EndTiebreaker
                End If
            End If
        Else
            If RCOAy < ValRCOAyArray(RCToUse) Then

                MaxCavingDeg = CavingDeg
                Maxdi = di
                MaxdItem = dItem
                MaxPasteNum = PasteNum
                MaxPasteRat = PasteRat
                RCToUse = RCThisItem
                CavingDeg = 0
                ItemNumToUse = ItemNum

                GoTo EndTiebreaker
            Else
                GoTo EndTiebreaker
            End If
        End If
    End If
EndTiebreaker:
    'End Tiebreaker


'   END Caving Degree Calculations

RCThisItem = RCThisItem + 1
'Loop Until RCThisItem > ValRCcnt

If RCThisItem <= ValRCcnt Then GoTo Start

'If ItemLoop > 13 Then
'    MsgBox MsgCavingDeg & vbCrLf & MsgRCToUse, vbYesNo, "Max Caving Degree"
'End If

End Sub


Sub PlaceItem()

NumUsedItems = NumUsedItems + 1

'Get next package info
x = LengthArray(ItemNumToUse, 1)
y = WidthArray(ItemNumToUse, 1)
z = HeightArray(ItemNumToUse, 1)

'On Error GoTo ErrorHandler

RCOAx = ValRCOAxArray(RCToUse)
RCOAy = ValRCOAyArray(RCToUse)
RCOAz = ValRCOAzArray(RCToUse)
RCOAd = ValRCOAdArray(RCToUse)

'ErrorHandler:
'Dim MsgError As Variant
'MsgError = "RCToUse = " & RCToUse & ", ValRCcnt = " & ValRCcnt & "NumUSedItems
= " & NumUsedItems
'MsgBox MsgError



'If ItemLoop > 13 Then
```

```
''Testing purposes only
'    Dim MsgValidate6 As String
'    Dim MsgValidate7 As String
'    MsgValidate6 = "Coordinates of the Real Corner (x, y, z, d): "
'    MsgValidate7 = "(" & RCOAx & ", " & RCOAy & ", " & RCOAz & ", " & RCOAd &
")"
'    MsgBox MsgValidate6 & MsgValidate7, vbYesNo, "Placing the Next Item"
'End If

If RCOAx = CL And RCOAy = 0 And RCOAz = 0 And RCOAd = 2 Then
    LRNCorner = 1
End If

ReDim Preserve UIPOArray(1 To NumUsedItems)
ReDim Preserve UInArray(1 To NumUsedItems)
ReDim Preserve UIlArray(1 To NumUsedItems)
ReDim Preserve UIwArray(1 To NumUsedItems)
ReDim Preserve UIhArray(1 To NumUsedItems)
ReDim Preserve UIRCxArray(1 To NumUsedItems)
ReDim Preserve UIRCyArray(1 To NumUsedItems)
ReDim Preserve UIRCzArray(1 To NumUsedItems)
ReDim Preserve UIRCdArray(1 To NumUsedItems)
ReDim Preserve UIx1Array(1 To NumUsedItems)
ReDim Preserve UIy1Array(1 To NumUsedItems)
ReDim Preserve UIz1Array(1 To NumUsedItems)
ReDim Preserve UIx2Array(1 To NumUsedItems)
ReDim Preserve UIy2Array(1 To NumUsedItems)
ReDim Preserve UIz2Array(1 To NumUsedItems)
ReDim Preserve UIVolArray(1 To NumUsedItems)
ReDim Preserve UICavDegArray(1 To NumUsedItems)
ReDim Preserve UIPNArray(1 To NumUsedItems)
ReDim Preserve UIPRArray(1 To NumUsedItems)
ReDim Preserve UIDistArray(1 To NumUsedItems)
ReDim Preserve UIdItemArray(1 To NumUsedItems)
ReDim Preserve UIPenCostArray(1 To NumUsedItems)

UIPOArray(NumUsedItems) = NumUsedItems
UInArray(NumUsedItems) = ItemNumToUse
UIlArray(NumUsedItems) = x
UIwArray(NumUsedItems) = y
UIhArray(NumUsedItems) = z
UIRCxArray(NumUsedItems) = RCOAx
UIRCyArray(NumUsedItems) = RCOAy
UIRCzArray(NumUsedItems) = RCOAz
UIRCdArray(NumUsedItems) = RCOAd
UICavDegArray(NumUsedItems) = MaxCavingDeg
UIVolArray(NumUsedItems) = (x * y * z)
UIPNArray(NumUsedItems) = MaxPasteNum
UIPRArray(NumUsedItems) = MaxPasteRat
UIDistArray(NumUsedItems) = Maxdi
UIdItemArray(NumUsedItems) = MaxdItem
UIPenCostArray(NumUsedItems) = 0

i = 1
j = 1
k = 1

Do
        Select Case RCOAd

            Case 1
                ReDim TempArray(1 To y, 1 To x)

                Set TempRange = Worksheets("Container" & SetNum) _
                    .Range(Cells(((CWwBW * (RCOAz + k + 1) + 1) - RCOAy - y), _
                            (RCOAx + 2)), _
                        Cells(((CWwBW * (RCOAz + k + 1)) - RCOAy), _
                            (RCOAx + x + 1)))
```

```
    Application.ScreenUpdating = False

    For j = 1 To y
        For i = 1 To x
            TempArray(j, i) = ItemNumToUse
        Next i
    Next j

    TempRange.Value = TempArray

Case 2
    ReDim TempArray(1 To y, 1 To x)

    Set TempRange = Worksheets("Container" & SetNum) _
        .Range(Cells(((CWwBW * (RCOAz + k + 1) + 1) - RCOAy - y), _
                (RCOAx - x + 2)), _
            Cells(((CWwBW * (RCOAz + k + 1)) - RCOAy), _
                (RCOAx + 1)))

    Application.ScreenUpdating = False

    For j = 1 To y
        For i = 1 To x
            TempArray(j, i) = ItemNumToUse
        Next i
    Next j

    TempRange.Value = TempArray

Case 3
    ReDim TempArray(1 To y, 1 To x)

    Set TempRange = Worksheets("Container" & SetNum) _
        .Range(Cells(((CWwBW * (RCOAz + k + 1) + 1) - RCOAy), _
                (RCOAx + 2)), _
            Cells(((CWwBW * (RCOAz + k + 1)) - RCOAy + y), _
                (RCOAx + x + 1)))

    Application.ScreenUpdating = False

    For j = 1 To y
        For i = 1 To x
            TempArray(j, i) = ItemNumToUse
        Next i
    Next j

    TempRange.Value = TempArray

Case 4
    ReDim TempArray(1 To y, 1 To x)

    Set TempRange = Worksheets("Container" & SetNum) _
        .Range(Cells(((CWwBW * (RCOAz + k + 1) + 1) - RCOAy), _
                (RCOAx - x + 2)), _
            Cells(((CWwBW * (RCOAz + k + 1)) - RCOAy + y), _
                (RCOAx + 1)))

    Application.ScreenUpdating = False

    For j = 1 To y
        For i = 1 To x
            TempArray(j, i) = ItemNumToUse
        Next i
    Next j

    TempRange.Value = TempArray
```

```
Case 5
    ReDim TempArray(1 To y, 1 To x)

    Set TempRange = Worksheets("Container" & SetNum) _
        .Range(Cells(((CWwBW * (RCOAz - k + 2) + 1) - RCOAy - y), _
                (RCOAx + 2)), _
            Cells(((CWwBW * (RCOAz - k + 2)) - RCOAy), _
                (RCOAx + x + 1)))

    Application.ScreenUpdating = False

    For j = 1 To y
        For i = 1 To x
            TempArray(j, i) = ItemNumToUse
        Next i
    Next j

    TempRange.Value = TempArray

Case 6
    ReDim TempArray(1 To y, 1 To x)

    Set TempRange = Worksheets("Container" & SetNum) _
        .Range(Cells(((CWwBW * (RCOAz - k + 2) + 1) - RCOAy - y), _
                (RCOAx - x + 2)), _
            Cells(((CWwBW * (RCOAz - k + 2)) - RCOAy), _
                (RCOAx + 1)))

    Application.ScreenUpdating = False

    For j = 1 To y
        For i = 1 To x
            TempArray(j, i) = ItemNumToUse
        Next i
    Next j

    TempRange.Value = TempArray

    Worksheets("Container" & SetNum) _
    .Range("A" & (CWwBW * (RCOAz + k + 1) + 1)) _
    .Offset((-RCOAy - j), (RCOAx + 1 - i)).Value = ItemNumToUse

Case 7
    ReDim TempArray(1 To y, 1 To x)

    Set TempRange = Worksheets("Container" & SetNum) _
        .Range(Cells(((CWwBW * (RCOAz - k + 2) + 1) - RCOAy), _
                (RCOAx + 2)), _
            Cells(((CWwBW * (RCOAz - k + 2)) - RCOAy + y), _
                (RCOAx + x + 1)))

    Application.ScreenUpdating = False

    For j = 1 To y
        For i = 1 To x
            TempArray(j, i) = ItemNumToUse
        Next i
    Next j

    TempRange.Value = TempArray

Case 8
    ReDim TempArray(1 To y, 1 To x)

    Set TempRange = Worksheets("Container" & SetNum) _
        .Range(Cells(((CWwBW * (RCOAz - k + 2) + 1) - RCOAy), _
                (RCOAx - x + 2)), _
            Cells(((CWwBW * (RCOAz - k + 2)) - RCOAy + y), _
```

```
                        (RCOAx + 1)))

                Application.ScreenUpdating = False

                For j = 1 To y
                    For i = 1 To x
                        TempArray(j, i) = ItemNumToUse
                    Next i
                Next j

                TempRange.Value = TempArray

        End Select

    k = k + 1
Loop Until k > z

Select Case RCOAd

    Case 1
        UIx1Array(NumUsedItems) = RCOAx
        UIy1Array(NumUsedItems) = RCOAy
        UIz1Array(NumUsedItems) = RCOAz
        UIx2Array(NumUsedItems) = RCOAx + x
        UIy2Array(NumUsedItems) = RCOAy + y
        UIz2Array(NumUsedItems) = RCOAz + z

    Case 2
        UIx1Array(NumUsedItems) = RCOAx - x
        UIy1Array(NumUsedItems) = RCOAy
        UIz1Array(NumUsedItems) = RCOAz
        UIx2Array(NumUsedItems) = RCOAx
        UIy2Array(NumUsedItems) = RCOAy + y
        UIz2Array(NumUsedItems) = RCOAz + z

    Case 3
        UIx1Array(NumUsedItems) = RCOAx
        UIy1Array(NumUsedItems) = RCOAy - y
        UIz1Array(NumUsedItems) = RCOAz
        UIx2Array(NumUsedItems) = RCOAx + x
        UIy2Array(NumUsedItems) = RCOAy
        UIz2Array(NumUsedItems) = RCOAz + z

    Case 4
        UIx1Array(NumUsedItems) = RCOAx - x
        UIy1Array(NumUsedItems) = RCOAy - y
        UIz1Array(NumUsedItems) = RCOAz
        UIx2Array(NumUsedItems) = RCOAx
        UIy2Array(NumUsedItems) = RCOAy
        UIz2Array(NumUsedItems) = RCOAz + z

    Case 5
        UIx1Array(NumUsedItems) = RCOAx
        UIy1Array(NumUsedItems) = RCOAy
        UIz1Array(NumUsedItems) = RCOAz - z
        UIx2Array(NumUsedItems) = RCOAx + x
        UIy2Array(NumUsedItems) = RCOAy + y
        UIz2Array(NumUsedItems) = RCOAz

    Case 6
        UIx1Array(NumUsedItems) = RCOAx - x
        UIy1Array(NumUsedItems) = RCOAy
        UIz1Array(NumUsedItems) = RCOAz - z
        UIx2Array(NumUsedItems) = RCOAx
        UIy2Array(NumUsedItems) = RCOAy + y
        UIz2Array(NumUsedItems) = RCOAz

    Case 7
```

```
        UIx1Array(NumUsedItems) = RCOAx
        UIy1Array(NumUsedItems) = RCOAy - y
        UIz1Array(NumUsedItems) = RCOAz - z
        UIx2Array(NumUsedItems) = RCOAx + x
        UIy2Array(NumUsedItems) = RCOAy
        UIz2Array(NumUsedItems) = RCOAz

    Case 8
        UIx1Array(NumUsedItems) = RCOAx - x
        UIy1Array(NumUsedItems) = RCOAy - y
        UIz1Array(NumUsedItems) = RCOAz - z
        UIx2Array(NumUsedItems) = RCOAx
        UIy2Array(NumUsedItems) = RCOAy
        UIz2Array(NumUsedItems) = RCOAz

End Select

'If ItemLoop > 13 Then
'    'Only for testing purposes!!!!!!!!!!
'    Dim MsgLLN As String
'    Dim MsgURF As String
'    MsgLLN = "Lower, Left, Near corner of the item placed: (" & _
'        UIx1Array(NumUsedItems) & ", " & UIy1Array(NumUsedItems) & ", " & _
'        UIz1Array(NumUsedItems) & ")"
'    MsgURF = "Upper, Right, Far corner of the item placed: (" & _
'        UIx2Array(NumUsedItems) & ", " & UIy2Array(NumUsedItems) & ", " & _
'        UIz2Array(NumUsedItems) & ")"
'    MsgBox MsgLLN & vbCrLf & MsgURF, vbYesNo, "Correct?"
'End If

NUI = NumUsedItems + 1

End Sub



Sub CalculatePenaltyCost()

Num = 2

Do
    If Num < LANum Then
        MaxM = Num - 1
        Else: MaxM = LANum - 1
    End If

    For m = 1 To MaxM
        If UInArray(Num) < UInArray(Num - m) Then
            If (UIx1Array(Num) < UIx2Array(Num - m) _
            And UIx2Array(Num) > UIx1Array(Num - m) _
            And UIy1Array(Num) > UIy2Array(Num - m)) _
            Or (UIx1Array(Num) < UIx2Array(Num - m) _
            And UIx2Array(Num) > UIx1Array(Num - m) _
            And UIz1Array(Num) > UIz2Array(Num - m)) Then

                UIPenCostArray(Num - m) = CurPenCost
                NewPenCost = CurPenCost + 1
                UIPenCostArray(Num - m) = NewPenCost
            End If
        End If
    Next m

    Num = Num + 1
Loop Until Num > NumUsedItems

End Sub
```

```
Sub CreateResultsSheet()

Dim oSheet As Worksheet
Dim vRet As Variant

On Error GoTo ErrHandler

'creating a new excel worksheet called RawData
Set oSheet = Worksheets.Add
With oSheet
    .Name = "Results" & SetNum
    .Cells(1.1).Select
    .Activate
End With
Exit Sub

ErrHandler:

'if error due to duplicate worksheet detected
If Err.Number = 1004 Then
    'display an options to user
    vRet = MsgBox("Worksheet called 'Results" & SetNum & "' already " & _
        "exists, click OK to continue creating new Worksheet and " & _
        "delete the old one, or click Cancel to go to the old sheet.", _
        vbOKCancel, "Duplicate Worksheet")

    If vRet = vbOK Then
        'delete the old worksheet
        Application.DisplayAlerts = False
        Worksheets("Results" & SetNum).Delete
        Application.DisplayAlerts = True

        'rename and activate the new worksheet
        With oSheet
            .Name = "Results" & SetNum
            .Cells(1.1).Select
            .Activate
        End With
    Else
        'cancel the operation, delete the new worksheet
        Application.DisplayAlerts = False
        oSheet.Delete
        Application.DisplayAlerts = True
        'activate the old worksheet
        Worksheets("Results" & SetNum).Activate
    End If

End If

End Sub



Sub OutputResults()

With Worksheets("Results" & SetNum)
    .Range("A1").Value = "Packing Order"
    .Range("B1").Value = "Item Number"
    .Range("C1").Value = "Length"
    .Range("D1").Value = "Width"
    .Range("E1").Value = "Height"
    .Range("F1").Value = "Volume"
    .Range("G1").Value = "x1"
    .Range("H1").Value = "y1"
    .Range("I1").Value = "z1"
    .Range("J1").Value = "x2"
    .Range("K1").Value = "y2"
```

```
    .Range("L1").Value = "z2"
    .Range("M1").Value = "RCx"
    .Range("N1").Value = "RCy"
    .Range("O1").Value = "RCz"
    .Range("P1").Value = "RCd"
    .Range("Q1").Value = "Caving Degree"
    .Range("R1").Value = "Paste Number"
    .Range("S1").Value = "Paste Ratio"
    .Range("T1").Value = "Distance"
    .Range("U1").Value = "Closest Item"
    .Range("V1").Value = "Penalty Cost"
    .Range("W1").Value = "Total Number of Items Used"
    .Range("X1").Value = "Total Volume Used"
    .Range("Y1").Value = "Volume Utilization"
    .Range("Z1").Value = "Total Penalty Cost Factor"
    .Range("AA1").Value = "Processing Time"
    .Range("AB1").Value = "Look-Ahead Number"
    .Range("AC1").Value = "Container Length"
    .Range("AD1").Value = "Container Width"
    .Range("AE1").Value = "Container Height"

    .Range("A1:AE1").Select
        With Selection
            .Font.Bold = True
            .HorizontalAlignment = xlCenter
            .VerticalAlignment = xlBottom
            .WrapText = True
            .Orientation = 0
            .AddIndent = False
            .IndentLevel = 0
            .ShrinkToFit = False
            .ReadingOrder = xlContext
            .MergeCells = False
        End With

    .Range("W1:AE1").ColumnWidth = 12
    .Range("Y2").Style = "Percent"

    .Range("A2:A" & NUI).Value =
Application.WorksheetFunction.Transpose(UIPOArray)
    .Range("B2:B" & NUI).Value =
Application.WorksheetFunction.Transpose(UInArray)
    .Range("C2:C" & NUI).Value =
Application.WorksheetFunction.Transpose(UIlArray)
    .Range("D2:D" & NUI).Value =
Application.WorksheetFunction.Transpose(UIwArray)
    .Range("E2:E" & NUI).Value =
Application.WorksheetFunction.Transpose(UIhArray)
    .Range("F2:F" & NUI).Value =
Application.WorksheetFunction.Transpose(UIVolArray)
    .Range("G2:G" & NUI).Value =
Application.WorksheetFunction.Transpose(UIx1Array)
    .Range("H2:H" & NUI).Value =
Application.WorksheetFunction.Transpose(UIy1Array)
    .Range("I2:I" & NUI).Value =
Application.WorksheetFunction.Transpose(UIz1Array)
    .Range("J2:J" & NUI).Value =
Application.WorksheetFunction.Transpose(UIx2Array)
    .Range("K2:K" & NUI).Value =
Application.WorksheetFunction.Transpose(UIy2Array)
    .Range("L2:L" & NUI).Value =
Application.WorksheetFunction.Transpose(UIz2Array)
    .Range("M2:M" & NUI).Value =
Application.WorksheetFunction.Transpose(UIRCxArray)
    .Range("N2:N" & NUI).Value =
Application.WorksheetFunction.Transpose(UIRCyArray)
    .Range("O2:O" & NUI).Value =
Application.WorksheetFunction.Transpose(UIRCzArray)
```

```
    .Range("P2:P" & NUI).Value =
Application.WorksheetFunction.Transpose(UIRCdArray)
    .Range("Q2:Q" & NUI).Value =
Application.WorksheetFunction.Transpose(UICavDegArray)
    .Range("R2:R" & NUI).Value =
Application.WorksheetFunction.Transpose(UIPNArray)
    .Range("S2:S" & NUI).Value =
Application.WorksheetFunction.Transpose(UIPRArray)
    .Range("T2:T" & NUI).Value =
Application.WorksheetFunction.Transpose(UIDistArray)
    .Range("U2:U" & NUI).Value =
Application.WorksheetFunction.Transpose(UIdItemArray)
    .Range("V2:V" & NUI).Value =
Application.WorksheetFunction.Transpose(UIPenCostArray)
    .Range("W2").Value = NumUsedItems
    .Range("X2").Value = Application.WorksheetFunction.Sum(UIVolArray)
    .Range("Y2").Value = (Application.WorksheetFunction.Sum(UIVolArray) / (CL *
CW * CH))
    .Range("Z2").Value = Application.WorksheetFunction.Sum(UIPenCostArray)
    .Range("AA2").Value = ProcessingTime
    .Range("AB2").Value = LANum
    .Range("AC2").Value = CL
    .Range("AD2").Value = CW
    .Range("AE2").Value = CH

    .Range("A1:V" & NUI).Select
    With Selection
        .Borders(xlDiagonalDown).LineStyle = xlNone
        .Borders(xlDiagonalUp).LineStyle = xlNone
        .Borders(xlEdgeLeft).LineStyle = xlContinuous
        .Borders(xlEdgeTop).LineStyle = xlContinuous
        .Borders(xlEdgeBottom).LineStyle = xlContinuous
        .Borders(xlEdgeRight).LineStyle = xlContinuous
        .Borders(xlInsideVertical).LineStyle = xlContinuous
        .Borders(xlInsideHorizontal).LineStyle = xlContinuous
    End With

    .Range("W1:AE2").Select
    With Selection
        .Borders(xlDiagonalDown).LineStyle = xlNone
        .Borders(xlDiagonalUp).LineStyle = xlNone
        .Borders(xlEdgeLeft).LineStyle = xlContinuous
        .Borders(xlEdgeTop).LineStyle = xlContinuous
        .Borders(xlEdgeBottom).LineStyle = xlContinuous
        .Borders(xlEdgeRight).LineStyle = xlContinuous
        .Borders(xlInsideVertical).LineStyle = xlContinuous
        .Borders(xlInsideHorizontal).LineStyle = xlContinuous
    End With


End With

End Sub


'================================================================================
'This area is for sub procedures not directly used in the main method


Sub AddToArray()


Do
    If RCOAx = RCOAxArray(NumPackages) And _
        RCOAy = RCOAyArray(NumPackages) And _
        RCOAz = RCOAzArray(NumPackages) And _
        RCOAd = RCOAdArray(NumPackages) Then
```

```
        Check = "Yes"

        Else: Check = "No"
    End If

    Select Case Check
        Case "Yes"
            GoTo EndSub
        Case "No"
            NumPackages = NumPackages + 1
    End Select

    Loop Until NumPackages > RCOAcnt

    NumPackages = 1

    RCOAcnt = RCOAcnt + 1

    'Redimension RCOA
    ReDim Preserve RCOAxArray(1 To RCOAcnt)
    ReDim Preserve RCOAyArray(1 To RCOAcnt)
    ReDim Preserve RCOAzArray(1 To RCOAcnt)
    ReDim Preserve RCOAdArray(1 To RCOAcnt)

    RCOAxArray(RCOAcnt) = RCOAx
    RCOAyArray(RCOAcnt) = RCOAy
    RCOAzArray(RCOAcnt) = RCOAz
    RCOAdArray(RCOAcnt) = RCOAd

EndSub:

End Sub

Sub TouchCheck()

If ItemCell = PackageNum Then GoTo EndSub

PackageNum = ItemCell

Do

'    On Error GoTo ErrHandler

    If PackageNum <> TouchItemArray(NumPackages) Then

        Check = "No"

        Else: Check = "Yes"
    End If

'ErrHandler:
'    If Err.Number = 9 Then
'        'display an options to user
'        Dim MsgError As String
'        MsgError = "PackageNum: " & PackageNum & vbCrLf & _
'            "NumPackages: " & NumPackages & vbCrLf & _
'            "TouchItemArray(NumPackages): " & TouchItemArray(2) & _
'            vbCrLf & "NumItems: " & NumItems & _
'            vbCrLf & "Check: " & Check
'        MsgBox MsgError, vbYesNo, "Correct?"
'    End If

    Select Case Check
        Case "Yes"
            GoTo EndSub
        Case "No"
            NumPackages = NumPackages + 1
```

```
    End Select

Loop Until NumPackages > NumItems

NumPackages = 1

NumItems = NumItems + 1

ReDim Preserve TouchItemArray(1 To NumItems)
TouchItemArray(NumItems) = PackageNum

'        'Only for testing purposes!!!!!!!!!!
'        Dim MsgTouch As String
'        Dim MsgItem As String
'        Dim MsgUsedItem As String
'        MsgTouch = "Number of Items Touching: " & NumItems
'        MsgItem = "Touching Item Number: "
'        MsgUsedItem = TouchItemArray(NumItems)
'        MsgBox MsgTouch & vbCrLf & MsgItem & MsgUsedItem, vbYesNo, "Correct?"

EndSub:

NumPackages = 1

End Sub

Sub ChooseRCOAd()

Select Case RCOAd

Case 1

    ItemCellT = Worksheets("Container" & SetNum) _
    .Range("A" & (CWwBW * (RCOAz + 2 + z)) + 1) _
    .Offset((-RCOAy - j), (RCOAx + i)).Value

    ItemCellB = Worksheets("Container" & SetNum) _
    .Range("A" & (CWwBW * (RCOAz + 1) + 1)) _
    .Offset((-RCOAy - j), (RCOAx + i)).Value

    ItemCellL = Worksheets("Container" & SetNum) _
    .Range("A" & ((CWwBW * (RCOAz + k + 1)) + 1)) _
    .Offset((-RCOAy - j), (RCOAx)).Value

    ItemCellR = Worksheets("Container" & SetNum) _
    .Range("A" & ((CWwBW * (RCOAz + k + 1)) + 1)) _
    .Offset((-RCOAy - j), (RCOAx + x + 1)).Value

    ItemCellN = Worksheets("Container" & SetNum) _
    .Range("A" & ((CWwBW * (RCOAz + k + 1)) + 1)) _
    .Offset((-RCOAy), (RCOAx + i)).Value

    ItemCellF = Worksheets("Container" & SetNum) _
    .Range("A" & ((CWwBW * (RCOAz + k + 1)) + 1)) _
    .Offset((-RCOAy - y - 1), (RCOAx + i)).Value

Case 2
    ItemCellT = Worksheets("Container" & SetNum) _
    .Range("A" & (CWwBW * (RCOAz + 2 + z)) + 1) _
    .Offset((-RCOAy - j), (RCOAx + 1 - i)).Value

    ItemCellB = Worksheets("Container" & SetNum) _
    .Range("A" & (CWwBW * (RCOAz + 1) + 1)) _
    .Offset((-RCOAy - j), (RCOAx + 1 - i)).Value

    ItemCellL = Worksheets("Container" & SetNum) _
    .Range("A" & ((CWwBW * (RCOAz + k + 1)) + 1)) _
    .Offset((-RCOAy - j), (RCOAx - x)).Value
```

```
    ItemCellR = Worksheets("Container" & SetNum) _
    .Range("A" & ((CWwBW * (RCOAz + k + 1)) + 1)) _
    .Offset((-RCOAy - j), (RCOAx + 1)).Value

    ItemCellN = Worksheets("Container" & SetNum) _
    .Range("A" & ((CWwBW * (RCOAz + k + 1)) + 1)) _
    .Offset((-RCOAy), (RCOAx + 1 - i)).Value

    ItemCellF = Worksheets("Container" & SetNum) _
    .Range("A" & ((CWwBW * (RCOAz + k + 1)) + 1)) _
    .Offset((-RCOAy - y - 1), (RCOAx + 1 - i)).Value

Case 3
    ItemCellT = Worksheets("Container" & SetNum) _
    .Range("A" & (CWwBW * (RCOAz + 2 + z)) + 1) _
    .Offset((-RCOAy + j), (RCOAx + i)).Value

    ItemCellB = Worksheets("Container" & SetNum) _
    .Range("A" & (CWwBW * (RCOAz + 1) + 1)) _
    .Offset((-RCOAy + j), (RCOAx + i)).Value

    ItemCellL = Worksheets("Container" & SetNum) _
    .Range("A" & ((CWwBW * (RCOAz + k + 1)) + 1)) _
    .Offset((-RCOAy + j), (RCOAx)).Value

    ItemCellR = Worksheets("Container" & SetNum) _
    .Range("A" & ((CWwBW * (RCOAz + k + 1)) + 1)) _
    .Offset((-RCOAy + j), (RCOAx + x + 1)).Value

    ItemCellN = Worksheets("Container" & SetNum) _
    .Range("A" & ((CWwBW * (RCOAz + k + 1)) + 1)) _
    .Offset((-RCOAy + y), (RCOAx + i)).Value

    ItemCellF = Worksheets("Container" & SetNum) _
    .Range("A" & ((CWwBW * (RCOAz + k + 1)) + 1)) _
    .Offset((-RCOAy - 1), (RCOAx + i)).Value

Case 4
    ItemCellT = Worksheets("Container" & SetNum) _
    .Range("A" & (CWwBW * (RCOAz + 2 + z)) + 1) _
    .Offset((-RCOAy + j), (RCOAx + 1 - i)).Value

    ItemCellB = Worksheets("Container" & SetNum) _
    .Range("A" & (CWwBW * (RCOAz + 1) + 1)) _
    .Offset((-RCOAy + j), (RCOAx + 1 - i)).Value

    ItemCellL = Worksheets("Container" & SetNum) _
    .Range("A" & ((CWwBW * (RCOAz + k + 1)) + 1)) _
    .Offset((-RCOAy + j), (RCOAx - x)).Value

    ItemCellR = Worksheets("Container" & SetNum) _
    .Range("A" & ((CWwBW * (RCOAz + k + 1)) + 1)) _
    .Offset((-RCOAy + j), (RCOAx + 1)).Value

    ItemCellN = Worksheets("Container" & SetNum) _
    .Range("A" & ((CWwBW * (RCOAz + k + 1)) + 1)) _
    .Offset((-RCOAy + y), (RCOAx + 1 - i)).Value

    ItemCellF = Worksheets("Container" & SetNum) _
    .Range("A" & ((CWwBW * (RCOAz + k + 1)) + 1)) _
    .Offset((-RCOAy - 1), (RCOAx + 1 - i)).Value

Case 5
    ItemCellT = Worksheets("Container" & SetNum) _
    .Range("A" & (CWwBW * (RCOAz + 2)) + 1) _
    .Offset((-RCOAy - j), (RCOAx + i)).Value
```

```
    ItemCellB = Worksheets("Container" & SetNum) _
    .Range("A" & (CWwBW * (RCOAz - z + 1) + 1)) _
    .Offset((-RCOAy - j), (RCOAx + i)).Value

    ItemCellL = Worksheets("Container" & SetNum) _
    .Range("A" & ((CWwBW * (RCOAz - k + 1)) + 1)) _
    .Offset((-RCOAy - j), (RCOAx)).Value

    ItemCellR = Worksheets("Container" & SetNum) _
    .Range("A" & ((CWwBW * (RCOAz - k + 1)) + 1)) _
    .Offset((-RCOAy - j), (RCOAx + x + 1)).Value

    ItemCellN = Worksheets("Container" & SetNum) _
    .Range("A" & ((CWwBW * (RCOAz - k + 1)) + 1)) _
    .Offset((-RCOAy), (RCOAx + i)).Value

    ItemCellF = Worksheets("Container" & SetNum) _
    .Range("A" & ((CWwBW * (RCOAz - k + 1)) + 1)) _
    .Offset((-RCOAy - y - 1), (RCOAx + i)).Value

Case 6
    ItemCellT = Worksheets("Container" & SetNum) _
    .Range("A" & (CWwBW * (RCOAz + 2)) + 1) _
    .Offset((-RCOAy - j), (RCOAx + 1 - i)).Value

    ItemCellB = Worksheets("Container" & SetNum) _
    .Range("A" & (CWwBW * (RCOAz - z + 1) + 1)) _
    .Offset((-RCOAy - j), (RCOAx + 1 - i)).Value

    ItemCellL = Worksheets("Container" & SetNum) _
    .Range("A" & ((CWwBW * (RCOAz - k + 1)) + 1)) _
    .Offset((-RCOAy - j), (RCOAx - x)).Value

    ItemCellR = Worksheets("Container" & SetNum) _
    .Range("A" & ((CWwBW * (RCOAz - k + 1)) + 1)) _
    .Offset((-RCOAy - j), (RCOAx + 1)).Value

    ItemCellN = Worksheets("Container" & SetNum) _
    .Range("A" & ((CWwBW * (RCOAz - k + 1)) + 1)) _
    .Offset((-RCOAy), (RCOAx + 1 - i)).Value

    ItemCellF = Worksheets("Container" & SetNum) _
    .Range("A" & ((CWwBW * (RCOAz - k + 1)) + 1)) _
    .Offset((-RCOAy - y - 1), (RCOAx + 1 - i)).Value

Case 7
    ItemCellT = Worksheets("Container" & SetNum) _
    .Range("A" & (CWwBW * (RCOAz + 2)) + 1) _
    .Offset((-RCOAy + j), (RCOAx + i)).Value

    ItemCellB = Worksheets("Container" & SetNum) _
    .Range("A" & (CWwBW * (RCOAz - z + 1) + 1)) _
    .Offset((-RCOAy + j), (RCOAx + i)).Value

    ItemCellL = Worksheets("Container" & SetNum) _
    .Range("A" & ((CWwBW * (RCOAz - k + 1)) + 1)) _
    .Offset((-RCOAy + j), (RCOAx)).Value

    ItemCellR = Worksheets("Container" & SetNum) _
    .Range("A" & ((CWwBW * (RCOAz - k + 1)) + 1)) _
    .Offset((-RCOAy + j), (RCOAx + x + 1)).Value

    ItemCellN = Worksheets("Container" & SetNum) _
    .Range("A" & ((CWwBW * (RCOAz - k + 1)) + 1)) _
    .Offset((-RCOAy + y), (RCOAx + i)).Value

    ItemCellF = Worksheets("Container" & SetNum) _
    .Range("A" & ((CWwBW * (RCOAz - k + 1)) + 1)) _
```

```
    .Offset((-RCOAy - 1), (RCOAx + i)).Value

Case 8
    ItemCellT = Worksheets("Container" & SetNum) _
    .Range("A" & (CWwBW * (RCOAz + 2)) + 1) _
    .Offset((-RCOAy + j), (RCOAx + 1 - i)).Value

    ItemCellB = Worksheets("Container" & SetNum) _
    .Range("A" & (CWwBW * (RCOAz - z + 1) + 1)) _
    .Offset((-RCOAy + j), (RCOAx + 1 - i)).Value

    ItemCellL = Worksheets("Container" & SetNum) _
    .Range("A" & ((CWwBW * (RCOAz - k + 1)) + 1)) _
    .Offset((-RCOAy + j), (RCOAx - x)).Value

    ItemCellR = Worksheets("Container" & SetNum) _
    .Range("A" & ((CWwBW * (RCOAz - k + 1)) + 1)) _
    .Offset((-RCOAy + j), (RCOAx + 1)).Value

    ItemCellN = Worksheets("Container" & SetNum) _
    .Range("A" & ((CWwBW * (RCOAz - k + 1)) + 1)) _
    .Offset((-RCOAy + y), (RCOAx + 1 - i)).Value

    ItemCellF = Worksheets("Container" & SetNum) _
    .Range("A" & ((CWwBW * (RCOAz - k + 1)) + 1)) _
    .Offset((-RCOAy - 1), (RCOAx + 1 - i)).Value

End Select

End Sub


Sub ChooseRCOAdSize()

Select Case RCOAd

Case 1
    SizeCell = Worksheets("Container" & SetNum) _
    .Range("A" & (CWwBW * (RCOAz + k + 1) + 1)) _
    .Offset((-RCOAy - j), (RCOAx + i)).Value

Case 2
    SizeCell = Worksheets("Container" & SetNum) _
    .Range("A" & (CWwBW * (RCOAz + k + 1) + 1)) _
    .Offset((-RCOAy - j), (RCOAx + 1 - i)).Value

Case 3
    SizeCell = Worksheets("Container" & SetNum) _
    .Range("A" & (CWwBW * (RCOAz + k + 1) + 1)) _
    .Offset((-RCOAy - 1 + j), (RCOAx + i)).Value

Case 4
    SizeCell = Worksheets("Container" & SetNum) _
    .Range("A" & (CWwBW * (RCOAz + k + 1) + 1)) _
    .Offset((-RCOAy - 1 + j), (RCOAx + 1 - i)).Value

Case 5
    SizeCell = Worksheets("Container" & SetNum) _
    .Range("A" & (CWwBW * (RCOAz - k + 2) + 1)) _
    .Offset((-RCOAy - j), (RCOAx + i)).Value

Case 6
    SizeCell = Worksheets("Container" & SetNum) _
    .Range("A" & (CWwBW * (RCOAz - k + 2) + 1)) _
    .Offset((-RCOAy - j), (RCOAx + 1 - i)).Value

Case 7
```

```
    SizeCell = Worksheets("Container" & SetNum) _
    .Range("A" & (CWwBW * (RCOAz - k + 2) + 1)) _
    .Offset((-RCOAy - 1 + j), (RCOAx + i)).Value

Case 8
    SizeCell = Worksheets("Container" & SetNum) _
    .Range("A" & (CWwBW * (RCOAz - k + 2) + 1)) _
    .Offset((-RCOAy - 1 + j), (RCOAx + 1 - i)).Value

End Select

End Sub


Sub ChooseRCOAdStab()

Select Case RCOAd

Case 1
    StabCell = Worksheets("Container" & SetNum) _
    .Range("A" & (CWwBW * (RCOAz + k) + 1)) _
    .Offset((-RCOAy - j), (RCOAx + i)).Value

Case 2
    StabCell = Worksheets("Container" & SetNum) _
    .Range("A" & (CWwBW * (RCOAz + k) + 1)) _
    .Offset((-RCOAy - j), (RCOAx + 1 - i)).Value

Case 3
    StabCell = Worksheets("Container" & SetNum) _
    .Range("A" & (CWwBW * (RCOAz + k) + 1)) _
    .Offset((-RCOAy - 1 + j), (RCOAx + i)).Value

Case 4
    StabCell = Worksheets("Container" & SetNum) _
    .Range("A" & (CWwBW * (RCOAz + k) + 1)) _
    .Offset((-RCOAy - 1 + j), (RCOAx + 1 - i)).Value

Case 5
    StabCell = Worksheets("Container" & SetNum) _
    .Range("A" & (CWwBW * (RCOAz - z + 1) + 1)) _
    .Offset((-RCOAy - j), (RCOAx + i)).Value

Case 6
    StabCell = Worksheets("Container" & SetNum) _
    .Range("A" & (CWwBW * (RCOAz - z + 1) + 1)) _
    .Offset((-RCOAy - j), (RCOAx + 1 - i)).Value

Case 7
    StabCell = Worksheets("Container" & SetNum) _
    .Range("A" & (CWwBW * (RCOAz - z + 1) + 1)) _
    .Offset((-RCOAy - 1 + j), (RCOAx + i)).Value

Case 8
    StabCell = Worksheets("Container" & SetNum) _
    .Range("A" & (CWwBW * (RCOAz - z + 1) + 1)) _
    .Offset((-RCOAy - 1 + j), (RCOAx + 1 - i)).Value

End Select

End Sub


Sub DistCalc()

    'The max function doesn't work, so had to be broken apart
```

```
    'dxij = Max((Abs(xic - xjc) - ((li + lj) / 2)), 0)
    'dyij = Max((Abs(yic - yjc) - ((wi + wj) / 2)), 0)
    'dzij = Max((Abs(zic - zjc) - ((hi + hj) / 2)), 0)

    dxij1 = Abs(xic - xjc) - ((li + lj) / 2)
    dyij1 = Abs(yic - yjc) - ((wi + wj) / 2)
    dzij1 = Abs(zic - zjc) - ((hi + hj) / 2)
    dxij2 = 0
    dyij2 = 0
    dzij2 = 0

    If dxij1 >= dxij2 Then dxij = dxij1 Else dxij = dxij2
    If dyij1 >= dyij2 Then dyij = dyij1 Else dyij = dyij2
    If dzij1 >= dzij2 Then dzij = dzij1 Else dzij = dzij2

End Sub
```

8 APPENDIX B: RESULT TABLES FOR NO LOOK-AHEAD

Set 1 - No Look-Ahead Results																				
Packing Order	Item Number	Length	Width	Height	Volume	x1	y1	z1	x2	y2	z2	RCx	RCy	RCz	RCd	Caving Degree	Paste Number	Paste Ratio	Distance	Closest Item	Unloading Cost
1	1	66	95	31	194370	0	0	0	66	95	31	0	0	0	0	0.000	0	0.000	0	0	0
2	2	76	108	30	246240	157	0	0	233	108	30	233	0	0	2	2053.048	3	0.500	91	1	0
3	3	66	95	31	194370	66	0	0	132	95	31	66	0	0	1	2054.068	3	0.500	25	2	0
4	4	77	83	46	293986	156	0	30	233	83	76	233	0	30	2	2052.368	3	0.497	24	3	0
5	5	27	95	26	66690	0	0	31	27	95	57	0	0	31	1	2053.563	3	0.500	38	3	0
6	6	78	104	34	275808	0	95	0	78	199	34	0	95	0	1	2050.146	3	0.495	79	2	0
7	7	72	98	46	324576	0	199	0	72	297	46	0	199	0	1	2035.111	3	0.471	161	1005	0
8	8	39	41	38	60762	194	0	76	233	41	114	233	0	76	2	2051.804	3	0.500	106	1002	0
9	9	72	98	46	324576	0	297	0	72	395	46	0	297	0	1	2052.157	3	0.500	161	1005	0
10	10	32	71	25	56800	27	0	31	59	71	56	27	0	31	1	2054.318	3	0.500	7	1002	0
11	11	74	104	65	500240	0	95	34	74	199	99	0	199	34	3	2589.828	4	0.412	24	0	0
12	12	72	98	46	324576	0	199	46	72	297	92	0	199	46	1	2052.637	3	0.500	128	1002	0
13	13	66	95	31	194370	59	0	31	125	95	62	59	0	31	1	2622.920	4	0.469	30	12	0
14	14	67	97	62	402938	0	297	46	67	394	108	0	297	46	1	2034.106	3	0.468	112	1002	0
15	15	70	111	48	372960	0	395	0	70	506	48	0	395	0	1	2049.739	3	0.496	163	1005	0
16	16	67	97	62	402938	166	108	0	233	205	62	233	108	0	2	2015.553	3	0.436	88	1002	0
17	17	78	104	34	275808	155	205	0	233	309	34	233	205	0	2	2045.549	3	0.487	83	1004	0
18	18	32	71	25	56800	27	0	56	59	71	81	27	0	56	1	2563.489	4	0.368	24	1002	0
19	19	76	108	30	246240	157	309	0	233	417	30	233	309	0	2	2053.144	3	0.500	85	15	0
20	20	67	97	62	402938	99	108	0	166	205	62	166	108	0	2	2579.677	4	0.395	1	1004	0

21	21	72	98	46	324576	0	199	92	72	297	138	0	297	92	3	3193.194	5	0.442	82	0	0
22	22	70	111	48	372960	0	88	99	70	199	147	0	199	99	3	2032.264	3	0.464	73	0	0
23	23	81	94	44	335016	152	417	0	233	511	44	233	417	0	2	2028.711	3	0.458	82	15	0
24	24	67	97	62	402938	0	297	108	67	394	170	0	297	108	1	2016.068	3	0.436	50	1002	0
25	25	32	71	25	56800	0	506	0	32	577	25	0	506	0	1	2054.474	3	0.500	1	23	0
26	26	43	110	25	118250	112	205	0	155	315	25	155	205	0	2	2048.539	3	0.491	40	1004	0
27	27	76	108	30	246240	157	309	30	233	417	60	233	417	30	4	3207.731	5	0.467	85	0	0
28	28	81	94	44	335016	152	205	34	233	299	78	233	205	34	2	2024.113	3	0.448	10	27	0
29	29	74	104	65	500240	159	101	62	233	205	127	233	205	62	4	1990.016	3	0.391	18	0	0
30	30	66	95	31	194370	59	0	62	125	95	93	59	0	62	1	2612.005	4	0.450	1	29	0
31	31	81	94	44	335016	152	205	78	233	299	122	233	205	78	2	2047.445	3	0.490	80	24	0
32	32	33	81	28	74844	0	216	138	33	297	166	0	297	138	3	2054.476	3	0.500	1	0	0
33	33	77	83	46	293986	156	417	44	233	500	90	233	417	44	2	2003.561	3	0.415	86	15	0
34	34	84	85	30	214200	149	332	60	233	417	90	233	417	60	4	2032.572	3	0.464	32	0	0
35	35	77	83	46	293986	156	205	122	233	288	168	233	205	122	2	1986.015	3	0.385	52	1002	0
36	36	39	41	38	60762	194	41	76	233	82	114	233	41	76	2	2054.475	3	0.500	1	1002	0
37	37	66	95	31	194370	167	110	127	233	205	158	233	205	127	4	2053.430	3	0.500	62	0	0
38	38	25	33	23	18975	208	299	60	233	332	83	233	332	60	4	3864.332	6	0.586	50	0	0
39	39	25	33	23	18975	183	299	60	208	332	83	208	332	60	4	3864.332	6	0.586	50	0	0
40	40	76	108	30	246240	70	395	0	146	503	30	70	395	0	1	2006.941	3	0.419	6	34	0
41	41	70	111	48	372960	163	94	158	233	205	206	233	205	158	4	1978.942	3	0.372	14	0	0
42	42	77	83	46	293986	156	205	168	233	288	214	233	205	168	2	2035.584	3	0.468	6	1002	0
43	43	78	104	34	275808	70	395	30	148	499	64	70	395	30	1	1962.289	3	0.343	1	34	0
44	44	84	85	30	214200	75	120	62	159	205	92	159	205	62	4	1949.919	3	0.322	1	0	0
45	45	27	95	26	66690	0	0	57	27	95	83	0	95	57	3	3940.906	6	0.714	16	0	0

Set 2 - No Look-Ahead Results																				
Packing Order	Item Number	Length	Width	Height	Volume	x1	y1	z1	x2	y2	z2	RCx	RCy	RCz	RCd	Caving Degree	Paste Number	Paste Ratio	Distance	Closest Item	Unloading Cost
1	1	36	48	31	53568	0	0	0	36	48	31	0	0	0	0	0.000	0	0.000	0	0	0
2	2	70	95	62	412300	163	0	0	233	95	62	233	0	0	2	2052.794	3	0.500	127	1	0
3	3	69	97	41	274413	164	95	0	233	192	41	233	95	0	2	2051.976	3	0.500	164	1004	0
4	4	69	84	66	382536	164	0	62	233	84	128	233	0	62	2	2053.233	3	0.500	92	1002	0
5	5	69	97	41	274413	164	192	0	233	289	41	233	192	0	2	2051.976	3	0.500	164	1004	0
6	6	25	49	21	25725	208	95	41	233	144	62	233	95	41	2	2054.466	3	0.500	1	5	0
7	7	88	98	26	224224	75	0	0	163	98	26	163	0	0	2	2052.157	3	0.497	39	1	0
8	8	77	89	46	315238	156	289	0	233	378	46	233	289	0	2	2040.042	3	0.475	1	5	0
9	9	76	103	64	500992	157	378	0	233	481	64	233	378	0	2	2031.715	3	0.465	156	1002	0
10	10	52	98	44	224224	181	481	0	233	579	44	233	481	0	2	2051.603	3	0.500	176	1002	0
11	11	69	97	41	274413	94	0	26	163	97	67	163	0	26	2	2041.497	3	0.479	58	1004	0
12	12	69	97	41	274413	164	0	128	233	97	169	233	0	128	2	2034.212	3	0.467	51	1002	0
13	13	48	71	47	160176	185	0	169	233	71	216	233	0	169	2	2054.426	3	0.500	4	1002	0
14	14	37	73	23	62123	38	0	0	75	73	23	75	0	0	2	2054.450	3	0.500	2	1	0
15	15	49	111	26	141414	184	144	41	233	255	67	233	144	41	2	2030.946	3	0.461	34	1002	0
16	16	48	61	39	114192	185	481	44	233	542	83	233	481	44	2	2014.391	3	0.436	137	1002	0
17	17	70	95	62	412300	163	386	64	233	481	126	233	481	64	4	1993.633	3	0.398	94	0	0
18	18	43	90	33	127710	138	481	0	181	571	33	181	481	0	2	2031.583	3	0.462	32	17	0
19	19	84	85	72	514080	149	293	46	233	378	118	233	378	46	4	1973.841	3	0.363	38	0	0
20	20	84	85	72	514080	73	396	0	157	481	72	157	481	0	4	1961.547	3	0.342	17	0	0
21	21	76	86	38	248368	62	481	0	138	567	38	138	481	0	2	2033.904	3	0.467	62	1004	0
22	22	76	86	38	248368	88	203	0	164	289	38	164	289	0	4	1994.586	3	0.398	10	0	0

23	23	69	97	41	274413	95	106	0	164	203	41	164	203	0	4	2049.876	3	0.492	8	0	0
24	24	51	60	41	125460	182	84	62	233	144	103	233	144	62	4	3779.970	6	0.440	20	0	0
25	25	75	75	63	354375	0	73	0	75	148	63	75	73	0	2	2576.512	4	0.393	157	1002	0
26	26	77	89	46	315238	79	289	0	156	378	46	156	289	0	2	2633.897	4	0.487	17	1004	0
27	27	43	90	33	127710	138	481	33	181	571	66	138	481	33	1	2585.971	4	0.405	1	18	0
28	28	84	85	72	514080	0	148	0	84	233	72	0	148	0	1	2034.339	3	0.466	4	1002	0
29	29	36	48	31	53568	0	0	31	36	48	62	0	0	31	1	2053.863	3	0.500	24	28	0
30	30	77	89	46	315238	0	233	0	77	322	46	0	233	0	1	2054.485	3	0.500	1	28	0
31	31	52	98	44	224224	0	322	0	52	420	44	0	322	0	1	2054.154	3	0.500	21	27	0
32	32	84	85	72	514080	0	233	46	84	318	118	0	233	46	1	1988.911	3	0.388	1	28	0
33	33	84	85	72	514080	0	148	72	84	233	144	0	233	72	3	2020.012	3	0.441	1	0	0
34	34	75	75	63	354375	0	73	63	75	148	126	0	148	63	3	2052.785	3	0.498	18	0	0
35	35	76	103	64	500992	0	233	118	76	336	182	0	233	118	1	1989.246	3	0.390	38	1002	0
36	36	25	49	21	25725	183	95	41	208	144	62	208	144	62	8	4005.465	6	0.824	1	0	0
37	37	51	60	41	125460	0	420	0	51	480	41	0	420	0	1	2054.280	3	0.500	11	27	0
38	38	25	49	21	25725	208	84	103	233	133	124	233	84	103	2	2054.466	3	0.500	1	1002	0
39	39	48	71	47	160176	0	480	0	48	551	47	0	480	0	1	2044.851	3	0.484	14	27	0
40	40	77	89	46	315238	0	144	144	77	233	190	0	233	144	3	2033.012	3	0.464	30	0	0
41	41	43	90	33	127710	190	144	67	233	234	100	233	144	67	2	2053.309	3	0.500	60	1002	0
42	42	37	73	23	62123	38	0	23	75	73	46	75	73	23	4	3785.768	6	0.449	2	0	0
43	43	76	103	64	500992	62	481	38	138	584	102	138	481	38	2	1932.291	3	0.292	14	39	0
44	44	64	73	55	256960	169	481	83	233	554	138	233	481	83	2	1993.615	3	0.397	31	43	0
45	45	42	74	40	124320	191	407	126	233	481	166	233	481	126	4	2008.870	3	0.424	54	0	0
46	46	84	85	72	514080	149	481	138	233	566	210	233	481	138	2	1942.800	3	0.310	10	1002	0
47	47	48	61	39	114192	185	420	166	233	481	205	233	481	166	4	2039.516	3	0.475	1	0	0
48	48	37	73	23	62123	0	0	62	37	73	85	0	0	62	1	2634.630	4	0.488	1	1002	0
49	49	75	75	63	354375	158	144	100	233	219	163	233	144	100	2	1917.954	3	0.269	57	1002	0
50	50	70	95	62	412300	0	322	44	70	417	106	0	322	44	1	1951.700	3	0.325	3	1002	0

Set 3 - No Look-Ahead Results																				
Packing Order	Item Number	Length	Width	Height	Volume	x1	y1	z1	x2	y2	z2	RCx	RCy	RCz	RCd	Caving Degree	Paste Number	Paste Ratio	Distance	Closest Item	0
1	1	78	102	39	310284	0	0	0	78	102	39	0	0	0	0	0.000	0	0.000	0	0	0
2	2	46	113	36	187128	187	0	0	233	113	36	233	0	0	2	2052.594	3	0.500	109	1	0
3	3	30	101	26	78780	203	113	0	233	214	26	233	113	0	2	2054.477	3	0.500	1	2	0
4	4	46	113	36	187128	141	0	0	187	113	36	187	0	0	2	2053.399	3	0.500	63	1	0
5	5	50	66	42	138600	183	0	36	233	66	78	233	0	36	2	2052.471	3	0.500	105	1	0
6	6	46	113	36	187128	95	0	0	141	113	36	141	0	0	2	2054.203	3	0.500	17	1	0
7	7	49	90	30	132300	0	102	0	49	192	30	0	102	0	1	2053.597	3	0.500	46	6	0
8	8	63	103	58	376362	0	0	39	63	103	97	0	0	39	1	2051.691	3	0.498	120	5	0
9	9	63	97	56	342216	0	0	97	63	97	153	0	0	97	1	2053.542	3	0.500	67	1002	0
10	10	56	100	35	196000	0	0	153	56	100	188	0	0	153	1	2049.491	3	0.492	32	1002	0
11	11	63	103	58	376362	0	192	0	63	295	58	0	192	0	1	2012.789	3	0.432	140	3	0
12	12	74	90	69	459540	0	295	0	74	385	69	0	295	0	1	2028.836	3	0.460	151	1002	0
13	13	63	103	58	376362	0	385	0	63	488	58	0	385	0	1	2052.256	3	0.500	162	1002	0
14	14	57	75	41	175275	0	488	0	57	563	41	0	488	0	1	2054.482	3	0.500	1	13	0
15	15	66	73	62	298716	167	0	78	233	73	140	233	0	78	2	2020.144	3	0.444	80	1002	0
16	16	63	97	56	342216	170	0	140	233	97	196	233	0	140	2	2024.711	3	0.450	24	1002	0
17	17	49	90	30	132300	0	0	188	49	90	218	0	0	188	1	2054.461	3	0.500	2	1002	0
18	18	49	90	30	132300	154	113	0	203	203	30	203	113	0	2	2041.950	3	0.479	12	1004	0
19	19	74	90	69	459540	159	214	0	233	304	69	233	214	0	2	1982.767	3	0.380	85	1002	0
20	20	43	94	31	125302	190	304	0	233	398	31	233	304	0	2	2052.182	3	0.500	116	1002	0
21	21	74	90	69	459540	159	398	0	233	488	69	233	398	0	2	1991.653	3	0.395	96	14	0
22	22	66	73	62	298716	167	488	0	233	561	62	233	488	0	2	2052.944	3	0.500	104	14	0

23	23	43	94	31	125302	190	304	31	233	398	62	233	398	31	4	3863.001	6	0.585	116	0	0
24	24	63	103	58	376362	0	385	58	63	488	116	0	385	58	1	1999.249	3	0.408	96	1002	0
25	25	68	71	64	308992	0	488	41	68	559	105	0	488	41	1	2030.939	3	0.460	1	24	0
26	26	50	66	42	138600	133	0	36	183	66	78	183	0	78	6	3856.897	6	0.572	36	0	0
27	27	46	113	36	187128	0	272	69	46	385	105	0	385	69	3	2022.857	3	0.449	113	0	0
28	28	56	100	35	196000	98	113	0	154	213	35	154	113	0	2	2032.685	3	0.464	34	1004	0
29	29	63	103	58	376362	63	385	0	126	488	58	63	385	0	1	2588.111	4	0.409	1	25	0
30	30	54	80	35	151200	74	305	0	128	385	35	74	385	0	3	2051.619	3	0.496	32	0	0
31	31	67	85	39	222105	57	488	0	124	573	39	57	488	0	1	2044.619	3	0.483	2	25	0
32	32	49	90	30	132300	141	304	0	190	394	30	190	304	0	2	2035.949	3	0.469	4	31	0
33	33	61	106	56	362096	0	279	105	61	385	161	0	385	105	3	1973.237	3	0.363	59	0	0
34	34	68	71	64	308992	0	385	116	68	456	180	0	385	116	1	2011.949	3	0.429	40	1002	0
35	35	54	80	35	151200	0	112	30	54	192	65	0	192	30	3	2029.007	3	0.457	8	0	0
36	36	68	71	64	308992	0	488	105	68	559	169	0	488	105	1	1976.234	3	0.367	1	24	0
37	37	50	91	40	182000	109	213	0	159	304	40	159	304	0	4	3230.340	5	0.503	10	0	0
38	38	50	91	40	182000	0	294	161	50	385	201	0	385	161	3	2023.922	3	0.448	19	0	0
39	39	61	118	40	287920	0	385	180	61	503	220	0	385	180	1	2699.014	4	0.602	172	1005	0
40	40	67	85	39	222105	166	66	36	233	151	75	233	66	36	2	1990.176	3	0.390	2	1002	0
41	41	78	102	39	310284	63	386	58	141	488	97	63	488	58	3	1968.705	3	0.354	1	0	0
42	42	54	80	35	151200	0	192	58	54	272	93	0	192	58	1	2627.853	4	0.477	19	41	0
43	43	63	103	58	376362	0	169	93	63	272	151	0	272	93	3	1956.628	3	0.335	65	0	0
44	44	66	73	62	298716	167	488	62	233	561	124	233	488	62	2	1974.816	3	0.365	26	41	0
45	45	49	90	30	132300	141	304	30	190	394	60	190	304	30	2	2629.654	4	0.480	4	44	0
46	46	30	101	26	78780	203	387	69	233	488	95	233	488	69	4	2036.637	3	0.472	62	0	0
47	47	67	85	39	222105	99	66	36	166	151	75	166	66	36	2	1956.709	3	0.333	1	1004	0
48	48	63	97	56	342216	96	207	40	159	304	96	159	304	40	4	1905.595	3	0.247	22	0	0
49	49	56	100	35	196000	177	388	95	233	488	130	233	488	95	4	1975.967	3	0.367	36	0	0
50	50	48	61	30	87840	49	131	0	97	192	30	49	192	30	7	3788.391	6	0.454	1	0	0

51	51	50	91	40	182000	183	488	124	233	579	164	233	488	124	2	1978.625	3	0.372	56	1002	0
52	52	66	73	62	298716	167	415	130	233	488	192	233	488	130	4	1985.883	3	0.384	28	0	0
53	53	50	91	40	182000	183	488	164	233	579	204	233	488	164	2	2036.936	3	0.471	16	1002	0

Set 4 - No Look-Ahead Results																				
Packing Order	Item Number	Length	Width	Height	Volume	x1	y1	z1	x2	y2	z2	RCx	RCy	RCz	RCd	Caving Degree	Paste Number	Paste Ratio	Distance	Closest Item	0
1	1	96	98	56	526848	0	0	0	96	98	56	0	0	0	0	0.000	0	0.000	0	0	0
2	2	34	68	33	76296	96	0	0	130	68	33	96	0	0	1	2052.072	3	0.500	103	1	0
3	3	49	116	47	267148	184	0	0	233	116	47	233	0	0	2	2053.662	3	0.500	54	2	0
4	4	45	75	35	118125	139	0	0	184	75	35	184	0	0	2	2054.296	3	0.500	10	2	0
5	5	96	98	56	526848	0	98	0	96	196	56	0	98	0	1	2053.410	3	0.500	88	3	0
6	6	44	83	23	83996	0	0	56	44	83	79	0	0	56	1	2054.180	3	0.500	14	5	0
7	7	52	54	49	137592	0	196	0	52	250	49	0	196	0	1	2051.188	3	0.500	171	1002	0
8	8	92	113	33	343068	0	250	0	92	363	33	0	250	0	1	2029.910	3	0.462	141	1005	0
9	9	88	98	47	405328	96	75	0	184	173	47	184	75	0	2	2629.961	4	0.482	61	8	0
10	10	68	79	44	236368	0	363	0	68	442	44	0	363	0	1	2033.289	3	0.468	165	1005	0
11	11	37	52	28	53872	52	196	0	89	248	28	52	196	0	1	2054.447	3	0.500	2	10	0
12	12	88	98	47	405328	0	442	0	88	540	47	0	442	0	1	2033.206	3	0.467	145	1005	0
13	13	35	59	34	70210	198	116	0	233	175	34	233	116	0	2	2054.161	3	0.500	14	1002	0
14	14	52	54	49	137592	89	196	0	141	250	49	89	196	0	1	2518.826	4	0.294	92	1005	0
15	15	69	103	49	348243	164	0	47	233	103	96	233	0	47	2	2025.194	3	0.452	68	14	0
16	16	59	119	39	273819	174	0	96	233	119	135	233	0	96	2	2033.348	3	0.466	85	1002	0
17	17	69	103	49	348243	164	0	135	233	103	184	233	0	135	2	2034.529	3	0.467	36	1002	0
18	18	53	97	32	164512	180	0	184	233	97	216	233	0	184	2	2054.427	3	0.500	4	1002	0
19	19	88	98	47	405328	145	175	0	233	273	47	233	175	0	2	2004.656	3	0.415	4	14	0
20	20	33	57	29	54549	92	250	0	125	307	29	92	250	0	1	2053.973	3	0.500	20	19	0
21	21	68	79	44	236368	68	363	0	136	442	44	68	442	0	3	2607.600	4	0.444	56	0	0
22	22	69	103	49	348243	164	103	47	233	206	96	233	103	96	6	3780.973	6	0.442	14	0	0

23	23	53	97	32	164512	180	273	0	233	370	32	233	273	0	2	2053.697	3	0.500	44	21	0
24	24	52	54	49	137592	181	206	47	233	260	96	233	206	47	2	2053.725	3	0.500	40	14	0
25	25	96	98	56	526848	137	370	0	233	468	56	233	370	0	2	2001.208	3	0.409	1	21	0
26	26	35	59	34	70210	88	442	0	123	501	34	88	442	0	1	2054.476	3	0.500	1	25	0
27	27	33	41	31	41943	147	329	0	180	370	31	180	370	0	4	2054.155	3	0.500	12	0	0
28	28	49	116	47	267148	184	468	0	233	584	47	233	468	0	2	2053.568	3	0.500	60	26	0
29	29	53	97	32	164512	180	273	32	233	370	64	233	370	32	4	3239.641	5	0.519	14	0	0
30	30	96	98	56	526848	0	83	56	96	181	112	0	83	56	1	1990.476	3	0.392	68	1002	0
31	31	35	59	34	70210	0	0	79	35	59	113	0	0	79	1	2053.918	3	0.500	24	30	0
32	32	45	75	35	118125	188	119	96	233	194	131	233	119	96	2	2054.255	3	0.500	12	1002	0
33	33	52	54	49	137592	132	468	0	184	522	49	184	468	0	2	2041.398	3	0.478	8	26	0
34	34	35	59	34	70210	198	194	96	233	253	130	233	194	96	2	2054.476	3	0.500	1	32	0
35	35	44	83	23	83996	44	0	56	88	83	79	44	83	56	3	3861.945	6	0.582	76	0	0
36	36	33	57	29	54549	35	0	79	68	57	108	35	0	79	1	2053.814	3	0.500	26	1002	0
37	37	88	98	47	405328	0	265	33	88	363	80	0	363	33	3	2000.755	3	0.409	15	0	0
38	38	68	79	44	236368	0	363	44	68	442	88	0	442	44	3	3219.848	5	0.487	69	0	0
39	39	34	68	33	76296	0	442	47	34	510	80	0	442	47	1	2052.189	3	0.500	98	33	0
40	40	37	52	28	53872	52	196	28	89	248	56	52	196	28	1	2689.832	4	0.582	2	38	0
41	41	33	41	31	41943	147	288	0	180	329	31	180	329	0	4	2054.471	3	0.500	1	0	0
42	42	52	54	49	137592	0	196	49	52	250	98	0	196	49	1	2574.726	4	0.386	1	1002	0
43	43	52	54	49	137592	132	522	0	184	576	49	184	522	0	2	2049.686	3	0.493	44	12	0
44	44	52	54	49	137592	0	0	113	52	54	162	0	0	113	1	2019.706	3	0.443	58	1002	0
45	45	34	68	33	76296	34	442	47	68	510	80	34	442	47	1	2052.991	3	0.500	64	43	0
46	46	33	57	29	54549	0	0	162	33	57	191	0	0	162	1	2047.265	3	0.489	29	1002	0
47	47	96	98	56	526848	137	370	56	233	468	112	233	370	56	2	1981.950	3	0.378	69	45	0
48	48	59	119	39	273819	0	442	80	59	561	119	0	442	80	1	1952.791	3	0.327	1	47	0
49	49	33	41	31	41943	147	329	31	180	370	62	180	370	31	4	2054.471	3	0.500	1	0	0
50	50	88	98	47	405328	145	272	64	233	370	111	233	370	64	4	1994.576	3	0.398	12	0	0

51	51	44	83	23	83996	88	501	0	132	584	23	88	501	0	1	2662.907	4	0.538	52	28	0
52	52	33	57	29	54549	0	0	191	33	57	220	0	0	191	1	2764.402	4	0.709	1	46	0
53	53	44	83	23	83996	88	501	23	132	584	46	88	501	23	1	2644.153	4	0.507	52	28	0
54	54	68	79	44	236368	68	363	44	136	442	88	68	363	44	1	2586.651	4	0.407	1	53	0
55	55	33	41	31	41943	92	322	0	125	363	31	92	363	0	3	2054.155	3	0.500	12	0	0
56	56	37	99	30	109890	196	468	47	233	567	77	233	468	47	2	2054.249	3	0.500	12	48	0
57	57	96	98	56	526848	0	265	80	96	363	136	0	363	80	3	1974.974	3	0.365	15	0	0
58	58	34	68	33	76296	0	363	88	34	431	121	0	363	88	1	2054.217	3	0.500	12	54	0
59	59	52	54	49	137592	34	363	88	86	417	137	34	363	88	1	2020.399	3	0.443	26	50	0
60	60	52	54	49	137592	181	468	77	233	522	126	233	468	77	2	1996.268	3	0.404	94	1002	0
61	61	35	59	34	70210	88	442	34	123	501	68	88	501	34	3	3774.806	6	0.431	1	0	0
62	62	33	57	29	54549	96	0	33	129	57	62	96	0	33	1	2032.123	3	0.462	1	1005	0
63	63	69	103	49	348243	164	365	112	233	468	161	233	468	112	4	1995.717	3	0.401	59	0	0

Set 5 - No Look-Ahead Results																				
Packing Order	Item Number	Length	Width	Height	Volume	x1	y1	z1	x2	y2	z2	RCx	RCy	RCz	RCd	Caving Degree	Paste Number	Paste Ratio	Distance	Closest Item	Unloading Cost
1	1	56	71	33	131208	0	0	0	56	71	33	0	0	0	0	0.000	0	0.000	0	0	0
2	2	40	83	36	119520	193	0	0	233	83	36	233	0	0	2	2051.719	3	0.500	137	1	0
3	3	58	109	54	341388	0	71	0	58	180	54	0	71	0	1	2028.002	3	0.458	135	2	0
4	4	77	87	43	288057	116	0	0	193	87	43	193	0	0	2	2037.550	3	0.473	58	3	0
5	5	32	34	31	33728	201	0	36	233	34	67	233	0	36	2	2054.252	3	0.500	8	4	0
6	6	54	88	39	185328	62	0	0	116	88	39	116	0	0	2	2053.317	3	0.498	4	3	0
7	7	37	72	32	85248	196	83	0	233	155	32	233	83	0	2	2054.432	3	0.500	3	6	0
8	8	80	100	72	576000	116	87	0	196	187	72	116	87	0	1	2536.958	4	0.323	37	1005	0
9	9	93	93	28	242172	0	180	0	93	273	28	0	180	0	1	2033.358	3	0.465	24	8	0
10	10	32	34	31	33728	201	155	0	233	189	31	233	155	0	2	2054.345	3	0.500	5	9	0
11	11	54	94	36	182736	0	273	0	54	367	36	0	273	0	1	2039.159	3	0.479	179	1005	0
12	12	73	79	45	259515	0	367	0	73	446	45	0	367	0	1	2020.772	3	0.447	160	1005	0
13	13	75	82	65	399750	0	446	0	75	528	65	0	446	0	1	2023.862	3	0.451	155	1002	0
14	14	55	94	30	155100	54	273	0	109	367	30	54	273	0	1	2640.395	4	0.501	79	13	0
15	15	80	83	57	378480	0	180	28	80	263	85	0	180	28	1	1998.134	3	0.404	10	14	0
16	16	81	109	28	247212	152	189	0	233	298	28	233	189	0	2	2025.371	3	0.452	42	15	0
17	17	32	34	31	33728	201	34	36	233	68	67	233	34	36	2	2054.252	3	0.500	8	1002	0
18	18	55	94	30	155100	0	86	54	55	180	84	0	180	54	3	2053.383	3	0.500	60	0	0
19	19	32	34	31	33728	84	88	0	116	122	31	116	88	0	2	2053.695	3	0.500	26	18	0
20	20	85	94	44	351560	148	298	0	233	392	44	233	298	0	2	2026.732	3	0.454	38	14	0
21	21	80	100	72	576000	153	392	0	233	492	72	233	392	0	2	2022.196	3	0.447	78	13	0
22	22	75	82	65	399750	158	492	0	233	574	65	233	492	0	2	2053.373	3	0.500	83	13	0

23	23	80	83	57	378480	153	309	44	233	392	101	233	392	44	4	2010.652	3	0.427	80	0	0
24	24	54	91	22	108108	179	392	72	233	483	94	233	392	72	2	2054.479	3	0.500	1	23	0
25	25	58	109	54	341388	175	189	28	233	298	82	233	189	28	2	2601.025	4	0.431	10	24	0
26	26	32	34	31	33728	201	155	31	233	189	62	233	189	31	4	3231.436	5	0.505	5	0	0
27	27	80	83	57	378480	0	363	45	80	446	102	0	446	45	3	1980.683	3	0.374	1	0	0
28	28	37	72	32	85248	196	83	32	233	155	64	233	83	32	2	3328.619	5	0.671	3	1002	0
29	29	73	79	45	259515	73	367	0	146	446	45	73	446	45	7	3783.986	6	0.446	1	0	0
30	30	80	100	72	576000	0	446	65	80	546	137	0	446	65	1	1988.509	3	0.389	73	1002	0
31	31	56	71	33	131208	0	0	33	56	71	66	0	71	33	3	3860.941	6	0.577	1	0	0
32	32	77	87	43	288057	75	446	0	152	533	43	75	446	0	1	2044.389	3	0.483	1	30	0
33	33	54	91	22	108108	75	446	43	129	537	65	75	446	65	5	3199.397	5	0.450	1	0	0
34	34	40	108	26	112320	112	190	0	152	298	26	152	298	0	4	2020.825	3	0.443	2	0	0
35	35	73	79	45	259515	80	367	45	153	446	90	80	446	45	3	2633.965	4	0.487	1	0	0
36	36	58	109	54	341388	58	0	39	116	109	93	116	0	39	2	2530.270	4	0.311	2	1004	0
37	37	40	108	26	112320	80	446	65	120	554	91	80	446	65	1	2020.470	3	0.443	33	24	0
38	38	32	34	31	33728	201	155	62	233	189	93	233	189	62	4	3201.685	5	0.454	1	0	0
39	39	40	83	36	119520	116	0	43	156	83	79	116	0	43	1	2054.419	3	0.500	4	1005	0
40	40	54	91	22	108108	0	355	102	54	446	124	0	446	102	3	2034.883	3	0.470	96	0	0
41	41	80	100	72	576000	153	189	82	233	289	154	233	189	82	2	1947.726	3	0.319	20	1002	0
42	42	32	34	31	33728	156	0	43	188	34	74	156	0	43	1	2054.098	3	0.500	13	1005	0
43	43	40	108	26	112320	0	338	124	40	446	150	0	446	124	3	2008.492	3	0.424	70	0	0
44	44	40	108	26	112320	0	446	137	40	554	163	0	446	137	1	2023.135	3	0.449	57	1002	0
45	45	78	104	26	210912	155	392	94	233	496	120	233	392	94	2	1946.297	3	0.318	75	1002	0
46	46	80	83	57	378480	153	309	101	233	392	158	233	392	101	4	1996.306	3	0.401	1	0	0
47	47	78	104	26	210912	155	392	120	233	496	146	233	392	120	2	2053.257	3	0.500	74	1002	0
48	48	32	34	31	33728	201	0	67	233	34	98	233	0	67	2	2054.098	3	0.500	13	1005	0
49	49	75	82	65	399750	158	392	146	233	474	211	233	392	146	2	1983.044	3	0.378	9	1002	0
50	50	58	109	54	341388	0	71	84	58	180	138	0	180	84	3	2565.291	4	0.372	71	0	0

51	51	56	71	33	131208	0	0	66	56	71	99	0	0	66	1	2671.648	4	0.551	2	1002	0
52	52	58	109	54	341388	0	180	85	58	289	139	0	180	85	1	2023.822	3	0.449	50	1002	0
53	53	40	83	36	119520	193	309	158	233	392	194	233	392	158	4	2052.457	3	0.497	26	0	0
54	54	56	71	33	131208	0	0	99	56	71	132	0	71	99	3	3885.091	6	0.619	1	0	0
55	55	40	83	36	119520	153	309	158	193	392	194	193	392	158	4	2044.275	3	0.483	26	0	0
56	56	85	94	44	351560	0	86	138	85	180	182	0	180	138	3	1938.900	3	0.304	38	0	0
57	57	54	94	36	182736	0	180	139	54	274	175	0	180	139	1	2053.707	3	0.500	45	1002	0
58	58	75	82	65	399750	116	0	79	191	82	144	116	0	79	1	1927.812	3	0.284	10	1005	0

Set 6 - No Look-Ahead Results																				
Packing Order	Item Number	Length	Width	Height	Volume	x1	y1	z1	x2	y2	z2	RCx	RCy	RCz	RCd	Caving Degree	Paste Number	Paste Ratio	Distance	Closest Item	Unloading Cost
1	1	33	42	21	29106	0	0	0	33	42	21	0	0	0	0	0.000	0	0.000	0	0	0
2	2	61	71	52	225212	172	0	0	233	71	52	233	0	0	2	2052.215	3	0.500	139	1	0
3	3	58	62	30	107880	114	0	0	172	62	30	172	0	0	2	2052.777	3	0.500	82	1	0
4	4	75	75	36	202500	158	71	0	233	146	36	233	71	0	2	2038.392	3	0.477	158	1004	0
5	5	80	114	44	401280	153	146	0	233	260	44	233	146	0	2	2038.795	3	0.477	153	1004	0
6	6	75	75	36	202500	158	71	36	233	146	72	233	146	36	4	2609.996	4	0.448	71	0	0
7	7	44	68	27	80784	189	0	52	233	68	79	233	0	52	2	2054.454	3	0.500	2	6	0
8	8	67	72	56	270144	166	260	0	233	332	56	233	260	0	2	2033.247	3	0.468	164	1002	0
9	9	61	71	52	225212	111	0	30	172	71	82	172	0	30	2	2580.587	4	0.398	74	1004	0
10	10	73	78	40	227760	160	332	0	233	410	40	233	332	0	2	2045.877	3	0.490	160	1004	0
11	11	54	70	37	139860	179	410	0	233	480	37	233	410	0	2	2051.052	3	0.500	179	1004	0
12	12	63	69	46	199962	170	480	0	233	549	46	233	480	0	2	2026.240	3	0.457	170	1004	0
13	13	45	81	34	123930	188	146	44	233	227	78	233	146	44	2	2043.824	3	0.483	34	1002	0
14	14	84	86	45	325080	0	42	0	84	128	45	0	42	0	1	1993.179	3	0.396	28	13	0
15	15	51	65	50	165750	0	128	0	51	193	50	0	128	0	1	2044.432	3	0.486	102	13	0
16	16	39	84	22	72072	119	62	0	158	146	22	158	146	0	4	3814.151	6	0.498	1	0	0
17	17	51	65	50	165750	0	193	0	51	258	50	0	193	0	1	2054.482	3	0.500	1	15	0
18	18	51	65	50	165750	0	258	0	51	323	50	0	258	0	1	2052.643	3	0.500	102	1002	0
19	19	68	86	33	192984	51	128	0	119	214	33	51	128	0	1	2620.530	4	0.465	34	18	0
20	20	80	114	44	401280	0	323	0	80	437	44	0	323	0	1	2032.204	3	0.464	80	12	0
21	21	63	69	46	199962	0	437	0	63	506	46	0	437	0	1	2049.121	3	0.494	107	12	0
22	22	58	62	30	107880	51	214	0	109	276	30	51	214	0	1	2053.576	3	0.500	44	1005	0

23	23	84	86	45	325080	0	42	45	84	128	90	0	128	45	3	1983.271	3	0.379	1	0	0
24	24	39	84	22	72072	0	128	50	39	212	72	0	128	50	1	2053.395	3	0.500	46	18	0
25	25	56	81	46	208656	0	506	0	56	587	46	0	506	0	1	2052.578	3	0.500	114	12	0
26	26	33	42	21	29106	33	0	0	66	42	21	33	42	0	3	3889.512	6	0.626	1	0	0
27	27	39	84	22	72072	0	212	50	39	296	72	0	212	50	1	2051.448	3	0.500	127	13	0
28	28	58	62	30	107880	175	332	40	233	394	70	233	332	40	2	2019.575	3	0.444	86	1002	0
29	29	88	94	50	413600	0	323	44	88	417	94	0	323	44	1	1972.358	3	0.361	20	28	0
30	30	61	71	52	225212	172	0	79	233	71	131	233	0	79	2	2610.533	4	0.450	88	1002	0
31	31	63	69	46	199962	109	0	82	172	69	128	172	0	82	2	2050.202	3	0.493	24	1002	0
32	32	84	86	45	325080	149	0	131	233	86	176	233	0	131	2	1996.774	3	0.403	44	1002	0
33	33	88	94	50	413600	63	437	0	151	531	50	63	437	0	1	1966.749	3	0.351	20	12	0
34	34	51	65	50	165750	182	267	56	233	332	106	233	332	56	4	1994.635	3	0.399	41	0	0
35	35	73	78	40	227760	160	0	176	233	78	216	233	0	176	2	2054.435	3	0.500	4	1002	0
36	36	75	75	36	202500	158	71	72	233	146	108	233	146	72	4	3801.862	6	0.477	2	0	0
37	37	44	68	27	80784	109	214	0	153	282	27	109	214	0	1	2649.080	4	0.513	14	34	0
38	38	45	81	34	123930	80	356	0	125	437	34	80	437	0	3	2054.299	3	0.500	10	0	0
39	39	45	81	34	123930	188	146	78	233	227	112	233	146	78	2	2047.015	3	0.489	41	34	0
40	40	52	59	22	67496	181	71	108	233	130	130	233	71	108	2	2054.451	3	0.500	2	39	0
41	41	61	71	52	225212	172	332	70	233	403	122	233	332	70	2	1998.824	3	0.408	84	29	0
42	42	68	86	33	192984	51	128	33	119	214	66	51	128	33	1	1986.519	3	0.384	1	1005	0
43	43	52	108	45	252720	0	128	72	52	236	117	0	128	72	1	1988.818	3	0.390	87	1002	0
44	44	54	70	37	139860	179	410	37	233	480	74	233	480	37	4	3181.236	5	0.420	1	0	0
45	45	52	59	22	67496	181	480	46	233	539	68	233	480	46	2	2053.763	3	0.500	30	33	0
46	46	80	114	44	401280	0	14	90	80	128	134	0	128	90	3	1980.569	3	0.374	14	0	0
47	47	33	42	21	29106	0	0	21	33	42	42	0	42	21	3	3889.512	6	0.626	1	0	0
48	48	67	72	56	270144	0	128	117	67	200	173	0	128	117	1	1967.804	3	0.354	47	1002	0
49	49	67	72	56	270144	0	56	134	67	128	190	0	128	134	3	2027.521	3	0.455	30	0	0
50	50	51	65	50	165750	0	236	72	51	301	122	0	236	72	1	2014.494	3	0.433	22	1002	0

51	51	84	86	45	325080	0	128	173	84	214	218	0	128	173	1	1955.000	3	0.331	2	1002	0

Set 7 - No Look-Ahead Results																				
Packing Order	Item Number	Length	Width	Height	Volume	x1	y1	z1	x2	y2	z2	RCx	RCy	RCz	RCd	Caving Degree	Paste Number	Paste Ratio	Distance	Closest Item	Unloading Cost
1	1	79	118	51	475422	0	0	0	79	118	51	0	0	0	0	0.000	0	0.000	0	0	0
2	2	61	91	61	338611	172	0	0	233	91	61	233	0	0	2	2053.180	3	0.500	92	1	0
3	3	63	103	59	382851	0	0	51	63	103	110	0	0	51	1	2053.013	3	0.500	108	2	0
4	4	70	84	35	205800	79	0	0	149	84	35	79	0	0	1	2054.127	3	0.500	22	2	0
5	5	57	76	36	155952	0	0	110	57	76	146	0	0	110	1	2053.125	3	0.500	74	1002	0
6	6	70	84	35	205800	0	118	0	70	202	35	0	118	0	1	2051.739	3	0.500	163	1005	0
7	7	82	94	66	508728	151	91	0	233	185	66	233	91	0	2	2027.915	3	0.456	72	6	0
8	8	42	42	32	56448	0	0	146	42	42	178	0	0	146	1	2053.405	3	0.500	42	1002	0
9	9	55	64	43	151360	178	0	61	233	64	104	233	0	61	2	2053.993	3	0.500	27	1002	0
10	10	79	118	51	475422	154	185	0	233	303	51	233	185	0	2	2053.424	3	0.500	84	6	0
11	11	66	80	52	274560	167	303	0	233	383	52	233	303	0	2	2050.426	3	0.497	167	1004	0
12	12	57	76	36	155952	176	383	0	233	459	36	233	383	0	2	2051.230	3	0.500	176	1004	0
13	13	32	77	30	73920	0	202	0	32	279	30	0	202	0	1	2051.593	3	0.500	122	1002	0
14	14	77	78	64	384384	156	0	104	233	78	168	233	0	104	2	2007.970	3	0.422	52	1002	0
15	15	66	80	52	274560	167	0	168	233	80	220	233	0	168	2	2756.959	4	0.700	125	8	0
16	16	100	101	77	777700	133	459	0	233	560	77	233	459	0	2	1988.242	3	0.390	133	1004	0
17	17	73	109	23	183011	160	185	51	233	294	74	233	185	51	2	2040.244	3	0.476	8	1002	0
18	18	57	76	36	155952	176	383	36	233	459	72	233	459	36	4	3256.879	5	0.551	80	0	0
19	19	61	117	57	406809	0	279	0	61	396	57	0	279	0	1	2011.743	3	0.427	1	18	0
20	20	61	117	57	406809	0	396	0	61	513	57	0	396	0	1	2053.528	3	0.500	72	18	0
21	21	32	77	30	73920	32	202	0	64	279	30	32	279	0	3	3863.181	6	0.581	1	0	0
22	22	60	95	55	313500	173	90	66	233	185	121	233	185	66	4	1993.663	3	0.397	12	0	0

23	23	61	88	31	166408	172	185	74	233	273	105	233	185	74	2	2053.571	3	0.498	1	17	0
24	24	66	80	52	274560	167	303	52	233	383	104	233	383	52	4	2000.611	3	0.408	8	0	0
25	25	32	86	31	85312	201	185	105	233	271	136	233	185	105	2	2030.614	3	0.463	84	1002	0
26	26	61	91	61	338611	0	118	35	61	209	96	0	118	35	1	1990.689	3	0.393	70	1002	0
27	27	55	64	43	151360	0	513	0	55	577	43	0	513	0	1	2053.036	3	0.500	78	16	0
28	28	61	91	61	338611	172	94	121	233	185	182	233	185	121	4	1988.325	3	0.388	14	0	0
29	29	79	118	51	475422	75	185	0	154	303	51	154	185	0	2	1995.754	3	0.400	1	1004	0
30	30	57	76	36	155952	176	383	72	233	459	108	233	459	72	4	3229.729	5	0.505	88	0	0
31	31	55	98	44	237160	96	87	0	151	185	44	151	185	0	4	2049.125	3	0.491	3	0	0
32	32	82	94	66	508728	85	303	0	167	397	66	167	303	0	2	2021.484	3	0.444	24	1004	0
33	33	32	86	31	85312	201	185	136	233	271	167	233	185	136	2	2054.477	3	0.500	1	25	0
34	34	70	84	35	205800	163	459	77	233	543	112	233	459	77	2	2034.884	3	0.470	108	1002	0
35	35	77	78	64	384384	79	0	35	156	78	99	79	0	35	1	1975.371	3	0.365	5	1005	0
36	36	66	80	52	274560	167	303	104	233	383	156	233	383	104	4	1979.478	3	0.373	30	0	0
37	37	58	64	52	193024	175	383	108	233	447	160	233	383	108	2	2045.653	3	0.485	12	34	0
38	38	66	80	52	274560	167	303	156	233	383	208	233	383	156	4	1979.846	3	0.373	12	0	0

Set 8 - No Look-Ahead Results																				
Packing Order	Item Number	Length	Width	Height	Volume	x1	y1	z1	x2	y2	z2	RCx	RCy	RCz	RCd	Caving Degree	Paste Number	Paste Ratio	Distance	Closest Item	Unloading Cost
1	1	58	75	57	247950	0	0	0	58	75	57	0	0	0	0	0.000	0	0.000	0	0	0
2	2	81	89	62	446958	152	0	0	233	89	62	233	0	0	2	2053.271	3	0.500	94	1	0
3	3	74	115	44	374440	159	89	0	233	204	44	233	89	0	2	2052.294	3	0.500	159	1004	0
4	4	84	118	27	267624	149	204	0	233	322	27	233	204	0	2	2047.031	3	0.491	149	1004	0
5	5	60	67	38	152760	58	0	0	118	67	38	58	0	0	1	2053.864	3	0.500	34	1005	0
6	6	74	115	44	374440	85	89	0	159	204	44	159	204	0	4	3181.618	5	0.421	21	0	0
7	7	60	67	38	152760	173	0	62	233	67	100	233	0	62	2	2052.255	3	0.500	120	1002	0
8	8	54	95	28	143640	0	75	0	54	170	28	0	75	0	1	2053.908	3	0.500	31	6	0
9	9	46	55	31	78430	187	0	100	233	55	131	233	0	100	2	2052.421	3	0.500	89	1002	0
10	10	46	55	31	78430	187	0	131	233	55	162	233	0	131	2	2053.145	3	0.500	58	1002	0
11	11	76	81	55	338580	0	0	57	76	81	112	0	0	57	1	2017.573	3	0.439	76	1002	0
12	12	84	118	27	267624	149	322	0	233	440	27	233	322	0	2	2052.188	3	0.500	149	1004	0
13	13	76	81	55	338580	0	0	112	76	81	167	0	0	112	1	2054.486	3	0.500	1	11	0
14	14	85	90	59	451350	0	170	0	85	260	59	0	170	0	1	2607.895	4	0.444	64	12	0
15	15	37	57	30	63270	0	0	167	37	57	197	0	0	167	1	2053.923	3	0.500	23	1002	0
16	16	33	40	23	30360	0	0	197	33	40	220	0	0	197	1	2764.272	4	0.720	200	1005	0
17	17	76	81	55	338580	0	260	0	76	341	55	0	260	0	1	2053.453	3	0.500	73	12	0
18	18	85	90	59	451350	0	341	0	85	431	59	0	341	0	1	2040.032	3	0.477	64	12	0
19	19	43	74	38	120916	0	431	0	43	505	38	0	431	0	1	2052.356	3	0.500	106	12	0
20	20	48	78	46	172224	0	505	0	48	583	46	0	505	0	1	2033.713	3	0.470	174	1002	0
21	21	53	67	49	173999	85	204	0	138	271	49	85	204	0	1	2029.461	3	0.457	1	18	0
22	22	37	57	30	63270	37	0	167	74	57	197	37	0	167	1	2054.475	3	0.500	1	15	0

23	23	33	40	23	30360	33	0	197	66	40	220	33	0	220	5	3951.795	6	0.732	1	0	0
24	24	84	118	27	267624	149	440	0	233	558	27	233	440	0	2	2052.933	3	0.500	101	20	0
25	25	84	118	27	267624	149	204	27	233	322	54	233	204	27	2	2038.300	3	0.473	10	24	0
26	26	33	40	23	30360	118	0	0	151	40	23	118	0	0	1	2054.468	3	0.500	1	1005	0
27	27	76	81	55	338580	0	260	55	76	341	110	0	341	55	3	3156.121	5	0.379	110	0	0
28	28	85	90	59	451350	0	341	59	85	431	118	0	341	59	1	2034.572	3	0.468	102	1002	0
29	29	72	72	51	264384	0	188	59	72	260	110	0	260	59	3	2052.817	3	0.500	108	0	0
30	30	72	72	51	264384	161	322	27	233	394	78	233	322	27	2	2013.301	3	0.431	46	28	0
31	31	48	78	46	172224	185	394	27	233	472	73	233	394	27	2	2052.703	3	0.500	100	28	0
32	32	76	81	55	338580	157	472	27	233	553	82	233	472	27	2	2013.805	3	0.433	109	20	0
33	33	72	93	35	234360	161	229	54	233	322	89	233	322	54	4	2035.844	3	0.468	1	0	0
34	34	99	104	74	761904	134	89	44	233	193	118	233	89	44	2	1986.355	3	0.384	11	33	0
35	35	60	67	38	152760	43	431	0	103	498	38	43	431	0	1	2031.656	3	0.461	8	32	0
36	36	58	75	57	247950	0	95	28	58	170	85	0	170	28	3	2009.801	3	0.424	14	0	0
37	37	98	99	33	320166	0	242	110	98	341	143	0	341	110	3	1966.283	3	0.352	77	0	0
38	38	99	104	74	761904	0	341	118	99	445	192	0	341	118	1	1966.994	3	0.351	28	1002	0
39	39	46	55	31	78430	187	0	162	233	55	193	233	0	162	2	2054.477	3	0.500	1	1002	0
40	40	33	40	23	30360	0	202	110	33	242	133	0	242	110	3	2054.468	3	0.500	1	0	0
41	41	54	95	28	143640	0	246	143	54	341	171	0	341	143	3	2053.564	3	0.500	49	0	0
42	42	48	78	46	172224	137	394	27	185	472	73	185	472	27	4	3205.492	5	0.462	34	0	0
43	43	74	79	35	204610	159	322	78	233	401	113	233	322	78	2	1990.024	3	0.390	1	1002	0
44	44	37	57	30	63270	0	431	38	37	488	68	0	431	38	1	2054.349	3	0.500	6	42	0
45	45	72	93	35	234360	161	229	89	233	322	124	233	322	89	4	2033.582	3	0.465	36	0	0
46	46	72	72	51	264384	161	322	113	233	394	164	233	322	113	2	1986.156	3	0.385	56	1002	0
47	47	54	95	28	143640	179	227	124	233	322	152	233	322	124	4	2048.090	3	0.491	68	0	0
48	48	72	72	51	264384	37	431	38	109	503	89	37	431	38	1	1962.680	3	0.344	2	42	0
49	49	72	72	51	264384	161	250	152	233	322	203	233	322	152	4	1958.089	3	0.336	17	0	0
50	50	60	67	38	152760	173	322	164	233	389	202	233	322	164	2	2054.163	3	0.500	18	1002	0

51	51	84	118	27	267624	0	223	171	84	341	198	0	341	171	3	1952.161	3	0.326	22	0	0
52	52	84	118	27	267624	0	341	192	84	459	219	0	341	192	1	1998.329	3	0.404	1	1002	0

Set 9 - No Look-Ahead Results																				
Packing Order	Item Number	Length	Width	Height	Volume	x1	y1	z1	x2	y2	z2	RCx	RCy	RCz	RCd	Caving Degree	Paste Number	Paste Ratio	Distance	Closest Item	Unloading Cost
1	1	44	92	29	117392	0	0	0	44	92	29	0	0	0	0	0.000	0	0.000	0	0	0
2	2	76	78	68	403104	157	0	0	233	78	68	233	0	0	2	2052.970	3	0.500	113	1	0
3	3	48	73	42	147168	109	0	0	157	73	42	157	0	0	2	2053.269	3	0.500	65	1	0
4	4	76	80	54	328320	157	78	0	233	158	54	233	78	0	2	2052.862	3	0.500	113	1	0
5	5	70	90	63	396900	163	158	0	233	248	63	233	158	0	2	2041.075	3	0.481	157	1002	0
6	6	61	94	54	309636	172	248	0	233	342	54	233	248	0	2	2052.046	3	0.500	166	1002	0
7	7	75	114	69	589950	158	342	0	233	456	69	233	342	0	2	2027.130	3	0.456	151	1002	0
8	8	44	91	28	112112	44	0	0	88	91	28	44	0	0	1	2054.064	3	0.500	21	1005	0
9	9	43	89	27	103329	0	0	29	43	89	56	0	0	29	1	2053.094	3	0.500	66	1002	0
10	10	76	80	54	328320	157	78	54	233	158	108	233	158	54	4	2591.601	4	0.417	78	0	0
11	11	55	57	48	150480	178	0	68	233	57	116	233	0	68	2	2054.086	3	0.500	22	10	0
12	12	61	94	54	309636	172	248	54	233	342	108	233	342	54	4	3189.275	5	0.435	90	0	0
13	13	50	69	45	155250	183	158	63	233	227	108	233	158	63	2	2054.091	3	0.500	22	12	0
14	14	55	57	48	150480	178	0	116	233	57	164	233	0	116	2	2053.447	3	0.500	56	1002	0
15	15	48	73	42	147168	109	73	0	157	146	42	157	73	0	2	2054.481	3	0.500	1	10	0
16	16	44	92	29	117392	189	342	69	233	434	98	233	342	69	2	2054.480	3	0.500	1	7	0
17	17	40	107	39	166920	193	456	0	233	563	39	233	456	0	2	2051.213	3	0.500	181	1002	0
18	18	46	99	39	177606	147	456	0	193	555	39	193	456	0	2	2039.551	3	0.479	147	1004	0
19	19	57	70	37	147630	176	456	39	233	526	76	233	456	39	2	2038.298	3	0.477	144	1002	0
20	20	66	92	44	267168	0	92	0	66	184	44	0	92	0	1	2017.145	3	0.438	43	1005	0
21	21	46	99	39	177606	0	184	0	46	283	39	0	184	0	1	2052.419	3	0.500	117	1002	0
22	22	48	73	42	147168	0	283	0	48	356	42	0	283	0	1	2044.828	3	0.487	110	1002	0

23	23	70	90	63	396900	0	356	0	70	446	63	0	356	0	1	2010.420	3	0.427	87	19	0
24	24	44	91	28	112112	0	446	0	44	537	28	0	446	0	1	2052.364	3	0.500	103	19	0
25	25	43	89	27	103329	0	0	56	43	89	83	0	0	56	1	2054.479	3	0.500	1	1002	0
26	26	76	80	54	328320	0	0	83	76	80	137	0	0	83	1	1999.903	3	0.409	81	1002	0
27	27	46	99	39	177606	46	184	0	92	283	39	46	283	0	3	3201.187	5	0.455	55	0	0
28	28	40	107	39	166920	0	446	28	40	553	67	0	446	28	1	2029.107	3	0.460	107	19	0
29	29	44	91	28	112112	113	0	42	157	91	70	157	0	42	2	2047.643	3	0.490	47	1004	0
30	30	66	92	44	267168	0	0	137	66	92	181	0	0	137	1	2036.046	3	0.470	39	1002	0
31	31	76	78	68	403104	96	264	0	172	342	68	172	342	0	4	1978.995	3	0.371	4	0	0
32	32	55	57	48	150480	103	342	0	158	399	48	158	342	0	2	2054.481	3	0.500	1	1004	0
33	33	75	114	69	589950	0	332	63	75	446	132	0	446	63	3	1954.552	3	0.330	20	0	0
34	34	61	94	54	309636	0	446	67	61	540	121	0	446	67	1	2011.973	3	0.430	98	1002	0
35	35	61	84	33	169092	0	0	181	61	84	214	0	0	181	1	2054.391	3	0.500	6	1002	0
36	36	57	70	37	147630	176	0	164	233	70	201	233	0	164	2	2025.260	3	0.451	19	1002	0
37	37	48	73	42	147168	48	283	0	96	356	42	48	356	0	3	3335.757	5	0.683	6	0	0
38	38	53	72	37	141192	0	446	121	53	518	158	0	446	121	1	2005.395	3	0.418	62	1002	0
39	39	48	73	42	147168	0	373	132	48	446	174	0	446	132	3	2027.376	3	0.455	46	0	0
40	40	76	80	54	328320	0	184	39	76	264	93	0	184	39	1	1977.840	3	0.370	20	1002	0
41	41	85	94	39	311610	0	90	44	85	184	83	0	184	44	3	2008.694	3	0.422	2	0	0
42	42	75	114	69	589950	97	228	68	172	342	137	172	342	68	4	1890.023	3	0.220	20	0	0
43	43	76	78	68	403104	0	106	83	76	184	151	0	184	83	3	1975.423	3	0.366	14	0	0
44	44	76	80	54	328320	0	184	93	76	264	147	0	184	93	1	2054.210	3	0.500	20	42	0
45	45	55	57	48	150480	103	399	0	158	456	48	158	399	0	2	2656.275	4	0.525	1	1004	0
46	46	43	89	27	103329	66	95	0	109	184	27	66	184	0	3	2678.941	4	0.564	4	0	0
47	47	48	73	42	147168	109	146	0	157	219	42	109	146	0	1	2588.880	4	0.411	6	1005	0
48	48	85	94	39	311610	62	456	0	147	550	39	147	456	0	2	2022.887	3	0.447	18	1004	0
49	49	76	78	68	403104	0	184	147	76	262	215	0	184	147	1	1967.385	3	0.352	5	1002	0
50	50	66	92	44	267168	0	92	151	66	184	195	0	184	151	3	2665.173	4	0.541	8	0	0

51	51	78	84	28	183456	98	456	39	176	540	67	176	456	39	2	2012.088	3	0.429	38	1004	0
52	52	57	70	37	147630	101	342	48	158	412	85	158	342	48	2	2011.447	3	0.427	26	51	0
53	53	70	90	63	396900	163	342	98	233	432	161	233	342	98	2	1949.969	3	0.323	59	1002	0
54	54	46	99	39	177606	187	243	108	233	342	147	233	342	108	4	2046.281	3	0.486	16	0	0
55	55	50	69	45	155250	107	91	42	157	160	87	157	91	42	2	2012.557	3	0.429	22	1004	0
56	56	61	84	33	169092	172	258	147	233	342	180	233	342	147	4	1982.127	3	0.378	40	0	0
57	57	57	70	37	147630	176	342	161	233	412	198	233	342	161	2	2019.427	3	0.441	22	1002	0
58	58	55	57	48	150480	0	316	132	55	373	180	0	373	132	3	2000.719	3	0.408	1	0	0
59	59	44	92	29	117392	189	250	180	233	342	209	233	342	180	4	2021.958	3	0.445	11	0	0
60	60	57	99	47	265221	0	446	158	57	545	205	0	446	158	1	1969.711	3	0.356	15	1002	0
61	61	61	84	33	169092	44	0	28	105	84	61	44	0	28	1	1932.514	3	0.292	4	1005	0
62	62	57	70	37	147630	0	376	174	57	446	211	0	446	174	3	2021.592	3	0.444	4	0	0
63	63	61	84	33	169092	115	456	67	176	540	100	176	456	67	2	1931.503	3	0.292	55	1004	0

Set 10 - No Look-Ahead Results																				
Packing Order	Item Number	Length	Width	Height	Volume	x1	y1	z1	x2	y2	z2	RCx	RCy	RCz	RCd	Caving Degree	Paste Number	Paste Ratio	Distance	Closest Item	Unloading Cost
1	1	50	76	43	163400	0	0	0	50	76	43	0	0	0	0	0.000	0	0.000	0	0	0
2	2	75	90	25	168750	158	0	0	233	90	25	233	0	0	2	2052.546	3	0.500	108	1	0
3	3	64	74	35	165760	50	0	0	114	74	35	50	0	0	1	2053.699	3	0.500	44	2	0
4	4	45	53	36	85860	188	0	25	233	53	61	233	0	25	2	2052.823	3	0.500	74	3	0
5	5	52	80	42	174720	0	76	0	52	156	42	0	76	0	1	2050.063	3	0.496	106	2	0
6	6	66	68	31	139128	167	90	0	233	158	31	233	90	0	2	2038.832	3	0.477	115	5	0
7	7	76	95	60	433200	0	156	0	76	251	60	0	156	0	1	2013.403	3	0.432	91	6	0
8	8	60	64	47	180480	0	251	0	60	315	47	0	251	0	1	2051.439	3	0.500	173	1005	0
9	9	47	61	34	97478	0	0	43	47	61	77	0	0	43	1	2052.414	3	0.500	96	1002	0
10	10	28	39	24	26208	114	0	0	142	39	24	114	0	0	1	2053.961	3	0.500	16	9	0
11	11	60	64	47	180480	0	315	0	60	379	47	0	315	0	1	2051.439	3	0.500	173	1005	0
12	12	60	64	47	180480	0	379	0	60	443	47	0	379	0	1	2051.439	3	0.500	173	1005	0
13	13	60	92	42	231840	0	443	0	60	535	42	0	443	0	1	2051.684	3	0.500	173	1005	0
14	14	90	99	32	285120	143	158	0	233	257	32	233	158	0	2	2037.118	3	0.472	67	1004	0
15	15	60	64	47	180480	173	257	0	233	321	47	233	257	0	2	2025.178	3	0.453	113	1004	0
16	16	52	80	42	174720	0	76	42	52	156	84	0	156	42	3	2604.919	4	0.438	16	0	0
17	17	45	53	36	85860	0	0	77	45	53	113	0	0	77	1	2053.956	3	0.500	24	16	0
18	18	69	82	46	260268	52	74	0	121	156	46	52	156	0	3	2640.898	4	0.500	34	0	0
19	19	96	102	59	577728	137	321	0	233	423	59	233	321	0	2	2014.705	3	0.434	77	13	0
20	20	90	99	32	285120	143	423	0	233	522	32	233	423	0	2	2053.239	3	0.500	83	13	0
21	21	40	53	36	76320	76	156	0	116	209	36	76	156	0	1	2053.863	3	0.500	27	1005	0
22	22	96	102	59	577728	137	423	32	233	525	91	233	423	32	2	1999.533	3	0.408	77	13	0

23	23	34	117	28	111384	60	251	0	94	368	28	60	251	0	1	2036.266	3	0.469	10	22	0
24	24	52	80	42	174720	181	343	59	233	423	101	233	423	59	4	2036.644	3	0.473	119	0	0
25	25	78	102	49	389844	155	155	32	233	257	81	233	257	32	4	1997.455	3	0.404	34	0	0
26	26	60	64	47	180480	113	257	0	173	321	47	173	321	0	4	3231.807	5	0.506	19	0	0
27	27	65	94	37	226070	0	156	60	65	250	97	0	156	60	1	2024.708	3	0.452	90	25	0
28	28	76	95	60	433200	157	423	91	233	518	151	233	423	91	2	1985.754	3	0.384	69	1002	0
29	29	78	102	49	389844	155	321	101	233	423	150	233	423	101	4	1984.506	3	0.382	70	0	0
30	30	69	82	46	260268	60	368	0	129	450	46	60	368	0	1	2001.981	3	0.411	8	29	0
31	31	90	99	32	285120	143	324	150	233	423	182	233	423	150	4	1975.593	3	0.367	38	0	0
32	32	66	68	31	139128	60	450	0	126	518	31	60	450	0	1	2054.268	3	0.500	12	28	0
33	33	34	120	26	106080	0	251	47	34	371	73	0	251	47	1	2038.284	3	0.473	8	1002	0
34	34	96	102	59	577728	137	423	151	233	525	210	233	423	151	2	1979.946	3	0.373	10	1002	0
35	35	69	82	46	260268	52	74	46	121	156	92	52	156	46	3	1978.031	3	0.371	34	0	0
36	36	34	117	28	111384	60	251	28	94	368	56	60	368	28	3	3194.826	5	0.443	6	0	0

Set 11 - No Look-Ahead Results																				
Packing Order	Item Number	Length	Width	Height	Volume	x1	y1	z1	x2	y2	z2	RCx	RCy	RCz	RCd	Caving Degree	Paste Number	Paste Ratio	Distance	Closest Item	Unloading Cost
1	1	76	109	42	347928	0	0	0	76	109	42	0	0	0	0	0.000	0	0.000	0	0	0
2	2	56	118	22	145376	177	0	0	233	118	22	233	0	0	2	2052.579	3	0.500	101	1	0
3	3	76	109	42	347928	0	109	0	76	218	42	0	109	0	1	2054.486	3	0.500	1	2	0
4	4	53	65	30	103350	76	0	0	129	65	30	76	0	0	1	2053.541	3	0.500	45	3	0
5	5	69	91	26	163254	0	0	42	69	91	68	0	0	42	1	2054.171	3	0.500	18	3	0
6	6	76	109	42	347928	0	218	0	76	327	42	0	218	0	1	2052.268	3	0.500	157	1005	0
7	7	78	85	20	132600	0	327	0	78	412	20	0	327	0	1	2053.293	3	0.498	1	6	0
8	8	32	52	32	53248	201	0	22	233	52	54	233	0	22	2	2052.586	3	0.500	72	1002	0
9	9	65	72	37	173160	0	0	68	65	72	105	0	0	68	1	2052.437	3	0.500	115	1002	0
10	10	79	91	66	474474	0	0	105	79	91	171	0	0	105	1	2013.870	3	0.432	49	1002	0
11	11	63	72	42	190512	0	0	171	63	72	213	0	0	171	1	2054.378	3	0.500	7	1002	0
12	12	74	74	60	328560	0	91	42	74	165	102	0	91	42	1	2000.361	3	0.408	3	10	0
13	13	59	84	54	267624	0	165	42	59	249	96	0	165	42	1	2052.576	3	0.500	124	1002	0
14	14	74	74	60	328560	0	249	42	74	323	102	0	249	42	1	2027.153	3	0.456	118	1002	0
15	15	63	83	54	282366	0	327	20	63	410	74	0	327	20	1	2007.152	3	0.423	146	1002	0
16	16	67	105	43	302505	76	65	0	143	170	43	76	65	0	1	2026.093	3	0.452	1	10	0
17	17	78	85	20	132600	0	412	0	78	497	20	0	412	0	1	2051.460	3	0.500	155	1005	0
18	18	39	48	25	46800	129	0	0	168	48	25	129	0	0	1	2054.223	3	0.500	10	16	0
19	19	32	71	26	59072	0	410	20	32	481	46	0	410	20	1	2054.474	3	0.500	1	15	0
20	20	80	106	59	500320	153	118	0	233	224	59	233	118	0	2	2001.751	3	0.410	10	1004	0
21	21	63	72	42	190512	76	170	0	139	242	42	76	170	0	1	2054.257	3	0.500	14	20	0
22	22	78	85	20	132600	76	242	0	154	327	20	76	327	0	3	3222.634	5	0.490	1	0	0

23	23	69	91	26	163254	164	224	0	233	315	26	233	224	0	2	2054.317	3	0.500	10	22	0
24	24	31	69	28	59892	202	224	26	233	293	54	233	224	26	2	2052.890	3	0.500	63	21	0
25	25	39	48	25	46800	194	70	22	233	118	47	233	118	22	4	2054.001	3	0.500	18	0	0
26	26	80	106	59	500320	78	327	0	158	433	59	78	327	0	1	1942.908	3	0.312	75	1005	0
27	27	59	84	54	267624	0	165	96	59	249	150	0	249	96	3	3170.186	5	0.403	70	0	0
28	28	67	105	43	302505	166	315	0	233	420	43	233	315	0	2	2031.216	3	0.461	8	26	0
29	29	69	91	26	163254	164	420	0	233	511	26	233	420	0	2	2052.928	3	0.498	6	26	0
30	30	80	106	59	500320	0	249	102	80	355	161	0	249	102	1	1979.952	3	0.374	59	1002	0
31	31	74	74	60	328560	0	91	102	74	165	162	0	165	102	3	3869.750	6	0.593	19	0	0
32	32	39	48	25	46800	163	224	26	202	272	51	202	224	26	2	2050.991	3	0.494	1	30	0
33	33	78	85	20	132600	76	242	20	154	327	40	76	242	20	1	2677.686	4	0.562	1	32	0
34	34	65	72	37	173160	168	511	0	233	583	37	233	511	0	2	2029.960	3	0.463	168	1004	0
35	35	79	91	66	474474	78	433	0	157	524	66	78	433	0	1	1970.258	3	0.357	6	34	0
36	36	78	85	20	132600	0	497	0	78	582	20	0	497	0	1	2657.506	4	0.527	1	34	0
37	37	63	74	61	284382	170	420	26	233	494	87	233	420	26	2	1991.826	3	0.394	12	35	0
38	38	76	109	42	347928	0	91	162	76	200	204	0	91	162	1	1957.085	3	0.334	16	1002	0
39	39	53	65	30	103350	76	0	30	129	65	60	76	65	30	3	3799.512	6	0.473	1	0	0

Set 12 - No Look-Ahead Results																				
Packing Order	Item Number	Length	Width	Height	Volume	x1	y1	z1	x2	y2	z2	RCx	RCy	RCz	RCd	Caving Degree	Paste Number	Paste Ratio	Distance	Closest Item	Unloading Cost
1	1	87	112	23	224112	0	0	0	87	112	23	0	0	0	0	0.000	0	0.000	0	0	0
2	2	35	48	33	55440	198	0	0	233	48	33	233	0	0	2	2051.589	3	0.500	111	1	0
3	3	87	112	23	224112	87	0	0	174	112	23	87	0	0	1	2054.088	3	0.500	25	2	0
4	4	86	101	31	269266	0	0	23	86	101	54	0	0	23	1	2052.766	3	0.500	112	2	0
5	5	53	66	51	178398	0	0	54	53	66	105	0	0	54	1	2054.482	3	0.500	1	4	0
6	6	39	106	22	90948	0	112	0	39	218	22	0	112	0	1	2053.455	3	0.500	47	3	0
7	7	87	112	23	224112	86	0	23	173	112	46	86	0	23	1	2048.903	3	0.491	25	2	0
8	8	77	82	67	423038	0	0	105	77	82	172	0	0	105	1	2005.149	3	0.417	48	1002	0
9	9	46	67	36	110952	0	0	172	46	67	208	0	0	172	1	2054.250	3	0.500	12	1002	0
10	10	62	63	41	160146	0	218	0	62	281	41	0	218	0	1	1996.623	3	0.407	171	1005	0
11	11	77	82	67	423038	0	281	0	77	363	67	0	281	0	1	2007.192	3	0.423	153	1002	0
12	12	86	101	31	269266	0	363	0	86	464	31	0	363	0	1	2046.570	3	0.490	147	1005	0
13	13	72	104	44	329472	0	363	31	72	467	75	0	363	31	1	2037.140	3	0.474	145	1002	0
14	14	53	59	48	150096	46	0	172	99	59	220	46	0	172	1	2677.672	4	0.566	134	1005	0
15	15	35	48	33	55440	198	0	33	233	48	66	233	0	33	2	2054.474	3	0.500	1	1002	0
16	16	41	116	40	190240	192	48	0	233	164	40	233	48	0	2	2047.804	3	0.489	18	1002	0
17	17	56	89	24	119616	0	464	0	56	553	24	0	464	0	1	2054.358	3	0.500	7	13	0
18	18	36	116	20	83520	197	48	40	233	164	60	233	48	40	2	2053.137	3	0.499	24	1002	0
19	19	65	69	37	165945	168	164	0	233	233	37	233	164	0	2	2026.827	3	0.453	4	18	0
20	20	58	100	37	214600	175	233	0	233	333	37	233	233	0	2	2052.863	3	0.500	98	1004	0
21	21	36	116	20	83520	197	333	0	233	449	20	233	333	0	2	2051.961	3	0.500	111	17	0
22	22	46	67	36	110952	0	214	41	46	281	77	0	281	41	3	2023.804	3	0.452	114	0	0

23	23	58	100	37	214600	175	164	37	233	264	74	233	164	37	2	2021.645	3	0.444	1	22	0
24	24	53	66	51	178398	53	0	54	106	66	105	53	0	105	5	3237.594	5	0.516	1	0	0
25	25	65	69	37	165945	168	264	37	233	333	74	233	264	37	2	2031.420	3	0.461	1	22	0
26	26	60	108	59	382320	173	449	0	233	557	59	233	449	0	2	2002.809	3	0.414	87	17	0
27	27	80	95	57	433200	77	268	0	157	363	57	77	363	0	3	1969.549	3	0.356	10	0	0
28	28	72	104	44	329472	86	363	0	158	467	44	86	363	0	1	2025.592	3	0.451	15	26	0
29	29	60	108	59	382320	173	333	20	233	441	79	233	333	20	2	2002.000	3	0.411	8	28	0
30	30	72	104	44	329472	161	229	74	233	333	118	233	333	74	4	1978.877	3	0.374	102	0	0
31	31	39	106	22	90948	39	112	0	78	218	22	39	218	0	3	3838.022	6	0.539	9	0	0
32	32	86	101	31	269266	78	112	0	164	213	31	78	112	0	1	2034.720	3	0.466	4	30	0
33	33	87	112	23	224112	146	333	79	233	445	102	233	333	79	2	1978.593	3	0.374	118	1002	0
34	34	72	104	44	329472	161	333	102	233	437	146	233	333	102	2	2014.583	3	0.434	74	1002	0
35	35	77	82	67	423038	0	281	67	77	363	134	0	281	67	1	2569.247	4	0.378	70	34	0
36	36	35	48	33	55440	198	0	66	233	48	99	233	0	66	2	2052.087	3	0.500	92	1002	0
37	37	41	116	40	190240	192	48	60	233	164	100	233	164	60	4	2633.166	4	0.487	48	0	0
38	38	53	56	35	103880	180	173	74	233	229	109	233	229	74	4	2054.309	3	0.500	9	0	0
39	39	62	63	41	160146	0	363	75	62	426	116	0	363	75	1	2052.953	3	0.500	84	34	0
40	40	36	64	36	82944	0	217	77	36	281	113	0	281	77	3	2052.046	3	0.500	107	0	0
41	41	53	59	48	150096	180	274	118	233	333	166	233	333	118	4	2016.896	3	0.438	54	0	0
42	42	53	59	48	150096	180	215	118	233	274	166	233	274	118	4	2027.040	3	0.453	1	0	0
43	43	41	116	40	190240	192	333	146	233	449	186	233	333	146	2	2019.016	3	0.441	34	1002	0
44	44	41	116	40	190240	192	217	166	233	333	206	233	333	166	4	2032.449	3	0.463	14	0	0
45	45	72	104	44	329472	0	363	116	72	467	160	0	363	116	1	1948.540	3	0.321	60	1002	0
46	46	77	82	67	423038	0	281	134	77	363	201	0	363	134	3	1996.295	3	0.401	1	0	0
47	47	77	82	67	423038	0	112	22	77	194	89	0	112	22	1	1966.563	3	0.350	2	1002	0

Set 13 - No Look-Ahead Results																				
Packing Order	Item Number	Length	Width	Height	Volume	x1	y1	z1	x2	y2	z2	RCx	RCy	RCz	RCd	Caving Degree	Paste Number	Paste Ratio	Distance	Closest Item	Unloading Cost
1	1	48	109	40	209280	0	0	0	48	109	40	0	0	0	0	0.000	0	0.000	0	0	0
2	2	36	52	25	46800	48	0	0	84	52	25	48	0	0	1	2050.365	3	0.500	149	1	0
3	3	61	100	36	219600	172	0	0	233	100	36	233	0	0	2	2053.041	3	0.500	88	2	0
4	4	38	75	30	85500	134	0	0	172	75	30	172	0	0	2	2053.365	3	0.500	50	2	0
5	5	69	90	55	341550	164	0	36	233	90	91	233	0	36	2	2038.710	3	0.476	116	1	0
6	6	52	112	25	145600	181	100	0	233	212	25	233	100	0	2	2051.972	3	0.500	133	1	0
7	7	52	79	36	147888	120	75	0	172	154	36	172	75	0	2	2555.122	4	0.355	72	1	0
8	8	69	90	55	341550	164	0	91	233	90	146	233	0	91	2	2053.441	3	0.500	74	1002	0
9	9	74	83	42	257964	159	0	146	233	83	188	233	0	146	2	2044.434	3	0.484	32	1002	0
10	10	52	72	33	123552	0	109	0	52	181	33	0	109	0	1	2048.191	3	0.492	68	7	0
11	11	61	100	36	219600	172	100	25	233	200	61	233	100	25	2	2594.336	4	0.423	120	10	0
12	12	33	91	28	84084	0	0	40	33	91	68	0	0	40	1	2051.510	3	0.500	131	11	0
13	13	63	99	36	224532	0	181	0	63	280	36	0	181	0	1	2039.299	3	0.477	108	11	0
14	14	48	109	40	209280	0	280	0	48	389	40	0	280	0	1	2046.573	3	0.492	180	1002	0
15	15	37	63	21	48951	97	0	0	134	63	21	134	0	0	2	2054.199	3	0.500	11	1004	0
16	16	37	63	21	48951	196	0	188	233	63	209	233	0	188	2	2054.199	3	0.500	11	1002	0
17	17	44	95	35	146300	0	389	0	44	484	35	0	389	0	1	2050.989	3	0.500	185	1002	0
18	18	66	76	31	155496	0	484	0	66	560	31	0	484	0	1	2030.141	3	0.464	167	1005	0
19	19	47	74	29	100862	186	212	0	233	286	29	233	212	0	2	2043.960	3	0.487	123	1004	0
20	20	37	63	21	48951	159	0	188	196	63	209	196	0	188	2	2054.199	3	0.500	11	1002	0
21	21	66	76	31	155496	167	286	0	233	362	31	233	286	0	2	2031.002	3	0.464	119	1004	0
22	22	52	112	25	145600	181	362	0	233	474	25	233	362	0	2	2052.124	3	0.500	125	18	0

23	23	63	99	36	224532	170	474	0	233	573	36	233	474	0	2	2029.249	3	0.460	104	18	0
24	24	52	79	36	147888	44	405	0	96	484	36	44	484	0	3	2011.989	3	0.428	16	0	0
25	25	48	100	20	96000	185	374	25	233	474	45	233	474	25	4	2037.899	3	0.472	12	0	0
26	26	52	79	36	147888	66	484	0	118	563	36	66	484	0	1	2011.906	3	0.427	1	24	0
27	27	68	86	44	257312	52	95	0	120	181	44	52	181	0	3	2597.358	4	0.426	32	0	0
28	28	93	101	40	375720	63	181	0	156	282	40	63	181	0	1	2021.522	3	0.444	14	1005	0
29	29	68	86	44	257312	165	200	29	233	286	73	233	286	29	4	2565.488	4	0.371	8	0	0
30	30	52	112	25	145600	129	362	0	181	474	25	181	474	0	4	3208.324	5	0.467	33	0	0
31	31	61	100	36	219600	172	100	61	233	200	97	233	200	61	4	2016.709	3	0.436	10	0	0
32	32	61	100	36	219600	172	200	73	233	300	109	233	200	73	2	2013.530	3	0.433	111	1002	0
33	33	66	76	31	155496	101	286	0	167	362	31	167	362	0	4	3193.553	5	0.441	4	0	0
34	34	47	74	29	100862	186	286	31	233	360	60	233	286	31	2	2054.242	3	0.500	12	33	0
35	35	61	100	36	219600	172	100	97	233	200	133	233	200	97	4	2016.709	3	0.436	10	0	0
36	36	33	91	28	84084	96	393	0	129	484	28	96	484	0	3	2703.939	4	0.606	1	0	0
37	37	47	74	29	100862	186	200	109	233	274	138	233	200	109	2	2042.867	3	0.483	82	1002	0
38	38	37	63	21	48951	133	474	0	170	537	21	170	474	0	2	2054.363	3	0.500	5	36	0
39	39	48	109	40	209280	48	296	0	96	405	40	96	405	0	4	2629.093	4	0.479	4	0	0
40	40	74	83	42	257964	112	286	31	186	369	73	186	286	31	2	2551.839	4	0.347	4	39	0
41	41	63	99	36	224532	0	181	36	63	280	72	63	181	36	2	3189.522	5	0.434	16	39	0
42	42	49	97	30	142590	0	280	40	49	377	70	0	280	40	1	2053.699	3	0.499	15	40	0
43	43	36	52	25	46800	0	129	33	36	181	58	0	181	33	3	2054.472	3	0.500	1	0	0
44	44	48	100	20	96000	185	474	36	233	574	56	233	474	36	2	2031.251	3	0.463	67	26	0
45	45	38	75	30	85500	96	0	21	134	75	51	134	0	21	2	2552.613	4	0.349	12	1004	0
46	46	36	52	25	46800	0	0	68	36	52	93	0	0	68	1	2039.732	3	0.481	127	1002	0
47	47	49	97	30	142590	184	377	45	233	474	75	233	474	45	4	2020.957	3	0.443	8	0	0
48	48	48	100	20	96000	137	374	25	185	474	45	185	474	25	4	2614.219	4	0.454	4	0	0
49	49	63	99	36	224532	170	101	133	233	200	169	233	200	133	4	2000.081	3	0.408	10	0	0
50	50	69	90	55	341550	164	200	138	233	290	193	233	200	138	2	1964.347	3	0.347	27	1002	0

51	51	52	79	36	147888	181	121	169	233	200	205	233	200	169	4	2033.461	3	0.465	15	0	0
52	52	33	91	28	84084	200	474	56	233	565	84	233	474	56	2	2037.933	3	0.477	136	1002	0
53	53	68	86	44	257312	63	181	40	131	267	84	63	181	40	1	1965.931	3	0.350	20	1005	0
54	54	52	72	33	123552	0	484	31	52	556	64	0	484	31	1	1998.036	3	0.404	14	52	0
55	55	69	90	55	341550	164	384	75	233	474	130	233	474	75	4	1949.322	3	0.323	84	0	0
56	56	74	83	42	257964	0	280	70	74	363	112	0	280	70	1	1937.946	3	0.301	1	1002	0
57	57	61	100	36	219600	0	180	72	61	280	108	0	280	72	3	2051.457	3	0.495	2	0	0
58	58	33	91	28	84084	0	393	35	33	484	63	0	484	35	3	2054.409	3	0.500	4	0	0
59	59	69	90	55	341550	0	190	108	69	280	163	0	280	108	3	1970.492	3	0.358	57	0	0
60	60	36	52	25	46800	0	0	93	36	52	118	0	0	93	1	2054.472	3	0.500	1	1002	0
61	61	36	52	25	46800	0	0	118	36	52	143	0	0	118	1	2052.363	3	0.500	77	1002	0
62	62	63	99	36	224532	0	280	112	63	379	148	0	280	112	1	2028.802	3	0.458	72	1002	0
63	63	66	76	31	155496	0	280	148	66	356	179	0	280	148	1	2013.723	3	0.432	41	1002	0
64	64	74	83	42	257964	0	197	163	74	280	205	0	280	163	3	1997.413	3	0.403	15	0	0
65	65	66	76	31	155496	0	280	179	66	356	210	0	280	179	1	2044.030	3	0.482	10	1002	0
66	66	52	112	25	145600	181	200	193	233	312	218	233	200	193	2	2000.636	3	0.408	2	1002	0

Set 14 - No Look-Ahead Results																				
Packing Order	Item Number	Length	Width	Height	Volume	x1	y1	z1	x2	y2	z2	RCx	RCy	RCz	RCd	Caving Degree	Paste Number	Paste Ratio	Distance	Closest Item	Unloading Cost
1	1	46	82	21	79212	0	0	0	46	82	21	0	0	0	0	0.000	0	0.000	0	0	0
2	2	73	90	38	249660	160	0	0	233	90	38	233	0	0	2	2052.690	3	0.500	114	1	0
3	3	39	60	36	84240	121	0	0	160	60	36	160	0	0	2	2052.812	3	0.500	74	1	0
4	4	78	114	60	533520	155	90	0	233	204	60	233	90	0	2	2025.183	3	0.453	155	1004	0
5	5	74	81	38	227772	159	0	38	233	81	76	233	0	38	2	2052.336	3	0.497	10	4	0
6	6	53	74	33	129426	180	0	76	233	74	109	233	0	76	2	2052.306	3	0.500	111	1002	0
7	7	73	90	38	249660	160	204	0	233	294	38	233	204	0	2	2051.959	3	0.500	160	1004	0
8	8	71	77	47	256949	162	294	0	233	371	47	233	294	0	2	2036.855	3	0.474	162	1004	0
9	9	77	101	45	349965	156	371	0	233	472	45	233	371	0	2	2049.466	3	0.491	1	8	0
10	10	71	77	47	256949	91	294	0	162	371	47	162	294	0	2	2570.820	4	0.380	1	9	0
11	11	64	71	54	245376	169	472	0	233	543	54	233	472	0	2	2037.563	3	0.476	166	1002	0
12	12	53	74	33	129426	180	0	109	233	74	142	233	0	109	2	2054.480	3	0.500	1	6	0
13	13	46	82	21	79212	0	0	21	46	82	42	0	0	21	1	2054.477	3	0.500	1	1002	0
14	14	74	81	38	227772	46	0	0	120	81	38	46	0	0	1	2053.861	3	0.500	39	1005	0
15	15	53	74	33	129426	107	220	0	160	294	33	160	294	0	4	2054.184	3	0.500	16	0	0
16	16	39	60	36	84240	194	0	142	233	60	178	233	0	142	2	2053.542	3	0.500	42	1002	0
17	17	49	64	47	147392	107	371	0	156	435	47	156	371	0	2	2048.027	3	0.492	107	1004	0
18	18	74	81	38	227772	0	82	0	74	163	38	0	82	0	1	2026.896	3	0.455	81	1005	0
19	19	46	82	21	79212	187	204	38	233	286	59	233	204	38	2	2054.314	3	0.500	8	17	0
20	20	55	116	36	229680	0	163	0	55	279	36	0	163	0	1	2053.700	3	0.500	49	19	0
21	21	35	59	31	64015	198	0	178	233	59	209	233	0	178	2	2054.225	3	0.500	11	1002	0
22	22	78	114	60	533520	0	279	0	78	393	60	0	279	0	1	2015.529	3	0.434	12	19	0

23	23	73	90	38	249660	87	204	33	160	294	71	160	294	33	4	2473.091	4	0.213	10	0	0
24	24	48	68	31	101184	0	393	0	48	461	31	0	393	0	1	2053.212	3	0.500	60	17	0
25	25	45	55	35	86625	0	0	42	45	55	77	0	0	42	1	2051.924	3	0.500	114	1002	0
26	26	55	116	36	229680	0	163	36	55	279	72	0	279	36	3	3215.147	5	0.478	32	0	0
27	27	47	104	34	166192	0	461	0	47	565	34	0	461	0	1	2048.406	3	0.493	108	11	0
28	28	80	104	63	524160	0	279	60	80	383	123	0	279	60	1	1986.774	3	0.385	8	23	0
29	29	77	101	45	349965	156	371	45	233	472	90	233	472	45	4	3180.056	5	0.417	1	0	0
30	30	73	90	38	249660	160	204	59	233	294	97	233	204	59	2	2538.649	4	0.327	78	29	0
31	31	49	64	47	147392	0	215	72	49	279	119	0	279	72	3	2052.588	3	0.500	101	0	0
32	32	35	59	31	64015	198	312	47	233	371	78	233	371	47	4	2054.050	3	0.500	18	0	0
33	33	62	68	52	219232	0	393	31	62	461	83	0	461	31	3	3169.666	5	0.400	10	0	0
34	34	55	116	36	229680	178	88	60	233	204	96	233	204	60	4	2050.506	3	0.493	8	0	0
35	35	74	81	38	227772	0	82	38	74	163	76	0	163	38	3	2622.072	4	0.467	1	0	0
36	36	53	74	33	129426	180	472	54	233	546	87	233	472	54	2	2046.119	3	0.490	133	1002	0
37	37	48	68	31	101184	48	393	0	96	461	31	48	393	31	5	3837.833	6	0.538	12	0	0
38	38	71	77	47	256949	127	294	47	198	371	94	198	371	47	4	3787.819	6	0.453	1	0	0
39	39	78	114	60	533520	0	461	34	78	575	94	0	461	34	1	1972.356	3	0.362	78	36	0
40	40	77	101	45	349965	92	472	0	169	573	45	169	472	0	2	1975.845	3	0.366	1	39	0
41	41	49	64	47	147392	0	0	77	49	64	124	0	0	77	1	2029.715	3	0.461	96	1002	0
42	42	47	104	34	166192	80	294	47	127	398	81	127	294	47	2	2604.476	4	0.437	2	39	0
43	43	78	114	60	533520	155	90	96	233	204	156	233	204	96	4	1950.358	3	0.323	16	0	0
44	44	74	90	66	439560	86	204	71	160	294	137	160	294	71	4	3106.667	5	0.293	6	0	0
45	45	77	101	45	349965	92	472	45	169	573	90	169	472	45	2	1928.326	3	0.285	1	40	0

Set 15 - No Look-Ahead Results																				
Packing Order	Item Number	Length	Width	Height	Volume	x1	y1	z1	x2	y2	z2	RCx	RCy	RCz	RCd	Caving Degree	Paste Number	Paste Ratio	Distance	Closest Item	Unloading Cost
1	1	71	83	43	253399	0	0	0	71	83	43	0	0	0	0	0.000	0	0.000	0	0	0
2	2	48	49	23	54096	71	0	0	119	49	23	71	0	0	1	2051.486	3	0.500	114	1	0
3	3	78	93	33	239382	155	0	0	233	93	33	233	0	0	2	2053.920	3	0.500	36	2	0
4	4	30	66	27	53460	125	0	0	155	66	27	155	0	0	2	2054.341	3	0.500	6	2	0
5	5	71	83	43	253399	0	83	0	71	166	43	0	83	0	1	2053.173	3	0.500	84	3	0
6	6	57	65	42	155610	0	0	43	57	65	85	0	0	43	1	2054.165	3	0.500	18	5	0
7	7	54	77	40	166320	71	49	0	125	126	40	71	49	0	1	2622.837	4	0.468	1	3	0
8	8	30	66	27	53460	125	66	0	155	132	27	155	66	0	2	2676.465	4	0.562	54	5	0
9	9	78	90	55	386100	155	93	0	233	183	55	233	93	0	2	2629.121	4	0.480	30	7	0
10	10	71	83	43	253399	0	166	0	71	249	43	0	166	0	1	2054.484	3	0.500	1	9	0
11	11	58	85	41	202130	175	0	33	233	85	74	233	0	33	2	2054.483	3	0.500	1	1002	0
12	12	80	111	68	603840	153	183	0	233	294	68	233	183	0	2	2038.095	3	0.474	82	10	0
13	13	70	71	53	263410	163	294	0	233	365	53	233	294	0	2	2054.484	3	0.500	1	12	0
14	14	58	85	41	202130	0	65	43	58	150	84	0	65	43	1	2053.368	3	0.498	1	1002	0
15	15	80	111	68	603840	153	365	0	233	476	68	233	365	0	2	2029.483	3	0.460	152	1002	0
16	16	73	109	73	580861	160	476	0	233	585	73	233	476	0	2	2047.695	3	0.491	147	1002	0
17	17	70	71	59	293230	163	294	53	233	365	112	233	365	53	4	3183.982	5	0.424	1	0	0
18	18	73	79	61	351787	160	0	74	233	79	135	233	0	74	2	2030.170	3	0.461	85	1002	0
19	19	70	71	59	293230	93	294	0	163	365	59	163	365	0	4	3163.552	5	0.389	1	0	0
20	20	80	111	68	603840	153	365	68	233	476	136	233	476	68	4	2613.750	4	0.454	71	0	0
21	21	57	65	42	155610	96	229	0	153	294	42	153	294	0	4	2054.054	3	0.500	24	0	0
22	22	80	111	68	603840	153	476	73	233	587	141	233	476	73	2	2036.732	3	0.470	1	20	0

23	23	78	93	33	239382	0	249	0	78	342	33	0	249	0	1	2049.001	3	0.491	15	1005	0
24	24	70	71	53	263410	93	294	59	163	365	112	163	294	59	2	2568.599	4	0.376	1	1004	0
25	25	69	81	50	279450	164	0	135	233	81	185	233	0	135	2	2050.870	3	0.495	35	1002	0
26	26	49	94	44	202664	104	365	0	153	459	44	153	365	0	2	2054.228	3	0.500	16	24	0
27	27	78	84	51	334152	155	210	68	233	294	119	233	294	68	4	2042.227	3	0.482	101	0	0
28	28	30	66	27	53460	125	0	27	155	66	54	155	0	27	2	2565.996	4	0.373	27	1004	0
29	29	49	73	40	143080	71	126	0	120	199	40	71	126	0	1	2054.424	3	0.500	4	27	0
30	30	80	111	68	603840	0	342	0	80	453	68	0	342	0	1	2015.880	3	0.434	13	26	0
31	31	30	66	27	53460	125	66	27	155	132	54	155	66	27	2	2655.067	4	0.523	4	1004	0
32	32	70	71	59	293230	163	294	112	233	365	171	233	365	112	4	3185.351	5	0.427	1	0	0
33	33	57	65	42	155610	0	453	0	57	518	42	0	453	0	1	2053.626	3	0.500	47	26	0
34	34	71	83	43	253399	162	211	119	233	294	162	233	294	119	4	2053.476	3	0.498	1	0	0
35	35	73	79	61	351787	80	365	44	153	444	105	153	365	44	2	2625.556	4	0.474	33	22	0
36	36	69	81	50	279450	0	261	33	69	342	83	0	342	33	3	2031.108	3	0.460	12	0	0
37	37	57	65	42	155610	0	0	85	57	65	127	0	0	85	1	2052.771	3	0.500	93	1002	0
38	38	44	100	37	162800	0	150	43	44	250	80	0	150	43	1	2052.953	3	0.498	12	36	0
39	39	54	77	40	166320	0	65	84	54	142	124	0	65	84	1	2054.482	3	0.500	1	37	0
40	40	58	73	52	220168	0	0	127	58	73	179	0	0	127	1	2039.765	3	0.476	41	1002	0
41	41	73	109	73	580861	87	476	0	160	585	73	160	476	73	6	3762.530	6	0.410	31	0	0
42	42	78	93	33	239382	155	365	136	233	458	169	233	365	136	2	2048.202	3	0.490	18	22	0
43	43	69	81	50	279450	0	342	68	69	423	118	0	342	68	1	2000.179	3	0.408	11	1002	0
44	44	44	100	37	162800	0	242	83	44	342	120	0	342	83	3	2024.397	3	0.450	49	0	0
45	45	70	71	53	263410	93	294	112	163	365	165	163	294	112	2	2567.443	4	0.374	1	44	0
46	46	78	84	51	334152	155	365	169	233	449	220	233	365	169	2	2693.037	4	0.592	155	1004	0
47	47	58	73	52	220168	95	365	105	153	438	157	153	365	105	2	2013.337	3	0.431	26	43	0
48	48	44	100	37	162800	0	0	179	44	100	216	0	0	179	1	2018.584	3	0.439	4	1002	0
49	49	58	73	52	220168	0	453	42	58	526	94	0	453	42	1	1999.879	3	0.408	30	1002	0
50	50	70	71	59	293230	163	112	55	233	183	114	233	183	55	4	1982.962	3	0.379	28	0	0

51	51	49	73	40	143080	44	269	83	93	342	123	44	342	83	3	2599.502	4	0.430	62	0	0
52	52	73	79	61	351787	0	342	118	73	421	179	0	342	118	1	1965.692	3	0.349	20	47	0
53	53	60	120	39	280800	173	245	171	233	365	210	233	365	171	4	1992.427	3	0.395	10	0	0
54	54	57	65	42	155610	0	518	0	57	583	42	0	518	42	5	3834.138	6	0.533	31	0	0
55	55	69	81	50	279450	0	150	80	69	231	130	0	150	80	1	1936.751	3	0.300	12	1002	0
56	56	71	83	43	253399	92	282	165	163	365	208	163	365	165	4	1893.642	3	0.226	12	0	0

Set 16 - No Look-Ahead Results																				
Packing Order	Item Number	Length	Width	Height	Volume	x1	y1	z1	x2	y2	z2	RCx	RCy	RCz	RCd	Caving Degree	Paste Number	Paste Ratio	Distance	Closest Item	Unloading Cost
1	1	40	43	39	67080	0	0	0	40	43	39	0	0	0	0	0.000	0	0.000	0	0	0
2	2	56	66	41	151536	177	0	0	233	66	41	233	0	0	2	2051.930	3	0.500	137	1	0
3	3	85	88	35	261800	92	0	0	177	88	35	177	0	0	2	2036.990	3	0.472	52	1	0
4	4	57	98	38	212268	0	43	0	57	141	38	0	43	0	1	2037.392	3	0.472	35	3	0
5	5	72	88	68	430848	161	0	41	233	88	109	233	0	41	2	2008.023	3	0.423	111	1002	0
6	6	83	100	69	572700	150	0	109	233	100	178	233	0	109	2	2026.449	3	0.453	42	1002	0
7	7	75	82	72	442800	0	141	0	75	223	72	0	141	0	1	1998.177	3	0.407	148	1002	0
8	8	72	87	53	331992	0	223	0	72	310	53	0	223	0	1	2052.175	3	0.500	161	1005	0
9	9	76	97	40	294880	157	0	178	233	97	218	233	0	178	2	2054.470	3	0.500	2	1002	0
10	10	56	86	23	110768	177	66	0	233	152	23	177	66	0	1	2659.501	4	0.531	18	9	0
11	11	64	82	61	320128	0	310	0	64	392	61	0	310	0	1	2041.559	3	0.482	159	1002	0
12	12	75	107	24	192600	0	392	0	75	499	24	0	392	0	1	2045.512	3	0.489	158	1005	0
13	13	31	101	30	93930	0	392	24	31	493	54	0	392	24	1	2050.848	3	0.500	166	1002	0
14	14	75	107	24	192600	158	152	0	233	259	24	233	152	0	2	2040.937	3	0.479	83	1004	0
15	15	75	82	72	442800	64	310	0	139	392	72	64	392	0	3	2546.057	4	0.339	69	0	0
16	16	71	93	43	283929	162	259	0	233	352	43	233	259	0	2	2025.155	3	0.451	23	15	0
17	17	31	101	30	93930	31	392	24	62	493	54	31	392	24	1	2054.434	3	0.500	3	15	0
18	18	30	74	27	59940	62	0	0	92	74	27	92	0	0	2	2054.347	3	0.500	6	1004	0
19	19	72	88	68	430848	161	352	0	233	440	68	233	352	0	2	2022.789	3	0.446	22	17	0
20	20	71	73	27	139941	162	440	0	233	513	27	233	440	0	2	2052.824	3	0.500	87	17	0
21	21	38	63	32	76608	72	247	0	110	310	32	72	310	0	3	2053.935	3	0.500	24	0	0
22	22	83	100	69	572700	150	159	24	233	259	93	233	259	24	4	1981.397	3	0.376	40	0	0

23	23	72	87	53	331992	0	223	53	72	310	106	0	310	53	3	3193.224	5	0.440	1	0	0
24	24	71	93	43	283929	162	259	43	233	352	86	233	352	43	4	3855.752	6	0.569	23	0	0
25	25	76	97	40	294880	0	126	72	76	223	112	0	223	72	3	2014.596	3	0.434	74	0	0
26	26	56	66	41	151536	0	310	61	56	376	102	0	310	61	1	2054.481	3	0.500	1	24	0
27	27	71	73	27	139941	162	513	0	233	586	27	233	513	0	2	2054.481	3	0.500	1	20	0
28	28	30	74	27	59940	0	67	38	30	141	65	0	141	38	3	2054.347	3	0.500	6	0	0
29	29	56	86	23	110768	75	392	0	131	478	23	75	392	0	1	2053.875	3	0.500	30	27	0
30	30	71	93	43	283929	162	440	27	233	533	70	233	440	27	2	2049.911	3	0.495	101	17	0
31	31	40	43	39	67080	52	0	27	92	43	66	92	0	27	2	2540.075	4	0.328	12	28	0
32	32	63	67	47	198387	0	499	0	63	566	47	0	499	0	1	2011.637	3	0.430	99	30	0
33	33	31	101	30	93930	131	440	0	162	541	30	162	440	0	2	2639.408	4	0.496	1	32	0
34	34	64	82	61	320128	169	352	68	233	434	129	233	352	68	2	1997.346	3	0.403	6	30	0
35	35	97	108	70	733320	0	392	54	97	500	124	0	392	54	1	1936.017	3	0.299	64	34	0
36	36	40	43	39	67080	193	309	86	233	352	125	233	352	86	4	2054.475	3	0.500	1	0	0
37	37	56	66	41	151536	75	478	0	131	544	41	131	478	0	2	2596.734	4	0.424	12	35	0
38	38	71	93	43	283929	0	223	106	71	316	149	0	223	106	1	1988.864	3	0.388	1	1002	0
39	39	72	87	53	331992	0	136	112	72	223	165	0	223	112	3	2029.952	3	0.460	55	0	0

Set 17 - No Look-Ahead Results																				
Packing Order	Item Number	Length	Width	Height	Volume	x1	y1	z1	x2	y2	z2	RCx	RCy	RCz	RCd	Caving Degree	Paste Number	Paste Ratio	Distance	Closest Item	Unloading Cost
1	1	68	70	61	290360	0	0	0	68	70	61	0	0	0	0	0.000	0	0.000	0	0	0
2	2	58	80	40	185600	175	0	0	233	80	40	233	0	0	2	2052.624	3	0.500	107	1	0
3	3	55	76	43	179740	178	0	40	233	76	83	233	0	40	2	2052.551	3	0.500	110	1	0
4	4	77	91	36	252252	0	70	0	77	161	36	0	70	0	1	2045.665	3	0.488	98	3	0
5	5	55	76	43	179740	178	0	83	233	76	126	233	0	83	2	2052.834	3	0.500	94	1002	0
6	6	77	91	36	252252	0	161	0	77	252	36	0	161	0	1	2052.031	3	0.500	156	1005	0
7	7	40	94	25	94000	193	80	0	233	174	25	233	80	0	2	2051.949	3	0.500	116	6	0
8	8	81	119	65	626535	0	252	0	81	371	65	0	252	0	1	2022.168	3	0.445	1	6	0
9	9	30	78	22	51480	0	70	36	30	148	58	0	70	36	1	2054.177	3	0.500	12	8	0
10	10	43	70	34	102340	68	0	0	111	70	34	68	70	0	3	3830.537	6	0.528	64	0	0
11	11	79	119	79	742679	0	371	0	79	490	79	0	371	0	1	2039.981	3	0.478	141	1002	0
12	12	49	72	35	123480	184	0	126	233	72	161	233	0	126	2	2054.480	3	0.500	1	5	0
13	13	79	119	79	742679	0	0	61	79	119	140	0	0	61	1	1999.225	3	0.407	80	1002	0
14	14	49	72	35	123480	0	0	140	49	72	175	0	0	140	1	2054.480	3	0.500	1	13	0
15	15	68	70	61	290360	77	70	0	145	140	61	77	70	0	1	2537.767	4	0.324	20	1005	0
16	16	68	70	61	290360	0	490	0	68	560	61	0	490	0	1	2052.099	3	0.500	159	1002	0
17	17	71	76	56	302176	77	140	0	148	216	56	77	140	0	1	2017.610	3	0.438	36	1005	0
18	18	59	98	44	254408	0	154	36	59	252	80	0	252	36	3	2033.937	3	0.465	6	0	0
19	19	30	78	22	51480	145	0	0	175	78	22	175	0	0	2	2651.539	4	0.519	34	1004	0
20	20	66	89	43	252582	167	174	0	233	263	43	233	174	0	2	2011.162	3	0.427	20	18	0
21	21	51	58	31	91698	182	263	0	233	321	31	233	263	0	2	2052.238	3	0.500	102	1004	0
22	22	89	113	27	271539	144	321	0	233	434	27	233	321	0	2	2034.113	3	0.467	63	16	0

23	23	46	93	39	166842	187	434	0	233	527	39	233	434	0	2	2035.834	3	0.472	108	16	0
24	24	30	78	22	51480	145	0	22	175	78	44	175	0	22	2	2632.122	4	0.486	34	1004	0
25	25	40	94	25	94000	193	80	25	233	174	50	233	174	25	4	3242.307	5	0.524	1	0	0
26	26	59	98	44	254408	0	252	65	59	350	109	0	252	65	1	2014.612	3	0.433	20	11	0
27	27	89	113	27	271539	144	321	27	233	434	54	233	321	27	2	2609.362	4	0.447	63	26	0
28	28	65	76	62	306280	79	371	0	144	447	62	79	371	0	1	2630.065	4	0.482	42	23	0
29	29	65	76	62	306280	79	447	0	144	523	62	79	447	0	1	2009.987	3	0.425	42	23	0
30	30	57	79	46	207138	81	292	0	138	371	46	81	371	0	3	2054.483	3	0.500	1	0	0
31	31	46	93	39	166842	0	159	80	46	252	119	0	252	80	3	2039.853	3	0.476	40	0	0
32	32	40	94	25	94000	153	80	0	193	174	25	193	174	0	4	3233.349	5	0.508	1	0	0
33	33	71	76	56	302176	81	216	0	152	292	56	81	292	0	3	2649.489	4	0.514	16	0	0
34	34	49	72	35	123480	0	0	175	49	72	210	0	0	175	1	2054.299	3	0.500	10	1002	0
35	35	55	119	50	327250	178	0	161	233	119	211	233	0	161	2	1996.285	3	0.401	9	1002	0
36	36	55	119	50	327250	0	252	109	55	371	159	0	252	109	1	1987.291	3	0.387	61	1002	0
37	37	58	80	40	185600	0	172	119	58	252	159	0	252	119	3	2022.390	3	0.447	52	0	0
38	38	71	76	56	302176	0	72	140	71	148	196	0	72	140	1	1983.266	3	0.379	24	37	0
39	39	55	119	50	327250	178	174	43	233	293	93	233	174	43	2	1974.789	3	0.365	27	1002	0
40	40	58	80	40	185600	175	94	50	233	174	90	233	174	50	4	2009.119	3	0.423	18	0	0
41	41	30	78	22	51480	30	70	36	60	148	58	30	70	36	1	2054.446	3	0.500	2	40	0
42	42	71	76	56	302176	0	490	61	71	566	117	0	490	61	1	1982.578	3	0.378	8	29	0
43	43	51	58	31	91698	0	432	79	51	490	110	0	490	79	3	2053.169	3	0.500	60	0	0
44	44	49	72	35	123480	49	0	140	98	72	175	49	72	140	3	3796.765	6	0.468	1	0	0
45	45	46	93	39	166842	187	434	39	233	527	78	233	434	39	2	2020.329	3	0.443	42	43	0
46	46	65	76	62	306280	168	358	54	233	434	116	233	434	54	4	1991.392	3	0.393	23	0	0
47	47	59	98	44	254408	174	76	90	233	174	134	233	174	90	4	2604.524	4	0.437	4	0	0
48	48	57	79	46	207138	81	292	46	138	371	92	81	371	46	3	3139.470	5	0.348	1	0	0
49	49	77	91	36	252252	156	174	93	233	265	129	233	174	93	2	1993.483	3	0.399	91	1002	0
50	50	77	91	36	252252	156	174	129	233	265	165	233	174	129	2	1997.942	3	0.405	55	1002	0

51	51	51	58	31	91698	0	374	79	51	432	110	0	432	79	3	2054.456	3	0.500	2	0	0
52	52	49	72	35	123480	49	0	175	98	72	210	49	72	175	3	3836.123	6	0.535	1	0	0
53	53	46	93	39	166842	187	434	78	233	527	117	233	434	78	2	2053.090	3	0.498	1	45	0
54	54	77	91	36	252252	79	371	62	156	462	98	79	371	62	1	1967.164	3	0.352	11	53	0
55	55	77	91	36	252252	81	201	56	158	292	92	81	292	56	3	1958.824	3	0.337	1	0	0
56	56	65	76	62	306280	168	358	116	233	434	178	233	434	116	4	1967.020	3	0.352	42	0	0
57	57	89	113	27	271539	0	377	110	89	490	137	0	490	110	3	1937.168	3	0.300	1	0	0
58	58	58	80	40	185600	175	434	117	233	514	157	233	434	117	2	2025.663	3	0.453	63	1002	0

Set 18 - No Look-Ahead Results																				
Packing Order	Item Number	Length	Width	Height	Volume	x1	y1	z1	x2	y2	z2	RCx	RCy	RCz	RCd	Caving Degree	Paste Number	Paste Ratio	Distance	Closest Item	Unloading Cost
1	1	68	73	62	307768	0	0	0	68	73	62	0	0	0	0	0.000	0	0.000	0	0	0
2	2	41	70	30	86100	68	0	0	109	70	30	68	0	0	1	2051.692	3	0.500	124	1	0
3	3	44	44	42	81312	189	0	0	233	44	42	233	0	0	2	2052.653	3	0.500	80	2	0
4	4	53	79	41	171667	0	73	0	53	152	41	0	73	0	1	2051.279	3	0.500	179	1002	0
5	5	83	113	76	712804	0	152	0	83	265	76	0	152	0	1	2002.893	3	0.415	144	1002	0
6	6	36	86	29	89784	197	44	0	233	130	29	233	44	0	2	2052.535	3	0.500	88	5	0
7	7	53	79	41	171667	0	73	41	53	152	82	0	152	41	3	3253.432	5	0.543	1	0	0
8	8	85	115	60	586500	0	265	0	85	380	60	0	265	0	1	2051.114	3	0.497	148	1005	0
9	9	68	73	62	307768	0	0	62	68	73	124	0	73	62	3	3839.561	6	0.543	96	0	0
10	10	53	79	41	171667	53	73	0	106	152	41	53	152	0	3	3218.912	5	0.484	1	0	0
11	11	41	70	30	86100	109	0	0	150	70	30	109	0	0	1	2054.477	3	0.500	1	6	0
12	12	98	99	68	659736	0	380	0	98	479	68	0	380	0	1	2034.615	3	0.466	1	8	0
13	13	89	92	73	597724	0	479	0	89	571	73	0	479	0	1	2046.688	3	0.490	144	1005	0
14	14	68	73	62	307768	68	0	30	136	73	92	68	0	30	1	2645.298	4	0.508	53	1005	0
15	15	94	98	74	681688	0	0	124	94	98	198	0	0	124	1	2001.014	3	0.409	22	1002	0
16	16	90	100	79	711000	143	130	0	233	230	79	233	130	0	2	1979.945	3	0.374	36	1002	0
17	17	89	92	73	597724	144	230	0	233	322	73	233	230	0	2	2053.800	3	0.500	59	1004	0
18	18	89	92	73	597724	144	322	0	233	414	73	233	322	0	2	2053.954	3	0.500	46	13	0
19	19	60	104	26	162240	83	152	0	143	256	26	83	152	0	1	2671.139	4	0.551	8	18	0
20	20	44	44	42	81312	0	73	82	44	117	124	0	73	124	5	3876.949	6	0.605	20	0	0
21	21	31	114	29	102486	202	414	0	233	528	29	233	414	0	2	2052.278	3	0.500	104	13	0
22	22	91	96	28	244608	111	414	0	202	510	28	202	414	0	2	2035.074	3	0.467	1	21	0

23	23	53	79	41	171667	53	73	41	106	152	82	53	152	41	3	3850.461	6	0.560	1	0	0
24	24	42	73	32	98112	68	0	92	110	73	124	68	0	124	5	3314.036	5	0.646	10	0	0
25	25	85	115	60	586500	0	265	60	85	380	120	0	265	60	1	2599.812	4	0.429	1	18	0
26	26	36	86	29	89784	197	44	29	233	130	58	233	130	29	4	3249.758	5	0.536	1	0	0
27	27	41	70	30	86100	156	60	0	197	130	30	197	130	0	4	2054.387	3	0.500	5	0	0
28	28	98	99	68	659736	0	380	68	98	479	136	0	380	68	1	2618.629	4	0.461	1	25	0
29	29	88	88	43	332992	0	479	73	88	567	116	0	479	73	1	2053.000	3	0.500	104	1002	0
30	30	83	113	76	712804	0	152	76	83	265	152	0	265	76	3	3202.100	5	0.456	34	0	0
31	31	53	79	41	171667	44	73	82	97	152	123	44	73	82	1	2646.478	4	0.509	2	1002	0
32	32	42	73	32	98112	0	265	120	42	338	152	0	265	120	1	2054.478	3	0.500	1	30	0
33	33	44	92	40	161920	100	322	0	144	414	40	144	414	0	4	2028.603	3	0.456	2	0	0
34	34	88	88	43	332992	0	479	116	88	567	159	0	479	116	1	2015.690	3	0.434	1	29	0
35	35	98	99	68	659736	0	380	136	98	479	204	0	479	136	3	1994.112	3	0.397	16	0	0
36	36	50	68	31	105400	0	479	159	50	547	190	0	479	159	1	2053.865	3	0.500	30	1002	0
37	37	68	73	62	307768	165	230	73	233	303	135	233	230	73	2	1972.659	3	0.361	20	1002	0
38	38	31	114	29	102486	202	414	29	233	528	58	233	414	29	2	2054.479	3	0.500	1	1002	0
39	39	60	104	26	162240	83	152	26	143	256	52	83	152	26	1	2671.139	4	0.551	8	1005	0
40	40	41	70	30	86100	0	479	190	41	549	220	0	479	190	1	2738.078	4	0.672	192	1005	0
41	41	91	96	28	244608	111	414	28	202	510	56	202	414	28	2	2043.393	3	0.481	1	1004	0
42	42	60	104	26	162240	83	152	52	143	256	78	83	152	52	1	2671.213	4	0.551	4	1005	0
43	43	83	113	76	712804	150	303	73	233	416	149	233	303	73	2	2027.188	3	0.453	1	1002	0
44	44	85	115	60	586500	42	265	120	127	380	180	42	265	120	1	2509.100	4	0.274	1	43	0
45	45	36	86	29	89784	161	44	30	197	130	59	197	130	30	4	2614.289	4	0.454	10	0	0
46	46	60	104	26	162240	83	152	78	143	256	104	83	152	78	1	2611.120	4	0.448	8	44	0
47	47	36	86	29	89784	197	44	58	233	130	87	197	130	58	3	2629.944	4	0.482	44	0	0
48	48	44	92	40	161920	189	138	79	233	230	119	233	230	79	4	2054.353	3	0.500	8	0	0

Set 19 - No Look-Ahead Results																				
Packing Order	Item Number	Length	Width	Height	Volume	x1	y1	z1	x2	y2	z2	RCx	RCy	RCz	RCd	Caving Degree	Paste Number	Paste Ratio	Distance	Closest Item	Unloading Cost
1	1	33	54	20	35640	0	0	0	33	54	20	0	0	0	0	0.000	0	0.000	0	0	0
2	2	57	62	51	180234	176	0	0	233	62	51	233	0	0	2	2051.968	3	0.500	143	1	0
3	3	57	62	51	180234	119	0	0	176	62	51	176	0	0	2	2052.960	3	0.500	87	1	0
4	4	52	63	35	114660	181	62	0	233	125	35	233	62	0	2	2054.418	3	0.500	4	3	0
5	5	65	66	36	154440	54	0	0	119	66	36	119	0	0	2	2049.788	3	0.492	1	3	0
6	6	33	54	20	35640	0	0	20	33	54	40	0	0	20	1	2053.862	3	0.500	21	5	0
7	7	43	71	39	119067	190	125	0	233	196	39	233	125	0	2	2044.089	3	0.489	181	1002	0
8	8	94	104	27	263952	139	196	0	233	300	27	233	196	0	2	2025.607	3	0.454	139	1004	0
9	9	81	91	48	353808	152	300	0	233	391	48	233	300	0	2	2020.403	3	0.446	152	1004	0
10	10	79	83	43	281951	154	391	0	233	474	43	233	391	0	2	2052.151	3	0.500	154	1004	0
11	11	57	62	51	180234	176	0	51	233	62	102	233	0	51	2	2052.411	3	0.500	118	1002	0
12	12	57	101	42	241794	176	474	0	233	575	42	233	474	0	2	2051.675	3	0.500	176	1004	0
13	13	76	119	61	551684	157	391	43	233	510	104	233	391	43	2	1955.079	3	0.333	116	1002	0
14	14	54	78	22	92664	0	54	0	54	132	22	0	54	0	1	2631.875	4	0.486	66	1005	0
15	15	33	54	20	35640	200	62	35	233	116	55	233	62	35	2	2054.257	3	0.500	8	1002	0
16	16	81	91	48	353808	152	300	48	233	391	96	233	391	48	4	2046.718	3	0.490	124	0	0
17	17	81	91	48	353808	152	209	27	233	300	75	233	300	27	4	2054.486	3	0.500	1	0	0
18	18	43	71	39	119067	147	125	0	190	196	39	190	125	0	2	2633.613	4	0.487	1	17	0
19	19	76	79	71	426284	157	0	102	233	79	173	233	0	102	2	2011.865	3	0.427	1	1002	0
20	20	71	99	64	449856	0	132	0	71	231	64	0	132	0	1	1998.613	3	0.406	68	18	0
21	21	57	62	51	180234	119	0	51	176	62	102	176	0	51	2	2677.486	4	0.561	1	20	0
22	22	65	66	36	154440	0	66	22	65	132	58	0	132	22	3	3210.450	5	0.470	12	0	0

23	23	76	79	71	426284	71	117	0	147	196	71	147	196	0	4	2571.932	4	0.382	6	0	0
24	24	46	100	21	96600	93	196	0	139	296	21	139	196	0	2	2054.021	3	0.500	22	20	0
25	25	54	78	22	92664	65	0	36	119	78	58	119	0	36	2	2610.436	4	0.448	32	23	0
26	26	76	79	71	426284	0	231	0	76	310	71	0	231	0	1	2039.572	3	0.475	17	24	0
27	27	66	68	48	215424	0	310	0	66	378	48	0	310	0	1	2053.065	3	0.500	86	16	0
28	28	68	93	25	158100	0	378	0	68	471	25	0	378	0	1	2051.529	3	0.498	84	16	0
29	29	79	83	43	281951	97	474	0	176	557	43	176	474	0	2	2601.333	4	0.432	1	10	0
30	30	68	93	25	158100	0	471	0	68	564	25	0	471	0	1	2054.482	3	0.500	1	29	0
31	31	65	66	36	154440	168	0	173	233	66	209	233	0	173	2	2054.295	3	0.500	11	1002	0
32	32	57	101	42	241794	0	378	25	57	479	67	0	378	25	1	2028.210	3	0.456	40	29	0
33	33	76	119	61	551684	76	300	0	152	419	61	152	300	0	2	2566.035	4	0.371	1	32	0
34	34	57	101	42	241794	0	479	25	57	580	67	0	479	25	1	2032.885	3	0.463	1	32	0
35	35	71	99	64	449856	0	132	64	71	231	128	0	231	64	3	2580.425	4	0.398	80	0	0
36	36	81	106	30	257580	152	194	75	233	300	105	233	300	75	4	2011.376	3	0.429	80	0	0
37	37	45	60	26	70200	74	0	58	119	60	84	119	0	58	2	2054.476	3	0.500	1	35	0
38	38	45	60	26	70200	0	72	58	45	132	84	0	132	58	3	2054.015	3	0.500	20	0	0
39	39	57	62	51	180234	0	231	71	57	293	122	0	231	71	1	2052.818	3	0.500	95	36	0
40	40	66	68	48	215424	0	310	48	66	378	96	0	378	48	3	3213.712	5	0.475	10	0	0

Set 20 - No Look-Ahead Results																				
Packing Order	Item Number	Length	Width	Height	Volume	x1	y1	z1	x2	y2	z2	RCx	RCy	RCz	RCd	Caving Degree	Paste Number	Paste Ratio	Distance	Closest Item	Unloading Cost
1	1	56	86	34	163744	0	0	0	56	86	34	0	0	0	0	0.000	0	0.000	0	0	0
2	2	43	58	31	77314	56	0	0	99	58	31	56	0	0	1	2051.355	3	0.500	134	1	0
3	3	69	81	69	385641	164	0	0	233	81	69	233	0	0	2	2053.621	3	0.500	64	2	0
4	4	70	112	51	399840	163	81	0	233	193	51	233	81	0	2	2052.173	3	0.499	107	1	0
5	5	43	58	31	77314	121	0	0	164	58	31	164	0	0	2	2054.007	3	0.500	21	4	0
6	6	53	74	40	156880	0	0	34	53	74	74	0	0	34	1	2052.442	3	0.500	111	4	0
7	7	69	81	69	385641	164	0	69	233	81	138	233	0	69	2	2054.486	3	0.500	1	1002	0
8	8	70	112	51	399840	163	193	0	233	305	51	233	193	0	2	2052.287	3	0.500	163	1004	0
9	9	72	74	68	362304	161	0	138	233	74	206	233	0	138	2	2050.033	3	0.493	14	1002	0
10	10	64	70	58	259840	169	81	51	233	151	109	233	81	51	2	2053.842	3	0.500	42	8	0
11	11	33	98	20	64680	0	86	0	33	184	20	0	86	0	1	2051.261	3	0.500	130	10	0
12	12	69	76	58	304152	164	151	51	233	227	109	233	151	51	2	2046.616	3	0.489	111	1002	0
13	13	42	109	22	100716	191	81	109	233	190	131	233	81	109	2	2054.479	3	0.500	1	7	0
14	14	50	76	35	133000	183	227	51	233	303	86	233	227	51	2	2051.875	3	0.500	134	1002	0
15	15	62	90	38	212040	171	305	0	233	395	38	233	305	0	2	2051.632	3	0.500	171	1004	0
16	16	70	112	51	399840	163	395	0	233	507	51	233	395	0	2	2031.477	3	0.465	163	1004	0
17	17	70	112	51	399840	0	184	0	70	296	51	0	184	0	1	2003.355	3	0.415	93	1005	0
18	18	43	97	32	133472	0	296	0	43	393	32	0	296	0	1	2052.152	3	0.500	120	16	0
19	19	53	74	40	156880	0	0	74	53	74	114	0	0	74	1	2052.535	3	0.500	106	1002	0
20	20	56	86	34	163744	0	393	0	56	479	34	0	393	0	1	2036.475	3	0.473	107	16	0
21	21	65	113	53	389285	0	0	114	65	113	167	0	0	114	1	1993.899	3	0.398	53	1002	0
22	22	69	76	58	304152	164	507	0	233	583	58	233	507	0	2	2041.709	3	0.482	162	1002	0

23	23	70	112	51	399840	0	0	167	70	112	218	0	0	167	1	2044.874	3	0.484	2	1002	0
24	24	33	98	20	64680	33	86	0	66	184	20	33	184	0	3	3252.691	5	0.541	1	0	0
25	25	53	74	40	156880	0	479	0	53	553	40	0	479	0	1	2042.092	3	0.482	110	22	0
26	26	53	109	24	138648	180	398	51	233	507	75	233	507	51	4	2025.362	3	0.453	92	0	0
27	27	33	98	20	64680	0	86	20	33	184	40	0	184	20	3	3252.340	5	0.541	1	0	0
28	28	69	76	58	304152	95	0	31	164	76	89	164	0	31	2	2000.300	3	0.408	5	27	0
29	29	69	82	42	237636	95	0	89	164	82	131	164	0	89	2	2043.234	3	0.481	7	23	0
30	30	72	74	68	362304	161	507	58	233	581	126	233	507	58	2	1972.053	3	0.362	94	1002	0
31	31	72	74	68	362304	161	433	75	233	507	143	233	507	75	4	2002.823	3	0.414	77	0	0
32	32	43	97	32	133472	43	296	0	86	393	32	43	393	0	3	3224.633	5	0.496	78	0	0
33	33	62	90	38	212040	171	305	38	233	395	76	233	395	38	4	3209.573	5	0.468	2	0	0
34	34	72	74	68	362304	0	296	32	72	370	100	0	296	32	1	1985.573	3	0.383	23	33	0
35	35	68	89	39	236028	0	207	51	68	296	90	0	296	51	3	2052.963	3	0.500	95	0	0
36	36	56	86	34	163744	56	393	0	112	479	34	56	393	0	1	2024.839	3	0.451	51	33	0
37	37	33	98	20	64680	33	86	20	66	184	40	33	86	20	1	2657.619	4	0.528	1	1005	0
38	38	53	109	24	138648	0	370	34	53	479	58	0	479	34	3	3790.400	6	0.457	4	0	0
39	39	62	90	38	212040	0	370	58	62	460	96	0	370	58	1	2031.905	3	0.464	99	33	0
40	40	77	97	66	492954	86	296	0	163	393	66	86	393	0	3	2532.720	4	0.315	8	0	0
41	41	69	82	42	237636	94	214	0	163	296	42	163	296	0	4	2054.371	3	0.500	8	0	0
42	42	64	70	58	259840	100	507	0	164	577	58	164	507	0	2	2558.564	4	0.359	17	31	0
43	43	33	98	20	64680	130	409	0	163	507	20	163	507	0	4	2054.101	3	0.500	16	0	0
44	44	56	86	34	163744	107	128	0	163	214	34	163	214	0	4	2053.824	3	0.500	37	0	0
45	45	69	76	58	304152	164	507	126	233	583	184	233	507	126	2	1990.187	3	0.391	36	1002	0
46	46	64	70	58	259840	169	437	143	233	507	201	233	507	143	4	2028.139	3	0.456	19	0	0
47	47	53	109	24	138648	0	75	40	53	184	64	0	184	40	3	2014.225	3	0.431	2	0	0
48	48	43	97	32	133472	53	479	0	96	576	32	53	479	0	1	2029.471	3	0.457	3	1005	0
49	49	69	82	42	237636	0	214	90	69	296	132	0	296	90	3	1997.070	3	0.405	88	0	0
50	50	62	90	38	212040	0	296	100	62	386	138	0	296	100	1	2017.872	3	0.440	82	1002	0

51	51	64	70	58	259840	169	227	86	233	297	144	233	227	86	2	1976.173	3	0.369	76	1002	0
52	52	53	109	24	138648	180	81	131	233	190	155	233	81	131	2	1990.709	3	0.391	1	51	0
53	53	69	76	58	304152	0	220	132	69	296	190	0	296	132	3	1976.025	3	0.367	30	0	0
54	54	53	109	24	138648	0	296	138	53	405	162	0	296	138	1	2022.800	3	0.448	58	1002	0
55	55	64	70	58	259840	0	296	162	64	366	220	0	296	162	1	2681.732	4	0.573	169	1005	0
56	56	53	109	24	138648	0	187	190	53	296	214	0	296	190	3	1999.662	3	0.407	6	0	0
57	57	69	81	69	385641	0	479	40	69	560	109	0	479	40	1	1953.688	3	0.328	1	1002	0
58	58	29	73	20	42340	134	434	20	163	507	40	163	507	20	4	2053.984	3	0.500	18	0	0
59	59	69	76	58	304152	94	220	42	163	296	100	163	296	42	4	1923.695	3	0.278	22	0	0
60	60	42	109	22	100716	121	105	34	163	214	56	163	214	34	4	1974.313	3	0.364	30	0	0
61	61	53	74	40	156880	0	366	162	53	440	202	0	366	162	1	1993.686	3	0.397	18	1002	0

9 APPENDIX C: RESULT TABLES FOR 5-PACKAGE LOOK-AHEAD

Set 1 - 5-Package Look-Ahead Results																				
Packing Order	Item Number	Length	Width	Height	Volume	x1	y1	z1	x2	y2	z2	RCx	RCy	RCz	RCd	Caving Degree	Paste Number	Paste Ratio	Distance	Closest Item	Penalty Cost
1	1	66	95	31	194370	0	0	0	66	95	31	0	0	0	0	0.000	0	0.000	0	0	0
2	4	77	83	46	293986	156	0	0	233	83	46	233	0	0	2	2053.146	3	0.500	90	1	0
3	3	66	95	31	194370	66	0	0	132	95	31	66	0	0	1	2054.086	3	0.500	24	2	0
4	2	76	108	30	246240	157	83	0	233	191	30	233	83	0	2	2054.101	3	0.500	25	3	0
5	8	39	41	38	60762	0	0	31	39	41	69	0	0	31	1	2053.839	3	0.500	26	3	1
6	5	27	95	26	66690	0	95	0	27	190	26	0	95	0	1	2053.563	3	0.500	38	4	0
7	10	32	71	25	56800	27	95	0	59	166	25	27	95	0	1	2054.318	3	0.500	7	4	0
8	6	78	104	34	275808	155	191	0	233	295	34	233	191	0	2	2044.484	3	0.487	155	1004	0
9	7	72	98	46	324576	161	295	0	233	393	46	233	295	0	2	2035.111	3	0.471	161	1004	0
10	9	72	98	46	324576	161	393	0	233	491	46	233	393	0	2	2052.157	3	0.500	161	1004	0
11	13	66	95	31	194370	167	491	0	233	586	31	233	491	0	2	2051.617	3	0.500	167	1004	1
12	14	67	97	62	402938	166	0	46	233	97	108	233	0	46	2	2036.466	3	0.472	112	1002	1
13	12	72	98	46	324576	161	0	108	233	98	154	233	0	108	2	2042.550	3	0.481	66	1002	0
14	11	74	104	65	500240	159	0	154	233	104	219	233	0	154	2	2044.738	3	0.483	1	1002	0
15	18	32	71	25	56800	59	95	0	91	166	25	59	95	0	1	2052.783	3	0.500	66	1005	1
16	19	76	108	30	246240	0	190	0	76	298	30	0	190	0	1	2019.502	3	0.443	79	1005	1
17	17	78	104	34	275808	0	298	0	78	402	34	0	298	0	1	2045.590	3	0.487	83	1005	0
18	15	70	111	48	372960	0	402	0	70	513	48	0	402	0	1	2035.759	3	0.470	91	11	0
19	16	67	97	62	402938	0	305	34	67	402	96	0	402	34	3	1996.595	3	0.404	94	0	0

Set 1 - 5-Package Look-Ahead Results																				
20	23	81	94	44	335016	152	97	30	233	191	74	233	191	30	4	3194.203	5	0.442	14	0	0
21	22	70	111	48	372960	0	402	48	70	513	96	0	402	48	1	2050.209	3	0.496	124	1002	0
22	21	72	98	46	324576	161	191	34	233	289	80	233	191	34	2	2045.889	3	0.485	6	1002	0
23	20	67	97	62	402938	70	402	0	137	499	62	70	402	0	1	1985.814	3	0.384	24	11	0
24	25	32	71	25	56800	201	97	74	233	168	99	233	97	74	2	2054.240	3	0.500	10	22	0
25	26	43	110	25	118250	78	292	0	121	402	25	78	402	0	3	2047.804	3	0.490	34	0	0
26	27	76	108	30	246240	0	190	30	76	298	60	0	298	30	3	2009.416	3	0.425	76	0	0
27	28	81	94	44	335016	39	0	31	120	94	75	39	0	31	1	2004.602	3	0.416	34	26	1
28	24	67	97	62	402938	78	305	25	145	402	87	78	402	25	3	1888.048	3	0.217	16	0	0
29	30	66	95	31	194370	27	95	25	93	190	56	27	95	25	1	2517.818	4	0.291	58	28	0
30	32	33	81	28	74844	200	491	31	233	572	59	233	491	31	2	2031.561	3	0.463	62	23	0
31	29	74	104	65	500240	159	387	46	233	491	111	233	491	46	4	1984.414	3	0.381	14	0	0
32	33	77	83	46	293986	156	304	46	233	387	92	233	387	46	4	2042.546	3	0.480	10	0	1
33	34	84	85	30	214200	149	302	92	233	387	122	233	387	92	4	2006.496	3	0.421	82	0	0
34	35	77	83	46	293986	156	387	111	233	470	157	233	387	111	2	1990.716	3	0.393	63	1002	0
35	31	81	94	44	335016	152	293	122	233	387	166	233	387	122	4	2021.544	3	0.445	54	0	0
36	36	39	41	38	60762	0	41	31	39	82	69	0	41	31	1	2740.046	4	0.668	1	1002	0
37	38	25	33	23	18975	132	83	0	157	116	23	157	83	0	2	2603.755	4	0.436	6	1004	0
38	39	25	33	23	18975	91	95	0	116	128	23	91	95	0	1	2054.463	3	0.500	1	37	0
39	37	66	95	31	194370	167	387	157	233	482	188	233	387	157	2	1995.461	3	0.400	32	1002	0
40	44	84	85	30	214200	149	302	166	233	387	196	233	387	166	4	2022.297	3	0.446	24	0	0
41	40	76	108	30	246240	157	387	188	233	495	218	233	387	188	2	1977.288	3	0.369	2	1002	0
42	45	27	95	26	66690	0	95	26	27	190	52	0	95	26	1	3360.833	5	0.727	38	1002	0
43	42	77	83	46	293986	70	499	0	147	582	46	70	499	0	1	1976.906	3	0.368	2	30	0

Set 2 - 5-Package Look-Ahead Results																				
Packing Order	Item Number	Length	Width	Height	Volume	x1	y1	z1	x2	y2	z2	RCx	RCy	RCz	RCd	Caving Degree	Paste Number	Paste Ratio	Distance	Closest Item	Penalty Cost
1	1	36	48	31	53568	0	0	0	36	48	31	0	0	0	0	0.000	0	0.000	0	0	0
2	2	70	95	62	412300	163	0	0	233	95	62	233	0	0	2	2052.794	3	0.500	127	1	0
3	4	69	84	66	382536	164	0	62	233	84	128	233	0	62	2	2053.233	3	0.500	92	1002	1
4	7	88	98	26	224224	75	0	0	163	98	26	163	0	0	2	2052.157	3	0.497	39	1	0
5	6	25	49	21	25725	50	0	0	75	49	21	75	0	0	2	2054.026	3	0.500	14	1	0
6	3	69	97	41	274413	164	95	0	233	192	41	233	95	0	2	2051.976	3	0.500	164	1004	0
7	5	69	97	41	274413	164	192	0	233	289	41	233	192	0	2	2051.976	3	0.500	164	1004	0
8	11	69	97	41	274413	164	289	0	233	386	41	233	289	0	2	2054.485	3	0.500	1	7	1
9	12	69	97	41	274413	164	386	0	233	483	41	233	386	0	2	2051.976	3	0.500	164	1004	0
10	10	52	98	44	224224	181	483	0	233	581	44	233	483	0	2	2047.688	3	0.493	176	1002	0
11	8	77	89	46	315238	86	0	26	163	89	72	163	0	26	2	2035.737	3	0.469	50	1	0
12	13	48	71	47	160176	185	0	128	233	71	175	233	0	128	2	2053.671	3	0.500	45	1002	1
13	9	76	103	64	500992	157	95	41	233	198	105	233	95	41	2	1990.712	3	0.393	92	1002	0
14	15	49	111	26	141414	184	198	41	233	309	67	233	198	41	2	2054.481	3	0.500	1	13	0
15	14	37	73	23	62123	196	309	41	233	382	64	233	309	41	2	2054.424	3	0.500	3	10	0
16	16	48	61	39	114192	185	0	175	233	61	214	233	0	175	2	2054.376	3	0.500	6	1002	0
17	18	43	90	33	127710	190	198	67	233	288	100	233	198	67	2	2052.117	3	0.500	120	1002	1
18	21	76	86	38	248368	105	483	0	181	569	38	181	483	0	2	2000.984	3	0.412	105	1004	1
19	17	70	95	62	412300	163	382	41	233	477	103	233	382	41	2	1992.103	3	0.394	6	10	0
20	23	69	97	41	274413	95	386	0	164	483	41	164	483	0	4	2629.276	4	0.482	95	0	0
21	22	76	86	38	248368	88	300	0	164	386	38	164	386	0	4	2048.301	3	0.490	3	0	0

22	19	84	85	72	514080	80	215	0	164	300	72	164	300	0	4	1966.186	3	0.350	18	0	0
23	24	51	60	41	125460	113	155	0	164	215	41	164	215	0	4	2652.239	4	0.520	57	0	0
24	20	84	85	72	514080	29	130	0	113	215	72	113	215	0	4	1942.411	3	0.309	1	0	0
25	25	75	75	63	354375	0	49	0	75	124	63	75	49	0	2	2584.448	4	0.403	6	24	0
26	29	36	48	31	53568	197	334	64	233	382	95	233	382	64	4	2054.473	3	0.500	1	0	0
27	27	43	90	33	127710	37	215	0	80	305	33	80	215	0	2	2047.902	3	0.490	37	1004	1
28	26	77	89	46	315238	18	386	0	95	475	46	95	386	0	2	1979.110	3	0.372	1	20	0
29	31	52	98	44	224224	28	215	33	80	313	77	80	215	33	2	1990.752	3	0.392	28	1004	1
30	30	77	89	46	315238	18	475	0	95	564	46	95	475	0	2	1978.198	3	0.370	1	28	0
31	28	84	85	72	514080	149	198	100	233	283	172	233	198	100	2	1914.766	3	0.263	48	1002	0
32	36	25	49	21	25725	50	0	21	75	49	42	75	49	21	4	3794.660	6	0.465	1	0	0
33	34	75	75	63	354375	158	123	105	233	198	168	233	198	105	4	2053.963	3	0.500	38	0	0
34	35	76	103	64	500992	105	483	38	181	586	102	181	483	38	2	1872.771	3	0.191	10	30	0

Set 3 - 5-Package Look-Ahead Results																				
Packing Order	Item Number	Length	Width	Height	Volume	x1	y1	z1	x2	y2	z2	RCx	RCy	RCz	RCd	Caving Degree	Paste Number	Paste Ratio	Distance	Closest Item	Penalty Cost
1	1	78	102	39	310284	0	0	0	78	102	39	0	0	0	0	0.000	0	0.000	0	0	0
2	2	46	113	36	187128	187	0	0	233	113	36	233	0	0	2	2052.594	3	0.500	109	1	0
3	4	46	113	36	187128	187	113	0	233	226	36	233	113	0	2	2054.483	3	0.500	1	2	0
4	6	46	113	36	187128	141	0	0	187	113	36	187	0	0	2	2054.483	3	0.500	1	3	0
5	3	30	101	26	78780	157	113	0	187	214	26	187	113	0	2	2054.477	3	0.500	1	4	0
6	9	63	97	56	342216	78	0	0	141	97	56	78	0	0	1	2676.920	4	0.561	33	5	0
7	8	63	103	58	376362	78	97	0	141	200	58	78	97	0	1	2544.234	4	0.335	16	5	0
8	7	49	90	30	132300	184	0	36	233	90	66	233	0	36	2	2054.029	3	0.500	24	7	0
9	5	50	66	42	138600	0	0	39	50	66	81	0	0	39	1	2053.959	3	0.500	28	8	0
10	10	56	100	35	196000	0	102	0	56	202	35	0	102	0	1	2054.121	3	0.500	22	7	0
11	14	57	75	41	175275	0	202	0	57	277	41	0	202	0	1	2041.291	3	0.481	100	5	1
12	11	63	103	58	376362	0	277	0	63	380	58	0	277	0	1	2028.273	3	0.459	162	1002	0
13	13	63	103	58	376362	0	380	0	63	483	58	0	380	0	1	2054.486	3	0.500	1	12	0
14	16	63	97	56	342216	0	483	0	63	580	56	0	483	0	1	2052.155	3	0.500	164	1002	0
15	15	66	73	62	298716	167	0	66	233	73	128	233	0	66	2	2026.015	3	0.454	92	1002	0
16	12	74	90	69	459540	159	0	128	233	90	197	233	0	128	2	2024.127	3	0.449	23	1002	0
17	20	43	94	31	125302	190	90	36	233	184	67	233	90	36	2	2052.898	3	0.497	4	16	1
18	17	49	90	30	132300	184	226	0	233	316	30	233	226	0	2	2049.066	3	0.495	120	1004	0
19	18	49	90	30	132300	184	316	0	233	406	30	233	316	0	2	2052.145	3	0.500	120	1004	0
20	23	43	94	31	125302	190	406	0	233	500	31	233	406	0	2	2050.439	3	0.497	127	14	0
21	22	66	73	62	298716	0	0	81	66	73	143	0	0	81	1	2020.188	3	0.444	77	1002	1

22	19	74	90	69	459540	0	0	143	74	90	212	0	0	143	1	2024.321	3	0.449	8	1002	0
23	25	68	71	64	308992	165	500	0	233	571	64	233	500	0	2	1988.427	3	0.390	102	14	0
24	24	63	103	58	376362	0	483	56	63	586	114	0	483	56	1	1981.957	3	0.379	102	23	0
25	21	74	90	69	459540	0	393	58	74	483	127	0	483	58	3	2012.390	3	0.429	14	0	0
26	28	56	100	35	196000	0	102	35	56	202	70	0	202	35	3	3191.076	5	0.437	22	0	0
27	27	46	113	36	187128	141	113	26	187	226	62	187	113	26	2	3134.268	5	0.339	1	26	0
28	29	63	103	58	376362	0	290	58	63	393	116	0	393	58	3	2053.281	3	0.500	88	0	0
29	26	50	66	42	138600	0	202	41	50	268	83	0	202	41	1	2031.000	3	0.460	8	28	0
30	32	49	90	30	132300	184	410	31	233	500	61	233	500	31	4	2033.869	3	0.469	110	0	0
31	30	54	80	35	151200	0	483	114	54	563	149	0	483	114	1	2014.468	3	0.434	71	1002	0
32	35	54	80	35	151200	0	403	127	54	483	162	0	483	127	3	2030.544	3	0.461	58	0	0
33	33	61	106	56	362096	0	287	116	61	393	172	0	393	116	3	1998.366	3	0.406	48	0	0
34	31	67	85	39	222105	0	117	70	67	202	109	0	202	70	3	1981.304	3	0.375	1	0	0
35	37	50	91	40	182000	183	226	30	233	317	70	233	226	30	2	2004.357	3	0.417	88	1002	0
36	38	50	91	40	182000	0	483	149	50	574	189	0	483	149	1	1999.228	3	0.407	31	1002	0
37	34	68	71	64	308992	165	317	30	233	388	94	233	317	30	2	1975.085	3	0.365	18	1002	0
38	40	67	85	39	222105	0	202	83	67	287	122	0	202	83	1	2568.204	4	0.375	4	1002	0
39	36	68	71	64	308992	0	216	122	68	287	186	0	287	122	3	2024.634	3	0.450	34	0	0
40	42	54	80	35	151200	0	403	162	54	483	197	0	483	162	3	2035.132	3	0.467	1	0	0
41	43	63	103	58	376362	0	99	109	63	202	167	0	202	109	3	1980.964	3	0.375	8	0	1
42	41	78	102	39	310284	0	287	172	78	389	211	0	287	172	1	1979.424	3	0.372	9	1002	0
43	39	61	118	40	287920	172	199	70	233	317	110	233	317	70	4	1977.823	3	0.372	104	0	0
44	45	49	90	30	132300	135	226	0	184	316	30	184	226	30	6	3777.724	6	0.438	72	0	1
45	46	30	101	26	78780	154	0	36	184	101	62	184	0	36	2	2041.364	3	0.478	4	43	1
46	47	67	85	39	222105	166	317	94	233	402	133	233	317	94	2	1988.040	3	0.389	87	1002	0
47	48	63	97	56	342216	170	220	110	233	317	166	233	317	110	4	2010.220	3	0.425	1	0	0
48	44	66	73	62	298716	167	317	133	233	390	195	233	317	133	2	2010.512	3	0.425	1	47	0

49	50	48	61	30	87840	136	316	0	184	377	30	184	316	30	6	3873.073	6	0.601	72	0	1
50	49	56	100	35	196000	177	217	166	233	317	201	233	317	166	4	2039.312	3	0.475	19	0	0
51	51	50	91	40	182000	183	409	61	233	500	101	233	500	61	4	1995.754	3	0.400	1	0	0
52	52	66	73	62	298716	167	500	64	233	573	126	233	500	64	2	2001.235	3	0.412	94	1002	0
53	53	50	91	40	182000	183	409	101	233	500	141	233	500	101	4	2031.352	3	0.461	6	0	0
54	54	66	73	62	298716	167	500	126	233	573	188	233	500	126	2	1981.018	3	0.376	32	1002	0
55	57	63	97	56	342216	170	403	141	233	500	197	233	500	141	4	2011.899	3	0.428	13	0	0

Set 4 - 5-Package Look-Ahead Results																				
Packing Order	Item Number	Length	Width	Height	Volume	x1	y1	z1	x2	y2	z2	RCx	RCy	RCz	RCd	Caving Degree	Paste Number	Paste Ratio	Distance	Closest Item	Penalty Cost
1	1	96	98	56	526848	0	0	0	96	98	56	0	0	0	0	0.000	0	0.000	0	0	0
2	5	96	98	56	526848	137	0	0	233	98	56	233	0	0	2	2053.992	3	0.500	41	1	0
3	2	34	68	33	76296	96	0	0	130	68	33	96	0	0	1	2054.335	3	0.500	7	2	0
4	3	49	116	47	267148	0	98	0	49	214	47	0	98	0	1	2053.134	3	0.500	88	2	0
5	4	45	75	35	118125	49	98	0	94	173	35	49	98	0	1	2054.480	3	0.500	1	4	0
6	8	92	113	33	343068	141	98	0	233	211	33	233	98	0	2	2053.857	3	0.500	45	5	0
7	9	88	98	47	405328	0	0	56	88	98	103	0	0	56	1	2053.838	3	0.500	49	2	0
8	10	68	79	44	236368	165	0	56	233	79	100	233	0	56	2	2053.384	3	0.500	69	7	1
9	7	52	54	49	137592	0	0	103	52	54	152	0	0	103	1	2053.183	3	0.500	68	1002	0
10	6	44	83	23	83996	189	98	33	233	181	56	233	98	33	2	2052.376	3	0.500	93	7	0
11	14	52	54	49	137592	0	0	152	52	54	201	0	0	152	1	2054.132	3	0.500	19	1002	0
12	13	35	59	34	70210	198	0	100	233	59	134	233	0	100	2	2052.415	3	0.500	86	1002	1
13	11	37	52	28	53872	196	79	56	233	131	84	233	79	56	2	2051.852	3	0.500	100	7	0
14	16	59	119	39	273819	174	211	0	233	330	39	233	211	0	2	2045.119	3	0.487	126	4	1
15	15	69	103	49	348243	164	330	0	233	433	49	233	330	0	2	2034.082	3	0.465	1	14	0
16	12	88	98	47	405328	145	433	0	233	531	47	233	433	0	2	2037.448	3	0.474	145	1004	0
17	20	33	57	29	54549	141	211	0	174	268	29	174	211	0	2	2054.474	3	0.500	1	1004	0
18	18	53	97	32	164512	0	214	0	53	311	32	0	214	0	1	2049.097	3	0.494	89	17	0
19	17	69	103	49	348243	0	311	0	69	414	49	0	311	0	1	2021.315	3	0.446	95	16	0
20	23	53	97	32	164512	0	214	32	53	311	64	0	311	32	3	2638.880	4	0.497	40	0	1
21	19	88	98	47	405328	53	213	0	141	311	47	53	311	0	3	2610.139	4	0.447	2	0	0

22	22	69	103	49	348243	0	414	0	69	517	49	0	414	0	1	2054.486	3	0.500	1	19	0
23	21	68	79	44	236368	69	311	0	137	390	44	69	311	0	1	2054.096	3	0.500	25	22	0
24	28	49	116	47	267148	0	98	47	49	214	94	0	214	47	3	3835.727	6	0.535	4	0	1
25	27	33	41	31	41943	141	268	0	174	309	31	174	268	0	2	2738.302	4	0.665	6	23	0
26	26	35	59	34	70210	69	390	0	104	449	34	69	390	0	1	2054.476	3	0.500	1	23	1
27	24	52	54	49	137592	0	517	0	52	571	49	0	517	0	1	2052.699	3	0.500	93	16	0
28	29	53	97	32	164512	0	214	64	53	311	96	0	214	64	1	2045.565	3	0.489	124	1002	0
29	25	96	98	56	526848	0	311	49	96	409	105	0	311	49	1	1974.347	3	0.364	6	27	0
30	33	52	54	49	137592	0	409	49	52	463	98	0	409	49	1	2054.481	3	0.500	1	27	0
31	31	35	59	34	70210	69	449	0	104	508	34	69	449	0	1	2053.482	3	0.500	42	16	1
32	34	35	59	34	70210	198	0	134	233	59	168	233	0	134	2	2053.240	3	0.500	52	1002	0
33	32	45	75	35	118125	0	463	49	45	538	84	0	463	49	1	2051.728	3	0.500	136	1002	0
34	30	96	98	56	526848	53	213	47	149	311	103	53	311	47	3	1985.880	3	0.385	72	0	0
35	36	33	57	29	54549	49	98	35	82	155	64	49	98	35	1	2054.474	3	0.500	1	34	0
36	35	44	83	23	83996	97	130	0	141	213	23	141	213	0	4	2054.454	3	0.500	2	0	0
37	41	33	41	31	41943	165	0	100	198	41	131	198	0	100	2	2054.442	3	0.500	2	1002	1
38	39	34	68	33	76296	104	390	0	138	458	33	104	390	0	1	2052.629	3	0.497	7	16	0
39	40	37	52	28	53872	196	531	0	233	583	28	233	531	0	2	2050.687	3	0.500	144	33	1
40	37	88	98	47	405328	145	433	47	233	531	94	233	433	47	2	1985.903	3	0.385	76	33	0
41	38	68	79	44	236368	165	354	49	233	433	93	233	433	49	4	2053.530	3	0.500	60	0	0
42	46	33	57	29	54549	49	98	64	82	155	93	49	98	64	1	2054.474	3	0.500	1	1002	1
43	45	34	68	33	76296	199	0	168	233	68	201	233	0	168	2	2038.235	3	0.473	19	1002	0
44	42	52	54	49	137592	0	54	103	52	108	152	0	54	103	1	2034.110	3	0.468	68	1002	0
45	43	52	54	49	137592	0	54	152	52	108	201	0	54	152	1	2054.132	3	0.500	19	1002	0
46	44	52	54	49	137592	52	0	103	104	54	152	52	0	103	1	2021.609	3	0.446	62	1002	0
47	49	33	41	31	41943	104	458	0	137	499	31	104	458	0	1	2054.270	3	0.500	8	40	0
48	51	44	83	23	83996	145	98	33	189	181	56	189	98	33	2	2053.838	3	0.500	29	1004	1

49	48	59	119	39	273819	174	211	39	233	330	78	233	330	39	4	2017.279	3	0.437	1	0	1
50	50	88	98	47	405328	145	335	93	233	433	140	233	433	93	4	1929.650	3	0.288	24	0	0
51	47	96	98	56	526848	137	433	94	233	531	150	233	433	94	2	2023.056	3	0.448	70	1002	0
52	55	33	41	31	41943	52	0	152	85	41	183	52	0	152	1	2054.097	3	0.500	14	45	0
53	52	33	57	29	54549	200	131	56	233	188	85	233	131	56	2	2036.983	3	0.471	10	1002	0
54	53	44	83	23	83996	189	350	140	233	433	163	233	433	140	4	2028.936	3	0.456	1	0	0
55	58	34	68	33	76296	131	0	56	165	68	89	165	0	56	2	2033.127	3	0.464	12	52	0
56	56	37	99	30	109890	196	433	150	233	532	180	233	433	150	2	2028.420	3	0.457	40	1002	0
57	54	68	79	44	236368	165	354	163	233	433	207	233	433	163	4	1948.714	3	0.320	13	0	0
58	61	35	59	34	70210	96	0	33	131	59	67	96	0	33	1	2638.063	4	0.494	6	1005	1
59	59	52	54	49	137592	181	531	28	233	585	77	233	531	28	2	2021.728	3	0.445	18	56	1
60	60	52	54	49	137592	181	531	77	233	585	126	233	531	77	2	2054.481	3	0.500	1	59	1
61	57	96	98	56	526848	100	433	150	196	531	206	196	433	150	2	1907.721	3	0.250	14	1002	0
62	64	44	83	23	83996	145	350	140	189	433	163	189	433	163	8	3313.049	5	0.644	1	0	0
63	62	33	57	29	54549	200	433	180	233	490	209	233	433	180	2	2050.081	3	0.493	4	61	0
64	67	37	52	28	53872	159	531	0	196	583	28	196	531	28	6	3870.397	6	0.598	108	0	1
65	63	69	103	49	348243	127	79	56	196	182	105	196	79	56	2	1915.018	3	0.263	29	1002	0
66	69	53	97	32	164512	0	214	96	53	311	128	0	311	96	3	2622.313	4	0.470	92	0	1
67	68	45	75	35	118125	0	139	94	45	214	129	0	214	94	3	2052.736	3	0.497	1	0	1
68	65	69	103	49	348243	0	311	105	69	414	154	0	311	105	1	2006.397	3	0.419	52	1002	0
69	70	64	92	33	194304	0	219	128	64	311	161	0	311	128	3	2015.568	3	0.434	6	0	0
70	66	96	98	56	526848	0	311	154	96	409	210	0	311	154	1	1944.719	3	0.313	10	1002	0
71	72	34	68	33	76296	107	145	23	141	213	56	141	213	23	4	2587.665	4	0.409	12	0	0
72	73	64	92	33	194304	0	219	161	64	311	194	0	311	161	3	2052.781	3	0.497	1	0	0
73	75	64	92	33	194304	0	463	84	64	555	117	0	463	84	1	1949.652	3	0.323	70	1002	0
74	74	72	78	57	320112	69	508	0	141	586	57	69	508	0	1	1911.089	3	0.256	4	64	0

Set 5 - 5-Package Look-Ahead Results																				
Packing Order	Item Number	Length	Width	Height	Volume	x1	y1	z1	x2	y2	z2	RCx	RCy	RCz	RCd	Caving Degree	Paste Number	Paste Ratio	Distance	Closest Item	Penalty Cost
1	1	56	71	33	131208	0	0	0	56	71	33	0	0	0	0	0.000	0	0.000	0	0	0
2	4	77	87	43	288057	156	0	0	233	87	43	233	0	0	2	2052.986	3	0.500	100	1	0
3	2	40	83	36	119520	116	0	0	156	83	36	156	0	0	2	2053.282	3	0.500	60	1	0
4	7	37	72	32	85248	79	0	0	116	72	32	116	0	0	2	2053.955	3	0.500	24	1	0
5	5	32	34	31	33728	0	71	0	32	105	31	0	71	0	1	2053.014	3	0.500	48	4	0
6	6	54	88	39	185328	179	87	0	233	175	39	233	87	0	2	2051.922	3	0.500	147	5	0
7	3	58	109	54	341388	175	175	0	233	284	54	233	175	0	2	2032.494	3	0.467	166	1002	0
8	12	73	79	45	259515	160	0	43	233	79	88	233	0	43	2	2052.995	3	0.500	96	7	1
9	10	32	34	31	33728	0	0	33	32	34	64	0	0	33	1	2051.900	3	0.500	84	8	0
10	11	54	94	36	182736	179	284	0	233	378	36	233	284	0	2	2051.346	3	0.500	179	1004	1
11	9	93	93	28	242172	140	378	0	233	471	28	233	378	0	2	2029.125	3	0.461	140	1004	1
12	8	80	100	72	576000	153	0	88	233	100	160	233	0	88	2	2022.510	3	0.447	60	1002	0
13	14	55	94	30	155100	124	284	0	179	378	30	179	378	0	4	3213.258	5	0.477	109	0	0
14	16	81	109	28	247212	152	471	0	233	580	28	233	471	0	2	2054.484	3	0.500	1	11	1
15	17	32	34	31	33728	0	0	64	32	34	95	0	0	64	1	2054.469	3	0.500	1	12	1
16	15	80	83	57	378480	153	0	160	233	83	217	233	0	160	2	2054.459	3	0.500	3	1002	0
17	13	75	82	65	399750	0	105	0	75	187	65	0	105	0	1	1983.460	3	0.381	100	1002	0
18	19	32	34	31	33728	32	71	0	64	105	31	32	105	0	3	3299.928	5	0.623	16	0	1
19	22	75	82	65	399750	0	187	0	75	269	65	0	187	0	1	2053.631	3	0.500	64	1002	1
20	18	55	94	30	155100	0	269	0	55	363	30	0	269	0	1	2053.216	3	0.500	69	1005	0
21	24	54	91	22	108108	0	269	30	54	360	52	0	269	30	1	2053.031	3	0.500	70	13	1

22	20	85	94	44	351560	0	363	0	85	457	44	0	363	0	1	2015.271	3	0.434	40	14	0
23	25	58	109	54	341388	0	457	0	58	566	54	0	457	0	1	2042.230	3	0.481	82	14	0
24	23	80	83	57	378480	95	201	0	175	284	57	175	284	0	4	1993.814	3	0.397	20	0	1
25	21	80	100	72	576000	153	378	28	233	478	100	233	378	28	2	1979.804	3	0.374	68	23	0
26	26	32	34	31	33728	0	71	31	32	105	62	0	105	31	3	3233.536	5	0.511	37	0	0
27	28	37	72	32	85248	196	306	36	233	378	68	233	378	36	4	2054.000	3	0.500	22	0	0
28	30	80	100	72	576000	153	478	28	233	578	100	233	478	28	2	2053.358	3	0.500	95	23	0
29	31	56	71	33	131208	58	457	0	114	528	33	58	457	0	1	2019.596	3	0.441	26	28	1
30	29	73	79	45	259515	102	122	0	175	201	45	175	201	0	4	1997.520	3	0.404	26	0	0
31	27	80	83	57	378480	0	374	44	80	457	101	0	457	44	3	1980.968	3	0.375	15	0	0
32	33	54	91	22	108108	0	457	54	54	548	76	0	457	54	1	2052.422	3	0.500	99	28	1
33	34	40	108	26	112320	0	457	76	40	565	102	0	457	76	1	2026.286	3	0.456	113	28	1
34	35	73	79	45	259515	0	378	101	73	457	146	0	457	101	3	1978.938	3	0.371	1	0	0
35	36	58	109	54	341388	0	457	102	58	566	156	0	457	102	1	2004.183	3	0.416	64	1002	0
36	32	77	87	43	288057	0	370	146	77	457	189	0	457	146	3	1974.290	3	0.364	31	0	0
37	38	32	34	31	33728	32	71	31	64	105	62	32	71	31	1	2645.500	4	0.508	16	1002	1
38	39	40	83	36	119520	55	269	0	95	352	36	55	269	0	1	2615.573	4	0.456	12	36	0
39	37	40	108	26	112320	0	457	156	40	565	182	0	457	156	1	2053.712	3	0.500	38	1002	0
40	42	32	34	31	33728	0	34	33	32	68	64	0	34	33	1	2054.469	3	0.500	1	1002	1
41	40	54	91	22	108108	0	269	52	54	360	74	0	269	52	1	2036.584	3	0.470	15	1002	0
42	43	40	108	26	112320	0	161	65	40	269	91	0	269	65	3	2027.433	3	0.458	127	0	0
43	44	40	108	26	112320	0	457	182	40	565	208	0	457	182	1	2026.942	3	0.453	12	1002	0
44	45	78	104	26	210912	0	353	189	78	457	215	0	457	189	3	1991.393	3	0.393	5	0	0
45	41	80	100	72	576000	0	269	74	80	369	146	0	269	74	1	1940.129	3	0.305	2	44	0
46	48	32	34	31	33728	0	34	64	32	68	95	0	34	64	1	2054.469	3	0.500	1	1002	1
47	50	58	109	54	341388	0	160	91	58	269	145	0	269	91	3	2014.357	3	0.433	75	0	1
48	47	78	104	26	210912	0	165	145	78	269	171	0	269	145	3	1961.587	3	0.343	49	0	0

49	46	80	83	57	378480	0	269	146	80	352	203	0	269	146	1	2006.388	3	0.418	2	44	0
50	51	56	71	33	131208	60	0	32	116	71	65	116	0	32	2	2523.259	4	0.299	4	1004	0
51	53	40	83	36	119520	116	0	36	156	83	72	116	0	36	1	2628.236	4	0.478	4	30	0
52	49	75	82	65	399750	41	0	65	116	82	130	116	0	65	2	1930.124	3	0.288	1	50	0
53	54	56	71	33	131208	0	198	171	56	269	204	0	269	171	3	2052.173	3	0.497	16	0	0
54	55	40	83	36	119520	193	92	39	233	175	75	233	175	39	4	2022.579	3	0.446	5	0	0
55	52	58	109	54	341388	175	175	54	233	284	108	233	175	54	2	2602.097	4	0.433	22	1002	0
56	57	54	94	36	182736	179	284	68	233	378	104	233	378	68	4	3797.478	6	0.472	99	0	0
57	56	85	94	44	351560	148	378	100	233	472	144	233	378	100	2	1980.531	3	0.374	6	1002	0
58	62	54	91	22	108108	179	287	104	233	378	126	233	378	104	4	2054.458	3	0.500	2	0	1
59	61	77	87	43	288057	156	472	100	233	559	143	233	472	100	2	2053.334	3	0.500	77	1002	1
60	58	75	82	65	399750	158	472	143	233	554	208	233	472	143	2	1968.198	3	0.353	12	1002	0
61	63	55	94	30	155100	124	284	30	179	378	60	179	378	30	4	3767.429	6	0.418	8	0	1
62	60	91	104	76	719264	142	368	144	233	472	220	233	472	144	4	2710.775	4	0.619	62	0	0
63	59	93	93	28	242172	82	191	57	175	284	85	175	284	57	4	1958.308	3	0.336	2	0	0
64	68	32	34	31	33728	116	0	72	148	34	103	116	0	72	1	2054.345	3	0.500	5	1005	0
65	66	55	94	30	155100	58	457	33	113	551	63	58	457	33	1	1961.054	3	0.342	38	62	0

Set 6 - 5-Package Look-Ahead Results																				
Packing Order	Item Number	Length	Width	Height	Volume	x1	y1	z1	x2	y2	z2	RCx	RCy	RCz	RCd	Caving Degree	Paste Number	Paste Ratio	Distance	Closest Item	Penalty Cost
1	1	33	42	21	29106	0	0	0	33	42	21	0	0	0	0	0.000	0	0.000	0	0	0
2	5	80	114	44	401280	153	0	0	233	114	44	233	0	0	2	2052.873	3	0.500	120	1	1
3	4	75	75	36	202500	78	0	0	153	75	36	153	0	0	2	2053.717	3	0.500	46	1	0
4	2	61	71	52	225212	172	0	44	233	71	96	233	0	44	2	2052.462	3	0.500	124	1002	0
5	7	44	68	27	80784	34	0	0	78	68	27	78	0	0	2	2054.454	3	0.500	2	1	0
6	3	58	62	30	107880	175	0	96	233	62	126	233	0	96	2	2052.525	3	0.500	94	1002	0
7	10	73	78	40	227760	160	114	0	233	192	40	233	114	0	2	2051.880	3	0.500	160	1004	1
8	6	75	75	36	202500	158	192	0	233	267	36	233	192	0	2	2049.893	3	0.497	158	1004	0
9	11	54	70	37	139860	179	267	0	233	337	37	233	267	0	2	2049.158	3	0.497	179	1004	1
10	9	61	71	52	225212	172	0	126	233	71	178	233	0	126	2	2034.540	3	0.467	42	1002	1
11	12	63	69	46	199962	170	337	0	233	406	46	233	337	0	2	2026.240	3	0.457	170	1004	0
12	8	67	72	56	270144	166	406	0	233	478	56	233	406	0	2	2032.083	3	0.466	164	1002	0
13	15	51	65	50	165750	182	478	0	233	543	50	233	478	0	2	2051.405	3	0.500	170	1002	1
14	13	45	81	34	123930	188	0	178	233	81	212	233	0	178	2	2037.682	3	0.472	8	1002	0
15	17	51	65	50	165750	182	71	44	233	136	94	233	71	44	2	2017.789	3	0.438	32	14	0
16	16	39	84	22	72072	143	478	0	182	562	22	182	478	0	2	2009.141	3	0.423	1	13	0
17	18	51	65	50	165750	182	71	94	233	136	144	233	71	94	2	2004.616	3	0.416	34	14	0
18	14	84	86	45	325080	69	75	0	153	161	45	153	75	0	2	1989.682	3	0.391	69	1004	0
19	22	58	62	30	107880	175	71	144	233	133	174	233	71	144	2	2036.715	3	0.470	4	14	1
20	19	68	86	33	192984	98	392	0	166	478	33	166	478	0	4	1992.842	3	0.398	98	0	0
21	24	39	84	22	72072	104	478	0	143	562	22	143	478	0	2	2052.001	3	0.500	104	1004	0

22	21	63	69	46	199962	170	337	46	233	406	92	233	406	46	4	1986.648	3	0.388	128	0	0
23	23	84	86	45	325080	149	406	56	233	492	101	233	406	56	2	1975.576	3	0.368	119	1002	0

Set 7 - 5-Package Look-Ahead Results																				
Packing Order	Item Number	Length	Width	Height	Volume	x1	y1	z1	x2	y2	z2	RCx	RCy	RCz	RCd	Caving Degree	Paste Number	Paste Ratio	Distance	Closest Item	Penalty Cost
1	1	79	118	51	475422	0	0	0	79	118	51	0	0	0	0	0.000	0	0.000	0	0	0
2	3	63	103	59	382851	170	0	0	233	103	59	233	0	0	2	2053.247	3	0.500	91	1	0
3	4	70	84	35	205800	100	0	0	170	84	35	170	0	0	2	2054.161	3	0.500	20	1	0
4	2	61	91	61	338611	172	0	59	233	91	120	233	0	59	2	2053.065	3	0.500	100	1002	0
5	9	55	64	43	151360	178	0	120	233	64	163	233	0	120	2	2053.430	3	0.500	57	1002	1
6	8	42	42	32	56448	191	0	163	233	42	195	233	0	163	2	2053.848	3	0.500	25	1002	1
7	6	70	84	35	205800	0	0	51	70	84	86	0	0	51	1	2052.806	3	0.500	100	1002	0
8	5	57	76	36	155952	176	103	0	233	179	36	233	103	0	2	2052.716	3	0.500	96	1	0
9	10	79	118	51	475422	0	118	0	79	236	51	0	118	0	1	2053.270	3	0.500	96	8	0
10	11	66	80	52	274560	0	0	86	66	80	138	0	0	86	1	2053.238	3	0.500	82	1002	1
11	7	82	94	66	508728	0	236	0	82	330	66	0	236	0	1	2031.603	3	0.464	151	1005	0
12	15	66	80	52	274560	0	0	138	66	80	190	0	0	138	1	2054.038	3	0.500	30	1002	1
13	13	32	77	30	73920	0	0	190	32	77	220	0	0	190	1	2763.833	4	0.715	159	6	0
14	12	57	76	36	155952	176	179	0	233	255	36	233	179	0	2	2052.754	3	0.500	94	11	0
15	18	57	76	36	155952	176	255	0	233	331	36	233	255	0	2	2052.754	3	0.500	94	11	0
16	14	77	78	64	384384	0	330	0	77	408	64	0	330	0	1	2053.138	3	0.500	99	15	0
17	19	61	117	57	406809	0	408	0	61	525	57	0	408	0	1	2052.300	3	0.500	163	1002	0
18	17	73	109	23	183011	0	84	51	73	193	74	0	84	51	1	2052.057	3	0.497	44	1002	0
19	20	61	117	57	406809	172	331	0	233	448	57	233	331	0	2	2029.019	3	0.459	95	17	0
20	16	100	101	77	777700	133	448	0	233	549	77	233	448	0	2	2005.257	3	0.417	72	17	0
21	21	32	77	30	73920	32	0	190	64	77	220	32	0	220	5	3945.962	6	0.724	52	0	0

22	25	32	86	31	85312	140	362	0	172	448	31	172	448	0	4	2053.046	3	0.500	64	0	1
23	23	61	88	31	166408	172	360	57	233	448	88	233	448	57	4	2033.053	3	0.466	95	0	0
24	22	60	95	55	313500	173	103	36	233	198	91	233	103	36	2	2008.151	3	0.422	58	1002	0
25	27	55	64	43	151360	178	198	36	233	262	79	233	198	36	2	2053.187	3	0.500	70	23	0
26	24	66	80	52	274560	104	0	35	170	80	87	170	0	35	2	2003.056	3	0.413	24	1004	0
27	30	57	76	36	155952	119	103	0	176	179	36	176	103	36	6	3768.930	6	0.422	40	0	1
28	26	61	91	61	338611	0	84	74	61	175	135	0	84	74	1	1994.097	3	0.399	85	1002	0
29	31	55	98	44	237160	61	408	0	116	506	44	61	408	0	1	2012.661	3	0.429	18	23	0
30	28	61	91	61	338611	172	448	77	233	539	138	233	448	77	2	1994.095	3	0.397	1	20	0
31	33	32	86	31	85312	201	362	88	233	448	119	233	448	88	4	2054.477	3	0.500	1	0	0
32	29	79	118	51	475422	97	213	0	176	331	51	176	331	0	4	1969.539	3	0.356	14	0	0
33	34	70	84	35	205800	0	408	57	70	492	92	0	408	57	1	1982.701	3	0.380	63	1002	0
34	35	77	78	64	384384	0	330	64	77	408	128	0	408	64	3	3175.412	5	0.412	92	0	0
35	36	66	80	52	274560	0	250	66	66	330	118	0	330	66	3	2053.608	3	0.500	58	0	1
36	32	82	94	66	508728	0	408	92	82	502	158	0	408	92	1	1985.862	3	0.384	62	1002	0
37	37	58	64	52	193024	0	344	128	58	408	180	0	408	128	3	2016.566	3	0.437	40	0	0
38	42	42	42	32	56448	191	262	36	233	304	68	233	262	36	2	2054.083	3	0.500	16	1002	1
39	40	73	109	23	183011	0	408	158	73	517	181	0	408	158	1	2017.606	3	0.438	39	1002	0
40	41	58	64	52	193024	77	344	0	135	408	52	77	408	0	3	2016.471	3	0.435	5	0	0
41	38	66	80	52	274560	0	250	118	66	330	170	0	330	118	3	1989.020	3	0.390	50	0	0
42	39	77	78	64	384384	156	198	79	233	276	143	233	198	79	2	1930.077	3	0.290	77	1002	0
43	47	57	76	36	155952	116	103	36	173	179	72	173	103	36	2	2571.021	4	0.381	26	42	1
44	44	70	84	35	205800	163	114	91	233	198	126	233	198	91	4	2032.252	3	0.463	22	0	0
45	43	77	78	64	384384	156	120	126	233	198	190	233	198	126	4	1977.331	3	0.369	30	0	0
46	45	100	101	77	777700	133	198	143	233	299	220	233	198	143	2	2662.861	4	0.538	67	41	0
47	50	73	109	23	183011	160	89	190	233	198	213	233	198	190	4	1997.915	3	0.404	7	0	1
48	49	58	64	52	193024	61	506	0	119	570	52	61	506	0	1	1968.566	3	0.354	14	39	0

49	48	61	88	31	166408	172	360	119	233	448	150	233	448	119	4	1954.041	3	0.331	62	0	0
50	46	82	94	66	508728	151	448	138	233	542	204	233	448	138	2	1950.457	3	0.323	16	1002	0
51	53	65	72	54	252720	98	126	72	163	198	126	163	198	126	8	3078.317	5	0.245	25	0	0
52	51	55	64	43	151360	178	384	150	233	448	193	233	448	150	4	2054.481	3	0.500	1	0	0
53	56	32	77	30	73920	140	371	31	172	448	61	172	448	31	4	2054.381	3	0.500	5	0	0

Set 8 - 5-Package Look-Ahead Results																				
Packing Order	Item Number	Length	Width	Height	Volume	x1	y1	z1	x2	y2	z2	RCx	RCy	RCz	RCd	Caving Degree	Paste Number	Paste Ratio	Distance	Closest Item	Penalty Cost
1	1	58	75	57	247950	0	0	0	58	75	57	0	0	0	0	0.000	0	0.000	0	0	0
2	2	81	89	62	446958	152	0	0	233	89	62	233	0	0	2	2053.271	3	0.500	94	1	0
3	5	60	67	38	152760	58	0	0	118	67	38	58	0	0	1	2053.864	3	0.500	34	2	0
4	3	74	115	44	374440	159	89	0	233	204	44	233	89	0	2	2052.294	3	0.500	159	1004	0
5	6	74	115	44	374440	159	204	0	233	319	44	233	204	0	2	2054.486	3	0.500	1	4	0
6	8	54	95	28	143640	0	75	0	54	170	28	0	75	0	1	2052.629	3	0.500	98	5	0
7	7	60	67	38	152760	173	0	62	233	67	100	233	0	62	2	2052.255	3	0.500	120	1002	1
8	4	84	118	27	267624	149	319	0	233	437	27	233	319	0	2	2047.031	3	0.491	149	1004	0
9	9	46	55	31	78430	187	0	100	233	55	131	233	0	100	2	2052.421	3	0.500	89	1002	0
10	10	46	55	31	78430	187	0	131	233	55	162	233	0	131	2	2053.145	3	0.500	58	1002	0
11	12	84	118	27	267624	149	437	0	233	555	27	233	437	0	2	2052.188	3	0.500	149	1004	0
12	15	37	57	30	63270	0	0	57	37	57	87	0	0	57	1	2051.614	3	0.500	115	1002	1
13	11	76	81	55	338580	0	170	0	76	251	55	0	170	0	1	2000.368	3	0.410	83	1005	0
14	13	76	81	55	338580	0	251	0	76	332	55	0	251	0	1	2054.486	3	0.500	1	13	0
15	16	33	40	23	30360	118	0	0	151	40	23	118	0	0	1	2054.468	3	0.500	1	1005	0
16	17	76	81	55	338580	0	332	0	76	413	55	0	332	0	1	2053.453	3	0.500	73	11	0
17	14	85	90	59	451350	0	413	0	85	503	59	0	413	0	1	2040.032	3	0.477	64	11	0
18	21	53	67	49	173999	0	503	0	53	570	49	0	503	0	1	2052.780	3	0.500	96	11	0
19	22	37	57	30	63270	0	0	87	37	57	117	0	0	87	1	2051.915	3	0.500	103	1002	1
20	19	43	74	38	120916	0	75	28	43	149	66	0	75	28	1	2039.205	3	0.475	20	1002	0
21	20	48	78	46	172224	185	0	162	233	78	208	233	0	162	2	2016.935	3	0.436	12	1002	1

22	18	85	90	59	451350	148	319	27	233	409	86	233	319	27	2	1991.320	3	0.393	28	1002	0
23	24	84	118	27	267624	149	409	27	233	527	54	233	409	27	2	2053.507	3	0.500	64	18	0
24	25	84	118	27	267624	149	409	54	233	527	81	233	409	54	2	2054.484	3	0.500	1	23	0
25	23	33	40	23	30360	53	503	0	86	543	23	53	503	0	1	2052.217	3	0.496	1	24	0
26	29	72	72	51	264384	76	341	0	148	413	51	76	413	0	3	2605.008	4	0.438	1	0	0
27	30	72	72	51	264384	76	269	0	148	341	51	76	341	0	3	2653.292	4	0.520	1	0	1
28	28	85	90	59	451350	148	229	44	233	319	103	233	319	44	4	2607.002	4	0.442	26	0	0
29	26	33	40	23	30360	85	413	0	118	453	23	85	413	0	1	2054.468	3	0.500	1	25	0
30	31	48	78	46	172224	76	191	0	124	269	46	76	269	0	3	2054.069	3	0.500	24	0	0
31	27	76	81	55	338580	157	148	44	233	229	99	233	229	44	4	2050.812	3	0.495	33	0	0
32	33	72	93	35	234360	76	320	51	148	413	86	76	413	51	3	2590.155	4	0.413	1	0	0
33	32	76	81	55	338580	0	332	55	76	413	110	0	413	55	3	2613.381	4	0.454	72	0	0
34	35	60	67	38	152760	0	265	55	60	332	93	0	332	55	3	2054.238	3	0.500	14	0	0
35	36	58	75	57	247950	0	413	59	58	488	116	0	413	59	1	2045.653	3	0.485	18	32	0
36	37	98	99	33	320166	135	319	86	233	418	119	233	319	86	2	2005.962	3	0.419	59	35	0
37	34	99	104	74	761904	0	161	55	99	265	129	0	265	55	3	1959.333	3	0.338	12	0	0
38	41	54	95	28	143640	54	75	0	108	170	28	54	170	0	3	3203.756	5	0.458	7	0	1
39	39	46	55	31	78430	76	265	51	122	320	82	76	320	51	3	3174.046	5	0.408	14	0	0
40	40	33	40	23	30360	85	413	23	118	453	46	85	413	23	1	2054.468	3	0.500	1	36	0
41	42	48	78	46	172224	185	241	103	233	319	149	233	319	103	4	2008.922	3	0.425	71	0	0
42	38	99	104	74	761904	134	319	119	233	423	193	233	319	119	2	1979.085	3	0.372	27	1002	0
43	44	37	57	30	63270	196	91	44	233	148	74	233	148	44	4	2054.425	3	0.500	3	0	0
44	47	54	95	28	143640	179	224	149	233	319	177	233	319	149	4	2008.433	3	0.423	43	0	0
45	43	74	79	35	204610	0	334	110	74	413	145	0	413	110	3	1995.736	3	0.400	1	0	0
46	46	72	72	51	264384	0	413	116	72	485	167	0	413	116	1	1992.950	3	0.397	53	1002	0
47	45	72	93	35	234360	0	320	145	72	413	180	0	413	145	3	2006.405	3	0.419	40	0	0
48	50	60	67	38	152760	173	418	81	233	485	119	233	418	119	6	3819.695	6	0.507	1	0	0

49	48	72	72	51	264384	0	413	167	72	485	218	0	413	167	1	1990.371	3	0.391	2	1002	0
50	53	33	40	23	30360	0	373	180	33	413	203	0	413	180	3	2054.468	3	0.500	1	0	0
51	49	72	72	51	264384	58	0	38	130	72	89	58	0	38	1	1972.911	3	0.362	22	1005	0
52	54	58	75	57	247950	175	423	119	233	498	176	233	423	119	2	2035.251	3	0.468	44	1002	1
53	51	84	118	27	267624	149	201	177	233	319	204	233	319	177	4	1944.232	3	0.313	16	0	0
54	52	84	118	27	267624	149	319	193	233	437	220	233	319	193	2	2781.497	4	0.741	77	50	0
55	59	43	74	38	120916	190	485	81	233	559	119	233	485	119	6	3198.114	5	0.449	28	0	0
56	56	54	95	28	143640	179	134	99	233	229	127	233	229	99	4	1987.631	3	0.387	22	0	0
57	57	72	72	51	264384	0	503	49	72	575	100	0	503	49	1	1945.885	3	0.317	77	55	0
58	58	72	93	35	234360	0	280	180	72	373	215	0	373	180	3	1943.565	3	0.311	1	0	0

Set 9 - 5-Package Look-Ahead Results																				
Packing Order	Item Number	Length	Width	Height	Volume	x1	y1	z1	x2	y2	z2	RCx	RCy	RCz	RCd	Caving Degree	Paste Number	Paste Ratio	Distance	Closest Item	Penalty Cost
1	1	44	92	29	117392	0	0	0	44	92	29	0	0	0	0	0.000	0	0.000	0	0	0
2	2	76	78	68	403104	157	0	0	233	78	68	233	0	0	2	2052.970	3	0.500	113	1	0
3	3	48	73	42	147168	109	0	0	157	73	42	157	0	0	2	2053.269	3	0.500	65	1	0
4	8	44	91	28	112112	44	0	0	88	91	28	44	0	0	1	2054.064	3	0.500	21	3	0
5	4	76	80	54	328320	157	78	0	233	158	54	233	78	0	2	2053.500	3	0.500	69	4	0
6	9	43	89	27	103329	0	0	29	43	89	56	0	0	29	1	2053.094	3	0.500	66	5	0
7	6	61	94	54	309636	172	158	0	233	252	54	233	158	0	2	2052.046	3	0.500	166	1002	1
8	5	70	90	63	396900	163	0	68	233	90	131	233	0	68	2	2038.238	3	0.474	89	1002	0
9	11	55	57	48	150480	178	0	131	233	57	179	233	0	131	2	2053.729	3	0.500	41	1002	1
10	10	76	80	54	328320	157	252	0	233	332	54	233	252	0	2	2035.833	3	0.472	157	1004	0
11	7	75	114	69	589950	158	332	0	233	446	69	233	332	0	2	2037.407	3	0.474	151	1002	0
12	12	61	94	54	309636	111	158	0	172	252	54	172	158	0	2	2605.482	4	0.441	80	11	0
13	15	48	73	42	147168	109	73	0	157	146	42	157	73	0	2	2054.481	3	0.500	1	12	0
14	16	44	92	29	117392	0	92	0	44	184	29	0	92	0	1	2053.173	3	0.500	65	13	0
15	14	55	57	48	150480	178	446	0	233	503	48	233	446	0	2	2051.266	3	0.500	172	1002	0
16	13	50	69	45	155250	183	503	0	233	572	45	233	503	0	2	2054.481	3	0.500	1	15	0
17	17	40	107	39	166920	0	184	0	40	291	39	0	184	0	1	2041.468	3	0.480	72	1002	0
18	22	48	73	42	147168	109	252	0	157	325	42	157	252	0	2	2050.322	3	0.495	69	17	0
19	18	46	99	39	177606	0	291	0	46	390	39	0	291	0	1	2046.652	3	0.489	63	18	0
20	21	46	99	39	177606	0	390	0	46	489	39	0	390	0	1	2054.482	3	0.500	1	19	1
21	19	57	70	37	147630	0	489	0	57	559	37	0	489	0	1	2038.444	3	0.477	122	16	0

22	24	44	91	28	112112	44	91	0	88	182	28	44	91	0	1	2054.064	3	0.500	21	1005	1
23	23	70	90	63	396900	0	0	56	70	90	119	0	0	56	1	2010.175	3	0.425	1	1002	0
24	20	66	92	44	267168	0	0	119	66	92	163	0	0	119	1	2050.640	3	0.495	57	1002	0
25	25	43	89	27	103329	0	89	29	43	178	56	0	89	56	5	3822.428	6	0.512	1	0	0
26	29	44	91	28	112112	44	0	28	88	91	56	44	0	28	1	2636.653	4	0.492	21	24	1
27	28	40	107	39	166920	40	184	0	80	291	39	40	291	0	3	2605.685	4	0.439	3	0	1
28	30	66	92	44	267168	0	0	163	66	92	207	0	0	163	1	2054.298	3	0.500	13	1002	1
29	27	46	99	39	177606	46	291	0	92	390	39	46	291	0	1	2041.028	3	0.477	1	21	1
30	26	76	80	54	328320	0	90	56	76	170	110	0	90	56	1	1995.038	3	0.399	9	28	0
31	35	61	84	33	169092	46	390	0	107	474	33	46	390	0	1	2039.567	3	0.475	15	21	0
32	32	55	57	48	150480	178	57	131	233	114	179	233	57	131	2	2008.961	3	0.422	1	1002	1
33	34	61	94	54	309636	172	238	54	233	332	108	233	332	54	4	2003.811	3	0.416	80	0	0
34	33	75	114	69	589950	158	124	54	233	238	123	233	238	54	4	2028.716	3	0.456	18	0	1
35	31	76	78	68	403104	157	332	69	233	410	137	233	332	69	2	2002.068	3	0.413	83	1002	0
36	38	53	72	37	141192	180	0	179	233	72	216	233	0	179	2	2054.423	3	0.500	4	1002	1
37	36	57	70	37	147630	176	262	108	233	332	145	233	332	108	4	2038.643	3	0.474	24	0	0
38	37	48	73	42	147168	109	0	42	157	73	84	157	0	42	2	2014.555	3	0.432	1	1004	0
39	39	48	73	42	147168	185	332	137	233	405	179	233	332	137	2	1997.936	3	0.405	41	1002	0
40	40	76	80	54	328320	157	252	145	233	332	199	233	332	145	4	1960.726	3	0.341	21	0	0
41	45	55	57	48	150480	178	410	69	233	467	117	233	410	69	2	2012.734	3	0.432	103	1002	1
42	44	76	80	54	328320	107	503	0	183	583	54	183	503	0	2	1950.998	3	0.325	50	21	1
43	43	76	78	68	403104	157	410	117	233	488	185	233	410	117	2	1938.756	3	0.304	35	1002	0
44	41	85	94	39	311610	46	390	33	131	484	72	46	390	33	1	1877.848	3	0.199	5	43	0
45	46	43	89	27	103329	115	332	0	158	421	27	158	332	0	2	2009.447	3	0.423	1	44	0

Set 10 - 5-Package Look-Ahead Results																				
Packing Order	Item Number	Length	Width	Height	Volume	x1	y1	z1	x2	y2	z2	RCx	RCy	RCz	RCd	Caving Degree	Paste Number	Paste Ratio	Distance	Closest Item	Penalty Cost
1	1	50	76	43	163400	0	0	0	50	76	43	0	0	0	0	0.000	0	0.000	0	0	0
2	2	75	90	25	168750	158	0	0	233	90	25	233	0	0	2	2052.546	3	0.500	108	1	0
3	3	64	74	35	165760	50	0	0	114	74	35	50	0	0	1	2053.699	3	0.500	44	2	0
4	6	66	68	31	139128	167	0	25	233	68	56	233	0	25	2	2053.477	3	0.500	53	3	1
5	8	60	64	47	180480	173	0	56	233	64	103	233	0	56	2	2054.482	3	0.500	1	4	0
6	4	45	53	36	85860	188	0	103	233	53	139	233	0	103	2	2052.664	3	0.500	81	1002	0
7	9	47	61	34	97478	0	76	0	47	137	34	0	76	0	1	2052.088	3	0.500	111	2	1
8	5	52	80	42	174720	0	0	43	52	80	85	0	0	43	1	2041.555	3	0.481	115	1002	0
9	10	28	39	24	26208	130	0	0	158	39	24	158	0	0	2	2053.961	3	0.500	16	8	1
10	11	60	64	47	180480	0	0	85	60	64	132	0	0	85	1	2037.400	3	0.474	88	1002	0
11	7	76	95	60	433200	157	90	0	233	185	60	233	90	0	2	2007.963	3	0.423	110	7	0
12	12	60	64	47	180480	0	0	132	60	64	179	0	0	132	1	2054.482	3	0.500	1	10	0
13	17	45	53	36	85860	0	0	179	45	53	215	0	0	179	1	2054.387	3	0.500	5	1002	0
14	13	60	92	42	231840	173	185	0	233	277	42	233	185	0	2	2051.684	3	0.500	173	1004	0
15	16	52	80	42	174720	181	277	0	233	357	42	233	277	0	2	2051.316	3	0.500	178	1002	0
16	15	60	64	47	180480	173	357	0	233	421	47	233	357	0	2	2032.131	3	0.467	173	1004	0
17	18	69	82	46	260268	164	421	0	233	503	46	233	421	0	2	2042.291	3	0.484	164	1004	0
18	14	90	99	32	285120	0	137	0	90	236	32	0	137	0	1	2026.483	3	0.454	67	1005	0
19	20	90	99	32	285120	0	236	0	90	335	32	0	236	0	1	2054.485	3	0.500	1	18	1
20	21	40	53	36	76320	193	0	139	233	53	175	233	0	139	2	2053.439	3	0.500	45	1002	0
21	23	34	117	28	111384	0	335	0	34	452	28	0	335	0	1	2051.798	3	0.500	130	17	0

22	19	96	102	59	577728	0	452	0	96	554	59	0	452	0	1	1989.281	3	0.390	68	17	0
23	24	52	80	42	174720	129	277	0	181	357	42	181	277	0	2	2595.072	4	0.422	39	22	0
24	26	60	64	47	180480	113	357	0	173	421	47	173	357	0	2	2623.711	4	0.471	48	22	0
25	25	78	102	49	389844	34	350	0	112	452	49	34	452	0	3	2003.295	3	0.413	1	0	0
26	22	96	102	59	577728	137	255	42	233	357	101	233	357	42	4	1972.030	3	0.360	25	0	0
27	30	69	82	46	260268	164	503	0	233	585	46	233	503	0	2	2053.435	3	0.500	68	22	0
28	27	65	94	37	226070	96	452	0	161	546	37	96	452	0	1	2010.082	3	0.424	3	27	0
29	32	66	68	31	139128	167	357	47	233	425	78	233	357	47	2	2044.473	3	0.485	55	25	0
30	31	90	99	32	285120	0	137	32	90	236	64	0	137	32	1	1999.819	3	0.407	1	1005	0
31	29	78	102	49	389844	0	236	32	78	338	81	0	236	32	1	2027.043	3	0.454	12	29	0
32	28	76	95	60	433200	0	141	64	76	236	124	0	236	64	3	1998.835	3	0.407	60	0	0
33	35	69	82	46	260268	0	236	81	69	318	127	0	236	81	1	2048.615	3	0.492	68	26	0
34	36	34	117	28	111384	0	119	124	34	236	152	0	236	124	3	1994.965	3	0.401	56	0	0
35	33	34	120	26	106080	0	236	127	34	356	153	0	236	127	1	2004.943	3	0.418	67	1002	0
36	37	69	82	46	260268	164	357	78	233	439	124	233	357	78	2	1988.796	3	0.391	96	1002	0
37	38	78	102	49	389844	155	255	101	233	357	150	233	357	101	4	2013.075	3	0.431	70	0	0
38	34	96	102	59	577728	137	357	124	233	459	183	233	357	124	2	1947.858	3	0.319	37	1002	0
39	43	60	92	42	231840	113	185	0	173	277	42	173	277	42	8	3837.907	6	0.539	23	0	1
40	39	47	61	34	97478	47	76	0	94	137	34	47	137	0	3	3227.065	5	0.498	2	0	0
41	42	90	99	32	285120	143	425	46	233	524	78	233	425	78	6	3191.558	5	0.437	10	0	1
42	40	69	82	46	260268	164	439	78	233	521	124	233	439	124	6	3850.650	6	0.561	32	0	0
43	44	47	61	34	97478	96	452	37	143	513	71	96	452	37	1	2613.551	4	0.453	20	42	0
44	45	45	53	36	85860	188	202	42	233	255	78	233	255	42	4	2054.183	3	0.500	14	0	1
45	41	65	94	37	226070	168	263	150	233	357	187	233	357	150	4	2047.595	3	0.489	33	0	0
46	47	63	109	28	192276	94	76	0	157	185	28	157	185	0	4	2660.475	4	0.532	1	0	0
47	46	66	68	31	139128	167	459	124	233	527	155	233	459	124	2	2039.797	3	0.477	65	1002	0
48	51	65	94	37	226070	168	357	183	233	451	220	233	357	183	2	2735.776	4	0.665	168	1004	0

49	52	69	82	46	260268	164	459	155	233	541	201	233	459	155	2	2585.385	4	0.405	19	1002	0
50	49	52	80	42	174720	181	175	78	233	255	120	233	255	78	4	1997.665	3	0.406	100	0	1
51	48	90	99	32	285120	143	258	187	233	357	219	233	357	187	4	1982.572	3	0.377	1	0	0
52	54	45	53	36	85860	143	202	42	188	255	78	188	255	78	8	3836.680	6	0.537	16	0	0
53	53	34	120	26	106080	0	116	152	34	236	178	0	236	152	3	2017.815	3	0.439	42	0	0

Set 11 - 5-Package Look-Ahead Results																				
Packing Order	Item Number	Length	Width	Height	Volume	x1	y1	z1	x2	y2	z2	RCx	RCy	RCz	RCd	Caving Degree	Paste Number	Paste Ratio	Distance	Closest Item	Penalty Cost
1	1	76	109	42	347928	0	0	0	76	109	42	0	0	0	0	0.000	0	0.000	0	0	0
2	3	76	109	42	347928	0	109	0	76	218	42	0	109	0	1	2054.486	3	0.500	1	1	0
3	6	76	109	42	347928	76	0	0	152	109	42	76	0	0	1	2054.486	3	0.500	1	2	0
4	4	53	65	30	103350	76	109	0	129	174	30	76	109	0	1	2054.479	3	0.500	1	3	0
5	5	69	91	26	163254	0	0	42	69	91	68	0	0	42	1	2054.354	3	0.500	8	3	0
6	2	56	118	22	145376	0	91	42	56	209	64	0	91	42	1	2054.120	3	0.500	20	3	0
7	10	79	91	66	474474	154	0	0	233	91	66	233	0	0	2	2054.474	3	0.500	2	6	0
8	7	78	85	20	132600	155	91	0	233	176	20	233	91	0	2	2054.441	3	0.500	3	6	0
9	9	65	72	37	173160	168	91	20	233	163	57	233	91	20	2	2054.213	3	0.500	16	6	1
10	12	74	74	60	328560	159	0	66	233	74	126	233	0	66	2	2053.196	3	0.500	90	5	1
11	11	63	72	42	190512	170	0	126	233	72	168	233	0	126	2	2053.596	3	0.500	52	1002	0
12	8	32	52	32	53248	201	0	168	233	52	200	233	0	168	2	2053.968	3	0.500	20	1002	0
13	17	78	85	20	132600	69	0	42	147	85	62	69	0	42	1	2054.343	3	0.500	8	1005	0
14	15	63	83	54	282366	0	0	68	63	83	122	0	0	68	1	2053.037	3	0.500	96	1002	1
15	13	59	84	54	267624	0	0	122	59	84	176	0	0	122	1	2052.451	3	0.498	44	1002	0
16	18	39	48	25	46800	0	0	176	39	48	201	0	0	176	1	2053.973	3	0.500	19	1002	1
17	16	67	105	43	302505	0	218	0	67	323	43	0	218	0	1	2050.664	3	0.498	166	1005	0
18	14	74	74	60	328560	0	323	0	74	397	60	0	323	0	1	2020.323	3	0.446	159	1005	0
19	22	78	85	20	132600	155	176	0	233	261	20	233	176	0	2	2052.951	3	0.500	79	18	0
20	19	32	71	26	59072	201	163	20	233	234	46	233	163	20	2	2052.651	3	0.500	72	1002	0
21	21	63	72	42	190512	0	397	0	63	469	42	0	397	0	1	2051.546	3	0.500	170	1005	0

22	24	31	69	28	59892	0	469	0	31	538	28	0	469	0	1	2049.593	3	0.500	192	1002	0
23	23	69	91	26	163254	164	261	0	233	352	26	233	261	0	2	2041.213	3	0.480	90	1004	0
24	20	80	106	59	500320	153	352	0	233	458	59	233	352	0	2	2009.361	3	0.425	79	22	0
25	29	69	91	26	163254	95	261	0	164	352	26	164	261	0	2	2603.760	4	0.436	22	1004	1
26	25	39	48	25	46800	194	304	26	233	352	51	233	352	26	4	2053.668	3	0.500	30	0	0
27	26	80	106	59	500320	153	458	0	233	564	59	233	458	0	2	2053.366	3	0.500	90	22	0
28	28	67	105	43	302505	86	352	0	153	457	43	153	352	0	2	2026.546	3	0.452	2	27	0
29	27	59	84	54	267624	94	457	0	153	541	54	153	457	0	2	2038.994	3	0.474	31	22	0
30	32	39	48	25	46800	155	304	26	194	352	51	194	352	26	4	2052.659	3	0.497	1	0	0
31	33	78	85	20	132600	77	176	0	155	261	20	155	261	0	4	2043.797	3	0.482	1	0	1
32	34	65	72	37	173160	0	251	43	65	323	80	0	323	43	3	2014.609	3	0.433	42	0	1
33	31	74	74	60	328560	0	323	60	74	397	120	0	323	60	1	1988.855	3	0.391	100	1002	0
34	30	80	106	59	500320	0	397	42	80	503	101	0	397	42	1	1989.581	3	0.390	6	29	0
35	39	53	65	30	103350	0	258	80	53	323	110	0	323	80	3	2052.156	3	0.500	110	0	1
36	36	78	85	20	132600	0	397	101	78	482	121	0	397	101	1	2047.988	3	0.492	99	1002	0
37	37	63	74	61	284382	170	91	57	233	165	118	233	91	57	2	1977.790	3	0.369	1	1002	0
38	38	76	109	42	347928	0	91	64	76	200	106	0	91	64	1	1960.624	3	0.341	50	37	0
39	35	79	91	66	474474	69	0	62	148	91	128	69	0	62	1	2550.135	4	0.345	7	37	0
40	40	32	52	32	53248	169	0	168	201	52	200	201	0	168	2	2050.461	3	0.494	20	1002	0
41	44	78	85	20	132600	155	0	200	233	85	220	233	0	200	2	2737.988	4	0.668	116	16	1
42	45	31	69	28	59892	63	457	0	94	526	28	94	457	0	2	2623.172	4	0.469	1	1004	1
43	43	69	91	26	163254	132	163	20	201	254	46	201	163	20	2	2005.102	3	0.416	3	1004	0
44	42	74	74	60	328560	0	323	120	74	397	180	0	397	120	3	1963.147	3	0.345	40	0	0
45	41	80	106	59	500320	0	397	121	80	503	180	0	397	121	1	2020.745	3	0.443	40	1002	0
46	49	32	71	26	59072	31	469	0	63	540	26	31	469	0	1	2725.878	4	0.644	16	45	1
47	47	60	71	25	106500	0	252	110	60	323	135	0	323	110	3	2018.897	3	0.442	85	0	1
48	50	67	105	43	302505	0	218	135	67	323	178	0	323	135	3	1996.216	3	0.402	42	0	1

49	46	69	91	26	163254	0	232	178	69	323	204	0	323	178	3	2002.531	3	0.412	16	0	0
50	52	32	52	32	53248	201	252	26	233	304	58	233	304	26	4	2608.646	4	0.444	8	0	0
51	51	39	48	25	46800	194	304	51	233	352	76	233	304	51	2	2609.635	4	0.446	1	1002	0
52	48	69	91	26	163254	0	323	180	69	414	206	0	323	180	1	2050.364	3	0.493	14	1002	0
53	54	60	71	25	106500	0	414	180	60	485	205	0	414	180	1	2054.479	3	0.500	1	52	0
54	53	78	85	20	132600	155	352	59	233	437	79	233	352	59	2	2027.449	3	0.455	22	1002	0
55	57	53	65	30	103350	180	437	59	233	502	89	233	437	59	2	2032.209	3	0.462	1	54	1
56	59	59	84	54	267624	174	353	79	233	437	133	233	437	79	4	1991.663	3	0.395	87	0	0
57	58	63	83	54	282366	170	437	89	233	520	143	233	437	89	2	1995.356	3	0.401	77	1002	0
58	55	80	106	59	500320	153	331	133	233	437	192	233	437	133	4	1938.386	3	0.303	28	0	0
59	60	76	109	42	347928	157	437	143	233	546	185	233	437	143	2	1998.151	3	0.405	35	1002	0

Set 12 - 5-Package Look-Ahead Results																				
Packing Order	Item Number	Length	Width	Height	Volume	x1	y1	z1	x2	y2	z2	RCx	RCy	RCz	RCd	Caving Degree	Paste Number	Paste Ratio	Distance	Closest Item	Penalty Cost
1	1	87	112	23	224112	0	0	0	87	112	23	0	0	0	0	0.000	0	0.000	0	0	0
2	4	86	101	31	269266	147	0	0	233	101	31	233	0	0	2	2053.571	3	0.500	60	1	0
3	6	39	106	22	90948	87	0	0	126	106	22	87	0	0	1	2054.011	3	0.500	22	2	0
4	3	87	112	23	224112	146	101	0	233	213	23	233	101	0	2	2053.683	3	0.499	21	3	0
5	5	53	66	51	178398	0	0	23	53	66	74	0	0	23	1	2052.830	3	0.500	94	4	0
6	2	35	48	33	55440	0	0	74	35	48	107	0	0	74	1	2051.537	3	0.500	113	1002	0
7	7	87	112	23	224112	0	112	0	87	224	23	0	112	0	1	2053.529	3	0.500	59	4	0
8	8	77	82	67	423038	156	0	31	233	82	98	233	0	31	2	2053.128	3	0.500	103	6	0
9	11	77	82	67	423038	156	0	98	233	82	165	233	0	98	2	2054.487	3	0.500	1	8	0
10	10	62	63	41	160146	171	0	165	233	63	206	233	0	165	2	2054.242	3	0.500	14	1002	0
11	9	46	67	36	110952	0	66	23	46	133	59	0	66	23	1	2052.419	3	0.500	100	9	0
12	15	35	48	33	55440	0	0	107	35	48	140	0	0	107	1	2054.474	3	0.500	1	1002	1
13	12	86	101	31	269266	147	213	0	233	314	31	233	213	0	2	2039.628	3	0.476	60	7	0
14	17	56	89	24	119616	177	314	0	233	403	24	233	314	0	2	2050.908	3	0.500	177	1004	0
15	16	41	116	40	190240	0	224	0	41	340	40	0	224	0	1	2034.120	3	0.468	106	14	1
16	13	72	104	44	329472	0	340	0	72	444	44	0	340	0	1	2023.537	3	0.450	105	14	0
17	18	36	116	20	83520	41	224	0	77	340	20	41	340	0	3	3841.394	6	0.547	70	0	1
18	14	53	59	48	150096	0	444	0	53	503	48	0	444	0	1	2043.946	3	0.488	172	1002	0
19	21	36	116	20	83520	41	224	20	77	340	40	41	340	20	3	3226.655	5	0.500	70	0	1
20	22	46	67	36	110952	0	133	23	46	200	59	0	133	23	1	2054.001	3	0.500	24	19	1
21	19	65	69	37	165945	0	503	0	65	572	37	0	503	0	1	2037.643	3	0.476	168	1005	0

22	20	58	100	37	214600	175	403	0	233	503	37	233	403	0	2	2032.568	3	0.466	103	21	0
23	26	60	108	59	382320	87	213	0	147	321	59	147	213	0	2	2524.890	4	0.302	10	1004	0
24	25	65	69	37	165945	168	503	0	233	572	37	233	503	0	2	2044.576	3	0.486	103	21	0
25	23	58	100	37	214600	88	113	0	146	213	37	146	213	0	4	2019.201	3	0.440	1	0	0
26	24	53	66	51	178398	53	0	23	106	66	74	53	0	23	1	2016.012	3	0.434	1	25	0
27	31	39	106	22	90948	46	66	23	85	172	45	46	66	23	1	2054.456	3	0.500	2	25	1
28	28	72	104	44	329472	161	101	23	233	205	67	233	101	23	2	2004.440	3	0.415	8	27	0
29	30	72	104	44	329472	0	236	40	72	340	84	0	340	40	3	1998.789	3	0.405	15	0	0
30	27	80	95	57	433200	0	340	44	80	435	101	0	340	44	1	2013.633	3	0.431	9	18	0
31	33	87	112	23	224112	72	340	0	159	452	23	72	340	0	1	2011.813	3	0.428	16	30	1
32	29	60	108	59	382320	0	232	84	60	340	143	0	340	84	3	2002.947	3	0.414	77	0	0
33	36	35	48	33	55440	35	0	74	70	48	107	35	0	74	1	2054.474	3	0.500	1	1002	1
34	34	72	104	44	329472	0	340	101	72	444	145	0	340	101	1	2028.442	3	0.457	75	1002	0
35	32	86	101	31	269266	0	239	143	86	340	174	0	340	143	3	1949.463	3	0.322	46	0	0
36	38	53	56	35	103880	0	340	145	53	396	180	0	340	145	1	2039.889	3	0.477	40	1002	0
37	37	41	116	40	190240	0	66	59	41	182	99	0	66	59	1	2027.014	3	0.454	13	1002	0
38	39	62	63	41	160146	0	396	145	62	459	186	0	396	145	1	2001.323	3	0.410	34	1002	0
39	35	77	82	67	423038	156	321	24	233	403	91	233	403	24	4	1948.433	3	0.319	6	0	0
40	41	53	59	48	150096	180	403	37	233	462	85	233	403	37	2	2053.710	3	0.500	42	1002	1
41	42	53	59	48	150096	180	462	37	233	521	85	233	462	37	2	2054.481	3	0.500	1	40	0
42	40	36	64	36	82944	197	521	37	233	585	73	233	521	37	2	2028.208	3	0.460	132	21	0
43	43	41	116	40	190240	192	403	85	233	519	125	233	403	85	2	2015.775	3	0.437	95	1002	0
44	44	41	116	40	190240	192	287	91	233	403	131	233	403	91	4	2008.247	3	0.424	89	0	0
45	45	72	104	44	329472	0	236	174	72	340	218	0	340	174	3	1994.006	3	0.397	2	0	0
46	50	36	116	20	83520	197	403	125	233	519	145	233	403	125	2	2032.285	3	0.465	75	1002	0
47	48	60	108	59	382320	173	295	131	233	403	190	233	403	131	4	1962.986	3	0.345	30	0	0
48	49	72	104	44	329472	161	403	145	233	507	189	233	403	145	2	1971.736	3	0.360	31	1002	0

49	46	77	82	67	423038	0	503	37	77	585	104	0	503	37	1	1942.492	3	0.311	91	1002	0
50	51	36	116	20	83520	72	340	23	108	456	43	72	340	23	1	2011.978	3	0.429	47	49	1
51	47	77	82	67	423038	46	66	45	123	148	112	46	66	45	1	1865.838	3	0.179	33	1002	0
52	52	53	56	35	103880	0	340	180	53	396	215	0	396	180	3	3833.046	6	0.530	1	0	0
53	55	35	48	33	55440	70	0	74	105	48	107	70	0	74	1	2054.474	3	0.500	1	51	0
54	57	62	63	41	160146	0	440	48	62	503	89	0	503	48	3	2027.369	3	0.454	5	0	0
55	54	56	89	24	119616	177	403	189	233	492	213	233	403	189	2	2009.695	3	0.424	7	1002	0

Set 13 - 5-Package Look-Ahead Results																				
Packing Order	Item Number	Length	Width	Height	Volume	x1	y1	z1	x2	y2	z2	RCx	RCy	RCz	RCd	Caving Degree	Paste Number	Paste Ratio	Distance	Closest Item	Penalty Cost
1	1	48	109	40	209280	0	0	0	48	109	40	0	0	0	0	0.000	0	0.000	0	0	0
2	5	69	90	55	341550	164	0	0	233	90	55	233	0	0	2	2052.841	3	0.500	116	1	0
3	3	61	100	36	219600	48	0	0	109	100	36	48	0	0	1	2053.588	3	0.500	55	2	0
4	4	38	75	30	85500	109	0	0	147	75	30	109	0	0	1	2054.137	3	0.500	16	2	0
5	6	52	112	25	145600	181	90	0	233	202	25	233	90	0	2	2053.131	3	0.500	72	3	0
6	2	36	52	25	46800	197	90	25	233	142	50	233	90	25	2	2054.472	3	0.500	1	5	0
7	8	69	90	55	341550	164	0	55	233	90	110	233	0	55	2	2052.926	3	0.500	110	1002	0
8	7	52	79	36	147888	181	0	110	233	79	146	233	0	110	2	2053.101	3	0.500	74	1002	0
9	10	52	72	33	123552	181	0	146	233	72	179	233	0	146	2	2053.677	3	0.500	41	1002	0
10	12	33	91	28	84084	0	0	40	33	91	68	0	0	40	1	2051.510	3	0.500	131	1002	1
11	11	61	100	36	219600	0	109	0	61	209	36	0	109	0	1	2040.964	3	0.480	120	6	1
12	13	63	99	36	224532	0	209	0	63	308	36	0	209	0	1	2049.952	3	0.497	170	1005	0
13	9	74	83	42	257964	0	308	0	74	391	42	0	308	0	1	2035.127	3	0.467	1	12	0
14	14	48	109	40	209280	61	100	0	109	209	40	61	209	0	3	2618.660	4	0.462	24	0	0
15	15	37	63	21	48951	196	0	179	233	63	200	233	0	179	2	2054.473	3	0.500	1	9	0
16	16	37	63	21	48951	109	75	0	146	138	21	109	75	0	1	2054.473	3	0.500	1	1005	0
17	20	37	63	21	48951	109	138	0	146	201	21	109	138	0	1	2054.473	3	0.500	1	16	0
18	17	44	95	35	146300	63	209	0	107	304	35	63	209	0	1	2054.405	3	0.500	5	13	0
19	22	52	112	25	145600	181	202	0	233	314	25	233	202	0	2	2053.131	3	0.500	72	18	0
20	18	66	76	31	155496	0	391	0	66	467	31	0	391	0	1	2051.394	3	0.500	167	1005	0
21	23	63	99	36	224532	0	209	36	63	308	72	0	308	36	3	3182.813	5	0.422	1	0	1

22	19	47	74	29	100862	0	135	36	47	209	65	0	209	36	3	2054.199	3	0.500	14	0	0
23	25	48	100	20	96000	48	0	36	96	100	56	48	0	36	1	2586.083	4	0.406	9	21	1
24	21	66	76	31	155496	0	467	0	66	543	31	0	467	0	1	2051.394	3	0.500	167	1005	0
25	24	52	79	36	147888	0	308	42	52	387	78	0	308	42	1	2044.103	3	0.482	1	21	0
26	30	52	112	25	145600	181	314	0	233	426	25	233	314	0	2	2052.466	3	0.500	107	25	0
27	26	52	79	36	147888	181	426	0	233	505	36	233	426	0	2	2033.300	3	0.468	115	24	0
28	31	61	100	36	219600	0	391	31	61	491	67	0	391	31	1	2014.886	3	0.436	120	27	1
29	27	68	86	44	257312	0	222	72	68	308	116	0	308	72	3	1980.559	3	0.377	104	0	0
30	32	61	100	36	219600	0	308	78	61	408	114	0	308	78	1	2003.596	3	0.416	106	1002	0
31	28	93	101	40	375720	66	391	0	159	492	40	66	391	0	1	1980.465	3	0.374	22	27	0
32	33	66	76	31	155496	0	491	31	66	567	62	0	491	31	1	2585.448	4	0.408	115	27	0
33	29	68	86	44	257312	74	305	0	142	391	44	74	391	0	3	2040.240	3	0.476	2	0	0
34	38	37	63	21	48951	196	142	25	233	205	46	233	142	25	2	2053.082	3	0.498	1	33	1
35	34	47	74	29	100862	186	505	0	233	579	29	233	505	0	2	2051.922	3	0.500	120	32	0
36	36	33	91	28	84084	0	0	68	33	91	96	0	0	68	1	2051.829	3	0.500	117	1002	1
37	37	47	74	29	100862	186	205	25	233	279	54	233	205	25	2	2029.863	3	0.458	1	1002	0
38	39	48	109	40	209280	185	279	25	233	388	65	233	279	25	2	2039.811	3	0.476	29	35	0
39	35	61	100	36	219600	0	308	114	61	408	150	0	308	114	1	2002.170	3	0.413	70	1002	0
40	40	74	83	42	257964	107	209	0	181	292	42	107	209	0	1	2606.086	4	0.440	4	38	0
41	43	36	52	25	46800	145	292	0	181	344	25	181	292	0	2	2054.417	3	0.500	3	1004	0
42	45	38	75	30	85500	0	233	116	38	308	146	0	308	116	3	2052.820	3	0.500	74	0	0
43	42	49	97	30	142590	0	0	96	49	97	126	0	0	96	1	1996.462	3	0.404	94	1002	1
44	44	48	100	20	96000	0	0	126	48	100	146	0	0	126	1	2047.437	3	0.491	74	1002	0
45	41	63	99	36	224532	0	0	146	63	99	182	0	0	146	1	2017.762	3	0.438	38	1002	0
46	49	63	99	36	224532	0	0	182	63	99	218	0	0	182	1	2054.467	3	0.500	2	1002	0
47	46	36	52	25	46800	197	90	50	233	142	75	233	90	50	2	2052.752	3	0.500	63	1002	0
48	51	52	79	36	147888	66	492	0	118	571	36	66	492	0	1	2023.772	3	0.450	63	35	0

49	48	48	100	20	96000	185	179	54	233	279	74	233	279	54	4	1985.574	3	0.384	37	0	0
50	47	49	97	30	142590	184	279	65	233	376	95	233	279	65	2	2015.805	3	0.438	116	1002	0
51	52	33	91	28	84084	200	188	74	233	279	102	233	279	74	4	2042.979	3	0.482	46	0	0
52	54	52	72	33	123552	118	492	0	170	564	33	118	492	0	1	2040.683	3	0.477	11	35	1
53	53	68	86	44	257312	0	491	62	68	577	106	0	491	62	1	1970.893	3	0.361	114	1002	0
54	50	69	90	55	341550	164	279	95	233	369	150	233	279	95	2	1948.227	3	0.321	70	1002	0
55	56	74	83	42	257964	0	408	67	74	491	109	0	491	67	3	3238.031	5	0.516	5	0	1
56	58	33	91	28	84084	200	188	102	233	279	130	233	279	102	4	2050.950	3	0.497	90	0	0
57	57	61	100	36	219600	0	408	109	61	508	145	0	408	109	1	2027.672	3	0.456	75	1002	0
58	55	69	90	55	341550	0	408	145	69	498	200	0	408	145	1	1971.590	3	0.359	20	1002	0
59	60	36	52	25	46800	197	90	75	233	142	100	233	90	75	2	2054.472	3	0.500	1	1002	0
60	61	36	52	25	46800	0	356	150	36	408	175	0	408	150	3	2053.251	3	0.500	45	0	0
61	63	66	76	31	155496	0	133	65	66	209	96	0	209	65	3	1954.418	3	0.331	36	0	0

Set 14 - 5-Package Look-Ahead Results																				
Packing Order	Item Number	Length	Width	Height	Volume	x1	y1	z1	x2	y2	z2	RCx	RCy	RCz	RCd	Caving Degree	Paste Number	Paste Ratio	Distance	Closest Item	Penalty Cost
1	1	46	82	21	79212	0	0	0	46	82	21	0	0	0	0	0.000	0	0.000	0	0	0
2	4	78	114	60	533520	155	0	0	233	114	60	233	0	0	2	2053.156	3	0.500	109	1	0
3	2	73	90	38	249660	82	0	0	155	90	38	155	0	0	2	2053.928	3	0.500	36	1	0
4	3	39	60	36	84240	0	0	21	39	60	57	0	0	21	1	2053.542	3	0.500	42	3	0
5	9	77	101	45	349965	156	0	60	233	101	105	233	0	60	2	2052.868	3	0.500	115	1002	1
6	6	53	74	33	129426	180	0	105	233	74	138	233	0	105	2	2054.480	3	0.500	1	5	1
7	7	73	90	38	249660	160	114	0	233	204	38	233	114	0	2	2051.959	3	0.500	160	1004	0
8	5	74	81	38	227772	159	204	0	233	285	38	233	204	0	2	2050.958	3	0.498	159	1004	0
9	12	53	74	33	129426	180	0	138	233	74	171	233	0	138	2	2053.531	3	0.500	49	1002	1
10	8	71	77	47	256949	162	285	0	233	362	47	233	285	0	2	2039.388	3	0.474	1	8	0
11	13	46	82	21	79212	187	114	38	233	196	59	233	114	38	2	2054.314	3	0.500	8	10	1
12	10	71	77	47	256949	162	362	0	233	439	47	233	362	0	2	2051.952	3	0.500	162	1004	0
13	15	53	74	33	129426	180	0	171	233	74	204	233	0	171	2	2054.480	3	0.500	1	9	1
14	14	74	81	38	227772	159	439	0	233	520	38	233	439	0	2	2051.668	3	0.495	1	12	0
15	11	64	71	54	245376	0	0	57	64	71	111	0	0	57	1	1998.384	3	0.407	91	1002	0
16	19	46	82	21	79212	187	196	38	233	278	59	233	196	38	2	2054.314	3	0.500	8	1002	0
17	17	49	64	47	147392	0	0	111	49	64	158	0	0	111	1	2053.326	3	0.500	62	1002	0
18	16	39	60	36	84240	0	0	158	39	60	194	0	0	158	1	2053.907	3	0.500	26	1002	0
19	21	35	59	31	64015	47	0	0	82	59	31	82	0	0	2	2054.325	3	0.500	7	1004	1
20	20	55	116	36	229680	0	82	0	55	198	36	0	82	0	1	2030.335	3	0.460	26	16	0
21	18	74	81	38	227772	0	198	0	74	279	38	0	198	0	1	2032.560	3	0.465	85	16	0

22	23	73	90	38	249660	87	114	0	160	204	38	160	204	0	4	3169.849	5	0.400	14	0	0
23	24	48	68	31	101184	111	204	0	159	272	31	159	204	0	2	2053.706	3	0.500	37	21	0
24	26	55	116	36	229680	0	279	0	55	395	36	0	279	0	1	2052.802	3	0.500	104	14	1
25	25	45	55	35	86625	0	395	0	45	450	35	0	395	0	1	2051.924	3	0.500	114	14	0
26	22	78	114	60	533520	0	450	0	78	564	60	0	450	0	1	2008.855	3	0.424	81	14	0
27	31	49	64	47	147392	184	520	0	233	584	47	233	520	0	2	2037.170	3	0.474	106	26	0
28	27	47	104	34	166192	55	279	0	102	383	34	55	279	0	1	2025.565	3	0.453	58	1005	0
29	32	35	59	31	64015	74	220	0	109	279	31	74	279	0	3	2041.658	3	0.478	2	0	1
30	30	73	90	38	249660	82	0	38	155	90	76	155	0	38	2	2021.102	3	0.444	18	1004	0
31	29	77	101	45	349965	0	279	36	77	380	81	0	279	36	1	1951.509	3	0.325	1	1002	0
32	28	80	104	63	524160	0	175	38	80	279	101	0	279	38	3	1993.540	3	0.396	8	0	0
33	35	74	81	38	227772	159	439	38	233	520	76	233	439	38	2	2598.708	4	0.427	1	26	0
34	37	48	68	31	101184	185	371	47	233	439	78	233	439	47	4	2050.221	3	0.493	8	0	0
35	36	53	74	33	129426	180	297	47	233	371	80	233	371	47	4	2044.682	3	0.484	19	0	0
36	34	55	116	36	229680	0	279	81	55	395	117	0	279	81	1	2012.900	3	0.432	103	1002	0
37	33	62	68	52	219232	0	211	101	62	279	153	0	279	101	3	1990.710	3	0.393	67	0	0
38	42	47	104	34	166192	0	279	117	47	383	151	0	279	117	1	2053.245	3	0.500	69	1002	0
39	41	49	64	47	147392	184	520	47	233	584	94	233	520	47	2	2021.847	3	0.448	106	26	0
40	38	71	77	47	256949	162	443	76	233	520	123	233	520	76	4	1996.436	3	0.401	4	0	0
41	40	77	101	45	349965	110	114	38	187	215	83	187	114	38	2	1947.658	3	0.319	30	1004	0
42	39	78	114	60	533520	0	279	151	78	393	211	0	279	151	1	1931.307	3	0.290	9	1002	0
43	46	74	81	38	227772	0	198	153	74	279	191	0	279	153	3	2008.583	3	0.423	29	0	0

Set 15 - 5-Package Look-Ahead Results																				
Packing Order	Item Number	Length	Width	Height	Volume	x1	y1	z1	x2	y2	z2	RCx	RCy	RCz	RCd	Caving Degree	Paste Number	Paste Ratio	Distance	Closest Item	Penalty Cost
1	1	71	83	43	253399	0	0	0	71	83	43	0	0	0	0	0.000	0	0.000	0	0	0
2	3	78	93	33	239382	155	0	0	233	93	33	233	0	0	2	2053.147	3	0.500	84	1	0
3	2	48	49	23	54096	185	93	0	233	142	23	233	93	0	2	2054.474	3	0.500	1	2	0
4	5	71	83	43	253399	71	0	0	142	83	43	71	0	0	1	2054.279	3	0.500	14	3	0
5	6	57	65	42	155610	0	0	43	57	65	85	0	0	43	1	2054.240	3	0.500	14	4	0
6	7	54	77	40	166320	0	83	0	54	160	40	0	83	0	1	2054.209	3	0.500	16	4	0
7	4	30	66	27	53460	203	0	33	233	66	60	233	0	33	2	2052.854	3	0.500	62	1002	0
8	8	30	66	27	53460	203	0	60	233	66	87	233	0	60	2	2054.473	3	0.500	1	7	0
9	11	58	85	41	202130	0	160	0	58	245	41	0	160	0	1	2045.590	3	0.490	175	1005	1
10	10	71	83	43	253399	0	245	0	71	328	43	0	245	0	1	2036.110	3	0.473	162	1005	1
11	13	70	71	53	263410	0	328	0	70	399	53	0	328	0	1	2037.973	3	0.472	1	10	0
12	9	78	90	55	386100	0	399	0	78	489	55	0	399	0	1	2041.902	3	0.482	155	1005	0
13	14	58	85	41	202130	0	489	0	58	574	41	0	489	0	1	2051.518	3	0.500	175	1005	0
14	12	80	111	68	603840	153	142	0	233	253	68	233	142	0	2	1995.334	3	0.401	82	1002	0
15	17	70	71	59	293230	70	328	0	140	399	59	70	328	0	1	2551.529	4	0.347	1	10	0
16	19	70	71	59	293230	0	328	53	70	399	112	0	399	53	3	2559.482	4	0.363	108	0	0
17	15	80	111	68	603840	153	253	0	233	364	68	233	253	0	2	2054.346	3	0.500	13	16	0
18	20	80	111	68	603840	153	364	0	233	475	68	233	364	0	2	2054.488	3	0.500	1	17	0
19	18	73	79	61	351787	160	475	0	233	554	61	233	475	0	2	2053.338	3	0.500	82	13	0
20	16	73	109	73	580861	0	219	43	73	328	116	0	328	43	3	2017.812	3	0.439	80	0	0
21	21	57	65	42	155610	57	0	43	114	65	85	57	0	43	1	2054.481	3	0.500	1	1005	0

22	25	69	81	50	279450	0	399	55	69	480	105	0	399	55	1	2054.469	3	0.500	2	19	1
23	26	49	94	44	202664	78	399	0	127	493	44	78	399	0	1	2049.317	3	0.492	26	19	1
24	23	78	93	33	239382	0	489	41	78	582	74	0	489	41	1	2555.143	4	0.353	1	19	1
25	24	70	71	53	263410	0	0	85	70	71	138	0	0	85	1	2043.314	3	0.483	82	1002	0
26	22	80	111	68	603840	0	0	138	80	111	206	0	0	138	1	2001.857	3	0.411	14	1002	0
27	28	30	66	27	53460	173	0	33	203	66	60	203	0	33	2	2054.473	3	0.500	1	1002	1
28	31	30	66	27	53460	173	0	60	203	66	87	203	0	60	2	2054.473	3	0.500	1	27	0
29	29	49	73	40	143080	54	83	0	103	156	40	54	83	0	1	2054.443	3	0.500	3	26	0
30	27	78	84	51	334152	155	0	87	233	84	138	233	0	87	2	2002.066	3	0.413	75	26	0
31	34	71	83	43	253399	71	245	0	142	328	43	71	328	43	7	3820.034	6	0.508	1	0	1
32	30	80	111	68	603840	73	217	43	153	328	111	73	328	43	3	2574.126	4	0.385	1	0	0
33	32	70	71	59	293230	163	0	138	233	71	197	233	0	138	2	2054.485	3	0.500	1	30	0
34	33	57	65	42	155610	70	328	59	127	393	101	70	328	59	1	2054.017	3	0.500	26	24	0
35	39	54	77	40	166320	0	83	40	54	160	80	0	160	40	3	3167.592	5	0.397	16	0	1
36	37	57	65	42	155610	58	180	0	115	245	42	58	245	0	3	2052.321	3	0.496	1	0	0
37	38	44	100	37	162800	0	399	105	44	499	142	0	399	105	1	1988.024	3	0.389	78	1002	0
38	36	69	81	50	279450	164	475	61	233	556	111	233	475	61	2	1983.560	3	0.381	86	1002	0
39	35	73	79	61	351787	160	396	68	233	475	129	233	475	68	4	2025.032	3	0.451	33	0	0
40	43	69	81	50	279450	164	315	68	233	396	118	233	396	68	4	2054.347	3	0.500	10	0	0
41	44	44	100	37	162800	189	215	68	233	315	105	233	315	68	4	2053.841	3	0.500	36	0	1
42	40	58	73	52	220168	70	0	85	128	73	137	70	0	85	1	2015.212	3	0.433	1	1002	0
43	45	70	71	53	263410	0	328	112	70	399	165	0	399	112	3	3177.967	5	0.415	55	0	0
44	42	78	93	33	239382	0	235	116	78	328	149	0	328	116	3	2036.767	3	0.472	71	0	0
45	41	73	109	73	580861	160	475	111	233	584	184	233	475	111	2	1965.879	3	0.350	36	1002	0
46	47	58	73	52	220168	175	402	129	233	475	181	233	475	129	4	2054.483	3	0.500	1	0	0
47	48	44	100	37	162800	0	399	142	44	499	179	0	399	142	1	2035.164	3	0.468	41	1002	0
48	49	58	73	52	220168	175	142	68	233	215	120	233	215	68	4	2015.118	3	0.435	58	0	0

49	46	78	84	51	334152	0	244	149	78	328	200	0	328	149	3	1997.588	3	0.404	20	0	0
50	53	60	120	39	280800	173	355	181	233	475	220	233	475	181	4	2681.247	4	0.571	122	0	0
51	54	57	65	42	155610	0	328	165	57	393	207	0	328	165	1	2041.125	3	0.477	6	1002	0
52	51	49	73	40	143080	103	83	0	152	156	40	103	83	0	1	2040.599	3	0.476	1	1005	0
53	50	70	71	59	293230	163	325	118	233	396	177	233	396	118	4	1978.708	3	0.371	1	0	0
54	55	69	81	50	279450	164	234	105	233	315	155	233	315	105	4	1951.830	3	0.325	1	0	0
55	56	71	83	43	253399	70	328	101	141	411	144	70	328	101	1	1941.728	3	0.308	1	53	0
56	52	73	79	61	351787	70	328	144	143	407	205	70	328	144	1	1908.094	3	0.251	15	1002	0
57	59	54	77	40	166320	54	83	40	108	160	80	54	83	40	1	2572.136	4	0.382	19	1005	1
58	60	44	100	37	162800	114	0	43	158	100	80	114	0	43	1	1952.722	3	0.327	4	1005	1
59	57	49	94	44	202664	78	399	44	127	493	88	78	399	44	1	1934.531	3	0.296	12	56	0
60	62	78	93	33	239382	155	475	184	233	568	217	233	475	184	2	2030.352	3	0.459	3	1002	0

Set 16 - 5-Package Look-Ahead Results																				
Packing Order	Item Number	Length	Width	Height	Volume	x1	y1	z1	x2	y2	z2	RCx	RCy	RCz	RCd	Caving Degree	Paste Number	Paste Ratio	Distance	Closest Item	Penalty Cost
1	1	40	43	39	67080	0	0	0	40	43	39	0	0	0	0	0.000	0	0.000	0	0	0
2	6	83	100	69	572700	150	0	0	233	100	69	233	0	0	2	2053.175	3	0.500	110	1	0
3	2	56	66	41	151536	177	0	69	233	66	110	233	0	69	2	2054.481	3	0.500	1	2	0
4	3	85	88	35	261800	65	0	0	150	88	35	150	0	0	2	2054.094	3	0.500	26	1	0
5	5	72	88	68	430848	161	100	0	233	188	68	233	100	0	2	2052.488	3	0.500	152	1002	1
6	8	72	87	53	331992	161	188	0	233	275	53	233	188	0	2	2052.175	3	0.500	161	1004	0
7	4	57	98	38	212268	176	275	0	233	373	38	233	275	0	2	2051.550	3	0.500	176	1004	0
8	10	56	86	23	110768	94	0	35	150	86	58	150	0	35	2	2053.376	3	0.500	54	1	0
9	9	76	97	40	294880	157	373	0	233	470	40	233	373	0	2	2034.193	3	0.469	157	1004	1
10	11	64	82	61	320128	169	470	0	233	552	61	233	470	0	2	2024.306	3	0.453	159	1002	1
11	7	75	82	72	442800	158	0	110	233	82	182	233	0	110	2	2012.736	3	0.430	38	1002	0
12	13	31	101	30	93930	0	43	0	31	144	30	0	43	0	1	2053.752	3	0.500	34	1002	0
13	12	75	107	24	192600	0	144	0	75	251	24	0	144	0	1	2028.002	3	0.457	86	1005	0
14	17	31	101	30	93930	31	43	0	62	144	30	31	144	0	3	3232.261	5	0.507	4	0	1
15	14	75	107	24	192600	75	88	0	150	195	24	150	88	0	2	2616.474	4	0.457	1	14	0
16	18	30	74	27	59940	203	0	182	233	74	209	233	0	182	2	2054.219	3	0.500	11	1002	0
17	16	71	93	43	283929	0	251	0	71	344	43	0	251	0	1	2024.135	3	0.451	90	1005	1
18	19	72	88	68	430848	0	344	0	72	432	68	0	344	0	1	2021.955	3	0.446	85	10	0
19	15	75	82	72	442800	0	432	0	75	514	72	0	432	0	1	2044.949	3	0.486	82	10	0
20	24	71	93	43	283929	71	251	0	142	344	43	71	251	0	1	2578.562	4	0.393	20	19	0
21	21	38	63	32	76608	72	344	0	110	407	32	72	344	0	1	2053.935	3	0.500	24	19	0

22	20	71	73	27	139941	0	514	0	71	587	27	0	514	0	1	2052.612	3	0.500	98	10	0
23	26	56	66	41	151536	177	66	69	233	132	110	233	66	110	6	3199.394	5	0.450	1	0	1
24	25	76	97	40	294880	0	154	24	76	251	64	0	251	24	3	2020.580	3	0.442	1	0	1
25	23	72	87	53	331992	0	257	43	72	344	96	0	344	43	3	2014.137	3	0.431	6	0	0
26	22	83	100	69	572700	150	370	40	233	470	109	233	470	40	4	1978.526	3	0.371	35	0	0
27	29	56	86	23	110768	177	82	110	233	168	133	233	82	110	2	2567.312	4	0.377	87	1002	1
28	28	30	74	27	59940	173	0	182	203	74	209	203	0	182	2	2054.219	3	0.500	11	1002	0
29	27	71	73	27	139941	0	344	68	71	417	95	0	344	68	1	2054.192	3	0.500	16	26	0
30	31	40	43	39	67080	193	82	133	233	125	172	233	82	133	2	2053.319	3	0.500	48	1002	1
31	32	63	67	47	198387	170	470	61	233	537	108	233	470	61	2	2052.871	3	0.500	95	19	0
32	33	31	101	30	93930	146	0	69	177	101	99	177	0	69	2	2036.419	3	0.470	11	1002	1
33	30	71	93	43	283929	162	188	53	233	281	96	233	188	53	2	2001.305	3	0.412	86	1002	0
34	37	56	66	41	151536	177	125	133	233	191	174	233	125	133	2	2572.948	4	0.385	46	1002	0
35	36	40	43	39	67080	193	82	172	233	125	211	233	125	172	4	3165.122	5	0.392	1	0	0
36	34	64	82	61	320128	105	470	0	169	552	61	169	470	0	2	1991.334	3	0.393	30	22	0
37	38	71	93	43	283929	0	344	95	71	437	138	0	344	95	1	1958.682	3	0.339	79	1002	0
38	39	72	87	53	331992	0	257	96	72	344	149	0	344	96	3	2035.374	3	0.469	71	0	0
39	35	97	108	70	733320	0	344	138	97	452	208	0	344	138	1	1937.669	3	0.301	12	1002	0
40	44	75	107	24	192600	0	237	149	75	344	173	0	344	149	3	2010.276	3	0.426	47	0	0

Set17 - 5-Package Look-Ahead Results																				
Packing Order	Item Number	Length	Width	Height	Volume	x1	y1	z1	x2	y2	z2	RCx	RCy	RCz	RCd	Caving Degree	Paste Number	Paste Ratio	Distance	Closest Item	Penalty Cost
1	1	68	70	61	290360	0	0	0	68	70	61	0	0	0	0	0.000	0	0.000	0	0	0
2	4	77	91	36	252252	156	0	0	233	91	36	233	0	0	2	2053.107	3	0.500	88	1	0
3	6	77	91	36	252252	79	0	0	156	91	36	156	0	0	2	2054.310	3	0.500	12	1	0
4	2	58	80	40	185600	175	0	36	233	80	76	233	0	36	2	2054.184	3	0.500	18	3	0
5	3	55	76	43	179740	0	70	0	55	146	43	0	70	0	1	2054.075	3	0.500	24	4	0
6	7	40	94	25	94000	193	91	0	233	185	25	233	91	0	2	2053.708	3	0.500	36	5	1
7	9	30	78	22	51480	163	91	0	193	169	22	193	91	0	2	2054.339	3	0.500	6	5	1
8	5	55	76	43	179740	178	0	76	233	76	119	233	0	76	2	2052.710	3	0.500	101	1002	0
9	12	49	72	35	123480	126	0	36	175	72	71	175	0	36	2	2053.335	3	0.500	58	5	0
10	10	43	70	34	102340	83	0	36	126	70	70	126	0	36	2	2054.201	3	0.500	14	5	0
11	8	81	119	65	626535	0	146	0	81	265	65	0	146	0	1	2015.945	3	0.436	82	7	0
12	15	68	70	61	290360	0	0	61	68	70	122	0	0	61	1	2054.485	3	0.500	1	11	1
13	14	49	72	35	123480	0	70	43	49	142	78	0	70	43	1	2054.420	3	0.500	4	11	1
14	11	79	119	79	742679	0	265	0	79	384	79	0	265	0	1	2039.981	3	0.478	141	1002	0
15	13	79	119	79	742679	0	384	0	79	503	79	0	384	0	1	2054.489	3	0.500	1	14	0
16	16	68	70	61	290360	0	0	122	68	70	183	0	0	122	1	2053.941	3	0.500	37	1002	0
17	21	51	58	31	91698	0	0	183	51	58	214	0	0	183	1	2054.367	3	0.500	6	1002	1
18	19	30	78	22	51480	133	91	0	163	169	22	163	91	0	2	2053.102	3	0.500	52	1004	0
19	17	71	76	56	302176	0	503	0	71	579	56	0	503	0	1	2052.086	3	0.500	162	1005	0
20	22	89	113	27	271539	144	185	0	233	298	27	233	185	0	2	2026.979	3	0.455	63	1004	1
21	18	59	98	44	254408	174	298	0	233	396	44	233	298	0	2	2029.803	3	0.460	95	1004	0

22	24	30	78	22	51480	103	91	0	133	169	22	133	91	0	2	2053.909	3	0.500	22	1004	0
23	23	46	93	39	166842	187	396	0	233	489	39	233	396	0	2	2052.538	3	0.500	108	19	0
24	20	66	89	43	252582	167	489	0	233	578	43	233	489	0	2	2030.047	3	0.458	1	23	0
25	25	40	94	25	94000	193	91	25	233	185	50	233	185	25	4	3209.118	5	0.467	1	0	0
26	27	89	113	27	271539	144	185	27	233	298	54	233	185	27	2	2631.445	4	0.485	63	1004	0
27	28	65	76	62	306280	79	265	0	144	341	62	79	265	0	1	2595.492	4	0.422	30	1005	1
28	30	57	79	46	207138	81	186	0	138	265	46	81	265	0	3	2054.483	3	0.500	1	0	1
29	29	65	76	62	306280	79	341	0	144	417	62	79	341	0	1	2054.055	3	0.500	30	1005	0
30	26	59	98	44	254408	79	417	0	138	515	44	79	417	0	1	2041.815	3	0.479	30	24	0
31	34	49	72	35	123480	138	417	0	187	489	35	187	489	0	4	3880.145	6	0.611	21	0	1
32	31	46	93	39	166842	187	396	39	233	489	78	233	489	39	4	3186.873	5	0.429	1	0	0
33	32	40	94	25	94000	153	91	22	193	185	47	193	91	22	2	2637.846	4	0.494	16	1004	0
34	37	58	80	40	185600	68	0	70	126	80	110	126	0	70	2	2584.727	4	0.404	12	1004	0
35	33	71	76	56	302176	162	0	119	233	76	175	233	0	119	2	2027.641	3	0.455	45	1002	0
36	38	71	76	56	302176	68	0	110	139	76	166	68	0	110	1	2025.643	3	0.451	23	35	0
37	35	55	119	50	327250	0	146	65	55	265	115	0	265	65	3	2015.264	3	0.433	4	0	0
38	40	58	80	40	185600	175	0	175	233	80	215	233	0	175	2	2047.710	3	0.489	5	1002	0
39	36	55	119	50	327250	0	265	79	55	384	129	0	265	79	1	2039.661	3	0.475	1	15	0
40	41	30	78	22	51480	144	298	0	174	376	22	144	298	0	1	2748.188	4	0.682	4	32	0
41	39	55	119	50	327250	0	384	79	55	503	129	0	384	79	1	2054.485	3	0.500	1	39	0
42	45	46	93	39	166842	126	0	71	172	93	110	126	0	110	5	3215.948	5	0.479	3	0	1
43	44	49	72	35	123480	138	417	35	187	489	70	138	417	35	1	3199.410	5	0.452	46	1005	0
44	46	65	76	62	306280	0	70	78	65	146	140	0	70	78	1	2654.805	4	0.523	4	42	1
45	43	51	58	31	91698	0	70	140	51	128	171	0	70	140	1	2054.123	3	0.500	17	1002	1
46	42	71	76	56	302176	0	503	56	71	579	112	0	503	56	1	2041.519	3	0.481	108	1002	0
47	47	59	98	44	254408	174	298	44	233	396	88	233	396	44	4	3218.035	5	0.483	30	0	0
48	51	51	58	31	91698	182	240	54	233	298	85	233	298	54	4	2054.478	3	0.500	1	0	0

49	52	49	72	35	123480	184	489	43	233	561	78	233	489	43	2	2052.669	3	0.498	46	46	0
50	48	57	79	46	207138	0	146	115	57	225	161	0	146	115	1	2016.877	3	0.437	39	1002	0
51	53	46	93	39	166842	141	396	70	187	489	109	187	489	70	4	2477.831	4	0.221	1	0	1
52	49	77	91	36	252252	68	0	166	145	91	202	68	0	166	1	1971.100	3	0.358	18	1002	0
53	50	77	91	36	252252	156	149	54	233	240	90	233	240	54	4	1962.787	3	0.345	56	0	0
54	58	58	80	40	185600	0	503	112	58	583	152	0	503	112	1	2006.596	3	0.420	68	1002	1
55	56	65	76	62	306280	0	427	129	65	503	191	0	503	129	3	1979.933	3	0.374	29	0	0
56	54	77	91	36	252252	0	336	129	77	427	165	0	427	129	3	1998.909	3	0.407	55	0	0
57	59	59	98	44	254408	79	417	44	138	515	88	79	417	44	1	2619.141	4	0.462	4	51	1
58	55	77	91	36	252252	0	336	165	77	427	201	0	427	165	3	2028.143	3	0.456	19	0	0
59	61	59	98	44	254408	0	238	129	59	336	173	0	336	129	3	2009.626	3	0.424	12	0	0
60	57	89	113	27	271539	0	223	173	89	336	200	0	336	173	3	1966.052	3	0.350	20	0	0
61	62	30	78	22	51480	144	298	22	174	376	44	144	298	22	1	2747.811	4	0.682	18	51	1
62	64	46	93	39	166842	187	396	78	233	489	117	187	396	78	1	2688.356	4	0.580	1	49	0
63	63	58	80	40	185600	0	503	152	58	583	192	0	503	152	1	2052.334	3	0.497	28	1002	0
64	60	79	119	79	742679	154	277	88	233	396	167	233	396	88	4	1961.598	3	0.342	37	0	0
65	68	43	70	34	102340	190	489	78	233	559	112	233	489	78	2	2054.414	3	0.500	4	1002	1
66	67	46	93	39	166842	187	396	117	233	489	156	233	396	117	2	2053.337	3	0.500	64	1002	0
67	66	57	79	46	207138	130	396	109	187	475	155	187	396	109	2	2000.661	3	0.408	1	64	1
68	65	66	75	47	232650	167	489	112	233	564	159	233	489	112	2	1976.996	3	0.370	61	1002	0
69	73	30	78	22	51480	144	298	44	174	376	66	144	298	44	1	2706.258	4	0.611	8	1005	0
70	70	43	70	34	102340	190	396	156	233	466	190	233	396	156	2	2011.667	3	0.428	22	68	0
71	69	55	119	50	327250	178	277	167	233	396	217	233	396	167	4	2019.494	3	0.440	3	0	0
72	74	55	76	43	179740	79	341	62	134	417	105	79	417	62	3	1967.363	3	0.352	4	0	0
73	71	66	89	43	252582	0	70	171	66	159	214	0	70	171	1	1938.323	3	0.302	2	1002	0
74	76	55	76	43	179740	79	265	62	134	341	105	79	265	62	1	2582.401	4	0.400	10	1005	0

Set 18 - 5-Package Look-Ahead Results																				
Packing Order	Item Number	Length	Width	Height	Volume	x1	y1	z1	x2	y2	z2	RCx	RCy	RCz	RCd	Caving Degree	Paste Number	Paste Ratio	Distance	Closest Item	Penalty Cost
1	1	68	73	62	307768	0	0	0	68	73	62	0	0	0	0	0.000	0	0.000	0	0	0
2	5	83	113	76	712804	150	0	0	233	113	76	233	0	0	2	2053.582	3	0.500	82	1	0
3	4	53	79	41	171667	97	0	0	150	79	41	150	0	0	2	2053.960	3	0.500	30	1	0
4	2	41	70	30	86100	109	0	41	150	70	71	150	0	41	2	2053.549	3	0.500	42	1	0
5	7	53	79	41	171667	0	73	0	53	152	41	0	73	0	1	2053.690	3	0.500	45	3	0
6	3	44	44	42	81312	53	73	0	97	117	42	53	73	0	1	2587.307	4	0.410	54	2	0
7	10	53	79	41	171667	97	79	0	150	158	41	150	79	0	2	2631.915	4	0.485	45	5	1
8	9	68	73	62	307768	165	113	0	233	186	62	233	113	0	2	2054.485	3	0.500	1	7	1
9	6	36	86	29	89784	0	152	0	36	238	29	0	152	0	1	2053.115	3	0.500	62	8	0
10	11	41	70	30	86100	0	0	62	41	70	92	0	0	62	1	2052.937	3	0.500	69	1002	0
11	8	85	115	60	586500	148	0	76	233	115	136	233	0	76	2	2048.159	3	0.491	84	1002	0
12	14	68	73	62	307768	165	0	136	233	73	198	233	0	136	2	2054.174	3	0.500	22	1002	1
13	12	98	99	68	659736	135	186	0	233	285	68	233	186	0	2	2022.257	3	0.447	99	9	0
14	13	89	92	73	597724	144	285	0	233	377	73	233	285	0	2	2046.688	3	0.490	144	1004	0
15	17	89	92	73	597724	144	377	0	233	469	73	233	377	0	2	2052.791	3	0.500	144	1004	0
16	18	89	92	73	597724	144	469	0	233	561	73	233	469	0	2	2052.791	3	0.500	144	1004	0
17	19	60	104	26	162240	0	238	0	60	342	26	0	238	0	1	2035.689	3	0.470	75	1005	1
18	15	94	98	74	681688	0	342	0	94	440	74	0	342	0	1	1986.309	3	0.385	50	16	0
19	20	44	44	42	81312	53	117	0	97	161	42	97	117	0	2	2707.187	4	0.613	17	1004	1
20	16	90	100	79	711000	0	440	0	90	540	79	0	440	0	1	2048.394	3	0.491	54	16	0
21	23	53	79	41	171667	0	73	41	53	152	82	0	73	41	1	2611.487	4	0.449	1	1002	0

22	24	42	73	32	98112	41	0	62	83	73	94	41	0	62	1	2593.470	4	0.419	26	1002	0
23	21	31	114	29	102486	113	285	0	144	399	29	144	285	0	2	2029.919	3	0.459	18	20	0
24	26	36	86	29	89784	0	152	29	36	238	58	0	152	29	1	2054.478	3	0.500	1	23	0
25	22	91	96	28	244608	142	189	68	233	285	96	233	285	68	4	2009.141	3	0.425	74	0	0
26	27	41	70	30	86100	0	0	92	41	70	122	0	0	92	1	2645.908	4	0.511	98	1002	0
27	29	88	88	43	332992	145	285	73	233	373	116	233	285	73	2	2020.707	3	0.443	4	1002	1
28	25	85	115	60	586500	148	373	73	233	488	133	233	373	73	2	2034.378	3	0.467	54	20	0
29	31	53	79	41	171667	60	263	0	113	342	41	60	342	0	3	2630.708	4	0.482	22	0	0
30	32	42	73	32	98112	0	269	26	42	342	58	0	342	26	3	2054.110	3	0.500	18	0	0
31	28	98	99	68	659736	135	488	73	233	587	141	233	488	73	2	1993.890	3	0.397	1	28	0
32	33	44	92	40	161920	100	399	0	144	491	40	144	399	0	2	2027.756	3	0.455	6	31	0
33	34	88	88	43	332992	145	197	96	233	285	139	233	285	96	4	2014.535	3	0.434	81	0	1
34	30	83	113	76	712804	150	375	133	233	488	209	233	488	133	4	1986.137	3	0.384	11	0	0
35	38	31	114	29	102486	113	285	29	144	399	58	144	399	29	4	3830.118	6	0.525	1	0	0
36	36	50	68	31	105400	94	399	40	144	467	71	144	399	40	2	2636.093	4	0.491	2	31	1
37	37	68	73	62	307768	165	488	141	233	561	203	233	488	141	2	2054.248	3	0.500	17	1002	0
38	39	60	104	26	162240	0	336	74	60	440	100	0	440	74	3	2005.999	3	0.420	85	0	0
39	35	98	99	68	659736	0	440	79	98	539	147	0	440	79	1	1975.344	3	0.366	37	37	0
40	40	41	70	30	86100	103	491	0	144	561	30	144	491	0	2	2054.183	3	0.500	14	39	0
41	45	36	86	29	89784	0	354	100	36	440	129	0	440	100	3	2052.468	3	0.500	91	0	0
42	42	60	104	26	162240	60	336	74	120	440	100	60	440	74	3	1954.010	3	0.330	25	0	0
43	41	91	96	28	244608	36	344	100	127	440	128	36	440	100	3	2016.569	3	0.436	18	0	0
44	47	36	86	29	89784	0	152	58	36	238	87	0	152	58	1	2045.822	3	0.486	32	43	0
45	46	60	104	26	162240	36	336	128	96	440	154	36	440	128	3	1953.543	3	0.330	52	0	0

Set 19 - 5-Package Look-Ahead Results																				
Packing Order	Item Number	Length	Width	Height	Volume	x1	y1	z1	x2	y2	z2	RCx	RCy	RCz	RCd	Caving Degree	Paste Number	Paste Ratio	Distance	Closest Item	Penalty Cost
1	1	33	54	20	35640	0	0	0	33	54	20	0	0	0	0	0.000	0	0.000	0	0	0
2	6	33	54	20	35640	33	0	0	66	54	20	33	0	0	1	2054.470	3	0.500	1	1	0
3	5	65	66	36	154440	168	0	0	233	66	36	233	0	0	2	2052.618	3	0.500	101	2	1
4	4	52	63	35	114660	116	0	0	168	63	35	168	0	0	2	2053.471	3	0.500	50	2	0
5	2	57	62	51	180234	176	0	36	233	62	87	233	0	36	2	2052.145	3	0.500	133	1002	0
6	3	57	62	51	180234	176	0	87	233	62	138	233	0	87	2	2053.048	3	0.500	82	1002	0
7	11	57	62	51	180234	176	0	138	233	62	189	233	0	138	2	2054.482	3	0.500	1	6	1
8	7	43	71	39	119067	190	66	0	233	137	39	233	66	0	2	2045.772	3	0.491	181	1002	0
9	12	57	101	42	241794	176	137	0	233	238	42	233	137	0	2	2034.694	3	0.471	176	1004	1
10	8	94	104	27	263952	139	238	0	233	342	27	233	238	0	2	2032.944	3	0.467	139	1004	0
11	10	79	83	43	281951	154	342	0	233	425	43	233	342	0	2	2024.718	3	0.453	154	1004	0
12	9	81	91	48	353808	152	425	0	233	516	48	233	425	0	2	2043.129	3	0.484	152	1004	0
13	15	33	54	20	35640	0	0	20	33	54	40	0	0	20	1	2054.470	3	0.500	1	1002	1
14	14	54	78	22	92664	0	54	0	54	132	22	0	54	0	1	2051.398	3	0.497	62	1005	0
15	13	76	119	61	551684	0	132	0	76	251	61	0	132	0	1	2005.402	3	0.418	63	1005	0
16	18	43	71	39	119067	147	66	0	190	137	39	190	66	0	2	2628.212	4	0.477	1	15	0
17	20	71	99	64	449856	0	251	0	71	350	64	0	251	0	1	2050.122	3	0.494	68	12	1
18	16	81	91	48	353808	0	350	0	81	441	48	0	350	0	1	2045.471	3	0.485	1	17	0
19	17	81	91	48	353808	0	441	0	81	532	48	0	441	0	1	2053.496	3	0.500	71	12	0
20	22	65	66	36	154440	103	0	35	168	66	71	168	0	35	2	2534.587	4	0.320	71	1004	1
21	21	57	62	51	180234	176	516	0	233	578	51	233	516	0	2	2047.592	3	0.491	95	19	0

22	19	76	79	71	426284	157	263	27	233	342	98	233	342	27	4	1982.358	3	0.377	1	0	0
23	25	54	78	22	92664	0	54	22	54	132	44	0	54	22	1	2664.895	4	0.542	50	1002	1
24	27	66	68	48	215424	167	342	43	233	410	91	233	342	43	2	2054.266	3	0.500	14	21	0
25	24	46	100	21	96600	130	138	0	176	238	21	176	238	0	4	2046.087	3	0.488	54	0	0
26	23	76	79	71	426284	0	350	48	76	429	119	0	350	48	1	1980.978	3	0.375	1	24	0
27	28	68	93	25	158100	71	251	0	139	344	25	71	251	0	1	2661.241	4	0.534	6	26	1
28	30	68	93	25	158100	71	251	25	139	344	50	71	251	25	1	2601.976	4	0.433	1	27	1
29	26	76	79	71	426284	0	429	48	76	508	119	0	429	48	1	2053.490	3	0.500	76	1002	0
30	31	65	66	36	154440	54	66	0	119	132	36	54	132	0	3	3766.090	6	0.416	2	0	1
31	32	57	101	42	241794	119	137	21	176	238	63	176	238	21	4	2524.206	4	0.300	7	0	0
32	29	79	83	43	281951	0	267	64	79	350	107	0	350	64	3	2037.274	3	0.471	1	0	0
33	36	81	106	30	257580	152	410	48	233	516	78	233	516	48	4	3197.597	5	0.449	68	0	0
34	37	45	60	26	70200	71	0	0	116	60	26	116	0	0	2	2054.379	3	0.500	5	1004	1
35	34	57	101	42	241794	176	410	78	233	511	120	233	410	78	2	2013.747	3	0.433	100	29	0
36	33	76	119	61	551684	0	132	61	76	251	122	0	251	61	3	1991.426	3	0.393	1	0	0
37	35	71	99	64	449856	0	251	107	71	350	171	0	350	107	3	3167.063	5	0.395	1	0	0
38	40	66	68	48	215424	167	342	91	233	410	139	233	410	91	4	3199.035	5	0.452	81	0	1
39	38	45	60	26	70200	188	0	189	233	60	215	233	0	189	2	2054.379	3	0.500	5	1002	0
40	39	57	62	51	180234	0	350	119	57	412	170	0	350	119	1	2054.217	3	0.500	16	1002	0
41	44	65	66	36	154440	54	66	36	119	132	72	54	132	36	3	3135.098	5	0.342	28	0	1
42	45	43	71	39	119067	76	132	0	119	203	39	76	132	0	1	2687.793	4	0.579	10	1005	1
43	41	81	106	30	257580	0	145	122	81	251	152	0	251	122	3	2036.271	3	0.471	68	0	0
44	46	33	54	20	35640	33	0	20	66	54	40	33	54	20	3	3854.886	6	0.567	1	0	1
45	42	81	106	30	257580	0	145	152	81	251	182	0	251	152	3	2029.879	3	0.459	38	0	0
46	47	66	68	48	215424	88	357	0	154	425	48	154	425	0	4	2550.414	4	0.345	8	0	0
47	43	81	106	30	257580	0	412	119	81	518	149	0	412	119	1	2011.828	3	0.429	71	1002	0
48	52	71	99	64	449856	81	425	0	152	524	64	152	425	0	2	2686.811	4	0.577	4	47	0

49	51	66	68	48	215424	167	274	98	233	342	146	233	342	98	4	2040.848	3	0.479	74	0	1
50	50	81	106	30	257580	0	412	149	81	518	179	0	412	149	1	2028.364	3	0.457	41	1002	0
51	48	76	119	61	551684	157	410	120	233	529	181	233	410	120	2	1960.546	3	0.341	39	1002	0
52	53	43	71	39	119067	76	132	39	119	203	78	76	132	39	1	2692.849	4	0.588	27	1005	0

Set 20 - 5-Package Look-Ahead Results																				
Packing Order	Item Number	Length	Width	Height	Volume	x1	y1	z1	x2	y2	z2	RCx	RCy	RCz	RCd	Caving Degree	Paste Number	Paste Ratio	Distance	Closest Item	Penalty Cost
1	1	56	86	34	163744	0	0	0	56	86	34	0	0	0	0	0.000	0	0.000	0	0	0
2	4	70	112	51	399840	163	0	0	233	112	51	233	0	0	2	2053.048	3	0.500	107	1	0
3	6	53	74	40	156880	110	0	0	163	74	40	163	0	0	2	2053.499	3	0.500	54	1	0
4	2	43	58	31	77314	56	0	0	99	58	31	56	0	0	1	2054.265	3	0.500	10	3	0
5	3	69	81	69	385641	164	0	51	233	81	120	233	0	51	2	2053.126	3	0.500	100	1002	0
6	7	69	81	69	385641	164	0	120	233	81	189	233	0	120	2	2054.074	3	0.500	31	1002	0
7	5	43	58	31	77314	190	0	189	233	58	220	233	0	189	2	2767.171	4	0.722	190	1004	0
8	8	70	112	51	399840	163	112	0	233	224	51	233	112	0	2	2052.287	3	0.500	163	1004	0
9	13	42	109	22	100716	191	81	51	233	190	73	233	81	51	2	2054.479	3	0.500	1	6	1
10	11	33	98	20	64680	200	81	73	233	179	93	233	81	73	2	2053.852	3	0.500	26	6	1
11	12	69	76	58	304152	164	224	0	233	300	58	233	224	0	2	2041.709	3	0.482	162	1002	0
12	10	64	70	58	259840	169	300	0	233	370	58	233	300	0	2	2051.961	3	0.500	162	1002	0
13	9	72	74	68	362304	0	0	34	72	74	102	0	0	34	1	2031.189	3	0.461	38	1002	0
14	14	50	76	35	133000	113	74	0	163	150	35	163	74	0	2	2053.697	3	0.500	41	13	0
15	18	43	97	32	133472	0	86	0	43	183	32	0	86	0	1	2053.130	3	0.500	70	14	0
16	16	70	112	51	399840	43	86	0	113	198	51	43	86	0	1	2580.894	4	0.398	50	1005	0
17	19	53	74	40	156880	0	0	102	53	74	142	0	0	102	1	2053.054	3	0.500	78	1002	0
18	15	62	90	38	212040	171	370	0	233	460	38	233	370	0	2	2051.632	3	0.500	171	1004	0
19	20	56	86	34	163744	107	0	40	163	86	74	163	0	40	2	2555.629	4	0.355	26	17	0
20	21	65	113	53	389285	168	460	0	233	573	53	233	460	0	2	2033.164	3	0.468	167	1002	0
21	17	70	112	51	399840	0	0	142	70	112	193	0	0	142	1	1986.972	3	0.386	27	1002	0

22	26	53	109	24	138648	0	0	193	53	109	217	0	0	193	1	2054.442	3	0.500	3	1002	0
23	24	33	98	20	64680	200	81	93	233	179	113	233	81	93	2	2054.351	3	0.500	6	1002	1
24	25	53	74	40	156880	180	370	38	233	444	78	233	370	38	2	2019.643	3	0.441	16	20	0
25	23	70	112	51	399840	163	258	58	233	370	109	233	370	58	4	2002.718	3	0.413	68	0	0
26	22	69	76	58	304152	100	300	0	169	376	58	169	300	58	6	3740.629	6	0.375	84	0	0
27	28	69	76	58	304152	95	224	0	164	300	58	164	300	58	8	3813.953	6	0.498	26	0	0
28	27	33	98	20	64680	0	183	0	33	281	20	0	183	0	1	2054.251	3	0.500	10	27	0
29	32	43	97	32	133472	0	86	32	43	183	64	0	86	32	1	2659.009	4	0.532	64	27	1
30	33	62	90	38	212040	0	281	0	62	371	38	0	281	0	1	2010.096	3	0.425	34	27	1
31	29	69	82	42	237636	0	371	0	69	453	42	0	371	0	1	2040.743	3	0.477	31	26	0
32	30	72	74	68	362304	0	453	0	72	527	68	0	453	0	1	2014.715	3	0.435	96	20	0
33	35	68	89	39	236028	0	364	42	68	453	81	0	453	42	3	2019.558	3	0.441	32	0	0
34	31	72	74	68	362304	0	453	68	72	527	136	0	453	68	1	1976.138	3	0.369	84	1002	0
35	37	33	98	20	64680	0	183	20	33	281	40	0	281	20	3	3847.689	6	0.555	10	0	1
36	36	56	86	34	163744	0	367	81	56	453	115	0	453	81	3	2052.581	3	0.500	105	0	0
37	38	53	109	24	138648	0	344	115	53	453	139	0	453	115	3	2009.479	3	0.426	81	0	0
38	34	72	74	68	362304	161	370	78	233	444	146	233	370	78	2	1973.969	3	0.365	74	1002	0
39	43	33	98	20	64680	62	273	0	95	371	20	62	371	0	3	2634.456	4	0.488	1	0	0
40	39	62	90	38	212040	171	280	109	233	370	147	233	370	109	4	2051.673	3	0.497	73	0	0
41	42	64	70	58	259840	169	81	113	233	151	171	233	81	113	2	2001.749	3	0.411	49	1002	1
42	44	56	86	34	163744	177	81	171	233	167	205	233	81	171	2	1999.689	3	0.407	15	1002	0
43	41	69	82	42	237636	102	378	0	171	460	42	171	460	0	4	1978.647	3	0.371	2	0	0
44	40	77	97	66	492954	91	460	0	168	557	66	168	460	0	2	1998.947	3	0.406	20	34	0
45	45	69	76	58	304152	68	377	42	137	453	100	68	453	42	3	3061.916	5	0.216	1	0	0
46	48	43	97	32	133472	0	183	40	43	280	72	0	183	40	1	2602.499	4	0.434	1	45	1
47	47	53	109	24	138648	0	74	64	53	183	88	0	183	64	3	3779.799	6	0.439	1	0	1
48	50	62	90	38	212040	0	74	88	62	164	126	0	74	88	1	2027.714	3	0.455	16	1002	1

49	49	69	82	42	237636	0	453	136	69	535	178	0	453	136	1	1973.330	3	0.363	42	1002	0
50	46	64	70	58	259840	0	383	139	64	453	197	0	453	139	3	2006.564	3	0.419	23	0	0
51	52	53	109	24	138648	0	453	178	53	562	202	0	453	178	1	2002.649	3	0.412	18	1002	0
52	54	53	109	24	138648	0	183	72	53	292	96	0	183	72	1	1992.835	3	0.395	1	1002	0
53	51	64	70	58	259840	169	370	146	233	440	204	233	370	146	2	1966.813	3	0.351	16	1002	0
54	55	64	70	58	259840	169	300	147	233	370	205	233	370	147	4	2049.378	3	0.492	15	0	0

10 APPENDIX D: RESULT TABLES FOR 10-PACKAGE LOOK-AHEAD

Set 1 - 10-Package Look-Ahead Results																				
Packing Order	Item Number	Length	Width	Height	Volume	x1	y1	z1	x2	y2	z2	RCx	RCy	RCz	RCd	Caving Degree	Paste Number	Paste Ratio	Distance	Closest Item	Penalty Cost
1	1	66	95	31	194370	0	0	0	66	95	31	0	0	0	0	0.000	0	0.000	0	0	0
2	11	74	104	65	500240	159	0	0	233	104	65	233	0	0	2	2053.328	3	0.500	93	1	1
3	10	32	71	25	56800	201	0	65	233	71	90	233	0	65	2	2054.474	3	0.500	1	2	1
4	6	78	104	34	275808	81	0	0	159	104	34	159	0	0	2	2054.270	3	0.500	15	1	1
5	7	72	98	46	324576	161	104	0	233	202	46	233	104	0	2	2054.471	3	0.500	2	4	1
6	3	66	95	31	194370	0	0	31	66	95	62	0	0	31	1	2054.241	3	0.500	15	5	0
7	5	27	95	26	66690	0	95	0	27	190	26	0	95	0	1	2054.401	3	0.500	4	6	0
8	9	72	98	46	324576	161	202	0	233	300	46	233	202	0	2	2052.157	3	0.500	161	1004	1
9	2	76	108	30	246240	85	104	0	161	212	30	161	104	0	2	2053.575	3	0.500	58	7	0
10	13	66	95	31	194370	0	0	62	66	95	93	0	0	62	1	2054.483	3	0.500	1	6	0
11	8	39	41	38	60762	0	0	93	39	41	131	0	0	93	1	2052.236	3	0.500	89	1002	0
12	12	72	98	46	324576	161	300	0	233	398	46	233	300	0	2	2052.157	3	0.500	161	1004	0
13	4	77	83	46	293986	156	398	0	233	481	46	233	398	0	2	2047.245	3	0.492	156	1004	0
14	18	32	71	25	56800	169	0	65	201	71	90	201	0	65	2	2054.474	3	0.500	1	1002	1
15	19	76	108	30	246240	85	212	0	161	320	30	161	212	0	2	2053.256	3	0.500	78	13	1
16	21	72	98	46	324576	161	481	0	233	579	46	233	481	0	2	2052.157	3	0.500	161	1004	1
17	17	78	104	34	275808	81	0	34	159	104	68	159	0	34	2	2047.866	3	0.489	15	1004	0
18	14	67	97	62	402938	166	0	90	233	97	152	233	0	90	2	2019.152	3	0.441	68	1002	0
19	16	67	97	62	402938	166	0	152	233	97	214	233	0	152	2	2054.419	3	0.500	6	1002	1
20	15	70	111	48	372960	163	104	46	233	215	94	233	104	46	2	2018.243	3	0.438	4	17	0

21	25	32	71	25	56800	27	95	0	59	166	25	27	95	0	1	2054.344	3	0.500	6	20	1
22	22	70	111	48	372960	163	215	46	233	326	94	233	215	46	2	2053.486	3	0.500	73	1002	0
23	26	43	110	25	118250	190	326	46	233	436	71	233	326	46	2	2053.583	3	0.500	45	16	0
24	27	76	108	30	246240	157	436	46	233	544	76	233	436	46	2	2021.052	3	0.447	144	1002	0
25	23	81	94	44	335016	0	190	0	81	284	44	0	190	0	1	1999.591	3	0.407	4	1005	1
26	28	81	94	44	335016	0	284	0	81	378	44	0	284	0	1	2054.442	3	0.500	4	24	1
27	20	67	97	62	402938	0	378	0	67	475	62	0	378	0	1	2032.071	3	0.464	88	24	0
28	33	77	83	46	293986	84	481	0	161	564	46	161	481	46	6	3753.876	6	0.397	84	0	0
29	24	67	97	62	402938	0	475	0	67	572	62	0	475	0	1	2054.486	3	0.500	1	28	0
30	38	25	33	23	18975	208	71	65	233	104	88	233	104	65	4	3900.117	6	0.644	2	0	0
31	36	39	41	38	60762	0	41	93	39	82	131	0	41	93	1	2054.475	3	0.500	1	1002	1
32	32	33	81	28	74844	123	400	0	156	481	28	156	481	0	4	2053.171	3	0.500	56	0	0
33	30	66	95	31	194370	0	283	44	66	378	75	0	378	44	3	2030.498	3	0.462	95	0	0
34	37	66	95	31	194370	0	188	44	66	283	75	0	283	44	3	2047.734	3	0.491	93	0	1
35	34	84	85	30	214200	77	104	30	161	189	60	161	104	30	2	2006.632	3	0.419	2	34	1
36	35	77	83	46	293986	0	0	131	77	83	177	0	0	131	1	1985.702	3	0.384	43	1002	1
37	29	74	104	65	500240	0	378	62	74	482	127	0	378	62	1	1982.159	3	0.379	83	24	0
38	39	25	33	23	18975	183	71	65	208	104	88	208	104	65	4	3900.117	6	0.644	2	0	0
39	40	76	108	30	246240	0	270	75	76	378	105	0	378	75	3	2028.739	3	0.458	87	0	1
40	31	81	94	44	335016	0	482	62	81	576	106	0	482	62	1	2017.145	3	0.438	76	24	0
41	49	39	41	38	60762	39	0	93	78	41	131	39	0	131	5	3297.626	5	0.618	1	0	1
42	45	27	95	26	66690	206	326	71	233	421	97	233	326	71	2	2050.331	3	0.493	1	1002	0
43	44	84	85	30	214200	0	0	177	84	85	207	0	0	177	1	2036.279	3	0.469	13	1002	1
44	43	78	104	34	275808	0	274	105	78	378	139	0	378	105	3	2027.969	3	0.457	81	0	1
45	42	77	83	46	293986	0	482	106	77	565	152	0	482	106	1	2011.046	3	0.428	68	1002	0
46	48	74	104	65	500240	0	378	127	74	482	192	0	482	127	3	3197.105	5	0.447	1	0	0
47	41	70	111	48	372960	0	267	139	70	378	187	0	378	139	3	2044.055	3	0.483	33	0	0
48	53	32	71	25	56800	66	0	68	98	71	93	66	0	93	5	3785.976	6	0.450	6	0	1

49	52	84	85	30	214200	0	482	152	84	567	182	0	482	152	1	2028.649	3	0.457	38	1002	0
50	54	76	108	30	246240	85	189	30	161	297	60	161	189	30	2	2022.126	3	0.445	3	1004	1
51	55	78	104	34	275808	0	166	75	78	270	109	0	270	75	3	1989.633	3	0.390	30	0	0
52	51	81	94	44	335016	152	232	94	233	326	138	233	326	94	4	1967.699	3	0.353	16	0	0
53	46	81	92	55	409860	152	140	94	233	232	149	233	232	94	4	2020.989	3	0.444	44	0	0
54	56	81	94	44	335016	152	232	138	233	326	182	233	232	138	2	2002.724	3	0.413	38	1002	0

Set 2 - 10-Package Look-Ahead Results																				
Packing Order	Item Number	Length	Width	Height	Volume	x1	y1	z1	x2	y2	z2	RCx	RCy	RCz	RCd	Caving Degree	Paste Number	Paste Ratio	Distance	Closest Item	Penalty Cost
1	1	36	48	31	53568	0	0	0	36	48	31	0	0	0	0	0.000	0	0.000	0	0	0
2	9	76	103	64	500992	157	0	0	233	103	64	233	0	0	2	2052.977	3	0.500	121	1	0
3	7	88	98	26	224224	69	0	0	157	98	26	157	0	0	2	2053.957	3	0.500	33	1	0
4	3	69	97	41	274413	0	48	0	69	145	41	0	48	0	1	2631.166	4	0.485	88	2	0
5	5	69	97	41	274413	0	145	0	69	242	41	0	145	0	1	2054.485	3	0.500	1	4	0
6	6	25	49	21	25725	69	98	0	94	147	21	69	98	0	1	2054.466	3	0.500	1	5	0
7	2	70	95	62	412300	163	103	0	233	198	62	233	103	0	2	2053.586	3	0.500	68	6	0
8	11	69	97	41	274413	94	103	0	163	200	41	163	103	0	2	2603.262	4	0.436	25	5	1
9	12	69	97	41	274413	164	198	0	233	295	41	233	198	0	2	2054.485	3	0.500	1	8	1
10	4	69	84	66	382536	164	0	64	233	84	130	233	0	64	2	2053.260	3	0.500	90	1002	0
11	16	48	61	39	114192	185	295	0	233	356	39	233	295	0	2	2054.479	3	0.500	1	9	1
12	14	37	73	23	62123	120	0	26	157	73	49	157	0	26	2	2053.717	3	0.500	31	8	1
13	13	48	71	47	160176	185	0	130	233	71	177	233	0	130	2	2053.708	3	0.500	43	1002	1
14	15	49	111	26	141414	0	242	0	49	353	26	0	242	0	1	2052.293	3	0.500	115	11	0
15	10	52	98	44	224224	181	356	0	233	454	44	233	356	0	2	2041.164	3	0.482	176	1002	0
16	8	77	89	46	315238	156	454	0	233	543	46	233	454	0	2	2026.806	3	0.457	156	1004	0
17	24	51	60	41	125460	69	0	26	120	60	67	120	0	26	2	2606.154	4	0.441	32	1004	1
18	18	43	90	33	127710	0	353	0	43	443	33	0	353	0	1	2041.381	3	0.482	122	16	0
19	23	69	97	41	274413	164	198	41	233	295	82	233	198	41	2	2024.480	3	0.449	1	1002	1
20	17	70	95	62	412300	163	103	62	233	198	124	233	198	62	4	3179.260	5	0.417	18	0	0
21	27	43	90	33	127710	190	198	82	233	288	115	233	198	82	2	2052.415	3	0.500	105	1002	0
22	21	76	86	38	248368	0	443	0	76	529	38	0	443	0	1	2019.257	3	0.442	80	16	1

23	22	76	86	38	248368	105	368	0	181	454	38	181	454	0	4	2009.223	3	0.424	29	0	0
24	26	77	89	46	315238	79	454	0	156	543	46	156	454	0	2	2021.949	3	0.445	4	22	0
25	25	75	75	63	354375	88	103	41	163	178	104	163	103	41	2	1956.150	3	0.333	20	1004	0
26	19	84	85	72	514080	0	242	26	84	327	98	0	242	26	1	1932.750	3	0.293	26	1002	0
27	29	36	48	31	53568	0	0	31	36	48	62	0	48	31	3	3843.581	6	0.549	32	0	1
28	20	84	85	72	514080	0	157	41	84	242	113	0	242	41	3	2015.916	3	0.434	4	0	0
29	36	25	49	21	25725	69	147	0	94	196	21	69	147	0	1	2750.142	4	0.685	1	28	1
30	37	51	60	41	125460	0	97	41	51	157	82	0	157	41	3	2054.480	3	0.500	1	0	1
31	30	77	89	46	315238	0	242	98	77	331	144	0	242	98	1	1998.791	3	0.407	76	1002	0
32	31	52	98	44	224224	0	144	113	52	242	157	0	242	113	3	2018.231	3	0.440	63	0	0
33	34	75	75	63	354375	0	242	144	75	317	207	0	242	144	1	1975.485	3	0.366	13	1002	1
34	35	76	103	64	500992	157	351	44	233	454	108	233	454	44	4	1939.707	3	0.306	56	0	1
35	28	84	85	72	514080	149	454	46	233	539	118	233	454	46	2	2032.918	3	0.465	102	1002	0
36	38	25	49	21	25725	0	48	41	25	97	62	0	97	41	3	3286.131	5	0.598	1	0	1
37	41	43	90	33	127710	43	353	0	86	443	33	43	353	0	1	2635.118	4	0.489	10	35	1
38	39	48	71	47	160176	0	171	157	48	242	204	0	242	157	3	2054.482	3	0.500	1	0	1
39	40	77	89	46	315238	156	365	108	233	454	154	233	454	108	4	1995.576	3	0.401	66	0	0
40	32	84	85	72	514080	149	454	118	233	539	190	233	454	118	2	2004.327	3	0.415	30	1002	0
41	42	37	73	23	62123	144	295	0	181	368	23	181	368	0	4	3172.647	5	0.405	1	0	0
42	33	84	85	72	514080	0	358	33	84	443	105	0	443	33	3	1968.079	3	0.353	21	0	0
43	48	37	73	23	62123	120	0	49	157	73	72	120	0	49	1	2669.153	4	0.547	7	1005	1
44	50	70	95	62	412300	94	200	0	164	295	62	164	295	0	4	2623.185	4	0.469	3	0	1
45	44	64	73	55	256960	0	443	38	64	516	93	0	443	38	1	2054.484	3	0.500	1	42	0
46	47	48	61	39	114192	185	0	177	233	61	216	233	0	177	2	2054.418	3	0.500	4	1002	1
47	45	42	74	40	124320	191	380	154	233	454	194	233	454	154	4	2047.615	3	0.489	26	0	0
48	51	69	97	41	274413	0	443	93	69	540	134	0	443	93	1	1967.037	3	0.351	1	1002	0
49	49	75	75	63	354375	0	368	105	75	443	168	0	443	105	3	2000.929	3	0.410	38	0	0
50	52	70	95	62	412300	0	443	134	70	538	196	0	443	134	1	2018.446	3	0.439	24	1002	0

51	46	84	85	72	514080	149	198	115	233	283	187	233	198	115	2	1918.754	3	0.269	33	1002	0
52	43	76	103	64	500992	157	95	124	233	198	188	233	198	124	4	2034.223	3	0.466	10	0	0
53	53	48	71	47	160176	64	443	46	112	514	93	64	443	93	5	3740.486	6	0.372	8	0	0
54	56	43	90	33	127710	147	198	82	190	288	115	190	198	115	6	3280.115	5	0.588	1	0	1
55	58	43	90	33	127710	190	198	187	233	288	220	233	198	187	2	2720.662	4	0.638	92	1004	1
56	55	69	84	66	382536	122	370	154	191	454	220	191	454	154	4	2590.528	4	0.414	46	0	0
57	57	42	74	40	124320	0	369	168	42	443	208	0	443	168	3	2035.168	3	0.467	12	0	0
58	61	42	74	40	124320	0	0	62	42	74	102	0	0	62	1	2026.386	3	0.453	23	1002	1
59	54	48	71	47	160176	0	0	102	48	71	149	0	0	102	1	2039.302	3	0.476	71	1002	0
60	64	37	73	23	62123	107	295	0	144	368	23	144	368	0	4	3866.059	6	0.587	22	0	0
61	60	48	71	47	160176	0	0	149	48	71	196	0	0	149	1	2054.058	3	0.500	24	1002	0
62	65	88	98	26	224224	145	100	188	233	198	214	233	198	188	4	2003.246	3	0.413	6	0	0
63	59	52	98	44	224224	52	144	113	104	242	157	52	242	113	3	1961.814	3	0.343	42	0	0
64	69	25	49	21	25725	25	48	41	50	97	62	25	48	62	5	3891.719	6	0.630	1	0	1
65	66	75	75	63	354375	48	167	157	123	242	220	48	242	157	3	2629.610	4	0.480	1	0	0
66	70	64	73	55	256960	56	0	67	120	73	122	120	0	67	2	1927.857	3	0.284	8	1004	0

Set 3 - 10-Package Look-Ahead Results																				
Packing Order	Item Number	Length	Width	Height	Volume	x1	y1	z1	x2	y2	z2	RCx	RCy	RCz	RCd	Caving Degree	Paste Number	Paste Ratio	Distance	Closest Item	Penalty Cost
1	1	78	102	39	310284	0	0	0	78	102	39	0	0	0	0	0.000	0	0.000	0	0	0
2	8	63	103	58	376362	170	0	0	233	103	58	233	0	0	2	2053.226	3	0.500	92	1	0
3	11	63	103	58	376362	107	0	0	170	103	58	170	0	0	2	2054.486	3	0.500	1	2	0
4	9	63	97	56	342216	170	0	58	233	97	114	233	0	58	2	2054.486	3	0.500	1	3	1
5	10	56	100	35	196000	177	103	0	233	203	35	233	103	0	2	2054.362	3	0.500	8	3	1
6	2	46	113	36	187128	0	102	0	46	215	36	0	102	0	1	2053.451	3	0.500	60	5	0
7	4	46	113	36	187128	0	215	0	46	328	36	0	215	0	1	2054.483	3	0.500	1	6	0
8	3	30	101	26	78780	46	102	0	76	203	26	46	102	0	1	2054.197	3	0.500	13	7	0
9	12	74	90	69	459540	0	0	39	74	90	108	0	0	39	1	2054.085	3	0.500	32	4	0
10	14	57	75	41	175275	113	0	58	170	75	99	170	0	58	2	2053.785	3	0.500	40	9	1
11	7	49	90	30	132300	128	103	0	177	193	30	177	103	0	2	2053.479	3	0.500	52	8	0
12	5	50	66	42	138600	183	0	114	233	66	156	233	0	114	2	2053.263	3	0.500	64	1002	0
13	15	66	73	62	298716	0	0	108	66	73	170	0	0	108	1	2053.752	3	0.500	50	1002	0
14	6	46	113	36	187128	187	203	0	233	316	36	233	203	0	2	2051.306	3	0.498	112	8	0
15	20	43	94	31	125302	190	316	0	233	410	31	233	316	0	2	2051.622	3	0.500	144	7	1
16	17	49	90	30	132300	0	328	0	49	418	30	0	328	0	1	2048.635	3	0.495	142	15	0
17	18	49	90	30	132300	0	418	0	49	508	30	0	418	0	1	2050.889	3	0.500	184	1005	0
18	22	66	73	62	298716	167	0	156	233	73	218	233	0	156	2	2021.310	3	0.444	2	1002	1
19	13	63	103	58	376362	170	410	0	233	513	58	233	410	0	2	2010.543	3	0.428	122	17	0
20	23	43	94	31	125302	190	316	31	233	410	62	233	410	31	4	3227.941	5	0.503	113	0	0
21	25	68	71	64	308992	165	513	0	233	584	64	233	513	0	2	2037.265	3	0.475	156	1002	1
22	24	63	103	58	376362	170	410	58	233	513	116	233	410	58	2	2583.534	4	0.404	104	1002	1

23	16	63	97	56	342216	170	313	62	233	410	118	233	410	62	4	2009.458	3	0.426	102	0	0
24	28	56	100	35	196000	177	103	35	233	203	70	233	203	35	4	3212.395	5	0.473	6	0	1
25	26	50	66	42	138600	0	0	170	50	66	212	0	0	170	1	2054.345	3	0.500	8	1002	0
26	27	46	113	36	187128	46	203	0	92	316	36	46	203	0	1	2030.942	3	0.460	1	24	0
27	19	74	90	69	459540	96	423	0	170	513	69	170	513	0	4	1976.202	3	0.367	12	0	0
28	30	54	80	35	151200	179	203	36	233	283	71	233	203	36	2	2031.330	3	0.461	30	27	1
29	29	63	103	58	376362	170	410	116	233	513	174	233	410	116	2	1989.616	3	0.391	46	1002	0
30	21	74	90	69	459540	159	320	118	233	410	187	233	410	118	4	2012.144	3	0.429	33	0	0
31	33	61	106	56	362096	172	97	70	233	203	126	233	203	70	4	3200.438	5	0.453	23	0	0
32	32	49	90	30	132300	184	66	126	233	156	156	233	66	156	6	3778.731	6	0.438	12	0	1
33	34	68	71	64	308992	165	73	156	233	144	220	233	73	156	2	2708.877	4	0.617	99	1004	1
34	37	50	91	40	182000	127	103	30	177	194	70	177	103	30	2	2632.497	4	0.486	45	33	1
35	35	54	80	35	151200	179	203	71	233	283	106	233	203	71	2	2053.937	3	0.500	30	30	0
36	36	68	71	64	308992	97	513	0	165	584	64	165	513	0	2	2053.065	3	0.500	97	1004	0
37	38	50	91	40	182000	140	319	0	190	410	40	190	410	0	4	2019.919	3	0.441	1	0	1
38	39	61	118	40	287920	172	410	174	233	528	214	233	410	174	2	2002.038	3	0.411	6	1002	0
39	31	67	85	39	222105	166	203	106	233	288	145	233	203	106	2	1984.587	3	0.381	1	1002	0
40	45	49	90	30	132300	79	103	0	128	193	30	128	103	30	6	3795.479	6	0.466	4	0	1
41	46	30	101	26	78780	46	102	26	76	203	52	46	203	26	3	3151.408	5	0.369	1	0	1
42	44	66	73	62	298716	167	513	64	233	586	126	233	513	64	2	2047.851	3	0.489	2	38	1
43	43	63	103	58	376362	107	410	69	170	513	127	170	513	69	4	3151.000	5	0.368	1	0	0
44	49	56	100	35	196000	131	203	0	187	303	35	187	203	0	2	2011.758	3	0.427	1	1004	1
45	42	54	80	35	151200	123	194	35	177	274	70	177	194	70	6	3113.352	5	0.305	31	0	1
46	40	67	85	39	222105	103	410	127	170	495	166	170	410	127	2	1990.748	3	0.391	1	29	0
47	50	48	61	30	87840	185	513	126	233	574	156	233	513	126	2	2054.140	3	0.500	16	43	0
48	47	67	85	39	222105	103	0	99	170	85	138	170	0	99	2	1967.113	3	0.351	1	1002	0
49	48	63	97	56	342216	0	328	30	63	425	86	0	328	30	1	1964.265	3	0.347	32	1002	0
50	41	78	102	39	310284	0	226	36	78	328	75	0	328	36	3	2035.959	3	0.469	12	0	0

51	60	46	113	36	187128	0	113	36	46	226	72	0	226	36	3	2680.416	4	0.567	12	0	1
52	52	66	73	62	298716	101	513	64	167	586	126	167	513	64	2	2042.740	3	0.482	94	1002	0
53	51	50	91	40	182000	0	425	30	50	516	70	0	425	30	1	2039.777	3	0.476	46	52	0
54	62	43	94	31	125302	190	316	187	233	410	218	233	410	187	4	2040.757	3	0.477	2	0	0
55	53	50	91	40	182000	0	425	70	50	516	110	0	425	70	1	2019.037	3	0.441	51	52	0
56	63	30	101	26	78780	0	324	86	30	425	112	0	425	86	3	2043.151	3	0.484	76	0	1
57	57	63	97	56	342216	0	129	72	63	226	128	0	226	72	3	1956.789	3	0.335	40	0	1
58	58	63	97	56	342216	0	226	75	63	323	131	0	226	75	1	2050.805	3	0.494	1	56	1
59	61	81	97	27	212139	0	129	128	81	226	155	0	226	128	3	1965.307	3	0.350	57	0	0
60	55	78	102	39	310284	0	226	131	78	328	170	0	226	131	1	1994.673	3	0.399	50	1002	0
61	54	66	73	62	298716	0	153	155	66	226	217	0	226	155	3	1986.694	3	0.385	3	0	0
62	65	61	118	40	287920	0	226	170	61	344	210	0	226	170	1	2034.398	3	0.466	10	1002	1
63	64	61	106	56	362096	0	425	110	61	531	166	0	425	110	1	1956.118	3	0.333	40	52	0

Set 4 - 10-Package Look-Ahead Results																				
Packing Order	Item Number	Length	Width	Height	Volume	x1	y1	z1	x2	y2	z2	RCx	RCy	RCz	RCd	Caving Degree	Paste Number	Paste Ratio	Distance	Closest Item	Penalty Cost
1	1	96	98	56	526848	0	0	0	96	98	56	0	0	0	0	0.000	0	0.000	0	0	0
2	5	96	98	56	526848	137	0	0	233	98	56	233	0	0	2	2053.992	3	0.500	41	1	0
3	11	37	52	28	53872	96	0	0	133	52	28	96	0	0	1	2054.394	3	0.500	4	2	0
4	8	92	113	33	343068	0	98	0	92	211	33	0	98	0	1	2053.857	3	0.500	45	2	1
5	9	88	98	47	405328	0	0	56	88	98	103	0	0	56	1	2053.838	3	0.500	49	2	1
6	7	52	54	49	137592	0	98	33	52	152	82	0	98	33	1	2054.481	3	0.500	1	4	1
7	10	68	79	44	236368	165	0	56	233	79	100	233	0	56	2	2053.384	3	0.500	69	1002	1
8	3	49	116	47	267148	184	98	0	233	214	47	233	98	0	2	2053.134	3	0.500	88	6	0
9	4	45	75	35	118125	139	98	0	184	173	35	184	98	0	2	2053.603	3	0.500	44	6	0
10	2	34	68	33	76296	0	0	103	34	68	136	0	0	103	1	2052.519	3	0.500	84	1002	0
11	14	52	54	49	137592	0	152	33	52	206	82	0	152	33	1	2054.481	3	0.500	1	9	1
12	13	35	59	34	70210	52	98	33	87	157	67	52	98	33	1	2053.288	3	0.500	50	9	1
13	6	44	83	23	83996	0	211	0	44	294	23	0	211	0	1	2051.303	3	0.500	140	8	0
14	21	68	79	44	236368	165	0	100	233	79	144	233	0	100	2	2053.271	3	0.500	76	1002	1
15	20	33	57	29	54549	200	0	144	233	57	173	233	0	144	2	2053.261	3	0.500	47	1002	1
16	18	53	97	32	164512	180	214	0	233	311	32	233	214	0	2	2048.239	3	0.494	136	13	1
17	16	59	119	39	273819	174	311	0	233	430	39	233	311	0	2	2039.103	3	0.478	174	1004	0
18	15	69	103	49	348243	164	430	0	233	533	49	233	430	0	2	2034.082	3	0.465	1	17	0
19	17	69	103	49	348243	0	294	0	69	397	49	0	294	0	1	2009.729	3	0.424	1	18	0
20	12	88	98	47	405328	0	397	0	88	495	47	0	397	0	1	2038.381	3	0.474	76	18	0
21	27	33	41	31	41943	151	173	0	184	214	31	184	214	0	4	3828.903	6	0.526	60	0	1
22	23	53	97	32	164512	180	214	32	233	311	64	233	311	32	4	2623.233	4	0.470	40	0	0

23	28	49	116	47	267148	184	98	47	233	214	94	233	214	47	4	3205.944	5	0.462	18	0	1
24	26	35	59	34	70210	0	495	0	35	554	34	0	495	0	1	2051.397	3	0.500	128	18	1
25	24	52	54	49	137592	181	533	0	233	587	49	233	533	0	2	2051.672	3	0.500	146	24	0
26	22	69	103	49	348243	69	294	0	138	397	49	69	397	0	3	2006.555	3	0.418	1	0	0
27	19	88	98	47	405328	0	397	47	88	495	94	0	397	47	1	1986.546	3	0.386	76	1002	0
28	32	45	75	35	118125	88	397	0	133	472	35	88	397	0	1	2054.276	3	0.500	11	27	1
29	31	35	59	34	70210	35	495	0	70	554	34	35	495	0	1	2054.209	3	0.500	12	27	1
30	29	53	97	32	164512	0	300	49	53	397	81	0	397	49	3	2054.190	3	0.500	17	0	0
31	33	52	54	49	137592	0	495	34	52	549	83	0	495	34	1	2052.331	3	0.500	112	25	0
32	34	35	59	34	70210	0	0	136	35	59	170	0	0	136	1	2049.997	3	0.494	50	1002	0
33	25	96	98	56	526848	53	299	49	149	397	105	53	397	49	3	1948.511	3	0.320	30	0	0
34	35	44	83	23	83996	44	211	0	88	294	23	44	294	0	3	3863.657	6	0.582	1	0	0
35	39	34	68	33	76296	34	0	103	68	68	136	34	0	136	5	3822.690	6	0.514	48	0	1
36	36	33	57	29	54549	200	0	173	233	57	202	233	0	173	2	2054.474	3	0.500	1	15	0
37	38	68	79	44	236368	0	215	23	68	294	67	0	294	23	3	2024.142	3	0.448	1	0	1
38	37	88	98	47	405328	0	98	82	88	196	129	0	98	82	1	1954.975	3	0.333	91	1002	0

Set 5 - 10-Package Look-Ahead Results																				
Packing Order	Item Number	Length	Width	Height	Volume	x1	y1	z1	x2	y2	z2	RCx	RCy	RCz	RCd	Caving Degree	Paste Number	Paste Ratio	Distance	Closest Item	Penalty Cost
1	1	56	71	33	131208	0	0	0	56	71	33	0	0	0	0	0.000	0	0.000	0	0	0
2	8	80	100	72	576000	153	0	0	233	100	72	233	0	0	2	2053.334	3	0.500	97	1	1
3	9	93	93	28	242172	60	0	0	153	93	28	153	0	0	2	2054.436	3	0.500	4	1	0
4	4	77	87	43	288057	76	0	28	153	87	71	153	0	28	2	2054.197	3	0.500	20	1	0
5	7	37	72	32	85248	0	71	0	37	143	32	0	71	0	1	2053.977	3	0.500	23	4	1
6	5	32	34	31	33728	0	0	33	32	34	64	0	0	33	1	2053.138	3	0.500	44	4	0
7	10	32	34	31	33728	0	0	64	32	34	95	0	0	64	1	2054.469	3	0.500	1	6	0
8	6	54	88	39	185328	179	0	72	233	88	111	233	0	72	2	2052.588	3	0.500	109	1002	1
9	2	40	83	36	119520	193	0	111	233	83	147	233	0	111	2	2053.018	3	0.500	73	1002	0
10	12	73	79	45	259515	160	100	0	233	179	45	233	100	0	2	2052.572	3	0.500	123	5	1
11	11	54	94	36	182736	179	179	0	233	273	36	233	179	0	2	2051.346	3	0.500	179	1004	0
12	3	58	109	54	341388	175	273	0	233	382	54	233	273	0	2	2029.395	3	0.461	166	1002	0
13	14	55	94	30	155100	178	179	36	233	273	66	233	273	36	4	3219.449	5	0.487	79	0	1
14	18	55	94	30	155100	124	179	0	179	273	30	179	273	0	4	3199.739	5	0.451	6	0	1
15	17	32	34	31	33728	0	34	33	32	68	64	0	34	33	1	2054.469	3	0.500	1	1002	0
16	19	32	34	31	33728	0	34	64	32	68	95	0	34	64	1	2054.469	3	0.500	1	15	0
17	16	81	109	28	247212	152	382	0	233	491	28	233	382	0	2	2038.719	3	0.477	152	1004	1
18	20	85	94	44	351560	148	491	0	233	585	44	233	491	0	2	2025.173	3	0.454	148	1004	1
19	13	75	82	65	399750	158	0	147	233	82	212	233	0	147	2	2002.888	3	0.412	8	1002	0
20	24	54	91	22	108108	179	382	28	233	473	50	233	382	28	2	2054.122	3	0.500	18	18	0
21	15	80	83	57	378480	95	273	0	175	356	57	175	273	0	2	1993.731	3	0.397	26	1004	0
22	29	73	79	45	259515	160	100	45	233	179	90	233	179	45	4	3225.411	5	0.495	1	0	1

23	25	58	109	54	341388	175	273	54	233	382	108	233	273	54	2	2597.365	4	0.428	112	1002	0
24	28	37	72	32	85248	196	201	66	233	273	98	233	273	66	4	2054.000	3	0.500	22	0	1
25	26	32	34	31	33728	0	0	95	32	34	126	0	0	95	1	2051.591	3	0.500	94	1002	1
26	22	75	82	65	399750	158	382	50	233	464	115	233	382	50	2	1995.057	3	0.401	105	1002	0
27	23	80	83	57	378480	0	143	0	80	226	57	0	143	0	1	1991.695	3	0.394	44	1005	1
28	27	80	83	57	378480	0	226	0	80	309	57	0	226	0	1	2054.486	3	0.500	1	27	0
29	21	80	100	72	576000	0	309	0	80	409	72	0	309	0	1	2037.516	3	0.471	15	26	0
30	35	73	79	45	259515	87	100	0	160	179	45	160	179	0	4	3184.647	5	0.425	1	0	1
31	33	54	91	22	108108	125	382	28	179	473	50	179	382	50	6	3162.642	5	0.388	18	0	0
32	30	80	100	72	576000	80	100	45	160	200	117	160	100	45	2	2490.447	4	0.243	26	1004	0
33	38	32	34	31	33728	0	0	126	32	34	157	0	0	126	1	2054.469	3	0.500	1	25	1
34	32	77	87	43	288057	0	409	0	77	496	43	0	409	0	1	2053.773	3	0.500	48	31	0
35	31	56	71	33	131208	0	496	0	56	567	33	0	496	0	1	2054.480	3	0.500	1	34	0
36	41	80	100	72	576000	73	0	71	153	100	143	153	0	71	2	2570.391	4	0.380	41	33	1
37	42	32	34	31	33728	0	34	95	32	68	126	0	34	95	1	2054.469	3	0.500	1	36	1
38	40	54	91	22	108108	0	409	43	54	500	65	0	409	43	1	2045.187	3	0.487	71	31	1
39	34	40	108	26	112320	0	201	57	40	309	83	0	309	57	3	2037.840	3	0.473	41	0	0
40	36	58	109	54	341388	40	200	57	98	309	111	40	309	57	3	3691.354	6	0.290	77	0	0
41	46	80	83	57	378480	0	117	57	80	200	114	80	200	57	4	2644.637	4	0.505	1	0	1
42	45	78	104	26	210912	0	309	72	78	413	98	0	309	72	1	2032.316	3	0.464	80	26	1
43	37	40	108	26	112320	0	201	83	40	309	109	40	309	83	4	2725.110	4	0.643	2	0	0
44	48	32	34	31	33728	0	34	126	32	68	157	0	34	126	1	2054.469	3	0.500	1	37	1
45	39	40	83	36	119520	84	179	0	124	262	36	124	179	0	2	2031.463	3	0.461	4	1004	0
46	47	78	104	26	210912	0	309	98	78	413	124	0	309	98	1	2028.157	3	0.457	80	26	0
47	43	40	108	26	112320	0	201	109	40	309	135	40	309	109	4	2631.972	4	0.484	2	0	0
48	50	58	109	54	341388	40	200	111	98	309	165	40	309	111	3	3118.292	5	0.314	55	0	0
49	44	40	108	26	112320	0	309	124	40	417	150	0	309	124	1	2025.740	3	0.453	70	1002	0
50	53	40	83	36	119520	0	226	135	40	309	171	40	309	135	4	2703.008	4	0.606	49	0	0

51	55	40	83	36	119520	0	309	150	40	392	186	0	309	150	1	2031.081	3	0.461	34	1002	0
52	51	56	71	33	131208	56	496	0	112	567	33	56	496	0	1	2012.973	3	0.429	1	34	0
53	57	54	94	36	182736	179	288	108	233	382	144	233	382	108	4	2008.983	3	0.425	76	0	0
54	54	56	71	33	131208	177	382	115	233	453	148	233	382	115	2	2044.346	3	0.483	1	1002	0
55	52	58	109	54	341388	40	309	124	98	418	178	40	309	124	1	1980.288	3	0.374	1	1002	0
56	49	75	82	65	399750	158	300	144	233	382	209	233	382	144	4	1939.983	3	0.305	11	0	0
57	64	80	100	72	576000	0	100	114	80	200	186	80	200	114	4	3163.366	5	0.390	32	0	1
58	62	54	91	22	108108	80	100	117	134	191	139	80	100	117	1	2054.332	3	0.500	8	1002	1
59	63	55	94	30	155100	178	382	148	233	476	178	233	382	148	2	2015.204	3	0.434	42	1002	0
60	59	93	93	28	242172	140	382	178	233	475	206	233	382	178	2	1968.748	3	0.354	14	1002	0
61	61	77	87	43	288057	80	100	139	157	187	182	80	100	139	1	1947.172	3	0.317	12	1002	1
62	56	85	94	44	351560	40	215	165	125	309	209	40	309	165	3	1884.748	3	0.211	11	0	0
63	66	55	94	30	155100	40	309	178	95	403	208	40	309	178	1	1988.635	3	0.388	12	1002	0

Set 6 - 10-Package Look-Ahead Results																				
Packing Order	Item Number	Length	Width	Height	Volume	x1	y1	z1	x2	y2	z2	RCx	RCy	RCz	RCd	Caving Degree	Paste Number	Paste Ratio	Distance	Closest Item	Penalty Cost
1	1	33	42	21	29106	0	0	0	33	42	21	0	0	0	0	0.000	0	0.000	0	0	0
2	5	80	114	44	401280	153	0	0	233	114	44	233	0	0	2	2052.873	3	0.500	120	1	1
3	10	73	78	40	227760	80	0	0	153	78	40	153	0	0	2	2053.730	3	0.500	47	1	0
4	7	44	68	27	80784	36	0	0	80	68	27	80	0	0	2	2054.407	3	0.500	4	1	0
5	8	67	72	56	270144	166	0	44	233	72	100	233	0	44	2	2052.644	3	0.500	120	1002	1
6	2	61	71	52	225212	172	0	100	233	71	152	233	0	100	2	2053.382	3	0.500	68	1002	0
7	9	61	71	52	225212	172	0	152	233	71	204	233	0	152	2	2054.237	3	0.500	16	1002	1
8	4	75	75	36	202500	158	114	0	233	189	36	233	114	0	2	2051.809	3	0.500	158	1004	1
9	6	75	75	36	202500	158	189	0	233	264	36	233	189	0	2	2051.809	3	0.500	158	1004	0
10	3	58	62	30	107880	175	264	0	233	326	30	233	264	0	2	2050.824	3	0.500	175	1004	0
11	20	80	114	44	401280	0	68	0	80	182	44	80	68	0	2	2606.998	4	0.445	176	1002	1
12	19	68	86	33	192984	80	78	0	148	164	33	80	78	0	1	2054.413	3	0.500	5	1005	0
13	11	54	70	37	139860	0	182	0	54	252	37	0	182	0	1	2052.496	3	0.500	104	10	0
14	13	45	81	34	123930	0	252	0	45	333	34	0	252	0	1	2052.213	3	0.500	114	10	0
15	16	39	84	22	72072	194	326	0	233	410	22	233	326	0	2	2050.896	3	0.500	150	14	1
16	15	51	65	50	165750	0	333	0	51	398	50	0	333	0	1	2021.638	3	0.444	1	15	0
17	17	51	65	50	165750	0	398	0	51	463	50	0	398	0	1	2051.897	3	0.500	143	15	0
18	18	51	65	50	165750	0	463	0	51	528	50	0	463	0	1	2054.482	3	0.500	1	17	0
19	12	63	69	46	199962	170	72	44	233	141	90	233	72	44	2	2005.044	3	0.418	90	1002	0
20	22	58	62	30	107880	175	410	0	233	472	30	233	410	0	2	2015.921	3	0.439	124	18	0
21	21	63	69	46	199962	170	472	0	233	541	46	233	472	0	2	2019.844	3	0.444	119	18	0
22	14	84	86	45	325080	54	182	0	138	268	45	54	182	0	1	1976.937	3	0.368	20	1005	0

23	24	39	84	22	72072	155	326	0	194	410	22	194	410	0	4	3228.329	5	0.500	1	0	1
24	27	39	84	22	72072	194	326	22	233	410	44	233	410	22	4	3217.388	5	0.481	1	0	1
25	28	58	62	30	107880	175	264	30	233	326	60	233	326	30	4	3193.462	5	0.442	37	0	1
26	26	33	42	21	29106	0	0	21	33	42	42	0	0	21	1	2054.467	3	0.500	1	1002	0
27	25	56	81	46	208656	177	183	36	233	264	82	233	264	36	4	2020.479	3	0.443	39	0	0
28	31	63	69	46	199962	170	72	90	233	141	136	233	72	90	2	1989.175	3	0.391	84	1002	1
29	30	61	71	52	225212	172	264	60	233	335	112	233	264	60	2	1982.594	3	0.381	108	1002	0
30	23	84	86	45	325080	149	178	82	233	264	127	233	264	82	4	1961.323	3	0.342	38	0	0
31	37	44	68	27	80784	36	0	27	80	68	54	80	68	27	4	3809.602	6	0.490	4	0	1
32	38	45	81	34	123930	0	252	34	45	333	68	0	333	34	3	3203.605	5	0.458	1	0	0
33	34	51	65	50	165750	45	268	0	96	333	50	45	333	0	3	3218.339	5	0.483	1	0	1
34	35	73	78	40	227760	80	0	40	153	78	80	80	0	40	1	2595.848	4	0.423	14	1005	1
35	36	75	75	36	202500	51	333	0	126	408	36	51	333	0	1	2025.255	3	0.451	29	29	1
36	32	84	86	45	325080	51	408	0	135	494	45	51	408	0	1	2032.898	3	0.464	20	24	1
37	29	88	94	50	413600	0	333	50	88	427	100	0	333	50	1	1934.603	3	0.297	36	29	0
38	39	45	81	34	123930	0	427	50	45	508	84	0	427	50	1	2051.772	3	0.500	136	1002	0
39	40	52	59	22	67496	0	528	0	52	587	22	0	528	0	1	2050.430	3	0.498	118	21	0
40	42	68	86	33	192984	80	78	33	148	164	66	80	78	33	1	2003.677	3	0.413	1	1005	1
41	41	61	71	52	225212	172	264	112	233	335	164	233	264	112	2	1994.408	3	0.399	56	1002	0
42	33	88	94	50	413600	145	170	127	233	264	177	233	264	127	4	1998.766	3	0.406	30	0	0
43	47	33	42	21	29106	200	141	36	233	183	57	233	183	36	4	3861.770	6	0.580	25	0	1
44	44	54	70	37	139860	0	182	37	54	252	74	0	182	37	1	3240.231	5	0.520	1	43	1
45	46	80	114	44	401280	0	68	44	80	182	88	0	182	44	3	3241.176	5	0.523	68	0	1
46	48	67	72	56	270144	166	264	164	233	336	220	233	264	164	2	2672.686	4	0.558	166	1004	0
47	50	51	65	50	165750	96	268	0	147	333	50	96	268	0	1	2655.006	4	0.523	1	1005	0
48	51	84	86	45	325080	54	182	45	138	268	90	54	182	45	1	2560.938	4	0.363	1	1005	0
49	45	52	59	22	67496	181	205	177	233	264	199	233	264	177	4	2053.984	3	0.500	21	0	0
50	43	52	108	45	252720	0	427	84	52	535	129	0	427	84	1	1973.388	3	0.364	91	1002	0

51	57	54	70	37	139860	0	182	74	54	252	111	0	182	74	1	2635.660	4	0.493	81	1002	1
52	58	54	70	37	139860	0	252	68	54	322	105	0	252	68	1	2631.537	4	0.483	11	50	1
53	54	58	62	30	107880	175	410	30	233	472	60	233	410	30	2	2629.811	4	0.482	40	50	0
54	56	58	62	30	107880	0	365	100	58	427	130	0	427	100	3	2044.134	3	0.484	43	0	1
55	55	56	81	46	208656	0	101	88	56	182	134	0	182	88	3	2017.033	3	0.439	86	0	1
56	49	67	72	56	270144	166	472	46	233	544	102	233	472	46	2	1973.193	3	0.364	114	50	0
57	61	33	42	21	29106	200	222	199	233	264	220	233	264	220	8	3959.602	6	0.747	22	0	1
58	59	54	70	37	139860	179	402	60	233	472	97	233	472	60	4	2036.183	3	0.471	66	0	0
59	52	73	78	40	227760	0	182	111	73	260	151	0	182	111	1	1964.675	3	0.349	69	1002	0
60	62	45	81	34	123930	0	101	134	45	182	168	0	182	134	3	2023.474	3	0.449	52	0	0
61	60	73	78	40	227760	0	182	151	73	260	191	0	182	151	1	2000.123	3	0.408	29	1002	0
62	53	84	86	45	325080	0	96	168	84	182	213	0	182	168	3	1941.430	3	0.308	7	0	0
63	63	33	42	21	29106	200	141	57	233	183	78	233	183	57	4	3889.512	6	0.626	1	0	0
64	69	44	68	27	80784	36	0	54	80	68	81	80	68	54	4	3873.630	6	0.599	1	0	1
65	71	44	68	27	80784	0	182	191	44	250	218	0	182	191	1	2043.721	3	0.482	2	1002	1
66	70	45	81	34	123930	0	427	129	45	508	163	0	427	129	1	1998.388	3	0.406	57	1002	1
67	64	56	81	46	208656	0	346	130	56	427	176	0	427	130	3	1994.608	3	0.398	1	0	0
68	74	45	81	34	123930	0	427	163	45	508	197	0	427	163	1	2019.500	3	0.440	1	67	0
69	73	75	75	36	202500	80	0	80	155	75	116	80	0	80	1	1981.743	3	0.376	11	62	0
70	67	56	81	46	208656	177	391	97	233	472	143	233	472	97	4	1969.443	3	0.357	56	0	0
71	68	56	81	46	208656	177	472	102	233	553	148	233	472	102	2	2032.055	3	0.464	72	1002	0
72	65	61	71	52	225212	172	401	143	233	472	195	233	472	143	4	1968.962	3	0.355	25	0	0
73	72	61	71	52	225212	172	472	148	233	543	200	233	472	148	2	2037.180	3	0.471	1	72	0
74	66	74	110	38	309320	0	317	176	74	427	214	0	427	176	3	1947.210	3	0.317	6	0	0
75	81	44	68	27	80784	36	0	81	80	68	108	80	68	81	4	3833.157	6	0.531	36	0	0
76	76	45	81	34	123930	80	78	66	125	159	100	80	78	66	1	1984.725	3	0.382	24	1005	0
77	79	45	81	34	123930	125	78	66	170	159	100	125	78	66	1	2612.681	4	0.451	1	76	0
78	84	54	70	37	139860	179	135	177	233	205	214	233	205	177	4	1956.247	3	0.333	6	0	0

79	82	63	69	46	199962	17	0	108	80	69	154	80	0	108	2	1942.452	3	0.309	1	1004	0
80	80	67	72	56	270144	80	0	116	147	72	172	80	0	116	1	2021.661	3	0.444	1	79	0

Set 7 - 10-Package Look-Ahead Results																				
Packing Order	Item Number	Length	Width	Height	Volume	x1	y1	z1	x2	y2	z2	RCx	RCy	RCz	RCd	Caving Degree	Paste Number	Paste Ratio	Distance	Closest Item	Penalty Cost
1	1	79	118	51	475422	0	0	0	79	118	51	0	0	0	0	0.000	0	0.000	0	0	0
2	7	82	94	66	508728	151	0	0	233	94	66	233	0	0	2	2053.598	3	0.500	72	1	0
3	4	70	84	35	205800	79	0	0	149	84	35	79	0	0	1	2054.466	3	0.500	2	2	0
4	10	79	118	51	475422	0	0	51	79	118	102	0	0	51	1	2053.577	3	0.500	72	2	1
5	3	63	103	59	382851	0	0	102	63	103	161	0	0	102	1	2054.486	3	0.500	1	4	0
6	6	70	84	35	205800	79	0	35	149	84	70	79	0	35	1	2054.466	3	0.500	2	2	0
7	9	55	64	43	151360	0	118	0	55	182	43	0	118	0	1	2054.369	3	0.500	7	4	1
8	11	66	80	52	274560	167	0	66	233	80	118	233	0	66	2	2054.223	3	0.500	18	6	1
9	5	57	76	36	155952	0	0	161	57	76	197	0	0	161	1	2054.073	3	0.500	23	1002	0
10	8	42	42	32	56448	79	0	70	121	42	102	79	0	70	1	2053.301	3	0.500	46	8	0
11	2	61	91	61	338611	172	94	0	233	185	61	233	94	0	2	2053.180	3	0.500	92	7	0
12	17	73	109	23	183011	0	0	197	73	109	220	0	0	197	1	2743.388	4	0.678	160	1005	0
13	15	66	80	52	274560	167	0	118	233	80	170	233	0	118	2	2053.731	3	0.500	50	1002	1
14	12	57	76	36	155952	176	0	170	233	76	206	233	0	170	2	2054.240	3	0.500	14	1002	0
15	19	61	117	57	406809	172	185	0	233	302	57	233	185	0	2	2052.300	3	0.500	163	1002	1
16	20	61	117	57	406809	172	302	0	233	419	57	233	302	0	2	2052.300	3	0.500	163	1002	0
17	13	32	77	30	73920	201	419	0	233	496	30	233	419	0	2	2054.476	3	0.500	1	16	0
18	21	32	77	30	73920	0	182	0	32	259	30	0	182	0	1	2051.164	3	0.500	140	1002	1
19	18	57	76	36	155952	0	118	43	57	194	79	0	118	43	1	2026.232	3	0.455	115	1002	1
20	23	61	88	31	166408	0	259	0	61	347	31	0	259	0	1	2025.122	3	0.453	111	1005	1
21	22	60	95	55	313500	0	347	0	60	442	55	0	347	0	1	2023.140	3	0.449	112	17	0
22	14	77	78	64	384384	0	442	0	77	520	64	0	442	0	1	2022.792	3	0.449	124	17	0

23	25	32	86	31	85312	201	496	0	233	582	31	233	496	0	2	2050.218	3	0.498	124	22	0
24	24	66	80	52	274560	63	0	102	129	80	154	63	0	102	1	2002.931	3	0.413	38	14	1
25	16	100	101	77	777700	101	419	0	201	520	77	201	419	0	2	1930.902	3	0.289	1	22	0
26	27	55	64	43	151360	55	118	0	110	182	43	55	118	43	5	3778.486	6	0.439	62	0	1
27	32	82	94	66	508728	73	0	154	155	94	220	73	0	220	5	2647.790	4	0.511	12	0	1
28	31	55	98	44	237160	117	321	0	172	419	44	172	419	0	4	2054.209	3	0.500	18	0	0
29	33	32	86	31	85312	140	235	0	172	321	31	172	321	0	4	2053.364	3	0.500	50	0	0
30	29	79	118	51	475422	61	203	0	140	321	51	140	321	0	4	2573.008	4	0.384	13	0	0
31	26	61	91	61	338611	0	256	31	61	347	92	0	347	31	3	2616.837	4	0.459	56	0	0
32	30	57	76	36	155952	0	347	55	57	423	91	0	347	55	1	2054.147	3	0.500	19	25	0
33	37	58	64	52	193024	0	520	0	58	584	52	0	520	0	1	2053.756	3	0.500	43	25	0
34	28	61	91	61	338611	111	94	0	172	185	61	172	94	0	2	2006.159	3	0.418	2	1004	0
35	42	42	42	32	56448	79	42	70	121	84	102	79	42	102	5	3336.017	5	0.684	18	0	1
36	41	58	64	52	193024	58	520	0	116	584	52	58	520	0	1	2016.604	3	0.438	85	23	1
37	34	70	84	35	205800	163	94	61	233	178	96	233	94	61	2	1998.693	3	0.407	66	1002	0
38	44	70	84	35	205800	0	118	79	70	202	114	0	118	79	1	1991.396	3	0.394	54	37	1
39	40	73	109	23	183011	160	185	57	233	294	80	233	185	57	2	1989.238	3	0.389	7	38	1
40	36	66	80	52	274560	167	294	57	233	374	109	233	294	57	2	2001.030	3	0.410	46	32	0
41	38	66	80	52	274560	167	214	80	233	294	132	233	294	80	4	2019.334	3	0.441	36	0	0
42	35	77	78	64	384384	156	294	109	233	372	173	233	294	109	2	1975.199	3	0.366	47	1002	0
43	47	57	76	36	155952	176	218	132	233	294	168	233	294	132	4	2053.534	3	0.500	52	0	0
44	48	61	88	31	166408	172	206	168	233	294	199	233	294	168	4	1975.387	3	0.366	21	0	0
45	39	77	78	64	384384	0	347	91	77	425	155	0	347	91	1	1933.062	3	0.295	65	1002	0
46	51	55	64	43	151360	62	321	0	117	385	43	117	321	0	2	2054.462	3	0.500	2	45	1
47	49	58	64	52	193024	116	520	0	174	584	52	116	520	0	1	2054.033	3	0.500	27	23	0
48	52	60	95	55	313500	0	252	92	60	347	147	0	347	92	3	2047.574	3	0.489	50	0	0
49	50	73	109	23	183011	160	294	173	233	403	196	233	294	173	2	1992.709	3	0.395	24	1002	0
50	43	77	78	64	384384	0	269	147	77	347	211	0	347	147	3	1950.474	3	0.323	9	0	0

51	54	61	91	61	338611	102	94	61	163	185	122	163	94	61	2	2502.210	4	0.263	1	1002	0
52	53	65	72	54	252720	0	347	155	65	419	209	0	347	155	1	2054.326	3	0.500	11	1002	0

Set 8 - 10-Package Look-Ahead Results																				
Packing Order	Item Number	Length	Width	Height	Volume	x1	y1	z1	x2	y2	z2	RCx	RCy	RCz	RCd	Caving Degree	Paste Number	Paste Ratio	Distance	Closest Item	Penalty Cost
1	1	58	75	57	247950	0	0	0	58	75	57	0	0	0	0	0.000	0	0.000	0	0	0
2	2	81	89	62	446958	152	0	0	233	89	62	233	0	0	2	2053.271	3	0.500	94	1	0
3	11	76	81	55	338580	157	89	0	233	170	55	233	89	0	2	2054.486	3	0.500	1	2	1
4	5	60	67	38	152760	58	0	0	118	67	38	58	0	0	1	2053.864	3	0.500	34	3	0
5	8	54	95	28	143640	0	75	0	54	170	28	0	75	0	1	2052.629	3	0.500	98	3	0
6	3	74	115	44	374440	159	170	0	233	285	44	233	170	0	2	2053.029	3	0.500	106	5	0
7	13	76	81	55	338580	157	0	62	233	81	117	233	0	62	2	2053.022	3	0.500	103	1002	1
8	7	60	67	38	152760	173	0	117	233	67	155	233	0	117	2	2053.284	3	0.500	65	1002	1
9	9	46	55	31	78430	187	0	155	233	55	186	233	0	155	2	2053.706	3	0.500	34	1002	1
10	10	46	55	31	78430	187	0	186	233	55	217	233	0	186	2	2054.477	3	0.500	1	9	1
11	6	74	115	44	374440	159	285	0	233	400	44	233	285	0	2	2052.294	3	0.500	159	1004	0
12	4	84	118	27	267624	149	400	0	233	518	27	233	400	0	2	2047.031	3	0.491	149	1004	0
13	21	53	67	49	173999	0	0	57	53	67	106	0	0	57	1	2054.482	3	0.500	1	1002	1
14	16	33	40	23	30360	118	0	0	151	40	23	118	0	0	1	2054.468	3	0.500	1	1005	0
15	15	37	57	30	63270	0	0	106	37	57	136	0	0	106	1	2052.392	3	0.500	84	1002	1
16	12	84	118	27	267624	0	170	0	84	288	27	0	170	0	1	2037.896	3	0.474	73	1005	0
17	17	76	81	55	338580	81	89	0	157	170	55	157	89	0	2	2565.605	4	0.371	1	1004	1
18	23	33	40	23	30360	119	49	0	152	89	23	152	89	0	4	2054.436	3	0.500	2	0	1
19	19	43	74	38	120916	116	170	0	159	244	38	159	170	0	2	2053.853	3	0.500	32	16	0
20	22	37	57	30	63270	122	244	0	159	301	30	159	244	0	2	2053.546	3	0.500	38	16	0
21	20	48	78	46	172224	0	75	28	48	153	74	0	75	28	1	2028.802	3	0.457	33	1002	1
22	14	85	90	59	451350	0	288	0	85	378	59	0	288	0	1	2009.164	3	0.424	37	20	0

23	24	84	118	27	267624	0	170	27	84	288	54	0	288	27	3	3817.872	6	0.504	17	0	1
24	25	84	118	27	267624	0	170	54	84	288	81	0	288	54	3	3191.716	5	0.437	1	0	1
25	18	85	90	59	451350	0	378	0	85	468	59	0	378	0	1	2053.666	3	0.500	64	12	0
26	28	85	90	59	451350	0	468	0	85	558	59	0	468	0	1	2053.666	3	0.500	64	12	0
27	26	33	40	23	30360	126	301	0	159	341	23	159	301	0	2	2053.186	3	0.500	41	1004	0
28	33	72	93	35	234360	0	288	59	72	381	94	0	288	59	1	2031.044	3	0.462	88	26	1
29	35	60	67	38	152760	0	381	59	60	448	97	0	381	59	1	2048.154	3	0.490	20	26	0
30	31	48	78	46	172224	0	448	59	48	526	105	0	448	59	1	2040.619	3	0.480	115	1002	0
31	36	58	75	57	247950	175	400	27	233	475	84	233	400	27	2	1997.413	3	0.403	1	30	0
32	29	72	72	51	264384	161	328	44	233	400	95	233	400	44	4	2022.172	3	0.446	42	0	0
33	30	72	72	51	264384	161	256	44	233	328	95	233	328	44	4	2053.316	3	0.500	76	0	0
34	27	76	81	55	338580	157	175	44	233	256	99	233	256	44	4	2041.133	3	0.477	5	0	0
35	40	33	40	23	30360	126	341	0	159	381	23	159	341	0	2	2053.891	3	0.500	19	1004	1
36	39	46	55	31	78430	187	518	0	233	573	31	233	518	0	2	2042.577	3	0.484	102	30	1
37	41	54	95	28	143640	0	193	81	54	288	109	0	288	81	3	2026.976	3	0.456	103	0	0
38	32	76	81	55	338580	157	89	55	233	170	110	233	89	55	2	1982.098	3	0.377	1	1002	0
39	42	48	78	46	172224	0	288	94	48	366	140	0	288	94	1	2008.470	3	0.422	14	1002	0
40	43	74	79	35	204610	159	256	95	233	335	130	233	256	95	2	1988.723	3	0.391	90	1002	0
41	37	98	99	33	320166	0	189	109	98	288	142	0	288	109	3	1938.186	3	0.303	61	0	0

Set 9 - 10-Package Look-Ahead Results																				
Packing Order	Item Number	Length	Width	Height	Volume	x1	y1	z1	x2	y2	z2	RCx	RCy	RCz	RCd	Caving Degree	Paste Number	Paste Ratio	Distance	Closest Item	Penalty Cost
1	1	44	92	29	117392	0	0	0	44	92	29	0	0	0	0	0.000	0	0.000	0	0	0
2	7	75	114	69	589950	158	0	0	233	114	69	233	0	0	2	2053.141	3	0.500	114	1	1
3	11	55	57	48	150480	103	0	0	158	57	48	158	0	0	2	2054.481	3	0.500	1	2	1
4	8	44	91	28	112112	44	0	0	88	91	28	44	0	0	1	2054.210	3	0.500	14	3	0
5	5	70	90	63	396900	88	57	0	158	147	63	158	57	0	2	2588.992	4	0.412	44	1	1
6	6	61	94	54	309636	172	114	0	233	208	54	233	114	0	2	2054.293	3	0.500	14	5	1
7	9	43	89	27	103329	0	0	29	43	89	56	0	0	29	1	2053.562	3	0.500	44	6	0
8	3	48	73	42	147168	185	0	69	233	73	111	233	0	69	2	2052.435	3	0.500	109	1002	1
9	4	76	80	54	328320	157	208	0	233	288	54	233	208	0	2	2035.833	3	0.472	157	1004	1
10	10	76	80	54	328320	157	288	0	233	368	54	233	288	0	2	2052.224	3	0.500	157	1004	0
11	2	76	78	68	403104	157	368	0	233	446	68	233	368	0	2	2033.401	3	0.468	152	1002	0
12	14	55	57	48	150480	103	0	48	158	57	96	158	57	48	4	3795.342	6	0.466	1	0	0
13	16	44	92	29	117392	44	91	0	88	183	29	88	91	0	2	2601.710	4	0.434	44	1004	1
14	15	48	73	42	147168	185	0	111	233	73	153	233	0	111	2	2053.231	3	0.500	67	1002	1
15	12	61	94	54	309636	172	446	0	233	540	54	233	446	0	2	2052.046	3	0.500	166	1002	0
16	22	48	73	42	147168	185	0	153	233	73	195	233	0	153	2	2054.026	3	0.500	25	1002	0
17	17	40	107	39	166920	0	92	0	40	199	39	0	92	0	1	2042.703	3	0.480	4	1002	1
18	18	46	99	39	177606	0	199	0	46	298	39	0	199	0	1	2045.798	3	0.489	111	1002	1
19	21	46	99	39	177606	0	298	0	46	397	39	0	298	0	1	2054.482	3	0.500	1	18	1
20	19	57	70	37	147630	0	397	0	57	467	37	0	397	0	1	2038.860	3	0.477	100	15	0
21	13	50	69	45	155250	0	467	0	50	536	45	0	467	0	1	2038.897	3	0.477	122	15	0
22	24	44	91	28	112112	44	0	28	88	91	56	44	91	28	3	3762.799	6	0.411	14	0	0

23	25	43	89	27	103329	0	0	56	43	89	83	0	0	56	1	2054.479	3	0.500	1	1002	0
24	29	44	91	28	112112	0	0	83	44	91	111	0	0	83	1	2046.623	3	0.489	58	1002	1
25	27	46	99	39	177606	0	0	111	46	99	150	0	0	111	1	2037.443	3	0.473	70	1002	0
26	28	40	107	39	166920	0	0	150	40	107	189	0	0	150	1	2045.102	3	0.484	1	25	0
27	20	66	92	44	267168	167	276	54	233	368	98	233	368	54	4	2008.824	3	0.424	68	0	0
28	30	66	92	44	267168	167	184	54	233	276	98	233	276	54	4	2050.969	3	0.495	46	0	1
29	32	55	57	48	150480	178	127	54	233	184	102	233	184	54	4	2046.650	3	0.487	14	0	1
30	26	76	80	54	328320	157	368	68	233	448	122	233	368	68	2	2007.023	3	0.422	98	1002	0
31	31	76	78	68	403104	96	446	0	172	524	68	172	446	0	2	2547.719	4	0.341	40	21	0
32	23	70	90	63	396900	87	356	0	157	446	63	157	446	0	4	2042.190	3	0.479	4	0	0
33	37	48	73	42	147168	40	91	29	88	164	71	88	91	29	2	2588.015	4	0.409	12	1004	1
34	36	57	70	37	147630	0	397	37	57	467	74	0	397	37	1	2586.862	4	0.407	1	32	0
35	34	61	94	54	309636	96	262	0	157	356	54	157	356	0	4	2053.761	3	0.500	50	0	0
36	35	61	84	33	169092	172	284	98	233	368	131	233	368	98	4	2038.094	3	0.472	8	0	0
37	38	53	72	37	141192	180	212	98	233	284	135	233	284	98	4	2046.591	3	0.487	28	0	0
38	39	48	73	42	147168	0	324	39	48	397	81	0	397	39	3	2037.531	3	0.472	26	0	0
39	40	76	80	54	328320	157	368	122	233	448	176	233	368	122	2	1981.924	3	0.377	44	1002	0
40	33	75	114	69	589950	0	210	39	75	324	108	0	324	39	3	1966.498	3	0.350	10	0	0
41	46	43	89	27	103329	43	0	56	86	89	83	43	0	83	5	3820.681	6	0.509	1	0	1
42	47	48	73	42	147168	185	295	131	233	368	173	233	368	131	4	2054.273	3	0.500	12	0	0
43	45	55	57	48	150480	102	205	0	157	262	48	157	262	0	4	2047.371	3	0.489	27	0	1
44	50	66	92	44	267168	91	354	63	157	446	107	157	446	63	4	1976.363	3	0.367	15	0	0
45	44	76	80	54	328320	0	324	81	76	404	135	0	324	81	1	1960.085	3	0.340	15	44	1
46	41	85	94	39	311610	0	230	108	85	324	147	0	324	108	3	2010.234	3	0.426	73	0	0
47	51	78	84	28	183456	0	324	135	78	408	163	0	324	135	1	2007.968	3	0.422	57	1002	1
48	48	85	94	39	311610	0	230	147	85	324	186	0	324	147	3	2011.809	3	0.428	34	0	1
49	43	76	78	68	403104	0	467	45	76	545	113	0	467	45	1	1946.976	3	0.317	20	31	0
50	49	76	78	68	403104	81	446	68	157	524	136	157	446	68	2	1894.582	3	0.228	5	49	0

51	42	75	114	69	589950	82	332	107	157	446	176	157	446	107	4	1944.385	3	0.312	4	0	0
52	60	57	99	47	265221	176	269	173	233	368	220	233	368	173	4	2662.664	4	0.537	18	0	0
53	54	46	99	39	177606	50	257	0	96	356	39	96	356	0	4	2642.126	4	0.501	2	0	1
54	53	70	90	63	396900	88	57	63	158	147	126	158	57	63	2	2507.534	4	0.272	2	1004	0
55	52	57	70	37	147630	176	368	176	233	438	213	233	368	176	2	2054.368	3	0.500	7	1002	0
56	59	44	92	29	117392	0	0	189	44	92	218	0	0	189	1	2040.945	3	0.477	2	1002	1
57	58	55	57	48	150480	0	410	74	55	467	122	0	467	74	3	2037.317	3	0.471	6	0	1
58	56	61	84	33	169092	0	324	163	61	408	196	0	324	163	1	2036.034	3	0.469	22	1002	0
59	61	61	84	33	169092	0	240	186	61	324	219	0	324	186	3	2012.926	3	0.429	1	0	1
60	64	55	57	48	150480	88	147	0	143	204	48	88	147	0	1	2007.272	3	0.420	1	1005	1
61	57	57	70	37	147630	0	467	113	57	537	150	0	467	113	1	1999.528	3	0.407	24	50	0
62	62	57	70	37	147630	100	446	136	157	516	173	157	446	136	2	1968.700	3	0.355	43	61	0
63	63	61	84	33	169092	88	147	48	149	231	81	88	147	48	1	1961.113	3	0.341	8	1005	1
64	55	50	69	45	155250	107	446	173	157	515	218	157	446	173	2	1881.181	3	0.205	1	62	0
65	70	76	80	54	328320	75	244	54	151	324	108	75	324	108	7	3109.285	5	0.297	6	0	1
66	66	46	99	39	177606	50	467	0	96	566	39	50	467	0	1	2627.939	4	0.477	6	1005	0
67	69	55	57	48	150480	96	524	0	151	581	48	96	524	0	1	2016.260	3	0.435	20	50	0

Set 10 - 10-Package Look-Ahead Results																				
Packing Order	Item Number	Length	Width	Height	Volume	x1	y1	z1	x2	y2	z2	RCx	RCy	RCz	RCd	Caving Degree	Paste Number	Paste Ratio	Distance	Closest Item	Penalty Cost
1	1	50	76	43	163400	0	0	0	50	76	43	0	0	0	0	0.000	0	0.000	0	0	0
2	7	76	95	60	433200	157	0	0	233	95	60	233	0	0	2	2053.086	3	0.500	107	1	0
3	2	75	90	25	168750	82	0	0	157	90	25	157	0	0	2	2053.921	3	0.500	32	1	0
4	10	28	39	24	26208	50	0	0	78	39	24	50	0	0	1	2054.365	3	0.500	4	3	0
5	9	47	61	34	97478	0	76	0	47	137	34	0	76	0	1	2053.740	3	0.500	35	3	1
6	3	64	74	35	165760	93	0	25	157	74	60	157	0	25	2	2053.717	3	0.500	43	5	0
7	6	66	68	31	139128	167	0	60	233	68	91	233	0	60	2	2054.288	3	0.500	11	6	1
8	4	45	53	36	85860	0	0	43	45	53	79	0	0	43	1	2053.412	3	0.500	48	7	0
9	8	60	64	47	180480	173	0	91	233	64	138	233	0	91	2	2053.049	3	0.500	82	1002	1
10	11	60	64	47	180480	173	0	138	233	64	185	233	0	138	2	2054.482	3	0.500	1	9	1
11	13	60	92	42	231840	173	95	0	233	187	42	233	95	0	2	2052.449	3	0.500	126	5	1
12	5	52	80	42	174720	181	187	0	233	267	42	233	187	0	2	2051.316	3	0.500	178	1002	0
13	17	45	53	36	85860	0	0	79	45	53	115	0	0	79	1	2052.120	3	0.500	105	1002	1
14	21	40	53	36	76320	0	0	115	40	53	151	0	0	115	1	2052.873	3	0.500	69	1002	1
15	16	52	80	42	174720	181	267	0	233	347	42	233	267	0	2	2051.316	3	0.500	178	1002	1
16	12	60	64	47	180480	173	347	0	233	411	47	233	347	0	2	2032.131	3	0.467	173	1004	0
17	23	34	117	28	111384	0	137	0	34	254	28	0	137	0	1	2054.479	3	0.500	1	1002	1
18	15	60	64	47	180480	173	411	0	233	475	47	233	411	0	2	2051.439	3	0.500	173	1004	0
19	18	69	82	46	260268	164	475	0	233	557	46	233	475	0	2	2042.291	3	0.484	164	1004	0
20	14	90	99	32	285120	0	254	0	90	353	32	0	254	0	1	2015.408	3	0.436	83	1005	0
21	20	90	99	32	285120	0	353	0	90	452	32	0	353	0	1	2053.239	3	0.500	83	19	1
22	27	65	94	37	226070	0	452	0	65	546	37	0	452	0	1	2044.921	3	0.486	99	19	1

23	26	60	64	47	180480	107	0	60	167	64	107	167	0	60	2	2023.396	3	0.447	1	14	0
24	24	52	80	42	174720	181	95	42	233	175	84	233	95	42	2	2016.539	3	0.436	12	1002	0
25	25	78	102	49	389844	0	350	32	78	452	81	0	452	32	3	1992.019	3	0.396	95	0	1
26	28	76	95	60	433200	0	255	32	76	350	92	0	350	32	3	2039.181	3	0.476	97	0	1
27	19	96	102	59	577728	0	452	37	96	554	96	0	452	37	1	1972.853	3	0.362	68	19	0
28	29	78	102	49	389844	0	350	81	78	452	130	0	350	81	1	2609.715	4	0.446	1	25	0
29	31	90	99	32	285120	0	452	96	90	551	128	0	452	96	1	2045.568	3	0.487	92	1002	0
30	30	69	82	46	260268	0	268	92	69	350	138	0	350	92	3	2040.362	3	0.478	82	0	1
31	22	96	102	59	577728	0	452	128	96	554	187	0	452	128	1	1966.767	3	0.351	33	1002	0
32	41	65	94	37	226070	65	452	0	130	546	37	65	452	37	5	3854.273	6	0.566	1	0	1
33	36	34	117	28	111384	34	137	0	68	254	28	34	254	0	3	3241.963	5	0.523	1	0	1
34	38	78	102	49	389844	0	350	130	78	452	179	0	350	130	1	2650.596	4	0.516	41	1002	0
35	39	47	61	34	97478	186	0	185	233	61	219	233	0	185	2	2054.478	3	0.500	1	1002	1
36	33	34	120	26	106080	90	332	0	124	452	26	90	452	0	3	2054.289	3	0.500	10	0	0
37	32	66	68	31	139128	0	282	138	66	350	169	0	350	138	3	2053.516	3	0.500	51	0	0
38	43	60	92	42	231840	173	175	42	233	267	84	233	175	42	2	2029.134	3	0.459	80	1002	1
39	42	90	99	32	285120	68	155	0	158	254	32	68	254	0	3	2004.018	3	0.414	1	0	1
40	35	69	82	46	260268	164	475	46	233	557	92	233	475	46	2	1980.922	3	0.376	68	31	1
41	37	69	82	46	260268	164	393	47	233	475	93	233	475	47	4	2034.643	3	0.468	68	0	0
42	40	69	82	46	260268	164	475	92	233	557	138	233	475	92	2	1981.131	3	0.377	68	31	0
43	34	96	102	59	577728	137	373	93	233	475	152	233	475	93	4	1961.587	3	0.343	41	0	0
44	49	52	80	42	174720	181	267	42	233	347	84	233	347	42	4	3236.203	5	0.516	80	0	0
45	46	66	68	31	139128	90	254	0	156	322	31	90	254	0	1	2054.307	3	0.500	10	44	0
46	45	45	53	36	85860	0	0	151	45	53	187	0	0	151	1	2040.598	3	0.478	33	1002	1
47	53	34	120	26	106080	139	355	0	173	475	26	173	475	0	4	2030.732	3	0.460	8	0	1
48	47	63	109	28	192276	0	137	28	63	246	56	0	137	28	1	2017.252	3	0.437	1	45	0
49	44	47	61	34	97478	0	76	34	47	137	68	0	137	34	3	3222.554	5	0.490	1	0	0
50	56	66	68	31	139128	167	475	138	233	543	169	233	475	138	2	2015.410	3	0.435	51	1002	0

51	51	65	94	37	226070	168	381	152	233	475	189	233	475	152	4	2022.177	3	0.446	31	0	0
52	54	45	53	36	85860	188	475	169	233	528	205	233	475	169	2	2018.422	3	0.439	15	1002	0
53	57	45	53	36	85860	128	95	0	173	148	36	173	95	0	2	2002.544	3	0.412	6	1004	1
54	48	90	99	32	285120	0	353	179	90	452	211	0	452	179	3	1988.670	3	0.388	9	0	0
55	58	45	53	36	85860	0	137	56	45	190	92	0	137	56	1	2000.870	3	0.409	1	1002	0
56	59	64	74	35	165760	0	276	169	64	350	204	0	350	169	3	1991.373	3	0.393	16	0	0
57	52	69	82	46	260268	0	55	68	69	137	114	0	137	68	3	1939.621	3	0.304	2	0	0
58	55	78	102	49	389844	90	254	31	168	356	80	90	254	31	1	1842.424	3	0.139	5	1005	0

Set 11 - 10-Package Look-Ahead Results																				
Packing Order	Item Number	Length	Width	Height	Volume	x1	y1	z1	x2	y2	z2	RCx	RCy	RCz	RCd	Caving Degree	Paste Number	Paste Ratio	Distance	Closest Item	Penalty Cost
1	1	76	109	42	347928	0	0	0	76	109	42	0	0	0	0	0.000	0	0.000	0	0	0
2	3	76	109	42	347928	0	109	0	76	218	42	0	109	0	1	2054.486	3	0.500	1	1	0
3	6	76	109	42	347928	76	0	0	152	109	42	76	0	0	1	2054.486	3	0.500	1	2	0
4	4	53	65	30	103350	76	109	0	129	174	30	76	109	0	1	2054.479	3	0.500	1	3	0
5	10	79	91	66	474474	154	0	0	233	91	66	233	0	0	2	2054.474	3	0.500	2	4	1
6	7	78	85	20	132600	155	91	0	233	176	20	233	91	0	2	2054.441	3	0.500	3	4	0
7	5	69	91	26	163254	0	0	42	69	91	68	0	0	42	1	2054.354	3	0.500	8	5	0
8	9	65	72	37	173160	168	91	20	233	163	57	233	91	20	2	2054.213	3	0.500	16	7	1
9	2	56	118	22	145376	0	91	42	56	209	64	0	91	42	1	2054.120	3	0.500	20	8	0
10	17	78	85	20	132600	69	0	42	147	85	62	69	0	42	1	2054.343	3	0.500	8	8	0
11	12	74	74	60	328560	159	0	66	233	74	126	233	0	66	2	2053.196	3	0.500	90	7	1
12	14	74	74	60	328560	159	0	126	233	74	186	233	0	126	2	2054.007	3	0.500	34	1002	0
13	8	32	52	32	53248	201	0	186	233	52	218	233	0	186	2	2054.447	3	0.500	2	1002	0
14	18	39	48	25	46800	162	0	186	201	48	211	201	0	186	2	2054.250	3	0.500	9	1002	0
15	15	63	83	54	282366	0	0	68	63	83	122	0	0	68	1	2053.037	3	0.500	96	1002	1
16	11	63	72	42	190512	0	0	122	63	72	164	0	0	122	1	2053.527	3	0.500	56	1002	0
17	21	63	72	42	190512	0	0	164	63	72	206	0	0	164	1	2054.257	3	0.500	14	1002	1
18	22	78	85	20	132600	155	176	0	233	261	20	233	176	0	2	2052.951	3	0.500	79	9	0
19	19	32	71	26	59072	201	163	20	233	234	46	233	163	20	2	2052.651	3	0.500	72	9	0
20	16	67	105	43	302505	0	218	0	67	323	43	0	218	0	1	2051.826	3	0.498	88	19	0
21	13	59	84	54	267624	0	323	0	59	407	54	0	323	0	1	2036.900	3	0.474	166	1002	0
22	27	59	84	54	267624	0	407	0	59	491	54	0	407	0	1	2051.924	3	0.500	166	1002	0

23	24	31	69	28	59892	0	491	0	31	560	28	0	491	0	1	2049.593	3	0.500	192	1002	0
24	25	39	48	25	46800	76	174	0	115	222	25	76	174	0	1	2046.138	3	0.488	40	19	0
25	23	69	91	26	163254	164	261	0	233	352	26	233	261	0	2	2041.104	3	0.480	96	1004	0
26	29	69	91	26	163254	164	352	0	233	443	26	233	352	0	2	2054.482	3	0.500	1	25	0
27	28	67	105	43	302505	166	443	0	233	548	43	233	443	0	2	2029.741	3	0.461	107	23	0
28	20	80	106	59	500320	153	337	26	233	443	85	233	443	26	4	1981.699	3	0.378	94	0	0
29	34	65	72	37	173160	168	265	26	233	337	63	233	337	26	4	2053.926	3	0.500	32	0	1
30	32	39	48	25	46800	194	443	43	233	491	68	233	443	43	2	2050.754	3	0.500	135	22	0
31	33	78	85	20	132600	69	0	62	147	85	82	69	0	62	1	2019.028	3	0.440	8	1005	1
32	26	80	106	59	500320	59	323	0	139	429	59	59	323	0	1	1980.307	3	0.374	14	30	0
33	39	53	65	30	103350	67	258	0	120	323	30	67	323	0	3	2053.775	3	0.500	34	0	1
34	36	78	85	20	132600	59	429	0	137	514	20	59	429	0	1	2040.417	3	0.477	22	30	1
35	37	63	74	61	284382	170	263	63	233	337	124	233	337	63	4	1994.833	3	0.398	1	0	1
36	38	76	109	42	347928	157	337	85	233	446	127	233	337	85	2	2035.572	3	0.470	93	1002	1
37	30	80	106	59	500320	0	217	43	80	323	102	0	323	43	3	1975.238	3	0.365	8	0	0
38	40	32	52	32	53248	0	323	54	32	375	86	0	323	54	1	2053.782	3	0.500	27	36	0
39	31	74	74	60	328560	59	429	20	133	503	80	59	429	20	1	1974.763	3	0.365	20	36	0
40	43	69	91	26	163254	0	91	64	69	182	90	0	91	64	1	1977.901	3	0.371	36	1002	0
41	44	78	85	20	132600	155	91	57	233	176	77	233	91	57	2	1969.482	3	0.358	86	40	1
42	42	74	74	60	328560	159	263	124	233	337	184	233	337	124	4	1949.814	3	0.323	36	0	1
43	41	80	106	59	500320	153	337	127	233	443	186	233	337	127	2	2040.101	3	0.476	34	1002	1
44	35	79	91	66	474474	154	491	43	233	582	109	233	491	43	2	1932.905	3	0.293	22	39	0
45	51	39	48	25	46800	155	443	43	194	491	68	194	491	43	4	3853.329	6	0.564	1	0	1
46	49	32	71	26	59072	169	163	20	201	234	46	201	163	20	2	2054.218	3	0.500	11	1004	1
47	45	31	69	28	59892	0	375	54	31	444	82	0	375	54	1	2053.784	3	0.500	28	45	0
48	52	32	52	32	53248	0	491	28	32	543	60	0	491	28	1	2037.327	3	0.472	27	45	0
49	47	60	71	25	106500	173	266	184	233	337	209	233	337	184	4	2000.515	3	0.408	11	0	0

50	54	60	71	25	106500	173	337	186	233	408	211	233	337	186	2	2049.636	3	0.492	9	1002	0
51	53	78	85	20	132600	76	109	30	154	194	50	76	109	30	1	1920.551	3	0.272	1	1005	0

Set 12 - 10-Package Look-Ahead Results																				
Packing Order	Item Number	Length	Width	Height	Volume	x1	y1	z1	x2	y2	z2	RCx	RCy	RCz	RCd	Caving Degree	Paste Number	Paste Ratio	Distance	Closest Item	Penalty Cost
1	1	87	112	23	224112	0	0	0	87	112	23	0	0	0	0	0.000	0	0.000	0	0	0
2	8	77	82	67	423038	156	0	0	233	82	67	233	0	0	2	2053.594	3	0.500	68	1	0
3	10	62	63	41	160146	94	0	0	156	63	41	156	0	0	2	2054.390	3	0.500	6	1	0
4	3	87	112	23	224112	0	0	23	87	112	46	0	0	23	1	2054.401	3	0.500	6	3	1
5	11	77	82	67	423038	0	0	46	77	82	113	0	0	46	1	2054.487	3	0.500	1	4	1
6	5	53	66	51	178398	0	0	113	53	66	164	0	0	113	1	2053.505	3	0.500	56	1002	1
7	2	35	48	33	55440	0	0	164	35	48	197	0	0	164	1	2053.897	3	0.500	23	1002	0
8	13	72	104	44	329472	161	82	0	233	186	44	233	82	0	2	2053.429	3	0.500	74	5	1
9	4	86	101	31	269266	0	112	0	86	213	31	0	112	0	1	2053.339	3	0.500	75	8	0
10	12	86	101	31	269266	0	213	0	86	314	31	0	213	0	1	2054.485	3	0.500	1	9	0
11	14	53	59	48	150096	180	0	67	233	59	115	233	0	67	2	2052.562	3	0.500	103	1002	1
12	15	35	48	33	55440	198	0	115	233	48	148	233	0	115	2	2052.612	3	0.500	72	1002	1
13	9	46	67	36	110952	187	186	0	233	253	36	233	186	0	2	2052.398	3	0.500	101	10	0
14	6	39	106	22	90948	194	253	0	233	359	22	233	253	0	2	2052.098	3	0.500	108	10	0
15	7	87	112	23	224112	0	314	0	87	426	23	0	314	0	1	2052.267	3	0.499	107	14	0
16	18	36	116	20	83520	197	359	0	233	475	20	233	359	0	2	2051.984	3	0.500	110	15	1
17	21	36	116	20	83520	0	426	0	36	542	20	0	426	0	1	2050.817	3	0.500	161	16	1
18	17	56	89	24	119616	177	82	44	233	171	68	233	82	44	2	2050.732	3	0.497	90	5	0
19	16	41	116	40	190240	0	112	31	41	228	71	0	112	31	1	2025.154	3	0.454	120	18	0
20	22	46	67	36	110952	0	228	31	46	295	67	0	228	31	1	2044.177	3	0.487	141	13	0
21	20	58	100	37	214600	175	475	0	233	575	37	233	475	0	2	2016.241	3	0.439	139	17	0
22	19	65	69	37	165945	91	0	41	156	69	78	156	0	41	2	2012.895	3	0.429	1	1004	0

23	31	39	106	22	90948	36	426	0	75	532	22	36	426	0	1	2043.781	3	0.486	100	21	0
24	32	86	101	31	269266	0	314	23	86	415	54	0	314	23	1	2012.139	3	0.432	147	1005	1
25	23	58	100	37	214600	103	82	0	161	182	37	161	82	0	2	2004.812	3	0.416	16	1004	0
26	33	87	112	23	224112	110	363	0	197	475	23	197	475	0	4	2016.909	3	0.436	4	0	1
27	25	65	69	37	165945	110	475	0	175	544	37	175	475	0	2	2025.597	3	0.452	34	23	0
28	24	53	66	51	178398	134	186	0	187	252	51	187	186	0	2	1975.448	3	0.367	48	1004	0
29	28	72	104	44	329472	89	82	37	161	186	81	161	82	37	2	2483.931	4	0.232	2	1004	0
30	26	60	108	59	382320	173	253	22	233	361	81	233	253	22	2	1960.614	3	0.340	2	27	0
31	36	35	48	33	55440	75	426	0	110	474	33	75	426	0	1	2621.349	4	0.466	1	27	0
32	30	72	104	44	329472	3	426	22	75	530	66	75	426	22	2	1850.671	3	0.153	3	1004	0

Set 13 - 10-Package Look-Ahead Results																				
Packing Order	Item Number	Length	Width	Height	Volume	x1	y1	z1	x2	y2	z2	RCx	RCy	RCz	RCd	Caving Degree	Paste Number	Paste Ratio	Distance	Closest Item	Penalty Cost
1	1	48	109	40	209280	0	0	0	48	109	40	0	0	0	0	0.000	0	0.000	0	0	0
2	5	69	90	55	341550	164	0	0	233	90	55	233	0	0	2	2052.841	3	0.500	116	1	0
3	9	74	83	42	257964	90	0	0	164	83	42	164	0	0	2	2053.840	3	0.500	42	1	0
4	4	38	75	30	85500	48	0	0	86	75	30	48	0	0	1	2054.409	3	0.500	4	3	0
5	2	36	52	25	46800	0	0	40	36	52	65	0	0	40	1	2053.002	3	0.500	54	3	0
6	8	69	90	55	341550	164	0	55	233	90	110	233	0	55	2	2052.926	3	0.500	110	1002	0
7	3	61	100	36	219600	172	90	0	233	190	36	233	90	0	2	2054.202	3	0.500	18	6	0
8	14	48	109	40	209280	0	109	0	48	218	40	0	109	0	1	2054.483	3	0.500	1	7	0
9	15	37	63	21	48951	48	75	0	85	138	21	48	75	0	1	2054.336	3	0.500	6	7	1
10	7	52	79	36	147888	181	0	110	233	79	146	233	0	110	2	2053.101	3	0.500	74	1002	0
11	10	52	72	33	123552	181	0	146	233	72	179	233	0	146	2	2053.677	3	0.500	41	1002	0
12	11	61	100	36	219600	172	90	36	233	190	72	233	90	36	2	2052.445	3	0.500	124	8	0
13	12	33	91	28	84084	200	190	0	233	281	28	233	190	0	2	2054.317	3	0.500	8	12	0
14	6	52	112	25	145600	0	218	0	52	330	25	0	218	0	1	2048.729	3	0.495	148	13	0
15	16	37	63	21	48951	196	0	179	233	63	200	233	0	179	2	2054.473	3	0.500	1	11	1
16	20	37	63	21	48951	48	138	0	85	201	21	48	138	0	1	2054.473	3	0.500	1	14	0
17	18	66	76	31	155496	98	0	42	164	76	73	164	0	42	2	2053.347	3	0.500	62	5	0
18	21	66	76	31	155496	98	0	73	164	76	104	164	0	73	2	2052.678	3	0.500	98	1004	0
19	17	44	95	35	146300	189	90	72	233	185	107	233	90	72	2	2052.355	3	0.500	113	1002	1
20	22	52	112	25	145600	0	330	0	52	442	25	0	330	0	1	2051.059	3	0.500	181	1005	0
21	19	47	74	29	100862	0	442	0	47	516	29	0	442	0	1	2042.607	3	0.487	186	1005	0
22	13	63	99	36	224532	170	281	0	233	380	36	233	281	0	2	2019.874	3	0.444	118	1004	0

23	23	63	99	36	224532	170	380	0	233	479	36	233	380	0	2	2054.484	3	0.500	1	22	0
24	31	61	100	36	219600	172	479	0	233	579	36	233	479	0	2	2052.445	3	0.500	124	21	0
25	25	48	100	20	96000	0	218	25	48	318	45	0	218	25	1	2045.161	3	0.485	12	1002	0
26	30	52	112	25	145600	0	318	25	52	430	50	0	318	25	1	2044.426	3	0.483	1	24	0
27	33	66	76	31	155496	134	205	0	200	281	31	200	281	0	4	2012.337	3	0.429	15	0	1
28	24	52	79	36	147888	118	281	0	170	360	36	170	281	0	2	2028.957	3	0.457	21	26	0
29	26	52	79	36	147888	118	360	0	170	439	36	170	360	0	2	2054.481	3	0.500	1	28	0
30	36	33	91	28	84084	200	190	28	233	281	56	200	281	28	3	3839.951	6	0.542	21	0	1
31	34	47	74	29	100862	0	52	40	47	126	69	0	52	40	1	2034.149	3	0.467	42	1002	0
32	32	61	100	36	219600	172	281	36	233	381	72	233	281	36	2	2016.570	3	0.435	2	29	1
33	35	61	100	36	219600	172	381	36	233	481	72	233	381	36	2	2054.467	3	0.500	2	29	0
34	27	68	86	44	257312	165	481	36	233	567	80	233	481	36	2	2019.796	3	0.445	140	1002	0
35	37	47	74	29	100862	0	126	40	47	200	69	0	126	40	1	2054.113	3	0.500	18	1002	0
36	29	68	86	44	257312	104	90	0	172	176	44	172	90	0	2	1992.964	3	0.395	10	35	1
37	28	93	101	40	375720	47	442	0	140	543	40	47	442	0	1	1960.247	3	0.340	24	34	0
38	43	36	52	25	46800	0	0	65	36	52	90	0	52	65	3	3830.248	6	0.525	1	0	1
39	42	49	97	30	142590	85	184	0	134	281	30	134	281	0	4	2600.604	4	0.430	1	0	0
40	46	36	52	25	46800	52	390	0	88	442	25	52	442	0	3	2054.472	3	0.500	1	0	0
41	39	48	109	40	209280	52	281	0	100	390	40	52	390	0	3	3200.184	5	0.452	1	0	0
42	38	37	63	21	48951	0	516	0	37	579	21	0	516	0	1	2054.199	3	0.500	11	37	0
43	44	48	100	20	96000	0	52	69	48	152	89	0	52	69	1	2040.548	3	0.478	50	1002	0
44	48	48	100	20	96000	185	381	72	233	481	92	233	481	72	4	2029.919	3	0.463	128	0	1
45	47	49	97	30	142590	184	284	72	233	381	102	233	381	72	4	2036.311	3	0.472	94	0	1
46	45	38	75	30	85500	162	206	31	200	281	61	200	281	31	4	2024.740	3	0.450	16	0	1
47	41	63	99	36	224532	170	481	80	233	580	116	233	481	80	2	1991.725	3	0.396	104	1002	0
48	49	63	99	36	224532	170	382	92	233	481	128	233	481	92	4	1999.969	3	0.407	2	0	0
49	40	74	83	42	257964	159	481	116	233	564	158	233	481	116	2	1978.284	3	0.372	62	1002	0
50	52	33	91	28	84084	200	190	56	233	281	84	200	281	56	3	3251.866	5	0.540	5	0	0

51	58	33	91	28	84084	167	190	61	200	281	89	200	281	61	4	2582.097	4	0.399	5	0	1
52	57	61	100	36	219600	111	90	44	172	190	80	172	90	44	2	2555.696	4	0.354	16	1004	1
53	54	52	72	33	123552	181	409	128	233	481	161	233	481	128	4	2047.472	3	0.490	59	0	0
54	51	52	79	36	147888	120	281	36	172	360	72	172	281	36	2	2002.360	3	0.411	1	1004	0
55	56	74	83	42	257964	159	481	158	233	564	200	233	481	158	2	1986.157	3	0.384	20	1002	0
56	53	68	86	44	257312	165	395	161	233	481	205	233	481	161	4	1996.234	3	0.401	15	0	0
57	50	69	90	55	341550	0	228	45	69	318	100	0	318	45	3	1947.631	3	0.319	28	0	0
58	60	36	52	25	46800	52	390	25	88	442	50	52	390	25	1	2632.823	4	0.485	1	1005	1
59	61	36	52	25	46800	136	360	36	172	412	61	172	360	36	2	2053.668	3	0.500	30	58	0
60	62	63	99	36	224532	0	318	50	63	417	86	0	318	50	1	2034.318	3	0.467	56	59	1
61	63	66	76	31	155496	0	318	86	66	394	117	0	318	86	1	2010.514	3	0.428	103	1002	0
62	55	69	90	55	341550	0	228	100	69	318	155	0	318	100	3	2000.672	3	0.408	1	0	0
63	65	66	76	31	155496	0	318	117	66	394	148	0	318	117	1	2053.161	3	0.500	72	1002	0
64	67	47	74	29	100862	0	318	148	47	392	177	0	318	148	1	2010.141	3	0.426	43	1002	0
65	66	52	112	25	145600	0	206	155	52	318	180	0	318	155	3	2010.501	3	0.426	40	0	0
66	64	74	83	42	257964	90	0	104	164	83	146	164	0	104	2	1958.531	3	0.338	74	1002	0
67	59	69	90	55	341550	0	52	89	69	142	144	0	52	89	1	1943.321	3	0.311	22	66	0
68	70	33	91	28	84084	129	190	31	162	281	59	162	281	31	4	3777.966	6	0.437	14	0	0
69	74	37	63	21	48951	0	516	21	37	579	42	0	516	21	1	2022.612	3	0.446	1	1002	1
70	75	38	75	30	85500	0	441	29	38	516	59	0	516	29	3	2019.906	3	0.441	1	0	1
71	77	38	75	30	85500	195	90	107	233	165	137	233	90	107	2	2004.358	3	0.418	83	1002	0
72	71	52	72	33	123552	0	318	177	52	390	210	0	318	177	1	1982.566	3	0.377	1	64	0
73	68	93	101	40	375720	0	217	180	93	318	220	0	318	180	3	2692.466	4	0.590	140	0	0
74	78	36	52	25	46800	0	0	90	36	52	115	0	52	90	3	3883.268	6	0.618	54	0	0
75	76	52	79	36	147888	110	202	59	162	281	95	162	281	59	4	1870.569	3	0.187	12	0	0

Set 14- 10-Package Look-Ahead Results																				
Packing Order	Item Number	Length	Width	Height	Volume	x1	y1	z1	x2	y2	z2	RCx	RCy	RCz	RCd	Caving Degree	Paste Number	Paste Ratio	Distance	Closest Item	Penalty Cost
1	1	46	82	21	79212	0	0	0	46	82	21	0	0	0	0	0.000	0	0.000	0	0	0
2	4	78	114	60	533520	155	0	0	233	114	60	233	0	0	2	2053.156	3	0.500	109	1	0
3	9	77	101	45	349965	78	0	0	155	101	45	155	0	0	2	2054.046	3	0.500	32	1	0
4	3	39	60	36	84240	0	0	21	39	60	57	0	0	21	1	2053.633	3	0.500	38	3	0
5	11	64	71	54	245376	169	0	60	233	71	114	233	0	60	2	2052.807	3	0.500	106	1002	1
6	2	73	90	38	249660	160	114	0	233	204	38	233	114	0	2	2051.959	3	0.500	160	1004	0
7	13	46	82	21	79212	0	82	0	46	164	21	0	82	0	1	2053.755	3	0.500	32	6	0
8	7	73	90	38	249660	160	204	0	233	294	38	233	204	0	2	2051.959	3	0.500	160	1004	1
9	5	74	81	38	227772	159	294	0	233	375	38	233	294	0	2	2050.958	3	0.498	159	1004	0
10	14	74	81	38	227772	159	375	0	233	456	38	233	375	0	2	2054.484	3	0.500	1	9	0
11	6	53	74	33	129426	180	456	0	233	530	33	233	456	0	2	2050.942	3	0.500	180	1004	0
12	16	39	60	36	84240	0	60	21	39	120	57	0	60	21	1	2053.633	3	0.500	38	1002	0
13	17	49	64	47	147392	184	0	114	233	64	161	233	0	114	2	2053.383	3	0.500	59	1002	1
14	12	53	74	33	129426	180	114	38	233	188	71	233	114	38	2	2033.093	3	0.464	16	12	1
15	15	53	74	33	129426	180	188	38	233	262	71	233	188	38	2	2053.867	3	0.500	32	10	1
16	8	71	77	47	256949	162	262	38	233	339	85	233	262	38	2	2016.401	3	0.436	37	10	0
17	10	71	77	47	256949	162	339	38	233	416	85	233	339	38	2	2054.484	3	0.500	1	16	0
18	25	45	55	35	86625	188	0	161	233	55	196	233	0	161	2	2053.958	3	0.500	24	1002	0
19	19	46	82	21	79212	0	164	0	46	246	21	0	164	0	1	2051.846	3	0.500	114	1005	0
20	21	35	59	31	64015	0	0	57	35	59	88	0	0	57	1	2051.500	3	0.500	120	1002	1
21	27	47	104	34	166192	0	120	21	47	224	55	0	120	21	1	2041.452	3	0.481	112	1002	1
22	24	48	68	31	101184	0	246	0	48	314	31	0	246	0	1	2029.785	3	0.462	111	17	0

23	20	55	116	36	229680	0	314	0	55	430	36	0	314	0	1	2041.283	3	0.480	104	17	0
24	26	55	116	36	229680	0	430	0	55	546	36	0	430	0	1	2052.802	3	0.500	104	11	0
25	18	74	81	38	227772	81	0	45	155	81	83	155	0	45	2	2007.802	3	0.422	42	21	0
26	31	49	64	47	147392	0	0	88	49	64	135	0	0	88	1	2017.268	3	0.437	1	20	0
27	23	73	90	38	249660	87	114	0	160	204	38	160	114	0	2	1994.447	3	0.399	40	1004	1
28	30	73	90	38	249660	87	204	0	160	294	38	160	204	0	2	2641.739	4	0.501	40	1004	1
29	29	77	101	45	349965	82	294	0	159	395	45	159	294	0	2	2027.434	3	0.455	26	24	1
30	22	78	114	60	533520	81	395	0	159	509	60	159	395	0	2	1971.688	3	0.359	26	24	0
31	32	35	59	31	64015	0	59	57	35	118	88	0	59	88	5	3831.332	6	0.527	1	0	0
32	35	74	81	38	227772	159	456	33	233	537	71	233	456	33	2	2563.656	4	0.370	104	24	1
33	37	48	68	31	101184	0	0	135	48	68	166	0	0	135	1	2045.127	3	0.486	54	1002	0
34	36	53	74	33	129426	0	0	166	53	74	199	0	0	166	1	2030.281	3	0.459	21	1002	0
35	34	55	116	36	229680	178	146	71	233	262	107	233	262	71	4	2019.531	3	0.442	74	0	1
36	33	62	68	52	219232	171	262	85	233	330	137	233	262	85	2	2000.479	3	0.408	10	17	0
37	28	80	104	63	524160	153	330	85	233	434	148	233	330	85	2	1994.205	3	0.399	72	1002	0
38	41	49	64	47	147392	0	64	88	49	128	135	0	64	88	1	2604.859	4	0.438	1	1002	1
39	42	47	104	34	166192	186	158	107	233	262	141	233	262	107	4	2047.557	3	0.491	79	0	0
40	38	71	77	47	256949	0	237	31	71	314	78	0	314	31	3	1928.820	3	0.286	10	0	0
41	46	74	81	38	227772	0	314	36	74	395	74	0	314	36	1	2013.561	3	0.430	7	37	0
42	40	77	101	45	349965	0	395	36	77	496	81	0	395	36	1	2001.036	3	0.409	1	41	0

Set 15 - 10-Package Look-Ahead Results																				
Packing Order	Item Number	Length	Width	Height	Volume	x1	y1	z1	x2	y2	z2	RCx	RCy	RCz	RCd	Caving Degree	Paste Number	Paste Ratio	Distance	Closest Item	Penalty Cost
1	1	71	83	43	253399	0	0	0	71	83	43	0	0	0	0	0.000	0	0.000	0	0	0
2	9	78	90	55	386100	155	0	0	233	90	55	233	0	0	2	2053.346	3	0.500	84	1	0
3	5	71	83	43	253399	84	0	0	155	83	43	155	0	0	2	2054.295	3	0.500	13	1	0
4	10	71	83	43	253399	0	0	43	71	83	86	0	0	43	1	2054.295	3	0.500	13	3	1
5	2	48	49	23	54096	0	0	86	48	49	109	0	0	86	1	2054.474	3	0.500	1	4	0
6	11	58	85	41	202130	0	83	0	58	168	41	0	83	0	1	2054.466	3	0.500	2	4	1
7	6	57	65	42	155610	0	83	41	57	148	83	0	83	41	1	2053.979	3	0.500	28	3	0
8	3	78	93	33	239382	155	90	0	233	183	33	233	90	0	2	2052.938	3	0.500	97	7	0
9	4	30	66	27	53460	125	83	0	155	149	27	155	83	0	2	2053.067	3	0.500	54	7	0
10	8	30	66	27	53460	95	83	0	125	149	27	125	83	0	2	2053.863	3	0.500	24	7	0
11	13	70	71	53	263410	163	0	55	233	71	108	233	0	55	2	2053.065	3	0.500	92	1002	1
12	14	58	85	41	202130	0	168	0	58	253	41	0	168	0	1	2052.847	3	0.500	97	8	0
13	7	54	77	40	166320	0	253	0	54	330	40	0	253	0	1	2054.482	3	0.500	1	12	0
14	17	70	71	59	293230	163	0	108	233	71	167	233	0	108	2	2053.702	3	0.500	53	1002	1
15	21	57	65	42	155610	176	0	167	233	65	209	233	0	167	2	2054.295	3	0.500	11	1002	1
16	12	80	111	68	603840	153	183	0	233	294	68	233	183	0	2	2014.910	3	0.434	95	13	0
17	23	78	93	33	239382	155	90	33	233	183	66	233	90	33	2	2680.535	4	0.567	1	1002	1
18	15	80	111	68	603840	153	294	0	233	405	68	233	294	0	2	2054.488	3	0.500	1	16	0
19	20	80	111	68	603840	153	405	0	233	516	68	233	405	0	2	2052.702	3	0.500	152	1002	0
20	19	70	71	59	293230	163	516	0	233	587	59	233	516	0	2	2054.485	3	0.500	1	19	0
21	25	69	81	50	279450	0	330	0	69	411	50	0	330	0	1	2024.289	3	0.451	84	1005	1
22	24	70	71	53	263410	0	411	0	70	482	53	0	411	0	1	2047.072	3	0.490	83	20	0

23	18	73	79	61	351787	0	482	0	73	561	61	0	482	0	1	2039.986	3	0.475	1	22	0
24	16	73	109	73	580861	0	148	41	73	257	114	0	148	41	1	1988.142	3	0.387	1	1002	0
25	29	49	73	40	143080	0	257	40	49	330	80	0	330	40	3	3833.840	6	0.531	1	0	0
26	28	30	66	27	53460	0	330	50	30	396	77	0	330	50	1	2054.128	3	0.500	14	23	0
27	31	30	66	27	53460	0	257	80	30	323	107	0	257	80	1	2051.500	3	0.500	113	1002	0
28	26	49	94	44	202664	184	89	66	233	183	110	233	183	66	4	1996.129	3	0.401	18	0	1
29	27	78	84	51	334152	155	183	68	233	267	119	233	183	68	2	2016.057	3	0.435	28	1002	0
30	22	80	111	68	603840	153	267	68	233	378	136	233	267	68	2	2034.558	3	0.467	27	1002	0
31	33	57	65	42	155610	0	83	83	57	148	125	0	148	83	3	3212.790	5	0.474	35	0	0
32	39	54	77	40	166320	54	253	0	108	330	40	54	330	0	3	3184.885	5	0.426	1	0	1
33	36	69	81	50	279450	69	330	0	138	411	50	69	330	0	1	2600.226	4	0.430	1	30	0
34	32	70	71	59	293230	70	411	0	140	482	59	70	411	0	1	2619.863	4	0.463	1	23	0
35	38	44	100	37	162800	111	83	27	155	183	64	155	83	27	2	2568.746	4	0.376	4	1004	1
36	34	71	83	43	253399	84	0	43	155	83	86	155	83	43	4	3780.023	6	0.440	13	0	1
37	30	80	111	68	603840	153	378	68	233	489	136	233	378	68	2	2054.488	3	0.500	1	30	0
38	40	58	73	52	220168	49	257	40	107	330	92	49	330	40	3	3173.934	5	0.407	1	0	1
39	44	44	100	37	162800	140	83	66	184	183	103	184	183	66	4	3161.694	5	0.387	12	0	1
40	43	69	81	50	279450	30	330	50	99	411	100	30	330	50	1	2580.871	4	0.398	54	37	1
41	37	57	65	42	155610	73	482	0	130	547	42	73	482	0	1	2054.481	3	0.500	1	37	0
42	42	78	93	33	239382	155	174	119	233	267	152	233	267	119	4	2007.253	3	0.421	68	0	1
43	41	73	109	73	580861	160	267	136	233	376	209	233	267	136	2	1996.998	3	0.402	1	42	0
44	35	73	79	61	351787	160	376	136	233	455	197	233	376	136	2	2054.174	3	0.500	23	1002	0
45	45	70	71	53	263410	0	411	53	70	482	106	0	482	53	3	3208.836	5	0.467	1	0	0
46	50	70	71	59	293230	70	411	59	140	482	118	70	411	59	1	2557.846	4	0.358	1	44	0
47	55	69	81	50	279450	164	186	152	233	267	202	233	267	152	4	2054.485	3	0.500	1	0	0
48	51	49	73	40	143080	58	180	0	107	253	40	58	253	0	3	2054.481	3	0.500	1	0	1
49	54	57	65	42	155610	0	482	61	57	547	103	0	482	61	1	2054.240	3	0.500	14	46	1
50	48	44	100	37	162800	0	148	114	44	248	151	0	148	114	1	2018.721	3	0.441	69	1002	1

51	47	58	73	52	220168	0	0	109	58	73	161	0	0	109	1	2004.312	3	0.415	11	1002	1
52	49	58	73	52	220168	0	0	161	58	73	213	0	0	161	1	2054.384	3	0.500	7	1002	1
53	52	73	79	61	351787	73	482	42	146	561	103	73	482	42	1	1942.347	3	0.309	1	46	0
54	46	78	84	51	334152	0	482	103	78	566	154	0	482	103	1	1932.694	3	0.294	66	1002	0
55	59	54	77	40	166320	99	334	50	153	411	90	99	411	50	3	2685.324	4	0.575	3	0	1
56	58	58	85	41	202130	0	397	106	58	482	147	0	482	106	3	2030.637	3	0.460	12	0	0
57	60	44	100	37	162800	108	230	0	152	330	37	108	330	0	3	2012.062	3	0.428	1	0	1
58	56	71	83	43	253399	78	482	103	149	565	146	78	482	103	1	1992.477	3	0.394	1	46	0
59	57	49	94	44	202664	0	388	147	49	482	191	0	482	147	3	1991.983	3	0.394	29	0	0
60	62	78	93	33	239382	0	482	154	78	575	187	0	482	154	1	2016.214	3	0.436	33	1002	0

Set 16 - 10-Package Look-Ahead Results																				
Packing Order	Item Number	Length	Width	Height	Volume	x1	y1	z1	x2	y2	z2	RCx	RCy	RCz	RCd	Caving Degree	Paste Number	Paste Ratio	Distance	Closest Item	Penalty Cost
1	1	40	43	39	67080	0	0	0	40	43	39	0	0	0	0	0.000	0	0.000	0	0	0
2	6	83	100	69	572700	150	0	0	233	100	69	233	0	0	2	2053.175	3	0.500	110	1	1
3	8	72	87	53	331992	161	0	69	233	87	122	233	0	69	2	2054.486	3	0.500	1	2	1
4	3	85	88	35	261800	65	0	0	150	88	35	150	0	0	2	2054.094	3	0.500	26	1	0
5	11	64	82	61	320128	169	0	122	233	82	183	233	0	122	2	2053.959	3	0.500	37	1002	1
6	10	56	86	23	110768	94	0	35	150	86	58	150	0	35	2	2053.376	3	0.500	54	1	0
7	5	72	88	68	430848	161	100	0	233	188	68	233	100	0	2	2052.488	3	0.500	152	1002	1
8	4	57	98	38	212268	176	188	0	233	286	38	233	188	0	2	2051.550	3	0.500	176	1004	0
9	2	56	66	41	151536	177	286	0	233	352	41	233	286	0	2	2045.511	3	0.490	177	1004	0
10	13	31	101	30	93930	0	43	0	31	144	30	0	43	0	1	2053.752	3	0.500	34	1002	1
11	12	75	107	24	192600	158	352	0	233	459	24	233	352	0	2	2040.965	3	0.482	158	1004	0
12	14	75	107	24	192600	158	459	0	233	566	24	233	459	0	2	2051.764	3	0.500	158	1004	0
13	9	76	97	40	294880	0	144	0	76	241	40	0	144	0	1	2009.892	3	0.426	85	1005	1
14	16	71	93	43	283929	0	241	0	71	334	43	0	241	0	1	2049.907	3	0.492	1	13	1
15	7	75	82	72	442800	0	334	0	75	416	72	0	334	0	1	2013.945	3	0.433	83	12	0
16	17	31	101	30	93930	31	43	0	62	144	30	31	144	0	3	3239.960	5	0.520	4	0	1
17	24	71	93	43	283929	71	241	0	142	334	43	71	241	0	1	2583.859	4	0.402	1	13	1
18	22	83	100	69	572700	75	334	0	158	434	69	75	334	0	1	2611.755	4	0.449	1	12	0
19	15	75	82	72	442800	0	416	0	75	498	72	0	416	0	1	2661.296	4	0.536	83	12	0
20	20	71	73	27	139941	0	261	43	71	334	70	0	334	43	3	2054.442	3	0.500	3	0	1
21	21	38	63	32	76608	195	0	183	233	63	215	233	0	183	2	2054.382	3	0.500	5	1002	1
22	18	30	74	27	59940	203	188	38	233	262	65	233	188	38	2	2053.887	3	0.500	24	20	0

23	19	72	88	68	430848	0	498	0	72	586	68	0	498	0	1	2053.361	3	0.500	86	12	0
24	29	56	86	23	110768	102	434	0	158	520	23	158	434	0	2	2053.959	3	0.500	26	23	1
25	28	30	74	27	59940	72	498	0	102	572	27	72	498	0	1	2627.052	4	0.478	56	12	1
26	26	56	66	41	151536	102	520	0	158	586	41	158	520	0	2	2600.243	4	0.431	30	23	0
27	31	40	43	39	67080	0	0	39	40	43	78	0	0	39	1	2053.171	3	0.500	54	1002	0
28	27	71	73	27	139941	71	261	43	142	334	70	71	334	43	3	2050.264	3	0.495	62	0	0
29	25	76	97	40	294880	76	144	0	152	241	40	76	241	0	3	2045.449	3	0.485	1	0	0
30	32	63	67	47	198387	0	43	30	63	110	77	0	43	30	1	2021.851	3	0.444	2	29	0
31	30	71	93	43	283929	162	352	24	233	445	67	233	352	24	2	2009.265	3	0.423	5	26	0
32	23	72	87	53	331992	161	445	24	233	532	77	233	445	24	2	2039.213	3	0.474	3	26	0
33	33	31	101	30	93930	63	0	35	94	101	65	94	0	35	2	2645.528	4	0.508	22	29	0
34	37	56	66	41	151536	94	0	58	150	66	99	94	0	58	1	2590.071	4	0.413	11	1005	1
35	36	40	43	39	67080	54	0	65	94	43	104	94	0	65	2	2611.906	4	0.450	14	1004	1
36	38	71	93	43	283929	162	352	67	233	445	110	233	445	67	4	2002.538	3	0.412	5	0	0
37	39	72	87	53	331992	161	445	77	233	532	130	233	445	77	2	2025.058	3	0.450	1	32	0
38	34	64	82	61	320128	169	270	41	233	352	102	233	352	41	4	2021.142	3	0.443	1	0	0
39	44	75	107	24	192600	158	338	110	233	445	134	233	445	110	4	2009.127	3	0.425	86	0	0
40	35	97	108	70	733320	0	133	40	97	241	110	0	241	40	3	1963.640	3	0.346	24	0	0
41	49	35	95	28	93100	97	146	40	132	241	68	97	241	40	3	2016.966	3	0.437	30	0	0
42	46	63	67	47	198387	0	43	77	63	110	124	0	43	77	1	1978.007	3	0.370	24	40	1
43	48	63	67	47	198387	170	445	130	233	512	177	233	445	130	2	1976.801	3	0.369	43	1002	0
44	47	85	88	35	261800	148	357	134	233	445	169	233	445	134	4	2017.923	3	0.439	51	0	0
45	40	97	108	70	733320	136	100	68	233	208	138	233	100	68	2	1926.219	3	0.282	4	1002	0
46	50	72	88	68	430848	0	498	68	72	586	136	0	498	68	1	1974.830	3	0.366	84	1002	0
47	41	97	108	70	733320	0	390	72	97	498	142	0	498	72	3	2000.048	3	0.408	51	0	0
48	51	40	43	39	67080	0	0	78	40	43	117	0	43	78	3	3912.519	6	0.665	1	0	0

Set 17 - 10-Package Look-Ahead Results																				
Packing Order	Item Number	Length	Width	Height	Volume	x1	y1	z1	x2	y2	z2	RCx	RCy	RCz	RCd	Caving Degree	Paste Number	Paste Ratio	Distance	Closest Item	Penalty Cost
1	1	68	70	61	290360	0	0	0	68	70	61	0	0	0	0	0.000	0	0.000	0	0	0
2	11	79	119	79	742679	154	0	0	233	119	79	233	0	0	2	2053.550	3	0.500	86	1	1
3	3	55	76	43	179740	99	0	0	154	76	43	154	0	0	2	2054.482	3	0.500	1	2	0
4	10	43	70	34	102340	111	0	43	154	70	77	154	0	43	2	2054.479	3	0.500	1	2	0
5	2	58	80	40	185600	0	70	0	58	150	40	0	70	0	1	2053.799	3	0.500	40	4	0
6	13	79	119	79	742679	154	0	79	233	119	158	233	0	79	2	2053.815	3	0.500	62	1002	1
7	5	55	76	43	179740	178	0	158	233	76	201	233	0	158	2	2054.482	3	0.500	1	6	1
8	4	77	91	36	252252	156	119	0	233	210	36	233	119	0	2	2053.835	3	0.500	42	6	0
9	15	68	70	61	290360	0	0	61	68	70	122	0	0	61	1	2054.485	3	0.500	1	1002	1
10	6	77	91	36	252252	156	210	0	233	301	36	233	210	0	2	2054.484	3	0.500	1	8	0
11	12	49	72	35	123480	184	119	36	233	191	71	233	119	36	2	2054.359	3	0.500	7	10	1
12	16	68	70	61	290360	0	0	122	68	70	183	0	0	122	1	2053.941	3	0.500	37	1002	1
13	14	49	72	35	123480	0	70	40	49	142	75	0	70	40	1	2053.576	3	0.500	46	12	1
14	7	40	94	25	94000	0	150	0	40	244	25	0	150	0	1	2051.949	3	0.500	116	11	0
15	9	30	78	22	51480	69	0	0	99	78	22	99	0	0	2	2051.735	3	0.495	1	1004	0
16	17	71	76	56	302176	162	301	0	233	377	56	233	301	0	2	2021.504	3	0.448	162	1004	0
17	8	81	119	65	626535	152	377	0	233	496	65	233	377	0	2	2036.013	3	0.472	152	1004	0
18	21	51	58	31	91698	0	0	183	51	58	214	0	0	183	1	2054.367	3	0.500	6	1002	1
19	25	40	94	25	94000	193	191	36	233	285	61	233	191	36	2	2054.148	3	0.500	16	17	1
20	20	66	89	43	252582	167	496	0	233	585	43	233	496	0	2	2051.858	3	0.500	167	1004	0
21	19	30	78	22	51480	0	244	0	30	322	22	0	244	0	1	2051.113	3	0.500	126	1002	1
22	24	30	78	22	51480	0	322	0	30	400	22	0	322	0	1	2051.220	3	0.500	122	1002	1

23	23	46	93	39	166842	0	70	75	46	163	114	0	70	75	1	2025.123	3	0.450	8	12	1
24	22	89	113	27	271539	0	400	0	89	513	27	0	400	0	1	2020.546	3	0.444	63	20	1
25	27	89	113	27	271539	30	287	0	119	400	27	30	400	0	3	2027.973	3	0.456	33	0	1
26	18	59	98	44	254408	0	70	114	59	168	158	0	70	114	1	2018.736	3	0.441	62	1002	0
27	28	65	76	62	306280	0	70	158	65	146	220	0	70	158	1	2684.763	4	0.576	90	7	1
28	29	65	76	62	306280	168	76	158	233	152	220	233	76	158	2	2664.212	4	0.541	103	27	0
29	35	55	119	50	327250	0	150	25	55	269	75	0	150	25	1	2562.074	4	0.365	18	1002	1
30	32	40	94	25	94000	40	150	0	80	244	25	40	150	25	5	3856.473	6	0.571	44	0	1
31	31	46	93	39	166842	0	163	75	46	256	114	0	163	114	5	3826.648	6	0.519	1	0	0
32	34	49	72	35	123480	58	78	0	107	150	35	58	150	0	3	2622.367	4	0.467	2	0	1
33	30	57	79	46	207138	176	119	71	233	198	117	233	119	71	2	2027.210	3	0.455	41	1002	0
34	26	59	98	44	254408	0	168	114	59	266	158	0	168	114	1	2013.417	3	0.432	62	1002	0
35	41	30	78	22	51480	69	0	22	99	78	44	99	0	22	2	2658.277	4	0.529	1	1004	1
36	36	55	119	50	327250	0	146	158	55	265	208	0	146	158	1	2054.326	3	0.500	12	1002	0
37	37	58	80	40	185600	175	119	117	233	199	157	233	119	117	2	2050.525	3	0.493	1	1002	0
38	33	71	76	56	302176	162	198	61	233	274	117	233	198	117	6	3149.971	5	0.367	25	0	0
39	44	49	72	35	123480	135	119	36	184	191	71	184	119	71	6	3168.888	5	0.399	7	0	1
40	38	71	76	56	302176	162	199	117	233	275	173	233	199	117	2	2604.812	4	0.439	47	1002	0
41	39	55	119	50	327250	80	150	0	135	269	50	80	150	0	1	2548.231	4	0.342	18	40	0
42	43	51	58	31	91698	0	513	0	51	571	31	0	513	0	1	2042.479	3	0.484	116	20	0
43	40	58	80	40	185600	175	496	43	233	576	83	233	496	43	2	2021.939	3	0.449	137	1002	0
44	51	51	58	31	91698	103	0	77	154	58	108	154	0	77	2	2032.988	3	0.463	1	1004	1
45	45	46	93	39	166842	187	403	65	233	496	104	233	496	65	4	2023.161	3	0.450	116	0	0
46	48	57	79	46	207138	97	0	108	154	79	154	154	0	108	2	2011.846	3	0.428	30	1002	0
47	49	77	91	36	252252	90	496	0	167	587	36	167	496	0	2	2002.686	3	0.412	1	42	1
48	47	59	98	44	254408	0	415	27	59	513	71	0	513	27	3	1998.956	3	0.406	14	0	1
49	50	77	91	36	252252	0	324	27	77	415	63	0	415	27	3	1987.128	3	0.387	55	0	1
50	42	71	76	56	302176	162	301	56	233	377	112	233	377	56	4	1980.865	3	0.375	16	0	0

51	52	49	72	35	123480	127	119	71	176	191	106	176	119	71	2	2585.177	4	0.404	7	50	0
52	53	46	93	39	166842	106	403	0	152	496	39	152	496	0	4	2050.270	3	0.493	3	0	0
53	54	77	91	36	252252	0	324	63	77	415	99	0	415	63	3	2000.190	3	0.409	55	0	0
54	55	77	91	36	252252	0	415	71	77	506	107	0	415	71	1	2002.275	3	0.414	98	45	0
55	46	65	76	62	306280	0	339	99	65	415	161	0	415	99	3	1978.330	3	0.372	59	0	0
56	62	30	78	22	51480	163	191	36	193	269	58	193	191	36	2	2054.419	3	0.500	3	1002	1
57	58	58	80	40	185600	0	415	107	58	495	147	0	415	107	1	2053.220	3	0.500	73	1002	1
58	63	58	80	40	185600	175	496	83	233	576	123	233	496	83	2	2013.685	3	0.433	97	1002	0
59	64	46	93	39	166842	187	403	104	233	496	143	233	496	104	4	2025.250	3	0.450	1	0	0
60	59	59	98	44	254408	0	415	147	59	513	191	0	415	147	1	1986.692	3	0.385	29	1002	0
61	65	66	75	47	232650	0	340	161	66	415	208	0	415	161	3	2018.635	3	0.439	12	0	0
62	56	65	76	62	306280	168	496	123	233	572	185	233	496	123	2	1975.854	3	0.367	35	1002	0
63	66	57	79	46	207138	176	417	143	233	496	189	233	496	143	4	2024.050	3	0.449	31	0	0
64	57	89	113	27	271539	0	415	191	89	528	218	0	415	191	1	1949.338	3	0.321	2	1002	0
65	68	43	70	34	102340	119	307	0	162	377	34	162	377	0	4	2674.375	4	0.556	1	0	1
66	69	55	119	50	327250	132	377	65	187	496	115	187	496	65	4	2551.515	4	0.347	8	0	1
67	67	46	93	39	166842	108	0	154	154	93	193	154	0	154	2	1936.022	3	0.299	27	1002	0

Set 18 - 10-Package Look-Ahead Results																				
Packing Order	Item Number	Length	Width	Height	Volume	x1	y1	z1	x2	y2	z2	RCx	RCy	RCz	RCd	Caving Degree	Paste Number	Paste Ratio	Distance	Closest Item	Penalty Cost
1	1	68	73	62	307768	0	0	0	68	73	62	0	0	0	0	0.000	0	0.000	0	0	0
2	9	68	73	62	307768	0	73	0	68	146	62	0	73	0	1	2054.485	3	0.500	1	1	0
3	2	41	70	30	86100	68	0	0	109	70	30	68	0	0	1	2054.409	3	0.500	4	2	0
4	11	41	70	30	86100	109	0	0	150	70	30	109	0	0	1	2054.477	3	0.500	1	3	0
5	5	83	113	76	712804	150	0	0	233	113	76	233	0	0	2	2666.420	4	0.543	42	3	0
6	3	44	44	42	81312	0	0	62	44	44	104	0	0	62	1	2053.808	3	0.500	30	5	0
7	4	53	79	41	171667	180	0	76	233	79	117	233	0	76	2	2052.647	3	0.500	103	1002	0
8	14	68	73	62	307768	165	113	0	233	186	62	233	113	0	2	2054.485	3	0.500	1	5	1
9	7	53	79	41	171667	180	0	117	233	79	158	233	0	117	2	2054.482	3	0.500	1	7	0
10	10	53	79	41	171667	180	0	158	233	79	199	233	0	158	2	2054.122	3	0.500	21	1002	0
11	6	36	86	29	89784	0	44	62	36	130	91	0	44	62	1	2051.954	3	0.500	114	1002	0
12	8	85	115	60	586500	0	146	0	85	261	60	0	146	0	1	2039.796	3	0.477	80	8	0
13	20	44	44	42	81312	106	0	30	150	44	72	150	0	30	2	2053.623	3	0.500	38	1004	1
14	19	60	104	26	162240	173	186	0	233	290	26	233	186	0	2	2052.887	3	0.500	88	12	1
15	21	31	114	29	102486	0	261	0	31	375	29	0	261	0	1	2051.466	3	0.500	142	14	0
16	12	98	99	68	659736	135	290	0	233	389	68	233	290	0	2	1988.450	3	0.390	104	15	0
17	22	91	96	28	244608	142	389	0	233	485	28	233	389	0	2	2052.229	3	0.500	142	1004	1
18	13	89	92	73	597724	144	389	28	233	481	101	233	389	28	2	2012.808	3	0.431	119	1002	0
19	23	53	79	41	171667	180	211	26	233	290	67	233	290	26	4	2054.482	3	0.500	1	0	1
20	15	94	98	74	681688	139	113	62	233	211	136	233	113	62	2	2518.168	4	0.291	71	1002	0
21	24	42	73	32	98112	191	211	67	233	284	99	233	211	67	2	2054.370	3	0.500	6	18	1
22	17	89	92	73	597724	144	297	68	233	389	141	233	389	68	4	2005.535	3	0.417	12	0	0

23	18	89	92	73	597724	144	389	101	233	481	174	233	389	101	2	2014.209	3	0.431	1	18	0
24	16	90	100	79	711000	143	289	141	233	389	220	233	389	141	4	2687.890	4	0.582	143	0	0
25	26	36	86	29	89784	197	211	99	233	297	128	233	211	99	2	2666.715	4	0.543	12	24	0
26	29	88	88	43	332992	85	202	0	173	290	43	173	290	0	4	2620.836	4	0.465	16	0	0
27	27	41	70	30	86100	68	70	0	109	140	30	68	70	0	1	2054.477	3	0.500	1	26	1
28	34	88	88	43	332992	145	389	174	233	477	217	233	389	174	2	2054.457	3	0.500	3	1002	1
29	33	44	92	40	161920	91	290	0	135	382	40	135	290	0	2	2053.399	3	0.500	60	15	1
30	32	42	73	32	98112	31	261	0	73	334	32	31	261	0	1	2044.712	3	0.484	12	29	1
31	31	53	79	41	171667	180	485	0	233	564	41	233	485	0	2	2030.212	3	0.464	179	1002	0
32	25	85	115	60	586500	0	375	0	85	490	60	0	375	0	1	1997.804	3	0.404	6	31	0
33	36	50	68	31	105400	85	382	0	135	450	31	135	382	0	2	2640.990	4	0.502	85	1004	1
34	37	68	73	62	307768	0	490	0	68	563	62	0	490	0	1	2049.929	3	0.495	112	31	0
35	30	83	113	76	712804	0	377	60	83	490	136	0	490	60	3	1979.295	3	0.373	52	0	0
36	28	98	99	68	659736	0	146	60	98	245	128	0	146	60	1	1954.726	3	0.331	41	1002	0
37	38	31	114	29	102486	0	261	29	31	375	58	0	375	29	3	3860.154	6	0.576	1	0	0
38	40	41	70	30	86100	109	70	0	150	140	30	109	70	0	1	2702.544	4	0.604	1	1005	0
39	41	91	96	28	244608	89	485	0	180	581	28	180	485	0	2	2013.264	3	0.430	4	35	1
40	39	60	104	26	162240	90	44	30	150	148	56	150	44	30	2	2003.964	3	0.414	4	1004	0
41	42	60	104	26	162240	120	0	76	180	104	102	180	0	76	2	1948.995	3	0.321	9	36	0
42	43	83	113	76	712804	97	0	102	180	113	178	180	0	102	2	2588.779	4	0.411	34	36	0

Set 19 - 10-Package Look-Ahead Results																				
Packing Order	Item Number	Length	Width	Height	Volume	x1	y1	z1	x2	y2	z2	RCx	RCy	RCz	RCd	Caving Degree	Paste Number	Paste Ratio	Distance	Closest Item	Penalty Cost
1	1	33	54	20	35640	0	0	0	33	54	20	0	0	0	0	0.000	0	0.000	0	0	0
2	6	33	54	20	35640	33	0	0	66	54	20	33	0	0	1	2054.470	3	0.500	1	1	1
3	8	94	104	27	263952	139	0	0	233	104	27	233	0	0	2	2053.378	3	0.500	72	2	1
4	9	81	91	48	353808	152	0	27	233	91	75	233	0	27	2	2052.450	3	0.500	145	1002	1
5	10	79	83	43	281951	154	0	75	233	83	118	233	0	75	2	2052.944	3	0.500	102	1002	1
6	2	57	62	51	180234	176	0	118	233	62	169	233	0	118	2	2054.482	3	0.500	1	5	0
7	3	57	62	51	180234	176	0	169	233	62	220	233	0	169	2	2746.395	4	0.684	176	1004	0
8	11	57	62	51	180234	0	0	20	57	62	71	0	0	20	1	2039.111	3	0.476	82	1002	1
9	4	52	63	35	114660	0	0	71	52	63	106	0	0	71	1	2050.351	3	0.496	100	1002	0
10	14	54	78	22	92664	85	0	0	139	78	22	139	0	0	2	2054.102	3	0.500	18	9	0
11	7	43	71	39	119067	0	0	106	43	71	145	0	0	106	1	2041.016	3	0.477	1	9	0
12	5	65	66	36	154440	168	104	0	233	170	36	233	104	0	2	2032.304	3	0.468	168	1004	0
13	15	33	54	20	35640	0	54	0	33	108	20	0	54	20	5	3844.720	6	0.550	1	0	0
14	18	43	71	39	119067	0	0	145	43	71	184	0	0	145	1	2053.768	3	0.500	36	1002	0
15	12	57	101	42	241794	176	170	0	233	271	42	233	170	0	2	2043.575	3	0.486	176	1004	0
16	19	76	79	71	426284	157	91	36	233	170	107	233	170	36	4	3163.630	5	0.390	7	0	1
17	22	65	66	36	154440	0	0	184	65	66	220	0	0	184	1	2731.920	4	0.658	111	7	0
18	21	57	62	51	180234	176	170	42	233	232	93	233	170	42	2	2052.252	3	0.500	127	1002	1
19	16	81	91	48	353808	152	271	0	233	362	48	233	271	0	2	2024.291	3	0.452	152	1004	1
20	17	81	91	48	353808	152	362	0	233	453	48	233	362	0	2	2054.486	3	0.500	1	19	0
21	13	76	119	61	551684	157	453	0	233	572	61	233	453	0	2	2038.737	3	0.476	157	1004	0
22	24	46	100	21	96600	0	108	0	46	208	21	0	108	0	1	2040.126	3	0.480	122	1005	0

23	25	54	78	22	92664	0	208	0	54	286	22	0	208	0	1	2043.178	3	0.484	98	1005	0
24	28	68	93	25	158100	0	286	0	68	379	25	0	286	0	1	2038.426	3	0.475	84	21	1
25	29	79	83	43	281951	0	379	0	79	462	43	0	379	0	1	2016.571	3	0.437	72	21	0
26	27	66	68	48	215424	0	462	0	66	530	48	0	462	0	1	2044.112	3	0.485	91	21	0
27	20	71	99	64	449856	162	354	48	233	453	112	233	453	48	4	1993.748	3	0.399	108	0	0
28	32	57	101	42	241794	119	170	0	176	271	42	176	271	0	4	3204.587	5	0.461	66	0	1
29	31	65	66	36	154440	103	104	0	168	170	36	168	170	36	8	3850.212	6	0.560	12	0	1
30	23	76	79	71	426284	81	91	36	157	170	107	157	170	36	4	2512.094	4	0.280	7	0	0
31	34	57	101	42	241794	119	170	42	176	271	84	176	170	42	2	2604.770	4	0.440	84	27	1
32	30	68	93	25	158100	165	453	61	233	546	86	233	453	61	2	2054.482	3	0.500	1	21	0
33	26	76	79	71	426284	157	275	48	233	354	119	233	354	48	4	2039.785	3	0.475	1	0	0
34	36	81	106	30	257580	0	102	21	81	208	51	0	208	21	3	2530.053	4	0.311	23	0	1
35	37	45	60	26	70200	0	208	22	45	268	48	0	208	22	1	2054.064	3	0.500	18	33	1
36	38	45	60	26	70200	188	453	86	233	513	112	233	453	86	2	2051.882	3	0.500	108	1002	0
37	41	81	106	30	257580	71	271	0	152	377	30	152	271	0	2	2024.697	3	0.449	2	31	1
38	35	71	99	64	449856	0	280	25	71	379	89	0	379	25	3	2583.181	4	0.401	12	0	0
39	42	81	106	30	257580	71	271	30	152	377	60	152	271	30	2	2645.562	4	0.507	2	1004	1
40	40	66	68	48	215424	86	377	0	152	445	48	152	377	0	2	2054.400	3	0.500	6	38	1
41	39	57	62	51	180234	0	379	43	57	441	94	0	379	43	1	2045.418	3	0.485	21	40	0
42	33	76	119	61	551684	81	453	0	157	572	61	157	453	0	2	1992.857	3	0.395	2	26	0
43	46	33	54	20	35640	33	54	0	66	108	20	33	54	20	5	3859.303	6	0.575	1	0	0
44	45	43	71	39	119067	119	382	48	162	453	87	162	453	48	4	2001.682	3	0.410	1	0	0
45	43	81	106	30	257580	84	453	61	165	559	91	165	453	61	2	2010.238	3	0.427	84	1004	0
46	53	43	71	39	119067	190	354	112	233	425	151	233	354	112	2	2000.625	3	0.408	1	36	0
47	44	65	66	36	154440	168	288	119	233	354	155	233	354	119	4	2021.872	3	0.446	65	0	0
48	54	54	78	22	92664	179	425	112	233	503	134	233	425	112	2	2024.058	3	0.451	86	1002	0
49	55	68	93	25	158100	0	286	89	68	379	114	0	379	89	3	2012.724	3	0.432	89	0	1
50	47	66	68	48	215424	0	379	94	66	447	142	0	379	94	1	1977.889	3	0.372	78	1002	0

51	57	43	71	39	119067	147	354	112	190	425	151	190	425	112	4	3168.285	5	0.397	1	0	0
52	51	66	68	48	215424	0	311	114	66	379	162	0	379	114	3	2018.054	3	0.440	58	0	0
53	52	71	99	64	449856	0	379	142	71	478	206	0	379	142	1	1959.838	3	0.339	14	1002	0
54	50	81	106	30	257580	0	273	162	81	379	192	0	379	162	3	1961.767	3	0.343	28	0	0
55	56	71	99	64	449856	162	425	134	233	524	198	233	425	134	2	1953.359	3	0.328	22	1002	0

Set 20 - 10-Package Look-Ahead Results																				
Packing Order	Item Number	Length	Width	Height	Volume	x1	y1	z1	x2	y2	z2	RCx	RCy	RCz	RCd	Caving Degree	Paste Number	Paste Ratio	Distance	Closest Item	Penalty Cost
1	1	56	86	34	163744	0	0	0	56	86	34	0	0	0	0	0.000	0	0.000	0	0	0
2	4	70	112	51	399840	163	0	0	233	112	51	233	0	0	2	2053.048	3	0.500	107	1	0
3	8	70	112	51	399840	93	0	0	163	112	51	163	0	0	2	2053.998	3	0.500	37	1	1
4	10	64	70	58	259840	169	0	51	233	70	109	233	0	51	2	2054.406	3	0.500	6	3	1
5	11	33	98	20	64680	60	0	0	93	98	20	93	0	0	2	2054.400	3	0.500	4	1	1
6	6	53	74	40	156880	180	112	0	233	186	40	233	112	0	2	2054.203	3	0.500	16	3	0
7	2	43	58	31	77314	0	86	0	43	144	31	0	86	0	1	2054.124	3	0.500	16	6	0
8	5	43	58	31	77314	0	0	34	43	58	65	0	0	34	1	2053.326	3	0.500	50	1002	0
9	12	69	76	58	304152	100	0	51	169	76	109	169	0	51	2	2046.187	3	0.487	56	8	1
10	9	72	74	68	362304	161	0	109	233	74	177	233	0	109	2	2048.972	3	0.492	43	1002	1
11	3	69	81	69	385641	92	0	109	161	81	178	161	0	109	2	2026.118	3	0.453	42	1002	0
12	14	50	76	35	133000	43	98	0	93	174	35	93	98	0	2	2575.094	4	0.388	43	1004	0
13	13	42	109	22	100716	0	144	0	42	253	22	0	144	0	1	2054.479	3	0.500	1	12	0
14	15	62	90	38	212040	171	186	0	233	276	38	233	186	0	2	2043.498	3	0.485	129	13	1
15	16	70	112	51	399840	163	276	0	233	388	51	233	276	0	2	2031.477	3	0.465	163	1004	0
16	7	69	81	69	385641	164	388	0	233	469	69	233	388	0	2	2029.555	3	0.461	151	1002	0
17	24	33	98	20	64680	60	0	20	93	98	40	93	98	20	4	3842.875	6	0.547	4	0	1
18	19	53	74	40	156880	127	112	0	180	186	40	180	186	0	4	3829.052	6	0.524	34	0	0
19	18	43	97	32	133472	0	144	22	43	241	54	0	144	22	1	2616.243	4	0.460	84	18	1
20	21	65	113	53	389285	168	469	0	233	582	53	233	469	0	2	2054.486	3	0.500	1	16	0
21	25	53	74	40	156880	180	0	177	233	74	217	233	0	177	2	2054.444	3	0.500	3	1002	1
22	26	53	109	24	138648	0	253	0	53	362	24	0	253	0	1	2043.913	3	0.482	1	1005	1

23	20	56	86	34	163744	115	186	0	171	272	34	171	186	0	2	2042.010	3	0.479	4	22	0
24	17	70	112	51	399840	0	362	0	70	474	51	0	362	0	1	2013.846	3	0.433	93	20	0
25	27	33	98	20	64680	0	264	24	33	362	44	0	362	24	3	2053.902	3	0.500	24	0	1
26	23	70	112	51	399840	0	474	0	70	586	51	0	474	0	1	2053.170	3	0.500	98	20	0
27	29	69	82	42	237636	164	306	51	233	388	93	233	388	51	4	2012.479	3	0.431	94	0	0
28	22	69	76	58	304152	164	388	69	233	464	127	233	388	69	2	2002.689	3	0.414	93	1002	0
29	33	62	90	38	212040	171	186	38	233	276	76	233	276	38	4	3190.455	5	0.437	74	0	1
30	30	72	74	68	362304	161	112	40	233	186	108	233	186	40	4	3192.221	5	0.439	34	0	1
31	36	56	86	34	163744	177	186	76	233	272	110	233	186	76	2	2050.470	3	0.494	34	1002	1
32	37	33	98	20	64680	200	469	53	233	567	73	233	469	53	2	2044.220	3	0.489	147	1002	1
33	35	68	89	39	236028	165	299	93	233	388	132	233	388	93	4	2032.737	3	0.464	28	0	1
34	32	43	97	32	133472	125	469	0	168	566	32	168	469	0	2	2012.140	3	0.428	1	26	1
35	28	69	76	58	304152	95	393	0	164	469	58	164	469	0	4	1995.227	3	0.399	5	0	0
36	39	62	90	38	212040	109	186	34	171	276	72	171	186	34	2	2578.968	4	0.394	30	1004	1
37	38	53	109	24	138648	72	469	0	125	578	24	125	469	0	2	2028.953	3	0.457	2	26	0
38	31	72	74	68	362304	161	388	127	233	462	195	233	388	127	2	1962.229	3	0.343	25	1002	0
39	42	64	70	58	259840	169	318	132	233	388	190	233	388	132	4	2054.030	3	0.500	30	0	0
40	43	33	98	20	64680	135	469	32	168	567	52	168	469	32	2	2051.201	3	0.497	66	26	1
41	41	69	82	42	237636	164	104	108	233	186	150	233	186	108	4	1970.735	3	0.358	27	0	0
42	34	72	74	68	362304	161	186	110	233	260	178	233	186	110	2	1990.068	3	0.391	40	1002	0
43	44	56	86	34	163744	177	100	150	233	186	184	233	186	150	4	2035.278	3	0.468	26	0	0
44	49	69	82	42	237636	164	186	178	233	268	220	233	186	178	2	2702.915	4	0.606	50	39	0
45	48	43	97	32	133472	190	89	184	233	186	216	233	186	184	4	2036.916	3	0.470	4	0	0
46	47	53	109	24	138648	53	253	0	106	362	24	53	362	0	3	2027.515	3	0.454	1	0	1
47	46	64	70	58	259840	0	0	65	64	70	123	0	0	65	1	2006.486	3	0.419	28	1002	0
48	45	69	76	58	304152	0	0	123	69	76	181	0	0	123	1	2037.735	3	0.472	23	1002	0