UNIVERSITY OF CINCINNATI

Date: 5/15/2009

I, Garth William Paquin,

hereby submit this original work as part of the requirements for the degree of:
Master of Architecture
in School of Architecture and Interior Design

It is entitled:

Thinking Through Making

Student Signature: Garth William Paquin

This work and its defense approved by:
Committee Chair: Gerald Larson
Rebecca Williamson

Approval of the electronic document:

I have reviewed the Thesis/Dissertation in its final electronic format and certify that it is an accurate copy of the document reviewed and approved by the committee.

Committee Chair signature: Gerald Larson
Thinking Through Making

A thesis

Submitted to the division of research and advanced Studies of the University of Cincinnati in partial fulfillment of the requirements for the degree of

Master of Architecture

In the

School of Architecture and Interior Design
College of Design, Architecture, Art, and Planning

2009

Garth William Paquin
BFA University of Louisville, 2004

Committee Chairs:

Gerald Larson
Rebecca Williamson
Abstract:

Something special occurs in the process of a human maker interacting with the physical world through creation. The product contains a quality of struggle and knowledge that is never possible to create in automated production. The maker also learns and grows through their interactions with the physical. The lack of this knowledge in the goods of our globalized industrialized economy is a form of poverty.

Architecture has a great opportunity to resist this trend in the depersonalization of our environment. It is one of the only remaining products that are still custom created for each site. This trend toward dehumanized architecture is exhibited in the ever-greater removal of the architect from the actual process of construction. I describe elements of the design process related to craft processes, which allow architects to interact more directly with their materials.

Architects develop an affinity for certain materials similar to the relationship a craftsman has for his materials or fabrication process. Architects who grow to understand materials at a deep enough level bring out the innate potential of the material and process their designs. Here I focus on developing understanding of the potentials of brick.

I propose to design a ceramics cooperative on the site of the Historic Nelsonville Brick Plant. This complex would display a continuum of making traditions. The spaces include an interpretive center for the display of the historical artifacts of the brick making site, a ceramics workshop and gallery to reflect the role local craft art plays in the community today.
Acknowledgements:

To my father

And thank you to all those who have shown me the way
# Table of Contents

i  Title Page
iv  Abstract
vii Acknowledgements
viii Table of contents
x  List of illustrations
1  Introduction
18  1 Maker
28   1.1 The Goodness of Work
34   1.2 Things for People
40   1.3 Craft in Architecture
43   2 Process
50   2.1 Skill
53   2.2 Knowledge
56   2.3 Craft-based Design Process
61   3 Material
65   3.1 Brick
67   3.2 Mortar
72   4 Product
73   4.1 Site
82   4.2 Program
86   4.3 Thesis Design Process
94   Conclusions
97   Bibliography
List of Figures and Illustrations

Figure 1 Throwing Demo
http://www.ceramicstoday.com/articles/throwing_demo.htm

Figure 2. Components of Systems of Making

Figure 3. Craft Process

Figure 4. Jigger Arm
http://axner.com/axner/equipment/images/pottery-wheel-powerarm.jpg

Figure 5 Buy More
http://fandomania.com/wp-content/uploads/2008/05/buymore.jpg

Figure 6 Hands in Clay
http://i.pbase.com/g1/82/265582/3/106456076.3BX1EOL7.jpg

Figure 7 Ruskin and Carver

http://www.newyorkcarver.com/orsan1.htm

Figure 8 Paper Making
http://users.stlcc.edu/nfuller/paper/paper4.jpg

Figure 9 Gaudi’s Process
http://farm2.static.flickr.com/1262/1414025954_d29c9e930b.jpg?v=0

Figure 10 Blacksmith’s tongs

Figure 11 Skill and Knowledge

Figure 12 Scarpa Drawings
http://www.mak.at/mysql/rte/upload/old/carlo_scarpa_2.jpg

Figure 13 Pye Boxes

Figure 14 Exeter
Photo by Edwin C Robertson
http://www.caed.kent.edu//History/Modern/Kahn/kahn_phillips3.JPG

Figure 15 Semper’s primitive Hut

Figure 16 Brick

Figure 17 Brick Bonds
Figure 18 Lewerentz detail
Photo by Jerry Larson

Figure 19 Hocking River Valley

Figure 20 The Nelsonville Star

Figure 21 Nelsonville

Figure 22 Starbrick Clay

Figure 23 Abstract

Figure 24 Site Model

Figure 25 4 x 8 sheet

Figure 26 Buildings

Figure 27 Anagama Construction

Figure 28 Scale Bricks

http://faculty.delhi.edu/hultendc/A220-Week2-BrickBonds.jpg
Introduction

When a potter begins to work they first knead the clay, removing air bubbles and aligning the platelets within the clay but also gaining an understanding of the specific stickiness and plasticity of that particular batch of clay. When the clay is taken to the wheel for throwing it is centered on the wheel with just enough water added to allow it to slide past the potter’s hands. Always working with some vision of the final work the interior opening of the vessel is then bored by the potter’s fingers and pulled open to the desired size. Here the thickness of the bottom is crucial. The bottom of the vessel is then compressed to realign the clay for durability. Then the process of throwing the pot begins. One hand is placed on either side of the wall of the pot and as the pot spins on the wheel gentle pressure is exerted in both hands grabbing a nub of clay and slowly drawing it up the wall of the pot. Variations in pressure change the amount of clay moved and the shape of the vessel. More pressure with the inside hand will produce a bowl or flared vase shape. Extra pressure on the outside hand will create a cone shape and a narrowing of the opening. Inconsistencies in the clay body or the centering of the clay must be accounted for with minute variations in pressure to avoid
knocking the whole pot off center or tearing through a thinner section of the vessel wall. These instantaneous variations in technique must be determined based on a profound knowledge of the behavior of clay on the wheel from experiences of failure after failure. Most of this is not even seen but rather felt in the way the clay moves against the potters hands as they throw a pot.

Fig 1. A Potter throws a pot.
What does the way a potter throws a pot have to do with architecture? It turns out that a process like this has a great deal to teach about how to go about making architecture. After all what is architecture but a way of going about making buildings. As a making process architecture has a lot in common with the example of the potter.

In a basic system of human creation there are four components: A person, or maker, who comes up with the idea and enacts a process to change the world in some way which they find to be beneficial; a material, a substance of the physical world which will be shaped by the will of the maker to take on those useful characteristics; the product, that material in its new form with a new and for the maker more desirable set of properties; and last but not least there is a process by which the maker alters the shape of the material acting on it in a controlled manner.

Fig 2. Components of a system of Making
It is the process which I find most interesting as it is the place of direct confrontation between the human mind and the physical world. In that place ideas can be measured against results and results against ideas creating a valid way to judge both the work and the person and an interaction with the world where new things can be learned through both success and failure.

Fig 3. A Process of Making

In this process the Maker always plays the instigating role coming to each action with some idea of intention. It is through the will of this person that the finished product is formed but in order to get a result skill is required. This skill comes in
two different forms the articulate hand, and the educated eye. The Articulate hand is where the physical body responds to the commands of the brain with an incredible precision allowing it to enact ideas in reality.¹ To the potter this is his or her ability to keep their hands steady when centering or apply the precise amount of pressure to flaire a bowl. For an architect this is the ability to create drawings. Both making sketches to convey an idea and precision drawings to show exact proportions. These skills are necessary and require prolonged practice but would be useless without an equally educated eye. The Maker must not only be able to act but be able to respond to the results. This can only be done from a body of knowledge of the results of various actions in various conditions. There must not only be the ability to act but to know when and how to act based on the progress of the process.² The potter must be able to judge the appropriate pressure for that moment on the wall of the pot and how that pressure might be changed to produce a more desired result. An architect must be able to judge the function of a space plan and the experience

of a room based on a drawing. The next step, the next iteration, must then be based on an experience of many similar rooms and how their slight differences in design created a different experience. This is a skill which Carlo Scarpa described as Visual Competency, an understanding of the content of a design drawing.  

Material is a vital part of the process of making. Materials have properties inherent to their essence which limit their possibilities for being shaped into products. To produce a tool for cutting it is best to use something hard which will hold an edge, thus wet clay is not the best material for such an action. If the physical properties of the material do not allow for the desired result so another material should be considered. Fired clay on the other hand can produce exquisitely sharp cutting instruments as the hardness of the fired material has the prerequisite physical characteristics to hold a cutting edge. So it is that the Designer must select appropriate materials to obtain the desired effect. But Materials have not only physical characteristics but psychological characteristics as well. Architects have long had responsibility for not only the function of a building but its meaning as well, so it is

---

important that a designer choose materials which not only do the job of creating a building but also express the poetics of the meaning behind that building. This sort of material consciousness has been seen in many of the greatest buildings. Two architectural practitioners with a strong material consciousness were Sigurd Lewerentz with his explorations of the mortar joint in brick construction,⁴ and Louis Kahn with his understanding of the monumentality of masonry construction.⁵ These properties of a material create limited methods for each material’s shaping. It is exactly those limitations that make working with materials most fruitful. It is in the resistance of the material that the intentions of the maker are formed into a deeper insight into the world as it exists.

When the process of Making occurs the ideas of the maker are confronted with the nature of the material. It is in this struggle between the maker to enact their changes of form upon the material and the material to maintain its own form that creation happens. In the midst of this struggle there is a true interaction between human mind and the physical world.

Information about the nature of the material


must be understood and then acted upon in such a way that this information is accounted for. For the theorist David Pye, this was called the “Workmanship of Risk”. A type of making in which there is always a chance for failure so vigilance and understanding on the part of the worker is necessary to avoid mistakes in the work. It is possible to set up a system of making where the risk has also been virtually removed but in doing so the thought and the understanding of the person making has been removed from the system.\(^6\) As with an architect who specifies off the shelf systems the current maker bears none of the risk of making but also fails to gain the benefits of the possibilities of the material, like the potter who throws using a jigger. They require less understanding of the exact method needed to make a shape but with a jigger they can only throw one specific shape.

Some of this risk can be removed by traditions. Tried and true methods of making allow for a known result. This can be a useful short cut allowing specific elements to be focused upon but when taken as the only method tends to be static. There must be a continuous probing of the abilities of both the person and the material for there to be continued progress. It is in this exploration that this process, which I call craft, proves its worth.

**Maker**

It is the aspect of the human maker that is truly being lost in the race for efficiency, which the industrial drive for “More” has created. It is the apparent efficiency defined by economics at the cost of human well being that is at the root of many of the problems of today.  

---

Fig 5. Big Box stores represent an example of many of the trends of globalized capitalism.

This problem of an incomplete efficiency is embedded in all parts of our society today but it is especially apparent in our systems of making. Our extreme division of labor in the industrial factory has taken work, the driving force behind much of human existence since we first gained consciousness and removed its value and meaning thus reducing us to cogs asked to perform one task repeatedly without reaction or reflection. Our lives have thus gone from a parade of colorful and challenging experiences to a bland grayness of monotony and boredom. This boredom of repetitive sameness not only affects our lives at work but through the things we use, those beautifully sleek and smooth mass produced products which line the shelves of the big boxes seductively promising a better world but merely leaving us alone to face our fears and failures in their shiny mirrored surfaces. The promise of the vision of a technological utopia has ceased to satisfy. As Marx and Engels promised all that is solid melts into
air. So we find ourselves trying to grasp at meaning as the promise of modernism disappears before our eyes. Postmodernists in an attempt to live in this world of ephemera have created cardboard cutouts of our former symbols but they are devoid of meaning without the truth, which they used to represent. Somehow we must find a way to create some substance, some solid ground of truth and right from which to begin again in a world beyond the stalled promise of the utopia of technical progress. Archimedes said “Give me a lever long enough, and a prop strong enough, I can single-handed move the world.”

We must find, perhaps must build, that solid place to prop our lever. A place where people are what matter and it is their potential, which must be developed, in order to create a better world. The new science must be that of human knowledge and understanding. The only way to find solidity in this contemporary world of ephemerality is to go back to where we began and see where we went wrong. The industrial revolution has made great strides in increasing the material wealth and the physical comfort of a great number of people.

---


Unfortunately much of that has been done at the cost of exploitation and dehumanization of people at both the level of consumer and producer. The divergent economies and societies exploited by the capitalist process insures that the poor will remain poor as their work is devalued in order to provide cheaper goods and services for the rich. They are deprived even of their land forcing them to be dependent on a system that does not favor them. The system is inherently flawed in that there are incentives built into it to incorrectly value contributions. This system can produce enormous gains in the production and thus the general wealth of the populace as long as that wealth is equally distributed. It is unfortunately inherent in our current system that there be unequal distribution as that inequality is the driving force behind capitalism. There can be no doubt that capitalism and the industrialization that followed have improved the lives of many people. On the other hand the richest have become in many ways victims of their own success. In the rush to gain material wealth we have neglected our psychological well being. In America people have become more and more isolated as we became wealthier. As we grew wealthier we separated ourselves, first into single family homes in the suburbs and then even to different rooms. We don’t know our
neighbors. We don’t know where our food comes from or where our trash goes.\(^{10}\)

In craft there is an intimate connection with a material, a real honest to goodness experience of reality. In the process of making we have to face facts about what is possible both in terms of the potential of elements of the physical world and the limitations of our own skill. It is upon the foundation of this basic experience the confrontation of a human maker with a physical material in the process of creation that I would found my solid place. This experience can be rapturous or disheartening but it is real and forces a reflection on the state of both the self and the world. The act of creation can make us glory in the improbable beauty of the world in which we find ourselves as we are spoken to through the conversation of the process of making acting and reacting, interacting with our creations as they grow to life under our caring touch; or we may be disappointed coming face to face with our own limitations of time, money, skill, patience or attention. While these reactions create extreme emotions the process never disappoints for it is never the world that is found lacking but ourselves. The work creates a judgment

neither good nor bad but stating a plain truth which we must interpret as we will. This is the reason that craftsmanship has long been associated with honesty. While we may try to hide our shortcomings in our dealings with others, in a work faults in making are displayed for all to see, a soul revealed.

1.1 The Goodness of Work

The Industrial Revolution was a time of great upheaval. Along with changes in the ways of making came social upheavals that resulted from the requirements and consequences of such production. This involved the creation of slums in cities as the peasants were moved off their land and close to the factories. Moral betterment was a strong issue in Victorian times, perhaps exactly because of the deteriorating conditions created by the need for cheap labor for the factories.

Fig 6. The raw experience of hands in wet clay
John Ruskin was a son of a well to do family who came face to face with this ugly reality of the accumulation of wealth in the Victorian era. His response was to turn to aesthetic pleasure but his writings on art and architecture always included a strong political element on the value of labor.

Fig 7. John Ruskin and the Happy Carver

Ruskin was famous for his evocation of the happy stone carver. This character became a romantic figure, a reactionary revolutionary always attempting to be free, but forever doomed by industrialized production. The argument Ruskin made was that the value of the life of the maker was reflected in the work and, therefore, it was necessary that the maker be more free to control his own life and production rather than simply becoming simply a cog in an larger machine of production.

Ruskin then attempted to create an idea of aesthetic appreciation based on these social positions. He felt that what was beautiful was what made the artisan happy. The
careful consideration of each and every object as well as the decorative arts, which went into them, created in them the only value worth having. He dismissed the production of factories of as lacking value because they lacked the human consideration of each individual object required to give them beauty. In his opinion life without beauty was worth nothing.11

*The Craftsman* by Richard Sennett is a contemporary viewing of the state of our systems of making. He feels that it is time for a review of the Ruskinian view of craft. He believes that skill and methods of production have become an issue once again. Since the industrial revolution we have predominantly created technologies to replace human work. Sennett proposes that we should instead use technology to assist human effort and preserve our place in the process of production as the final arbiters of quality. This gives the jobs that require skill and discernment to people and the mindless physical labor to the machines. It places the value back into the hands of the human worker and respects the practical knowledge of the craftsman.12

1.2 Things for People

People are better at designing the aesthetics of our environment than machines. This is not because they are necessarily smarter or more accurate. It has to do with the fact that these designs are being created for people. There are so many variables involved in creating something to please human senses that to attempt to program each variable into a computer would be futile. Humans are instead gifted with the amazing ability not only to experience these sensations but also to imagine what they might be like. This
suggests that the craft process whereby a thing is created and experienced, then altered and adjusted to fit the precise intentions of the maker, is the best way to create.

Gaudi had a design process that was based in the craftsman builders of the European cathedrals. Rising out of Catalanon craft traditions Gaudi not only oversaw and directed the craftsmen who built his buildings but built large-scale mockups and wrote detailed directions for the fabrication of many pieces. He was known to demonstrate techniques for difficult works. As gifted as he may or may not have been as a craftsmen, he was not able to build whole buildings on his own. He had to come up with ways to design his buildings and describe them to his craftsmen in ways that still respected the craft tradition. His process was in many ways a holdover from the craftsman builders of the Middle Ages, consisting of an onsite workshop with analytical models, large-scale mockups, and full-scale patterns for the production of building elements.  

Gaudi’s process has many possibilities for the production of a design process with a closer relationship to craftsmanship. His use of analytical models gives a way for the

---

designer to get direct feedback. The use of large-scale mockups and patterns might demonstrate a method of representation, which would be more conducive to translation into craftsmanship.

One issue with the process that Gaudi used is that it relied on a cadre of trained craftsman from whom Gaudi could expect certain skills required for the individual fabrication of each and every piece of the building. In a post industrial age a literal return to his methods of design would be difficult and nostalgic. Currently, it would be difficult to find the team of skilled craftsmen necessary to complete all the tasks to make solely handcrafted buildings. Even if they could be found it would be impossible to pay them to do the work necessary at today’s standard of living. Some compromise with the industrial world would have to be found to retain the benefits of the creative work of craftsmen while still being economically feasible. The compromise must be made in such a way that while machines do much of the labor the work is still under the control of the craftsman. The value of having human beings create our environment is that they are best able to judge what is pleasing to a human being.
1.3 Craft in Architecture

Architecture has a singular opportunity to apply this type of making in that it is one of the few remaining processes of making which necessitate a craft approach. The individual requirements of each site as well as the shear scale of the construction of a building have lead to architecture adopting industrialized methods late and incompletely. A different sort of separation in the relationship between maker and material has occurred. The design process has been separated from the process of making. Beginning in the Renaissance with
the separation between artist and craftsman, the architect became a professional no longer involved directly in the act of building but instead a genius visionary, manager, and politician. The role of the architect became more focused on convincing all the parties involved in the building project to work together for a single vision. What was built became a secondary focus.\textsuperscript{14} This is displayed most prominently in the recent trend to paper architecture where actual buildings are scorned as only being imperfect reflections of an architect’s drawn vision.

The application of a craft based process to an architectural design is intended to remedy this separation between the designer and the material realization of their design, to bring back to the fore the built environment as the primary expression of the architectural art.

In order to create a process, which has the possibility of bridging this gap, we must look more carefully at how that process functions both in the work of craftsmen and in the design process of architects.

2 Process

The Craft process occurs when a maker is confronted by a material. The creator of any object has an intention in their mind for the end product which they are attempting to create.

The Craft process is the method by which that idea is transmuted into physical substance.

The resulting product is always related to the idea as conceived but never exactly replicated, as it has been entrapped in the solidity of matter. In order for the creation of a product to occur the maker must gain two characteristics. First, the maker must develop skill at manipulating the material. This is the physical knowledge of the specific collections of actions which allow the material to be shaped to the creator’s will. This must be accompanied by craft knowledge. This not only includes the understanding of how each action will affect

Fig 10. The difference between design intent and actual materiality.
the material, but also how others have manipulated the material and the results they have achieved. The control of material that is accomplished by a potter with their own two hands is accomplished in architecture through the practice of detailing. Detail drawings are the one of the few places in the architect’s repertoire of techniques in which they are forced to confront the actual nature of the material.

In the Tell the Tale Detail, Frascari lays out the idea of detailing as a method for establishing the concept of the building. He explains how in small things large issues can be worked out and in the relationship of the whole to the part a greater richness is found. As a student of Scarpa, Frascari came in contact with a different method of design, where the conception of the building did not drive the design of the building. Instead the conception of the details drove the design of the building. 15

---


15

---

Fig.11. *skill and knowledge in the craft process*
Fig 12.

Carlo Scarpa’s unique style of drawing and design.

To facilitate the production of a detail oriented building, Scarpa’s drawing process consisted of three specific parts. There was the large drawing board upon which the final drawing was drawn and this served as the reference for where the project was at a given time. He also had ocher card stock that he would use to work out portions at a larger scale. Lastly, he would use tracing paper to go over these and make proposals about variations in proportion or form, a process he called filing down. This process gave him the characteristic fragmentation of his work but it also seems to have allowed a common reference to the larger whole,
because there was always the large drawing board, which showed the greater whole.

Scarpa’s concept of Visual competency seems to be pertinent to developing a craftsmanship like process for architecture. Visual competency is his parallel to material consciousness in the work of the craftsman as a way to get feedback from a drawing. In developing this skill the architect may make drawings which provide a sort of test for the validity of an idea because the architect who has developed this visual competency can see by looking at the drawing whether it works or not, and continue to make drawings to develop a better solution.  

2.1 Skill

David Pye wrote his instrumental books on workmanship in the 1960’s. Once again the industrialized mechanism was being questioned with the resurgence of folk craft and the back to the land movement. Among the youth movements and the protests he expressed a quiet but powerful argument for a method of increasing human dignity through work. His most famous concept was the idea of the Workmanship of

---

Risk. This is the idea that workmanship (a similar idea to skill or craftsmanship) was demonstrated by producing highly regulated results in situations where those results were not predetermined by the tools used. This created a continuum between the “Workmanship of Risk” and the “Workmanship of Certainty”, where, like industrialized production, the result was predetermined by the tools before the process even began.

By valuing the “Workmanship of Risk”, Pye found a way to value the skill of a knowledgeable maker without denying the industrialized system. Embedded in this discussion of skill is an assumption of added quality of objects formed by a knowledgeable maker.

Fig 13. David Pye’s work reflected his theories of workmanship

2.2 Knowledge

Peter Dormer wrote about craft knowledge and learning at the same time that David Pye was writing about workmanship. As an art potter he was concerned with the departure of younger artists from the skills, which had been the mainstay of pottery throughout the ages. The modernist rejection of traditional methods had come into the crafts and he felt it was important to enumerate exactly what was important about these skills. He wrote about craft knowledge as a part of a type of knowledge called tacit knowledge.

Tacit knowledge is a type of knowledge that cannot be expressed in words. It must be seen and practiced to be acquired. Specialized language or jargon is created to express this knowledge to other practitioners who also have this knowledge, but it functions as a way of relating experiences, which can never be truly expressed in words. He divided craft knowledge into two categories, connoisseurship and practice. Both of these types of knowledge derive from understanding a process of creation through a series of successes and failures. Connoisseurship comes from observing many examples of work done with a specific process so that while the practitioner may not perform the process themselves, they are able to see the results, both good and bad, as
others experimentations with the process. In practice the practitioner uses the process to attempt to accomplish particular results. Through variation and mistakes the practitioner slowly evolves their technique to the point that they are able to accomplish the intended result. A skilled instructor is of the utmost importance in this process as through demonstration and critique they can direct their students to more successful methods and away from major mistakes.\(^{18}\) It is this continual process of repeated failure that makes craft knowledge so valuable, and also so frustrating as a model for architectural design.

### 2.3 A Craft based Design Process

The difficulty with the design processes of most architects, with the possible exception of Antonio Gaudi, is that they allow for little interaction with material during the design process itself. They must be based almost exclusively on the connoisseurship type of craft knowledge. All other material knowledge must come through the actual building of buildings.

This is the typical craft process, but

---

stretched out over an entire lifetime as each building may take considerable time to
design and construct. The design process should contain within it a way to speed up this learning. The general method is to do all experimentation through drawing. As Scarpa remarks the architect must develop a visual competency so that drawings are able to take the place of any real experiment with materials through remembered qualities. Granted it is much faster to be able to design through sketch, diagram and drawing alone, but it removes the material reality of the structure from the design process. In a building which is to last many decades as the work of most of these architect has, is it not pertinent to take a little more time in the design phase in order to ensure the best possible building for the expenditure of time energy and resources? Gaudi does this admirably both in doing models in related materials and analytical models which show him the properties of those materials. Kahn does something similar to those models but in his drawing of his diagramatic designs. By separating the functions of each material diagrammatically he is able to cater his design to its specific qualities. But where is one to learn of these qualities?
The traditional method for architects has been to practice for several decades before producing significant buildings. While this is a worthwhile and adequate process it has the liability that architecture, unlike most other crafts, can not afford a large amount of initial failures leading up to a small body of good work. The time and expense are simply too great. So there must be a way to develop a faster and less costly education process. Of course there is always the method, which Lewerentz uses, of leaving the craft to the craftsmen. By designing spaces generally, without technical specifications, and then describing his intentions for a space to the

Fig 14. In Kahn’s Exeter Library each material performs a diagramatic function
craftsmen building it, he puts the success of his buildings in their hands. Which in the end is the fate all built work.

3 Material

Material based processes were central to Gottfried Semper’s theories of making. He proposed that each of the different parts of a building had evolved from a different material process. He felt that the archetypal meaning of the parts of the building were somehow related to their relationship to that initial process. For him the wall and its relation to fabrics and weaving were paramount, but he also talked about the frame, the earthwork and the hearth.  

Fig 15. Semper based his four elements on his idea of a primitive hut

All crafts have a similar basic structure in the way that the maker and material relate, but as each material has its own character, it greatly affects the kind of process that occurs informing the relationship with the maker. For this project, I chose to focus on brick. It has had a long tradition of craftsmanship and its inherent relation to the human body uniquely displays the process of making. What is so unique about brick is that it consists of a collection of small units within a matrix, which make a larger whole. The arrangement and placement of those small units greatly affect the end result making it difficult to explore its possibilities within the general forms of drawing and modeling. Brick is often treated by designers and architects as simply a surface thus negating all of its inherent form creating properties.

Fig 16.
A brick is a masonry unit that can be held in one hand.
3.1 Brick

Brick is originally formed from clay. Clay is a highly plastic material with no inherent form. It is through a careful mixing, molding, and firing process that this material is formed into the modular ceramic units we call bricks. The clay itself can take almost any form but for our convenience in the building process bricks are formed into regular orthogonal units which fit in the human hand. The units are orthogonal in geometry because of the simplicity in tessellating them. An intersection that is 90 degrees creates only other 90 degree angles which allows the length of the sides of a shape with 90 degree angles to be altered without altering its angles. This property greatly expands the possible combinations of a single unit by allowing not only repetition of the same piece but also repetition of other forms with harmonic or integer ratio relationships. The modular brick for example contains the ratios 1:2, 1:3, and 2:3 depending on the side of the brick used. It is the complexity created by combinations of these ratios which allow the multitude of possible brick patterns.

Fig 17. The variety of brick bonds
3.2 Mortar

In his *Case for the Techtonic*, Peter Frampton wrote about the need for a poetics of construction. He took Semper’s division of the crafts in each part of a building and took the frame as paramount. Influenced by structural rationalism, he focused on the frame whose sole role is to bear a building’s loads. He also felt that the frame, rather than the earthwork or the woven wall, showed more promise for carrying out the intensions of lightness and transparency inherent in modernism. As he focused on the frame his interest was drawn to the joint, that pinnacle of the craft of the frame. He spoke eloquently on the poetic potential of the expression of the joint and not just the joint within the frame, but as the joint between the frame and the earthwork. His work seems inconclusive and incomplete, having explored the Tectonic, or frame, it simply poses the question of the Stereotomic, or earthwork.  

In brick work the joint, which was so fetishized by Frampton is created with mortar. This plastic medium made from a mixture of lime, cement, and sand in water forms the matrix which joins bricks together. The craft of brick laying is less

---

about bricks than about the skillful application of mortar, creating large constructions out of the small brick unit. While little attention is paid to this mortar joint in most brick construction, without it building in brick would be impossible. Its specific fluid properties make a variety of results possible which are not apparent from the orthogonal form of brick. 21

Sigurd Lewerentz had a very distinctive style of brick detailing, which was often raw in the extreme but always well crafted. He would not allow the masons building his buildings to cut bricks or use levels or plumb bobs. He developed a technique for using wider mortar joints to allow the system of brick to adapt to varying conditions imposed by details at corners and openings. He would often specify that mortar, instead of being cleaned from the brick face and carefully toweled to make recessed joints would instead be rubbed off with a piece of sack cloth spreading mortar down onto the bricks and leaving textured impressions on the joints. His austerity and devotion to the honesty of brick as a material also lead him to often specify that utilities be run outside the wall and exposed in their most utilitarian form.

Lewerentz’s interest in the materials and process of brick masonry as well as many of his ideas about specifying a unique process to promote craftsmanship in the builders, is important to the search for a process to mediate between design and craft. The special consideration of the mortar joint in brick masonry as a solution to many of the problems faced in brick construction, sheds new light on this building system and is provocative for the possibilities of brick construction to come.

4 Product

To test this process and gain an understanding of brick as a material, it is necessary to develop a project with the specific attributes of site and program which are advantageous to this pursuit. It was important that the site have a history which provides material for the understanding of

---

the role of tradition in the crafts process. The program must be diverse enough to allow for a variety of techniques to be experimented with while creating an appropriate focus for the development of expressive detailing. Together these elements create opportunities for the exploration of the expressive capabilities of brick construction.

### 4.1 Site

In order to find a site for this proposed brick building, I searched the region for places rich in traditions of both brick and craft. The Hocking River valley in southeastern Ohio has a long tradition of brick making.\(^\text{23}\)

![Location of Hocking River Valley and Nelsonville](http://www.ohgen.net/ohathens/hocking_valley_brick_industry.htm)

**Fig 19.** Location of Hocking River Valley and Nelsonville

\(^{23}\) http://www.ohgen.net/ohathens/hocking_valley_brick_industry.htm
This valley in the Appalachian Mountains was originally mined for coal but the same geological features which produce coal seams also contain shale and fire clay the raw materials necessary for the making of brick. With the introduction of the railroad to the area these natural resources were capitalized upon creating a brick industry, which stretched up and down the entire river valley from Columbus to Athens. Late in the brick making phase of this area there was also the introduction of art pottery production. The largest of the workshops was Roseville Pottery in Zanesville, Ohio. One of the foremost brick producing towns in this area was Nelsonville. It was known for producing a star imprinted paver brick and a salt glazed block, which can still be seen in the houses and silos of the area. As a center of the brick boom, the parts of the town built during this period contain exquisite examples of brick craftsmanship in red, orange salt glazed, and ebony brick in a variety of sizes, styles and textures.

Fig 20. The famous Nelsonville Star

Today Nelsonville is a tourist and college town. Valued for its proximity to the spectacular Hocking Hills and Wayne National Forest, the town is known mostly for Hocking College, Rocky Boots, and its central crafts square. The old Town square has been converted by an Appalachian Ohio Fund project into a craft market containing eight galleries and the craft school for Hocking College.\textsuperscript{25} This abundance of resources and support has made Nelsonville host to some well respected artists and high quality work.

\textsuperscript{25} http://www.nelsonvillechamber.com/
Just outside of Nelsonville is the site of the old Nelsonville brick factory. In operation from 1887 till 1937, this factory produced the famous Nelsonville star brick as well as the Nelsonville block and many other styles. Despite the fact that the welcome sign at the entrance to town lists it as home to this factory, there has been very little preservation since the factory’s closure. Most of the site has been sold to the Wayne National Forest. The park service has had a plan in place for many years to create a handicap accessible pathway through the site, following the old tram tracks but has yet to accomplish any development. In the 1980’s a small piece of the site with road frontage was sold to the city to create a park and they have managed to preserve one of the beehive kilns and its smoke stack but today a lack of funds has caused the park to begin to deteriorate. Most recently the site has been turned over to the Nelsonville Chamber of Commerce in hopes that a tourist destination might be more easily sustained than a public park. Two other kilns remain in various stages of disrepair as well as the smokestack they used. The ruins of the two clay sheds remain and the whole site is scattered with discarded block.

Following in the footsteps of Starbrick Clay, the initial gallery in the main square, I hope to use the traditions of ceramic manufacture in the area to create not only an interpretive center to educate visitors about the importance of this site, but also a working ceramics workshop and gallery to develop the understanding that this is not a static history but continues in the production of craft pottery and ceramic art today.

Fig. 22. Starbrick Clay was the first craft gallery to open on the old town square

4.2 Program

The program for this project came out of the need to create a way for visitors to interact with the history of this locally important site, as well as the desire to express the continuing crafts traditions which exist in Nelsonville today. The program is divided into two parts: the buildings to address historic brick production and the contemporary ceramic craft production areas. The historic part of the program consists of an interpretive center and a history trail. The interpretive center contains a small museum to display artifacts from the site’s brick making past, an archive to store historic documents about the
ceramic history of the area, and a trailhead
to orient visitors and inform them on the
features visible from the trail. The history
trail leads visitors from the museum through
the remaining ruins to the contemporary
crafts workshop and gallery.

The part of the program to support the
current ceramic craft in the area consists of a
Ceramics workshop and a gallery to display
and sell the work on site. Only the workshop
and the gallery need be accessible to the
public. The Workshop is to not only function
as the workspace for the artisans living on
site, but to provide a demonstration area so
that visitors to the site can learn about the
ceramic process. All the necessities of
ceramic crafts must be provided but in such
a way that while they are visible when ever
possible, they are separated when necessary
for visitors safety.

The Gallery is to provide a space in
which visitors can optimally experience the
craft work which is produced on the site.
Space to accommodate sales functions must
also be included.
**Program**

**Museum**
- Artifact display: 500 sqft
- Archive/Artifact Storage: 200 sqft
- Office: 100 sqft
- Restroom: 100 sqft
- Grossing Factor: 100 sqft
- Total: 1000 sqft

**Gallery**
- Artwork Display: 800 sqft
- Office: 100 sqft
- Grossing factor: 100 sqft
- Total: 1000 sqft

**Workshop**
- Clay Storage: 500 sqft
- Clay Preparation: 300 sqft
- Clay Forming: 500 sqft
- Storage and Drying: 1000 sqft
- Glazing: 200 sqft
- Kilns and Firing: 500 sqft
- Restroom: 100 sqft
- Break Room: 500 sqft
- Individual spaces: 400 sqft
- Grossing Factor: 1000 sqft
- Total: 5000 sqft

Total square footage on the site is 7,000 sqft

---

### 4.3 Thesis Design Process

In designing this project I have attempted to find a way to create a more direct connection between the process of making in the process of design. By using the resistance created by models and drawings I hoped to allow the information embodied in those researched elements to directly influence my design process. by acting as constraints.

Fig 23. A three dimensional thesis abstract emphasizes the importance of materials
This scenario was developed as a response to the idea of arched spaces at the end of the first quarter of thesis. The plaster model lent itself to explorations of excavation.

A second scenario was developed using multiple spanning methods. The clay site model enabled experimentation with both cut and fill.

In an attempt to create a similar method for learning from drawings to that of the site model, I combined all of my drawings on one board. Inspired by drawing sessions I have experienced on construction sites, I did these drawings on a 4 x 8 sheet of plywood. While this did provide a valuable condensation of graphics and an interesting size for presentation it was ultimately less than successful in creating limitations to facilitate design. In addition the size and weight made it difficult to move and manipulate.
A second method for connecting design with the making process was to find a way to make design reflect the feedback of the actual building material, rather than that of a design element. To advance this a great deal of research into bricks was necessary. I found that spanning seemed to be the determining factor in brick design and construction and broke down my design into two different categories lintels and arches.

Fig 25. Drawings on a 4 x 8 sheet of plywood
Fig 26. *Explorations of lintels and arches.*

Two buildings showing different methods of using arches to create spaces. The higher building which is programmed to be a ceramics studio uses more traditional vault and dome techniques similar to those employed in most ceramics kilns, including the beehive kilns on the site. The lower building is to be used as a gallery space. It takes its more organic shape from anagama kiln design (a Japanese wood fire kiln style) where a wicker framework is built before laying the brick.

Fig 27. Lattice centering is used to build anagama style kilns
In order to get a greater understanding for the nature of brick I have embarked on a process of creating scale bricks. In experimenting with various production techniques and coloration methods I have gained a greater understanding of how the variety of brick is produced the relation of the brick making

*Fig 28. 1” =1’ scale brick wall sample*

**Conclusion**

In experimenting with the creation of form in material, it is important always to keep in mind that it is the designer, the maker, who is directing the outcome toward their intended goal. The designer must clearly envision this goal, perhaps not in the particulars of making but rather in a deep understanding of the intended effect on those who experience their creation. With this clear intention in mind the tango that occurs between material and maker in a craft process can only serve to add richness and depth to the final creation showing not only
the ideal but its struggle for emergence into reality.
Bibliography

Adamson, Glen. *Thinking Through Craft.*
Berg, New York, NY; 2007


McKibben, Bill. Deep Economy: The Wealth of Communities and the Durable


Salomon, Shay. Little House on a Small Planet. Lyons Press, Guilford, CT; 2006


Wilson, Frank R. *The Hand*. Vintage Books,

New York, NY; 1998


http://www.ohgen.net/ohathens/

hocking_valley_brick_industry.htm

http://www.nelsonvillechamber.com/

http://quotationsbook.com/quote/31599/