POSTGRADUATE

1983

D. STEINBERG
TEMPORARY KINGS
.285 M X .298 M
RED BRONZE
Prior to my postgraduate year at the Canberra School of Art, I was enrolled in the Master of Fine Arts programme at the University of Oregon, U.S.A.

My main concerns during that time were conceptual, with emphasis placed upon personal and social issues.

Emphasis in the Sculpture department at the Canberra School of Art is on the development of traditional directions in sculpture. This approach reinforces the fundamental concepts of formalist sculpture.

Initially, I faced frustrations related to my approach of the working environment; the question was how to benefit from the facilities and expertise available - in answer to this I addressed new issues and reassessed my original intentions in regard to my work.

This report is an assessment of the years work, including both technical and aesthetic aspects, and a personal evaluation of the results I achieved.
AESTHETIC

Throughout my year of study I explored a variety of mediums and concepts. I began the year intending to continue from my previous studies in developing ideas that involved the realization of concepts such as emotion, into 3-dimensional form. I chose to use the figure as a starting point. The ensuing pieces were minimal in style, fragmented, human related structures. These first pieces dealt with aspects of loneliness, discomfort, alienation and depression.

'Relinquishment' I believe, was the most successful of the pieces completed in this initial period. The fragmented bronze face protrudes at a right angle from the wall. The stark nature of the wall emphasized and isolated the actual face - its presence was crucial to the piece. It was effective as it produced the reaction intended.

My next step was to express something of the complexity between humankind and nature. I continued to use human forms (faces) and combined them with rigid planes, reminiscent of the wall in my last piece, to provide the tension and contrast. All of this work was discarded as I did not achieve the relationship between the two elements that I had intended.

I researched the work of various artists. Particularly the work of Ipoustigui. His preoccupation with the figure and its relationship to his work encouraged me to look past the figure in an effort to find a balance between form and the original concept.
Until then, I had paid little attention to formal sculptural issues, and decided, as a result of my previous work, to concentrate solely on broadening my understanding of form. It was a difficult period for me as my previous education had not dealt with these problems. I found myself avoiding the issues of volume, mass, space and composition and occupying myself with surface textures. This was also due to my choice of material, wax, and of course, my inexperience in dealing with this area.

After studying the work of the minimalists, primarily Donald Judd and the early work of Robert Morris, I became interested in the clarity and composition of geometric form and the possibilities it held for my own work.

I made plaster spheres ranging in size from a ping pong ball to basket ball. My intention was to cast from these in wax, and to encorporate these shapes, wholes and segments, in contrast with planes and other geometric forms. By limiting myself to these shapes I was able to make sculptures dealing specifically with form.

Two of the more successful pieces were 'Businessmen as Lovers' and 'Beyond the Bedroom Wall'. I felt that both of the pieces achieved the unity I had hoped for.

'The Worms must Wait' and 'Error of Judgement' have more of an implied structure that provide the tension that integrate the surface forms which deviate from the geometric. My intention was to imply stress at the junctions formed by the segmented spheres and planes. These stress points were to encourage and lead the eye around the piece - reading the object as an
integrated whole. As a result of my working to imply structural movement, I formulated the step-like structures seen in these pieces.

My next step was to use the sphere as the dominant element in the piece. 'Temporary Kings' was a result of this new direction. Like my previous work I employed both concave and convex spheres. The box-like forms lost their rigidity when incorporated with the modified spheres. Volume now became my primary concern.

Throughout all the pieces that use spheres and planes there are a number of similarities.

Scale, I kept consistent, consciously, for these reasons. For me, it was now a primary concern aesthetically - I cast all my wax shapes from the same plaster molds I began with. Also the technical and financial considerations when working in bronze caused me to keep the work small. I feel strongly that I must be able to lift and handle my work by myself. Of relevance is my own small stature and the proportinate size of my work. This was perhaps an unconscious decision, but nevertheless a possibility.

Another similarity is the works relationship to the ground plane (base) that is primarily for stability - each piece was heavy in relation to its size, hence the work was created in such a way as to sit firmly upon its base.

The surface of each sculpture remains fairly consistent, as a result of my previous preoccupation with unnecessary surface detail. On some of the pieces I allowed the process to be apparent. The drips caused by the molten wax and grind marks
all became an integral part of the surface. The uniformity of surface assists in the visual unity of the piece.

The limitations I placed in restricting the sculptures to basically geometric forms and the uniformity of scale and surface, allowed me to concentrate on the pertinent principles and problems of form, an intention that, I believe, was fulfilled and proved valuable.
BRONZE AND ALUMINUM POIRS
TECHNICAL

Process played an important role in my work. I spent a great deal of time experimenting with various materials; namely glass, metals (ferrous and non-ferrous) paper, wax, clay, leather, cement, and lithography. Many of the materials did not lend themselves to the concerns of each piece. As a result many of these materials were not used in the final pieces.

Cement

My interest in casting led me to experiment with cement of two kinds; cement and cement fondue. The latter proved very successful and I am pleased with the final results 'Punishment and Profit' and 'Soft in the Middle'. The former I employed towards the end of my postgraduate year in structures made from aluminium and wood. With these works I devised a casting technique and worked directly with the materials. I think that the direct cement with paper and other mediums has definite possibilities, but the time factor has limited any progression with these techniques.

Glass

Again the process of casting led me to glass. I am grateful for the assistance from Klaus Moje in experimenting with this medium. I made the original forms in wax and invested them with:

1 part moleate (fine grade)
3 parts plaster
1 part Ludo (reconstituted mold material)
water
The dry ingredients were mixed together then added to the water. The piece was allowed to air dry for one week before being placed in the electric kiln. After placing the mold in a kiln to remove moisture, crushed glass was placed into the mold and the firing then proceeded.

My first piece was not a total success as not all of the glass fused. This was caused by kiln temperature not being high enough. Cracking appeared in the mold.

The next piece was more successful when adopting the firing graph below.
To prevent cracking I reinforced the mold with wire mesh - it worked.

I found the fragility and transparency of the cast glass an exciting possibility in the development of my work. "Extricate", depicts these qualities admirably, however I concluded that the medium did not lend itself to the concerns of the piece.

Paper

I experimented with the casting of paper also. Shredded and pulped paper were pressed into flat and spherical plaster molds. The flimsy structure of the cast paper again was not suited to my work. It was not until I began working with cement that I realised that the combination of the two would give it the visual and structural strength I wanted.
EXTRICATE

.289 M × .276 M

GLASS
Bronze Casting

Bronze is an alloy of copper and tin. It is a non precious metal that lends itself to the making of sculpture. I believe bronze inspires warmth and craves to be touched.

As a medium it is labour intensive but by far my favourite sculptural medium. I have worked with it extensively since I began my art training at California College of Arts and Crafts in 1977.

The process provides me the freedom to work with malleable materials such as clay, wax and paper. These materials are then made permanent by the casting process.

The versatility of bronze is attractive; it can appear rough or smooth, sharp or soft, can be highly polished or dulled and colored with the use of patina. Although the beauty and potential of the metal are fascinating, I find the process equally as attractive.

Wax is an essential material in bronze casting. The majority of my pieces were constructed directly in wax. This eliminated a mold making step that would have involved modelling the form in clay, taking a mold in plaster from that, then painting wax into the mold. I used three types of petroleum wax varying in malleability.

With the use of dentistry tools, an electric frypan and plaster sphere molds I constructed forms from the wax in preparation for casting in bronze. The surface textures were achieved by rubbing window screen over the wax with kerosene.
Gating

Gating refers to the 'plumbing' system that is attached to the original wax. Runners are the pipes that allow the molten metal to flow freely into the form. Risers allow the gases to escape. There are two basic types of 'plumbing' systems that I use regularly, depending on the sculptural form. The first is (top) direct feeding. Gravity is used to assist the metal to flow into the piece.

The second type is referred to as bottom feeding, or indirect feeding. This is the method I prefer for a variety of reasons. One reason is that gases rise. To prevent gas being trapped (causing holes in the bronze) it makes sense to feed the metal in from the bottom so that the gases do not have to travel through the piece to escape. The pertinent factors in gating are complete metal fill, minimal turbulence and complete gas evacuation.
Runners, also referred to as gates, vary in size, numbers and shape depending on the nature of the form itself. I prefer to use square runners to prevent the vortexing of the metal poured. Vortexing of molten bronze causes gasses to develop. I also attach a drain onto the bottom of the piece that assists in the burning out process.

Investing

The next step in the lost wax process is investing. The original wax is encased in a refractory material. The material I prefer to use consists of plaster, sand, water and Ludo (reconstituted crushed investment). This traditional mixture was most suited to my needs as it is economical, materials are easily obtained and most important, it works. I apply the
investment in layers, then mold the material to follow the contours of the original wax pattern. This allows for even firing of the mold and decreases fracturing. Three inches of investment is distributed evenly around the piece then reinforced with wire mesh. The wire is then coated in an additional layer of investment. Upon completion of the mold, it is then placed in a kiln for the burn-out process.

**Burnout**

I did a number of experiments using different firing techniques.

I found it important to keep the invested waxes at a consistant temperature throughout this process, as a sudden increase in temperature tends to distort the wax and cause cracking in the mold.

The following graph shows what I believe to be an ideal burnout.
The burnout stage for me is one of the most exciting. There is an element of suspense as you lose sight of the piece - what was positive is now negative.

Common Problems with Casting

Throughout the year I experienced a number of difficulties with the casting process. These were overcome by experimentation. The following are some of the problems and how I overcame them.

Inclusion

This refers to any substance that is in the metal itself. Carbon Inclusion is caused by not burning the wax from the mold completely. This causes bubbles and concave voids to form in the bronze pattern.

I often attach trash sumps to the lowest point of the mold to catch excessive inclusion particles.
Hot tear and shrinkage are two problems due to pouring a casting too hot and/or insufficient gating. To prevent these problems I kept the wax patterns even thickness ($\frac{1}{8}'' \rightarrow \frac{1}{4}''$), used "chokes" on the gating systems, etc.

This year I cast 3 different types of metal; aluminium, silican bronze, gun metal. Gun metal consists of 85% copper, 5% tin, 5% zinc, 5% lead. Silican bronze is composed of 91.71% copper, .01% tin, .01% lead, 4.24% zinc, .05 iron, .02 nickel, 3.96% silicon.

My preference is gun metal for the following reasons: I had more success pouring the metal (minimal gassing etc), its cheaper than silican, its color is much richer, warmer and it takes a patina beautifully.

Pouring

The metal is melted in a clean crucible to a temperature of about 75% hotter than the desired pouring temperature. This allows time for impurities to be removed from the metal and degasifiers to be added.
The molds are placed into a sand pit for support, then vacuumed clean to remove excess carbon, sand etc which can contaminate and cause inclusion in the bronze pattern. The mold should be warm and totally free of moisture.

Pouring Temperatures

<table>
<thead>
<tr>
<th>Wax Pattern</th>
<th>Starting</th>
<th>Mid Range</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gun Metal</td>
<td>1900°F</td>
<td>2000°F</td>
<td>2150°F</td>
</tr>
<tr>
<td>256 Aluminium</td>
<td>1200°F</td>
<td>1350°F</td>
<td>1500°F</td>
</tr>
<tr>
<td>Silican</td>
<td>1900°F</td>
<td>2000°F</td>
<td>2150°F</td>
</tr>
</tbody>
</table>

Cold Shut is another problem that occurred in a number of my castings. This is the incomplete filling of the mold. I believe it to be caused by: low metal temperature, slow metal pouring and insufficient gating. I found that by correcting these insufficiencies and also gating directly into thin areas of the wax patterns, helped to alleviate cold shut.

Deoxidization

Degassifiers eliminate gas from molten metal. The most troublesome gasses being carbon monoxide and dioxide, hydrogen and hydrocarbons, and water vapor.

Improper melt downs can result in excessive gassing of the metal. Deoxidization tablets are placed under the surface of the molten metal to eliminate the excessive gasses but if the furnace is monitored closely minimal gassing should occur.
Patination

Patination is the final step in the Bronze casting process. It involves the application of various chemicals to bronze surfaces which cause a color change.

The chemicals can be sprayed on, painted on both hot and cold surfaces.

I do not feel there is a "correct" way to apply patinas. Experimentation is the only way to approach this process.

My color preferences are browns and blacks. Potassium sulphide, (liver of sulphur) produces a black color. Ferric Nitrate produces brown.

I do not necessarily feel that patination is the only way to treat the surface of bronze sculptures. Undoubtedly bronze is enhanced by the use of patina, however, it is only one of many methods used in the finishing of bronze.
As well as my own experimental casting this past year, I assisted Ante Dabro / Peter Morley for 3 weeks of a foundry school.

I found it extremely interesting discussing various casting methods and learnt a great deal.

I was also able to assist a fourth year Industrial Design student from C.C.A.E., Keith Phillip, with his design thesis. The project was to cast golf club patterns in silican bronze. The project went extremely well. It was a completely different experience for me to cast a functional object which had to be precise.
FINAL CONCLUSION

Of importance and value were the decisions to take unexplored areas of study, looking elsewhere for answers to problems in my work, aesthetic and technical.

My concentration on the principles and problems of form has provided me a language in which I can develop and integrate my social concerns, providing an articulate balance between the two. Realising technique as an equally important but secondary concern, has proved a major break-through.

Studying in another country presented its problems; through these I have gained insight and knowledge of Australian culture that I feel is of great value.

The prospect of furthering the results of my various experiments this year is an exciting and challenging direction to take in my development as an artist.
ACKNOWLEDGEMENTS

I'd like to thank Sylvia Kleinert for allowing me to participate in her Australian Art History class - through which I gained an understanding of the evolution of Australian art into what it is today.

I'd also like to thank Carl and John from the Ried Technical College - they taught me various welding techniques and encouraged me to use a greater variety of metals.

Len Hennes's inventive and ingenious solutions to many technical problems was invaluable. Thanks to him for his patience and imparting of knowledge throughout the year.
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SAUNDERS Wade, "Touch and Eye": 50's Sculpture, Art in America, December 1982.
UNTITLED
.294 M x .197 M
SILICON BRONZE

CAST PAPER
TOO TRUE
.346 M X .75
SILICON BRONZE

WAX STUDY
ON GUARD
.290 x .250 M
SILICON BRONZE

UNTITLED
.270M x .245M
SILICON BRONZE
RELINQUISHMENT
0.400 M x 0.310
SILICON BRONZE

SOFT IN THE MIDDLE
0.340 M x 0.350
CEMENT FONDUE
THE WORMS MUST WAIT
.290 M x .340 M
RED BRONZE
BEYOND THE BEDROOM WALL
SILICON BRONZE
.300 M X .350 M
BUSINESSMEN AS LOVERS
.210 M X .370 M
RED BRONZE

UNTITLED
WAX
.400 M X .350 M
ERROR OF JUDGEMENT
RED BRONZE
330 M X .360 M
PUNISHMENT AND PROFIT
.370 M X .250 M
CEMENT FONDUE
Sex seen as part of the job appeal

'God's work'

Yes!
You can still get good old fashioned quality & service.

Rebels 'lose' battle