May 24, 1974

To the Graduate Council:

I am submitting herewith a thesis written by Richard Anthony Cary entitled "A Study of Selected Materials for Use as Interior Support for Ceramic Sculpture." I recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Related Arts, Crafts, and Interior Design.

Sandra Blain, Major Professor

We have read this thesis
and recommend its acceptance:

Accepted for the Council:

Vice Chancellor
Graduate Studies and Research

A STUDY OF SELECTED MATERIALS FOR USE AS INTERIOR SUPPORT FOR CERAMIC SCULPTURE

A Thesis

Presented for the

Master of Science

Degree

The University of Tennessee

Richard Anthony Cary

June 1974

ACKNOWLEDGMENTS

The author wishes to express to Sandra Blain his appreciation not only for her capable direction of this thesis but also for her instructive concern throughout his course work. Appreciation is also acknowledged to Marion Heard and Dennis Peacock for their advice and constructive criticism concerning both this thesis and the author's ceramic forms. Thanks to Dr. James Darrow for his help in formulating the topic of this paper into a research format.

To Ann Lacava, typist and printer, and to David Stansbury, photographer, the author expresses both his thanks and admiration for their craftsmanship.

Finally, the author wishes to acknowledge his debt to his learned colleagues--present and past graduate students in ceramics at U.T.K.

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ABSTRACT

Paper, foam rubber, and styrofoam covered with 1 inch thick foam rubber were tested for use as interior support for slab built ceramic box forms. Foam rubber proved most successful against criteria including vertical strength and sufficient resiliency to shrink with the drying clay without causing cracks in the ceramic form. Foam rubber was adopted as a studio tool for the author's work in ceramics and was recommended as a tool for other artists.

TABLE OF CONTENTS

CHAPTER		PAGE
I.	INTRODUCTION	1
II.	REVIEW OF THE LITERATURE	6
III.	METHODOLOGY	11
IV.	RESULTS AND DISCUSSION	15
BIBLIOGRAPHY		21
APPENDIX		23
VITA		30

CHAPTER I

INTRODUCTION

Developments in art since World War II have included emphasis on large scale. Abstract expressionists frequently applied their action painting techniques to canvasses of a size formerly reserved for wall murals. Jackson Pollock's "Blue Poles" measures 83 x 192 1/2 inches.[1] More recently, Pop artists, such as Claes Oldenburg, have made the familiar larger than life by using larger scale. His canvas and foam rubber "Giant Ice Cream Cone" measures 150 x 50 x 50 inches.[2] Involvement with large scale has also been reflected in the use of media traditionally identified with the crafts. Claire Zeisler's sculptural macrame "Winter White" is 84 inches high.[3] Metalsmith Arline Fisch has fashioned a silver body ornament 52 1/2 inches long.[4] Paul Hultberg's enamel panel "Johnson Together" measures 48 x 84 inches.[5] As these media have been pushed to new forms in larger scale, new tools, techniques, and materials have been developed to enhance the old.

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[1]Kermit Lansner, "The $2 Million Understanding," Newsweek, 82 (Sept. 15, 1973), 45.

[2]Maurice Tuckman, American Sculpture of the Sixties (Los Angeles: Los Angeles County Museum, 1967), p. 169.

[3]Lee Nordness, Objects: U.S.A. (New York: Viking Press, 1970), p. 342.

[4]Ibid., p. 230.

[5]Ibid., p. 32.

Statement of the Problem

This study compares paper, foam rubber, and styrofoam covered with foam rubber for use as interior support material for large scale, soft slab ceramic box forms.

Need for the Study

Soft slab construction of large scale ceramic box forms with clay additions present certain problems. Soft clay slabs lack the vertical strength necessary for the construction of these forms. Support material is needed to accomplish the intended forms. Support materials suggested in the literature are few. Also, each material in these reports was employed for the forms and procedures of other artists, which are different from forms and procedures in this study.

Rationale

Involvement with large scale, soft slab ceramic box forms came through exploration of juxtaposing organic and inorganic forms.

Large scale forms are intriguing for several reasons. Aesthetically, large scale forms tend to create an environment rather than decorate it. A second reason is the challenge of the strenuous physical involvement required for large scale forms. This challenge provides a refreshing contrast to the often tedious enterprise of making meticulous wheel thrown forms. A third reason is the task of finding ways to treat the surface areas of large scale box forms. Methods aesthetically acceptable for traditional wheel thrown forms appear to be only minimally successful when applied to large scale box forms.

Soft slab construction techniques were preferred for several reasons. Soft slabs allow freedom and spontaneity in that during construction of the intended form, new ideas can readily be applied and parts can be added or subtracted with minimal risk of structural damage. The primary reason for preference of soft slabs is that box forms in soft slabs approximated more closely the balance between the organic and the inorganic. Soft slab boxes can be made to have fluid, irregular edges and concave-convex areas. This records suggestions of forces acting upon the object. While retaining the inorganic geometric qualities of the rectangle and square, soft slab box forms have organic feelings opposed to those forms with rigidly linear, sharp edges. Also, irregular soft slab box forms tend to accept addition of clay parts that contribute to the organic feeling of the form; whereas, hard edge geometric box forms tend not to accept organic additions.

Interior support is required to allow access to the exterior top and sides of the slab form. This allows additions of clay parts, textural treatment, and other changes to be made during the construction process while the clay is soft and the idea for the change is fresh. Likewise, the new idea can be changed if it is found not to be aesthetically pleasing. Like the use of soft slabs, the use of interior support allows freedom and spontaneity during construction of the form.

Scope and Criteria

This study compares the suitability of three materials--paper, styrofoam covered with 1 inch thick foam rubber, and foam rubber in thicknesses varying from 2 to 4 inches--for support material for the

construction of large scale, soft slab ceramic box forms. The suitability of the materials encompasses the following criteria:

1. Each material must have the capability to be manipulated into the large scale box forms.
2. Each material must have the capability to support soft clay slabs of suitable thickness in a large scale box form without collapsing or sagging radically.
3. Each material must be resilient enough to contract with the drying clay, thus preventing cracking.
4. Each material must have the capability of resisting collapse or radical sagging as additive parts are pressed into the form under construction.

CHAPTER II

REVIEW OF THE LITERATURE

This chapter reviews reports of artists' uses of support materials for construction of ceramic projects. The literature discusses various materials used as interior support for clay forms. Overcast reports the use of wadded newspapers as interior support for slab bottles.[1] Schoenberger achieves larger scale forms by constructing slab container forms over a paper bag filled with wadded newspapers.[2] Patel has used styrofoam covered with cellulose sponge as an armature for modeling life-sized clay busts.[3] The styrofoam core provided the strength and forming quality for the bust. The cellulose sponge provided the resilience so that the interior support material would contract with the drying clay, preventing cracks. In the present study, 1 inch thick foam rubber is substituted for cellulose sponge because foam rubber of a size necessary for large scale box forms is cheaper and more easily obtained commercially than corresponding sizes of cellulose sponge.

Patel has reported using other support materials for clay forms.

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[1]Roy Overcast, "Hanging Bottles," Ceramics Monthly, 21 (February 1973), 34.

[2]Sylvia Schoenberger, "Paper Bag Pottery," Ceramics Monthly, 15 (March 1967), 24.

[3]Glenn C. Nelson, Ceramics: A Potter's Handbook, Third Edition (New York: Holt, Rinehart and Winston, Inc., 1971), pp. 172-174.

He has experimented with painting layers of clay slip over a styrofoam core.[4] As the drying clay contracted around the styrofoam core and began to crack, a styrofoam solvent was poured into the form through the cracks. This changed the styrofoam to a liquid which drained through a hole at the base of the form. While this material and method could be adapted to forms used in the present study, it is unnecessarily complex and expensive. The primary objection to this material and method is that clay slip is employed instead of soft clay slabs.

A similar objection pertains to a process used independently by two artists, Marxhausen[5] and Staryos.[6] They painted clay slip over balloons. A second drawback to balloons as interior supports is that they are generally round rather than box forms.

Daniel Rhodes also uses thick clay slip and thin slabs to construct sculptural forms using fiberglass mesh as support.[7] This fiberglass is interior to the clay itself rather than the clay form.

Two artists, working independently, construct large scale box

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[4] Ibid., p. 174.

[5] Reinhold Marxhausen, "Balloon Forms Without Molds," Ceramics Monthly, 5 (May 1958), 19-21.

[6] Francis Staryos, "Balloon Forms From Buttered Clay," Ceramics Monthly, 17 (September 1969), 14-17.

[7] Daniel Rhodes, Clay and Glazes for the Potter, Revised Edition (Philadelphia: Chilton Book Co., 1973), p. 58.

forms with exterior supports. Kememiffy[8] uses cardboard, while Vergette[9] uses wood. However, their exterior supports allow no access to the surfaces of the clay while it is still soft enough to receive clay additions, texturing, or other changes.

Simches[10] uses both interior and exterior supports for large scale box forms. She sandwiches clay slabs between plywood rectangles slightly smaller in perimeter than the clay slabs composing the box form. This allows the seams of the box to be joined. The plywood slabs are held together with bolts going through the clay slabs. However, this method, like the Kemeniffy and Vergette methods described above, does not allow complete access to the exterior sides and top clay surfaces for additions of clay parts and textural treatment.

The Overcast and Schoenberger reports are most pertinent to the present study. They directly contribute the idea of using paper as an interior support. The present study seeks to determine if paper works for different forms than those used by Schoenberger and Overcast.

Patel's use of styrofoam covered with cellulose sponge was the starting point for this study's use of styrofoam covered with foam rubber and thicker foam rubber slabs by themselves as interior support materials. While carrying out the troublesome and expensive task of

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[8]Ed Chamness, "The Folding Method for Large Scale Slab Sculpture," Ceramics Monthly, 17 (September 1969), 14.

[9]Ed Chamness, "Monumental Ceramic Sculptures for Southern Illinois Campus," Ceramics Monthly, 19 (April 1971), 28.

[10]Francis Simches, "Building Large Boxes," Ceramics Monthly, 20 (August 1972), 30.

covering the styrofoam core with the 1 inch thick foam rubber, the idea occurred to try thicker foam rubber by itself as a support material. The idea of using foam rubber by itself was also influenced by the use of foam rubber as an interior support for a three dimensional weaving by Nancy Garretson ("Fertility," 1972, collection of the author). Another influence was a series of sculpture by John Chamberlain, who tied foam rubber itself into irregular, organic shapes, e.g., "Strawberry Mush," 1967.[11]

The other reports mentioned above influenced the author's concern with scale and form and helped isolate the criteria against which the materials should be judged.

Hypotheses

It is evident that each of the three materials used in this study can be expected to yield a degree of success for some artist working with some form. Each has a degree of resiliency and each has a degree of vertical strength. However, the criteria these materials must meet are determined by the intended forms and the artist's modus operandi.

The idea of large scale box forms occurred before the ideas of paper, styrofoam, and foam rubber as support materials. Paper and styrofoam covered with foam rubber were suggested directly by the literature. Thicker foam rubber slabs as interior support were suggested indirectly by the literature in combination with the author's

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[11]Diane Waldman, John Chamberlain: A Retrospective Exhibition (New York: Solomon R. Guggenheim Foundation, 1971), p. 78.

curiosity. Rationally, all three materials seemed to contain qualities required by the box form and soft slab construction technique. Which material works best is a rationally formed question with an empirically determined answer.

1. It was hypothesized that there is no significant difference in the three materials in their abilities to contract with the drying clay, thus preventing cracks. Paper, i.e., one sheet of newsprint loosely wadded into an irregular spheroid roughly six inches in diameter would appear to offer little resistance to shrinking clay. The resistance would not be uniform since the wads are irregular. If the paper was tightly wadded, the interior support would be rigid enough to crack the shrinking clay.

The foam rubber is the most uniformly resilient of the three materials. Loosely wadded paper, being irregularly shaped, may be wadded more tightly in some places than in others. Foam rubber in 2 to 4 inch thicknesses would appear to have more capacity to shrink than the 1 inch thick foam rubber covering on the styrofoam.

The styrofoam covered with foam rubber should allow the drying clay to shrink at least three quarters of an inch before the foam rubber covering becomes compressed and rigid enough to allow crack-free shrinkage in the box forms in the present study. Although this limit appears not to be as broad as those for paper and foam rubber, no significant difference in the materials' abilities to shrink with the drying clay is expected.

2. It was hypothesized that there is no significant difference in vertical strength provided the clay form by the three materials.

The rigid styrofoam with foam rubber covering should provide the most vertical strength. Although not as rigid as the styrofoam, the foam rubber slabs in 2 to 4 inch thicknesses should provide adequate vertical strength. It appears that the greater the thickness of the foam rubber, the greater the vertical strength it provides.

It appears that paper would provide the least vertical strength. Putting the wads of newsprint into a large paper bag should help this material to provide adequate vertical strength.

3. It was hypothesized that styrofoam covered with foam rubber and foam rubber slabs will provide significantly better support for clay additions, alterations, and texturing than paper. It was hypothesized that there is no significant difference between styrofoam covered with foam rubber and foam rubber in this respect. The resiliency of the two materials is greater than that of paper. Foam rubber compresses with the pressure exerted in adding a clay part, then bounces back somewhat to the original position. Paper appears to have no such resiliency. When pressure is exerted adding a clay part to a form supported by paper, a concave area could be expected. Once the clay supported by nonresilient paper is pushed in, it could be expected to stay in.

4. It was hypothesized that there is no significant difference in the three materials' abilities to be manipulated to assume a rectilinear box form. The styrofoam can be cut with a hot wire or a hack saw. Foam rubber can be cut with an electric knife. The wadded newspapers can be put into a paper bag of the type used in grocery stores or a bag can be constructed with scissors and tape.

CHAPTER III

METHODOLOGY

Definition of Terms

1. Soft slab: Clay of a same consistency as clay to be thrown on the potter's wheel.

2. Suitable clay slab thickness: From 1/4 to 1 inch.

3. Large scale: A minimum vertical height of 24 inches.

Assumptions and Limitations

1. This study is limited to the question of which of three materials is the best interior support for the forms. The aesthetic qualities of the forms are not considered in this report. It is recognized that success of the material in supporting the form does not insure aesthetic success.

2. This study is limited to evaluating the feasibility of the materials as studio tools for constructing the intended forms in the intended manner. Precise mathematical descriptions and evaluations of the physical and chemical properties of the materials are outside the range of this study.

3. This study is limited to the use of the materials as supports for box forms conceived by the author in studio work. Whether these materials will suffice for different forms by different artists is outside the range of this study.

4. The cause of cracking in constructed forms is determined finally by the author's judgment. In addition to lack of resiliency in interior support materials, many things can cause cracking.

5. The aesthetically objectionable amount of sagging due to lack of vertical strength in the interior support material is determined finally by the author's judgment.

6. As each form constructed was an artistic effort as well as an experiment, the intervening variable of the author's aesthetic goals and intuitions superceded this study's need for strict control. This accounts for the wide range of control of the independent variable of large scale.

7. The water content of the clay used in soft slab form was assumed to be approximately 30 percent.

8. It was assumed that the efficacies of each material will be demonstrated in construction and drying of the forms before firing. That is, there was no control for firing each piece to the same temperature and in the same atmosphere.

Design of the Study

The independent variables are the box form, large scale, and soft slab construction method. The dependent variables are the material used for interior support: Paper, styrofoam covered with 1 inch thick foam rubber, and foam rubber slabs from 2 to 4 inches thick. At least three trials for each dependent variable were conducted, i.e., at least three pieces were attempted with each interior support material. This repetition should control for extraneous and intervening variables such as differences in water content of clay, humidity, and unconscious variations in the author's construction techniques.

Procedures and Materials

This section describes procedures and materials used for the

construction of the pieces. For purposes of explanation, the size of the pieces is held constant throughout this section. As noted above, this was not the case in the actual experimental trials.

Foam Rubber

Four inch thick foam rubber was cut with an electric knife to 24 x 10 inches. Clay of throwing consistency was rolled into 3/8 inch thick slabs on two canvas covered plywood boards. The slabs were cut into the following dimensions: Two slabs at 25 x 11 inches, two slabs at 25 x 4 inches, and two slabs at 11 x 4 inches. The foam rubber was placed in the center of one of the 25 x 11 inch slabs. The edges of the slab were dampened and scored with a fork. The two 25 x 4 inch slabs and the two 11 x 4 inch slabs were joined at right angles to the bottom 25 x 11 inch slab. Coils of clay were added along each joint at the outside for reinforcement. The remaining 25 x 11 inch slab was placed on top of the emerging box form and the edges were joined and reinforced with clay coils.

The box form, essentially completed, was allowed to partially dry so that it could be turned upright with the 11 x 4 inch sides as the top and bottom. Addition of clay parts was then executed. The completed piece was then allowed to dry slowly under loose plastic approximately four to seven days before bisque firing.

Styrofoam Covered with 1 Inch Foam Rubber

A styrofoam block was cut with a hack saw to 23 x 10 x 4 inches. One inch thick foam rubber was glued to the entire surgace of the styrofoam block. The ceramic piece was then constructed in the same manner as with foam rubber as an interior support.

Paper

Sheets of newsprint were wadded into irregular spheroids approximately 6 inches in diameter. These were placed in a grocery bag altered with scissors and tape to the 24 x 11 x 4 inch size. The ceramic piece was then constructed in the same manner as the piece using foam rubber as in interior support.

CHAPTER IV

RESULTS AND DISCUSSION

Results

This section examines the results of the constructions with the three interior support materials with reference to the hypotheses.

Hypothesis 1. The null hypothesis was rejected. Radical, irreparable cracking occurred with each trial using styrofoam covered with 1 inch thick foam rubber. It was determined that this cracking was due to insufficient resiliency to shrink with the drying clay. No such cracking was found, however, in pieces constructed with foam rubber or paper as interior supports.

Hypothesis 2. The second null hypothesis was rejected. Constructions over paper lacked sufficient vertical strength to support the forms. Collapse occurred on two of three trials. Forms constructed over foam rubber and styrofoam covered with foam rubber did not collapse. Both these materials, then, provide sufficient vertical strength. Distinctions between the two successful materials were observed. These differences and their aesthetic implications will be dealt with in the Discussion section that follows.

Hypothesis 3. The third hypothesis was confirmed. Foam rubber and styrofoam covered with foam rubber provided adequate support for clay additions and other alterations. Forms with paper as an interior support lacked strength to support large additions. Also, the box form over paper

became easily distorted in response to any pressure on the surface of the clay.

Hypothesis 4. Hypothesis four was confirmed. All support materials initially, at least, could easily be made into box forms.

Discussion

This section includes a discussion of the results. Following is a section giving observations which do not pertain directly to the hypotheses but which are important to the procedures and their aesthetic implication. Concluding is a note on the author's personal aesthetics, both in general and in relation to the pieces constructed by methods investigated in this study.

Throughout the results of the trials, foam rubber consistently met or exceeded demands of the hypotheses as well as the less explicit demands of the author's way of working. Of the other materials, each met part of the criteria, but not all. Conclusively, foam rubber is the best of the three. The author has adopted it for studio use. The generalizability of this conclusion to other artists seems to be a valid proposition. It is reinforced by additional observations made during construction and by rational considerations.

Regarding the abilities of the support materials to contract with the drying clay, it was observed during the unsuccessful trials with styrofoam covered with foam rubber that this material may be successful with smaller scale forms. The reason is that the clay body used, like most other stoneware bodies, shrinks approximately 4 to 5 percent before bisque firing. A form 25 inches long, therefore, will shrink at least

1 inch. The resilient foam rubber covering is only 1 inch thick and can be expected to contract only 3/4 inch with the shrinking clay before it is too compacted to be resilient. Either a thicker foam rubber covering or smaller scale form might solve this problem. However, the expense of the styrofoam, glue, and foam rubber covering, as well as the time involved to put them together render styrofoam covered with foam rubber significantly inferior to the other two materials. The price of the styrofoam covered with foam rubber was over five times the price of an equivalent size of foam rubber. It took approximately 45 minutes to construct. The foam rubber in 4 inch thicknesses cost $.80 per square foot.[1] It took five minutes to cut to the prescribed dimensions. The paper cost nothing and took 15 minutes to construct. Ironically, the material shown unsuccessful as regards the first hypothesis cost the most and took the most time to prepare.

While there was no significant difference shown in testing the second hypothesis between foam rubber and styrofoam covered with foam rubber, there are significant aesthetic differences between the two materials. The rigid styrofoam inner core resulted in a box form with rigid lines--hard edged and geometric. The forms constructed over foam rubber had natural flowing curves resulting from an amicable compromise between the weight of the clay and the vertical strength of the foam rubber. With reference to the above stated predisposition toward combining organic and inorganic forms, the box form with these fluid lines was more pleasing

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[1]Telephone conversation with Foam Rubber Outlet, February 1974, Knoxville, Tennessee.

than the box form with rigid lines constructed over styrofoam. Of course, softer lines could be achieved on styrofoam core box forms by the addition or subtraction of clay. However, besides being extra work, this might violate the stated limitation of suitable thickness of the clay slabs.

A final observation concerns the type of clay body used. Foam rubber would seem to be an adequate interior support for forms constructed with virtually any clay body. A highly plastic throwing body was used in this study for several reasons. A plastic clay body with a high shrinkage rate imposes stricter requirements on the support materials being tested since one of the criteria these materials had to meet was ability to shrink with the drying clay. Another reason is convenience. It is simply easier to mix one clay body for both handbuilding and throwing purposes than it is to mix a different clay body for each type of construction. Foam rubber is resilient enough to allow handbuilding with a highly plastic clay body. However, a suggestion for further research is to develop a less plastic clay body for handbuilding over interior supports of paper and styrofoam covered with foam rubber.

A Note on Personal Aesthetics

"Aesthetics is for artists what ornithology is for birds."[2]

This section discusses the author's verbal impressions about his own work. In 1944, Naum Gabo wrote to Herbert Read, "When an artist ventures to write about himself and about his work he is heading straight into

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[2]Attributed to Barnett Newman by Robert Hughes, "Barnett Newman," Time, 98 (Oct. 18, 1971), 69.

a minefield. . . ."[3] The best guide in this venture, then, is simplicity, leaving the arcane business of aesthetics proper to practicing philosophers.

I put together geometric forms--the spheroid, the rectangle, the circle, etc. One of my goals is to put these rather inorganic forms together in such a way that the resulting form has an organic quality. I can best approximate this goal by using these geometric forms as units of a "language" and spontaneously, extemporaneously "speaking," i.e., combining these units into a form that is more than the sum of its parts. I speak most fluently in this language if I work unfettered by rigid, preconceived ideas of how the final form should look. That is, my aesthetics involve the process of discovery--of putting forms together and reacting to the result. Most aesthetic decisions made during the process of construction are made on a subjective basis.

This language metaphor is a dangerous analogy. Clay forms are mute: Their impact is not verbal. While objects can communicate ideas, these ideas are secondary to the non-verbal, sensuous aspects of form. Clay forms are only themselves, resting on no ideology, with form and content united. A pot is a hole with clay around it. The physical clay, given form, is a visual prophylactic. The space in and around the clay form is more important than the material.

The reconciliation in clay form of the apparent dichotomy between the organic and the inorganic interests me because the resolution of

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[3]Herbert Read, Gabo (Cambridge, Mass.: Harvard University Press, 1957), p. 171.

either/or type contradictions (e.g., appearance versus reality, science versus nature), seems to be the origin of creatively found value. The act of finding or creating felt value is essential to my development as an artist and as a person.

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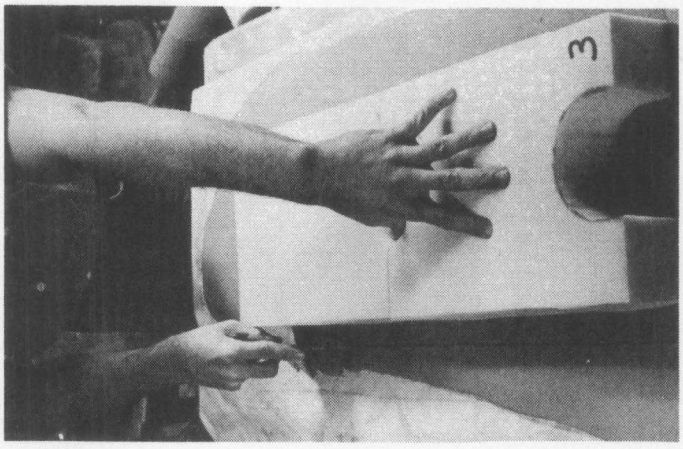
APPENDIX

Figure 1. Photographic summary of methods used for the construction of ceramic forms with foam rubber, the most successful of the materials tested.

1. Clay slabs of a consistency appropriate for wheel throwing are rolled to a thickness of 1/4 inch to 1 inch.

2. A foam rubber core is cut to a predetermined form with a commercial carving knife.

3. The clay slabs are trimmed with a fettling knife to fit the foam rubber core.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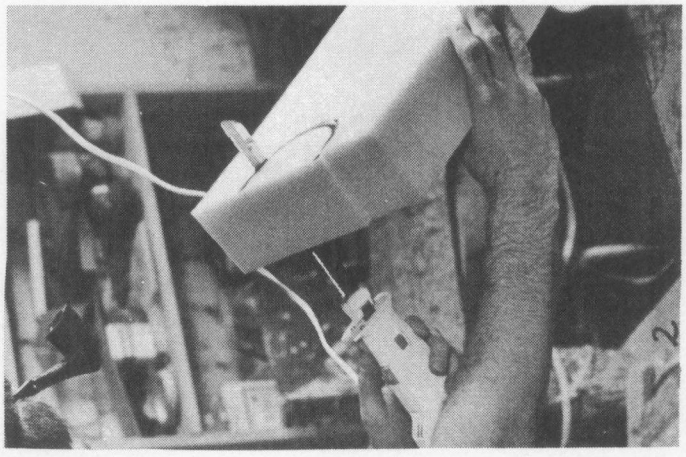
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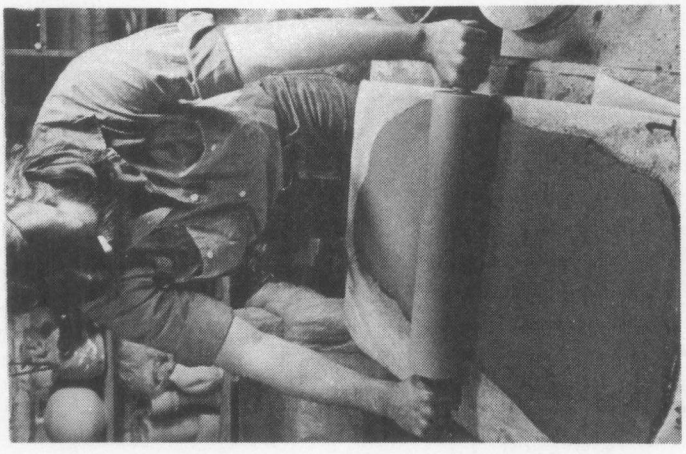
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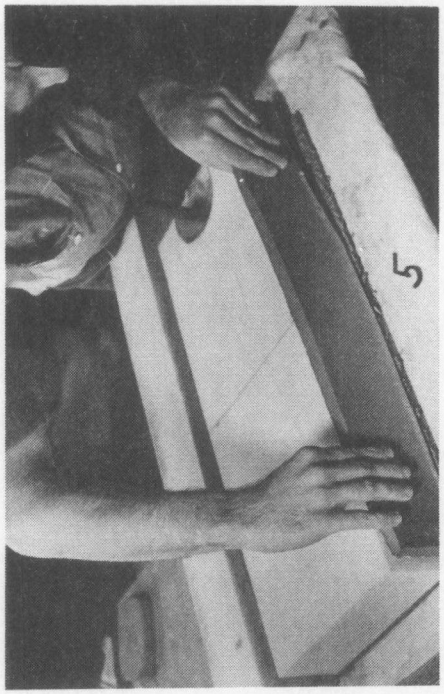
Figure 1 (continued)

4. The edges of each slab to be joined together in the box form are scored with a fork to insure a strong joint.

5. Slabs are joined to make the box form. One slab is omitted at this point to provide access to the interior joints.

6. The joints are welded together from the outside.

7. The joints are reinforced on the inside by gently removing the foam rubber core and welding in a clay coil.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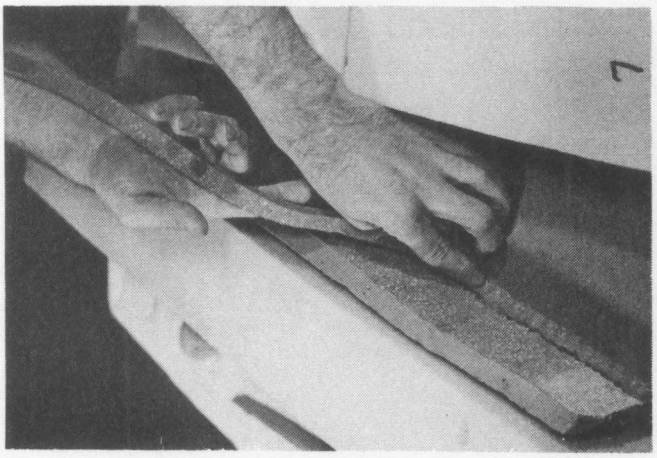
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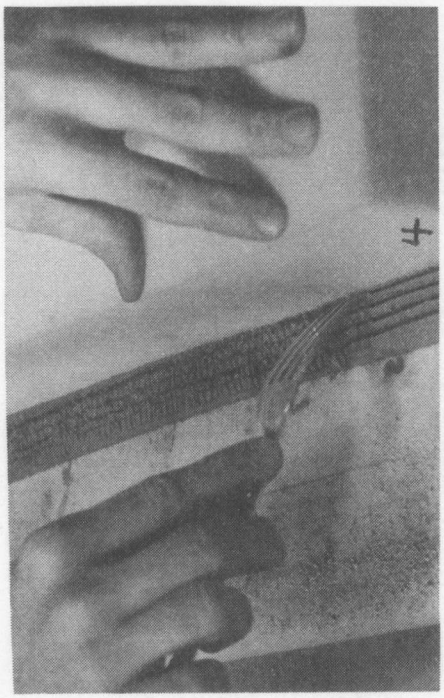
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Figure 1 (continued)

8. The box form is completed by adding the remaining slab.

9. Having been constructed horizontally, the box form is lifted to its intended vertical position by lifting the canvass covering of the construction table. This uniform pressure helps prevent damaging the still soft box form.

10. Thrown parts are added to the exterior to complete the form.


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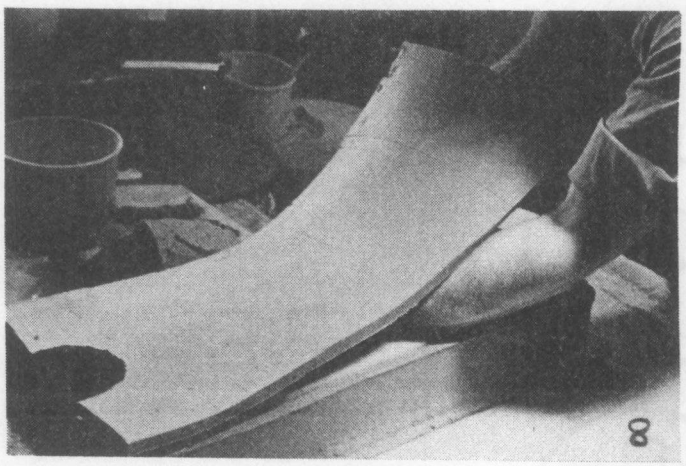
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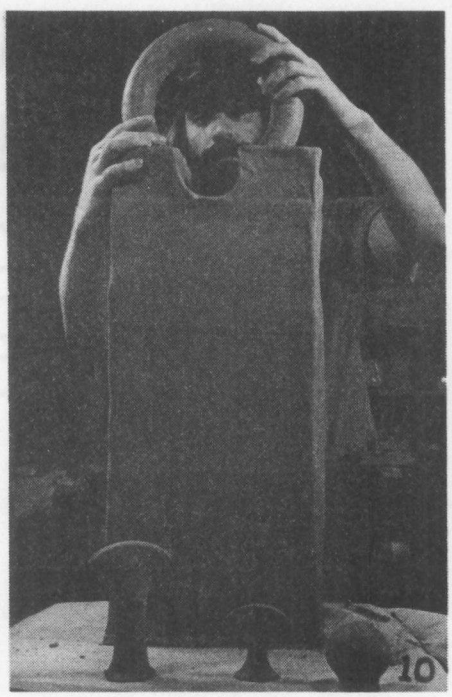
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VITA

Richard Anthony Cary was born August 26, 1947 in Chattanooga, Tennessee. He grew up in Maryville, Tennessee. He received a B.A. in Psychology from the University of Tennessee in 1969. He taught in the Knox County School system for two years.

Actualizing a long interest in ceramic art, he entered the graduate program in ceramics at the University of Tennessee from which he received an M.S. in 1974. He is a member of the American Crafts Council and the Tennessee Artists-Craftsmen Association.