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Acrylic Sheet in Combination with Other Plastics as a Personal Art Form

Olga K. Durham
Eastern Illinois University

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ACRYLIC SHEET IN COMBINATION WITH OTHER PLASTICS AS A PERSONAL ART FORM

(TITLE)

BY

Olga K. Durham

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INTRODUCTION

The pursuit of new forms of expression in contemporary art invariably leads to the search for new ways to use familiar and traditional materials. An extension of this pursuit can and often does lead to the use and incorporation by the artist of new materials made available by industrial, technological and scientific developments. Artist's materials which are now considered traditional were at one time new discoveries themselves; so it would seem only logical that as new man-made materials become available, artists would experiment with and incorporate these "new" materials in their creative endeavors. Newness in itself is not sufficient justification for use of a material as an art medium. However, when a newly developed substance has the physical characteristics and properties that would open up new vistas and limitless possibilities in all facets of living, why not, then, look to this new material as a vehicle to express man's soaring imagination? (11-1)

Synthetic materials, commonly called plastics, are a product of technological development that has characterized the past century. This large, varied family of materials offers the means of achieving a great number of interesting and novel effects. Plastics often have been

used to imitate or replace natural materials. It is this facility for imitation that many consider to be a weakness since the term "imitation" frequently implies something of lesser quality. So it has taken many years since the discovery of plastics for designers, engineers and consumers to develop and use plastics that exploit the inherent physical properties and characteristics of this large family of materials. With the exception of a few, artists in general were slow to use plastics as art media.

Laslo Moholy-Nagy, writing in Vision in Motion, states "The new artist working with plastics has to take up scientific studies or else wait decades until knowledge about plastics becomes commonplace." (10-31)

Decades have passed and people in general have become well acquainted with plastics in their lives; but knowledge about plastics, their make-up and properties is still not commonplace. "Plastics are ready for artists' use yet the surface has only been scratched. Plastics as an art form is an open ended area waiting for experimentation and exploration." (11-18)

It is the aim of the author to incorporate plastics with more traditional art media in developing a personal art form that could be pursued in ordinary studio conditions without the aid of costly or heavy equipment. Availability of the plastic materials was an added factor that needed consideration. Would equipment normally found in the home be sufficient to produce satisfactory results? These were

some of the questions confronting the author in her pursuit of a personal art form.

In several quotations cited in the following text, some of the terms used within the text are capitalized, i.e., Constructivism and Cubism. This is done in accordance with the material cited from that particular author and does not represent an inconsistency with the remaining portions of this manuscript.

CHAPTER I

HISTORY AND DEVELOPMENT OF PLASTICS

Plastic substances were first discovered in the mid-eighteen hundreds. In 1855 Alexander Parkes treated cotton with nitric acid in the presence of sulphuric acid and obtained nitrocellulose or pyroxylin. Later, collodion, a mixture of pyroxylin and ether was used to coat wounds.

In 1868, John Wesley Hyatt, searching for a substitute material for ivory used in forming billiard balls, developed the first modern plastic. This substance was made from nitrocellulose and solid camphor. He called this substance cellulose. It was soon used for making a variety of things such as dental plates, celluloid toys, shirt cuffs and collars and photographic film.

Development of plastics moved slowly until 1909 when Leo H. Baekeland, a chemist, introduced phenol-formaldehyde thus creating the first phenolic plastic which was named Bakelite after the inventor.

After 1926 the development of plastics accelerated to produce the many members of the modern family, some of which are acrylics, vinyls, nylon, polyesters, polystyrene and polyethylene.

High cost of manufacture and difficulty in production were factors which kept plastics from being more fully developed earlier in the twentieth century. Scarcity or unavailability of natural materials made synthetic replacements a necessity and a wide range of plastics became commercially feasible.

Not all plastics are suitable for use by the artist, mostly because of heavy equipment and huge expense involved in their use and some are better suited to use by the artist because of ease and economy of application. (11-27)

Initial exploration with plastic does not require any deep technical information. However, a knowledge of basic terminology and processes is essential.

Plastics are a large varied family of materials, not a single substance. The raw materials which produce plastics can be combined in many ways to produce nearly any property desired in a finished product. Plastics are composed wholly or in part of various combinations of carbon, oxygen, hydrogen, chlorine, fluorine and/or nitrogen. Though solid in their finished states, plastics are sufficiently fluid at some point in their processing to be formed into various shapes. This is accomplished through the use of heat and/or pressure. The heat can be chemical or thermal.

Whatever their varieties, plastics fall into two broad categories, thermosetting and thermoplastic. Thermosetting plastic, once cast or formed and after curing

(polymerization) has been accomplished, will not soften with heat and will retain its shape permanently unless decomposition temperature is reached. This occurs because of the cross linking of chains of molecules which hold tightly together.

On the other hand, thermoplastics change physically rather than chemically. They soften and become flexible upon being heated. Continued application of heat will cause fluidity. Upon cooling all thermoplastics harden and unless impeded some return to their original shape. Reheating will cause resoftening. Thermoplastics are made up of coiled and long molecules intertwined in a tangled maze. At normal temperatures these molecules are quiet but begin to move when warmed giving this material its flexibility.

Almost all synthetic resins of plastics are organic materials, that is they contain carbon. The carbon atom combines with other carbons as well as with other elements. These atoms combine into long chains or rings with atoms of other elements hanging on to the sides. Organic or carbon substances are sensitive to heat and become unstable. Heat and pressure cause these unstable molecules to link and form larger molecules. This is polymerization. Heat, pressure, catalysts or combinations of these can trigger polymerization. A catalyst is a chemical substance that can accelerate or retard this reaction and a catalyst that retards the action is called an inhibitor. (11-126)

Each of the basic plastics has characteristics in common with others and also properties that are unique to itself.

Today, we as consumers are continually exposed to plastics in all phases of our daily living. Almost everything we buy is made wholly, in part, or comes wrapped in plastic. Transparency, strength and flexibility make some plastics especially good for packaging. The expanded or foamed plastics, such as styrofoam and urethane make excellent cushioning or protective materials that are used in everything from protecting delicate products to filling chair cushions and mattresses.

Plastics are used as floor covering materials, window panes, decorative panels, dental plates, surgical instruments and on and on. The list is endless. Many plastics are used to imitate natural materials especially when the natural materials are scarce or unavailable. Some people have a low regard for plastics because of their use as imitations and most of us have had bad experiences with some form of plastic, i.e., bad odor, low melting point, inadequate strength, etc. However, the many advantages of this technologically developed family of materials far outweigh the disadvantages. When care is given to select the plastic with properties and characteristics most suitable for the task at hand, the result can be an unqualified success.

This new matter, though as versatile as any old forms, flexible enough to stand by itself as any other medium, is a material that strongly reflects its own era. Whether used for outer space and rocketry, or as a vehicle to express man's soaring imagination, plastics are certainly valid and likely representatives of today's world. (11-1)

CHAPTER II

PROPERTIES AND CHARACTERISTICS OF ACRYLICS

Acrylic plastic was developed in 1931. It is a thermoplastic material and is known chemically as Methyl Methacrylate. It is available in rigid sheets, rods, tubes, molding powders, syrup and liquid resin. It is also used as a vehicle for paint. Most acrylic paints are soluble in water and their development has revolutionized the paint industry. The best known trade names for solid acrylics are Plexiglas and Lucite. Solid acrylics are virtually moisture proof, have high strength and are relatively shatter proof. They have excellent weatherability and most colored acrylics will not fade when exposed to sunlight. Acrylics have very good clarity (up to 92 per cent light transmission) and some are of optical quality. They have a slow burning rate, with some varieties being fire retardant, yet they can be molded by exposure to temperatures in the range of 240 F. to 340 F. Acrylics are resistant to most household chemicals but can be attacked by strong alkalis and acids and are soluble in ketones, esters, aromatic and chlorinated hydrocarbons. While nontoxic in the final state, vapors of the basic material, monomeric methylate, used in producing acrylics are harmful.

When formed either by casting or molding, solid acrylics have excellent machining qualities. They can be sawn, carved and etched with most tools used in metal and wood working. Optically clear sheets of uniform thickness will transmit light from one edge across to the opposite edge. Surface incisions, whether purposeful or accidental, will leak some of the transmitted light.

The greatest drawback of solid acrylics is that they are easily scratched, so care must be taken to protect the surfaces while they are being handled and worked. There is also a shrinkage factor of approximately two per cent that must be considered. However, preshrunk sheet acrylic is available at a higher cost.

Among other desirable qualities, solid acrylics have no odor and can be stored indefinitely.

There are three basic heating methods used when working with acrylic sheet material. The most commonly used being a temperature controlled electric or gas oven that allows uniform heating of the sheet. Radiant heat is a second method employed to render sheet material formable. Uniform heating is difficult if not impossible to accomplish with radiant heat. Heat lamps and propane torches are two types of radiant heat that are readily available and easy to use. Lastly, strip heaters can be applied to the sheet material when a bend is desired. The heating method chosen by the artist should be consistent with the design approach used by the artist.

The forming temperature of acrylic sheet ranges between 240 degrees Fahrenheit and 340 degrees Fahrenheit. However, temperatures above 320 degrees Fahrenheit will cause bubbling. Forming can be accomplished manually or mechanically. One of the most common mechanical methods used is vacuum forming. Most people have become acquainted with this process through children's toys that have been popularized in the last several years. Another mechanical method employed is a rigid form or press mold which holds the heated sheet material in place until it has cooled. This is called drape forming.

For the artist, manual forming offers greater flexibility in the creation of shapes since multiple irregular forms can be achieved. However, size is limited since the heated material must be held until it is relatively cool.

Cementing of acrylic sheet can be accomplished by using solvents or cements that are made specifically for use with acrylics. Solvent cements and polymerizable cements are the two types available. Most cements contain volatile liquids which are toxic when inhaled and some of which are flammable, so caution should be exercised while cementing. There are several ways in which acrylics can be cemented. The material can be dipped into the solvent long enough for softening action to occur, usually about three to ten minutes depending on the type of cement used, and assembled to other parts of acrylic material.

The cement can be introduced to a joint with a paintbrush, eyedropper or syringe. A solvent cement can be thickened with acrylic chips to make a viscous glue which can be applied the same way any other glue is applied to any other material. There are also several adhesives available for attaching acrylics to other materials such as wood, glass and metal.

Industrially, acrylics are used for window panes, appliance housings, furniture, decorative panels, airplane canopies, radar plotting boards, and other items too numerous to mention.

The properties of strength, durability, light weight and transparency of solid acrylic can lead to profound changes in media areas. Paintings and sculptures that use light as well as the traditional aspects of color, texture and form are possible. A new dimension is added. "The nuances of texture, pattern, color and form integrate dynamically when plastics full potential is realized." (11-78)

CHAPTER III

INFLUENCES ON THE USE OF NEW MATERIALS AS ART MEDIA

While the earliest plastic was formulated in the mid-eighteen hundreds, the use of plastics in art was not attempted until the late nineteen-tens.

Picasso, Braque, and Duchamp, among others, paved the way by using materials in their paintings and constructions other than the traditional oil and canvas, wood, bronze or marble. Around 1911-12, Braque and then Picasso used paper pasted on their paintings in their development of what is now called synthetic Cubism. Thus the first collages (Papier Collé) came into being. (1-20)

Not only were new materials being added to the list of artists' media, but a new approach to painting was being established that literally revolutionized contemporary art. A new way of seeing was introduced. In a small wall sculpture, Still Life, 1914, (collection of Lady Penrose, London) Picasso broke with traditional sculpture. Not only did he build by tacking together pieces of wood instead of carving the form, Picasso used a piece of real upholstry fringe to represent the fringe of a tablecloth.

The development of Cubism in art had its influence on many artists of that day, among them Marcel Duchamp. In 1911 he began paintings that emphasized successive images of a body in motion. Nude Descending a Staircase No. 1, (oil painting, Philadelphia Museum of Art) was painted in that year. In the following year, 1912, the beginnings of radical and ironic ideas developed to challenge commonly held notions of art. This development began from the friendship of Duchamp, Picabia, Apolinaire and others and preceded the official founding of Dada in Zurich during the year 1916. Dadaism, an anti-art, anti-everything movement, resulted from social, political and psychological dislocations of World War I. Although short lived as a movement, Dada served as a liberator of expressive freedom. In 1913 Duchamp, later a proponent of Dadaism, began machine-like drawings and studies that culminated in his complex and highly regarded work, Large Glass, 1915-23 (Philadelphia Museum of Art). This work was created with oil, lead wire, foil, dust and varnish on glass. (4-29) Rotary Glass Plate (collection of Cordier and Eckstrom) was executed in 1920 using five painted glass plates that turned on a metal axis by an electric motor.

While not working directly with plastics themselves during the second decade, Picasso, Braque, Duchamp and others, nonetheless opened up new vistas in the vision of artists that led to greater acceptance of and experimentation with new materials as artistic media.

Naum Gabo and Anton Pevsner, Russian-born brothers and artists, were part of the Constructive movement in art. The immediate source from which the Constructive idea derives is Cubism. (39-3) Gabo states,

> The Cubistic analysis had left for us nothing of the old traditions on which we could base even the flimsiest foundation. We (the Constructivists) have been compelled to start from the beginning. We had a dilemma to resolve, whether to go further on the way to destruction or to search out new bases for the foundation of a new Art. (4-5)

The sermons of Picabia, 1914-16, predicted the wreck of art; the manifestos of the Dadaist's celebrated the funeral of art with chorus and demonstrations." (9-5) According to Gabo, "the basis of the Constructive idea in art lay in a new approach to the nature of art and its function in life." (9-6) Maintaining that art is built up of two fundamental components, form and content, the Constructivists viewed these two components as one and the same thing. They felt that all previous art concepts of the world were based on or conceived from a representation of the external aspects of the world and that even when the artist tried to portray his inner perceptions and emotions, the most he could hope to achieve would be "more or less individual distortions of the external images of Nature--This indestructable content in a work of art always predicted the forms which art had followed down to our own time." (9-7)

The Constructivists, therefore, decided that the elements of art, line, color, and shape possessed their own

forces of expression that were independent of any outward worldly aspects, that they were not merely abstract signs but were organically bound up with human emotions. (9-8)

In their pursuit of these ideals, both Gabo and Pevsner created paintings and sculptures that utilized celluloid in their earlier works, and later acrylic sheet material when it became available. As early as 1920, Anton Pevsner created with plastic a construction entitled Mask (collection of Carlos Neuva, Venezeula). In the years to follow, Pevsner was to use plastic time and again in combination with other materials such as wood, copper, bronze and zinc. He also experimented with oxidizing plastic as in Red Background and Red Gamut, both done in 1923 (collection of the artist).

In 1920, Naum Gabo created a wall piece entitled Construction (Miss Dreyer, New York City) that used to advantage the transparency of celluloid. Another sculpture created in 1929, entitled Construction, was made entirely of transparent plastic.

While both men used plastics in their creations early in their artistic careers, Pevsner abandoned this material in his sculptures after 1935 in favor of copper, brass and bronze, particularly wires of these materials. Gabo, on the other hand, continued to work with plastics. Some of his best known and highly regarded works are of etched Lucite. Linear Construction, 1943, (Otto Gerson Gallery) is typical of his work with solid acrylic sheet

material. Lines carved into the shaped acrylic sheet were threaded over with string to create a strong linear quality that expressed dynamic movement successfully. Linear Construction, 1942-43, (Phillips Collection, Washington, D.C.) is another etched plastic creation. Gabo continued to execute linear constructions in acrylic using various materials to create the linear quality he desired. Stainless steel wire was threaded over the acrylic form in Linear Construction No 4. created in 1958 (Whitney Museum of American Art).

The influence of Gabo and Pevsner led Lazlo Moholy-Nagy to work on the aesthetic problems resulting from the mobile, its play of light and diverse spatial relations. Plastic sheet was used in these mobile structures created during the 1920's. It was during these years that Moholy-Nagy headed the preliminary course at the Bauhaus School in Germany.

Founded in Weimar, Germany, during the year 1919, the Bauhaus was an institute for art that resulted from the combination of an academy and a school of arts and crafts. It was an educational establishment with a strong tendency toward practical and manual training along with the usual theoretical teachings.

The nineteenth century was characterized by industrial and technological development that triggered an almost unbridgeable gap between artistic conception and the

realization of these conceptions. The goal of the Bauhaus was to reunite this gap between the "spiritual" on the one hand and the "materialistic" on the other. (21-xviii)

"The Bauhaus was started and ended with the first German republic. It existed for fourteen years in three locations: Weimar, Dessau, and Berlin." (21-9) For political reasons it was forced to close its doors in 1933.

Many of the people who taught and were taught at the Bauhaus during these years became known throughout the world for their accomplishments in the fields of art and architecture. Walter Gropius and Ludwig Mies van der Rohe strongly influenced architectural thought and development in this century. Kandinsky, Klee, Oscar Schlemmer, Johannes Itten, Joseph Albers and Lazlo Moholy-Nagy are but a few of the artists who have distinguished themselves not only as teachers but as artists. Albers and Marcel Breuer were among the Bauhaus students who became Bauhaus teachers. Otto Stelzer states,

> Creative freedom was the climate that permeated everything and was imparted to all masters and students. The intimate contact with the present, service to mankind and society, humanism, in a word is what gave the Bauhaus its vital impulses. (19-9)

After its closing in Germany in 1933, the Bauhaus remained in thought and principle in the minds and deeds of these former students and teachers.

A complete definitive writing on the accomplishments of the Bauhaus and its influence on present day art and architecture is not the purpose of this paper, however, it

should be pointed out that the ramifications of Bauhaus teaching and thought are so integrated in our present day culture that most people today are affected by its influence in their every day lives.

The artists discussed in this manuscript have either influenced the development of the Bauhaus or have been influenced by Bauhaus thought or Bauhaus teachers. The unique contributions of the Cubists, Dadaists and Constructivists unboubtedly paved the way for Bauhaus thought and teachings.

Since the goal of the early Bauhaus was to reunite the gap between artistic conception and its realization, importance was placed on the role of materials. The preliminary course at the Bauhaus was the prerequisite for all further study. Johannes Itten was responsible for introducing this preliminary course which consisted of problem studies and exercises in color, form, material and texture. New sensibilities were awakened in the students by their experiments with a variety of materials used in combination. Exciting collages resulted.

This emphasis on the use of material for its inherent qualities in the areas of art and architecture had a profound influence on the art of nations whose technology was developing rapidly.

When Itten left the Bauhaus in 1923, he did so because of disagreement between himself and Walter Gropius about the extent of unity between art and industry.

Lazlo Moholy-Nagy was an ardent admirer of the new unity and became Itten's successor, together with Joseph Albers, to the teaching of the preliminary course. Moholy-Nagy turned the playful approach to form under Itten to technological research. In the words of Albers, "It was geared to the inner forces and practical possibilities of material and led to a more impersonal creativity, or professionally speaking it led from collage to montage." (19-36)

It is not surprising then that Moholy-Nagy would use plastics in his own works of art. Transparency, light weight and flexibility of the material surely played an important part in his work with mobiles; and in the years in which he headed the New Bauhaus in Chicago, he created many pieces using Plexiglas. Space Modulator, 1940, a construction in Plexiglas on a mirroring plane (Paul Theobald and Co., Chicago) is one of these creations.

> Moholy's artistic intentions constituted an integral element of his conception--the free creative works of the last years of his life are particularly revealing with respect to the visual problems that constantly preoccupied him in every phase of his activity. In those years, these problems primarily concerned kinetics, light and transparence /sic/. (22-582)

Moholy-Nagy died of leukemia in 1946. His untimely death terminated an ascending career as an artist, designer and educator. His legacy was a lifetime of creative work and a book, Vision in Motion, publiched posthumously in 1947 (Paul Theobald and Co., Chicago).

Greatly influenced by Moholy-Nagy, students at the Institute of Design used thermoplastics in various phases of their studies. The material was heated, bent, twisted, etched and generally manipulated to form sculptures, light paintings, diffusion panels and a great number of other creations.

Since that time plastics have become more widely accepted for use by artists. Various kinds of plastic lent themselves particularly well for sculpture. Polyester and acrylic resins could be poured for castings. These castings could be clear, translucent, opaque, contain inclusions such as marble dust, wires, threads of other materials, color could be added, etc. In some cases the internal stresses created during the curing process provided their own unique quality to the sculptures. Marisol Esteban and Louise Nevelson, both noted sculptors, have created pieces of art with plastics. Marisol used the casting method for her plastic creations while Nevelson used acrylic sheets and blocks cemented and bolted together. Nevelson's Canada Series V, 1968 (Pace Gallery, New York) is one such sculpture.

Robert Morris, a proponent of the school of minimal sculpture, is best known for works similar to one shown at the Castelli Gallery in 1968. This was a series of nine rectangular units of translucent fiberglass, each 48 x 24 x 24 with 12 inch intervals between all the units. (8-53)

Frank Gallo has earned an international reputation chiefly through his work with epoxy castings. Working primarily with the female form, Gallo achieved with epoxy an almost lifelike skin quality with color and translucency not approached by other sculpture media.

In general, sculptors seemed to embrace the use of plastics more rapidly and with greater diversity than artists concerned primarily with painting.

There are, however, some notable exceptions. Irene Rice Pereira is best known for her abstract paintings which involved layers of glass with abstract lines and shapes painted on and attached to them, so that one layer was affected by other layers and by the ground, resulting in various optical variations and effects. (7-485,6)

Although Pereira's first exhibit was shown in 1926 it was not until 1936 that she exhibited her first "pure" abstractions. These were paintings on canvas. It was even later in her career that transparency became an integral and necessary part of her work of which Frederick S. Wight writes,

> The boundaries of techniques are conventions which most artists accept: a new result is produced with familiar means. But what if the artist refuses to be bound by any particular means such as the technique of oil on canvas? Whether the work is painting, sculpture or architecture then no longer matters; that it establishes relationships is enough. Contrasts of any sort allow composition--light against dark, color against color, coarse against fine, line against shape, transparent against opaque. I. Rice Pereira exploits these contrasts with other means besides paint. . .Miss Pereira happens to be concerned with rectangular

> compositions in which one plane hovers over another. this is carried out in actuality rather than in the illusion of paint. . . . Her art is primarily one of arrangement, not of illusion: illusion is only an additional resource. (21-104,5)

Pereira herself says, "I have tried to produce an integrated picture with actual light as part of the painting. I have tried to achieve results by developing a working process with the medium itself rather than by creating an illusionistic interpretation." (14-27)

These "layered abstractions" on glass were executed during the apex of Pereira's career. She employed plastic along with other materials to produce varying degrees of opacity and transparency in her work. In a review appearing in the May, 1964, issue of Art News, the reviewer presents this critique of Pereira's work appearing at The Galerie Internationale:

> Her later works define her "philosophies of light" in various plastics, glass and metal dating up to 1963. Her career has run the gamut of texturing materials to involve description of layered transparencies and these rectangular suspensions including her signature horizontal land, sea and sky bands and lateral forms are all well displayed. (15-15)

Robert Rauschenberg, described as the "Enfant Térrible" of the art world by Calvin Tomkins, (20-209) is another artist whose contribution to and influence on the art world has been notable. Having begun his career in art almost as an accident, Rauschenberg has, in relatively few years, achieved an enviable reputation in the art world. He has in his career to date used almost every imaginable

material as media for his art, many times to the shock and bewilderment of other artists and to spectators in general.

Rauschenberg enrolled in Art School in Kansas City in 1946 following World War II. He had had no previous training in art. The GI Bill provided him with the means to school himself. After one year at the Kansas City Art Institute, he went to Paris where he studied at the Acadamie Julian for approximately one year. The following year he enrolled at Black Mountain School in North Carolina because he had read that Joseph Albers, Head of the Fine Arts Department at Black Mountain, was a great disciplinarian and partly because Sue Weil, a girl he had met in Paris, had returned to the United States to study at Black Mountain.

Following his stay at Black Mountain, Rauschenberg moved to New York's lower east side. His work at that time was comprised mainly of canvases painted white, first with stenciled numbers and later all white or silver. The viewer provided variations on these later canvases by casting shadows as he passed by. The time of day and the type of lighting also affected the canvases. Soon Rauschenberg was painting black paintings he referred to as "night plants." (20-202) At this time he began using newspaper as a ground to provide subtle variations "so that even the first stroke in the painting would have its position in a gray map of words." (20-204) Red paintings using comic strips as a ground were begun at this time as well. In an effort to achieve a kind of painting in which his personality

and taste would not be the controlling element, Rauschenberg soon began using bits of flotsom and things he had collected. He constructed a variety of boxlike structures with strange fetish-like objects, some painted, which a dealer in Rome called "thought boxes." (20-207)

During the summer of 1953, he continued to work with objects and materials he found, experimenting with sculpture and boxlike frames. This development led to Rauschenberg's "Combine" (20-220) paintings such as Bed 1955, (Mr. and Mrs. Leo Castelli collection), in which he stretched a patterned quilt on a frame, added a pillow, and used the assemblage as a surface on which to paint. In other paintings he used objects such as doors, ladders, street signs, assorted stuffed birds and animals in combination with canvas and paint. Most were wall hung but some were exhibited on the floor in a kind of environmental arrangement.

During the fifties, most of art world, artists, dealers, collectors and critics found Rauschenberg's paintings and combines disturbing. He had broken with the ideas and approaches of the abstract expressionists in much the same way as Picasso and Braque had broken with traditional approaches to painting during the years from 1908 to 1915. Rauschenberg found allies in Jasper Johns and John Cage. They encouraged him to pursue his own goals. In 1964, he won the international grand prize at the Venice Biennale, the first time for any American to be so honored.

Two years before that Rauschenberg went back to working with "flat" painting. In 1959, he began doing transfers. By rubbing the nib or a dry ball point pen over the back of selected pages from Newsweek, Life or Time magazine pages that had been placed on drawing paper wetted with lighter fluid, Rauschenberg produced fragmented images. Soon he was working with large silk screens on canvas. He became engrossed with graphics, lithography in particular. He used discarded plates, laid silk screen directly on the stone, applied magazine pages directly and through the medium of transfer papers on various surfaces, as subject and creative environment. (2-91) He lithographed directly onto Plexiglas. Overcast III, 1963 (collection of Mr. and Mrs. Ben Heller, New York), an oil on canvas with silk screened Plexiglas, is typical of Rauschenberg's work during the early sixties. In 1967 Rauschenberg arranged five silk-screened transparent Plexiglas discs in a metal base. This work entitled Revolver (collection of the artist) was motorized so that the discs rotated at varying rates of speed producing changing relationships of color and images. Transparency became another component of his complex art.

Continuing to exert great influence in the world of art it can be said of Rauschenberg that he introduced into the fine arts the use of images, colors and objects not normally found in art. Brian O'Dogerty used the term "cross media insemination" (13-84) to describe Rauschenberg's work.

Many other artists, some renowned in the world of art, others of lesser stature than Rauschenberg, have used sheet acrylic in their creations, each using the material to express their particular art form.

Beginning in the middle sixties, Elise Asher created a series of cylinders and "books" using Mylar and Plexiglas along with oil, enamel and canvas. They were calligraphic paintings somewhat reminiscent of Pollock's dribble paintings. However, they differed in that Asher's dribbles were painted on transparent sheets of plastic that were mounted on frames, attached to canvases or hinged together with metal clamps to form books with each plastic sheet becoming a page. Song for the Middle Years, 1972 (owned by the artist) is one of Elise Asher's "book" paintings. (21-107)

One common denominator among artists using sheet acrylic such as Plexiglas is that each has been able to treat or manipulate the same material to suit his individual goals.

CHAPTER IV

THE USE OF PLASTICS AS A PERSONAL ART FORM

Past training in industrial design acquainted the author with various technological methods and developments. The curriculum, by its very nature, stresses the role of materials. One is continually reminded of the contrasts or similarities inherent in various materials and surfaces. One is taught to render these surfaces as accurately as possible. One soon becomes adept at portraying wood, metal, plastic, etc. and their varieties of surface through the medium of pencil, ink, chalk and air brush.

Braque's past training as a house painter and decorator enabled him to simulate wood grains and depict marble surfaces. He used this technique in his analytical Cubist paintings and continued to place emphasis on surface texture in his life long work.

The developing art of the author has been markedly influenced by her past training. Surface variations and textural treatments, whether actual or drawn, have been an important part of her art regardless of the media used. It is not surprising, then, that the search for a means of personal artistic expression would lead to the use of

acrylic sheet in combination with other plastics as an addition to other more traditional materials such as ink, pencil, paper, canvas and masonite.

The use of acrylic sheet by the author was a sequential development following a series of drawings on illustration board in which acrylic transfers were used to create illusive and fragmented images.

Working with landscape as a theme, two drawings, Haven't I seen you somewhere before? and Mind's Eye, both pencil and ink collages on illustration board, were created. While traditional materials were used, both show a departure from this artist's previous work. While relying mainly on identifiable pictorial representation, Haven't I seen you somewhere before? shows an organizational departure and includes pencil transfers arranged in patterns. Mind's Eye also incorporates the use of transfer but now the transfer is colored ink on paper which was burned on the edges and pasted on the illustration board.

These pieces led to experiments with acrylic transfer which resulted in several paintings. The Measure of Things, a collage which combined acrylic transfer, ink, pencil, spray paint, formed paper and a clear plastic ruler, was the first of this series. The framing of this piece brought to light the problem of weight. Glass weighs more than the same size piece of sheet plastic. Besides the advantage of lesser weight, window glass thickness sheet acrylic is much less breakable, therefore easier to store

Fig. 1.--Haven't I seen you somewhere before?
22 x 28

Fig. 2.--Mind's Eye
18 x 23

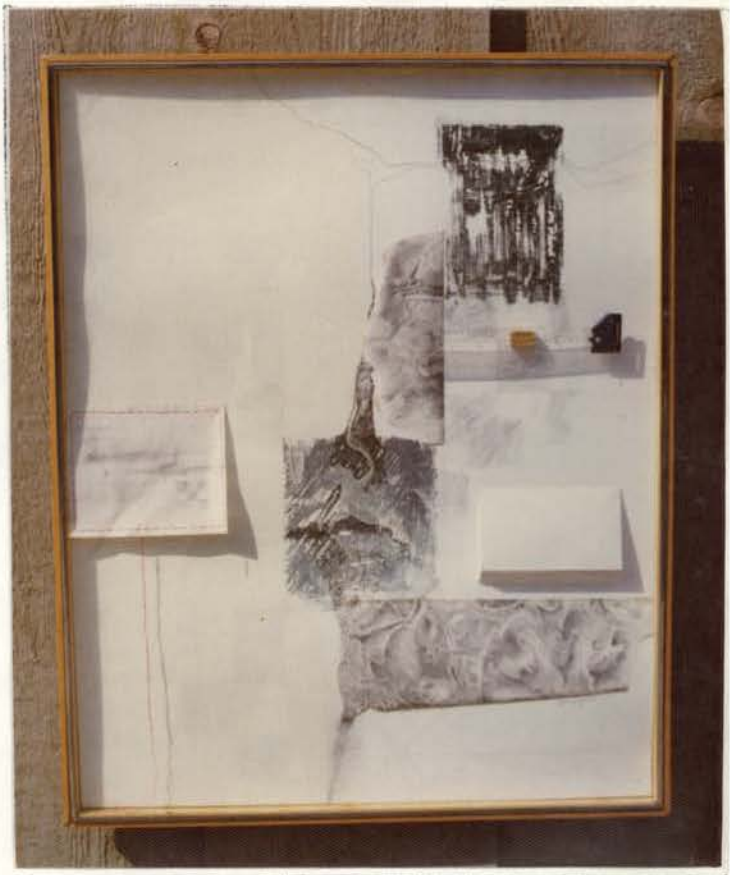

Fig. 3.--The Measure of Things
23 x 29

and is readily obtainable in local hardware stores and lumber yards. As a result of experimentation, a number of pieces were created using acrylic transfer directly on acrylic sheet. This was accomplished in the same way as transfers on illustration board. Acrylic medium was brushed onto the desired area. The printed material (in this case, Life magazine pages) was placed onto the medium, pressed over and rubbed with a blunt brush back or by hand until the ink from the printed paper was "transferred" to the acrylic medium. The length of time this took varied with the thickness of medium application and the amount of transfer desired. The process was checked by slowly lifting the printed material at one corner and observing the degree of transfer. If there was not enough exchange, the corner was replaced quickly and pressed again. When the desired amount of transfer was achieved, the paper was simply removed. Any remaining shreds were rolled off by rubbing with a finger. An added advantage of transfers on acrylic sheet was that the printed paper could be allowed to dry completely and be removed at a later time by soaking in a warm water bath. In this way, an almost complete transfer could be accomplished.

Other experiments with manipulation of acrylic sheet were conducted. Various sources of heat such as candles, propane torch, gas stove flame and temperature-controlled oven were used to render the acrylic sheet malleable and also to texture it. It was found that candle flame caused a smoking of the plastic sheet that could not be completely

removed. This offered another method of coloring the plastic sheet. All the types of heat application caused varying degrees of distortion in the material.

In the search for additional methods of adding color to acrylic sheet, further experiments were conducted using clear liquid plastic resin to which were added colorants. A catalyst was introduced to the mixture which was then poured onto the acrylic sheet and allowed to cure. Where desired, several colors could be blended directly on the acrylic sheet or if preferred, various hues could be mixed in the liquid resin before the addition of the setting catalyst. One of the greatest advantages in using these colored liquid resins was the great clarity and intensity of hue which was obtainable. Furthermore, because the curing time was fairly long, ranging from three to twenty-four hours, inclusions of various other materials could be added after the liquid resin was on the acrylic base. The resin then acted as a glue. The addition of inclusions produced varying degrees of translucency in an otherwise transparent material. The liquid resin could also be poured over areas that contained transfers, areas that had been textured by heat and manipulation or combinations of these various types of treatment.

The one drawback in using liquid resins was the need for very good ventilation during the mixing and curing processes. The vapors released are harmful if inhaled over

an extended period of time or if there is inadequate space for the vapors to disperse.

Environment became an important consideration, not only during the working processes involved in using plastics but also in their display. In order to display the worked plastic sheet to best advantage, environment had to be controlled or at least taken into consideration. Three freestanding pieces were created, each using a different display organization. All three pieces incorporated acrylic sheet with applied transfer. The acrylic material was heated over a gas flame and shaped by hand. Portions were heated and smoked over a candle flame. The transfer areas held up well during the heat treatments, retaining their color except where smoking or bubbling interfered with the passage of light through the plastic. In Form No. 1, the shaped acrylic sheet was then attached by screws to a wood form painted white. This form acted as a base and backdrop. The entire creation could then be hung on a wall or be freestanding. The second piece, Form No. 2, was mounted on a curved block of oiled mohogany. The third work was created entirely of sheet acrylic. Magritte Squared, like Form No. 1 and Form No. 2, contained transfers, was heated and shaped but the entire work was made up of three pieces of slotted acrylic sheet. One was a rectangle and the other two irregular shapes. These three slotted shapes slipped into one another at right angles and enabled the work to be freestanding.

Fig. 4.--Form No. 1
15 x 14 3/4

Fig. 6.--Form No. 2
(Back View)

Fig. 5.--Form No. 2
(Front View)
15 1/2 x 11 1/4

Fig. 7.--Magritte Squared
18 x 20 1/2

A desire on the part of the author to create pieces that were more wall oriented led to the creation of Lost Images and Cityscape No. 1. In both, acrylic transfer was used on illustration board which formed a background for acrylic sheet with transfer. The acrylic sheet in each took the place of framing glass, thus the frame became an integral part of the painting. No manipulation by heat of the acrylic was attempted so both paintings remained flat, physically speaking. However, the space between the illustration board and the plastic sheet was utilized. In Lost Images, a small piece of heat treated, formed acrylic was used as a transitional area between the two flat layers. Cityscape No. 1 contained a fairly small rectangle of acrylic sheet that had been colored with liquid resin and placed at a level between the two layers by gluing the plastic to blocks of balsam wood and the wood to the illustration boards.

It was felt by the author that the essential flatness of this approach was not using the material to its fullest possible advantage. Yosemite, Retrospection (Buchanon collection, Charleston, Illinois) is the outgrowth of the attempt by the author to incorporate the fluidity of the three free standing pieces and still retain a wall oriented flatness. Once again acrylic transfer was applied to illustration board. This time irregular pieces of colored liquid resin that had not completely cured were peeled from their plastic bed and placed on the illustration board.

Fig. 8.--Lost Images
18 1/2 x 24 3/4

Fig. 9.--Cityscape No. 1
18 1/2 x 26

Since the uncured plastic is sticky, adherence to the illustration board was no problem. The illustration board was then mounted on a masonite backing somewhat larger than the board. A piece of acrylic sheet the same size as the board was spot heated with a propane torch to create a bubbly texture and an uneven surface that enhanced the painting beneath it. Holes were then drilled through all the layers and bolts with barrel nuts, and spacers made of plastic tubing were used to attach the plastic sheet to the background yet keeping them separated. The entire piece was then framed with corner molding.

It should be understood that while work on the various creations being discussed occurred sequentially, they were not developed one at a time but most frequently several pieces were in process at the same time. Big Red and The Beholder were in various stages of development at the same time that Yosemite, Retrospection was being completed. Big Red and The Beholder were comprised of several pieces of plastic overlaying transferred illustration board instead of one sheet as was the case in Yosemite. In Big Red two pieces of transferred acrylic sheet were sewn together with sisal cord. These were held in place by bolts with chrome plated metal spacers. The gap between the two sewn plastic pieces exposed a third plastic sheet that had been colored with liquid resin. Heat in the form of gas flame had been applied to the inside edges of the outermost

Fig. 10.--Yosemite, Retrospection
12 x 22 1/2

Fig. 11.--The Beholder
21 1/2 x 31 5/8

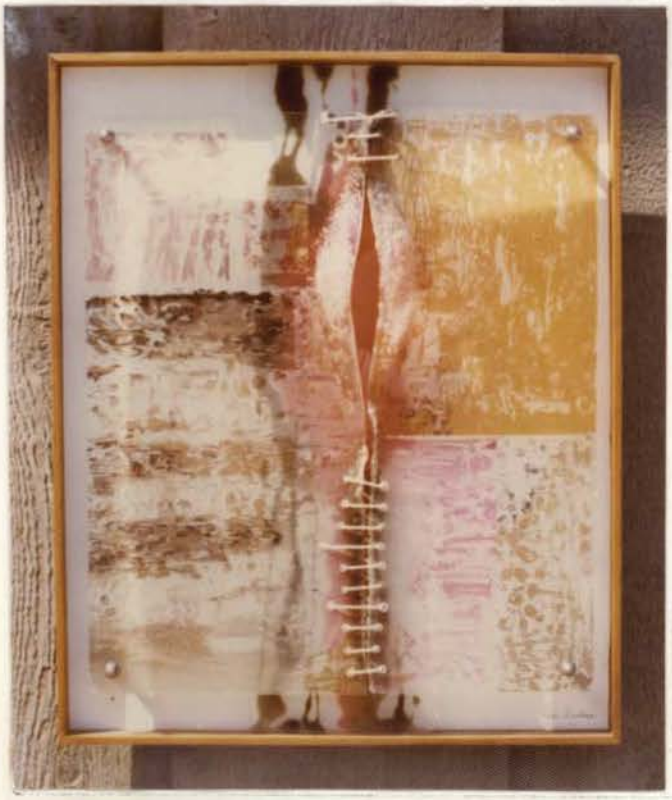

Fig. 12.--Big Red
18 1/2 x 22 1/2

plastic pieces and these were molded by hand to form a curving oblong aperture.

The Beholder was another creation in which two pieces of plastic sheet with transfers were exposed to a gas flame on one edge and molded by hand to create an aperture. This time the underlying plastic sheet had been treated with liquid resin on which was placed uncolored transparent, translucent pellets and opaque black pellets of polyethelene plastic. The introduction of the pellets produced a completely different type of texture than had previously been effected and resulted in a concentration of color in the spaces around and in between the pellets. The method of assembly also differed. This time varying lengths of acrylic rod were cemented to the sheet material with an acrylic solvent and the entire assemblage held in place by bolts with spacers made from acrylic rod. Corner molding was used to frame both pieces.

All of the aforementioned works using plastic were relatively small in size, ranging in size from 15 1/2 x 11 1/4 to 21 1/2 x 31 5/8 inches. The larger pieces were those that were made up of several smaller pieces of plastic assembled to create a larger piece.

The next two pieces created by the author were attempts to increase the overall size of the work as well as the size of the sheets of plastic and incorporate the developments of the previous pieces.

Skyscape, 25 3/4 x 30, involved one large sheet of plastic that overlayed a transferred illustration board which had been mounted on a masonite backing. Two rectangular pieces of plastic colored with liquid resin were glued directly to the illustration board. The overlying sheet of acrylic was then exposed to radiant heat from a sun lamp causing buckling and in some instances bubbling of the sheet material. This heat treatment did not appreciably affect the transfers on this sheet. The length of time of exposure determined the amount of buckling and bubbling which occurred. The greatest problem that had to be overcome was that of excessive distortion of the plastic sheet. Since the piece had been conceived as a rectangle and was to be wall mounted, excessive distortion was not wanted. This was overcome by using pressure after each heat treatment. A large wooden drawing board weighted down with bricks was used to hold the sheet in place until it was cool. Any distortion not desired by the author was simply reheated and remanipulated. It was felt that the textures and contours produced by the radiant heat were sufficient to achieve the effects desired by the artist. The total effect when light penetrated the textured manipulated areas was one of producing various grays or shadows on the surface behind the plastic sheet.

Deep Blue, 26 1/2 x 36 1/4, (Ensign collection, Charleston, Illinois) incorporated yet another variation in

Fig. 13.--Skyscape
25 3/4 x 30

Fig. 14.--Deep Blue
26 1/2 x 36 1/2

the series using plastic sheet. Two full sized sheets of acrylic were anchored, one over the other, to a background of illustration board with transfers. These were mounted on masonite. Bolts with chrome spacers were used to separate each layer from the other. One plastic sheet was treated with colored liquid resin onto which polyethelene pellets had been placed during the curing process. This sheet was almost completely covered by the liquid resin which was colored in blues, greens, golds, and browns. The topmost sheet of acrylic was heat treated with a propane torch and etched with a soldering iron. Bubbling and local distortion of the sheet occurred. The entire assemblage was framed by corner molding deep enough to reach the edge of the outermost layer. Light passed effectively through the top two layers to reflect back from the deepest layer creating the effect desired by the artist.

An overriding interest in landscape provided the greatest inspiration to the artist in the development of the entire series of paintings using plastic. The human figure served as impetus for some. These sources of subject matter have provided artists with ideas since the beginning of time and will doubtless continue to do so in the future. It is the feeling of this artist that one cannot completely dis-associate oneself from past experiences and influences when creating or organizing ideas for works of art. Having previously used traditional materials to express ideas influenced by this subject matter, it was the hope of this

artist to find a way to express this interest, a new way more closely related to today's time. As Frederick S. Wight has said of Pereira's work, "Her art is one of arrangement not of illusion," (22-27) the same could be said of the pieces in this series. Like Pereira, the author has tried to achieve results by developing a working process with the medium, in this case, sheet acrylic.

CHAPTER V

SUMMARY AND CONCLUSIONS

The readers of this manuscript have been exposed to a brief history of the development of plastics in general and information that applies specifically to the properties and characteristics of acrylics.

The following chapter concerns itself with the relationship between and influence of various art forms and artists beginning with Cubism and concluding with contemporary artists using sheet acrylic. Artists, critics and historians have all commented on the role of "new" materials in art. Beginning with Cubism, Picasso and Braque used materials in paintings and sculptures that had not been used previously. Such materials as paper, sand, plaster, scrap wood, and various fabrics were incorporated in their work. Duchamp, with his readymade urinals, coat racks, bicycle wheels, etc. paved the way for the Dadaists who used even more bizarre materials producing works of art such as fur lined cups and books laced with razor blades. While the Dadaists were conducting their anti-art campaign, the Constructivists were trying to "search out new bases for the foundation of a new Art," (9-15) in which the elements of

art "possessed their own forces of expression." (9-8)

Naum Gabo and Anton Pevsner, both Constructivist sculptors, used plastics in their creations. Gabo states:

> In sculpture as well as in technics [sic], every material is good and worthy and useful because every single material has its own aesthetic value. In sculpture as well as in technics the method of working is set by the material itself. (9-105)

The Bauhaus School came into being during the Constructivist era and placed great emphasis on the role of materials in bridging the gap between artistic conception and realization. Whether one follows the premise of unity as espoused by the Bauhaus in trying to reunite the gap between the "spiritual" and the "materialistic" or considers the problems which confronted Rauschenberg when he tried to work in the gap between life and art, one cannot escape the conclusion that there is great similarity between the two. Rauschenberg, too, placed great emphasis on the role materials played in his "combines."

Each of the artists discussed or mentioned has felt free to use materials other than those considered traditional in his or her work. Each has developed personal art forms using the products of an ever developing technology.

Moholy-Nagy and Pereira, along with other artists, concerned themselves with the element of transparency in addition to those of line, color, shape and texture.

The author has also concentrated on this added element in her work. Using equipment ordinarily found in

the home or home workshop, she has been able to develop a personal art form using plastics that were readily available in the local community. Clear transparent sheet acrylic was used as a support for other plastics which provided color, textural changes and translucent variations. The heated sheet acrylic was manipulated by hand to cause physical changes in the material. Heat from gas flame, propane torch, candle and soldering iron produced additional textural variations.

The treated acrylic sheet was used for the most part with other more traditional materials as support and environment.

The resulting works of art were intended to provide the viewer with optical variations that changed depending on the source of light, time of day, environmental placement or position of the viewer. In some pieces the support and material are one and in a sense these become reversible paintings that can be seen from either side. Others have layers which can be visually penetrated to reach elements behind so that the inner and outer can be simultaneously perceived as a whole.

Writing in The Painters Handwriting, J. P. Hodin states:

> Every work of art aspires to be something that never was before and never can happen again. . . . Every artist builds on those who went before him or on those living and working in his day. He builds his own world, taking to himself and working upon every sort of material

> that may further the attainment of his creative purposes. (6-150)

Sheet acrylic has become an essential tool to the expression of a personal art form by the author.

BIBLIOGRAPHY

1. Acrylite Acrylic Sheet Fabrication Manual. Wakefield, Massachussetts: American Cyanimide Co., 1967.

2. Davis, Douglass M. "Rauschenberg's Recent Graphics." Art in America, July-August, 1969.

3. Forge, Andrew. Rauschenberg. New York: Harry N. Abrams, Inc., 1969.

4. Gray, Cleve. "Marcel Duchamp, 1887-1968, The Great Spectator." Art in America, July-August, 1969.

5. Grote, Ludwig. Bauhaus - 50 Years. Chicago: Illinois Institute of Technology, 1969.

6. Hodin, J. P. "The Painters Handwriting." sign, image, symbol. Edited by Gyorge. Vision and Value Series. New York: G. Braziller, 1966.

7. "I. Rice Pereira." Current Biography. 1953.

8. Kramer, Hilton. "The Emperor's New Bikini." Art in America, January-February, 1969.

9. Martin, J. L.; Nicholson, Ben; and Gabo, N. Circle. New York: Praeger Publishers, Inc., 1971.

10. Moholy-Nagy, Lazlo. Vision in Motion. Chicago: Paul Theobald, 1947.

11. Newman, Thelma R. Plastics as an Art Form. Philadelphia: Chilton Books, 1964.

12. O'Doherty, Brian. "Elise Asher-Ut Pictora Poesis." Art in America, November-December, 1973.

13. _____. "Rauschenberg and the Vernacular Glance." Art in America, September-October, 1973.

14. Pereira, I. Rice. "How I work." Art News, Summer, 1947.

15. P(eterson), V(alerie). "Review," Art News, May, 1964.

16. Petrothene Polyolefins - a Processing Guide. New York: U.S.I. Chemicals - Division of National Distillers and Chemicals Corp., 1971.

17. Richardson, John. G. Braque. Greenwich, Connecticut: New York Graphic Society, 1961.

18. Roukes, Nickolas. Sculpture in Plastics. New York: Watson Guphill Publications, 1968.

19. Stelzer, Otto. Bauhaus - 50 Years. Chicago: Illinois Institute of Technology, 1969.

20. Tomkins, Calvin. The Bride and the Bachelors. New York: Viking Press, 1965.

21. Wight, Frederick M. Milestones of American Painting in Our Century. Chanticleer Press, 1949.

22. Wingler, Hans M. Bauhaus, Weimar, Dessau, Berlin, Chicago. Cambridge, Massachussetts and London, England: M. I. T. Press, 1969.