FLIGHT IMAGERY USING STRETCHED FABRIC OVER WIRE ARMATURES

PROBLEM IN LIEU OF THESIS

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CHAPTER I

INTRODUCTION

Artists have perceived and used the imagery of flight to create a wide array of symbols having various interpretations. Songs and literature also speak of flight and flying, and the message is often about experiences other than physical flight, including themes of solitude, freedom, escape, sexuality, and even death. Such themes may embrace both the spiritual and physical symbolism of flight. While some of the flight symbolism is immediate and easily understood, other symbolism is subliminal. It would seem, then, that sculpture in particular would provide a challenging medium for the expression of flight in both its physical and spiritual dimensions.

While searching for solutions to the problem of translating my own perceptions of flight imagery into sculpture, I began thinking of alternate ways of defining sculptural space. Traditional techniques of making sculpture seemed to restrict my design exploration.

Early aircraft used a covering of paper or thin fabric stretched over a lightweight frame that created a structure much like a fly wing. While this technique produced an object capable of flight, it also produced a wonderful

sculptural object. An airplane wing, a bird feather, or the wing of a flying insect is each capable of flight. I decided to use this commonality and to mix and match these elements to create images that are a new representation of spiritual as well as physical flight.

Statement of the Problem

The purposes of this Problem in Lieu of Thesis are:

1. To explore the use of stretched fabric over constructed wire armatures to create sculptural forms that suggest the potential for flight; and

2. To evaluate the artistic merits of such forms as they relate to an interior architectural environment.

Questions

This project generated several questions, including:

1. How large can a stretched fabric structure be constructed before it becomes too heavy visually to suggest the idea of flight?

2. What technical or physical problems of wire structure construction will be encountered in making large sculptures?

3. To what extent will the solution of the technical problems, encountered in these large forms, visually affect the final sculpture?

4. What physical and aesthetic problems will be encountered in attempting to exhibit these sculptural forms in a given interior architectural environment?

Methodology

For this study I constructed more than ten sculptures, each successively larger eventually than the preceding piece with the largest sculpture over twenty-four feet wide.

I installed eleven of these works in the light well of the Art Building at the University of North Texas, and analyzed their aesthetic impact (visual suggestion of flight) in view of the various technical solutions I chose. Source materials for this study included the body of work and a journal written during the time of the thesis project.

I constructed this series of sculptures for display in an overhead space. The vertical interior spaces, the negative spaces within the sculptures, the relation of the sculptures to this space, and the objects themselves all came into play in this study. The intent was to have the sculptures take on a bit of playfulness, wit, whimsy, bizarre reality, or, perhaps, no reality at all.

The sculptures were built of wire-welded armatures, with fabric stretched over part or all of each armature. At times, the skeletal structure seemed important to the design and was left exposed. Occasionally, other elements--materials other than wire and fabric--were used to add interest. The sculptures were covered with thin fabric, for

the most part, so that overhead light would affect the translucency and shadows within the sculptures, often revealing the inner skeleton.

Although I undertook this study to fulfill the requirements for my degree, the project also encompassed the larger aspects of my own sculptural experience, producing answers to questions that relate to these concerns. The mix of a non-traditional sculptural environment and an unconventional medium formed the technical basis of the study. Overhead space is rarely an appropriate display space for sculpture made of conventional materials, but the marriage of flight imagery and stretched fabric in the uncommonness of overhead space provided a unique search/study that added to my vision of the sculptural potential.

CHAPTER II

ANALYSIS OF THE WORK

Potential of Flight

I designed my sculptures to have the mood and the lightness of flight, to look like they belonged in the upper atmosphere and could glide in that space indefinitely, without visual support. In short, I created the sculptures to project the capacity of flight, though actual flight was not considered.

The sculptures were designed to be shown in an overhead space, often just out of the reach of the viewer. The interactions between the viewer and the sculptures augment the idea of flight by suggesting an upward view, not unlike that produced by the verticality of medieval cathedrals.

Technical and Physical Problems

Maximum size was limited more by the size of display and storage space than by the limitations of the materials and of the wire construction technique. In fact, I believe it is possible to construct a structure of almost any size

using this technique. While very large sculptures are possible with wire armatures, however, there is a point where construction is simplified by using other structural elements, such as steel rod, and steel tube. Limitations fell into three categories: (1) the construction and engineering of the armature; (2) the level of acceptable flex in the design, as well as in the fabric covering; and (3) the dynamics of the hanging system.

"Big Flyer" is over twenty-four feet in width, and almost twelve feet in depth. This is not the largest size possible with 1/8-inch wire, but it is both the largest I have constructed and the largest I would most likely construct using 1/8-inch wire for the armature.

Since it is difficult to transport a piece of sculpture over six or eight feet in any direction, many pieces, including "Big Flyer" and "Big Bird," were built in sections. Because it is often difficult for the different sections of such pieces to make an exact match, so that the sections line up perfectly, in " Big Flyer" I decided to make each matching segment different so that an exact match would not be necessary. Toward this aim, I made the sections curved, with the negative spaces in the joint suggesting the engines and the cockpit. The alignment between the sections was maintained by a series of pins and tubes, while lacing across the top section, along with the hanging harness, made the piece sufficiently strong.

Steel has two qualities that are important to this series: It does not compress nor does it stretch easily. The combination of these qualities can produce a stable sculpture or one that has controlled flexibility. Not only do long sections of wire tend to bend, but the polyhedron shape is an inherently unstable form. By adding bracing, usually in some sort of a diagonal basis, a three-sided, stable structure is created. This triangular bracing system allows for the construction of a very large and complex design.

A design that uses two pieces of steel, more or less parallel, can be triangulated with a series of "w"-like elements between two outside steel elements. Such a structure, when supported on both ends, will be strong when the ratio of the length to the height (the distance between the parallel wires as compared to the length of the wires) does not exceed 1:35. In a cantilever design, the ratio drops to 1:17. That is, with a one-inch height, the structure could cantilever into space seventeen inches and maintain the same strength as the thirty five-inch span between two points.

The fabric skin can also provide considerable strength. On "Big Bird I," the fabric did not contribute to the strength of the piece since it was installed only on the lower planes. When the piece was rebuilt into "Big Bird II," however, the fabric was attached to the top of the wing

and body, giving considerable added strength. "Twin Jet Bird," which is completely covered with fabric, gains considerable strength from the fabric covering. Some of the pieces in the "Capriccio" series use stressed fabric on the upper plane as a strength-giving device. "Airbird I" uses fabric as a hinge to keep the wing in the proper alignment

when down, yet the fabric hinge also allows the wing to be raised for storage or for a different mode of display.

Frequently I prefer the sculptures to hang in graceful, flexible curves. Since "Big Bird I" is over eleven feet wide and because there is a minimum of structure in the wings, I added a small wire that limits the flex to the top cord of the wing. Without some limiting device on a wing of this size, the weight would cause the wires to bend over time, destroying the graceful curved lines that I desire; this small wire on the top cord effectively eliminates any such problems. Had these sculptures been designed for outdoor display, the bracing would have had to include a margin of strength to handle any danger of capricious weather.

In fact, "Big Bird I" did hang in an outdoor space for about two months in the summer of 1988. Although subjected to considerable wind, the sculpture emerged without damage. Most of the wind damage I have encountered with outdoor sculpture comes when the wind blows the sculpture off of the hanging mechanism, or when the turning of the piece in the wind eventually strangles the sculpture in the hanging apparatus.

Multi-element pieces are more complex than single-element pieces. With multi-element pieces, designed to be assembled for display and then disassembled for shipping or storage, engineering complexity increases. Often, unusual

fasteners are required to assemble the elements and allow them to be disassembled without damage to the components. These fasteners may need to be designed and manufactured. Sleeves of 1/8-inch brass tube, combined with 1/8-inch pins can align whole sections. Sections may be held together with very small fishing leader, sewn with thread, or threaded with fasteners of all sorts, including friction fasteners. Braces, using left and right threads, can quickly join two sections. Flexible fasteners, involving various plastic and rubber tubing and fittings, solved problems on some of the flexible designs. Sheet metal fillets, gussets, and tabs remedy other structural and assembly difficulties.

The design focus of an internal armature sculpture is the exterior shape, with less consideration on the internal structure. When the armature becomes exposed, however, the armature also becomes a part of the aesthetics and must be considered both for its structural and aesthetic contribution. In "Death," part of the"Capriccio" series, the bare ribs of the structure become both aesthetic and structural bracing. In that piece, therefore, the fabric covering is a minimal consideration.

Visual Problems

The most vexing technical problem was keeping the feeling of lightness and simplicity in a design even when

the size was large. It is easy to bend a single wire into a solid, simple design, but translating that design into a sculpture of five or fifteen feet in size, while maintaining the visual simplicity of the model, can be complex and frustrating.

The technical limitations have less to do with maximum size than with maintaining a simple, dynamic line and plane when the size is dramatically increased. "Dream Image I" began as a ten-inch model was covered with thin paper. The design was simple, an understatement, and yet it held a visual complexity that I found intriguing. When that size was expanded, however, the problems changed. The small design was made of 1/16-inch wire bent into the desired form. In the larger version, the three pieces were designed to disassemble for storage and transportation. At the same time, the largest versions needed to maintain the line and plane structure that was appealing in the model. It would have been easy to attach a number of wires and braces to strengthen the extensions, but I felt that this would take away from the design. In the end, I designed a fastening device from sheet metal that did not require additional bracing. The hanging yoke did provide additional strength, however.

Exhibition Problems

Commercial buildings often contain large vertical spaces. Sometimes this space has a modest floor dimension, but can be quite high, making room for large complex sculptures or groups of sculptures. In homes, smaller sculptures can be suspended from smaller spaces and still produce eye-catching effects. "Big Bird I" hung in my small apartment for about a year. It was visually acceptable in the small space, even though it was over eleven feet in width in a space that was less than twenty feet wide. How well a piece of sculpture works in the available space depends on several factors:

1. The size of the space in relation to the size of the proposed sculpture.

2. The lightness or darkness of the sculptural surface contrasted with the ambient lightness and darkness of the display space.

3. The light that enters the sculptural space, whether available or controlled, as well as the light that shines on the sculpture.

CHAPTER III

CONCLUSION

This investigation shows that fabric can be stretched over a steel wire armature to provide an immense range of sculptural solutions. The project also demonstrates that these sculptures can mimic a litany of materials. For example, it is possible for them to look very heavy and dense, while actually being very light and airy, or to look as light as they really are. Dimensions can vary from a few inches to many feet in size. The choice of fabric and the treatment of that fabric can produce sculpture that is related to flying, as in this series, or it can project a very earth-bound presence. This variety of visual solutions, from light to very heavy, provides one of the most interesting challenges in this technique and helps to represent the many spiritual and physical dimensions of flight.

It is possible to use other materials than wire on the armature. Although wire does offer a very light solution it may be the lightest material in actual weight as well. I

have experimented with wood armatures with some success, but for the work in this study, steel wire was the material of choice.

The impetus for this study was to fulfill the requirements for the Master of Fine Arts degree. My involvement with the technique and the imagery has already gone far beyond that application, however. This technique, combined with the larger aspects of my sculptural experience, will most certainly be a major part of my lifetime sculpture production.

The non-traditional sculptural environment combined with a rather unusual technique bring this study into some new visual territory. Overhead space is rarely an appropriate display space for sculpture made of conventional materials. As stated earlier, this marriage of flight imagery and stretched fabric in the uncommonness of overhead space provided the beginnings of an intriguing study.

Reactions to these sculptures vary. Sometimes people with little art training are the most ecstatic about the pieces. In reality, it is the viewer who lives outside the art world whose reaction I find most interesting and rewarding.

While doing this study I did an extensive review of the literature of flight, from the point-of-view of both the creative artist and the inventor. The designs of many of my sculptures are close to those of archetypal flying machines.

Frequently I am asked "Will it fly?" I find this question to be the ultimate justification and vindication of this series. No, they won't fly, but I am pleased that they look enough like they might to inspire the question.

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