EXPERIMENTAL ACID RESISTANT ELEMENTS AND THEIR APPLICATION IN DEVELOPING AN INTAGLIO PRINT

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EXPERIMENTAL ACID RESISTANT ELEMENTS AND THEIR APPLICATION IN DEVELOPING AN INTAGLIO PRINT

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Chairman

Dean of the Graduate Division
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CHAPTER I

THE PROBLEM

The purpose of this study was to find and employ various acid-resistant elements with which to develop an intaglio print. The original print demonstrated results comparable but uniquely different from traditional printmaking procedures.

I. IMPORTANCE OF THE PROBLEM

Printmaking has been practiced as an art form for the past five hundred years in the Western world and a few hundred years more in the Orient. Through these centuries of development the technical aspects of the media have been derived through a gradual process of evolution. More technical innovations have occurred within the past twenty-five years than during all the previous centuries.¹

The use of acid-resistant elements to add new directions to the field of printmaking was one of the considerations in doing this research. The traditional printmaking procedures have always been laborious and time consuming. The monetary expense involved in printmaking has also

become a limiting factor. The writer demonstrated that the time element and financial aspects of intaglio printmaking can be reduced to moderate proportions by using conventional ingredients and commercially produced consumer products.

II. PROCEDURES

The preparation for developing an intaglio print began by reading material related to contemporary printmaking. The writer began a period of study placing the thesis project in correlation to what is happening in the field of printmaking. Works executed by other artists were studied to gain insight into what was happening in contemporary printmaking.

Test plates were used to determine desirable effects that could be obtained from experimental methods. Information for the major print was derived from the small test plates. The writer sent out fifty letters to artists, companies, and institutions asking for information about acid-resistant materials. The information received from contributing sources was analyzed and accepted or rejected as it pertained specifically to this study.

A drawing for the major print was based on the results of the test plates. Work on all aspects of the test plates and major print was conducted within the
confines of the Drake University art department.

Analysis of these experimental methods and procedures is stated placing this problem into context with contemporary printmaking.
CHAPTER II

CORRELATING SUBJECT MATTER TO EXPERIMENTATION

The artist was concerned with the imagery used in conveying the experimental approach. The results of many of the small test plates were textural and spontaneous in appearance. It was determined that the drawing should demonstrate qualities displayed in the test plates. The size of the drawing was 8-1/2" by 12". A lycygraph, indirect projector, was used to expand a parchment transfer to the size of the cut plate having a face size of 10-1/2" by 14". The tracing was covered on the reverse side with chalk and was ready for transfer to the metal plate.

I. TRADITIONAL PROCEDURES

The traditions of intaglio printmaking date back many centuries and have their beginning in the early fifteenth century. No one seems yet to have discovered precisely when the process of etching designs began. Recipes for making mordants have been found dating as far back as the year 1431, but no authenticated knowledge

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of etching appeared until the beginning of the sixteenth century.

Traditionally, printmakers have used as their acid-resistant ingredient in the etching process a substance known as ground. Printmakers employ two types of grounds. Hard ground is drawn through, whereas soft ground is used to achieve impressions from textural materials. Attempts have been made through the centuries to achieve the best ground possible.

Rembrandt developed a ground that has proved to be one of the most functional. The main ingredients of Rembrandt's ground are basically unchanged in the grounds used by today's printmakers. Rembrandt's ground consists of one ounce virgin wax, one-half ounce mastic, and one-half ounce asphaltum or amber. ¹

The aquatint process is accomplished by dusting the metal plate with powdered rosin. A covering in a fifty to fifty ratio is heated and the rosin is bound to the plate's surface. Mordants are used to bite the areas not covered by the melted particles. A tonal effect is achieved by printing the bitten aquatint plate.

The new techniques used by the writer differed from traditional methods in the directness of their application.

The effects demonstrated the use of many of the newer acid-resistant materials by drawing, melting, or adhering the materials directly to the plate's surface. Many of the experimental acid-resistant elements were bitten without further treatment upon the plate.

II. ARTISTS' PHILOSOPHIES

Experimental techniques used in developing intaglio prints lends freedom of expression and insight into the vast possibilities of the printmaking media. The following statement by Ernest Freed, the Head of Graphic Arts at Otis Art Institute, Los Angeles, summarized the view held by many contemporary printmakers.

A great revival in recent years has come about in the area of graphic art, bringing with its experimental approach, a new and exciting freedom. Prints today can no longer be considered as the exclusive possession of the connoisseur. The use of color has created a new dimension of space and form. Resistance of the copper plate to the intentions of the artists has brought about a lively and vigorous attack that lends a penchant quality to the print.1

The attack Freed talked about is the felt desire of artists to convey imagery. Artists use experimentation to expand the traditional printmaking media. "Artists

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invent, not by intent, but by necessity."¹

Garo Z. Antreasian's ideas about letting the technical facilities dictate imagery typified the approach used by some contemporary printmakers. Antreasian stated that in his work the images are not planned but are allowed to develop from the materials he uses as his printmaking progresses.² The philosophies of today's printmakers are not based on experimentation for experimentation's sake. Innovations are justified as conveying the images and ideas vital for the artists' existence.

III. PAST AND FUTURE PRINTMAKING

Many printmakers feel a deep alliance and affection for the traditional techniques of printmaking. Other artists devote much time and effort in attempts to achieve flexibility through extensive experimentation. Experimentation during the past twenty years has given contemporary printmaking an excitement and vitality all its own.

What the future holds for intaglio printmakers is not known. Whatever direction the printmakers take, the major influences will come from people who work to expand the potentials of the media.

¹Peters, op. cit., v. xxii.
²Harold, op. cit., p. 4.
CHAPTER III

INTRODUCTION

There are several terms the writer wishes to clarify so the experiments stated in the thesis can be understood fully. When the term acid is used, it refers to nitric acid in a solution of one part nitric to nine parts water. When the term plate appears, it refers to zinc plates used for the experiments and the final print. Selection of these particular ingredients is given further attention in Chapter III.

1. THE EXPERIMENTS

Developing a simple ground. Grounds used by printmakers are of great importance in the etching process. A poor or inferior ground lends an unpredictable quality to the artists' endeavors. Traditionally, beeswax has been the basic ingredient in the etching grounds. The addition of mastic, asphaltum, and rosin give the ground a quality of hardness not present in pure beeswax.

The writer proposed to develop a ground that would suffice for line etching. Experimentation with various ingredients produced several ground formulations. The writer chose the most effective experiment as the basis
for an etching ground. A combination of beeswax for plasticity, paraffin for hardness as well as a small amount of crayon or preferably asphaltum for coloration and hardness make a satisfactory ground. The formula derived by the writer was one ounce virgin wax, one-fourth ounce paraffin, and one-fourth ounce crayon or asphaltum.

Virgin wax is bright in color while mature beeswax is dark brown. Beeswax melts at 65° Centigrade.\(^1\) Paraffin, a refined petroleum product, melts at 50° Centigrade to 60° Centigrade.\(^2\) Crayon is a combination of several waxes, soap, and pigment. Asphaltum is a bituminous substance composed mostly of hydrocarbons.

The virgin wax, paraffin, and crayon were melted in a double boiler over medium heat until the waxes were combined. The asphaltum was first ground into a fine powder. The asphaltum powder was placed in a small container and enough turpentine was added to make a paste solution. The asphaltum solution was added slowly to the heated waxes. The ingredients were heated until the turpentine slowly evaporated from the mixture. The melted waxes were poured directly into a pan of lukewarm water.

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A ball of ground was formed by compressing the wax into spherical shapes. The hard ground was placed in an air-tight container to prevent foreign material from contaminating the ground. A clean plate was the first step in applying the ground. The plate was cleansed by scrubbing the surface with an abrasive household cleanser and a small scrub brush. A hard rubber brayer rolled the ground over the heated plate in an even film. The grounded plate was ready for extensive line work. Etching needles were used to draw through the ground. A variation in the lines was accomplished by using various sizes of etching needles. Different line weights were also achieved by stopping out lines during biting. An etching done with beeswax ground can be seen in Figure 1. The right half of the plate was a beeswax, paraffin, and crayon ground while the left side was done with the addition of asphaltum to the previous mixture. The plate was bitten in the acid for periods of three, six, and nine minutes. Warm water allowed the mixture to cool and solidify.
Figure 1. Beeswax etching.
Crayon drawing techniques. Drawing with crayons produced a line or mark on the plate which when bitten became a relief surface. The crayons used for the experiments were the common wax crayon used by children and the lithographic crayon used by artists in the lithography process.

The lithographic crayon came in varying degrees of hardness, ranging from a number zero which was soft to a number five which was hard. The writer found the number three crayon best suited for fine line work when working with the direct drawing techniques.

The wax crayon had the disadvantage of coming in only one degree of hardness. Although there were several wax crayons manufactured, the variations within the different brands was slight. The wax crayon was a versatile tool that could be applied in many different ways. Melted crayon wax was used to cover large areas as a stopout material. Also, wax crayons were melted and applied in a continuous and constant line by using a tjanting tool. The tjanting tool is an instrument used in the art of batik.

Preparing the plate for drawing followed the same procedure as that for grounding the plate. The crayon was

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Statement by Thomas Coleman, personal letter correspondence.
used as a drawing implement to put wax directly on the plate's surface. The plate was then bitten to the desired depth.

Figure 2 depicts line techniques as well as the wax crayon used as a stopout and etching ground. The bottom of the plate illustrates a variety of relief line work executed with wax crayons. The crayon used as a stopout and ground can be seen on the top portion of the plate. The etched portion shows a variety of etched lines varying in length of bite from three to fifteen minutes.

**Texture rubbing transfers.** A piece of paper placed over a tactual surface and rubbed with a colorant produces a texture transfer. This was the premise for transfer experimentation. The writer found that by making a texture rubbing on a piece of tracing paper with a crayon the texture could be transferred to a metal plate.

Crayon was a logical choice for the problem because of its plasticity and acid-resistant qualities. The writer made a crayon rubbing. The rubbing was placed face down on a clean, warm plate. Transparent tracing paper enabled accurate adjustment of the rubbing on the plate. The textural transfer was burnished on the back with a rubber squeegee until the crayon was attached to the plate's surface. The warm plate was then allowed to cool. Reheating
Figure 2. Crayon drawing techniques.
the plate assured a good bond of the crayon to the metal. The plate was then bitten to the desired depth.

Figure 3 shows a crayon rubbing bitten in three different time periods of three, six, and nine minutes. A piece of burlap hardened with latex paint was the texture used in this illustration.

Dry transfer type. Dry transfer type is a commercially prepared lettering available at art and stationery stores. It is available in many different and unusual type faces and sizes. Dry transfer type is a polyvinyl butyran letter adhered to a piece of vegetable parchment, treated with a coating of methyloxydimethylsiloxane of a non-migrating type. The back of the letter is covered with a non-tacky wax coating to act as the letter's adhesive.1 The carrier film is clear to facilitate positioning of the letter upon the receiving surface. Several graphic companies produce dry transfer type with trade names such as Instant Type, Deca Dry, and Letra Set, all of which work well for this experiment.

Dry transfer type used directly on the plate's surface printed as a reversed white letter on a dark ground. Letters burnished in overlaying patterns created abstract

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Figure 3. Transfer rubbing.
designs. It was possible to use several different type faces together to add variety to the composition.

Letters were transferred to the clean metal plate by using a stylus to burnish the letters. Dry transfer type did not transfer under normal hand pressure but required a pressure of fifty pounds per square inch. Dry transfer type was found to be very acid-resistant, allowing extensive periods of biting action.

Reversed black letters on a white ground required a slight change in the preceding process. The letters were first burnished onto the clean plate as usual. A mixture of diluted shellac, approximately 70 per cent shellac and 30 per cent alcohol, was spread evenly over the entire plate. The shellac was allowed to dry completely. A piece of masking tape was burnished vigorously over the letter faces. When the tape was removed, the letters came with it creating a stencil pattern in the shellac's surface. The plate was bitten in the acid to achieve the desired relief.

Creating a lettered pattern that would read correctly complicated the previous processes. The letters were transferred from the carrying film to a piece of stiff parchment paper. The parchment paper with the transferred letters was placed face up on a plate heater. A cube of beeswax was

\[1\text{Ibid.}\]
drawn quickly over the surface of the letters giving them an even coating of wax. After the wax-coated letters dried, they were burnished onto the metal plate. Transferring the letters a second time reversed them on the plate's surface. The letters were etched as negatives or positives by one of the previously described processes.

Figure 4 contains a sample of reversed white letters on a dark ground. Note the clarity and crispness of the design. This particular example was allowed to bite fifteen minutes. Several of the letters were overlayed creating abstract patterns.

**Dry transfer textures.** Several manufacturers of dry transfer type also produce a product known as dry transfer texture. The trade names of two of the dry transfer textures are Instantex, and Zip-Tex. For the purposes of this experiment the writer refers to dry transfer texture as Instantex, although both brands function effectively. Instantex is what its name implies; it is instant texture. There are nineteen different textures plus a solid black available in the Instantex line.

The printed texture of the carrying film is transferred to the receiving surface by burnishing it with a stylus. It is possible to burnish any amount of texture onto the receiving material, allowing latitude for achieving different graphic effects.
Figure 4. Dry transfer type and dry transfer texture.
The writer began by cleaning a metal plate. The carrying film was laid on the clean plate and the desired amount of texture was transferred to the receiving surface. The plate was bitten in the acid. Shellac was used as a stopout during biting intervals to achieve a variation in the depth of the bitten surface.

A white line on a dark ground was accomplished by using a stylus and transferring a line from the face of the all black Instantex film to the metal plate. The plate was bitten leaving the transferred line as a relief portion of the plate. A textured line was achieved by selecting one of the Instantex textured carriers and following the previously described procedure.

Instantex used in a variety of ways is seen in Figure 4. The upper portion of the plate is a demonstration of drawing and manipulating the Instantex texture on the plate. Notice the single fine lines and the stipple effect in this experiment. The lower portion of the plate is a tonal effect bitten in three different stages of four, eight, and twelve minutes.

Melted plastics. Plastic fabrics such as nylon, rayon, and acetate can be found in many of today's garments. The writer investigated the possibility of using these materials in developing an intaglio print. Effects
similar to soft ground textures can be derived by biting plastic materials that have been bonded to a metal plate. Soft ground textures are positive impressions of the fabric, while melted plastic textures are the negative areas.

The experiments were concerned with plastics classified as thermoplastics. Thermoplastics when heated will change from solid to liquid. When cooled, the plastics will harden again and go back to their original shape or state (This is often called plastics "memory."\(^1\)) Plastic material in a liquid form becomes very tacky and binds readily to other materials.

Nylon is a term used for plastics classified as polyamides. A wide selection of weave patterns can be found in nylon material. Nylon has many properties that make it acceptable as a textural device. One of the most important characteristics is its availability and inexpensiveness. It has good moisture resistant quality enabling handling without fear of damaging the melted material. Nylon burns slowly and in most cases is self-extinguishing. The aromatic odors given off during the heating process are nontoxic. Nylon is attacked by strong acids such as sulphuric and hydrochloric acid and is

resistant to most solvents. Hydrochloric and sulphuric acids are not recommended for removing the nylon because they may affect the bitten portion of the metal in an uncontrollable manner.

The metal plate was cleansed before the plastic experiment began. The artist cut several small strips of masking tape slightly longer than the edges of the plastic material. Strips of masking tape were laid upon the edges of the fabric securing it tightly to the metal surface. Nylon under heat shrinks slightly. The masking tape held the material in position and prevented wrinkles. After the nylon had been fastened to the metal surface, the plate was heated on a hot plate. Nylon melts between 175° and 400° Fahrenheit. As the nylon reached melting temperatures it began to smoke, darkened slightly, and gave off a pungent odor. The plate was removed from the heat when the nylon was visibly melted. Prolonged heating can result in total decomposition of the fabric. After the plate had cooled, it was bitten in the acid.

Acetate and rayon materials are cellulosic plastics. Rayon and acetate properties qualify them as acceptable textural producing elements for use in the intaglio process. They both have good moisture resistant quality which is essential in an acid-resist. These two materials shrink
little and rarely cause any health complications from fumes or handling. Rayon is attacked by strong acids and is soluble in the stronger ketones and esters. Acetate has the same degree of acid-resistant quality as rayon but is soluble in the weaker ketones and esters. The adhesion and biting procedures are the same for these materials as they were for the nylon fabrics.

The test plate printed in Figure 5 allows evaluation of melted plastic fabrics as textural devices. From top to bottom, nylon, acetate, and rayon fabrics have been used respectively. All three materials were bitten in intervals of three, six, and nine minutes.

Styrofoam aquatint. The most common forms of plastics found today are the plastic foams. Foams are expanded plastics that have had gas introduced during manufacturing, creating gas filled cells distributed throughout the mass. Sanded particles of these foams can create results comparable to a rosin aquatint. Selection of a plastic foam is the first consideration in achieving results with this media. The two most common types of foams available on the market are urethane and polystyrene foams. Urethane and polystyrene foams will burn but are not regarded as highly combustible.
Figure 5. Melted plastics.
Urethane foams are an inexpensive class of easily obtainable materials. Urethanes are light, strong and highly resistant to water. One variety is susceptible to everything while another variety is resistant to everything including most solvents. The common forms in which urethanes are available are slabs, sheets, and blocks. Urethane foams give off toxic odors during fabrication and heating. ¹

The polystyrene foam known as styrofoam is the most common of the leading plastic foams. It is attacked only by oxidizing acids and is soluble in turpentine, benzene, or acetone. ² "It is low in cost, readily available, easily fabricated, strong, durable and resistant to moisture." ³ Usual forms in which styrofoam is available are expanded beads and finished boards. Styrofoam gives off an aroma when it is heated but is not toxic.

The styrofoam aquatint was begun with cleaning of the metal plate. A piece of sand paper was used to remove small particles of plastics from a styrofoam board. After a quantity of particles had been collected they were put into a double layer of nylon stocking. The clean plate was laid down on a draft-free working area. A layer of

¹ Newman, op. cit., pp. 36, 37.
² Ibid., pp. 30, 31. ³ Ibid., p. 38.
styrofoam dust was distributed on the plate by lightly thumping the nylon while rotating it ten to twelve inches from the surface of the plate. A sufficient covering was achieved when 60 to 70 per cent of the plate's surface had an even coating of the styrofoam dust. A heavy covering of dust was applied because the styrofoam shrank under heat and eventually became a fifty to fifty ratio of plastic to exposed metal. The dusted plate was placed on a plate heater. The plate was removed from the heater when the plastic particles were melted. The plate was bitten after it had cooled. It was possible to achieve a wide range of values by using shellac as a stopout during biting intervals.

Figure 6 depicts styrofoam aquatints of different qualities. A course and very irregular pebbled aquatint is seen on the top portion of the plate. In the center a finer quality of the more delicate styrofoam aquatint is illustrated. Both of the tests were bitten for a time period of five minutes. The aquatint on the bottom was produced by means other than melted styrofoam and is discussed in the next experiment.

Enamel spray aquatint. Experimentation into several aerosol spray paints was conducted by the writer. The aerosol spray paints were found to be effective in achieving aquatint effects.
Figure 6. Styrofoam and enamel spray aquatints.
The aerosol enamel procedure began with a clean plate. The plate was laid down on a flat working surface. The spray can was held approximately twenty inches away from the receiving surface. The paint covering was made uniform by rotating the plate during the spraying procedure. The spray was applied in approximately a 50 per cent covering. It was necessary to clean the orifice of the spray can repeatedly during use to prevent paint from gathering and being dispensed in irregular spurts. A dark-colored enamel on a shiny metal enhanced the evaluation of the covering. After the paint dried, the plate was bitten in the acid. It was possible to achieve degrees of tonality by using shellac as a stopout during biting intervals.

An enamel spray aquatint is shown on the bottom of Figure 6. The paint aquatint was bitten ten minutes.

II. PLATE'S DEVELOPMENT

The writer began preparation for the major print by cutting, beveling, and cleaning the zinc plate. The plate was heated on the plate warmer and a beeswax ground was applied. Masking tape secured the chalk dusted transfer to the grounded plate. A chalk line was deposited on the grounded plate by retracing the original lines with a ball-point pen. The pen line told the artist what lines were
traced and what lines remained to be traced. Removal of the tracing paper left fine white guide lines upon the dark ground.

A variety of etching needles was used to draw through the chalk lines. When the writer felt enough line work had been developed, the biting process began. The plate was bitten for a period of thirty minutes. The etched plate was removed from the acid and the ground was removed with turpentine. Evaluation of the bitten line was done at this stage of the print by examining a proof pulled from the etched plate.

Crayon, Instantex, and dry transfer type were used to create several areas of texture on the metal plate. The crayon, Instantex, and dry transfer type were applied and bitten at the same time. Shellac protected areas of the plate preventing unwanted biting. Careful examination during the biting determined the depth of the etch. Evaluation of the proof determined the effectiveness of the results and indicated the next steps.

It was determined at this stage of the print's development to texture several more areas by using the melted plastics technique. Acetate fabric was chosen because of the ease with which it could be removed from the plate. The fabrics were carefully selected and bonded to the plate in designated areas. Areas were stopped out
and the plate was bitten for approximately eight minutes. The plate was cleaned, printed and made ready for future work.

The writer used coarse styrofoam to achieve a variation of tonal ranges and effects. The plate was dusted with the plastic particles and bitten according to prescribed procedures. After printing and evaluating the plate the writer saw the need for areas of fine delicate tones. Spray paint aquatint was well suited for achieving the delicate tones needed. Thus, the plate acquired a covering of enamel paint and the biting commenced. The enamel was removed, and a proof of the plate pulled. The top of the plate lacked unity. A beeswax ground was applied, drawn through and bitten in a stippled pattern. Examination of a proof of the last state determined the plate’s completion. The finished plate was evaluated to determine the best printing procedure.

Figure 7 is a photograph of the final print. It can be observed that not all the experiments were used on the major print. Only techniques deemed best for the print’s development were employed.
III. RESISTS AND SOLVENTS

It is advisable when working with experimental acid-resistant elements to be acquainted with their solvents. The materials used in the experiments and the major print are for the most part conventional products. Table I gives the resist and their solvent involved in this study.

**TABLE I**

ACID RESISTS AND THEIR SOLVENTS

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<td>Dry transfer texture</td>
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<td>Waxes</td>
<td>Turpentine, benzene, kerosene</td>
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CHAPTER IV

COMPARISONS OF PRINTING PROCEDURES

The writer found little difference in printing plates developed by experimental procedures as compared to those developed by traditional means. Since the plates were etched and not built upon as in the collagraph process, there was nothing extremely different to be noted in the printing process. The press pressure, ink, and all other aspects of printing the two types of plates were interchangeable.

I. SELECTION OF PLATE AND ACID

After much investigation with acid-resistant elements the writer decided to use zinc for the metal plates. Zinc was chosen because it could be bitten in a diluted nitric acid solution with results comparable to those obtained from copper plates. The low cost of zinc metal compared to other plate materials was also worthy of consideration.

The writer chose nitric acid as the mordant for the research. Nitric was selected because it gave off gaseous bubbles, could be used effectively on zinc, and could be used in a diluted solution. Many of the acid-resists were soluble in hydrochloric acid which ruled out the use of Dutch mordant.
II. PRINTING PROCEDURE

Analysis of the plate and its proof suggested the ink, paper, and printing procedure to be used. The print lacked a quality of richness that the writer thought it should possess. Added depth and tonal richness were achieved by printing two colors directly over one another from the same plate. The plate was first printed in one color; the second color was aligned to the first printing by using registration marks.\(^1\)

The ink used for the first printing was a combination of raw sienna and burnt umber dry pigments with number three burnt plate oil. The dry pigments were blended thoroughly and a small amount of burnt plate oil was added. The ingredients were blended until the mixture was the consistency of honey.

The black ink was derived by following Peterdi's formula for black printing ink. The proportions of Peterdi's formula are two parts Frankfort black pigment to one part Vinc black pigment.\(^2\) The dry pigments were combined with number three burnt plate oil until a heavy tar-like paste had been mixed. The writer knew he could depend on the results from the Peterdi formula. The main

\(^1\)Peterdi, op. cit., p. 182.

\(^2\)Ibid., p. 195.
concern was mixing a brown ink that would achieve harmonious effects when printed with the Peterdi formula.

The major print contained many tonal and textural areas. The final print was pulled on heavy weight Arches paper. "Deeply etched or heavily cut plates should be printed on heavy soft paper, because they absorb better, have less tendency to blotch, and hold the embossment."

Preparation for printing began by soaking the printing paper in a soaking tray for a period of approximately thirty minutes. The brown ink was spread on the plate's surface and forced into the etched crevices. After the ink completely filled the indentures, the excess ink was removed with a plastic squeegee. Good results were obtained by wiping the plate immediately after removing it from the plate heater. Tarlatan cloth rolled into wads was used to spread an even film of ink over the metal surface. The writer finished the wiping process by using the edge of the hand.

The printing paper was removed from the soaking tray and put between two blotters. The inked plate was placed on a piece of newsprint that had been laid on the press bed. The plate was registered with pencil marks. After the plate had been registered, the dampened paper was removed from between the blotters and placed on the inked plate.

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1 Ibid., pp. 154.
Registration marks were made, and a piece of newsprint was placed on the printing material. The second sheet of newsprint absorbed the sizing from the printing paper. The felt blankets were laid on the newsprint, and the plate was pulled slowly through the press. Slowly pulling the plate under the press cylinder allowed ample time for the printing paper to dip down, pick up the ink, and mold itself in the plate's impression. The print was lifted off the plate and hung on a drying rack to dry.

When the ink from the first printing had dried, the plate was re-inked and the printing procedure was repeated using black ink. It was extremely important that the paper be dampened for a period of time corresponding to the first soaking. The registration marks were used as a guide to tell the size of the paper when first printed. The final print was dried slowly between two clean blotters.

Whether the plate was developed by experimental or traditional methods, the proper printing procedures are important for best results. The most exquisitely produced plate would yield only poor prints if the printer did not understand and utilize all aspects of the printing process.
CHAPTER V

SUMMARY

This study investigated various acid-resistant elements that could be used to develop intaglio prints. Results from the experimental acid-resistant elements were comparable to traditional printmaking procedures. The effects were also uniquely different from traditional procedures.

The writer, knowledgeable of different approaches in the printmaking field, began experimentation for the study. A series of experiments on test plates furnished the information used in the final print. The conclusions and results of the experiments are stated in the following conclusions.

I. CONCLUSIONS FROM EXPERIMENTS

Developing an etching ground. The experimental ground was similar to commercial hard grounds. The beeswax ground, softer than commercial grounds, required care in handling and storage. Although the ground was softer than the commercial grounds, the writer found all other aspects of the formula quite satisfactory.
Crayon drawing techniques. Crayons used as drawing instruments on the plate produced some very unusual and spontaneous effects. The relief surface obtained by using the crayon could be printed relief or intaglio, or with a combination of the two methods.

Lithographic crayons contain large amounts of soap. Soap in the crayon results in a weak acid-resistant quality. Large amounts of pure wax in the wax crayon permitted long biting periods. Uneven drawing pressure resulted in lines that were uneven and ragged. The writer found that wax crayons used as an etching ground left pockets that were bitten as small pits upon the plate. This pitting could be attributed to the fact that the crayon is self adhering while drawing. Thus, an uneven coating of wax was formed on the plate's surface.

Texture rubbing techniques. Texture rubbing technique success depended on the type of texture used. The choice of textures was important because delicate patterns ran together upon contact with the warm plate. A coarse texture allowed the crayon to remain in a segregated pattern. Texture rubbing techniques were useful when large areas of coarse texture were developed.
Dry transfer type. The acid-resistant quality of dry transfer type permitted long periods of biting action, creating a plate that had a high relief surface. The surface of the bitten plate was printed equally well by intaglio or relief printing procedures. The characteristic of the dry transfer type to be overlayed made the product applicable to abstract designs. When dry transfer type was used, the bitten edges were crisp and meticulous looking.

Dry transfer textures. Results obtained from Instantex textures were similar to textures produced by soft ground methods. It was possible by drawing upon the solid black carrying film to create textures that were not commercially produced.

Melted plastics. Melted plastics produced effective results without following traditional soft ground methods. The results were comparable to soft ground textures. Selection of the right weave pattern was important. A closely woven material would fuse together when the fabric melted. It was important to select fabrics that did not have cotton blends because the foreign fibers would not melt.

Working with synthetic materials requires knowledge of the toxic effects of both the materials and their solvents. Although the field of plastics is exciting and extremely
interesting, it must be approached with an understanding of the problems involved.

**Styrofoam aquatints.** The fact that foams were easily obtainable was a major reason for their selection as a resist. The acid-resistant qualities and easy solubility made styrofoam a highly desirable material. The aquatinting effects of the styrofoam differed from rosin aquatints. Styrofoam created a fibrous, hair-like quality when melted compared to the dot quality of rosin particles.

The urethane foams had two limiting aspects that made them undesirable. These two limiting disadvantages were the toxic odors released during fabrication and heating and the unpredictable acid-resistant quality of the urethane foams. The problems involved in working with urethane foams far outnumber its assets.

The writer was impressed with the variation achieved by simply changing the size of the styrofoam particle that was used. The different tonal effects enabled the user to achieve a fusion of several qualities from the same material.

**Enamel lacquer aquatint.** Enamel lacquer aquatints resemble a fine quality rosin aquatint. One of the greatest advantages in using aerosol spray paints was the speed and efficiency with which results were obtained. The solubility and acid-resistant qualities of the spray paint lent this
product ideally to the aquatinting process. Color achieved by spraying a plate with colored paint simplified the evaluation of the paint's covering.

The only disadvantage in using enamel sprays is the toxic odors given off by the spray during application. Enamel sprays must be used with proper ventilation.

II. GENERAL CONSIDERATIONS

Not all of the information gained from the test plates could be used in the major print. The writer selected only those experimental effects that would provide satisfactory results on the major print.

Excellent results were achieved in all aspects of the basic methods of tone, texture, and line by using only the results from the experimental methods. Close examination of the major print illustrated the unusual effects accomplished in the study.

It was understood that, although these new elements added to the aspects of the traditional procedures, they were limited by properties that enabled them to accomplish their given tasks. When the materials were given full consideration before work began, the results were substantially rewarding.
III. RESULTS FROM CORRESPONDENCE

The field of experimental acid-resistant elements was new in the contemporary printmaking field. The writer sent fifty letters of inquiry at the beginning of the research. It was the writer's purpose to find information and personal philosophies that would benefit the study. The return from the letters was disappointing. The writer received twelve letters from persons obliging a reply. Contained within the twelve letters was little information related to the research and absolutely no personal opinions about the problem. The writer was unable to furnish any philosophies of artists working in the field of acid-resistant materials.
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