

Rochester Institute of Technology

RIT Digital Institutional Repository

Theses

2004

Modular display fixture system

Young C. Lee

Follow this and additional works at: <https://repository.rit.edu/theses>

Recommended Citation

Lee, Young C., "Modular display fixture system" (2004). Thesis. Rochester Institute of Technology.
Accessed from

This Thesis is brought to you for free and open access by the RIT Libraries. For more information, please contact repository@rit.edu.

Rochester Institute of Technology

A thesis Submitted to the Faculty of
The College of Imaging Arts and Sciences
in Candidacy for the Degree of
Master of Fine Arts

Modular Display Fixture System

By
Young Choon Lee

May 2004

Approvals

Chief Advisor: David Morgan

David Morgan

Date 5-20-04

Associate Advisor: Stan Rickel

Stan Rickel

Date 5/20/04

Associate Advisor: Ray Crouch

Ray Crouch

Date 5/19/04

School Chairperson: Patti Lachance

Patti Lachance

Date 5-20-04

I, Young Choon Lee, hereby grant permission to the Wallace Memorial Library of RIT to reproduce my thesis in whole or in part. Any reproduction will not be for commercial use or profit.

Signature Young Choon Lee

Date 05/24/04

To my mom

CONTENTS

LIST OF TABLES.....	iii
LIST OF ILLUSTRATION.....	iv
CHAPTER 1. INTRODUCTION.....	1
Background	
Objective	
Research	
Analysis	
CHAPTER 2. DESIGN DEVELOPMENT.....	11
Goal	
Criteria	
Concept development	
Evaluation of concept	
CHAPTER 3. FINAL DESIGN.....	24
3D computer model rendering	
2D CAD drawing	
Prototype model	
Features	

Install directions

Advanced setup

Different options

Configurations

Thesis show exhibition

CHAPTER 4. CONCLUSION..... 45

The design review

Conclusion

BIBLIOGRAPHY..... 49

LIST OF TABLES

Table	Page
1. Comparison chart.....	46

LIST OF ILLUSTRATIONS

Figure	Page
1. Traditional gallery display wall.....	4
2. Wood structural customized display wall.....	5
3. Steel structural customized display wall.....	6
4. An example of Modul USA Incorporated Aluminum extrusion frame	6
5. ISO Knock down display panel unit.....	7
6. Display KIT, JET Exhibition, England.....	8
7. The image of cell.....	13
8. Sketches inspired by cell structures.....	13
9. Thumbnail sketch of 1 st stage.....	13
10. Thumbnail sketches of 1 st stage.....	14
11. Idea sketch.....	15
12. 1 st concept design sketches.....	16
13. 1 st concept design sketches. (structural solutions)	16
14. The final concept drawing.....	17
15. 3-D Mock up, ABS.....	18
16. Final concept sketch (alignment block).....	19
17. Final concept sketch (alignment block 2).....	19
18. Final concept sketch (panel and corner post).....	20
19. Final concept sketch (peg).....	20

20. Final concept sketch (panel hook and multi-purpose connections).....	21
21. Final concept sketch (magnetic catch).....	21
22. Final concept sketch (frame).....	22
23. The Alias/Wavefront Studio 10.0 3D modeling.....	25
24. 3D dimensions of design.....	26
25. The overall perspective view of design.....	27
26. Welding the frame in RIT's Engineering Shop	28
27. The model making process / Two different sizes of frame members.....	29
28. The model making process / Detail work, test and feedback.....	30
29. Perspective of design.....	31
30. Detail view of display wall with clear panel and designer's note.....	32
31. Detail view of display wall with clear panel and designer's note.....	33
32. Detail view of display wall with clear panel and designer's note.....	34
33. Example of using additional fixtures (customized pedestal and plexi panel).....	35
34. Detail view of display wall (top connection).....	36
35. Detail view of display wall (panel cover hooks and inside of display wall).....	36
36. Detail view of display wall (key hole, peg, and magnetic catches).....	37
37. Detail view of display wall (alignment block).....	37
38. Detail view of display wall (latch).....	38
39. Detail view of display wall (latch).....	38
40. Detail View of display wall (key hole).....	39
41. Example of using an accessory (lighting fixture).....	39
42. 4 step quick installation guide.....	40

43. Examples of the advanced setup.....	41
44. Some examples of different options.....	42
45. Images of typical configurations.....	43
46. Thesis show exhibition overall view.....	44

CHAPTER 1

INTRODUCTION

Background

Today, exhibit and gallery shows give people new energy, inspiration, cultural perspective, and history. Therefore, the Gallery and Exhibit industries can be good representations of current society. Additionally, galleries help connect and introduce artists to patrons, bringing together different people through art. This in turn develops art and culture within society. Likewise, exhibits help introduce and advertise new products and technology to people. This helps to create a springboard for developing and encouraging industry from the bottom up. Consequently, these two systems, galleries and exhibits, are very important and necessary in current society.

Unfortunately, there is little development of new gallery display systems and related products due to deflating budgets. It is especially hard to find an example of good fixture design for show spaces, such as display walls, pedestals, shelves, and accessories. Although there are some existing fixtures available, they have many problems. For example, many lack efficiency and flexibility. Also, most existing systems are hard to reconfigure and store when not in use. Once I became more aware of these problems, I decided to design a better system for display walls.

Current situation of fixtures for show spaces

There are many kinds of show spaces worldwide such as art galleries, trade shows, and museums, but most are not well developed. Further, the exhibit fixtures in show spaces remain a problem, because of budget constraints and physical limitations. Most exhibit companies and galleries design display spaces based on existing exhibit fixtures or custom made products for

specific shows to eliminate effort and costs related to developing new designs. They prefer a limited and safe design instead of a creative, varied one. Major companies with in-house or easily available fabrication resources use traditional handmade style fixtures, instead of developing reusable fixtures. Although most companies and galleries understand the benefits of designing multi-functional display fixtures, they cannot because of budget, labor, high risk, etc. This situation isolates the two industries from current trends, which often serve to inspire new thought and creativity. The result is that current designs for reusable fixtures are stagnant and fail to meet the demands of the industry.

Future of show spaces

Communication and news are transmitted at increasingly higher speeds. Exhibits have begun to follow by taking advantage of technology. The developments of mass communication and transportation world wide require exhibits to function at a faster pace. Consequently, assembly speed, international trade, budgets, easy shipping, and variety should be the main issues for the future exhibit design field. As designers, we must understand these issues to raise the quality of exhibits and indirectly improve the benefits to society. Further, it will be very important to solve these problems in the future exhibit industry for not only a small limited area but also internationally. Additionally, we must seek to create new exhibit styles to better meet the demands of the industry. Displays are increasingly utilizing projected images, large screens, internet hook-ups, etc. Consequently, the fixtures of modern exhibits have to be updated more often. It is necessary to develop a fixture which can be assembled easily to save time and budget. The fixture design for the show spaces should go hand in hand with the future of the art and exhibits themselves. This practical and innovative design approach to fixture design will play a main role in the future exhibit and gallery field.

Objectives

The objective of my thesis is to design an exhibit fixture that addresses the issues stated above, specifically a display wall system. The wall system is usually the most important part of exhibit fixtures for small show spaces. My fixture design will give the exhibitor more aesthetic options, wider functionality, easier maintenance, and physical durability and help improve the way small art venues show their work. The main direction of my thesis will solve the weight, cost, assembly, moving, and storage problems associated with existing systems. Possibly, my design could be offered in several different size options. Finally, these fixtures will help provide a unique aesthetic display experience.

The thesis will begin with research into existing galleries and exhibit fixtures. I will present my findings and a synthesis of my research. From this I will begin a stage of sketching and ideation, followed by rendering, more drawings, a study of materials, and test scale models. Design considerations will include appearance, mechanical functions, and human factors. The final presentation will consist of a full-size prototype model, 3-D images, and description of a mass production method.

Research

There are many kinds of display walls or panels in the gallery and exhibit field, such as a structural gallery wall, custom made panels for galleries or trade shows, and display fixtures for retail markets. Most of these options are designed for specific purposes and change depending on the situation. I would like to introduce a modular, easy to use display panel or wall as described above, so I will try to show mostly examples of similar fixtures on the market today.

Gallery display wall



Fig. 1. Traditional gallery display wall

Traditional gallery display walls are made with a frame and cover structure, typically a wood frame covered with fabric or a plywood surface. The weight of this style depends on the method of construction, but is approximately 200 - 300 pounds per wall. Consequently, when a gallery designs a layout with these walls, they use a forklift for installation because people cannot move them easily. It is also hard to fasten the walls together. Storage is also difficult due to size and weight.

Customized display wall

There are many kinds of customized display walls. In the exhibit design field, the display wall is the most important fixture. Each exhibit design firm or client requires a special display wall to meet the unique needs of their display. However, the initial monetary investments and manufacturing costs can be quite high.

There are mainly two kinds of typical custom display walls existing in the exhibit or display design field. One is a wood structure type and the other is a steel structure type covered with sintra, fabric, plywood, or metal.

1. Wood structure type



Fig. 2. Wood structural customized display wall

Exhibit design firms usually create traditional display panels. These panels are usually made from wood cut to fit the design or user needs. It is custom made for a specific event, trade show, or exhibit design proposal, therefore it is hard to reuse for a different project. Manufacturing costs are high due to the need for specialists for both construction and installation.

2. Steel frame with cover

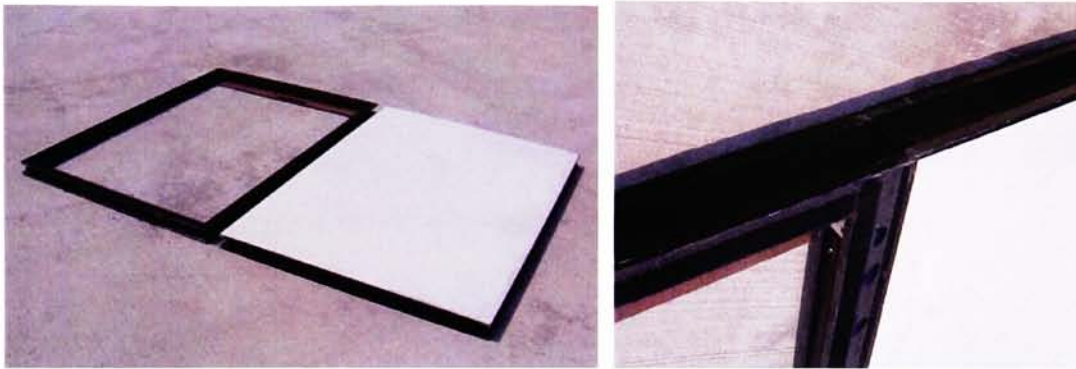


Fig. 3. Steel structural customized display wall

Major trade show companies use customized steel or Aluminum frames with covers to help reduce cost and time. Alternatively, they use aluminum for the frame, then use plywood or acrylic for the panels that can be covered with graphics if required. To attach panels to the frame, they use screws, Velcro, or other readily available hardware.

Aluminum extrusion frame with panel



Fig. 4. An example of Modul USA Incorporated Aluminum extrusion frame

There are many different Aluminum extrusion shapes, which can create many different styles of display systems. These kinds of materials allow panel designs with unique knock down

features. Although better than the previous types shown, there are some limitations in the field with this system. Most systems include proprietary ideas, which are not interchangeable and make it difficult to mix different systems and sizes. Further, the unique extrusion shapes that some companies choose for their frames don't always fit the situation, making the system too difficult to use extensively. Unfortunately, the cost of these systems is also prohibitively high.

Knock-Down style panel system

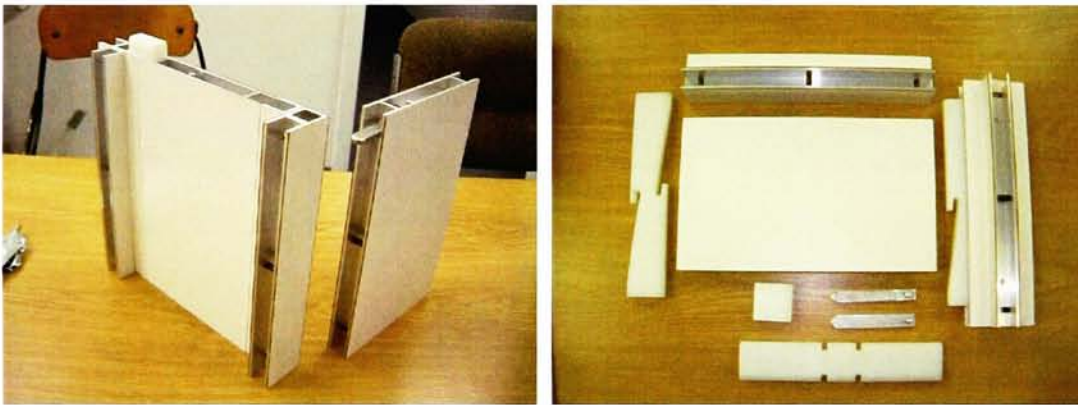


Fig. 5. ISO Knock down display panel unit

This is an example of a knock down display wall. There are many kinds of knock down systems available worldwide. Most products are focused on comparatively easy assembly and disassembly as well as durability. However, the assembly processes are still complicated for most users and high costs and limited models do not match current gallery needs. This is further illustrated by my inability to find an exhibit or gallery utilizing this fixture style.

Fold and Assemble panel style



Fig. 6. Display KIT, JET Exhibition, England

These kinds of panels are designed for a small show space or short term exhibit. They are lightweight, and easy to install and store due to their hinged folding style. However, for mid sized shows or use as longer-term gallery display panels, their size, connections between panels, and functional limitations are not sufficient. They need to further develop the functional, economic, and durability issues for various uses.

Analysis

There are a number of concerns involved in designing fixtures for galleries or show spaces, such as materials, function, flexibility, maintenance, aesthetics, storage, and life expectancy. Further, there are many additional problems in the display panels available now. Everyone in the exhibit industry understands that good display panels are very important, but because of budget problems and functional problems, modular display panel design is stagnant.

Problems

- There are only a few modular products on the market for gallery needs. So galleries usually utilize conventional handmade panel systems. Also, the limited supply system cannot support such wide user demands.
- Most display walls have a complex assembly process. This also makes installation costs high because specialists are required for assembling and installing display walls.
- Customized display walls and some gallery walls are sometimes impossible to reuse or modify for different purposes.
- Display wall options for additional applications, such as changing the surface materials, the method of connecting walls, incorporating multimedia devices, etc., are limited in current existing products.
- High manufacturing costs and difficulties in shipping, handling, and installation with significant labor investments.
- Hard to align and fit the panels, which requires lots of time and subsequent labor charges.
- Limited materials for panel covers.

- Some products have few aesthetic and functional options. However, these are usually restricted to expensive systems.
- Easy to see the panel seams when panels are connected.

Moreover, to add some new features for the future in exhibit field is important and needed, such as supporting a heavy plasma or screen, built in internet cable, power cable, additional customer needs, and so on.

CHAPTER 2

DESIGN DEVELOPMENT

Goal

The first goal of my design is to be able to support many different purposes or conditions in show spaces. It can be used for gallery show, trade show, display for stores, etc. The second goal is ease of use. By simplifying function and design, it should be easy to install without any expert knowledge. My third goal is that it will be lightweight to make both installation and shipping easy and inexpensive. A fourth goal is to be flexible to various user needs. Based on individual needs, different material options for the panel cover can be incorporated as required. Finally, it could be easily mixed with other existing exhibit fixture or hardware.

Criteria

The criteria for my thesis are to define a product that accomplishes the above goals. Therefore, the design concepts would be developed and evaluated by how well my design solves the stated problems. Based on my goals, my concepts will be examined based on:

1. Ease of setup: The design should be a simple structure so exhibitors can set it up easily.
2. Durability: The design should extend the duration of use beyond those of existing display walls, thereby reducing the required maintenance and replacement budget.

3. Light weight: By reducing the weight of the design, it will help reduce moving, installing, and shipping difficulties and expenses. This is a relative factor, so my success in this area will be based on weight comparisons to other existing systems.
4. Different options and functions: The design should be made to fit many different exhibit situations. It should accommodate other options such as different materials, colors, and sizes.
5. Reduced production costs: By using standard materials for the frame instead of custom extrusions and fabrications, the design should cost less to manufacture.

Ultimately, the design should give the exhibit space several aesthetic options, wider functionality, easier maintenance, and physical durability so that it helps improve the way small exhibitors show their work. Wider functionality and easier maintenance will ease the concerns of gallery owners, save money, and increase the variety of show designs.

Concept development

Inspiration

In this stage, I was inspired by biological forms, specifically cell structures (Fig. 7). Each small unit connects and organizes with others, becoming a new and different structure or organism. My initial idea of this concept focused on a way to connect separate display walls like cells do. Also, I was primarily thinking of the connecting ability in each direction (Fig. 9).

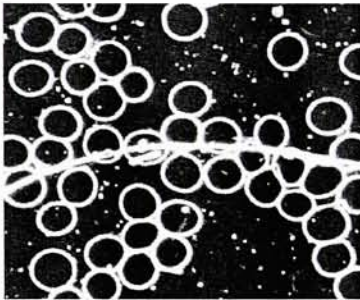


Fig. 7. The image of cell

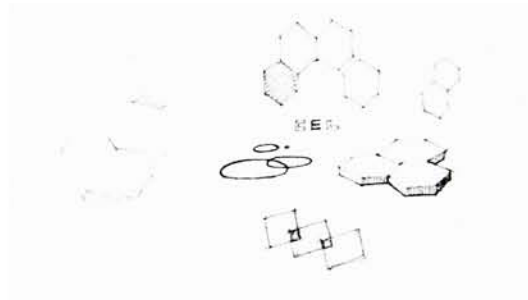


Fig. 8. Sketches inspired by cell structures

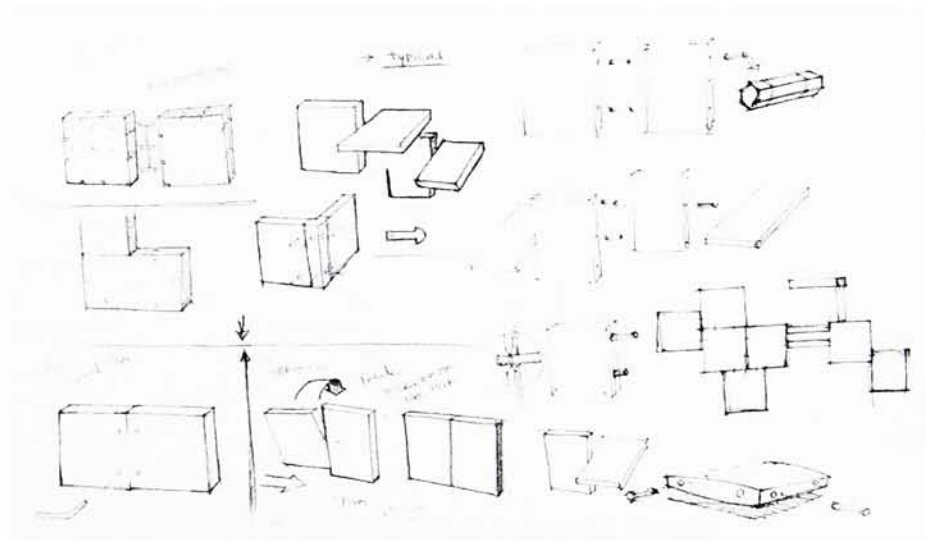


Fig. 9. Thumbnail sketches of 1st stage

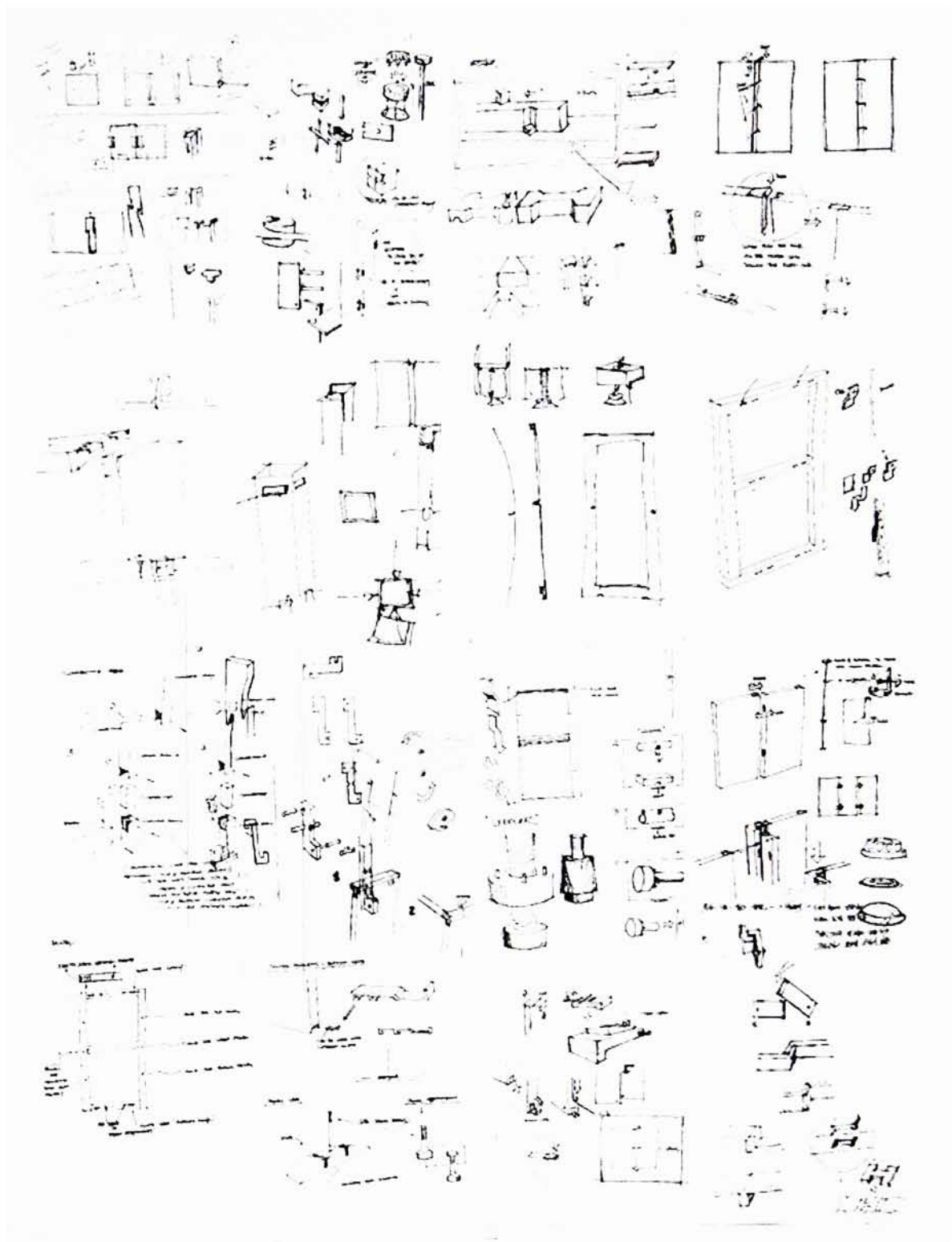


Fig. 10. Thumbnail sketches of 1st stage

Ideation

After drawing idea sketches, I decided the basic structure of display wall had to be an Aluminum structure frame with changeable panel covers because these can help solve the problems of weight, cost, and flexibility in choosing cover materials. In addition, I tried to solve the problem in connecting each display walls without requiring any undue effort, knowledge, or tools. The frame was designed as a symmetrical shape so it can be used in both directions, and the cover has a special hardware to hold to the frame firmly.

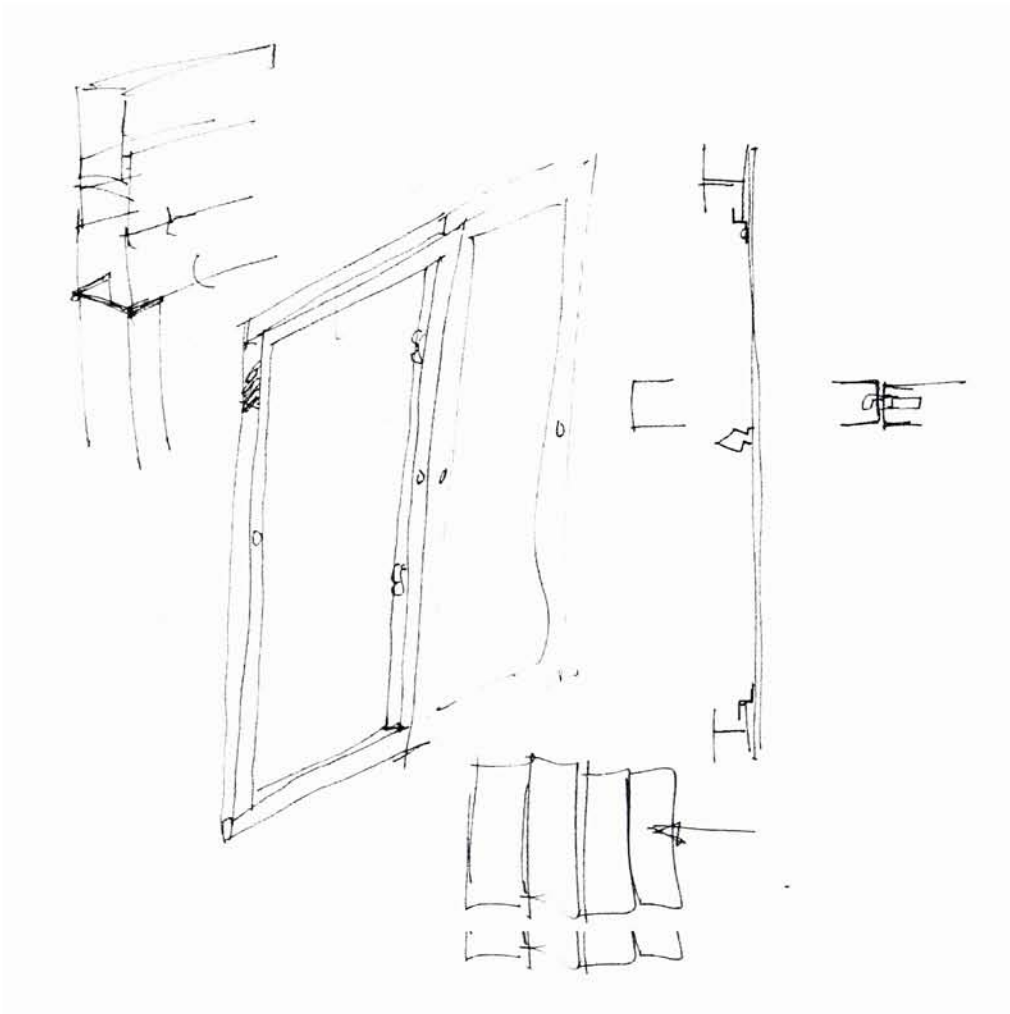


Fig. 11. Idea sketch

In 1st concept (see Fig. 12 and Fig. 13), I successfully configured the basic structure and material. It supported the main requirements of my design objectives. However, there were still problems of using specialized hardware for connecting the frame to the cover. Of course, at this stage, the details of manufacturing concerns, specific size of design features, and the mechanism of wall connections were finalized during further development and prototypes.

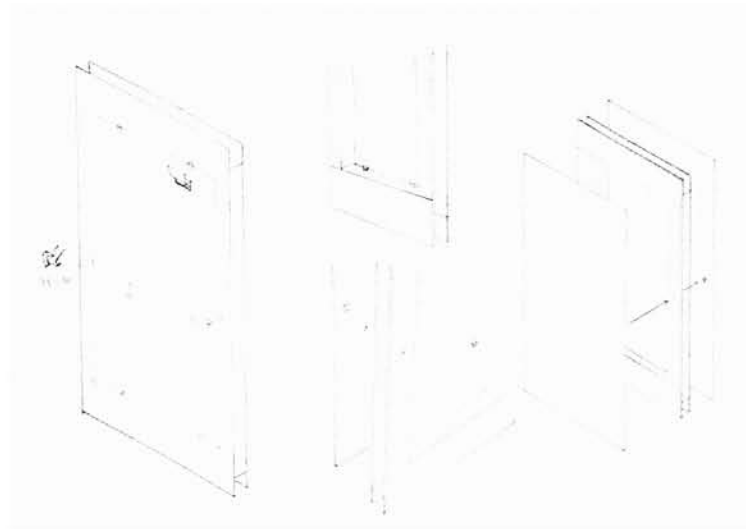


Fig. 12. 1st concept design sketch

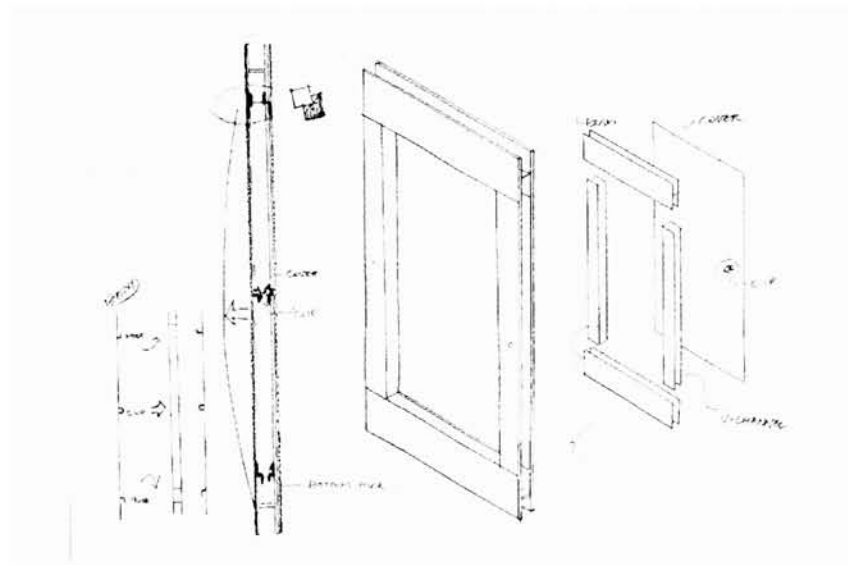
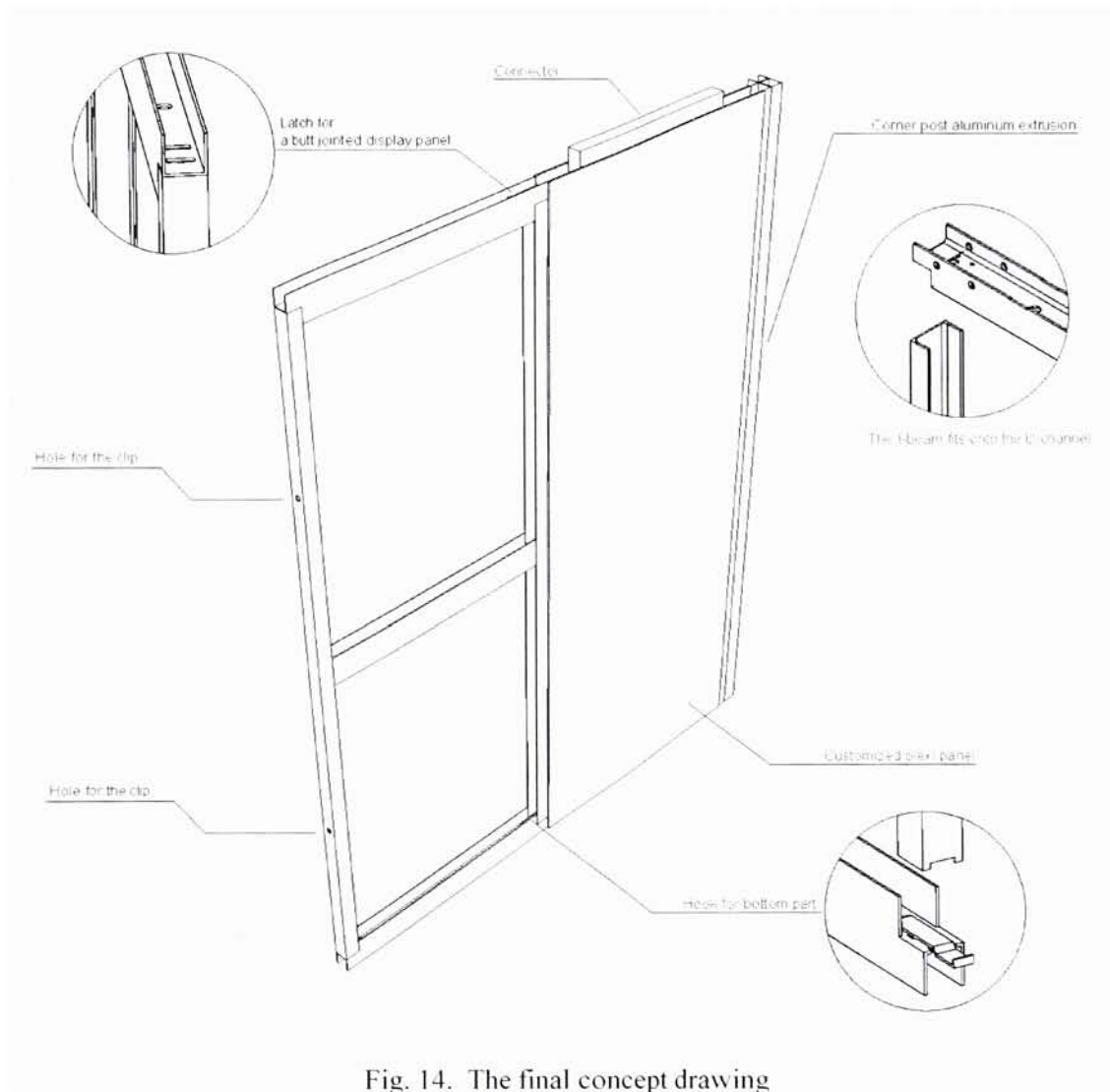


Fig. 13. 1st concept design sketch. (structural solutions)

After drawing many sketches to generate many different ideas and methods, I decided on a final concept to be mocked up in three-dimensional form. During this time, I evaluated many concerns such as the way of connecting each wall, structure of frame, hardware, and so on. The final concept was as follows:



After deciding on the final concept, I made a 3-D mock-up (Fig. 15). The mock up was made with ABS. It showed how the concept works and what it looks like. Then the committee and I evaluated the model. We realized that this design was enough to satisfy most criteria of my design objectives such as connecting display walls in any direction, fixture method between the wall cover and frame, extra stability, solving problems in manufacturing, and so on. But we also understood that I had to develop a way of connecting the frames, hardware to attach the panel covers, and some minor problems. Also, the committee suggested that I put more possible options in the design, such as a power cable slot, leveler, bracket connection for the ceiling panel, and so on.

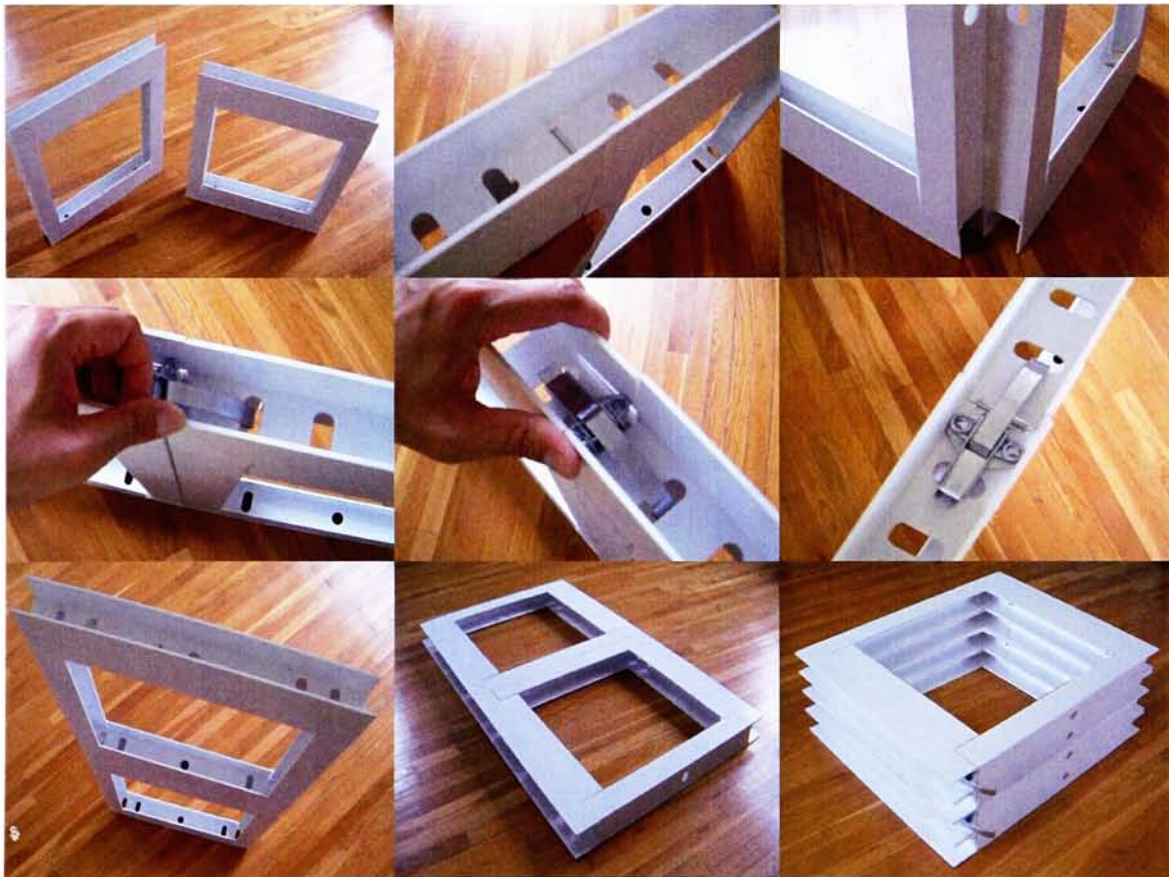


Fig. 15. 3-D Mock up, ABS

Development of final concept

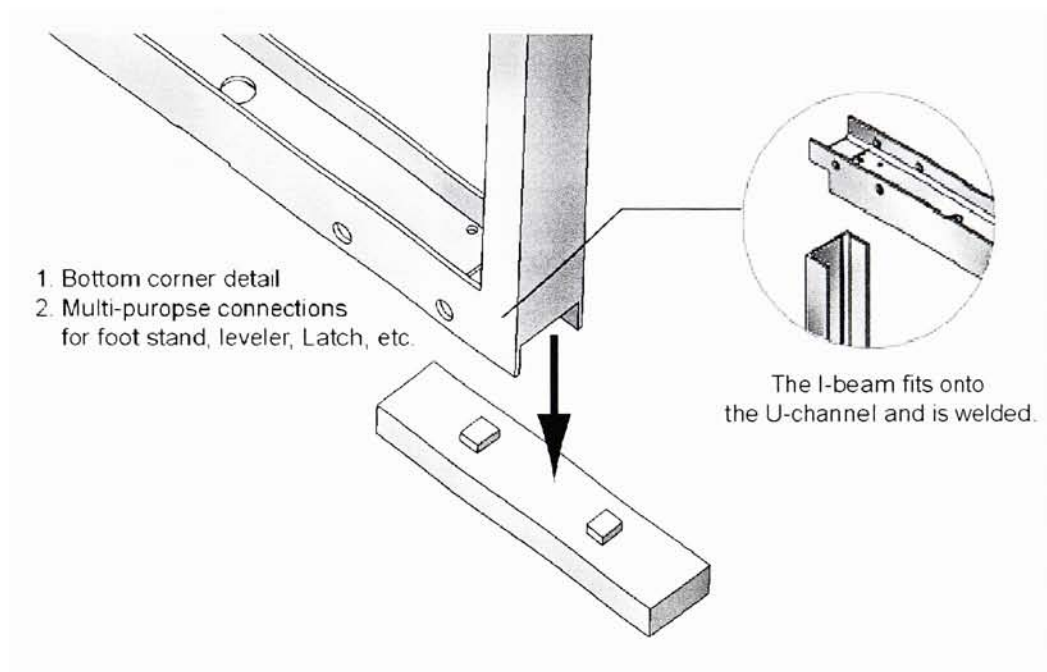


Fig. 16. Final concept sketch (alignment block)

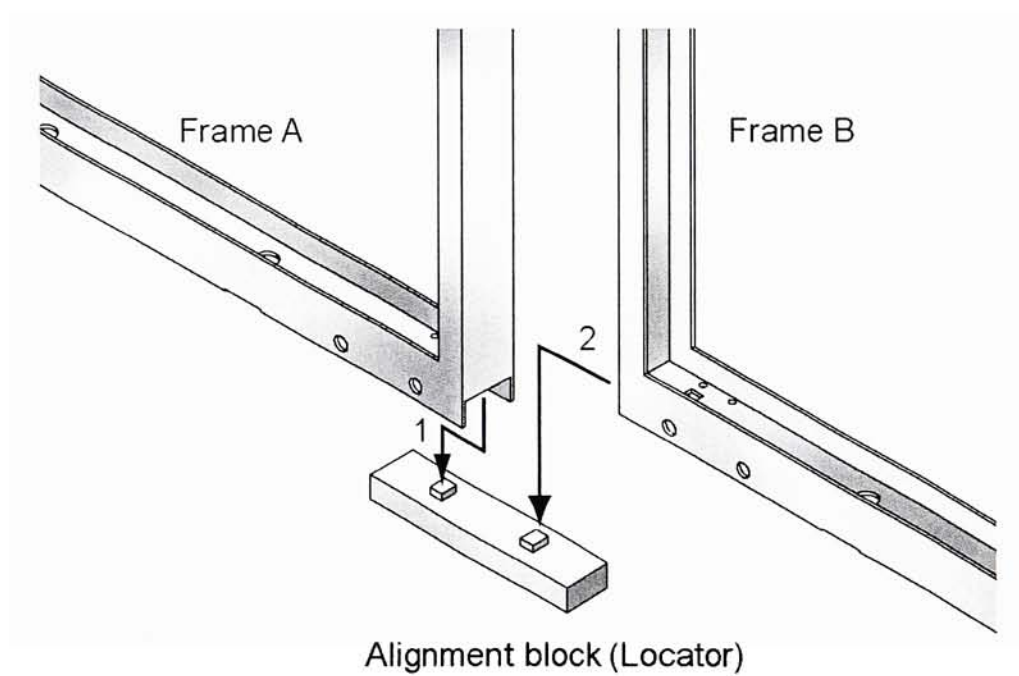


Fig. 17. Final concept sketch (alignment block 2)

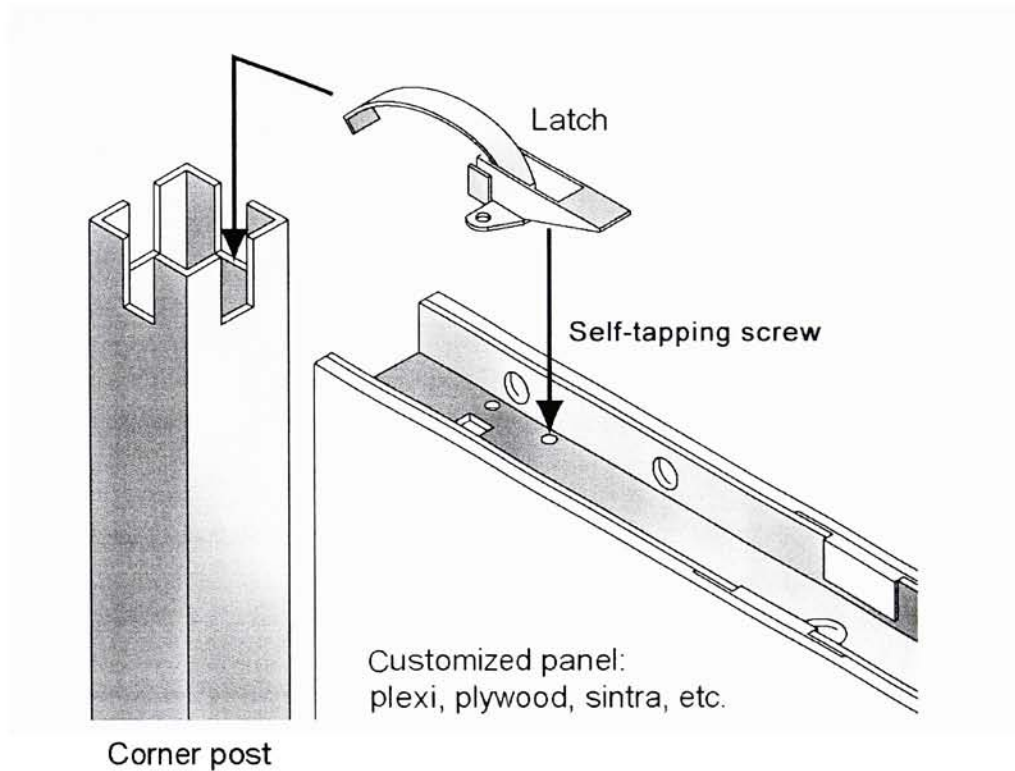


Fig. 18. Final concept sketch (panel and corner post)

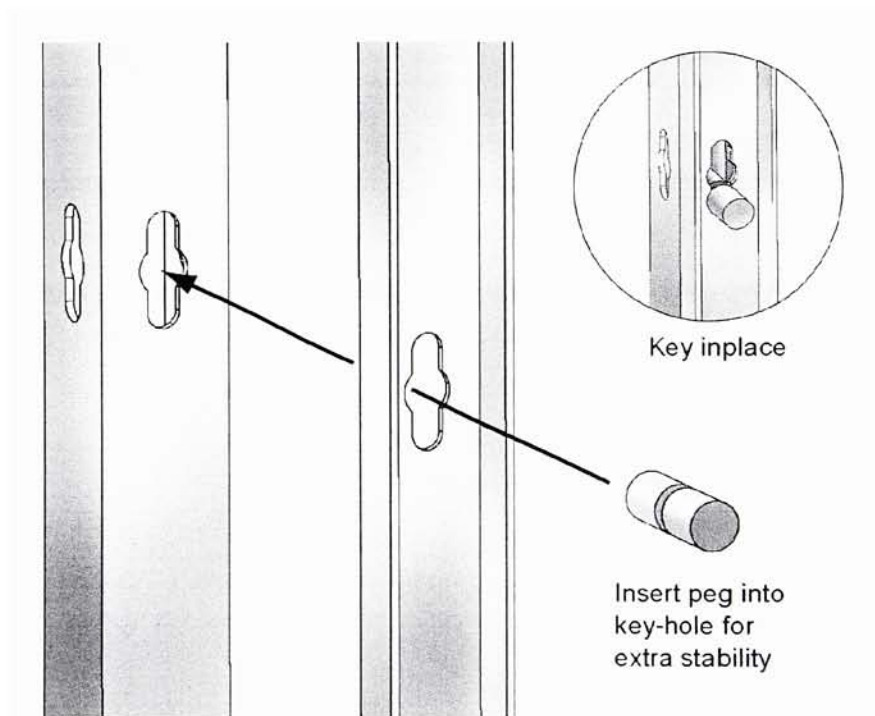


Fig. 19. Final concept sketch (peg)

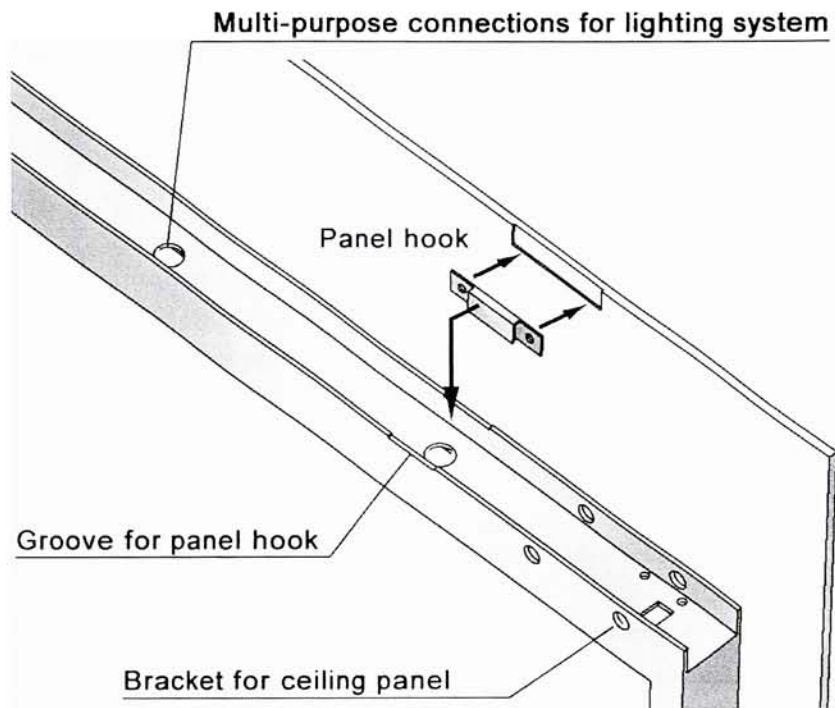


Fig. 20. Final concept sketch (panel hook and multi-purpose connections)

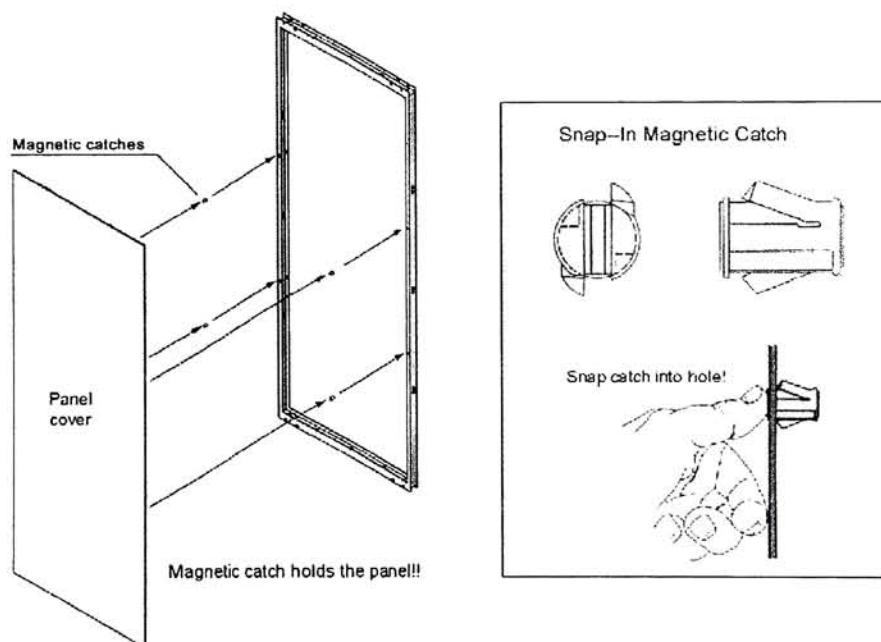


Fig. 21. Final concept sketch (magnetic catch)

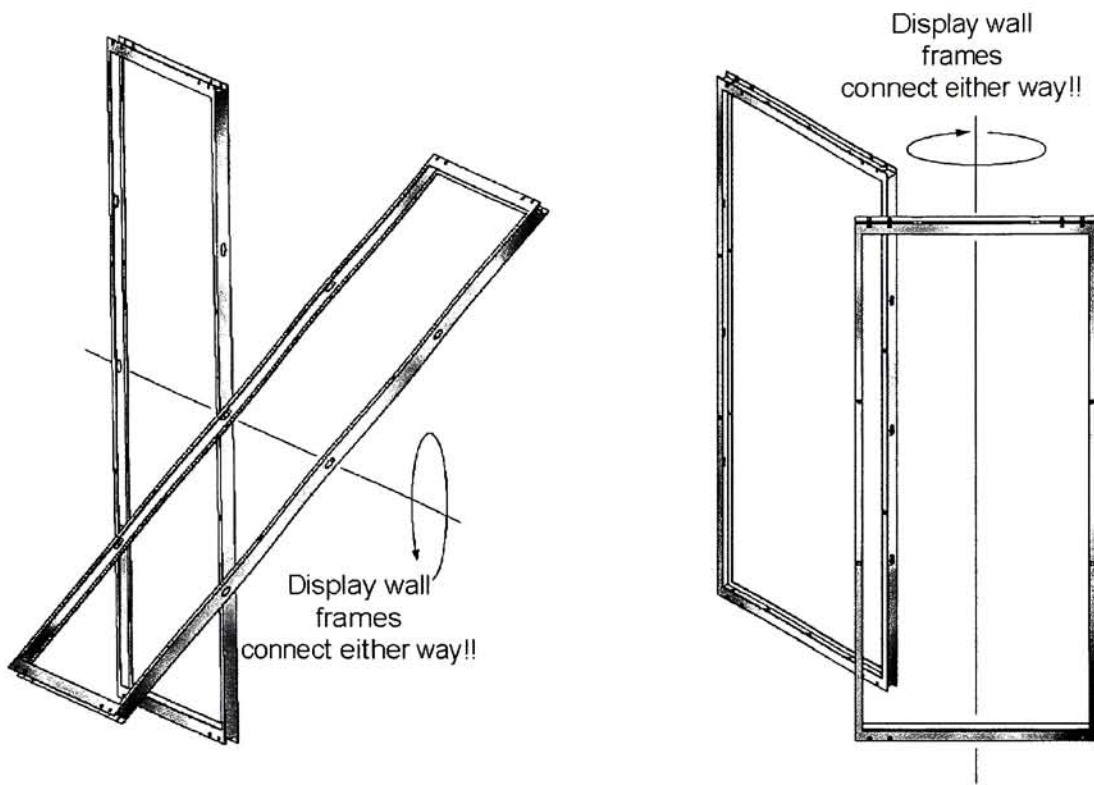


Fig. 22. Final concept sketch (frame)

Evaluation of concept

After doing a search for available hardware that doesn't require tools, I decided that I could use existing hardware made by Southco Latch Inc. to hold the display walls. That would help to keep costs down rather than designing new customized hardware. I also incorporated some of the committee's suggestions for more options, such as a power cable slot, leveler, brackets, and connection to ceiling panels.

My functional solutions to design and realistic problems were very successful, especially with the incorporation of my committee's suggestions. Adding power cable slots, the ability to level a wall on an uneven surface, and create a way to join the walls to ceilings, etc., made my concept much better than products on the market today.

However, I believe that my design and concept generation would have been more successful if I had spent more time on understanding various manufacturing processes and materials. That would allow me to develop more design configurations, allow for more final details, and possibly be even more effective in reaching my goals. Perhaps working with an engineer would help me reach these goals more efficiently, and help me with the poor availability of research data.

CHAPTER 3

FINAL DESIGN

The design's first issue was how to connect walls easily without any difficulty. A second issue focused on multi use functions to easily adapt to many different applications, like lighting, different cover materials, pedestals, etc. Most issues were solved by making prototype models. I learned lots of information about fixture in exhibit field, gallery fixtures, manufacturing process, budget line, and much useful knowledge by researching books, internet, interviewing professionals, participating exhibit design work, and making my design work the way I intended.

3D computer model rendering

3D renderings helped me to easily show and change the product in various materials, textures, and colors. The virtual models of the display fixture for small show spaces were constructed using Alias/WaveFront Studio 10.0 (Fig. 23). The models were then viewed at many different angles.

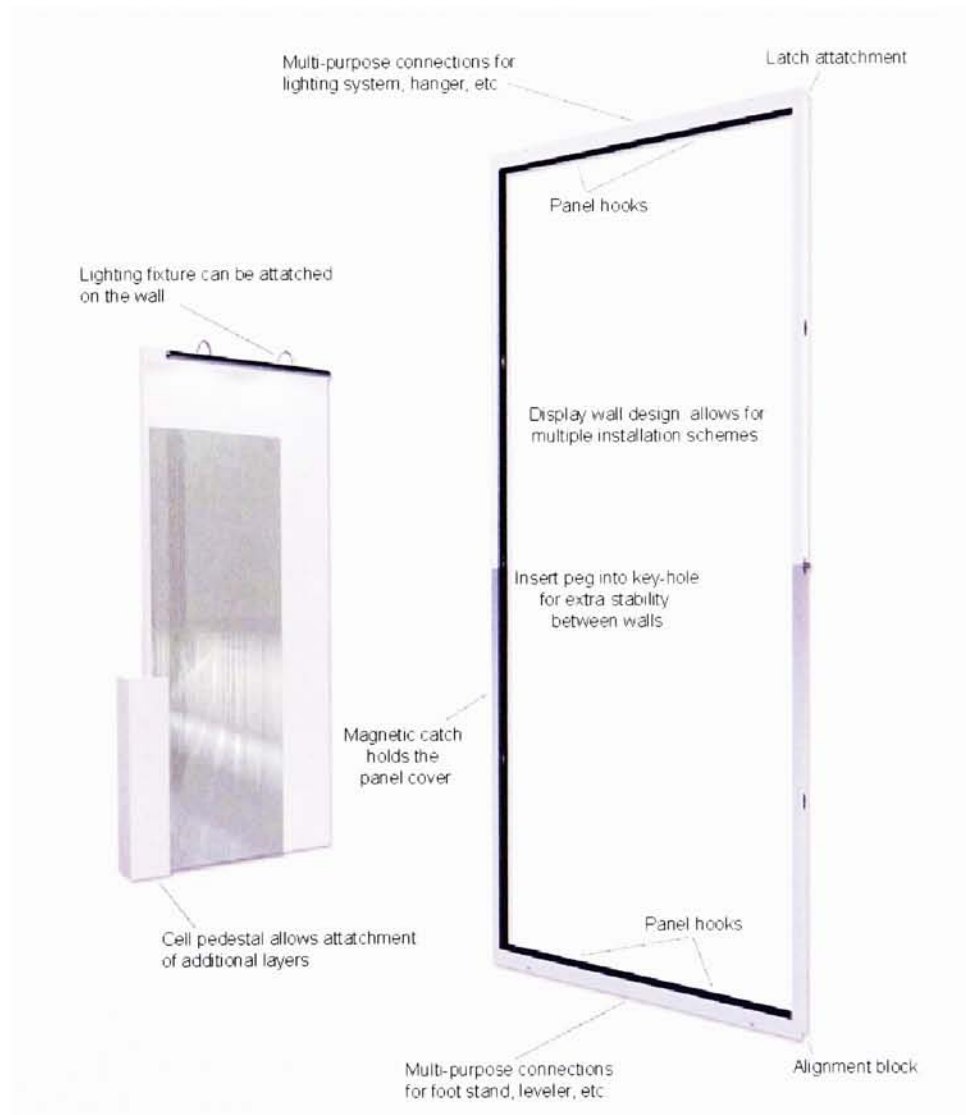


Fig. 23. The Alias/WaveFront Studio 10.0 3D modeling

2D CAD drawing

Frame of Display wall

1. 8'(H) x 3'(W) x 3"(T)
2. The U-channel and I-beam measurements are regulation sizes from the Aluminum Association Standard Structural Shapes (AASSS).
3. Welding on each corner after cutting

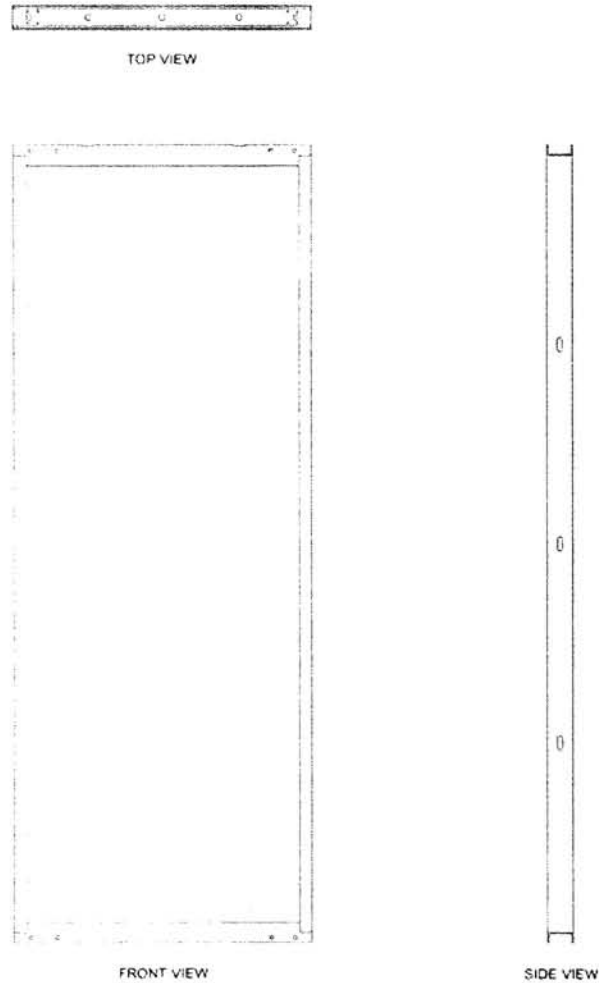


Fig. 24. 3D dimensions of design

Prototype model

After exporting the technical drawings from Alias/WaveFront Studio 10.0 to AutoCAD 2002, I built several test models. Two different size (8'x3' and 8'x1.5') models were made with standard aluminum "I beam" and "U channel" extrusions. The extrusions were cut to length and welded together in the RIT engineering machine shop. The panels incorporated magnetic catches and mechanical latches for ease of assembly. Panel covers were made of sintra and covered with a photo printout on glossy paper, which is relatively inexpensive and easily customized.



Fig. 25. The overall perspective view of design



Fig. 26. Welding the frame in RIT's Engineering Shop



Fig. 27. The model making process / Two different sizes of frame members



Fig. 28. The model making process / Detail work, test and feedback

Features

While designing the display wall, I focused on how to setup the panels easily allowing minimal concern for the panel orientation, or the need for specialized knowledge or tools. I also focused on creating a sturdy structure, minimizing weight, manufacturing costs, and maximizing aesthetic options. In addition, I designed many possibilities of joining panels together with connectors, and increased the number of customizable options.



Fig. 29. Perspective of design

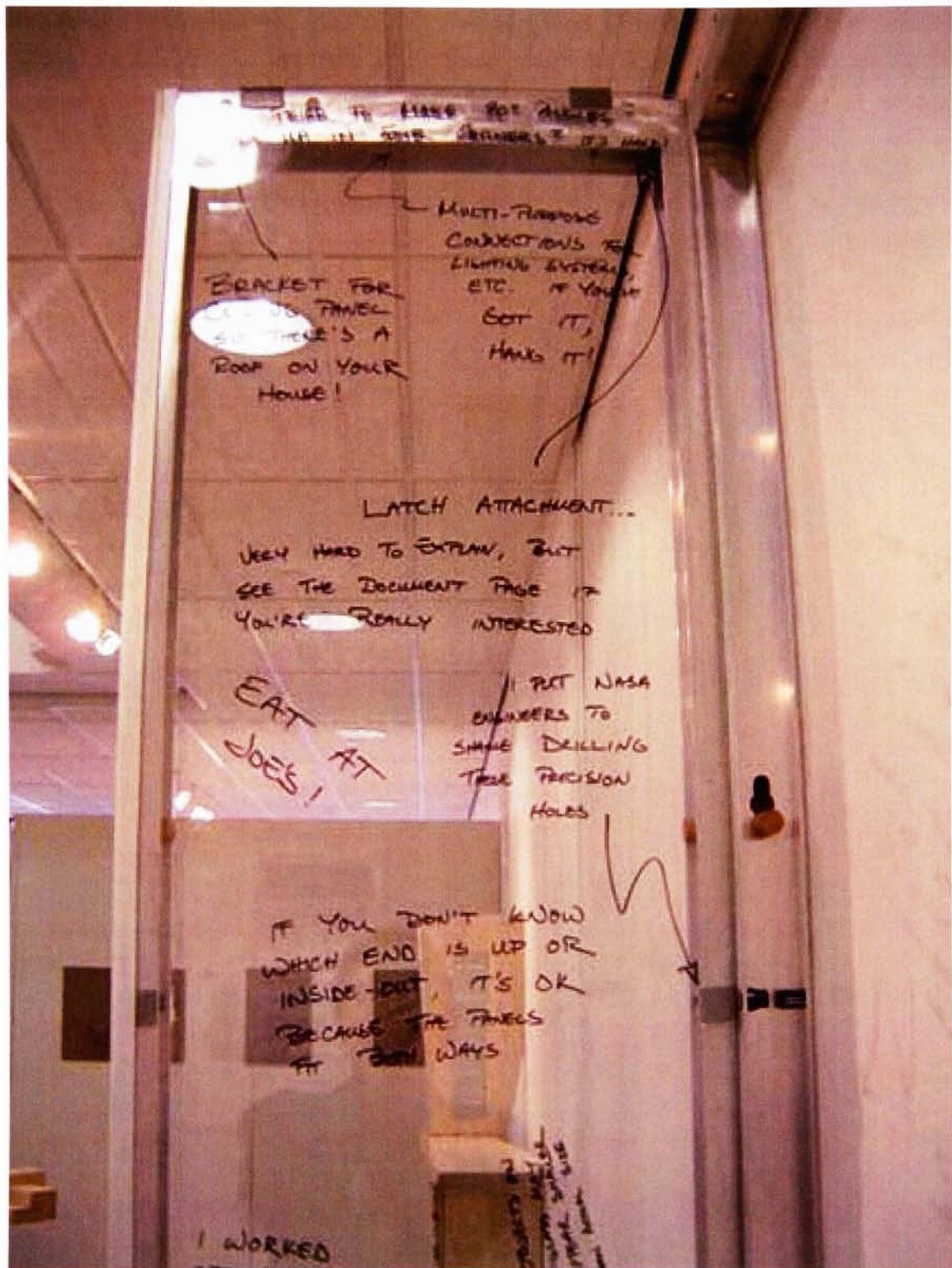


Fig. 30. Detail view of display wall with clear panel and designer's notes

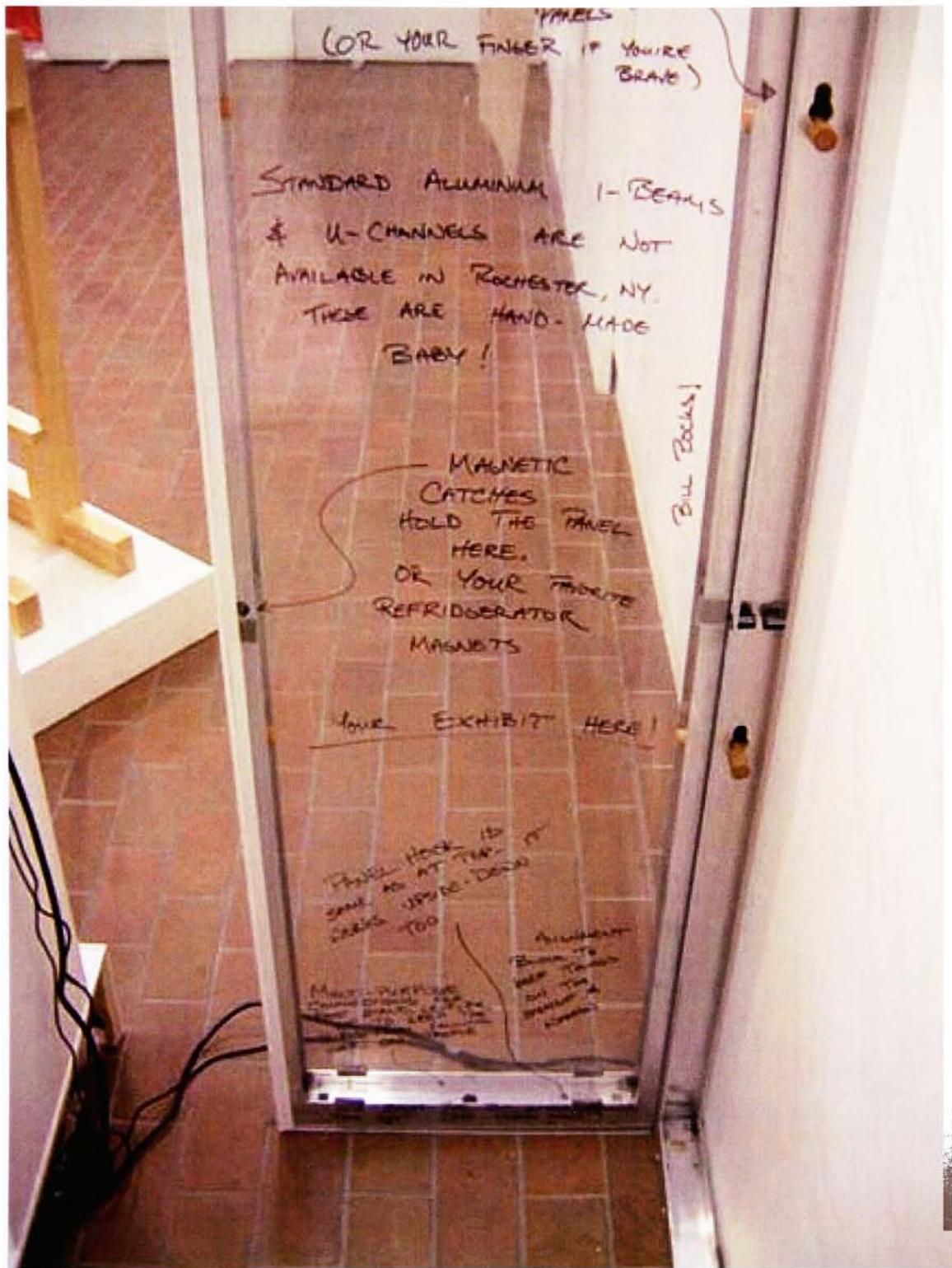


Fig. 31. Detail view of display wall with clear panel and designer's notes

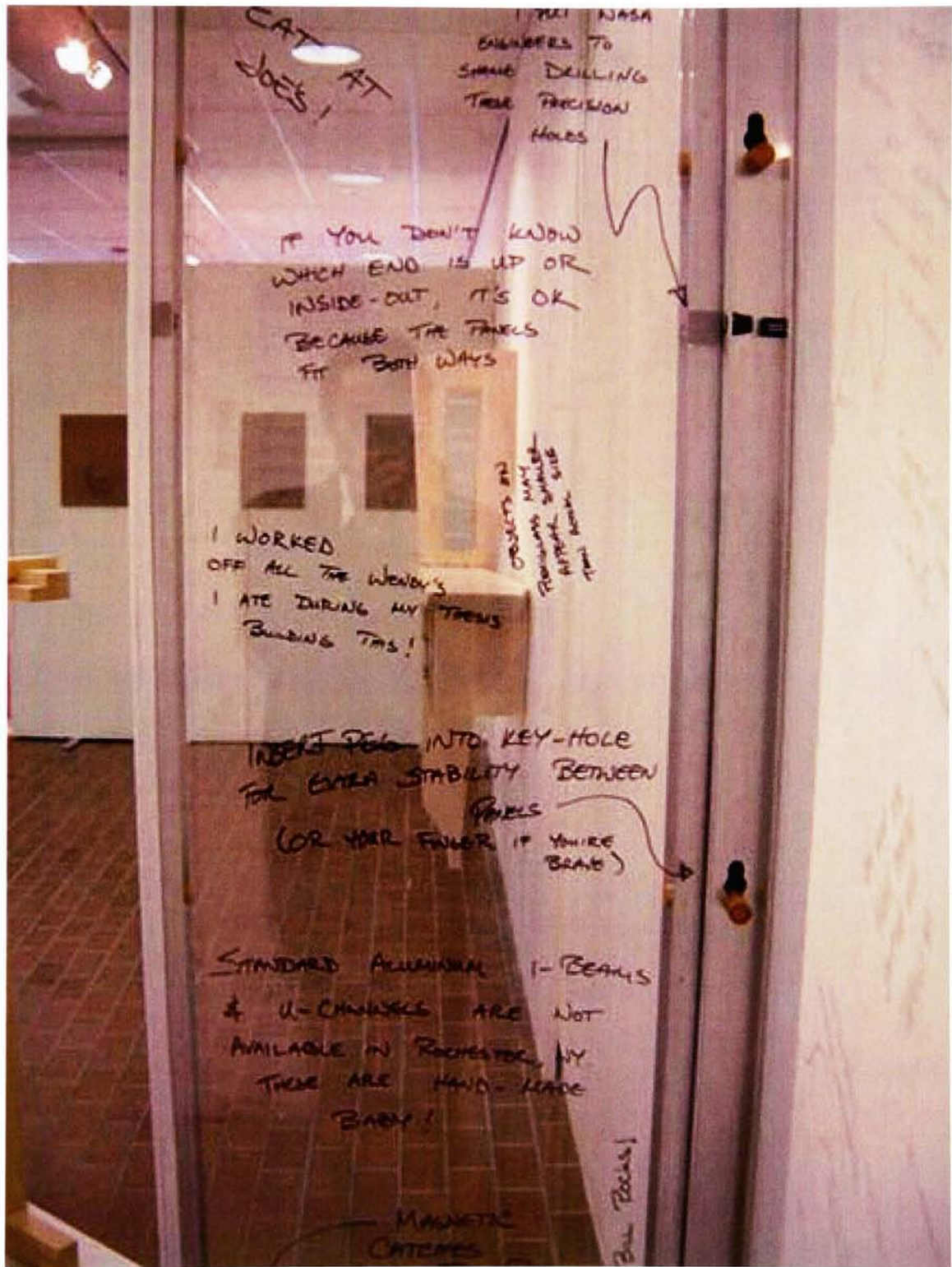


Fig. 32. Detail view of display wall with clear panel and designer's notes

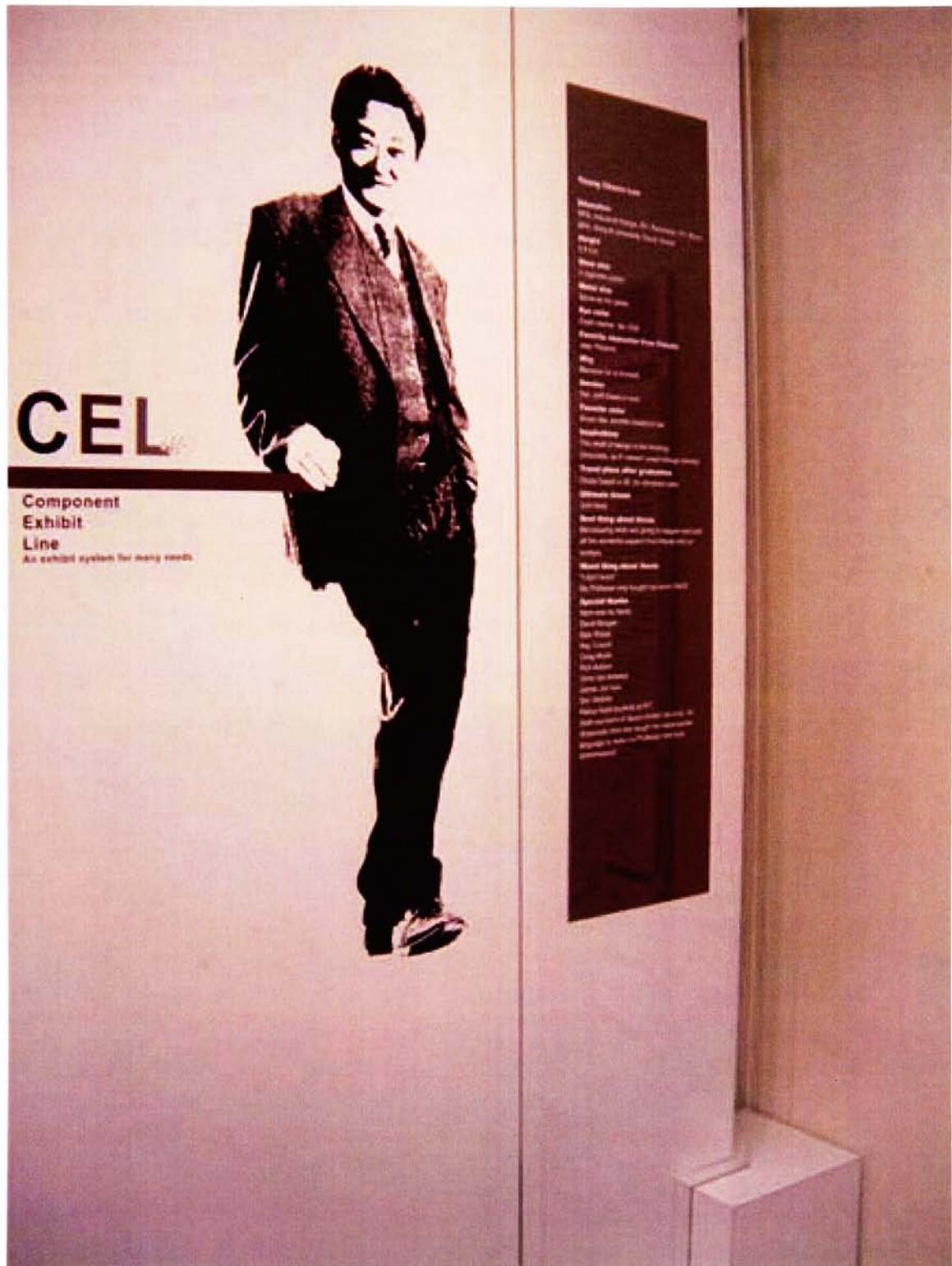


Fig. 33. Example of using additional fixtures (customized pedestal and plexi panel)

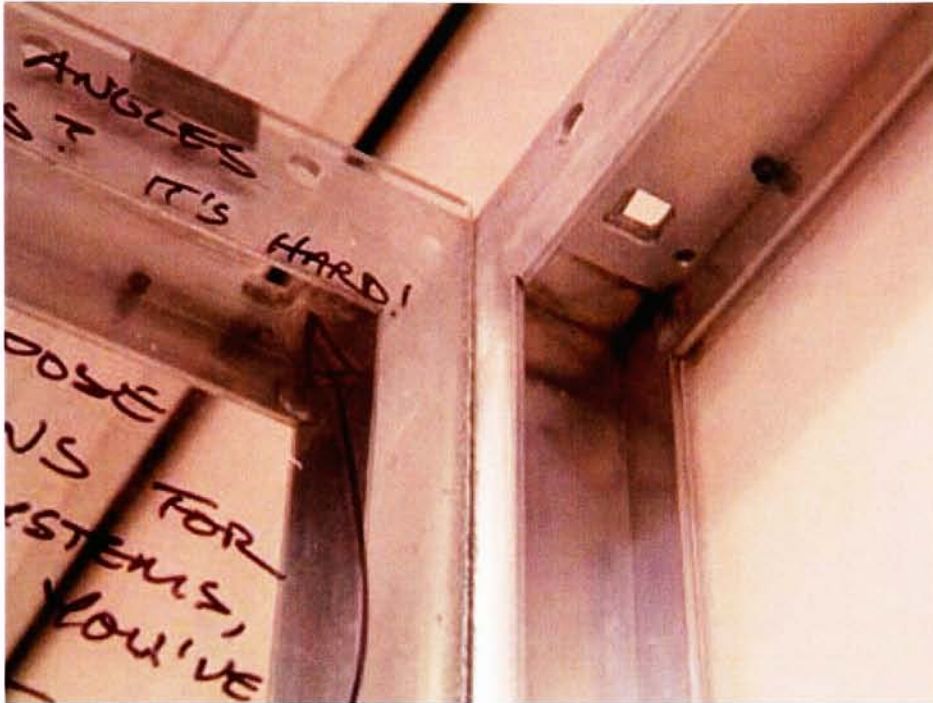


Fig. 34. Detail view of display wall (top connection)

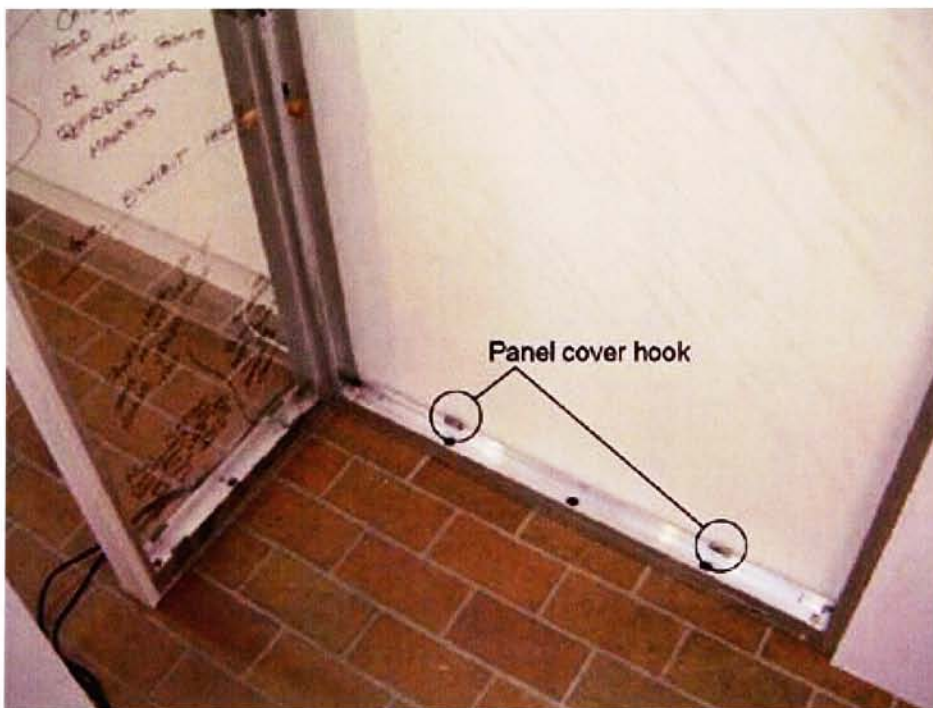


Fig. 35. Detail view of display wall (panel cover hooks and inside of display wall)



Fig. 36. Detail view of display wall (key hole, peg, and magnetic catches)



Fig. 37. Detail view of display wall (alignment block)



Fig. 38. Detail view of display wall (latch)



Fig. 39. Detail view of display wall (latch)



Fig. 40. Detail View of display wall (key hole)



Fig. 41. Example of using an accessory (lighting fixture)

Install directions

4 step quick installation guide

The design has a 4 step quick installation method. This does not require any special installation technique so there is no need for an expensive installation specialist.

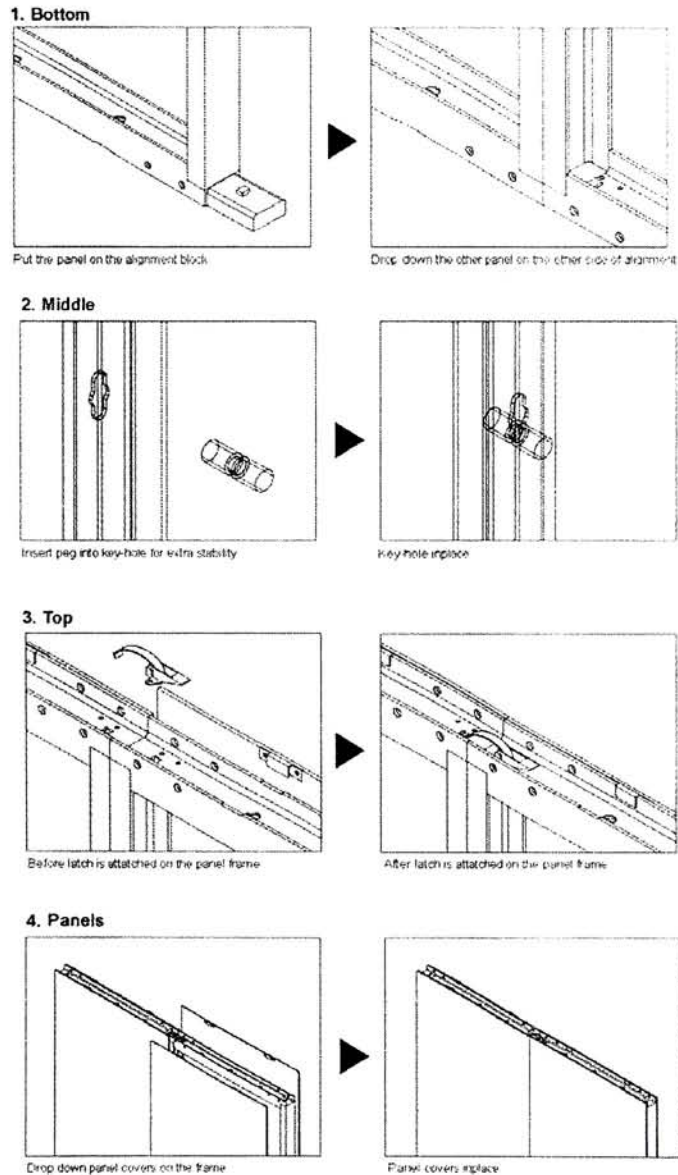
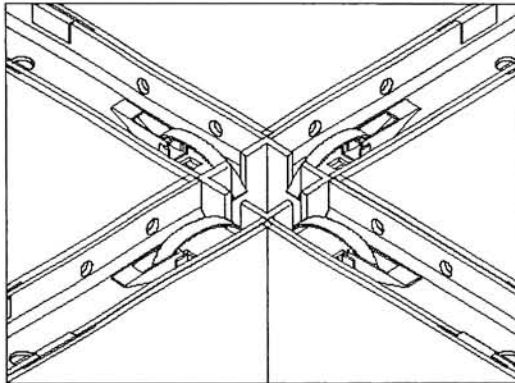


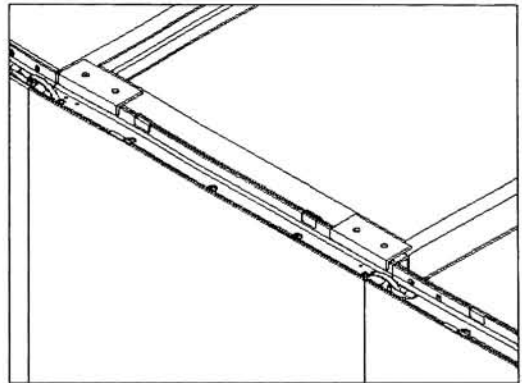
Fig. 42. 4 step quick installation guide

Advanced setup

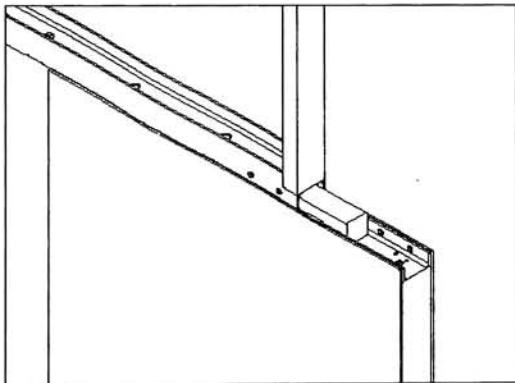
The design can be connected in 3 or 4 directions with a corner post. Also, by using a bracket, locator block, or hinge connector, exhibitor can establish a flexible design based on the exhibit situation.



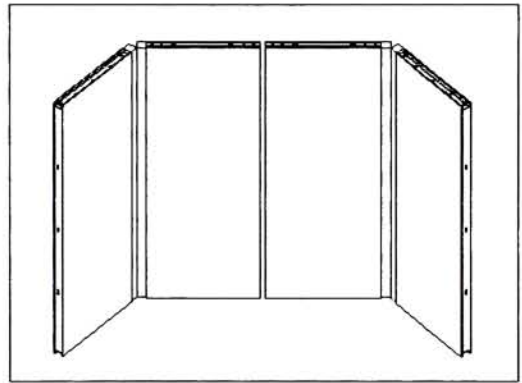
3 ways & 4 ways connections with corner post



Bracket application for ceiling panel



Two story panel application

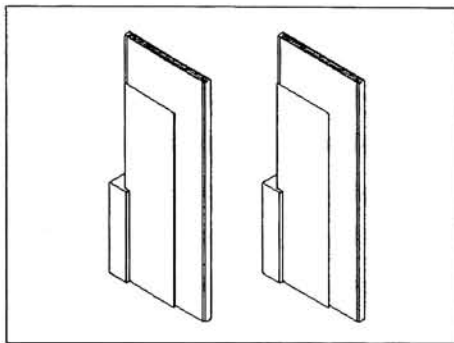


Hinge connector for adjusting the angle of panels

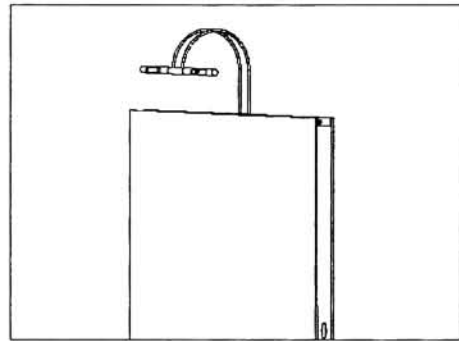
Fig. 43. Examples of the advanced setup

Different options

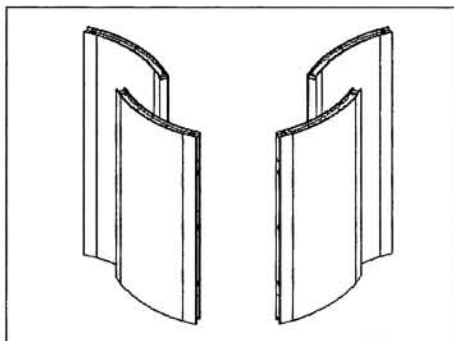
The design has many different kinds of design options so it improves the quality of the show. Combined with a pedestal, lighting, and other accessory increases the usefulness of the design. Also, curved display walls, as another option, help to design a more beautiful show space.



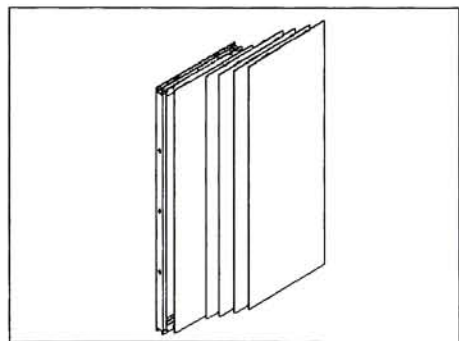
Pedestal with glass



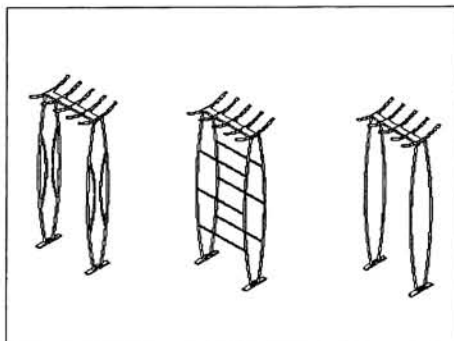
Lighting



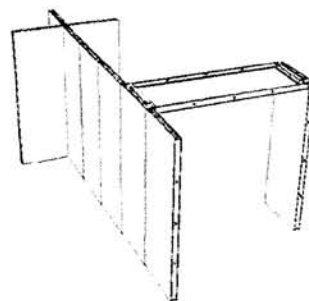
Curved panels



Different panel covers (fabric to metal)



The CEL skin for extra function



Perspective view of installation

Fig. 44. Some examples of different options

Configurations

The design can be used for any configuration based on a show space condition or user's design taste.

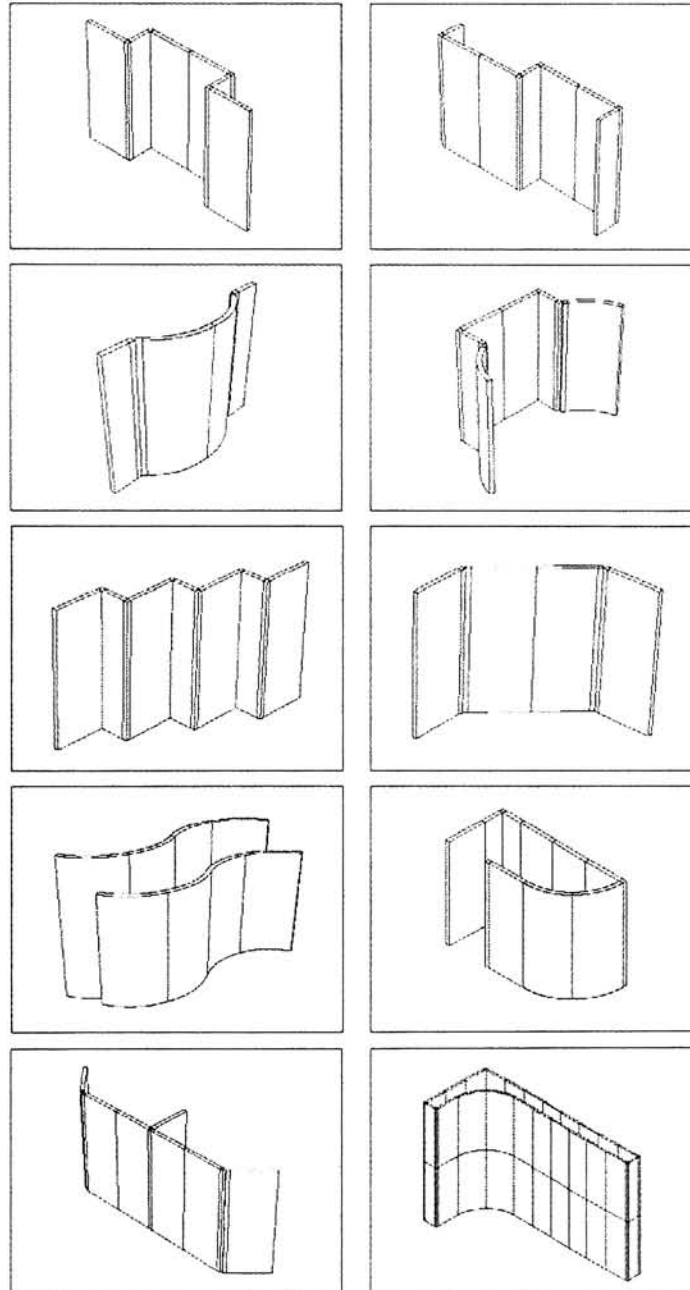


Fig. 45. Images of possible configurations

Thesis show exhibition

For the gallery exhibition, I designed posters to describe the panel's various features and functions. To create an effective display of my design, I planned an arrangement of the prototype that included the informational posters. Also, to better show other functions such as the assembly process, I made a computer animation with 3D Max, Macromedia Director, and Macromedia Flash, which I displayed on a computer installed near the panels. This animation is included on a CD with this document. The panel was installed RIT's Bevier Gallery for two weeks from Apr. 22 to May 7, 2003.



Fig. 46. Thesis show exhibition overall view

CHAPTER 4

CONCLUSION

Design review

1. Easy to setup

By incorporating a simple structure and a latch system into the design, the exhibitor can set up quickly and save on costs associated with installation and dismantling.

2. Light weight and low cost

The use of Aluminum Association Standard Structural Shapes (I-beam and U-channel) allows minimal machining. Therefore, the production costs of the design are kept low, and the aluminum frame provides a strong, flexible structure. Further, the aluminum frame of the design is much lighter than previous panel systems.

3. Aesthetic options

The modular design of my fixture system can easily fit many different exhibit situations. Many aesthetic options such as pedestals, lighting, shelving, clear sections, etc. are easily incorporated.

5. More benefits

The removable panels lend the design a strong flexibility. This design allows exhibitors to choose panel covers made of anything from cloth to metal and attach them easily to fit many different situations.

6. Comparison chart

- 4ft x 8ft standard display wall system

	Weight	Estimated Production cost	Estimated Maintenance per year	Versatility
New display wall	40 lb	500 USD	150 USD	Excellent
Profile wall system	75 lb	1200 USD	200 USD	Good
Custom wall system	65 lb	1000 USD	400 USD	Low

Table 1. Comparison chart

Final thoughts

When I started this design, I initially planned and developed the process based on a few issues, namely, difficulty in installation, weight, flexibility, and cost. After much research, several interviews, visits to galleries, show spaces, and trade shows I established the main direction of my design. Meeting with my committee helped me to start with a valid objective. However, due to the rarity of this kind of design, broad research and analysis was difficult.

I focused on making this design function in the real world with emphasis on a creative and unique display wall. I also focused on solving the problems with similar fixtures in current production. Based on my evaluation and prototype results, I believe that I successfully achieved my objectives for a first generation of the design.

During the process of ideation, concept design, mock-up, and final development, I constantly discussed my design objectives with my committee, gallery professionals, and designers. Their feedback and advice were very helpful. I received several excellent ideas and suggestions, which ultimately saved me a lot of time and effort.

While building my prototype model, I tried to follow the intended manufacturing process to observe first hand any possible unforeseen problems that might occur in real production. Aluminum welding is difficult for people who are unfamiliar with that process, so I had to meet with the engineering department at RIT and ask them for assistance. This collaboration with engineering taught me a lot about the materials, processes, and techniques of making a reliable aluminum structure.

The prototype model demonstrates a solution for all my design objectives. By building, moving, and installing the design myself for the thesis exhibition, I proved that my solutions would work in the real world. Further, by incorporating a customized pedestal, clear plexi panel, and modular lighting in the exhibit, I showed some of the possibilities of future flexibility. Unfortunately, while I was not able to include many other ideas of customization and flexibility in my exhibit due to budget and time constraints, those ideas could easily be demonstrated during later manufacturing efforts. Moreover, defects such as welding scars would be less noticeable when done in real production.

2D presentation posters and 3D animation assisted perfectly to demonstrate my thoughts, design, and process. The posters and animation also helped me create a more interesting exhibit, as well as show that multimedia could be easily incorporated into an exhibit using my fixtures. Further, my fixtures did not look out of place with existing fixtures in the gallery, and it was a good example of what can be accomplished with a small exhibit space.

The fact that the prototypes were actually used as part of the gallery is partial proof of the success of my design. Many people were surprised to see an actual working prototype. The overall concept was easily understood, but perhaps not entirely appreciated by those who have never set up an exhibit. However, several people mentioned that I should pursue a patent for the panel system.

Like I mentioned above, I regret that I could not show other possible configurations because of time and money problems. However, I think that this result is a good springboard for a

new type of show space display wall. Ultimately, this design met all my objectives, and shows what the next iteration of display fixtures should be. Consequently, it could help develop the market if put into production.

Note: All the images, animations, and CAD drawings are provided in Macromedia Projector and Adobe PDF file formats for further review on a CD-ROM included with this thesis document.

Bibliography

Christman, Christine. *The Complete Handbook Of Profitable Trade Show Exhibiting*. Englewood Cliffs, N.J.: Prentice Hall, 1991

Kroll, Lucien. *An Architecture Of Complexity*. Cambridge, Mass.: MIT Press, 1987

Konikow, Robert B. *Exhibit Design: The Graphics Of Trade Show Communication*. New York, N.Y.: PBC International: Distributors to the trade in the U.S., Robert Silver Associates, 1984

Konikow, Robert B., *Exhibit Design 2: Trade Show Graphics*. New York, N.Y.: PBC International, 1986

Pegler, Martin M. *Contemporary Exhibit Design*. New York, N.Y.: Visual Reference; London: Hi Marketing, 2001

Siskind, Barry. *The Successful Exhibitor's Handbook: Trade Show Techniques For Beginners And Pros*. North Vancouver, B.C.: International Self Counsel Press, 1993

Merchant Catalogs:

Austin Hardware Inc. *Austin Romtech*, Minneapolis, M.N.: Austin Hardware, 1993

Hafele, *Furniture Hardware: The Complete Hafele*. Nagold, Germany: Hafele, Sep. 1996

Skyline Exhibits. *Design Ideas*, Eagan, M.N.: Skyline Exhibits, 2002

Southco Co. *Southco Handbook*. Chester, P.A.: Southco, 1999

Website:

<http://www.daydesign.com>

<http://www.designdb.com>

<http://www.dwr.com>

<http://www.pleoremedies.com>

<http://www.jetexhibitions.co.uk>

<http://www.skyline.com>

<http://www.spoonexhibits.com>