I, Travis Shane Little hereby submit this work as part of the requirements for the degree of: Master of Architecture in: The School of Architecture and Interior Design

It is entitled: Materials Matter: Exploring Unconventional Applications of Brick in Architecture

This work and its defense approved by:

Chair: Michael McInturf
Gordon Simmons
Materials Matter:
Exploring Unconventional Applications of Brick in Architecture

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Abstract

Throughout history, man has shared an intimate relationship with materials and what purpose these materials hold in art, architecture and buildings. Over the last half century, the exploration of new materials and the re-invention of traditional materials has grown at an exponential rate. Material explorations, coupled with advancements in technology, have expanded the palette of materials available to architects and designers, but reduced their intimate relationship with and knowledge of these new materials. Architects and designers must explore unconventional applications for traditional and non-traditional materials in order to discover new ways to push the limitations of these resources to express qualities that were previously overlooked.
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Introduction

“A man who works with his hands is a laborer; a man who works with his hands and his brain is a craftsman; but a man who works with his hands and his brain and his heart is an artist.”  
- Louis Nizer

Materials played an important role in the practice of architecture long before books were written on the subject. For centuries their use and development in buildings have continually impacted the progression of architecture, construction and civilization itself. Civilizations are categorized by the materials they used: i.e. the Stone Age, Bronze Age, Iron Age. These periods spanned centuries; but the introduction of new concepts and applications of materials are now introduced in months rather than decades or centuries.  

According to the Random House Dictionary, materials are the substance or substances of which a thing is made or composed; anything that serves as crude or raw material to be used or developed; any constituent element. Materials are more than just a technical property of buildings; they are a precondition that promote ideas, creativity and pleasure in architecture and guide us to the loftiest aspirations of theory.

Although early cultures were limited by the number of available materials, some of the most artistic and well crafted buildings were created with only stone and wood. Many centuries passed before materials like marble and travertine were used in ancient Greece and Egyptian temples. With this passage of time, various trades improved their skills and use of these materials in their buildings. Until the 18th century, materials used in buildings helped to set cities apart from one another and established a ‘language of places.’ This separation helped to categorize cites by their entrenched habits, construction practices and symbolic codes, which led cities and neighborhoods to possess a well-defined repertory of solutions for individual aesthetic and construction problems.
The Industrial Revolution broke this balance by providing new possibilities from materials such as iron, reinforced concrete, steel and structural glass. These advancements along with the creation of many new finishing materials expanded the palette of forms and textures that architecture and construction could draw. Now as we leave the 20th century the introduction of new materials and advancements in technology have changed the way buildings are designed and constructed. Buildings that once were constructed of materials applied in conventional ways are now built using materials created from various fabrication techniques that rarely express the true nature of the materials being used.

Though these advancements are a welcomed improvement to the profession, the time dedicated to studying a material’s properties and possible applications is continually being reduced. According to Stephen Kieran, principal architect in KieranTimberlake, “More products [materials] have been invented in the past fifteen years than in the entire prior history of architecture and we are only just beginning to tap into the potential of these materials.” The world of material possibilities is larger than most architects and designers are aware of, so architects and designers rely on material manufacturers for researching and creating new materials they can use, which forces them to depend on the results provided by the manufacturers. As the goals of manufacturers are not always aligned with the goals of architects, this reliance on manufactures presents a problem. Architects must do their own research into materials. They cannot be limited by the failure of architecture schools to teach about materials in their curriculum, or the failure of manufacturers to provide innovative materials.

There is a tradition to which architects can look for inspiration in their material use. There are architects and artists from the 20th century who have developed theories of design based on their interest in materials, both traditional and new. The architects who follow this tradition are allowing materials to be an integral part of early design phases and affect the way spaces are viewed, structured
This thesis examines the work of various architects, artists, writers and historians, focusing on their methods of research, modes of application, and thought process regarding their unconventional uses of materials in art and architecture. Their ideas establish a solid foundation from which my thesis can be generated and supported: that the unconventional application of conventional materials can create spaces that users can enjoy and experience for centuries.

The design portion of this thesis attempts to put this theory into practice in the design of a Technical School in the Over-the-Rhine neighborhood of Cincinnati that focuses on teaching the properties, fabrication, and unconventional applications of materials to the built environment. The goal of the school is that the taught skills and knowledge of materials and their unconventional applications will allow students to apply materials in unconventional ways, but stay within the material’s properties, manufactured process and value of the product. The goal of the project is to use a specific conventional material, brick, to achieve an extraordinary design for the school that lives up to its mission. The following chapters discuss the theories and the design portion of the thesis as laid out below:

Chapter One, Materials Matter: Material Expressions in Architecture, investigates the views and works of Frank Lloyd Wright, Peter Zumthor, Toshiko Mori regarding the importance of materials to architecture. Understanding the inherent properties and various applications of materials in architecture allows architects to create spaces that allow its users to experience materials in a new light.

Chapter Two, Materials in Art: Transforming the Ordinary into Extraordinary, looks at the work of artists Marcel Duchamp and the Boym Studio, exploring their use of ordinary materials in extraordinary ways. Their work, along with Michael Blahnik’s views on the human consciousness as it pertains to one's view of materials and objects in a space, will be explored further to expand my
knowledge of materials and their importance to art, architecture and society.

Chapter Three, Materials in Architecture: From Theory to Practice, explores the work of Herzog and de Meuron, Kennedy Violich Architects, Rural Studio, Office dA and Lewis Tsurumaki Lewis. It details their use of conventional materials in unconventional ways, thus creating a better understanding of materials and their place in architecture and the built environment.

Chapter Four, Materials: From Past to Present, presents the history of brick and its conventional applications. Further exploration of brick and its specific affects on architecture is researched to allow for a better understanding of how architects can assign different properties to brick, allowing them to apply brick in ways that push the limits of the material, while staying within its technical properties, manufactured process and value to architecture.

Chapter Five, “A Project For an Unconventional Brick” explains the project chosen as the subject of the design portion of this thesis, and the ways brick will be applied to its design and construction to allow for its properties to be pushed beyond their normal limits. Once the design intentions are explained, the history of the site and the reasons for its selection is explored. To help strengthen the ideas and reasons behind the selection of the site and building type, the history of Over-the-Rhine and its development over the last two hundred years is explored, along with a brief explanation of the history of technical education in the United States. Photos, text and diagrams will accompany these ideas and help to verbally and graphically document and support the site and building.

Chapter Six, Methodology: Thesis Precedents, focuses on various architectural projects that support this thesis and project by analyzing their design strategies and ideas in order to find principles that can be applied to the final design project, a Technical School. The American Folk Art Museum in New York by Tod Williams and Billie Tsien, the Casa La Roca House by Office dA, Venice Pizza in Over-the-Rhine by Terry Boling and University of Cincinnati architecture students and the Center
for Furniture Craftsmanship in Maine, are analyzed to understand the aspects of their designs that pertain to the premise of this thesis. The next chapter begins exploring the beauty, fundamental nature and cultural aspects of materials to create a better understanding of their importance to art, architecture and buildings.

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Endnotes

5 Portoghesi, Paolo. “New Materials” Materia. NR 42, 25
Chapter 1
Materials Matter: Material Expressions in Architecture

Various architects, authors, and historians, have written on the subject of materials and their contributions and importance to architecture. Architects such as Frank Lloyd Wright, Peter Zumthor, Toshiko Mori and many others have taken materials to a new level in their designs and are true material scientists as well as architects. Each considers materials in a different manner: Wright categories a material by its capacity for beauty, Zumthor attempts to express the fundamental nature of a material by its application in a specific instance, and Mori is interested in a material's social and cultural meaning.

1.1 - Beauty: Frank Lloyd Wright

According to Terry Patterson, in his book Frank Lloyd Wright and the Meaning of Materials, “Architects rarely comment on the expressive role of building materials in their work. Since it is often difficult to recognize a clear and consistent relationship between a building’s materials and the architectural goals of the designer, critical discourse on the subject has been limited.” Patterson believes that architects do not define specific strategies for materials in their designs and doubts their significance in the artistic realm. He believes that one architect, Frank Lloyd Wright, understood the importance and proper use of building materials in his designs.

Wright believed in evoking the essence of materials. He advised architects to reveal the essence of wood, plaster, brick or stone in their designs, because they are all inherently beautiful. Throughout his seventy-year career, Wright recorded an extensive log of buildings and materials that very few architects, if any, can equal.

For example, Wright’s attention to the detail and the durability levels of brick in his design of the Robie House in Chicago (Fig. 1.1 and 1.2) had a huge impact on the overall aesthetic of the
building. The stone coping and base used at the exterior brick walls not only protected the brick from water penetration and staining, they also added to the overall aesthetic of the building. His use of roman brick established horizontality to the house, a design strategy for which Wright is well known in many of his projects. He rarely defined the nature of materials by their technical properties but by their ability to yield beauty.\textsuperscript{10} If Wright's expression positively reflects the nature of materials, then his commitment to the material's essence is justified, but his material sensitivity would not.

According to Wright, an architect should train himself to see that every material possesses poetry of its own; hence each material can become its own ornamentation and even suggest the appropriate proportions for a building.\textsuperscript{11} He also suggested working whenever possible in mono-materials, except where the use of sympathetic extra materials may add the necessary grace needed. To Wright each material speaks its own language and contains its own message and to a creative architect it has its own song.\textsuperscript{12}

1.2 - Fundamental Nature: Peter Zumthor

Peter Zumthor is another master of materials boasting some of Switzerland’s major contemporary architectural achievements because of his careful use of materials left natural such as stone, wood and concrete. He received his training as an apprenticed woodworker for his father. His careful attention to details and materials is seen in the majority of his work including his Thermal Baths at Vals (Fig. 1.3), Art Museum in Bregenz, Austria (Fig. 1.4) and Saint Benedict Chapel in Sumvitg (Fig. 1.5).

His designs strive to expose the fundamental nature of materials, focusing less on beauty and more on the language of materials and their application to buildings. This is evident not so much in his plans or sections but in his treatment of the materials and their connections that make the buildings the objects of beauty. He believes materials can take on a poetic quality in the context of an architectural object only if the architect applying them is able to generate a meaningful situation.
for them, because materials themselves are not poetic. According to Zumthor:

“The sense that I try to instill into materials is beyond all the rules of composition, and their tangibility. Smell and acoustic qualities are merely elements of the language that we are obligated to use. This sense emerges when I succeed in bringing out the specific meaning of certain materials in my buildings, meaning that can only be perceived in just this way in this one building.”

To achieve this goal, Zumthor says to constantly ask ourselves what we plan to use the materials for and in what context. If this goal is met, architects will be able to express the intrinsic essence of materials and separate them from their cultural meanings, thus making them sing out and shine. He also believed that such artworks will benefit from the sensuous presence of the materials that define space. This faith in materials and craft is an element that is always present in Zumthor’s work; in many aspects, this is the most important feature in his work.

During an interview conducted while he was a guest professor at the Berlage Institute in Amsterdam, Zumthor explained his view on building and architectural theory:

“Basically I am not interested in architecture as a profession on paper. I am just saying this because many architects are not so interested in the real building; they are more interested in the theory of the building or only in some aspects of the building. I am concerned about the material, how things are put together, not the way it looks, but the way it is. I am interested in the building itself, how you see it, how you feel it, how it is made, the building as a body.”

In his Thermal Baths at Vals he limited the palette of materials to stone and water. The building was constructed using a metamorphic rock called gneiss that is found locally. Gneiss was cut
into lumber-like planks and stacked in alternating lengths similar to the boulders that are embedded on the concrete walls in Frank Lloyd Wright’s Taliesin West.\(^\text{17}\)

The plan (Fig. 1.6) is organized around an outdoor rectangular pool and an interior square pool. To add definition to some of the bathing areas, water, light, steam and heat were incorporated throughout the design to enhance the users’ overall perception of the spaces. The dark interior spaces were interrupted with moments of light created by openings in the stone above (Fig. 1.7). These light sources, both direct and indirect, are used to create spaces that direct the user through the space.\(^\text{18}\)

The Art Museum in Bergenz, Austria is another great example of Zumthor’s beautiful understanding of materials and their connections to architecture. The museum’s exterior skin is wrapped in an unconventional material, finely etched glass (Fig. 1.8). The glass panels are all the same size. Neither perforated nor cut, they rest on metal consoles (Fig. 1.9) held in place by large clamps, leaving the edges of the glass exposed to the elements. According to an article written in the *Architectural Record*:

“The museum’s smoky translucent and skewed angulations of the glass panels make the cube a volatile presence: it constantly changes during the day according to the light, at times even seeming to evaporate; at night, it becomes a radiant lantern…”\(^\text{19}\)

Along with its exterior, its pinwheel plan (Fig. 1.10), created by three interior concrete planes and etched glass exterior, shields its users, transporting the body away from the outside world, just as he did in his Thermal Baths at Vals.
1.3 - Culture: Toshiko Mori

In the introduction of *Immaterial/ Ultramaterial*, Toshiko Mori addresses the cultural aspects of materials. According to her, “Materials are the universal language of culture and civilization that is accessible and understandable to young and old. As an artifact, it carries with it many messages pertaining to: the place of its origin, the reason for its having been made, the history of its use, its mythical and cultural meaning, its performance value, its economic value and its life cycle, including the possibility for recycling or eventual disposal.”

‘Immaterial / Ultramaterial,’ was a 2001-2002 exhibition of research into materials by Harvard students led by Toshiko Mori, Nader Tehrani, Marco Steinberg, and Ron Witte. The exhibition was experiential, attempting to harness physical space, materials, exploration and celebration of intense effects of immateriality, and speculation about the coming era of ultramaterials. These experiments were categorized into four groups focused on the themes of ‘Surface’, ‘Edge’, ‘Phenomena’, and ‘Substance’. All installations in the exhibition were full-size, specific prototypes, tests, and mock-ups representing ongoing research.

Team ‘Surface’ (Fig. 1.11) explored the anonymous quality of homasote to rework it in ways unperceived by focusing on various design strategies that could impact a design. Team ‘Edge’ (Fig. 1.12) borrows techniques from textiles such as darting, pleating, and tabbing, to focus on themes such as edges, junctions, and corners, and to extend a material’s spatial, tactile, and experiential quality. This project pushed the conventional limits of plywood by weaving razor-thin strips into shapes that looked like they could float on air. This new expressive way to transform plywood will change our perception of wood and its possibilities for the field of architecture. Team ‘Phenomena’ used foam for its capability to respond to weight and body position, felt for its absorptive and tactile quality, and fiber optic lighting to project
shadows of hidden structures. Team ‘Substance’ (Fig. 1.13) used the thickness and massing of aerogel to challenge the ‘window’ and ‘wall’ distinction, and vacillate between opacity and translucency. 21

Wright, Zumthor, and Mori each have their own opinions about materials, what they mean to the profession of architecture, and how they should be applied, researched or developed. What we must realize is that materials coupled with the emergent digital design technologies are transforming the role of the architect and the boundaries of the discipline. As architects we must decide to embrace these changes and figure out ways to implement them in our designs, as well as find new ways to push the limits of materials in architecture. There is a tradition in both art and architecture of the 20th century of pushing those limits by exploring unconventional uses of conventional materials. The next two chapters present several instances of designers who participate in that tradition.

Endnotes
9 Patterson, 1994, 1.
10 Patterson, 1994, 237.
12 Wright, Frank Lloyd. Frank Lloyd Wright of Architecture. 8th Ed. (New York: Duell, Sloan and Pearce, 1941), 125-126.
18 Indersoll, 95.
19 Indersoll, 99.
21 Mori, Toshiko, 1-46.
Chapter 2

Materials in Art: Transforming the Ordinary to Extraordinary

“When an artist of talent makes a painting or a sculpture, he is always aware of the potentials and limitations of his materials; the better the artist, the more likely he is to know just what he can and cannot do with them.” - Bruce Cole

Along with architecture, one must look at art works for examples of material explorations because it is the ideas, research and implementations of many artists’ work that continue to point us toward the future. The artist, like the architect and designer, uses materials to promote ideas and creativity, the only difference being the artist actually has an intention for the material, while designers and architects use material to fulfill a function or satisfy the demands of the marketplace.

One movement in particular, Dadaism, looked at everything new: new ideas, new materials, new directions, and new people. Unlike the many other movements before it, Dadaism had no uniform characteristics. Many believed it to be a myth due to its extreme ideas and use of materials, but it was very real. The following artists best represent the ideas that coincide with the ideas of this thesis.

2.1 - Boym Studio

The Boym Studio’s work entitled “Recycle Project” (Fig. 2.1 and 2.2) aimed to recycle the aesthetic of everyday things. In all projects of the series at least one everyday object was used, particularly something that normally goes unnoticed. The objective was to place a frame around the object to take it out of its familiar context. This idea was taken from the dematerialization technique used by Russian Literary Formalists in the 1920’s. Their motto was “the old and habitual must be spoken of as if it were new and unusual.” This motto describes the intent of the works of the “Recycle Project.”
2.2 - Marcel Duchamp and Michael Blahnik

Marcel Duchamp, a French Dada artist and sculptor, also employed these ideas in a variety of his works. Two of his most famous Dada pieces, the ‘Fountain’ (Fig. 2.3) and ‘Bicycle Wheel’ (Fig. 2.4), changed the way people viewed everyday objects in their surroundings. He accomplished this by using familiar objects in unfamiliar ways. The style was named ready-made, because it used ordinary manufactured objects and singled them out and exhibited them as art. These ideas are further explored in Michael Blahnik’s book, *In Experience: An Exploration into the Structure and Dynamics of Human Consciousness*.

In the book, Blahnik provides examples of human perception regarding familiar and unfamiliar objects. He states:

“When entering someone’s house for the first time we scan the living room. We see a variety of furniture placed at various angles, carpeting, colored walls, pictures, nick-nacks, and other decorations. While we scan the room we also see a chair. We note nothing extraordinary about the chair, we see the chair and reflect upon it as a chair and we do not see it and think to ourselves or say aloud that it is a chair. Rather, we understand what we see without having to form in thought or speech what it is we see. Our perception is clear; the room is familiar; our understanding is immediate.”

Blahnik is asserting that it is difficult for familiar objects to capture a person’s attention when they are placed in a familiar context. He believes that before an object or material can affect or engage a person, it has to be placed in an unfamiliar context that will force the user to take a second look. For example he also states:
“Upon entering someone’s house we scan the living room and stop when we see an object that captures our attention. We’re not sure what the object is called or what function it serves, but we are sure that it is an object... At this point we see the object as an object with certain properties or characteristics... We focus on the properties, then on the whole we had initially perceived, in an attempt to understand what the object is... only later do we understand that what we see is a chair.”

In this example, Blahnik asserts that when a person encounters an unfamiliar object he or she has trouble deciding what the object is, which forces the user to further examine the unfamiliar object to try and attach a name to it so it can be archived in his mind.

How do these principles from Dadaism apply to architecture? How can architects explore these ideas and apply them to their designs? According to Louis Kahn, “Even a common, ordinary brick wants to be more than it is. It wants to be something better than it is.” Many designers test the way in which materials can be truthful but be pushed beyond their limits and assigned uncommon properties, to turn something ordinary into something extraordinary. The following chapter presents several contemporary architecture firms who explore unconventional applications of materials in built forms.

Endnotes

25 Boym, 22.
28 Blahnik, 3.
Many architects today still detail with the honesty of materials in mind by building on what a material ‘wants to be’. They believe that every material has a specific nature and set of inherent properties, which can either be expressed, revealed, or hidden depending on its application. They are continually working on ways to push the limits of materials and their applications in the built environment, hoping to re-contextualize a materials future use in design and construction. By researching new ways to process and apply these materials to buildings, architects will increase their role in the process of making and building.

Over the next few pages five-modern day firms, the work of Herzog and de Meuron; Kennedy and Violich Architects; the Rural Studio; Office dA; and Lewis Tsurmaki Lewis, are explored to show how they utilize new materials or re-invent old materials in new ways in their projects. Whether it is by assigning uncommon properties to the materials, applying them in a non-traditional way or using economically efficient materials richly in architecture, they all want to change the ways materials are viewed in the built environment.

3.1 - Herzog and de Meuron

Herzog and de Meuron, a Swiss architectural firm with an international reputation, founded in 1978 by Jacques Herzog and Pierre de Meuron, assigns unconventional properties to familiar building
materials, causing their appearance to contrast their essence.

For example, in their Pfaffenholtz Sports Center (Fig 3.1), both the concrete and glass were represented to look soft like carpet, instead of hard and solid as they typically are perceived. To achieve this goal the appearance was altered by using special forms and stamps which created areas of differing surface textures and finishes to cause the material to look darker in some areas and lighter in others. 31

Another project, the Dominus Winery in California (Fig. 3.2), used gabions, (steel-mesh screens usually used to keep rocks from falling on roadways), filled with stones collected from a nearby canyon to function as an external skin of the building. 32 This design allows for the density of the stone to change with elevation, allowing varying degrees of light to filter down to the rooms in the basement (Fig. 3.3). The project fully celebrates the nature of stone and its historical importance to architecture, while clearly expressing the fact that stone is no longer an important structural element.

Herzogs and de Meurons commitment to expressing materiality shows through all their projects and their success can be attributed to their skills in revealing unfamiliar or unknown relationships through familiar materials. Their passion for materials and their endless applications to architecture will continue to drive the way they view materials in their designs for years to come.

3.2 - Kennedy and Violich Architects

Kennedy and Violich Architects was founded in 1988 by principals Sheila Kennedy and Frano Violich. This firm explores the uses of materials by taking common materials in architecture out of their common framework, again assigning materials unconventional properties and transforming them from ordinary to extraordinary. In describing their practice, Kennedy explains, “As architects, we try to uncover the ideas that are embedded in everyday things in order to rethink the form of institutions
which are assumed to be already ‘known’ or ‘given.’ In Material Misuse, she goes on to say “Today, materials, building components, and even programs arrive pre-formed as products to the building site or to the imagination. Our role as architects is not so much to form these entities as it is to deform them from their standard applications and to invent for them new possibilities and uses.”

For example, in KVA’s 1998 exhibit entitled “Fabrications” at the San Francisco Museum of Modern Art (Fig 3.4 and 3.5), they re-contextualized plaster and drywall and used them in an art installation to show how familiar materials can be used out of context and assigned unconventional properties. Their uses of drywall, plaster and plywood in many of their projects have changed the way architects, designers and contractors are viewing these materials in the built environment. Instead of using them only as a finish or substrate, these materials have been assigned new properties that will ultimately affect their future use in the architecture and construction industries.

3.3 - The Rural Studio

The Rural Studio, an extension of the Auburn University School of Architecture, was cofounded in 1993 by the late Samuel Mockbee and D.K. Ruth. The studio wanted to balance the teaching of the creative purpose with hands-on lessons of sustainable housing and social culture. Mockbee believed that one of the greatest lessons that an architecture student could receive was to build what he or she had designed. He believed that experience gained from conversing with the professionals from the construction trades was also very valuable to their education.

Mockbee’s Rural Studio represents a vision of architecture that embraces not only practical architectural education and social welfare but also the use of salvaged, recycled, and curious materials and aesthetics of place. By applying inexpensive materials richly in architecture, the Rural Studio is
able to affect the lives of many poor families in the Deep South by completing many projects each year, such as the projects mentioned above. Projects such as, the Mason’s Bend Community Center, the Lucy House and the Yancey Chapel each used inexpensive materials like wood, carpet tiles, used tires and car windows as materials in the design and construction of the building.

The Mason’s Bend Community Center (Fig. 3.6), is a windshield chapel with mud walls that picks up on the community’s vernacular forms and shapes. The center rests on a broad base of rammed earth that blends with the iron-colored road, and like neighboring buildings it hugs the ground. The final touch was a glass roof made from car windshields that they purchased for $120 from a scrap yard in Chicago, home to one of the students who worked on the project.36

The Lucy House (Fig. 3.7), was also constructed using salvaged and recycled materials, the most interesting of which was carpet tile that the students salvaged from surrounding office buildings. The house was supported on steel tubes and the carpet was used to clad the exterior. The project was then capped off with their signature big red metal roof.

The last project, the Yancey Chapel (Fig. 3.8), perches on a bluff overlooking an open field and wetlands. Because its walls are made of recycled tires, everyone refers to it as the “tire chapel”. To form the chapel’s walls, the students filled 1,000 donated old tires with soil, fortified them with reinforcing bars, wrapped them with wire mesh, and coated them with stucco.

Though their leader and cofounder, Mockbee, died in 2001 his vision did not. His students continue to find new ways to apply inexpensive materials richly in architecture in all of their designs and construction projects. Hopefully, their ideas will continue to influence students for years to come.
The next firm, Office dA, a Boston-based architecture and design firm led since 1991 by principal partners Monica Ponce de Leon and Nader Tehrani, have used some of their projects as sort of test bed for applying unconventional construction vocabularies on building materials. Their work ranges from small scale furniture to urban design and infrastructure, with a focus on architecture. In every project they focus on the particulars of the site, requirements for program and materials as the catalysts for transformations in architecture. They investigate the potential of material and construction techniques, often imported from fields outside of architecture. Their explorations often involve traditional and digital techniques of design and assembly.37

Their designs are cutting edge and their exploration of materials and process is evident in many of their projects. The design of the Mill Road House (Fig. 3.9), Casa La Roca (Fig 3.10), The Zahedi House, and The Toledo House all won Awards in the annual Progressive Architecture Awards Competition.38 Many of their projects assign uncommon properties to traditional materials, transforming them into something that catches the eye and invoke a response.

Their Tongxian Gatehouse in Beijing, China (Fig 3.11) does just that: its large cantilever and morphing exterior re-contextualize the use of brick and transform it from ordinary to extraordinary. It also used materials that were local to the site, such as bamboo, oak and grey clay brick. Though it came after the initial design concept, the gatehouse provided its users with a place that was not only inspiring and pleasurable, but created spaces that exploited the boundaries of materials.39

Office dA continues to push the limits of materials in their designs and they are always looking for new ways to express materials in a context that has not been experienced. It is this drive and determination that will allow for Office dA to maintain their status as a firm that prides themselves on materiality, structure and expression.
Lewis Tsurumaki Lewis is an architecture and design partnership founded in 1993 by Paul Lewis, Marc Tsurumaki, and David J. Lewis, located in New York City. Their work turns ordinary materials into creative architectural solutions by closely examining the conventional and the overlooked. Their work ranges from large scale academic buildings to small scale commercial renovations and museum installations. Two of their most recent works, the Ini Ani Coffee Shop and Fluff Bakery, both push the limits of cardboard and felt by applying these inexpensive materials richly in architecture.

The Ini Ani Coffee Shop (Fig 3.12), has won a variety of design awards, including *ID Magazine*’s Design Distinction Interiors Award in 2005 and *Contract Magazine*’s Casual Restaurant Award in 2004, and have also been published in the *Architectural Record* in September of 2004. Fast, cheap and in control: that is the way LTL tackled this small but challenging project of designing and constructing a 350 square foot coffee shop in New York City for only a $40,000 budget. New ideas and materials were explored to create a space that was both aesthetically pleasing and cost effective. Cardboard, was cut into two inch strips and used as a wall treatment, applying the principles from the Boym Studio’s “Recycle Project” and framing the strips in metal to re-contextualize it and take it out of its familiar context.

Fluff Bakery, which opened in New York City in the Fall of 2004, also won a variety of design awards, including the Casual Restaurant award for *Hospitality Design* magazine in 2005, and was a finalist for the Gold Key Casual Dining Award for *Interior Design* magazine in 2005. This project included the interior and storefront designs for an 800 square foot bakery and coffee shop. The design incorporated the use of two common inexpensive materials, felt and stained plywood. The walls and ceiling are composed of 18,500 linear feet of 3/4”x 3/4” strips of felt (Fig 3.13) and stained plywood, each individually positioned and anchored into place. The mixture of grey, black and white felt strips act as a visual attractor to the people on the street.
The five firms discussed above push the boundaries of materials in the realm of architecture, creating aesthetically pleasing spaces and changing the user’s perceptions of various common materials and their applications to the built environment. Their ideas and methods of transforming materials have expanded my understanding of materials and their application to the field of architecture, design and construction. However, an in-depth understanding of the conventional applications of a material is necessary before one can design unconventional applications for it. The next chapter focuses on the history and conventional fabrication and application of the brick, which was chosen as the material to study in the design portion of this thesis.

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**Endnotes**

30 http://en.thinkexist.com/quotes/louis_kahn/
33 http://www.kvarch.net-directory.htm
37 http://www.officeda.com, under the profile section, then office description.
40 http://www.ltlarchitects.com/pages/profile.html
41 http://www.ltlarchitects.com/pages/profile.html
Chapter 4
Materials: From Past to Present

“Now the subject of materials is clearly the foundation of architecture, and perhaps one would not go very far wrong if one defined architecture as the art of building suitably with suitable materials. There are certainly many other things which are considered architectural, and yet not clearly so intimately and essentially a part of architecture, as a consideration of material.”

- William Morris

4.1 - The History of Brick

Brick has played an important role in architecture and building. It has been a part of man’s history for several thousands years. Since prehistoric times man has been experimenting with the possibility of using dried mud as a building material. Originally used as a structural element, with the advent of steel and concrete the brick has been transformed into a non-structural element used for ornament and cladding in buildings. This has forever changed the way brick is viewed in the field of architecture and design.

Brick is one of the simplest, most versatile and least regarded materials in architecture. It is also one of the oldest building materials dating back to 10,000 BC when the first mud brick may have been invented. Then 5000 years later in Mesopotamia the first molded brick was invented. Although these first bricks are in fact still in use today (Fig. 4.1), it was another development 1500 years later that changed the character of bricks forever.

In 3500 BC the fired brick was invented, which allowed for the construction of permanent structures. This gave brick the durable properties of stone while providing its users with more flexibility to create and manipulate an array of architectural surfaces. For example, if a smooth, planar surface is desired, the brickwork can be designed and constructed to achieve this. At the other extreme, if the
design calls for a mottled surface, this too can be accomplished. Since each brick is laid in the wall individually, the brickwork can take on many different textures. \(^{45}\)

For the next five centuries man experimented with bricks as both permanent structures and finish texture. The range of structure and finish can be seen the Great Wall of China (Fig 4.2) and Hagia Sophia (Fig 4.3). By 1200 AD the use of bricks in construction had expanded throughout Europe, Asia and the Americas. \(^{46}\) During the Renaissance, advancements in technology changed the way bricks were used once again, making bricks more cost effective and socially accepted. Then during the 19th century, machines were invented that allowed brick to become the standard material for industrial and commercial applications, giving brick architecture an unparalleled opportunity for experimentation and innovation. The premier example of brick architecture from this period is the Monadnock Building, designed by Burnham and Root between 1889-91. To support the 16 stories of masonry above, the walls on the ground floor were six feet thick (Fig. 4.4). \(^{47}\)

### 4.2 - Modern Fabrication and Articulation

Choosing the right brick is time-consuming and important. Qualities such as texture, pattern, color, size and shape are just a few that should be considered when selecting brick. Like many other building components, bricks are manufactured objects which require specific raw materials and specialized skills to be produced successfully. The possibilities of brick textures, styles and application techniques available in today’s marketplace are rich. A brick’s initial texture comes from its method of forming, which can be stiff-mud, soft-mud, or dry-press. \(^{48}\)

The stiff-mud or extruded method involves forcing the clay through a die, a tapering steel form piece with a rectangular hole at its end. The soft-mud or molded method involves taking a clay mixture
with about twice the water of the stiff-mud process, dropping it into a mold box, “striking” the excess clay off the top, and releasing the brick. The last of the three the methods, dry-press, involves stuffing clay with about half the amount of water of the stiff-mud process into steel molds under high pressure from hydraulic or compressed air rams.

Once the basics are mastered, brickwork can be taken to another plateau by artfully playing different brick surfaces against each other through their manipulation in the wall. Skillful articulation of brickwork can be used successfully to achieve many design requirements. Many different surfaces can be developed by careful selection of the brick and mortar point type. Manipulating units in and out can create shadows, delineate facades and emphasize other elements.

Along with various manipulations, several articulation maneuvers (Fig. 4.5) can be employed using brick. Corbeling and racking allow brick courses to project from or recess into the plumb face of the brickwork. Other standard brickwork details include projections and recesses, reveals, quoins and dentils. Quoins make corners of brickwork more prominent and dentil courses provide a three dimensional surface, often used on cornices at the top of buildings. 49

Incorporating special shape brick can also articulate brickwork. Constructing the entire wall

Figure 4.5: Brick work. Photo: Barry Halkin
using a special shape can have dramatic results as seen in Hotel Valencia in (Fig. 4.6). This seven-sided brick exposes two of its faces to cast sharp shadows against the courses below. To achieve a truly unique surface, the brick moves in and out of the wall plane both vertically and horizontally. In the “ruled wall” shown in (Fig. 4.7), each brick is laid non-orthogonally to adjacent bricks. The wall surface is constantly changing as the shadows shift in response to the moving sun and the curving brick courses.50

This study of the history and conventional applications of brick sets the foundation for a personal exploration of brick as a material for the design portion of this thesis. Using the modern theories of unconventional application of materials, as put forth by the various artists and architects discussed previously, as a guide, the design portion of the thesis will use brick as both wall and screen, as both a functional and a beautiful material. The next chapter discusses how bricks are used in the design, as well as presenting the project’s site, function, and history.

Endnotes
45 Campbell, J, 13.
46 Campbell, J, 13.
47 Campbell, J, 250
Chapter 5: A Project for an Unconventional Brick
5.1 - Design Intent

This thesis argues that materials play an important role in the fields of art, architecture and construction. It explored the ideas and opinions of various architects and design firms throughout the world to help establish a firm foundation and understanding of materials and their ever changing role in art, architecture and construction. These ideas can lead to a greater appreciation for materials and their application to buildings.

One material in particular, brick, was further explored to understand its place in architecture and how its role has changed throughout the centuries with the help of various technological advancements. This exploration and research presented many possibilities and uses for brick in the field of architecture and design, such as a structural element, decorative material, veneer, or screen: its applications are endless. To fully exploit these uses, brick and its application to architecture will be pushed beyond its traditional limits, in particular by exploring new ways to use it as a screen wall, but stay within the materials properties, manufactured process and value of the product.

Various mocks-ups will be generated to create a panel system that will allow brick to be shown in an application that is normally uncommon to the material. To strengthen the idea of using brick as a screening element, brick’s ability to be used both as an interior and exterior element will be exploited. This will allow its users to experience spaces that will blur the boundary between the indoors and outdoors.

Once the system is created it will be used in the design of a Technical School in Over-the-Rhine that focuses on teaching students how to push the limits of materials by finding new ways to apply them in their designs and buildings. The design of the school will apply brick in
unconventional ways that are normally overlooked by architects and designers.

By using these principles to form design ideas, a Technical School in the Over-the-Rhine neighborhood of Cincinnati applies these ideas to its design, as well as focuses its curriculum around teaching the properties, fabrication and unconventional applications of materials to the built environment. The goal is that the taught skills and knowledge of materials and their unconventional applications will allow students to apply materials in unconventional ways, but stay within the materials properties, manufactured process and value of the product.

5.2 - Project Location: Site Information

The site is located on the corner of Elm and Liberty Street in the Over-the-Rhine neighborhood of Cincinnati, Ohio (Fig. 5.1), adjacent to the Boys and Girls Club (Fig. 5.2) and the Warren Brothers building (Fig. 5.3). The site is rich in history and currently is the home of a temporary employment agency that helps local residents find jobs on a day-by-day basis. The other buildings on the site (Fig. 5.4 and 5.5) are slated for demolition because of the current unsafe conditions. The bricks from this demolition or bricks from the same time period will be reused in the new design of

Figure 5.1: Aerial view of Site. Google Earth.

Figure 5.2: View of Boys and girls Club. Photo: by Author.

Figure 5.3: View of Warren Bros. building. Photo: by Author.

Figure 5.4: Abandon building to be demolished. Photo: by Author.

Figure 5.5: Abandon building to be demolished. Photo: by Author.
a technical school. The idea is to incorporate these materials into the new design to not only reduce the cost of construction, but also to engage the new with the old by intermixing conventional and non-conventional applications for these materials.

This area is currently blighted with many abandoned buildings and vacant lots that need immediate attention. Besides offering education to the youth of this area and surrounding areas, this school will help establish a beacon for the community similar to the role that Washington Park school has played in its current location. This area has so much untapped potential that a project that will help to strengthen community pride is a welcomed addition. The school project is only the first step in a long process that will one day allow for this area to return to a place that people will experience, enjoy and take pride in on a daily basis.

This site was chosen because it has access to two main roadways, Liberty Street and Central Parkway, which both lead to interstates I-71 and I-75, and because Over-the-Rhine is within walking distance of many important landmarks, including Findlay Market, Washington Park and Main Street plus the Cincinnati Ballet (Fig. 5.6), School for the Creative and Performing Arts (Fig. 5.7), Music Hall (Fig. 5.8) and many others. This corner site will allow the school to establish a presence in the community and create a place where people will want to visit.

5.3 - History of Over-the-Rhine

Like many Midwestern cities, Cincinnati contains a variety of small diverse neighborhoods each rich in its own history and historical character. One of the most historically significant districts in Cincinnati is Over-the-Rhine. With its collection of commercial, residential, religious and civic architecture, Over-the-Rhine is one of America’s largest and most cohesive surviving examples of an urban, nineteenth-century community.\(^{51}\)
This area holds a special place in the hearts of many historians and preservationists. It is an area rich in history and heritage that once housed many working-class immigrants, especially those from Germany. Similar neighborhoods in other cities have been disturbed by intrusive development or lost entirely. Over-the-Rhine, however, continues to display its original dense, urban development patterns and buildings of excellent architectural quality, imbuing the neighborhood with a 'sense of time and place.' In recognition of both its exceptional nineteenth-century architecture and its association with the successive waves of German immigration to America in the nineteenth century, Over-the-Rhine was listed in the National Register of Historic Places in 1983.\textsuperscript{52}

Between 1830 and 1840 the area was filled with small, mostly wood-framed row houses that were influenced by the first wave of German immigrants who resided there. Then between 1848 and 1858, a second wave of German immigrants, who were fleeing political unrest and economic decline, settled into the already densely populated city. By 1950, almost 31,000 German immigrants were living in Cincinnati, (which had a total population of 115,000) and 43,000 of whom resided in Over-the-Rhine. At the beginning of the twentieth century, the population of Over-the-Rhine began to decline. In 1930, the once German population began to be replaced by many rural Appalachians from eastern Kentucky. By 1960 a population of 44,500 in 1900 had dwindled to a mere 27,500. By 1970 the population of Over-the-Rhine had declined to a mere 15,000 and continued a downward turn until it reached 9,500 in 1990, of which 70 percent were African-Americans.\textsuperscript{53} This shift in population has contributed to the decay of the neighborhood infrastructure.

Another factor that led to the current state of Over-the-Rhine was economics. It was reported that by 1990 the average household income for Over-the-Rhine was $5,000, compared to $21,000 for Greater Cincinnati. This led to many federal housing programs and government aid starting in the 1970s. Along with low income levels, the area also contains many deteriorated and abandoned
buildings that are in desperate need of attention.

An estimated 350 buildings are vacant, 500 are underutilized and some 1,000 are undeveloped. To help improve these buildings, various private investment groups began investing money into them to help return them to their original state. By 1996, 100 more houses were expected to be developed, adding to the 200 units that already existed. Though the development of Over-the-Rhine has been a long one, the results thus far have been remarkable and will hopefully continue well into the future. By 2020, the expected population of Over-the-Rhine is expected to surpass 20,000.

One of the reasons for the success of the revitalization are sub-neighborhoods with strong independent character: Three main ones are Washington Park (Fig 5.9), one of the largest parks in the city to be surrounded by dense blocks of housing; the Main Street district (Fig. 5.10), which contains art galleries and restaurants that cater to young middle class people; and Findlay Market (Fig. 5.11), the oldest such open-air market in Ohio, and the only remaining original market in Cincinnati. The sad thing is that many people have driven by these areas numerous times but have never stopped to enjoy their hidden secrets.

5.4 - History of Technical Education

Centuries ago, there were three ways in which a person prepared for work. First they could gain experience from an organized apprenticeship; secondly they could gain experience from working in the family business; and lastly they could gain experience by observation and imitation, also known as the pick-up method. In the last hundred years, vocational education has evolved in response to changes in society, technology, education and educational philosophy, and the workplace. During the first half of the 21st century, vocational or technical education has gone far beyond the specific technical
knowledge and skills required for a particular occupation. Today vocational education encompasses not only technical preparation but also sound academic foundations, higher-order thinking skills, and personal qualities needed for success in the workplace.

Along with the above ideas, several additional benefits were expected as vocational education became a part of the system of public education. First, vocational school would provide students with the opportunity for a more meaningful education by expanding their levels of knowledge in a variety of areas. Second, vocational education would be expected to increase the wage-earning of youth by helping them move from unskilled laborers to positions as skilled workers sought after by industry. Last, training in the scientific principles of farming and the household occupations would contribute to greater efficiency in farming and would strengthen the American home.

To help prepare today’s youth for jobs resulting from the industrial revolution and to provide them with an alternative to the general in curriculum of schools, The Smith-Hughes Act was established in 1917. Its goal was to provide for a continuing appropriation for vocational education in agriculture, trades and industry, and home economics and for teacher training in each of these fields, which was an alternative high school education from that typically provided at the time for middle and wealthy classes of students.

The earliest vocational programs were grounded primarily in the need to prepare more immigrants and blue collar-type workers with practical skills for the nation’s farms, factories and homes. Over the past hundred years the focus of these programs shifted to help support various problems that arose in the United States. In 1920 they were used to support national defense efforts; in the 1930s they helped to reduce the unemployment problems; in the 1940s they helped to assist the war effort; and during the 1950s and 1960s they helped to shift industries to peacetime economic developments.

In public secondary schools, one or more courses identified with vocational education are offered in
93 percent of the nation’s 15,200 comprehensive, grades 9-12 high schools. Nearly all of these high schools offer introductory courses taught for purposes of general labor market preparation or to provide students with practical or life skills, such as typing or word processing, technology education, formerly called industrial arts, or family and consumer sciences, formerly called home economics. About 70 percent of all comprehensive high schools offer specialized courses in one or more occupational programs, historically identified as agriculture, business and office, marketing, health, family and consumer sciences.\textsuperscript{57}

There are about 250 vocational high schools in the United States that focus on preparing students for work in a particular occupation or industry, but offer the academic and general courses at the school as well. Students attend this type of vocational high school full time.\textsuperscript{58} Public postsecondary vocational education is provided by roughly 720 degree-granting community technical institutes or colleges that grant degrees in technical fields and postsecondary area vocational schools that do not grant degrees, 308 postsecondary schools serving only one industry and 70 postsecondary skills centers for disadvantaged youth. In addition, there are approximately 2,400 private postsecondary schools offering vocational programs or courses.\textsuperscript{59}

Understanding the history of Over-the-Rhine and technical education in the United States provides information that supports the decision to place a Technical School on the site in Over-the-Rhine. The ideas and knowledge gained from research of these topics will lead to a design that will capture the character of the site, as well as create a building that people in the community will respect and take pride in for decades to come. The following chapter presents four projects that will specifically inform the design of the building.
Endnotes
51 McAvey, Maureen. Over-the-Rhine, Cincinnati, Ohio: Strategies For Revitalizing The Over-The-Rhine Neighborhood, 8.
52 McAvey, 9.
53 McAvey, 8.
54 McAvey, 8.
58 Boesel, 1994
Chapter 6
Methodology: Thesis Precedents

The following projects have been chosen as specific precedents for this thesis because they each have a particular connection to this thesis. The first project, Williams and Tsien’s American Folk Art Museum, is the precedent that addresses the transformation of a material. Office dA’s Casa La Roca House focuses on transforming a material by applying it in an unconventional manner. Venice Pizza, designed and built by University of Cincinnati architecture students under the leadership of Terry Boling, addresses the same neighborhood as this thesis, as well as applies materials in unconventional ways. Finally, the Center for Furniture Craftsmanship in Maine is the functional precedent, dealing with a vocational school.

6.1 - American Folk Art Museum: Tod Williams and Billie Tsien

Tod Williams and Billie Tsien are constantly examining new and old materials in construction to create new uses and fabrication techniques that exploit these materials in ways never seen before. They hope to provide insight into the production process. In their work, everyday materials are manipulated through a combination of both handcrafted and mechanical techniques, changing the ways that these materials are traditionally perceived and applied in the built environment. One in particular, the American Folk Art Museum in Manhattan (Fig. 6.1), embodied these ideas and created a museum that according to Martin Filler “is not only New York’s greatest museum since Frank Lloyd Wright’s, but nothing less than the city’s best work of architecture since then, period.”

When first asked what material would be used for the facade Williams and Tsien gave two responses. Their first response was old bubble gum; then they considered tilt-up concrete panels cast on the vacant lot next door to the site. Though both these ideas were unrealistic, they revealed their

Figure 6.1: American Folk Art Museum: Façade panel detail. Photo: Michael Moran
passion to clad the exterior in a material that was both ordinary and extraordinary and would reflect the direct connection between heart and hand. 61

The facade for the Museum was created after many hours of communication, experimentation and process between architects, engineers, industrialist and artist. These experiments yielded a metal called Tombasil (Fig. 6.2), which was a commercially produced alloy consisting of white bronze with a fifty-seven percent copper content, which up until then was used for fire nozzles and ship propellers and had never been used for architectural purposes. 62

Once a material had been chosen, a method and process was researched to allow the material to have a purpose in architecture. In conjunction with the Tallix Art Foundry in Beacon, New York, the panels were created by using an ancient method known as sand casting (Fig. 6.3), which dates back some two-thousand years. The successful creation and application of this new material has changed the way that bronze is used in an architectural application. Before its use in the Folk Art Museum, bronze was typically used as a veneer to conceal less expensive materials. For example, in Mies van der Rohe's Seagrams building in New York (Fig. 6.4), pre-fabricated bronze sheets were used to clad the building’s exterior, which added beauty and color to the exterior quality of the building.

This determination to push the limits of materials and their applications to buildings is why the American Folk Art Museum was chosen for analysis. Its expression of bronze as a primary material instead of a normal secondary application will forever transform the view of bronze in architecture. The idea of transforming a material that is normally viewed on a everyday basis into something that is normally not associated with that material will be one of the principles that will be applied during the design section of this thesis.
6.2 - Casa La Roca House: Office dA

In the Casa La Roca house (Fig 6.5), the terracotta bricks and blocks are used in a different manner than usual in buildings. Normally terracotta units are closely stacked together to form one continuous wall and often hidden underneath paint or stucco. In this building the architects chose to expose the beautiful color and true nature of the material by forgoing the application of paint or stucco, which is uncommon for most middle and upper-class neighborhoods in South America. The goal of the house was to imitate the sense of openness while trying to maintain privacy and a sense of closure from its surroundings. They achieved this by using different patterns of bare terracotta on each side of the house. In Office dA's design, the elevations all perform different tasks based on position on the site.

The front elevation, which faces south, terracotta was applied in a configuration that not only shielded the inner spaces from the sun's rays but also provided security without the need for bars; it also calibrated the spacing and rotation of the blocks in specific ways to generate special views from various locations throughout the house. 63

The side elevation applied terracotta in a way that shielded it from the east. The wall starts out as a solid running bond in the living room and strategically begins to separate as it approaches the patio (Fig. 6.6). Though the wall appears to be screen-like, it is quite structurally sound. Brick screen walls do not conventionally perform as drapery. However, by pulling the terracotta bricks apart to reveal their individuality, Office dA could shape the bricks like drapery. The screen not only enabled excellent views from the patio, it assigned a lightweight quality to a material that normally is not viewed as lightweight. 64

This project was highlighted because it assigned lightweight fabric-like properties to terracotta that are normally not associated with the material. Office dA's idea of assigning a property to a material that normally is not associated with that material is a principle that will also be applied during the design section of this thesis.
6.3 - Venice Pizza: Terry Boling’s Design Build Studio

Terry Boling’s Venice Pizza Project focuses on finding new ways of applying common materials in unconventional ways. Venice Pizza is a community restaurant located at 1301 Vine Street in Over-the-Rhine neighborhood of Cincinnati, which that provides nutritious food alternatives, job training and employment opportunities for neighborhood residents. The new storefront business will advance the effort to revitalize Vine Street and promote community development. 65

With funding from the University of Cincinnati Institute for Community Partnerships, the Community Design Center was able to hire a co-op interior design student, who, under the supervision of CDC Director and Architect Frank Russell, was able to create construction documents for building permit application. In the Summer and Fall academic quarters of 2004 a “Design-Build” studio of architecture students from the University of Cincinnati College of Design, Architecture, Art and Planning, led by Assistant Professor Terry Boling, created and installed interior finishes in the restaurant. 66

This project used wood, ceramic tile, copper pipes, and glass bottles to add to the aesthetic of the space. For example, scrap pieces of donated lumber were glued together and book-matched into wood panels that were then sanded and varnished (Fig. 6.7). The floor throughout the spaces used broken tiles donated from local building material suppliers and cut them into one-inch strips that were later applied to the floor to create a mosaic pattern (Fig 6.8). Copper pipes (Fig. 6.9) and glass bottles (Fig. 6.10) were also donated by various local companies in the area and applied to the space in unconventional ways that transformed the bottles from ordinary to extraordinary (Fig. 6.11).

This project was chosen for two reasons. First, its principles and teaching methods are similar to what the students at the technical school, the subject of the design portion of this thesis, will be asked to do for their design-build projects at the end of each year. The students from the school will apply the knowledge they attain while attending the various courses to various buildings in Over-the-Rhine to not
only enhance their skills, but give back something back to the community where they live, work and play. Second, Venice Pizza was chosen as an example because the project’s process and methodology with regard to how each material is applied all have a similar theme and objective that tie back to the original design principles established for the thesis design project, which is the idea of using ‘leftovers’ to create a new and expressive element that can be used to add character and meaning to the project.

6.4 - Center for Furniture Craftsmanship: Peter Korn, Maine

The Center for Furniture Craftsmanship (Fig. 6.11) is a nonprofit woodworking school located in the coastal village of Rockport, Maine, between Camden and Rockland. The school’s mission is to provide the best possible education for people who want to design and build functional, beautiful, expressive work out of wood to the highest standard of craftsmanship. Founded twelve years ago by Executive Director Peter Korn, the school quickly became nationally and globally recognized.

Today the school consists of four buildings on one site; the 4,200 square-foot Workshop Building houses a bench room, a classroom, and a machine room; the 5,600 square foot Satterlee Building houses similar rooms plus a spray booth and a lumber storage facility; the 2,300 square foot
Gallery Building houses the Messler Gallery, Fine Woodworking Library, and administrative offices. The last of the buildings, the 5,400 square foot Thomas Miller Jackson Building is the home of the Studio Fellowship Program and the Wood Turning Studio. In addition to the built structures, the project also financed the creation of a comprehensive course, a third intensive course, an expansion of the studio fellowship program and an endowment for support of the fellowship program and for long-range maintenance of facilities. 68

The school offers various programs for novice, intermediate, advanced, and professional woodworkers. Though the school has grown, that devotion to teaching craftsmanship has not changed. What started as a small, one-teacher workshop has grown into a full-blown campus with the finest machinery, high-end hand tools, state-of-the-art facilities and faculty from around the world.

The main reason this school was chosen as a precedent is because it contains many of the same spaces, courses and teaching principles as the technical school design for this thesis. The two spaces I most admire are the Messler Gallery (Fig. 6.12) and the Fine Woodworking Library (Fig. 6.13). The Messler Gallery is first and foremost educational. It provides students with the opportunity to display their work to the community and it also serves as a venue for public lectures by faculty and visiting artists. The Fine Woodworking Library houses a large collection of books and periodicals on woodworking and design, as well as instructional discs and videos.

Besides the various spaces, the curriculum is also important. The curricula include workshops, twelve-week intensive courses, a nine-month comprehensive course and fellowships that allow local woodworkers to explore new techniques. The twelve-week intensive classes are created to allow professional furniture makers and amateurs to expand their knowledge of woodworking at their own pace.

The nine-month comprehensive curriculum was established to provide in-depth training at the highest standard of excellence to professional furniture makers and amateurs who strive to become

Figure 6.12: Messler Gallery at the Center for Furniture Craftsmanship

Figure 6.13: Fine Woodworking Library at the Center for Furniture Craftsmanship
better woodworkers. To ensure this training is fulfilled, each student must complete eight sequential projects that explore the fundamentals of design and craftsmanship. The eight projects in order are a project that incorporates basic woodworking skills; a machine joinery piece; a case construction piece; a piece involving veneering; a piece involving bending; a chair; to design, make, and sell a multiple object within a set price range; and a self-exploration or portfolio piece. 69

The Center for Furniture Craftsmanship is an excellent example of what spaces and curricula the technical school for this thesis will contain. These ideas will be the basis for the design of my school and will influence many of the decisions that will arise during the design process of this thesis. To conclude, all of the above projects have their own unique element or principle that can contribute to this thesis document, both in design and theory. Some may only have a singular idea, while others may have many. Regardless of the extent of their contribution, each project will impact this thesis project and the ideas that are generated for its design, process, and construction.

Endnotes

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64 Rodolphe El-Khoury and Oscar Riera Ojeda, 90-93.
65 http://www.uc.edu/cdc/Venice%20pizza%20proc.htm
66 http://www.uc.edu/cdc/Venice%20pizza%20proc.htm
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Appendix A: Program – Spaces, Overall Square Footage

Workshops: (3) @ 2400 SF  
-------------------------  
7,200 SF

Storage: (2) @ 800 SF - (1) @ 400 SF  
--------------------------------------  
2,000 SF

Cafe: (one floor @ 3,600 SF and one floor @ 2,400 SF)  
---------------------------------  
6,000 SF

Library: (two floors @ 3,500 SF)  
-----------------------------  
7,000 SF

Gallery: (two floors @ 2,400 SF)  
-----------------------------  
4,800 SF

Classrooms: (6) @ 1000 SF  
-------------------------  
6,000 SF

Lobby:  
-------  
500 SF

Administrative Offices: (7) @ 150 SF & (1) @ 350 SF  
---------------------------------  
1,400 SF

Restrooms: (6) @ 200 SF  
-----------------------  
1,200 SF

Lounge:  
-------  
2,400 SF

Loading Dock:  
---------------  
500 SF

Mechanical/ Electrical:  
----------------------  
2,000 SF

Subtotal:  
----------  
41,000 SF

Circulation: 41,000 x 30%:  
--------------------------  
12,000 SF

Parking: (two floors @ 27,250 SF) - 120 spaces  
-----------------------------------------------  
54,500 SF

Total:  
-------  
106,500 SF
WORKSHOPS: (3) @ 2,400 SF

Occupants:
- 20 students and 2-3 instructors

Activities:
- Production of detailed pieces with instructions from faculty
- Use of machine and hand tools

Health/ Safety and Security:
- Emergency “off” switches for all electrical machinery
- Access to basins, sinks, and eye washes/safety showers
- Two means of egress from all spaces with fire extinguishers and sprinklers
- First aid kits, safety goggles, dust mask/respirators, gloves, face shields, etc
- Code Requirements: Americans with Disabilities Act, International Building Code, Mechanical and Electrical codes

Functional/ Equipment Requirements:
- Workbenches located throughout the shop will provide a steady surface for the assembly and production of the users’ pieces
- Heavy woodworking machinery: table saw, planer, joiner, compound miter saws, radial arm saw, panel saw, band saws of varying sizes, lathe, mortising machine, drill press, router table, spindle sander, belt sander, drum sander, scroll saw, and equipment necessary for a spray/finishing room
- Wide variety of hand and power tools
- Miscellaneous items: clamps, extension cords, waste disposal
- Electrical outlets for each tool will be located as near as possible to the tool to prevent any cables that may be a hazard
- Racks and lockable cabinets to store hand tools and power tools

Ambient Environment:
- Room temperature should remain between 68° and 72° F

Ventilation/ Lighting:
- Outside and inside CFM requirements per mechanical code
- Dust collection system attached to any machine that needs dust exhaust
- 80 to 100 foot-candles
- Natural light with supplemental lighting provided by ambient lights and task lighting on the workbenches and certain power tools
• All the lights should be easily controllable so users can adjust the lighting to the task at hand
• Various windows throughout

**Acoustics:**
• Sound proof doors and walls adjacent to surrounding rooms

**Location/ Adjacencies:**
• Locate adjacent to the storage, electrical and mechanical rooms
• Should be kept away from library, gallery and classrooms
STORAGE: (2) @ 800 – (1) @ 400 SF  
2,000 SF

Occupants:
- Students and instructors

Activities:
- Storage of large or expensive tools
- Storage of materials for the workshop

Health/ Safety and Security:
- Access to first aid kits, safety goggles, dust mask/ respirators, gloves, face shields, etc
- Code Requirements: ADA, IBC, Mechanical and Electrical codes

Functional/ Equipment Requirements:
- Shelving, storage lockers

Ambient Environment
- Room temperature should remain between 68° and 72° F

Ventilation/ Lighting:
- Outside and inside CFM requirements per mechanical code
- 50 foot-candles

Location/ Adjacencies:
- Located adjacent to the workshop
- Should be kept away from library, gallery and classrooms
Cafe': Two Stories (One story @ 3,600 SF and one story @ 2,400 SF) 6,000 SF

Occupants:
- Students, teachers, patrons from gallery and people from the community

Activities:
- Eating and drinking

Health/ Safety and Security:
- Two means of egress to all spaces with fire extinguishers and sprinklers
- Code Requirements: ADA, IBC, Mechanical and Electrical codes

Functional/ Equipment Requirements:
- Kitchen equipment
- Public restrooms
- Seating area for patrons
- Tables and chairs

Ambient Environment:
- Room temperature should remain between 68° and 72° F

Ventilation/ Lighting:
- Outside and inside CFM requirements per mechanical code
- 60-100 foot-candles.
- Lighting provided by direct and indirect lighting

Location/ Adjacencies:
- Should be located adjacent to the gallery and library
- Should located near a street for easy access
- Should be located away from the workshops to minimize noise levels
LIBRARY: Two Stories @ 3,500 SF 7,000 SF

Occupants:
- Students, instructors and the public will be using the space at any given time. Max occupancy established by code

Activities:
- Reading books and magazines pertaining to architecture, woodworking, craft, etc

Health/ Safety and Security:
- Two means of egress to all spaces with fire extinguishers and sprinklers
- Code Requirements: ADA, IBC, Mechanical and Electrical codes

Functional/ Equipment Requirements:
- Storage for books/videos and a small, comfortable reading area
- Should be a quiet area that allows users to read and study the materials

Ambient Environment:
- Room temperature should remain between 68° and 72° F

Ventilation/ Lighting:
- Outside and inside CFM requirements per mechanical code
- 60-100 foot-candles
- Lighting provided by direct and indirect lighting

Location/ Adjacencies:
- Should be located in the public realm of the building near the main entrance
- Should be located adjacent to the gallery, cafe and classrooms
- Should be located away from the workshops to minimize noise levels
GALLERY: Two Stories @ 2,400 SF

Occupants:
- The gallery will be used by the students, instructors and the public

Activities:
- Displaying and discussing exemplary projects produced in workshops
- Showcase the school

Health/ Safety and Security:
- Area will be accessible by the public yet monitored with cameras
- Two means of egress to all spaces with fire extinguishers and sprinklers
- Code Requirements: ADA, IBC, Mechanical and Electrical codes

Functional/ Equipment Requirements:
- Various stands for the display of projects
- Floor space for larger projects
- Project storage area

Ambient Environment:
- Room temperature should remain between 68° and 72° F

Ventilation/ Lighting:
- Outside and inside CFM requirements per mechanical code
- 60-100 foot-candles
- Lighting provided by direct and indirect lighting
- Special lighting for featured projects

Location/ Adjacencies:
- Should be located adjacent to the library and café
- Could be interactive from inside or outside
- Should be located away from the workshops to minimize noise levels
CLASSROOMS: (6) @ 1000 SF                  6,000 SF

Occupants:
  - Maximum of twenty students plus one instructor in every classroom

Activities:
  - Will consist of academic instruction

Health/ Safety and Security:
  - Code Requirements: ADA, IBC, Mechanical and Electrical codes

Functional/ Equipment Requirements:
  - Tools for classroom instruction (i.e. blackboards, etc.)
  - Workbenches for students
  - Storage lockers for academic assignments/materials

Ambient Environment:
  - Room temperature should remain between 68° and 72° F

Ventilation/ Lighting:
  - Outside and inside CFM requirements per mechanical code
  - 100 foot-candles
  - Lighting provided by direct and indirect lights

Location/ Adjacencies:
  - Should be located near library, gallery, café, lounge and offices
LOBBY: 500 SF

Occupants:
- Approximately 1-5 individuals will be using this space at any given time

Activities:
- Orient incoming visitors throughout the operating hours of the facility
- Outdoor/indoor transition space for customers
- Single main customer entry into gallery, easily monitored for security

Health/ Safety and Security:
- Easy access to fire extinguishers and sprinklers
- Access to security monitors for all the spaces
- Access to keys for spaces within the building
- Code Requirements: ADA, IBC, Mechanical and Electrical codes

Functional/ Equipment Requirements:
- Lobby desk incorporating security monitors
- Ample seating for visitors and guests

Ambient Environment:
- Room temperature should remain between 68° and 72° F

Ventilation/ Lighting:
- Inside CFM requirements per mechanical code
- Required Outdoor Ventilation: 15 CFM/person
- 50-60 foot-candles
- Lighting provided by direct and indirect lights

Location/ Adjacencies:
- Should be located adjacent to gallery, library and near main entrance
- Should be located away from the workshops to minimize noise levels
ADMINISTRATIVE OFFICES: (7) @ 150 SF (1) @ 350 SF 1400 SF

Occupants:
- The offices will be used by the administrative staff of the workshop and classrooms

Activities:
- Will consist of office related duties, paperwork and classroom preparation

Health/ Safety and Security:
- Code Requirements: ADA, IBC, Mechanical and Electrical

Functional/ Equipment Requirements:
- Storage for papers/books
- Desks and office equipment
- Computer workstations, desks, file storage, money safe, chairs and security equipment

Ambient Environment:
- Room temperature should remain between 68° and 72° F

Ventilation/ Lighting:
- Inside CFM requirements per mechanical code
- Required Outdoor Ventilation: 15 cubic feet per minute/person
- 50-100 foot-candles
- Lighting provided by direct and indirect lights

Location/ Adjacencies:
- Should be located near classrooms, lobby and gallery
- Should be located away from the workshops to minimize noise levels
RESTROOMS: (6) @ 200                              1200 SF

Occupants:
- The restrooms will be used by the students, instructors and the public

Health/ Safety and Security:
- Code Requirements: ADA, IBC, Mechanical and Electrical
- Easy access to fire extinguishers and sprinklers
- Non-slip floor, stain resistant floor

Functional/ Equipment Requirements:
- All necessary plumbing
- GFCI per code compliance

Ambient Environment:
- Room temperature should remain between 68° and 72° F

Ventilation/ Lighting:
- Inside CFM requirements per mechanical code
- Required Outdoor Ventilation: 15 cubic feet per minute/person
- 50-60 foot-candles
- Lighting provided by direct and indirect lights

Location/ Adjacencies:
- Should be located in café and near lounge area
- One set of restrooms for public use
- One set of restrooms for student/instructor use
LOUNGE  2,400 SF

Occupants:
• 20-30 students will be using this space at any given time

Activities:
• Eating area, break lounge, employee meeting area

Health/ Safety and Security:
• Code Requirements: ADA, IBC, Mechanical and Electrical
• Non-slip floor, stain resistant floor
• Easy access to fire extinguishers and sprinklers

Functional/ Equipment Requirements:
• Chairs, tables, small kitchen, vending machine
• Refrigerators, microwaves, storage, industrial grade sink, dishwasher, trash disposal
• 220 volt outlets for required equipment and GFCI outlets near water

Ambient Environment:
• Room temperature should remain between 68° and 72° F
• Provide exhaust fans for removal of excess smoke

Ventilation/ Lighting:
• Inside CFM requirements per mechanical code
• Required Outdoor Ventilation: 15 cubic feet per minute/person
• 50-60 foot-candles
• Lighting provided by direct and indirect lights

Location/ Adjacencies:
• Should be located away from the workshops to minimize noise levels
• Should be located near classrooms, administration offices and restrooms
LOADING DOCK:  500 SF

Occupants:
- Students and instructors

Activities:
- Used for shipping and receiving

Health/ Safety and Security:
- Access to first aid kits, safety goggles, dust mask/respirators, face shields, etc
- Code Requirements: ADA, IBC, Mechanical and Electrical codes

Functional/ Equipment Requirements:
- Overhead service door, garbage dumpster

Ventilation/ Lighting:
- Outside and inside CFM requirements per mechanical code
- 50 foot-candles

Location/ Adjacencies:
- Located adjacent to the workshop
- Located near main drive for easy access for deliveries
- Should be kept away from library, gallery and classrooms to minimize noise
MECHANICAL/ELECTRICAL ROOMS: (2) @ 1000 SF

2,000 SF

Occupants:
- Intermittent-maintenance workers

Activities:
- Servicing of mechanical equipment, storage and cleaning of custodial supplies

Health/ Safety and Security:
- Code Requirements: ADA, IBC, Mechanical and Electrical
- Easy access to fire extinguishers and sprinklers

Functional/ Equipment Requirements:
- HVAC units, circuit breakers, water valves, storage shelving, utility sink

Ambient Environment:
- Room temperature should remain between 68° and 72° F

Ventilation/ Lighting:
- .05 cubic feet per minute/area square foot
- 20 foot-candles
- Lighting provided by indirect lights

Location/ Adjacencies:
- Adjacent to an exterior wall
- Near workshop That will feed the entire building