Alvin W. Boese Papers.

Version 3
August 20, 2018

GIFT WRAP & FABRIC LABORATORY & PILOT PLANT HOME ADDRESSES

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GIFT WRAP AND FABRIC LABORATORY

RESEARCH REPORT

#748

February 20, 1961

SUBJECT Artist Painting Media

OBJECT: To produce a material suitable for use by amateur and professional artists using oil and watercolor paints. The material is to be of a caliber at least comparable to the best of those on the market today and to have characteristics capable of revealing hitherto hidden qualities of the paints.

DISCUSSION:

On February 22, 1960, Mr. Richard Sussman came to 3M on a temporary basis to explore any possibilities he felt worthy of developing into new products. Among the several projects he proposed to pursue in his research were:

A. Discovering new basic materials to replace canvas and canvas boards for oil painting and new materials to replace paper for watercolor painting.
B. The development of new methods of expanding the creation of new and unusual decorative materials for the building fields such as for wall panels, acoustical panels and tiles, as well as decorative materials for the home such as screens and room dividers, place mats, lamp shades, etc.

These proposed projects met with enthusiastic approval by Mr. Alvin W. Boese and Donald J. David. In pursuit of objective "A" Mr. Sussman obtained a wide variety of materials in the company that had potential in this field. Among these were various types of abrasives, durable-printable film, synthetic fiber papers, and numerous types of non-woven fabrics and PSA tapes.

The art field is large. There are about ten million people practicing art. The school market is very large. In 1959, about three million high school and one million university and college students studied art. The market is about $325 million dollars a year of which paints are $200 million.

Mr. Sussman in his search for a canvas replacement material discovered that on one specific roll of discarded non-woven fabric (which happened to be the irregular beginning of a run to be used in his decorative experiments)were several yards that seemed to contain the "feel" and appearance he sought for a watercolor material. Experimentation proved that this segment of web was highly sympathetic to watercolors but created a wicking problem with oils. It "took" watercolor with a response and a "feel" he had long been searching for and produced a great depth of color as well as unusual brilliance.

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It was apparent that the characteristics discovered in this segment of web (which we shall refer to as sample 1A) could open up to watercolor painting a new vista of exceedingly wide range of expression, varying from very delicate nuances to a strength and power heretofore obtainable only with oil colors.

Mr. Sussman working with Paul Hansen, Profab Lab, during last spring and summer attempted to reproduce and enhance the qualities inherent in sample 1A. Various amounts of GR-5 were added to the impregnating solution. On two occasions the qualities of sample 1A were approximated. The delicate balance of properties was not predictable using this method of manufacture.

During the months of July, August, and September of 1960 Mr. Sussman carried on intensive experimentation of numerous webs (among which was sample 1A) on the North Shore of Lake Superior under normal outdoor painting conditions. Information relevant to the development of web was relayed to Mr. Hansen either by letter or by intermittent trips back to St. Paul. At the end of September, Mr. Sussman returned to St. Paul absolutely convinced that sample 1A had characteristics that must be thoroughly investigated and controlled. Beginning with November he carried on his various projects as a consultant.

In October our New Products Group was assigned the problem. Examination of sample 1A and similar desirable material indicated a difference of water wetting properties between the two surfaces. This led to the thought that controlled wetting out of the fabric would give the desired effect.

The key to the hidden qualities attainable on non-woven web made possible by the discovery of sample 1A lies in the fact that the numerous translucent fibers in DEPTH are coated with color, which, due to the random dispersal of these fibers at opposing angles, tilts and levels reflects the light from the colors to their greatest potential.

Samples of viscose fiber web bonded with AC33 (Rhoplex) were then treated with rewetting agents i.e., Triton GR-5. It was found that too much of the GR-5 would cause wicking while too little gave a splotchy effect. The desired amount of rewetting agent depends upon the fiber-binder system used, and probably upon the density of the web. The necessary amount of rewetting agent to give controlled penetration could be controlled.

The oil painting web was then approached. It was found that an oil repellent such as Fluorochemical FC805 in low concentration allowed controlled penetration of the oil paint into the fabric. Too much prevented continuity of paint and too little gave wicking of the solvent i.e., turpentine.

Some benefits of web versus canvas for oil painting are;

1. No need to prime the material with a glue size and a white paint to achieve a white working surface and an isolation of the linen from the destructiveness of oil saturation.
2. The dimensional stability of web plus the exclusion of priming (which creates an added element of destructability to contend with) should greatly reduce the possibility of cracking of the dried oil painting.
3. The "tooth" in depth of the non-woven web allows a wide range of expression from washes(dilution with solvent)to heavy impasto painting.

On February 18, 1961, and continuing for one month, a show of drawings and watercolors by Mr. Sussman was held at the Walker Art Center in Minneapolis. Included in the show were four watercolors painted on web during his research on the North Shore in the summer of 1960. Since no mention was made that new materials other than paper were used on four of the exhibited works, the enthusiastic response of artists and public alike to the qualities achieved in the four examples on web was a highly encouraging indication of possible public response to the new material.

This material should be a boon to professional as well as amateur artists for it should greatly facilitate the achievement of quality in watercolor and oil painting.

Patrick H. Carey

P. H. Carey - Gift Wrap & Fabric Laboratory - 27-1

Richard N. Sussman

R. N. Sussman - Gift Wrap & Fabric Laboratory - 27-1

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GIFT WRAP AND FABRIC LABORATORY

RESEARCH REPORT

748-2

July 19, 1961

SUBJECT: Artist Painting Media

OBJECT: To produce a non-woven material suitable for use an an artist's media in the replacement of water color paper and artist's canvas.

CONCLUSION:

The most acceptable material produced to date has been made using the procedures described in this report. Detailed descriptions of these procedures will be made in reports following.

REPORT: I. Making Process

A. Fiber

RM 4965 - Viscose rayon two - 1.5 denier/filament - dull, moderate crimp - cut to 5/8 - 3/4" - preshrunk

B. Rando Webber Operation

1. 110# web
   Weight 82-85#/ream
   Permissible deviation from standard - none
   Appearance - free from foreign matter
   Uniform fiber distribution - white
   Speed - 18-20 ft./min.
   Web length and width - continuous length, 40" wide
2. 70# web
   Fiber weight - 52-54#/ream
   All other specifications same as in B-1

C. Impregnation

RM 6288	Rhoplex B-15	5 gal.
RM 3896	Rhoplex AC-33	10 gal.
RM 1868	Igepal CO-630	175 ml.
RM 3172	Triton X-100	175 ml.
RM 3012	Hydrogen Peroxide (30%)	350 ml.
RM 92	Ammonium Hydroxide	75 ml.
	Water	22.5 gal.
RM 1980	Acrysol ASE-60	1,750 ml.

Acrysol ASE-60 to be diluted to 5 gal. with water and added slowly and with constant stirring to prevent curds forming.

Adjust addon by raising or lowering nip press. Addon should be 128-138#/ream giving total wet weight of 210-223#/ream.

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Finished web weight - 107-111#/ream
Resin content of finished web - 22-26%
Deviation from standard - none

D. Oven Drying Temperature
1. 110# web
No jets - fan on slow - 250°F.
Speed - approximately 30 seconds in oven
2. 70# web
No jets - fan on slow - 150°F.
Speed - approximately 30 seconds in oven

E. Hot Can Drying
Minimum steam press. required to dry web - approx. 8-10 psi
Regulator press. normally

F. Windup
Maintain as much tension on web as possible during windup.
Jumbo size - 300-500 yards

II. Finished web should be free of shrinkage wrinkles and cockles sometimes encountered in drying process. Surface of web should have a minimum of loose fibers and have a smooth texture, dry to the touch. Caliper should be .021" to .023".

Orville M. Wiste

Orville M. Wiste
Gift Wrap & Fabric Laboratory
27-1

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GIFT WRAP AND FABRIC LABORATORY

RESEARCH REPORT

#748-3

August 11, 1961

SUBJECT: Artist Painting Media

OBJECT: To treat artist media with an agent to permit controlled wetting of the media when water color is applied.

CONCLUSION:

The method of treating and drying reported here has given the best results to date. When water color is applied the color distribution is even with a minimum of spotty areas.

REPORT: The treatment of the artist media for use with water colors consists of saturation with a Triton GR-5 water solution of a specific concentration. After saturation the material is passed through a nip to control wet pickup, and then dried and ironed, as it were, on hot cans. The material is sheeted directly as it comes off the hot cans. At the present time sheeting is done manually to rough dimensions and trimming is accomplished by a sheeter at some later date.

I. Saturation:

Saturation of the material must be thorough for best results. Immersing the material in itself is not satisfactory as air pockets remain causing incomplete saturation and as a result spotty wetting in the finished material.

The best method of saturation to date has been accomplished by passing the treating solution through the material prior to immersion in the solution. This method appears to force the entrapped air from between the fibers and cause complete wetting during the immersion process.

A diagram showing the saturation procedure is attached. The initial wetting, where the solution is passed through the material, occurs at idler roll #2 on the diagram. The solution is pumped into the cavity formed by the web and the roll. The idler roll, in turning, helps to force the solution through the web.

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Using this method the web is being continually wetted from the time it passes under roll #2 until it reaches the squeeze rolls. Approximate length is six feet.

A. Specifications:

1. Treatment Solution

   To give a wetting time of approximately 6-7 seconds in the finished material a 0.07% solution of GR-5 in water is used. (Wetting time is determined by placing a drop of distilled water on the web surface and measuring the time it takes for the drop to be completely absorbed.)

   To effect a gross change in wetting time the concentration of GR-5 in the solution may be varied. An increase of 0.01% GR-5 will decrease the wetting time 2-3 seconds.

2. Squeeze Roll Pressures

   A finer adjustment of the wetting time in the finished web may be made by controlling the wet pickup at the squeeze rolls. Between 30 and 35 psi on the squeeze roll rams gives satisfactory results with the 110#/ream material. Usually a 5 psi increase is required when treating the 70# material. Wet pickup for both materials would be approximately 105 to 110%.

II. Drying

While using the equipment at Product Fabrication in the production of art material it is necessary that the material passes through an oven before it goes over the hot cans. In a production line the oven would be eliminated.

In the drying procedure it has been found that the minimum amount of heat required is best for drying the web to a wrinkle-free state. Oven temperature is kept at about 200°F. The reason for this is the web is unsupported from the oven to the hot cans and a slight amount of drying in the oven helps prevent the web from stretching.

Steam pressure on the hot cans should be applied about 30 minutes before they are to be used in order for them to be evenly heated. Steam should be set at 10-12 psi on the regulator for the 110# web and 8-10 psi for the 70# web. If drying is not complete at these pressure settings the pressure should be elevated slightly until drying is complete. Overdrying causes cockling and should be avoided. The web is not threaded around hot can #5 so that the felt blanket has a chance to dry.

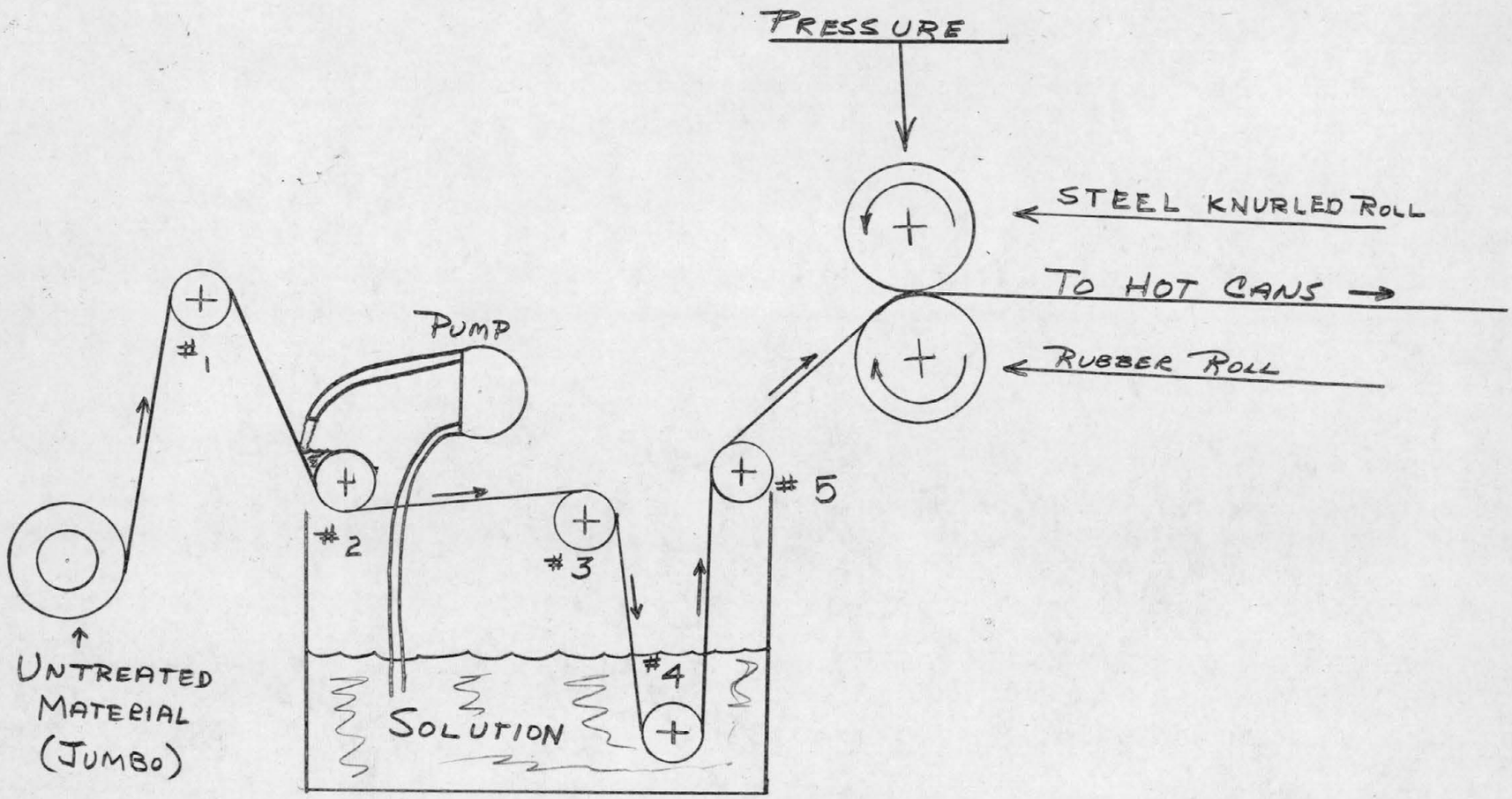
A diagram shows the web threaded over the hot cans.

Orville M. Wiste

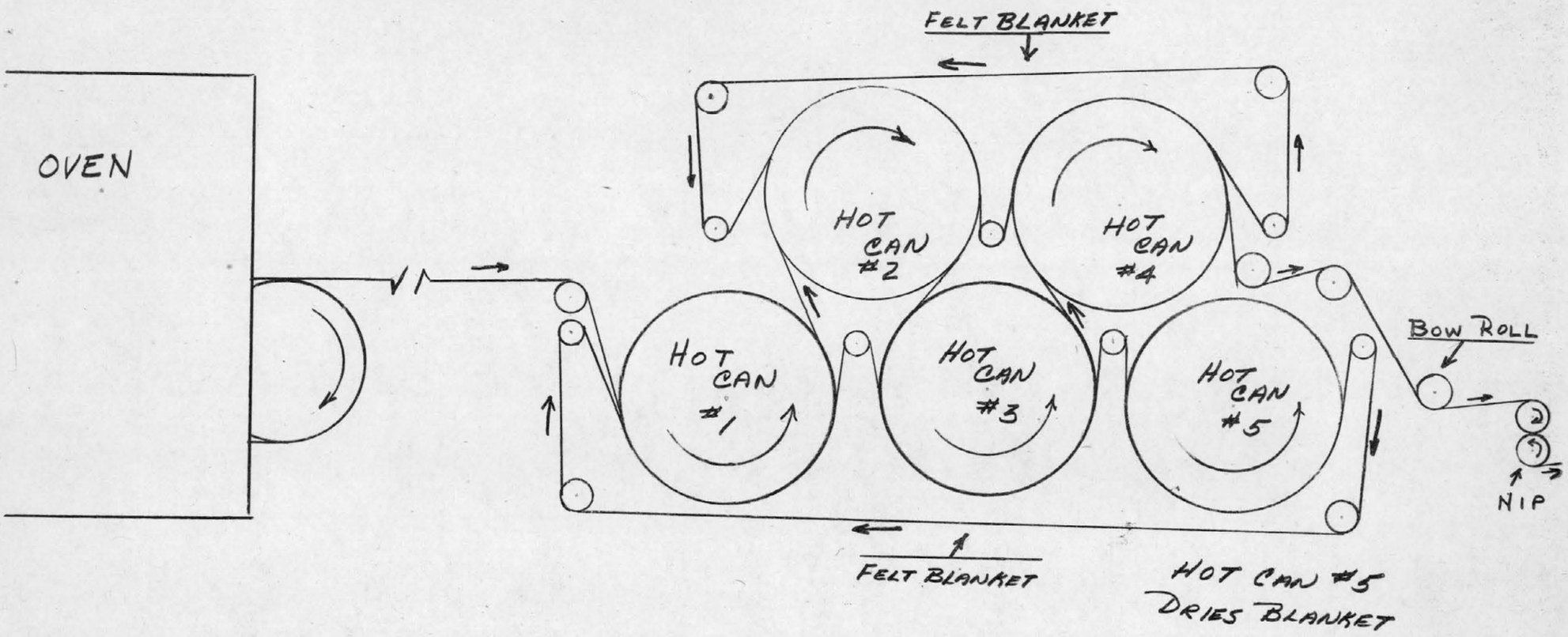
Orville M. Wiste
Gift Wrap & Fabric Laboratory
27-1

OMW:seg Attachments (2)

SATURATION PROCESS



DRYING PROCESS



MINNESOTA MINING AND MANUFACTURING COMPANY

SAINT PAUL 6, MINNESOTA
INTEROFFICE CORRESPONDENCE
SUBJECT:

cc: H. R. Courtney - 27-1

November 14, 1961

TO: R. F. MERRILL GIFT WRAP & FABRIC LABORATORY 27-1
O. M. WISTE GIFT WRAP & FABRIC LABORATORY 27-1

FROM: P. H. CAREY - TECHNICAL MANAGER - NEW PRODUCTS - 27-1

All lab reports on art fabric should use one of the following subjects:

A. Water Painting Fabric
- Web Formulation
- Impregnation System Solution
- Drying - 778
- Retreating Solution - 771
- Equipment
- Painting Evaluation
- Printmaking Evaluation
- Testing
- General

B. Oil Painting Fabric
- General
- Web Formulation
- Impregnation System Solution
- Drying
- Retreating Solution
- Equipment
- Painting Evaluation
- Testing
- Board Adhesion

Take out a separate number whenever a new subject comes up.

a- Painting Masking Tape
Painting evaluation 772

Pat D. Matte art paint - general
- formulation
- coating methods
- equipment
- evaluation
- testing

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cc: H. R. Courtney - 27-1

November 14, 1961

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O. M. WISTE GIFT WRAP & FABRIC LABORATORY 27-1

FROM: P. H. CAREY - TECHNICAL MANAGER - NEW PRODUCTS - 27-1

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A. Water Painting Fabric

Web Formulation
Impregnation System
Drying
Retreating Solution
Equipment
Painting Evaluation
Printmaking Evaluation
Testing
General

B. Oil Painting Fabric

General
Web Formulation
Impregnation System
Drying
Retreating Solution
Equipment
Painting Evaluation
Testing

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12-1-61

SUBJECT: Face Mask C. B. R. (Chemical, Bacteriological, Radiological) Mask Evaluation

OBJECT: To determine if Pluton B contains active carbon

CONCLUSION:

The Pluton B web apparently absorbed the acetone and formeldehyde vapors. The respective vapors were detected by the wearer but at a greatly reduced level. Breathing was normal. The mask also gave wearer no impression of breathing in a 175°F. atmosphere.

METHOD: Samples of Pluton B were prepared on Profab equipment and with their help. A piece of Pluton web approximately 4" x 6" x 1/4" was sandwiched between two #8500 masks. This was the construction evaluated and will be referred to as the vapor absorbing mask.

RESULTS:

1. The vapor absorbing mask was worn, and a beaker of acetone was placed in the vicinity of the wearer's nose. A slight odor of acetone was detected. Breathing was normal, ie., continuous. The acetone didn't impair breathing.

2. The vapor absorbing mask was worn in the Abrasive ovens where a high concentration of formeldehyde is present. With the use of goggles to protect the eyes, the person wearing the vapor absorbing mask was able to remain in the formeldehyde atmosphere for a period of four and one-half minutes. Again formeldehyde was detected by the wearer, but breathing was not impaired. Wearer left oven because of the heat.

3. The wearer, while in the oven at 175°F. had no indication of the heat, with respect to breathing.

Reference: Patent defense notebook 10556-54.

R. J. Barghini

R. J. Barghini
Gift Wrap & Fabric Laboratory
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RJB:seg

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12-1-61

SUBJECT: 3M Block Printing Tape

OBJECT: To appraise the response of art education students making prints with 3M block printing tape to a concept that EMPHASIZES:

1. The economy of the tape
2. The possibilities inherent ONLY with 3M tape
3. The educational aid to the stimulation of design possibilities by limiting the amount of tape.

CONCLUSION:

Am thoroughly convinced that 3M block printing tape can be not only a very economical but a totally NEW concept in artists print making media as well as a unique educational aid in the development of creativity when it is gravitated around the imaginative design stimulation made possible by a positive collage type technique limiting the amount of tape used, as my experiment at the University of Minnesota on November 21, 22, 1961, has successfully borne out.

REPORT: In an interoffice memo to Pat Carey on November 13, 1961, I recalled my reporting last May to him, Al Boese, Orv Wiste and Bob Martin, after experimenting with 3M block printing tape, that to promote the tape to its best advantage it would be necessary to approach it not as a substitute for linoleum with some possible advantages over it, but rather as a totally NEW print medium. Where wood block or linoleum block printing was based upon a negative approach of cutting away the unwanted portions, 3M tape could be used in a POSITIVE method of adhering only those parts needed.

EMPHASIS on this approach could put 3M block printing tape in the area of an altogether NEW print making medium and also establish it as a much more economical one to use than linoleum.

Last spring while experimenting with our art web in the art education department at the University of Minnesota, I was told of the 3M block print experiment held there some years previous. The appraisal of 3M's tape by those in the department, familiar with their experiment, was that it could be used as a substitute for linoleum block printing but that its price outweighed any advantages it might have had over linoleum. Ever since my own experimenting with the tape, and discovering the many possibilities opened up by a positive collage type approach, have discussed with Professor Reid Hastie the possibility of experimenting with 3M

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block printing tape in his class. My concept of using the tape as an AID to education by limiting the amount of tape to stimulate creative designing interested him and arrangements were made to conduct the experiment on November 21, 22, 1961.

Called on Pat Carey, Orv Wiste and Art Fry to assist me with the students. Professor Hastie had masonite cut up into 6 x 9 inch rectangles for about 55 students. Requested Art Fry to prepare two sizes of tape, 3 x 6 inches and 1 x 9 inches to determine whether there were any noticeable differences between those given tape one-third the area and those given tape one-sixth the area of the 6 x 9 masonite.

On the first day I EMPHASIZED the difference between the negative approach of linoleum and wood block printing and the POSITIVE collage approach possible ONLY with tape, whereby infinite manipulation of the various parts is possible until the utmost sensitivity of balance is achieved.

As an example of stimulation to design possibilities; given a 1 x 9 inch tape, what could be done if one had a 9 inch circle in his total design? The unimaginative would hasten to say, "Impossible" and feel frustrated. However, being limited in material he would be compelled to find countless ways out and thus his imaginative creativity would be stimulated.

Asked them to limit themselves on the first day to working completely abstractly so that once having grasped the concept they could, on the second day, cut out realistic forms or use abstract shapes to create realistic forms. Demonstrated on the blackboard how several color plates could be made from the one piece of material. Showed that a three color design, 6 x 9 inches, using a 1 x 9 inch tape could use only one-eighteenth the amount of material necessary to do the same design that would take three 6 x 9 inch blocks of linoleum.

The first day's experiment drove home the concept. The second day, working with realistic forms, found several students having even a surplus of material.

Detected no noticeable differences between those using the 1 x 9 and those using the 3 x 6 inch piece of tape. Obviously everybody must have (at least in the beginning) felt constrained by the limitation of material, just as one would feel he could do much more with a hundred dollars than with five. But without exception it was very evident that EVERYONE was compelled to enlarge their scope of designing.

Professor Hastie noted that the adhesive had been improved since the experiment some years ago with Art Fry.

He was particularly impressed with the "extremely high pitch of interest, enthusiasm and results" that marked the present experiment. He was intrigued by the fact that never before in his experience had he seen a material used (as had been done in this experiment) in limitation to induce unlimited design imagination. He felt the POSITIVE approach, EMPHASIZED in this experiment, as an aid in stimulating creativity, opens up a whole new horizon in the evaluation of art materials for schools. He is anxious to carry out this experiment with actual work in schools and I am now drawing up arrangements for this. Also, on November 1, when in Duluth, I told Miss Meany about my concept of using this material as an aid to education and she also was intrigued with the idea and expressed a desire to experiment in Duluth.

He also felt I should write and illustrate an article developing my concept of this tape as a NEW print medium for publication in the various school arts magazines. Since I was going to recommend writing and illustrating a new brochure (as Al Boese suggested I do for art material products some time ago) aimed at gaining the interest of educators, as well as amateurs and artists, the one article could suffice for both.

I believe that EMPHASIS on the above concept is the basis on which 3M block printing tape can be widely distributed and accepted by school systems at all levels as well as in the amateur and professional world of print making. And once this concept has served its purpose of gaining acceptance and establishing 3M tape as a totally NEW, economical print making medium with many possibilities, artists and schools will use the tape more liberally as time goes on and will broaden its technique to include other methods such as those used in linoleum block cutting, etc.

To disassociate 3M tape from linoleum block printing, so as to further establish it as a totally NEW medium I suggest renaming it to COLLAGE-O-PRINT tape. This also should make the finished product, a collage-o-print, solely a 3M process.

I would recommend immediate planning of the kit I suggested in the interoffice letter of November 13 to Pat Carey.

Richard N. Sussman

R. N. Sussman, Consultant
Gift Wrap & Fabric Laboratory
Building 27-1

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775

December 8, 1961

SUBJECT: Oil Painting Fabric Impregnating Solution

OBJECT: To improve the "dryness" of the oil painting fabric

CONCLUSIONS:

1. Calcium carbonate will improve the painting properties of the fabric.
2. Calendering at higher pressures gives better painting properties.

BACKGROUND:

We have made samples of oil painting fabric using an acrylic-bonded viscose fiber web. The penetration properties and lack of wicking were gained by retreating the fabric with a fluorocarbon such as FC-805. The use of FC-128 was suggested by Mr. Don Loveness several months ago. This fluorocarbon is both a water wetting agent and an oil repellent. The early samples of oil fabric had the properties of high brush drag, the lack of ability to mix colors on the surface, apparently good ageing properties, and some difficulty in building up paint layers (wet in wet technique). Investigation of the problem led to the use of oil absorbing pigments as a device to control the "wetness" or "dryness" of the paint. The use of hot calendering has reduced the brush drag without loss of penetration.

REPORT:

Work began 10-18-61 and was done on 464L6F fabric with preparation of titanium dioxide, zinc oxide and calcium carbonate dispersions in water. These dispersions were mixed with AC33 and padded onto 110# #8400 art fabric. They were then retreated with FC-805 (Sample 1-11). The titanium and zinc pigments gave objectionable whitening. The calcium pigment was very interesting. It improved brush drag on a previously painted area. There was some indication of wicking. It seemed likely to be caused by the pigment. Samples 12-15 were prepared using dispersed calcium carbonate in AC33 and FC-805 and samples 16-35 used FC-128 in place of FC-805. Various combinations of pigment and fluorochemical were evaluated. The effects of hot calendering were also evaluated. Sample #21 was compared to linen canvas in its painting properties. The linen canvas was a double prime canvas (3.25 per yd. at St. Paul Book). The oil paints remained bright and more glossy on #21 than on canvas. The impasto layers on canvas cracked when flexed because of the ground coating. The drying on #21 was slightly slower than on canvas but it was possible to paint over areas using a wash without lifting or wicking after a day. Canvas has the same ability.

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Calendering at 350°F. and 80 psi improves the fabric. Brush drag is reduced;mixing of colors on the surface is possible. It is possible to paint over paint easily. The brush drag is sufficient to give good control.

There appears to be a big difference in the soaking and leveling properties of the Thalo violet and Cadmium red washes (10 gm. paint per 70 gm turp). The violet is a much harder paint to control.

It appears during this work that the additions of FC-128 to the impregnation bath would eliminate the second trip. Samples 36 to 43 were repeats of 21 - 35 and gave same results as those samples. The use of more pigment and less FC-128 gave poor painting results. It was decided to use 1% and 1/2% FC-128 as the variable in a Profab Run using about 5% and 10% calcium carbonate.

RESULTS:
1. More calcium carbonate increased wicking.
2. The use of calcium carbonate improved painting properties.
3. An opaque pigment like titanium dixoide modifies the color of paint applied.
4. About 1% FC-128 in the first saturation appears to give good painting properties.
5. Calendering or surface embossing gives better holdout of paint.

Reference: Notebook 12109

P. H. Carey

P. H. Carey
Gift Wrap & Fabric Laboratory
27-1

PHC:seg

GIFT WRAP AND FABRIC LABORATORY
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782

March 12, 1962

SUBJECT: Sheeting Art Fabric #8400 on the Beck Sheeter

OBJECT:

1. To learn if dimensions of sheeted material can be kept within an adequate tolerance.
2. To learn if the sheeted material is cut at an angle square with the edge.
3. To learn the capacity of the machine in relation to lineal speed when sheeting the material to fifteen inches, which would be our smallest dimension.
4. To learn if a slitter may be attached and what difficulties may be encountered in making such an attachment.

CONCLUSION:

1. We were able to cut a number of sheets at fifteen inches across the width of the sheet with no variation. This does not indicate that the sheeter will do this consistently, but it indicates that we may be able to sheet at an acceptable tolerance.
2. Some of the sheets were cut at a slight angle, ie., not square. This may have been due to the way the web was fed into the sheeter as the roll from which it was feeding was not wound evenly. If the web is steered into the sheeter properly and slit on the machine the chances of cutting sheets with squared edges should be improved to a point where they are within an acceptable tolerance.
3. At cuts of fifteen inches the lineal speed of the machine is 50 ft./min. According to Mr. William McMann of Mullery Paper Company we should encounter no difficulty in at least doubling the machines capacity.
4. With slight modification we feel a slitter bar could be mounted fairly easily on the machine if this proves necessary.

RESULTS: Materials used:

1. A fairly stiff 115# web impregnated with HA-16.
2. A soft 60# web impregnated without standard impregnating solution (refer to Process Specifications for Art Fabric #8400 dated December, 1961.)

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Both webs were in roll form on three inch cores. Web width was 40".

A 42" Beck Sheeter was furnished for our use by the Mullery Paper Company in their plant and operated by an experienced operator.

When mounted on the Beck sheeter unwind station the rolls were allowed to unwind freely with no braking. No difficulty was encountered.

The range of dimensions for this particular sheeter were from 13" to 72" with a maximum width of 42". It was demonstrated by the operator that any length within the above range can be selected at 1/8" increments in a matter of seconds as all cutter bar to feed roll ratios are just a matter of setting gear ratios.

This particular machine was driven at a constant speed with no provision for variance. We were able to compute the lineal speed by counting the number of fifteen inch sheets/min. The rate was 40 sheets/min. which is a lineal speed of 50 ft./min. According to Mr. William McMann of Mullery Paper Company, where our test was run, the machine has a capacity of probably twice that lineal speed. Both John Fowler and I agree that it is reasonable to assume that this is true as the rotary cutter assembly is counter-balanced, and a lineal speed of 100 ft./min. would cause the cutter assembly to rotate at only 80 RPM for a fifteen inch cut.

Upon inspection of the sheeted web we found that in some cases the length of the cut varied 1/8" from one end to the other of a 15" x 40" sheet, ie., 14 7/8" at one end and 15" at the other. In discussing this problem with John Fowler we thought this may be attributed to the fact that the rolls used were wound unevenly and consequently when the web was being fed into the sheeter the material shifted slightly at an angle. It was also noted that the rubber feed roll, which is center mounted, is only about fifteen inches wide and does not drive the whole width of the web. However, we did find that quite a few of the sheets were cut at exactly fifteen inches across the entire 40".

In regard to a slitting arrangement mounted on the sheeter there appears to be a number of places above the feed roll assembly where slitter knives might be mounted with very little modification to the sheeter.

The sheeter cutter bar is a self-sharpening type and according to the operator has given satisfactory results for three years. The quality of edge cut on our web was good and showed no sign of tearing or pulling.

O. M. Wiste
G.W. & F. Lab., 27-1

J. S. Fowler
Tape Engineering, 207-BN

OMW: seg

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780-1

March 14, 1962

SUBJECT: Oil Painting Fabric Board Construction

OBJECT: To laminate our 70 pound Art Fabric to grade 420A Fome-Cor board.

CONCLUSION:

This board consists of a low density polystyrene foam sandwiched between two sheets of heavy weight Kraft paper. The styrene foam core contributes to light weight, water resistance and dimensional stability.

Laminating our Art Fabric to one side of the board with water soluble adhesives causes severe warping which is minimized by the use of solvent base adhesives. Sealing both sides of the board before laminating the Art Fabric eliminates the warping of the laminate due to changes in humidity.

REPORT: The following sealer and adhesive were used with good results:

A. Polyvinyl Butyral Sealer

Butvar B-76	1 part
Ethanol	7 parts

B. Solvent Adhesive

Polyvinyl Acetate (Gelva C-3 V-10)	3 parts
Pentalyn "A"	1 part
Toluene	5 parts
Isopropanol	5 parts

The sealer was applied to one side at a time and dried. The adhesive was applied to one side by brushing and the Art Fabric applied immediately, while wet, and passed through low pressure laminating rollers to insure good all-over contact with the wet adhesive.

RESULTS: Very good adhesion of the Art Fabric to the board was obtained with no warping of the board or wrinkling of the fabric.

PROPOSED WORK:

Sheets will be laminated in quantity utilizing the roll coating and roll laminating equipment at the Scotchlite Technical Service Department. Material will be evaluated as to all requirements outlined in Research Report #780.

E. C. Bowers, G.W. & F. Lab., 27-1

ECB:seg

Witnesseth that the foregoing record was typed and signed on or before _____, 19____ the date of affixing my seal and signature hereunto.

Edwin C. Bowers

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741-22

March 13, 1962

SUBJECT: Face Mask Evaluation

OBJECT: To evaluate the properties and construction of a new Johnson & Johnson molded non-woven surgical mask

CONCLUSIONS:

1. The J & J mask is made from porous, resin-bonded, molded non-woven fabric, formed such that contact with the face is made over the bridge of the nose, under the eyes, along the cheeks and under the chin. No contact is made with the tip of the nose or the lips. The mask is held on with four cotton tie strings.

2. The J & J mask leaks around the nose. It has a pressure drop of a value (.140" @ 50 liters/minute) that was cause for complaint in the #8300 mask.

3. The J & J mask has a smoother feel on the face than the #1800 mask but the fibers can be loosened easily with friction.

4. The mask is made of cellulose (probably rayon) fibers bonded with a polyvinyl acetate-polyvinyl chloride resin.

REPORT: <u>Mask Description & Properties</u>

Two masks were made available to the Gift Wrap & Fabric Laboratory to study. The mask, in appearance, looks much like our current #1800 mask. It is light green in color, made from a non-woven fabric and molded such that contact with the face is made over the bridge of the nose, under the eyes, along the cheeks and under the chin, though it is not as large a mask as the #1800 and doesn't extend as far under the chin or fit a larger face as well. The volume is somewhat less than the #1800 but the mask is designed not to touch the tip of the nose or the lips. Ribs have been molded into the front, though they are of a different design than our mask. There is no special provision, such as a nose clip, to insure a seal at the top of the mask. The mask is held in place by four light weight flat cotton ties, two of which are tastened at each side of the mask by a folded over and glued mask flap. The edge of the mask is flanged for comfort and probably to permit die cut trimming.

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The entire mask weighs four grams. The pressure drop at 50 liters/minute is .140 inches of water which is about four times that of the #1800 mask. The caliper of the mask near the edge is 22 mils, and at the area in front of the nose, 38 mils.

The adhesive securing the flaps which hold the string ties seems to loosen with water probably because of rayon in the mask material. Acetone makes this adhesive tacky.

The Central Research Analytical Lab analyzed the mask for fiber and resin content. Resinous material extracted with chloroform was polyvinyl acetate and polyvinyl chloride. The fiber remaining was cellulosic, that is, rayon or cotton. Microscopic examination shows no cotton to be present. The possibility was considered that the extracted material might include Vinyon fiber, which is a copolymer of polyvinyl acetate and chloride. When a piece of mask material was placed under the microscope and wetted with acetone, there was no evidence of any fiber being destroyed by solution. This eliminates Vinyon which is very soluble in acetone.

The color of the mask is apparently due to the use of dyed rayon fibers. The faintly streaky, white and green appearance may be due to blending colored fiber with white for the right shade.

The mask was soaked in hot water for ten minutes. The fiber bond and the color were still good, but the material had swelled considerably and the rib structure was badly deformed. No wet crock was evident.

There is no data on the quantity of resinous material extracted by chloroform but extraction with warm acetone removed about 25% of soluble material. After this extraction, the material still had some strength, indicating undissolved binder.

The dry mask material can be separated into two well-bonded surface plies and a relatively fluffy interior, indicating resin migration during drying, or possibly the effects of heat and pressure (as in hot forming) on each surface with reduced penetration of heat to the interior. The mask looks as if it has been molded between matched male and female dies.

W M Westberg

W. M. Westberg
Gift Wrap & Fabric Laboratory
27-1

WMW:seg

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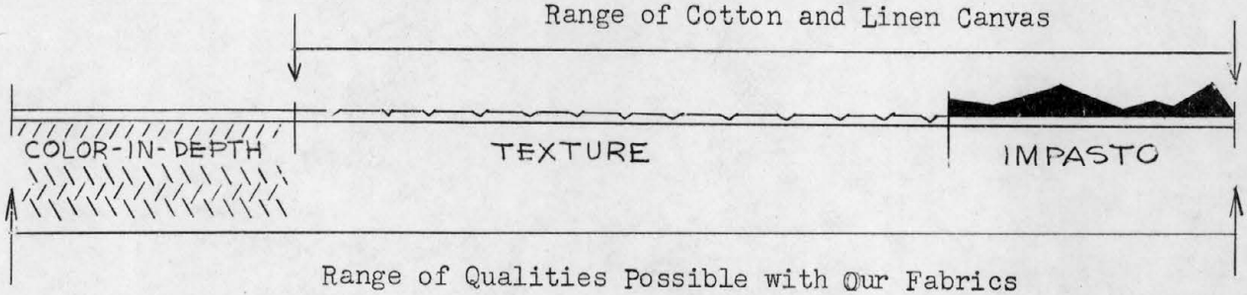
783

March 16, 1962

SUBJECT: Oil Painting Fabrics Evaluation

OBJECT: Their appraisal and suggestions for future direction



CONCLUSION:

If Area "C", the color in depth concept first introduced to the world of art materials by our Art Fabric #8400, is also to become a significant contribution in extending the range of qualities possible with oil paints, we must also fully develop that large middleground, Area "A" which excites the tactile stimulation and satisfies the resistance appetite in the creative challenge to the artist, now met and supplied by the many textured cotton and linen canvases.

REPORT: Together with Pat Carey, adhered fabric 464-L6S to six canvas stretchers ranging in size from 28" x 36" to 36" x 40". Because our fabric does not have the tear strength of canvas, felt it best to develop a technique of mounting without resorting to canvas pliers. We used a stapling gun and normal hand tightening. This took much less time than canvas would have taken but did not have the tautness canvas has when pulled tight with canvas pliers. Using a sponge, I later dampened the fabric of one stretched frame. Though it contained creases from a previous stretching, the fabric pulled tight upon drying, but the fibers were raised, accenting the objectionable flannel like appearance and feel. This raising of the fibers was not as noticeable in those canvases of last spring when Orv Wiste rewetted the material and I mounted the fabric while still wet. However, some of these canvases show stretch lines at the stapling points.

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Kept these mounted oil fabrics of last spring, painted and unpainted ones stretched both wet and dry over canvas stretchers, in my plastic hut where they were subjected to extreme heat, cold and moisture. On bringing them into the house last week all were loosened and sagged, some considerably, but after being in the warm dry house for about three quarters of an hour all regained their original tautness.

Fabric 464-L6S appeared dry looking especially when pigment was used thinly diluted with turpentine. The soft, blotter paper or flannel like appearance of this sample seems to me contrary to the needs of the medium which calls for a harder, if not more rugged material to withstand the excessive brushing, scuffing and scraping common to oil painting. Also where oil sized canvas can be safely left unpainted in areas, this material would have a tendency to catch dirt and dust.

Fabric 464-L6Q appealed to me more than 464-L6S because its appearance and feel were not quite as fiberous. It had good penetration, no wicking, and the pigment smoothed out fully when applied thinly.

Also painted on some fabric made by Orv Wiste a few months ago in which the resin migrated to one side. Though it was not treated for oil, painting on this material displayed possibilities for at least another form of oil painting fabric. Inasmuch as the material is absorbent, the color penetrates into it under the glossy surface of resin. Thus the fabric has what amounts to a built in varnish giving the absorbed colors sheen and luster; especially thinly diluted colors which are very dry looking on canvas.

Inasmuch as oil paintings, unlike water colors, usually are not framed under glass, this glossy surface might suggest the solution for thinly painted or totally unpainted areas that could be a problem with a fiberous surface.

Another sample, (although it also had not been treated for oil) that showed promise was our rough, "Indian skin" textured experiment made at Fairmont on February 13, 1962. Its surface was harder, seemed to take much brushing, and its roughness gave added character to the pigment.

Would suggest further and simultaneous developing of the three above mentioned fabrics; completely eliminating any trace of a fiberous look and feel in 464-L6Q, controlling migration of resin in the second fabric, and eliminating the yellowness in the rough textured sample.

Because the basic construction of our fabrics is totally different, we cannot look to the numerous weaves of cottons and linens for guidance, but rather must search deep into our own resources for means to satisfy those needs which stimulate creativity when using oil paints. Inasmuch as our fabrics are composed of many components, fibers, chemicals, etc., randomly wed by various resins, it seems to me not at all out of keeping to introduce another ingredient such as grit to obtain our objective. Therefore, in addition to further developing the three materials and watching for possible interesting combinations, we should try all of these sparsely salted with a white grit from #60 to about #180.

One procedure might be to first rewet the fabric with a resin containing partial concentration of rewetting agent; two, with pressure blow the grit into the fabric; three, spray the remainder of concentration in resin to further seal the grit just before it enters the heating chamber. Perhaps a hard H-16 might work satisfactorily.

A second possibility is to sandblast the grit into the fabric at the time the web first comes onto the conveyor after its original resin dipping. And a third possibility is to mount the fabric dry onto the styrofoam board or frame, adhering the four edges only. Then put on conveyor, spray with partial concentration in resin, sparsely sandblast grit into fabric, and spray remainder of concentration in resin for anchoring grit securely. Upon drying we should obtain a very taut mounting by this method, but the styrofoam may need added treatment first to resist adhesion of wetted fabric.

This rough, sparsely gritted surface may introduce a rugged and sparkly note that could give greater meaning to the soft, mellow absorbency of our fabric, thereby stretching its range of quality from soft mellowness to the thick impasto possible with rough canvas. And furthermore it could also prove to be a very beautiful material for pastel painting.

Richard N. Sussman

Richard N. Sussman
Consultant
Gift Wrap & Fabric Laboratory
27-1

RNS:seg

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785

March 22, 1962

SUBJECT: Oil Painting Board Evaluation

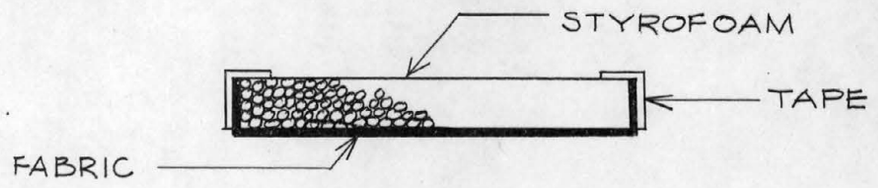
OBJECT: To suggest a different board construction and method of packaging

CONCLUSION:

In our efforts to develop a product replacing canvas boards, Clair Bowers gave me several samples of fabric laminated to chipboard and styrofoam. The problems of wicking, warping, penetration, adhesion, and opacity in many samples seemed satisfactorily solved. However, in all cases our fabric loses its rich, tactile appeal when cemented down and becomes relatively indistinguishable from paper laminated boards. Furthermore, because our fabric is basically "free" in character, its maximum potential of color depth, richness and flowout is hampered when cemented down.

REPORT: Inasmuch as laminating our fabric to a board seems to deaden all its vibrancy in the same way that the full resonance of a cello is stifled when something touches the instrument, I mounted some fabric to sheets of chipboard and styrofoam in the following manner. Laid the fabric face down on a clean table, centered the board on it, bent the four sides up and back over the board, and taped them down with packaging tape. This is a very simple and quick method of mounting fabric tautly, giving support and backing yet leaving the painting surface free to breathe.

Would suggest, however, that we now consider mounting our fabric on a plain uncovered (or covered one side only) styrofoam, or other low density material about one-half inch thick. The openness of a low density material will allow complete freedom for our fabric to absorb all the thinner it needs while being a receptacle for the surplus.



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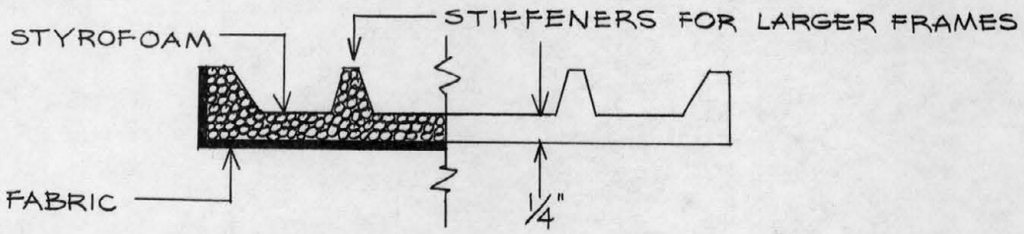
CUSTODIAN OF RECORD FILES

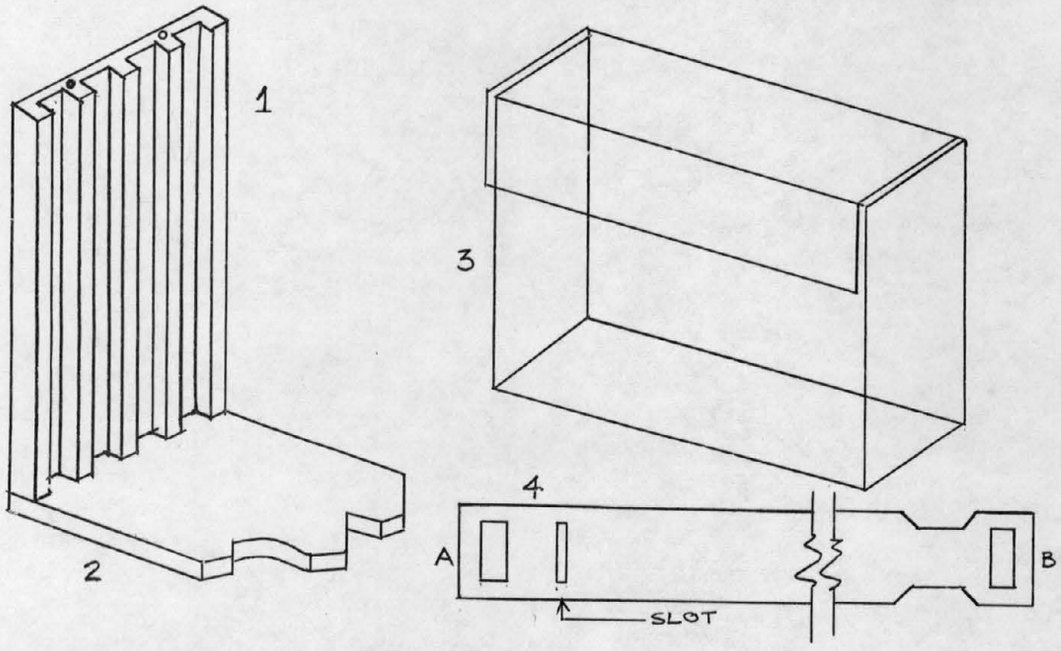
Another suggestion is to mold a frame very much like packaging styrofoam or Pelaspan are made. This might make a stronger job around the edges and use less styrofoam over the surface. Its form would be much like a molded tray. A few stiffeners, waffle style, might strengthen the larger frames.



In either event, the white styrofoam would give greater opacity to our fabric, making the use of lighter material possible, provide a firm yet cushiony backing for it, and decrease puncturing possibilities that exist on open canvas stretchers.

One method of packaging would be to include a sheet of styrofoam, several sheets of fabric, and tape of packaging tape strength in white or colors, with directions for mounting.

While the above suggestion would be more economical to the consumer, a much more attractive setup would be a set of 4 or 6 pre-mounted boards kept intact by molded styrofoam or Pelaspan separators, and housed in a polyethylene carrying bag.

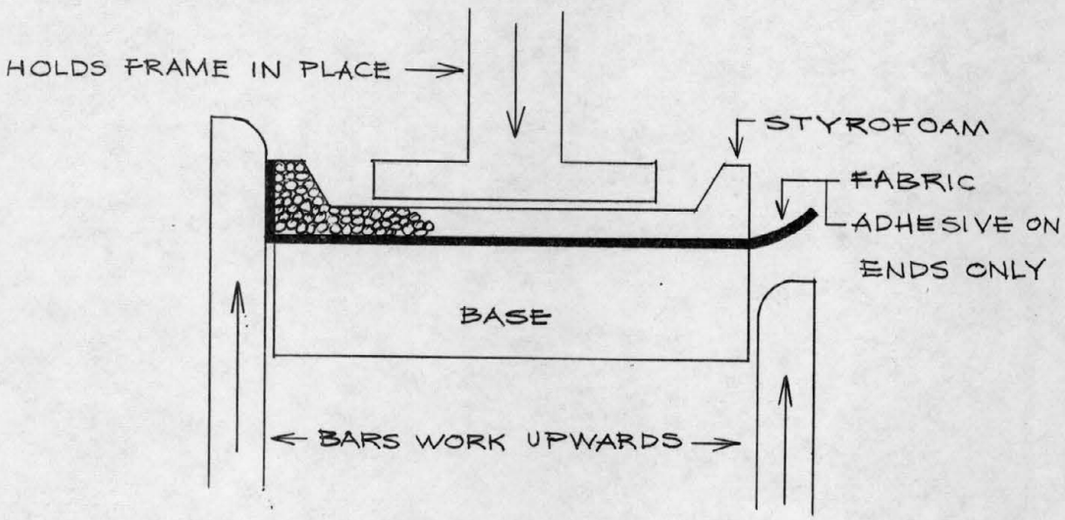


1. Molded styrofoam painting board separators.
2. Plain lengths of styrofoam at top and bottom peg into end pieces.
3. Polyethylene storage bag.
4. Polyethylene strap wraps completely around bag. Handle B folds through slot and unites with foam filled handle A for carrying.

This setup serving as a carrying case and storage compartment for freshly painted boards to dry leisurely while transported, and finally as permanent storage protecting the paintings from dirt and damage, would be an alluring incentive to use our product.

Since our material is about 40" wide at present we could make a product up to 38 inches by 54 or 60 inches long. These larger sizes would prove popular in colleges, universities and art schools as well as to professional artists.

A possible method of adhering fabric to styrofoam might be arranged in the following manner.



Canvas boards came into being as a time saving, ready-to-use substitute for stretched canvas, sacrificing the qualities of the latter for convenience and economy to the amateur painter. I believe that the preceding proposed direction can lead us out of the area of substituting for a substitute and into a more creative atmosphere where we can develop an oil painting product, based upon the fullest potential of our fabrics and geared to the highest standards of the professional artist, that will also answer the needs of the student and amateur painter.

The qualities possible by the further development of the three mentioned fabrics in Lab Report #783, plus the lightness, convenience and compactness of the suggested setup, should make a very attractive product that would bypass canvas stretchers and the work involved, give support and opacity to our fabric, eliminate the need of backing canvas stretchers with chipboard as done now by museums and conscientious professional artists, provide ready-to-use painting boards of much larger size that would capture a much larger market than now served by canvas boards, and above all, provide a painting surface capable of greater range of qualities than possible with sized canvas.

Richard N. Sussman

Richard N. Sussman
Consultant
Gift Wrap & Fabric Laboratory, 27-1

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GIFT WRAP AND FABRIC LABORATORY
RESEARCH REPORT

FORM 1726-G PWO

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Hansen
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783-1

April 16, 1962

SUBJECT: Oil Painting Fabrics Evaluation

OBJECT: Their appraisal and suggestions for future direction.

CONCLUSION:

Fabrics 464-L8W through Z and 464-L9A demonstrate textural possibilities, but the use of heavy denier fibers into the depth of the fabrics results in opening larger pockets, which seems to diminish the color-in-depth potential and becomes the dominant textural characteristic rather than one created by the length, denier and type of fiber on the surface of the web. The texture we desire must not only be felt, it must be seen with the naked eye, and therefore am suggesting we experiment with other methods of construction in an effort to achieve our objective.

REPORT: Fabrics 464-L8W through Z and 464-L9A made as a result of our desire to explore and develop ways of building texture into our webs as suggested in Lab Report #783 have more tactile appeal and give the pigment more body and ruggedness than do webs 464-L6S and Q. In both treated and untreated samples, when paint was applied very thinly, I could not detect any appreciable difference of evenness of flowout with the exception of 464-L8Y which showed greater resistance in both instances. The untreated samples, although they wicked considerably, displayed greater ease of flowout than did the treated ones. This, of course, could be adjusted.

While all five fabrics could make interesting materials into which to deposit pigment used in certain viscosities, they might prove limited in acceptance.

In all five instances the side of the web to which the heavier fibers fell offered more interference to the brush than the opposite side, which, the microscope shows, was more leveled off by being filled with the finer fibers. This seems to bear out my contention that a surface texture on a firm, dense base rather than one of large open pockets created by using heavy fibers or yarns in depth may fulfill our needs.

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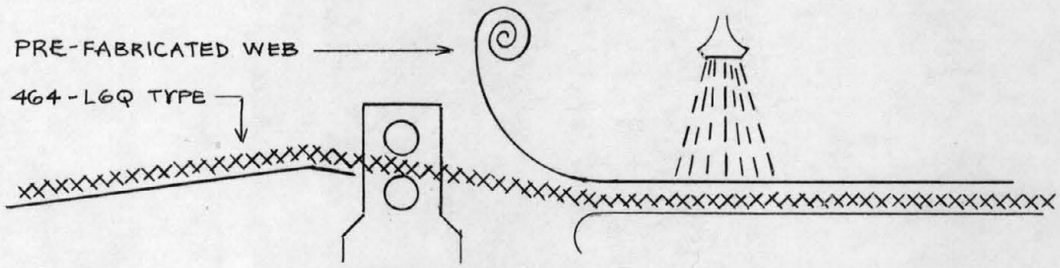
Also applied paint very thinly to a sample of "Indian skin" fabric dried without tension at Fairmont. This sample took the diluted color with the richness of water color and its texture was dominant rather than the fibers which predominated in the other five samples.

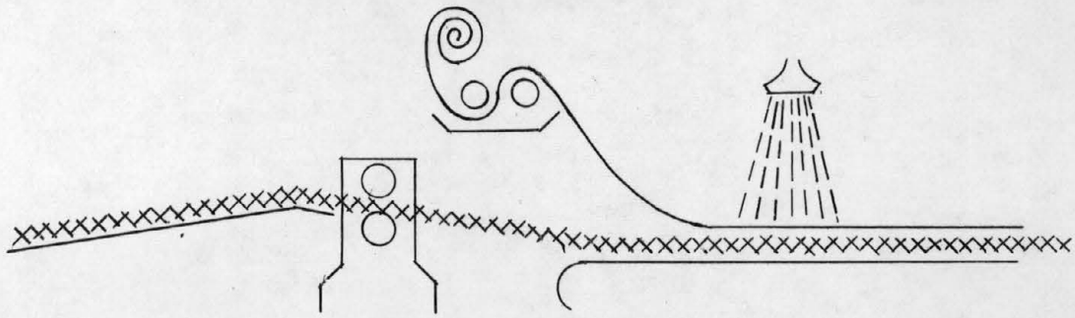
The larger pockets and openness resulting from the use of heavy denier fibers into the depth of the five previously mentioned fabrics is inclined to offer interference rather than resistance to the brush, especially to sable ones. The more open the web, the more we get what amounts to the brambles that hinder and bog down the flight of the deer. The element of resistance and challenge mentioned in Lab Report #783 I believe we should aim for, is suggested by the mounds of a rolling landscape, the resistance of which serves as sure footing for the challenge created by the tempo of their spacing as the deer soars from one to the other in an accelerated flight through space.

Inasmuch as open webs also seem to diminish the color-in-depth potential, and it appears that this quality depends on an even, closely knit fabric composed of fine fibers, am suggesting we experiment with the following possibilities for the purpose of stimulating research towards the achievement of the textural objectives of Lab Report #783 without losing color-in-depth characteristics.

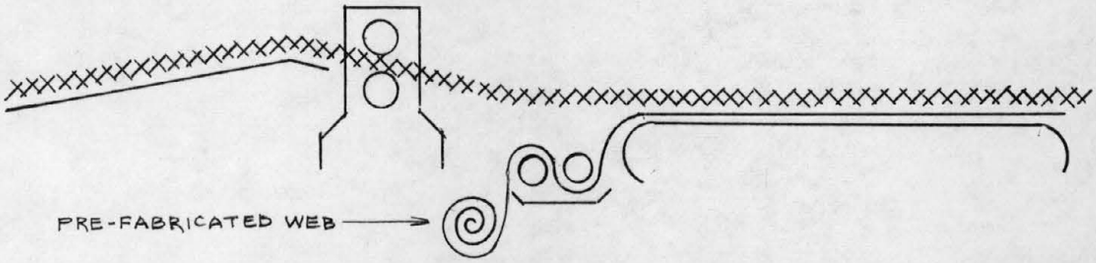
1. Laminate a THIN, pre-fabricated web made of heavy denier fibers to an impregnated batt like 464-L6Q. A shower of extra resin might aid the bondage.



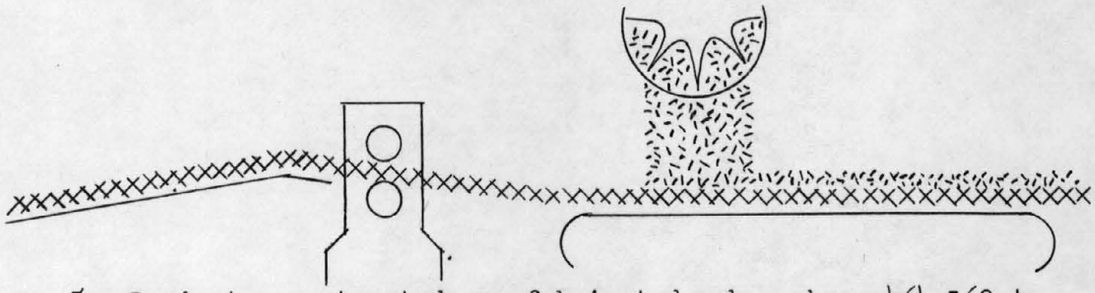
2. The roll of pre-fabricated web could be saturated in resin before contacting the impregnated batt. A shower of extra resin might further aid the bondage.



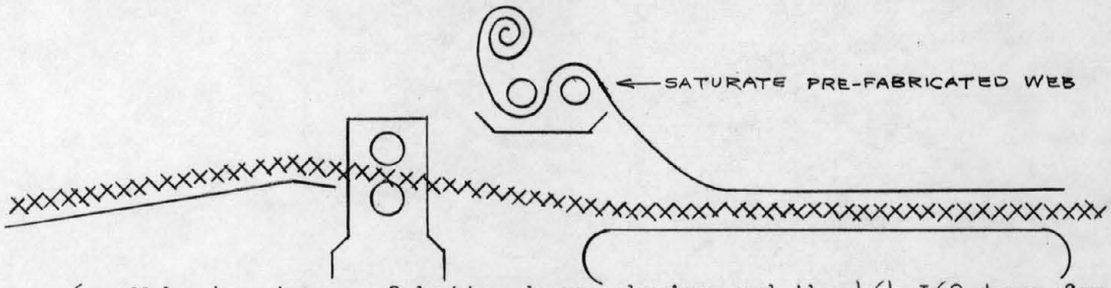
3. A reversal of 1 and 2. Migrating the resin on an impregnated batt such as 464-L6Q down into a pre-fabricated web of heavy denier fibers should be tried. This could make not only a stronger bond between the two webs, but could also add a little skid to the brush and provide the built in varnish mentioned in Report #783.



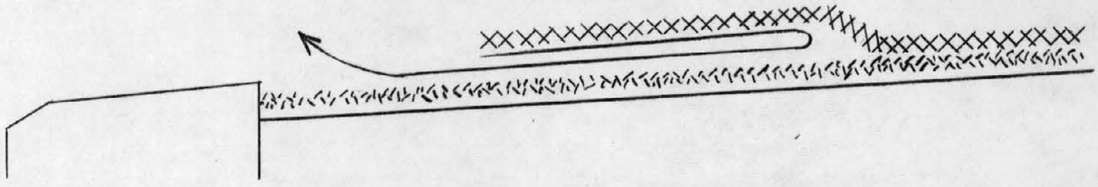
4. Salt extra heavy denier fibers cut to the size of flock into an impregnated web and add shower of resin.



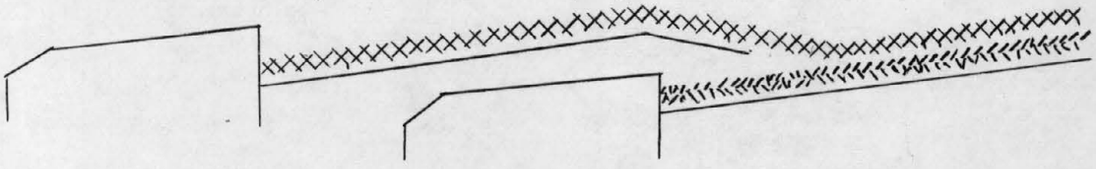
5. Laminate a saturated pre-fabricated web such as 464-L6Q to a thin impregnated batt of heavy denier fibers.



6. Make two types of batts, heavy denier and the 464-L6Q type for placing on the dry web carrier belt to the padding station. Lengths of several yards could be placed on paper in the manner of face mask batts and pulling out the paper slowly.



7. If this experiment shows promise and found necessary, perhaps in time two Webbers could be employed.



Since the above experiments would provide a base ply of web which could remain constant in retaining the quality of color-in-depth, we would be free to use extremely heavy fibers up to about the size of coarse thread or yarn for the top ply of our textural objectives. The heavier the fibers the more open a very thin ply of textural web would be thus making possible the coming through of the color-in-depth of the web underneath.

These suggested experiments are similar to those made in March and April of 1960 on bras in an attempt to give surface texture to them and get away from the paper look and feel. At that time I put heavy yarns of various types and lengths set in numerous patterns into the dry batts, but not having at my disposal heavy fibers or yarns like dacron etc. compatible with the other fibers for heat sealing they did not make good adhesion. Perhaps if proper heavy yarns are available at this time these same experiments might work out for bras now. Also at that same time in my search for a fabric to replace canvas I put heavy yarns, sisal, and split manilla rope into webs made with Paul Hansen at Profab in an effort to achieve a surface texture, but they were too stiff and wirey for good adhesion and their color and permanence were not satisfactory.

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GIFT WRAP AND FABRIC LABORATORY
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786

April 17, 1962

SUBJECT: Durable Printing Film

OBJECT: Appraisal of its use for creative painting and architectural renderings.

CONCLUSION:

Durable printing film could make a good material for many mediums of creative painting and architectural rendering if properly used.

REPORT: In the spring of 1960 during my combing of 3M for materials that could serve as a basis for developing into a canvas replacement and other creative art uses, I obtained from Tore Eikvar some samples of durable printing film.

Experimented with them in transparent and opaque water colors, oils, pastels. Water color flowed on easily, lines and edges were sharp, but it showed a tendency to bead at times. Perhaps this could be overcome by first rubbing the film with some form of alum, or so. However, the color was very brilliant, due to the glossy polyester base, but took excessively long to dry. When both transparent and opaque water colors were used heavily, and not evenly distributed, puckering developed. Oil colors behaved likewise. The base seems to shine through but also extends the drying time. Pastel colors also were very bright and worked out best when used thinly without overworking the surface. Had wanted to experiment with larger particles but Tore said that the added resin necessary had, in the past, given trouble with resulting cracking and bad adhesion, and could not be guaranteed.

Reported my findings and our uses for it to Mr. Eikvar and Don David who called and asked for added film telling them of our desires to conduct further research into its use as a painting and architectural rendering material. Made a few simple architectural renderings that spring, and its value for that purpose as well as the need for developing a technique of using it became very apparent to me.

During the summer of 1960 I took the durable printing film up to the North shore and made several water colors on it. The long drying time was a bit disconcerting but the results were very good. Had been painting at that same time on some web I discovered in the spring of that year, to appraise its value also and was struck by the totally diverse characteristics and

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results of each. Where the web, developed into Art Fabric #8400 was deeply absorbent and the color echoed down into depth, the impenetrable glossy base of durable printing film flashed the color back to the surface. Their uses and desirability, therefore, would not conflict.

In the fall of 1961 I gave samples of the film to some beginning architectural students in my art classes at the University of Minnesota. While all liked the precision and effects possible with water color most of them had difficulty with it because they used it the same way they used the established water color papers and illustration boards. The mistake all of them made was to draw preliminary pencil lines on the film first and then attempted to ink the pencil lines which acted as a barrier to water and inks. Smudging, due to erasing with art gum, was another pitfall.

The following suggestions may interest those who perceive the advantages and beauty inherent in durable printing film for architectural renderings.

1. Put the tracing paper drawing on a light table, place durable printing film over it and directly trace onto the film with ink (or pencil if desired). This eliminates one whole tracing procedure necessary when working on illustration board or water color paper.

2. DO NOT ERASE. Art gum smudges and greases the film making water color application difficult. If item #1 is followed there will be no need to erase. Guide lines will be unnecessary as all details will have been worked out on preliminary drawings.

3. Keep a clean cloth or paper over worked areas to eliminate smudging.

4. A hair dryer may aid drying of ink or water color.

5. Use water color thinly.

6. Water color can be thoroughly washed off, where not wanted, with sponge or rag.

7. After the rendering is completed adhere with light even coats of rubber cement or glue to a WHITE illustration or matboard for opacity and stiffness. If all details have been traced in item #1 adherence may be made at that time. A very translucent backing covering a pressure sensitive adhesive may be advisable.

It seems to me that durable printing film in its present state has finer particles than the samples obtained two years ago. However, it could prove desirable for architectural renderings and to some creative artists using transparent water color, if properly used. Opaque water color such as poster paints, show more tendency to chip off than on paper, however, Liquitex, an acrylic latex paint, is especially brilliant on the film, seems to make good contact even when used heavily, showed no sign of puckering or beading and dried faster than water color.

Some artists might prefer the film mounted on a white styrofoam board. This should eliminate any possibility of puckering and might work out better for those who prefer to work thinly with oil paints and would be welcomed by those who paint precisely, providing them with a type of fine ground similar to those on hardwoods used by some old masters. If mounted, perhaps larger particles than those used on samples of 1960 could satisfactorily be adhered, widening its possible usage for pastels, oils, and other mediums.

Greater whiteness would be preferable, however, durable printing film should be tested together with other water color papers or illustration boards to determine the permanence of its yellowish tinge, the possible effects of the film's properties on various pigments and vehicles, and the adhesion, in all degrees of viscosity, of mediums to the film.

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795-1

May 4, 1962

SUBJECT: Water Painting Fabric Equipment

OBJECT: To determine cause for the occurrence of dirt and dirty fibers in Art Fabric #8400 during the making process.

CONCLUSION:

The insertion of a screen in the Rando Webber blower case before the blowers and a screen in the baffle orifice after the blowers virtually eliminates almost all of the dirt and dirty fibers previously found imbedded in Art Fabric #8400 during the making process.

REPORT: To this point one of the most prevalent problems in the production of Art Fabric has been the high percentage of waste due to dirt in the web. A thorough cleaning of each unit in the production line failed to eliminate completely the occurrence of dirt and dirty fibers.

Closer inspection of the Rando Webber condenser blowers showed that there was a considerable buildup of small fibers on the blower vanes and shafts. This buildup is caused when fibers pass through the Rando condenser, through the humidifying sprays and finally into the blowers. Any vibration or speed-up of the blowers cause greasey or rust covered fibers to dislodge from the blowers and be deposited on the condenser in the formation of the web.

To prevent any further dirt problems a screen was installed before the blowers and another screen was installed in the baffle system after the blowers.

After one day with the screens installed we observed a moderate buildup of fibers on the screen before the blowers. The greatest buildup seemed to be on the screen in the baffle system.

From preliminary observation I think that it may be necessary to clean the baffle screen at least after 5 or 6 hours of running. If the screen is not cleaned the buildup of fibers may become great enough to impede the passage of air and therefore cause poor formation in the web.

O. M. Wiste

O. M. Wiste
Gift Wrap & Fabric Laboratory - 27-1
Attachment

OMW:seg

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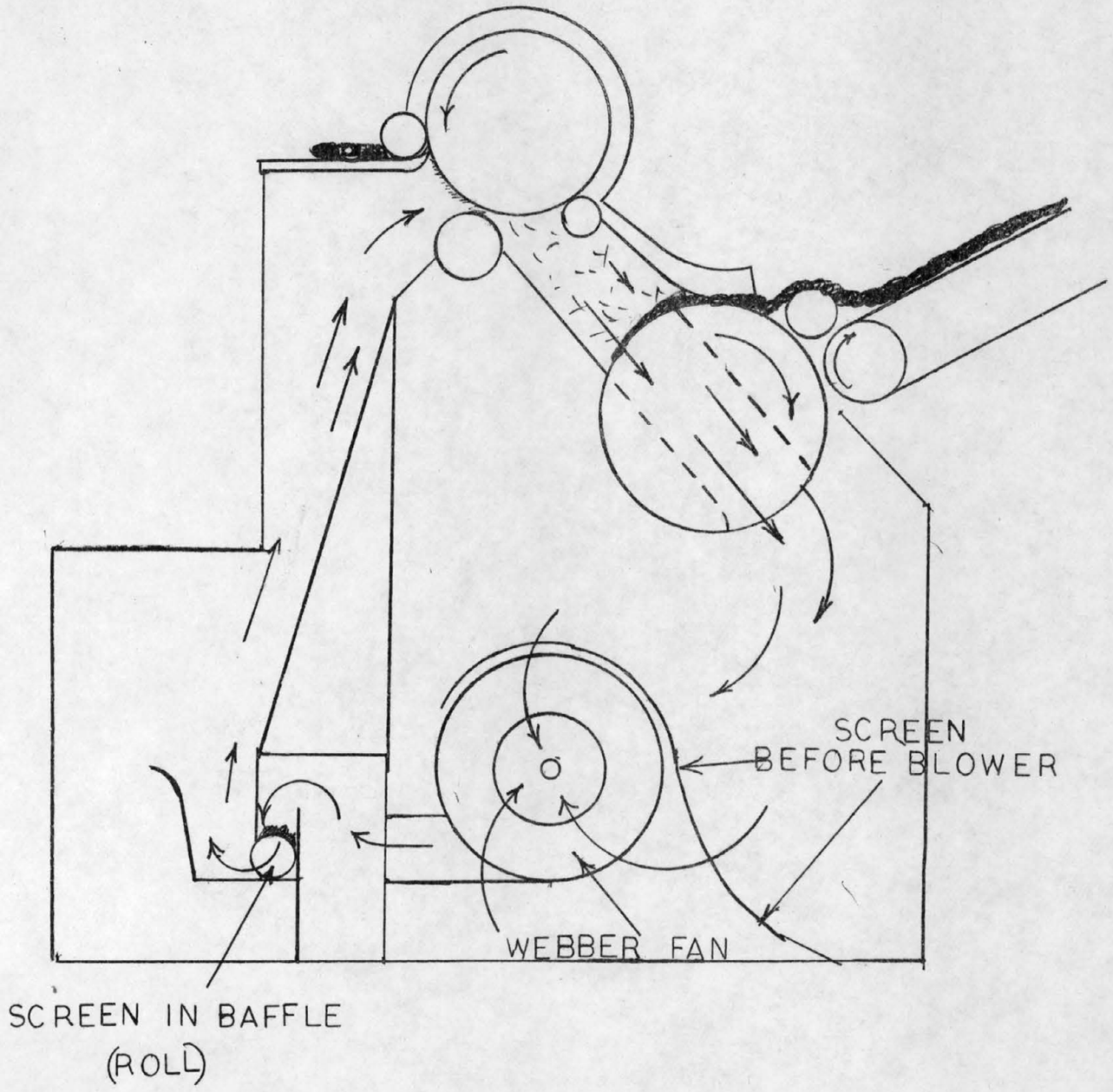

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792

May 9, 1962

SUBJECT: Art Fabric Print Making Evaluation

OBJECT: To describe methods of using Art Fabrics as screens for serigraphy or commercial screen process.

CONCLUSION:

Art Fabrics can make fine mesh screens when printed with a roller pressing method, and in conjunction with the paint being developed in Retail Tape can expand possibilities of the screen process.

REPORT: At the University of Minnesota in the spring of 1961 while experimenting with the printing of etchings and a print made of vinyl tape, the ink came through the Art Fabric being printed on, damaging the large thick felt pad. The precise image printed onto the felt displayed possibilities of using Art Fabric as a screen for screen process printing.

With a razor blade cut a stencil out of ordinary bond paper and placed it on a sheet of Art Fabric put over an inked copper plate. Put another sheet of fabric over the paper stencil and squeezed copper plate and all through the etching press. The printed design was as sharp as any screening I had ever done through a #16 mesh silk screen.

Stapled Art Fabric to a silk screen frame and tried printing with the standard squeegee method but the results were very unsatisfactory. The fibers were pulled up, clogged the paint, and produced very poor printing.

More recently while experimenting with the paint given me by Art Fry of Retail Tape, painted a simple design onto our light weight Art Fabric and heat cured it. Rolled some of the same paint onto a thin sheet of galvanized steel, placed the painted fabric over it, and over this placed another sheet of fabric. This triple decker sandwich (inked plate, web screen, and print fabric) was pressed through our small roller in the lab, repeating the process several times with both dry and dampened fabrics. The dry ones printed best. Repeated the process on unsized poplin and coarse laundry duck both wet and dry. The image on them was very sharp and the dry cloths printed best here, also.

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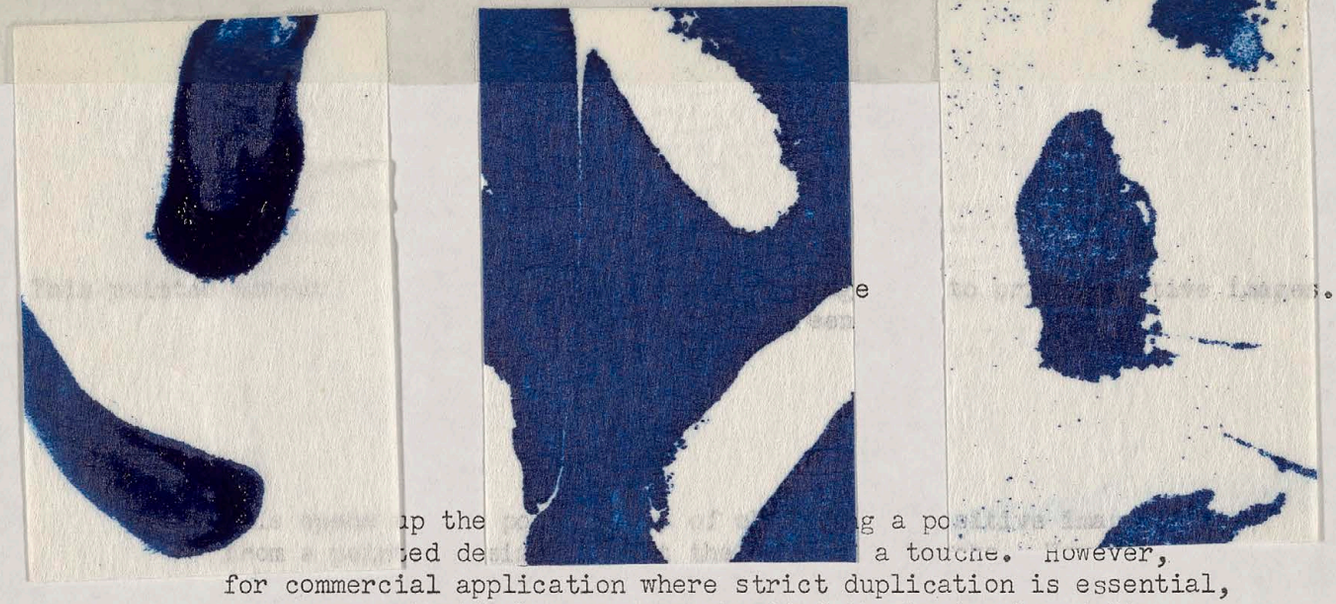
Like any silk screen the original designed fabric was clogged wherever painted, printing only the unclogged areas; that is, it printed a negative image. Heat cured this negative printing and used it as a screen to print positive impressions.



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Printing onto paper is also very satisfactory and our web as a screen can have the advantage of using thinner paint, thus producing sharper impressions and retaining greater brilliance of color than possible with a transparent base. Where the openness of a silk screen does not allow too much dilution, the intricate web construction and absorbent nature of our fabrics can hold thinly diluted paint.

The pressing method can be immediately employed by the serigrapher with an etching press and should prove popular in grade and elementary schools. While my experiments were pressed without the screen mounted to a rigid frame, an opening the desired size can be cut into a flat thin sheet of aluminum, or thin poster board, and the fabric taped to it. Felt or newspaper padding is then placed over the print fabric.

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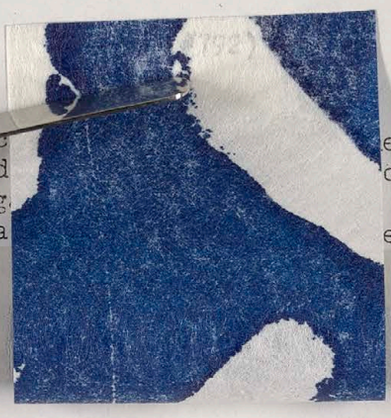

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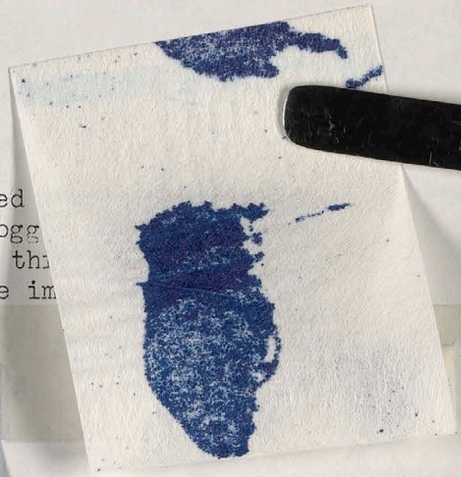

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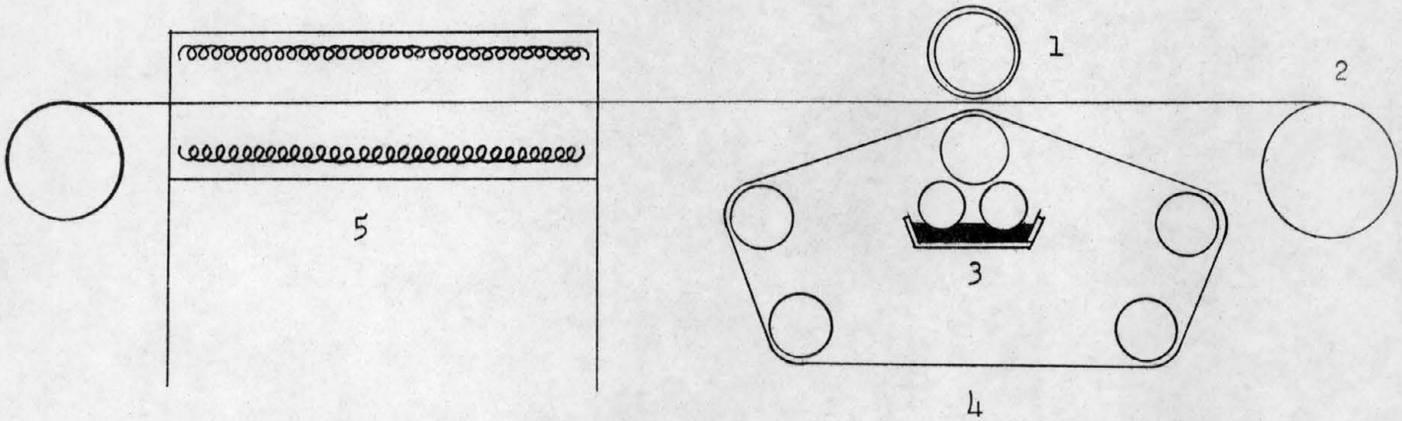
Because the standard squeegee method of printing does not work with our fabrics, the pressing method necessary could be the basis for accelerating the screen process commercially especially for textile printing. The development of a pressing type printing method such as suggested, using an endless belt type screen combined with the immediacy of drying possible with the paint being developed in Retail Tape can expand the possibilities of speeding up high quality screen textile printing.



1. Felt on steel roller
2. Fabric or cloth
3. Ink trough
4. Vinyl edge taped around 3M Fabric screen
5. Drying chamber

Richard N. Sussman

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791-1

May 10, 1962

SUBJECT: Retail Tape Artist Paint

OBJECT: To suggest its use as a print making material.

CONCLUSION:

The base of the paint being developed in Retail Tape can make a very flexible easy to use print making material for grade and elementary schools as well as for hobbyists and the professional artist. It also shows possibilities for achieving belt line production of high quality printed textiles with a hand printed character and origin.

REPORT: About a year ago at our initial meeting with Mr. Nachtsheim in Pat Carey's office, mentioned that one of the items I was looking for was a material that could remain workable and firm long enough so that even a very young child could scribe a simple design into it and thereby learn at an early age the principle of print making. The base of the paint given me by Art Fry of Retail Tape recently appears capable of fulfilling that search.

Painted a simple design on a thin sheet of galvanized steel. Although I painted it with a bristle brush, a painting knife, fingers or any other means of applying paint or marking into it can be used. Heated it to dry and with a soft gelatin roller rolled some of the same paint over the surface, inking all the ridges. Put a sheet of Art Fabric over the inked plate, covered it with paper towels for a blanket and pressed it through the small ringer in the lab. Every brush mark printed accurately giving a spontaneous and unworked result.

Next, printed various dampened Art Fabrics but all the dry ones seemed to work out best. Repeated the process with wet and dry poplin and rough laundry duck. Both wet and dry poplin printed equally well. However, the heavier duck worked best printed damp.

The satisfactory results of this experiment proved the paint's worth as a print making medium. However, incised lines tended to even out and some of the heavier brushed lines broke down in the wet stage. While applying a little heat can be used to stiffen the paint it would be good if a special formula for print making could be developed that would retain every brush mark or incised line with firmness yet be capable of easy

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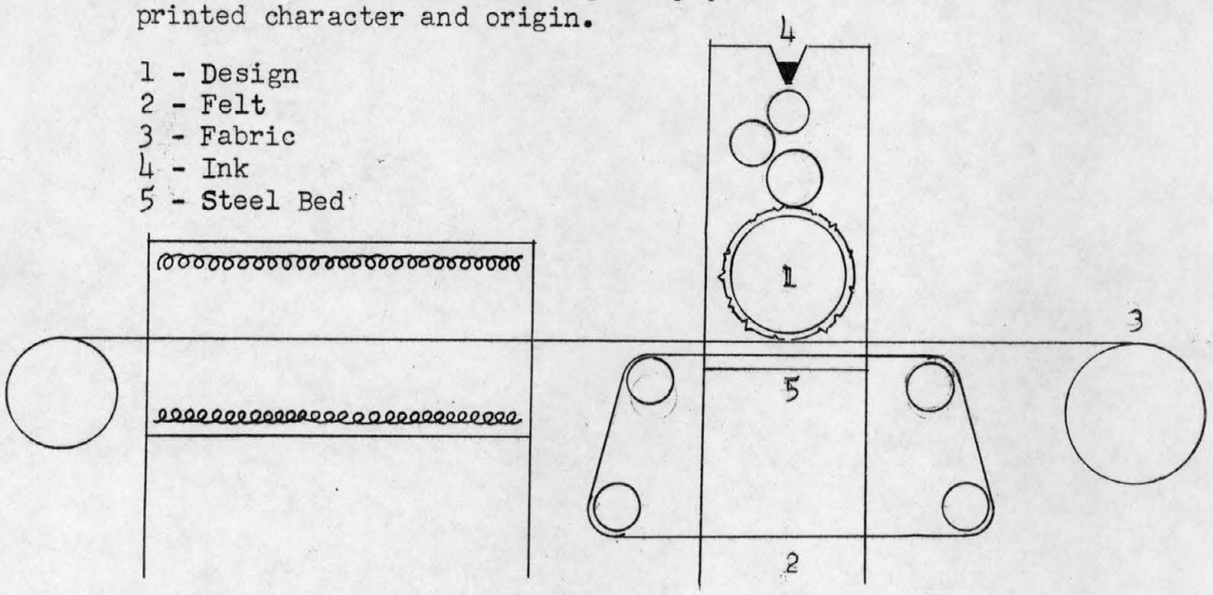
dilution for finer work. If in addition it could be made to dry harder without being brittle, the resulting sharper and crisper print would attract more professional print makers.

This medium could also prove very stimulating for textile printing in grade and elementary schools as well as for hobbyists and the commercial trade. The design could be painted onto a thin sheet of aluminum treated for good adhesion and set into a roller for belt line production of quality printed textiles with a hand printed character and origin.

1 - Design
2 - Felt
3 - Fabric
4 - Ink
5 - Steel Bed



Also made several experiments of monotypes with this paint on both wet and dry fabric. The dry fabric worked out best. This type of print making is very similar to the finger painting of children and because of the immediacy of drying should also prove very popular in schools as well as for hobbyists and professional artists.

Painted on thin aluminum, bronze and galvanized tin. Our fabrics are very sensitive and show every brush stroke.

A similar kit to the one mentioned in Lab Report #792 can be evolved for these fascinating print making methods also or can be combined with the silk screen kit for a very exciting package.

Richard N. Sussman

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Consultant
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RNS:seg

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794

May 16, 1962

SUBJECT: Water Painting Fabric Painting Evaluation

OBJECT: To report the results of our experiment which was designed to:

1. Determine whether the translucency of Art Fabric has any value in craft work.

2. Measure the value of type of design (simple or detailed), size of sheet ($8\frac{1}{2}$ x 11, 15 x 19), weight of fabric (light or medium), type of paint (tempera or water color) and age group (children or adults).

3. See if adult craft workers like plain art.

CONCLUSIONS:

A program for Art Fabric in the recreation field should use tempera paint on either medium or light weight fabric. The see-through feature should be used with a black line on white opaque paper. Children responded to simple design or to no design better than too complex detailed designs. Children felt their results were more worthwhile than did the adults. Choice of sheet size varied with the individual. Simple aids such as a color wheel and good quality brushes in two sizes were requested by the recreation leaders, and would be used in a program of this type. The recreation leader must be given all possible aid in setting up a craft program for either age group.

RESULTS:

1. Fabric weight (light or medium)

   a. No preference between age groups.
   b. No preference on design.
   c. No preference on paint type.

2. Design type (general, detailed, none)

   a. Children preferred simple or no design too detailed.
   b. No preference on weight of fabric.
   c. Tempera paint was preferred to water color.

3. Type of paint (tempera or water color)

   a. Preference by both adults and children for tempera.
   b. No preference in weight of fabric.

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4. Size of sheet ($8\frac{1}{2}$ x 11 or 15 x 19)

   a. No preference.

5. Was the work worthwhile

   a. Children felt their results were more worthwhile than adults.
   b. Design had little influence on feeling of achievement.
   c. Choice of paint had little or no effect on feeling of achievement.

6. The teacher or recreation leader plays a very important role in the results.

7. A color wheel is very necessary for recreation activities.

8. Adults in the craft program did not respond favorably to a pure painting. A design is necessary for them.

The design was made up to show the effect of the following variables:

1. Age group (children or adult).
2. Type of design (simple, detailed, none).
3. Type of paint (tempera or water color).
4. Size of sheet ($8\frac{1}{2}$ x 11 or 15 x 19).
5. Weight of fabric (medium or light weight).

Variables, Numbers 4 and 5, were combined in a single column in the total design so that light weight and small size were one phase and medium weight and large size were the other phase in this column. The total design is shown below.

Group No.	Age A-adult C-children	Design D-detailed S-simple	Type of Paint T-tempera WC-water color	Fabric M-medium weight large L-light weight small
1	A	D	WC	M
2	C	D	WC	M
3	A	S	WC	M
4	C	S	WC	M
5	A	D	T	M
6	C	D	T	M
7	A	S	T	M
8	C	S	T	M
9	A	None	T	M
10	C	None	T	M
11	A	D	WC	L
12	C	D	WC	L
13	A	S	WC	L
14	C	S	WC	L
15	A	D	T	L
16	C	D	T	L
17	A	S	T	L
18	C	S	T	L

This design was reduced in the final experiment to those group numbers which are underlined in order to facilitate running the experiment.

A preliminary meeting was held with those recreation leaders from the St. Paul parks and playground centers under the supervision of Mrs. Vick as well as Mr. Vick of the Selby Community Center and Mrs. Cary, art supervisor for the above mentioned centers. At this meeting the general scope of this experiment was described by Mr. Patrick Carey of the Gift Wrap & Fabric Lab. The materials which would be used were demonstrated. This group then made up a list which showed how many groups were available, how many people were in each of these groups and what day of the week and time each group met.

Inasmuch as these groups showed quite a variability within the individual groups in the number of people available, a standard number of six people per group was used.

These groups were each arbitrarily assigned a position in the design and sufficient equipment was obtained to fill their needs. The equipment needed consisted of:

1. Six sets of the required paint for each group- watercolor (8 colors), Prang, tempera (5 colors, 1½ oz. bottles).

2. Eighteen sheets of fabric of the right size and weight.

3. Six #7 water color brushes.

4. Six sheets of frosted acetate film to be used as palettes (where tempera was used).

5. Seven simple questionnaires (one for the instructor).

6. Six full size Thermo-Fax copies of an outline for each of the choice of two designs; also included was one original copy of each of the designs. The picture for the group using detailed design was landscapes taken from the Arizona Highways magazine. The picture for the group using simple designs was 1) also a landscape taken from Arizona Highways magazine but in simpler terms, and 2) surrealistic reporductions by the painter Jean Miro.

The questionnaires contained the following questions and were designed to be supplemented by first-hand observation on the part of an observer:

1. Did you enjoy using the kit?
2. Was there sufficient instruction given to you?
3. Did you like the materials which were included?
4. Was there a sufficient amount of material included? If not, specify.
5. Would you like to see such a kit available for purchase?
6. Any additional comments?

DATA: Utilizing both the questionnaire and the observation the following results were obtained on various factors:

Did they enjoy use of materials?

Group	Yes (Range 1 to 10)	Comment
1	10	
2	10	
5	5	Soaked up paint, runs.
8	10	
9	10	
10	10	
11	10	
12	10	
15	10	
17	10	
18	10	

Effect of weight of fabric

Group	Score	Comment
1	10	
2	5	Could not see through it.
5	3	Hard to spread, soaks up too much paint.
8	10	Like ability to see through fabric.
9	10	
10	10	Liked it.
11	8	Didn't like running of paint.
12	4	Fabric too thin, too absorbent.
15	10	
17	2	Didn't like shrinkage, too absorbent.
18	10	

Effect of size of sheet

Group 1 preferred a smaller size, Group 15 wanted a larger size and the rest had no comment.

Effect of type of design

Group	Score	Comment
1	4	Didn't care.
2	3	Afraid, after completion 30% liked it.
5	9	
8	3	Not impressed, 30% liked it.
9	5	
10	10	Liked it very much.
11	4	Not impressed.
12	10	Good reaction.
15	1	
17	10	Liked it very much.
18	5	

Effect of type of paint

Group	Score	Comment
1	4	Complaint about running.
2	3	Complaint about running.
5	8	Slight complaint about running.
8	8	Slight complaint about penetration.
9	5	
10	10	
11	3	Didn't like running.
12	3	Didn't like running and absorbency.
15	10	
17	3	Hard to handle; too absorbent.
18	10	

Did they feel the results were worthwhile?

Group	Score
1	7
2	8.5
5	5
8	10
9	8
10	10
11	6
12	8
15	8
17	7
18	10

Additional comments showed interest in the following:

1. Brush was unsatisfactory. At least two sizes were desired and in a better quality.

2. The group leader (recreation director) played a very important part in the end results.

3. Some objection to long drying time.

4. A color wheel would be very useful.

5. Suggested material be dyed pastel colors.

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795-2

May 21, 1962

SUBJECT: Water Painting Fabric Equipment

OBJECT:

1. To test the Beck sheeter for cutting tolerances and quality of cutting.

2. To determine what modifications in the sheeter may be necessary for installation in our Art Fabric production line.

CONCLUSION:

By making minor adjustments at the sheeter feed roll we were able to cut sheets at 15", 23½", and 30" with a tolerance of plus or minus 1/32". Both John Fowler and I feel that we should be able to maintain this tolerance with little difficulty.

The only modification we found necessary is that the sheeter drive will have to be changed to afford us a means of varying speeds to match production line speeds. Also, it will be necessary to build guards for the cutter assembly and drive belt.

REPORT:

The Beck sheeter was uncrated and installed in an open area at Product Fabrication. An unwind stand was set up at approximately 10 - 15 feet from the front of the sheeter. The jogger table was installed just after the sheeter. The overall length of the sheeter and jogger table below the cutter assembly is 8 feet. The length of the space from the end of the production line to the wall is 9½ feet.

The sheeter was furnished with a 220 volt drive motor. We used this means of drive for our tests.

A roll of medium weight Art Fabric #8400 was set up in the unwind stand and threaded into the sheeter. The first sheets cut were as much as 3/8" undersized when the sheeter was set to cut the 15" dimension. Upon investigation we found the rubber in the feel roll had become hard with age and could not be adjusted properly. All the rubbers were replaced and proper adjustments were made. By making fine adjustments on the feed roll sheets were cut to the required 15" with hardly any variance. Occasionally one side of the sheet was cut about 1/32" short but as a rule the sheets were right on 15". The 23½" and 30" cuts showed the same variations.

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Upon installation at the end of the production line the sheeter will require a variable drive so that we may adjust sheeting speeds in relation to the production and speeds. Mr. John Fowler is looking into the availability of such a drive.

Other modifications required for the sheeter are a guard for the cutter assembly and the drive belt.

In a general evaluation of the Beck sheeter Mr. Fowler and I both agree that the sheeter is in fairly good condition and should require a minimum of maintenance for an extended period of time due to its simplicity of construction and the fact that it has just been overhauled.

O. M. Wiste

O. M. Wiste
Gift Wrap & Fabric Laboratory
27-1

OMW:seg

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781-1

May 22, 1962

SUBJECT: Water Painting Fabric Testing

OBJECT: To compare ageing characteristics of Art Fabric #8400, light, medium, and heavy weights, with water color papers according to standards set up by the American Society for Testing Materials in relation to retention of fold strength, tear strength, color change, and pH value.

CONCLUSION:

1. Fold Strength:

   From the results obtained the Art Fabric #8400 shows greater fold strength initially. After ageing the ratio of fold strength for Art Fabric to water color papers shows a marked increase. The medium weight Art Fabric didn't exhibit these characteristics as well as the light and heavy weight material, but still showed better results than the papers tested.

2. Tear Strength (Secondary):

   Tear strength retention was comparable with the water color papers tested.

3. Acidity:

   Art Fabric #8400 is slightly less acid than the papers tested, both originally and after ageing.

4. Color Change:

   Though the Art Fabric #8400 is slightly grayer originally it showed less tendency to discolor with ageing than did any of the papers tested.

METHOD: Samples of Art Fabric #8400 and competitive water color papers were heated in an oven to 105°C. continuously over a 48-day period. At intervals of 0, 3, 6, 12, 18, 24, 36, and 48 days samples were removed from the oven and conditioned in a controlled humidity room at 50% relative humidity and 70°F. for at least 24 hours before endurance tests were made. Five strips 15 MM wide and long enough to be tested on the MIT fold tester were cut from each sample along with four 2½" x 3" pieces for tear tests. From the remaining sample color comparisons and acidity tests were made.

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Color comparisons were made using the Dictionary of Color by Maerz and Paul and acidity tests were made using the cold extraction method and a pH meter. The results of these tests follow.

DATA & RESULTS:

1. Fold strength - Ratio of 3M Art Fabric number of folds to competitive papers with respect to time.

	0 Time - Age			12 Days - Age			48 Days - Age		
	LW	MW	HW	LW	MW	HW	LW	MW	HW
Strathmore 240#	1.4	8.1	5.9	6.0	4.3	15.2	43	38	116
Whatman 140#	5.1	29.5	21.1	41.0	29.3	103.0	43	38	116
Aqua Bee 115#	0.6	3.6	2.6	27.2	19.5	68.5	43	38	116

Fold Endurance:

The Art Fabric fold strength is originally higher than the papers tested (0.6 to 29.5 ratio). It increases markedly after ageing. For some reason, as yet unknown, the medium weight did not perform as well as the heavy and light weight fabrics but was still better than the paper.

2. Tear strength - Gram Tear Strength (secondary)

	0	12	48
Strathmore 240#	466	310	215
Whatman 140#	294	183	129
Aqua Bee 115#	248	99	61
#8400 - HW	330	250	160
#8400 - MW	297	94	92
#8400 - LW	114	61	53

Values are comparable to the papers tested with 31 to 48% of the original tear left after 48 days of ageing.

3. Acidity (pH)

Day of Ageing	0	3	6	12	18	24	36	48
Strathmore 240#	5.37	5.10	5.13	5.38	5.20	5.23	5.20	5.25
Whatman 140#	5.52	4.70	5.00	4.87	4.90	4.89	4.86	4.87
Aqua Bee 115#	4.84	4.68	4.93	4.58	4.45	4.42	4.38	4.42
#8400 - HW	6.45	6.33	5.60	6.01	5.99	6.02	5.99	6.00

Day of Ageing -	0	3	6	12	18	24	36	48
#8400 - MW	6.38	6.25	5.70	5.68	6.05	6.14	6.19	6.13
#8400 - LW	6.21	5.83		5.54	5.39	5.40	5.34	5.30

The Art Fabric is slightly less acid both originally and after 48 days of ageing.

4. Color

Day of Ageing	0	3	6	12	24	48	Color Plates	Color Row After 3 Days Ageing
			(Color Letter)					
Strathmore 240#	A	C	D	D	D	E	17	1
Whatman 140#	A	B	C	C	D	E	17	1
Aqua Bee 115#	A	D	D	D	E	F	10	3
#8400 - HW	A	B	C	C	C	D	9	1
#8400 - MW	A	A	B	B	B	C	10	1
#8400 - LW	A	A	-	B	B	B	10	1

12 Steps from White to Yellow

Plate #17 is white and yellow - green
9 is white and yellow - orange
10 is one step grayer than 9 and yellow - orange
Row 1 is white (A) to yellow (E)
3 is more orange than Row 1

The Art Fabric is grayer than Strathmore or Whatman.
It shows less color change than any of the papers after ageing.
It shows color change more slowly than papers.

O. M. Wiste

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780-2

May 25, 1962

SUBJECT: Oil Painting Fabric Board Construction

OBJECT: To evaluate our art board at the Fairmont High School under the direction of Mr. Gerald Chase, Art Director.

CONCLUSIONS:

The points of criticism we are looking for on our art fabric board consist of the following:

1. Is a "fuzzy" surface detrimental?
2. Does our material use more oil paint and turps than canvas board?
3. Does the 1/4 inch Fome-Cor board have definite advantages?
4. Is surface texture important and what coarseness is most desired?

REPORT: Mr. Chase turned over part of his advanced class to the evaluation of our art board whereby three different textures were employed. The art fabric used was:

1. Lot 9C, 10% low denier acetate.
2. Lot 9B, 30% low denier acetate.
3. Lot 7D, Fairmont made material.

All lots were treated with 1/2% FC 128 and dried without tension in the pilot plant maker oven.

Art fabric was laminated to grade 420A Fome-Cor board using the following primer-sealer coating and adhesive coating:

1. White sealer coating

Ethanol	1,800 grams
Butvar B-73	300 grams
Titanium Dioxide Grind	1,200 grams

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2. Adhesive Coating

Ethanol	1,000 grams
Krumbhaar K1717	300 grams
Gelva C-3 V-10	500 grams

RESULTS: Drying in the oven at 180°F., without tension produced "cockling" of the web which was retained at a lesser degree after laminating to the board. Fabric laminated while still damp showed less "cockling" due to the shrinking of the fabric after the adhesive had set. This causes undue warping of the board due to the tension of shrinking.

The finger painting technique applied directly to the fabric without underpainting was unsuccessful due to the coarse texture and poor spreading of the oil paint.

Still life subjects using an open technique on the coarse texture was effective and the students were well pleased with the results. The pre-shrunk material made at Fairmont which produced a finer more even texture was favored by all concerned.

SUMMARY OF EVALUATION:

1. The fuzzy surface must be reduced to a minimum or eliminated for a successful oil painting fabric.

2. The texture may vary in coarseness but the surface should be smooth to promote easy spreading of the oil paint.

3. The porous nature of the fabric requires more oil paint and turps than treated canvas. This should not be a problem since a variety of techniques may be employed.

4. The Fome-Cor board has painting advantages together with its unusual light weight and resistance to warping.

Ernest C. Bowers

E. C. Bowers
Gift Wrap & Fabric Laboratory
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ECB:seg

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748-5

June 8, 1962

SUBJECT: Artist Painting Media

OBJECT: The appraisal of water color fabrics as a result of painting and drawing on them during the summer of 1961.

CONCLUSION:

All fabrics were sensitive to humidity. Best results were obtained with 464-LIG-3&4 and 464-L4F-1A as these heavier materials were more controllable under damp conditions than lighter weights 464-LIH-3&4.

REPORT: During the summer of 1961 painted approximately 800 water colors and black ink drawings on fabrics 464-LIG-3&4, 464-LIH-3&4 and 464-L4F-1A. Both LIG-3 and 4 seemed to have good body so was not able to develop a preference. There were indications of their sensitivity to moisture but felt capable of adjusting to it. The controllability of both mediums was about equal with each of the various fabrics used.

464-L4F-1A was also satisfactory. The tenter-hook experiment made at Chemolite, Lab Report #748-4, was not quite as satisfactory as L4F-1A. It had a somewhat softer, fiberous, flannel type feel.

Lighter weights 464-LIH-3&4, at the time they were made and tested at Profab about June of 1961 seemed very satisfactory. There was no wicking, color was fresh and brilliant, strokes clean and sharp. Took the tested samples also up to Grand Marais. Painting out-of-doors directly from nature, this fabric was acutely sensitive to moisture. Humidity was difficult to determine in sunshine, but the moment brush touched fabric, the degree of moisture became very apparent.

On damp days the considerable wicking made it extremely difficult to retain the picture originally painted. On one of those frustrating days, recalling the satisfactory results at Profab and wondering if the material was wrongly marked pulled out the previously paint tested sheets of LIH-3&4 and painted on them.

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Wicking was equally excessive and after a few minutes the strokes painted at Profab with "dime store" water colors also began to crawl though the surrounding fabric was not being painted on. The sharp edges and clear color painted a month earlier lost their crispness.

A week ago, desiring to refresh some memories for this report, found that a heavy stack of painted fabrics about eight inches thick that had been set on end had collapsed into a solidly deformed "S". The steel-like deformity looked irremediable. Removing sheet by sheet and replacing them in opposition, they soon flattened out completely.

At this date, no yellowing of the material or any change of the paint (Winsor & Newton professional water colors) qualities achieved are apparent. The color appears as fresh now as when painted.

When considerable moisture was obviously present, put water colors made on 464-LIG 3&4 and 464-L4F-1A into a waterproof portfolio as soon as completed. If the return to camp was made without undue delay, taking them out onto a level dry place stopped the wicking.

Personally welcomed moderate cockles or clumps inherent in the fabric as part of the creative challenge. Did not feel at all concerned about any puckering of the material as a result of painting.

Never resorted to wetting the fabrics even though many of the washes attained appear to have been painted in a wet state.

Without waiting for the fabric to dry before continuing, painted directly without hesitation until the work was completed.

An attitude of constant adjustment to the pulse of the fabric directed to the expression of the concept was the only cook-book recipe formulated.

The ruggedness of the fabrics was revealed by the abandon with which I found myself throwing them around the ragged rocks to dry. They draped around the rocks and often creased, but after drying and stacking, resumed their flatness. Such warping and creasing with paper is not easily remedied, if at all.

On one occasion a sudden strong wind blew several sheets of unpainted fabric out of the portfolio towards the water. Thought all had been rescued. On returning to the area about ten days later, observed a sheet floundering in the water, evidently knocking around the rocky shore all that time. Pulled it in, dried and used it. No damage was noticeable.

The joy of painting on the more successful fabrics was very similar to that experienced the previous summer on the originally discovered sample of Lab Report #748. A rapport of challenge, intimate response with the material, and electrified excitement were its strange components. The fabric seems charged with a life which is released upon painting.

In November of 1961 a large one-man-show of some of these paintings and drawings was held in the Tweed Gallery at the University of Minnesota, Duluth. A catalogue of the work with a reproduction of a black and white drawing was printed on the fabric which offered a glimpse into the qualities possible for fine arts reproduction. This was the first publicized showing of paintings made on 3M Art Fabric.

Another one-man-show of some of these paintings held shortly afterwards at the Minneapolis Institute of Arts in February and March drew the following review in the Minneapolis Sunday Tribune of February 25, 1962 and is interesting not for personal reasons but rather because it reveals critic John K. Sherman's response to the joy and excitement experienced in the paintings' creation.

"The spectator's spots-in-front-of-the-eyes effect when first looking at Richard Sussman's paintings shifts quickly to satisfaction in the forms and forces this dot-dash style suggests. The patterns are almost like steel filing that follow the paths of magnetic attraction.

On view at the Minneapolis Institute of Arts' Little Gallery, Sussman's new pictures are dancing and vibrant abstractions that come fresh from nature, but at one remove from it. The interesting thing is that this one "remove" is not in the studio for a reworking of a preliminary sketch, but is created on the spot. This probably accounts for the immediacy of these staccato swirls and explosions, and the lines of action they take. Some of the works are black on white-sprays of short dabs and spots that follow a free yet controlled flight over the picture surface. Others, in color, have denser tones and more variety in blurred and sharp outlines. Of these, "Bewitched Sun" with its dramatic and reaching-out red beams is probably the most remarkable.

Sussman is airy and off-the-ground here, never tied to the solid or static, choosing instead those elements of nature which represent motion and vitality rather than mass."

Richard N. Sussman

Richard N. Sussman
Consultant
Gift Wrap & Fabric Laboratory
27-1

RNS:seg

GIFT WRAP AND FABRIC LABORATORY
RESEARCH REPORT

FORM 1726-G PWO

[redacted]PIES FOR
MESSRS:

BARD
BARGHINI
BOESE
BOHN
BOWERS
BROWN
BYHOFFER
CAREY
CLAYTON
COULTER
COURTNEY
DAVID
DONALDSON
DROBINSKI
FRANK
GALLIGAN
HAGUE
HALVERSON
HANSON
HENNEN
KOSTOHRYZ
LAB. FILE
LARSON
MATT
MAY
MERRILL
MILLER
[redacted]SH
[redacted]UENFELDT
OWEN
REDPATH
REID
SCHMIDT
SCHNEIDER
SHEPPARD
TRUSKOLASKI
WALDEN
WESTBERG
WISTE

781-2

June 27, 1962

SUBJECT: Water Painting Fabric Testing

OBJECT: 1. To compare ageing characteristics of Art Fabric #8400, light, medium, and heavy weight, with water color papers in accordance with standards set up by the American Society for Testing Materials in relation to retention of fold strength, tear strength, color change, and PH value (acidity).

2. To compare the results obtained with previous tests (refer to Report #781-1, March 20, 1962).

CONCLUSION:

1. Fold Strength:
Art Fabric #8400 shows greater fold strength initially. After ageing the Art Fabric retained more fold strength, but the ratio for Art Fabric to water color papers decreased as the ageing period increased. At the end of the ageing period, the Art Fabric still exhibited greater fold strength retention than any of the papers tested.

2. Tear Strength (secondary):
Tear strength was comparable with the water color papers tested.

3. Acidity:
Art Fabric #8400 is slightly less acid than the papers tested, both originally and after ageing.

4. Color Change:
As opposed to previous tests, Art Fabric #8400 showed greater discoloration at 24 days and above than the papers tested.

A study is being conducted to determine the cause of this discoloration of the art fabric.

METHOD: Samples of Art Fabric #8400 and competitive water color papers were heated in an oven to 105° C. continuously over a 48 day period. At intervals of 0, 3, 6, 12, 18, 24, 36, and 48 days, samples were removed from the oven and conditioned in a controlled humidity room at 50% relative humidity and 70° F. for at least 24 hours before endurance tests were made. Five strips, 15 MM wide and long enough to be tested on the MIT fold tester were cut from each sample along with four 2½" x 3" pieces for tear tests.

Witnesseth that the foregoing record was typed and signed on or before _____, 19____ the date of affixing my seal and signature hereunto.

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[redacted]EAL)

Received in the collection of original records _____, 19 _____

_____

_____
CUSTODIAN OF RECORD FILES

From the remaining sample, color comparisons and acidity tests were made. Color comparisons were made using the Dictionary of Color by Maerz and Paul and acidity tests were made using the cold extraction method and a pH meter. The results of these tests follow.

DATA AND RESULTS:

1. Fold Strength - Ratio of 3M Art Fabric #8400 number of folds to competitive papers with respect to time.

	0 Time - Age			12 Days - Age			36 Days - Age		
	LW	MW	HW	LW	MW	HW	LW	MW	HW
Fabrino 140#	12.9	19.5	21.9	13.6	18.3	28.0	6.3	7.0	9.2
Fabrino 72#	17.9	26.9	30.3	9.9	13.3	20.4	3.9	4.4	5.7
Whatman 140#	26.8	40.5	30.3	14.9	20.0	30.6	5.7	6.4	8.3
Kosho	5.3	8.0	9.0	27.9	37.8	57.7	41.7	46.7	61.2
Hasu	82.5	124.0	140.0	68.0	91.5	140.0	41.7	45.7	61.2

In opposition to previous tests, the ratio of 3M Art Fabric number of folds to competitive papers decreases with age. At the end of the ageing period, however, the art fabric still exhibited greater fold strength retention.

2. Tear Strength - Gram tear strength (secondary)

Days of Ageing	0	12	36
Fabrino 140#	256	256	200
Fabrino 72#	99	93	84
Whatman 140#	262	240	208
Kosho	107	30	15
Hasu	105	67	34
#8400 HW	277	208	208
#8400 MW	182	112	112
#8400 LW	61	56	63

Values are comparable to the papers tested with 62 to 100% of the original tear left after 36 days of ageing.

Compared with previous tests, the tear strength values are slightly lower, but tear strength retention after ageing is higher.

3. Acidity (pH)

Days of Ageing	0	12	36
Fabrino 140#	5.13	4.75	4.77
Fabrino 72#	5.76	4.75	4.75
Whatman 140#	5.49	4.88	4.84
Kosho	6.46	5.92	5.84
Hasu	6.46	6.32	5.97
#8400 HW	6.49	6.06	5.98
#8400 MW	6.48	5.69	5.93
#8400 LW	6.21	5.57	5.42

The Art Fabric is slightly less acid both originally and after 36 days of ageing.

Data in this test compares closely with previous tests.

4. Color

Days of Ageing	0	3	6	12	24	36	Color Plate	Color row 3 days ageing
Fabrino 140#	A	B	C	C	D	D	9	1
Fabrino 72#	A	B	B	C	D	E	9	1
Whatman 140#	A	B	B	B	B	C	9	1
Kosho	A	B	B	C	C	C	10	1
Hasu	A	B	B	B	B	C	10	1
#8400 HW	A	B	B	C	E	F	9	1
#8400 MW	A	B	B	C	E	F	9	1
#8400 LW	A	B	B	C	E	F	9	1

12 steps from white to yellow

Plate #9 is white and yellow-orange
Plate #10 is one step grayer than 9 and yellow-orange

Row 1 is white (A) to yellow (E)
Ascending numbers are more orange than row 1

The Rice papers (Kosho and Hasu) are grayer than all the other materials. Color change in the art fabric is greater at 24 days and above. The art fabric shows a more rapid color change after 12 days.

In previous tests, art fabric did not discolor as rapidly or as much as in this. A study to determine the cause for these changes is now being conducted.

O. M. Wiste

O. M. Wiste
Gift Wrap & Fabric Laboratory
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OMW:bcf

GIFT WRAP AND FABRIC LABORATORY
RESEARCH REPORT

FORM 1726-G PWO

COPIES FOR ASSRS:

BARD
BARGHINI
BOESE
BOHN
BOWERS
BROWN
BYHOFFER
CAREY
CLAYTON
COULTER
COURTNEY
DAVID
DONALDSON
DROBINSKI
FRANK
GALLIGAN
HAGUE
HALVERSON
HANSON
HENNEN
KOSTOHRYZ
LAB. FILE
~~LARSON~~
MATT
MAY
MERRILL
MILLER
NASH
NEUENFELDT
OWEN
REDPATH
REID
SCHMIDT
SCHNEIDER
~~SHEPARD~~
TRUSKOLASKI
WALDEN
WESTBERG
WISTE
Aitken
Potter
Sussman

782

June 28, 1962

SUBJECT: Water Painting Fabric Impregnating System

OBJECT: To study heat aging properties of the binding resins and fibers

CONCLUSION:

1. The B-15 resin appears to cause the browning of Art Fabric.
2. The HA-8 and HA-12 appear to have better aging properties and should be investigated.
3. The materials are very sensitive to higher temperatures. Degradation increases quite rapidly as the temperature increases.

METHOD: Various resins were coated onto glass plates and subjected to oven aging.

Set 1	72 hours	200°F.
Set 2	24 hours	250°F.
Set 3	24 hours	300°F.

Resins used full strength as purchased from vendor:

Rhoplex B-15
Rhoplex AC-33
Rhoplex HA-4
Rhoplex HA-8
Rhoplex HA-12
Rhoplex HA-16
Acrysol 2003 (Solution)
Acrysol 2004 (Solution)
Acrysol ASE-60

Fiber: 1½ dpf - 5/8" - dull viscose tow (RM 4965)

DATA: Measure of browning or discoloration of film or film fiber:

Resin	Set 1		Set 2		Set 3	
	Film	Fiber Film	Film	Fiber Film	Film	Fiber Film
Rhoplex B-15	1	0	3	4	8	9
Rhoplex AC-33	0	0	0	0	2	6
Rhoplex HA-4	3	2	5	5	9	8

Witnesseth that the foregoing record was typed and signed on or before _____, 19____ the date of affixing my seal and signature hereunto.

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Received in the collection of original records _____, 19_____

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Resin	Set 1		Set 2		Set 3	
	Film	Fiber Film	Film	Fiber Film	Film	Fiber Film
Rhoplex HA-8	1	1	0	0	3	4
Rhoplex HA-12	0	0	2	2	2	4
Rhoplex HA-16	0	0	1	1	3	5
Acrysol 2003(Sol.)	2	1	2	2	3	9
Acrysol 2004(Sol.)	3	3	3	8	4	10
Acrysol ASE-60	0	0	0	2	0	8
Total	10	7	16	24	35	63

Fiber Browning

1½ dpf, 5/8", dull viscose tow (RM 4965)	1	3	7

0 value is no discoloration
10 value is deep brown

RESULTS:

1. Effect of Temperature

   a. Increase from 200-72 hrs. to 250-24 hrs. caused 50% increase in browning.
   b. Increase from 250-24 hrs. to 300-24 hrs. caused 100% increase in browning.
   c. Browning effect was increased by the fibers where the film and fibers merged.
   d. 72 hrs. at 200°F. is not as damaging as 24 hrs. at 250°F.

2. Type of Resin

   a. B-15 is the prime cause of browning in the Art Fabric.
   b. ASE-60 and fibers browned considerably at 300°F., but amount of ASE-60 is lower and so would have little effect.
   c. HA-8 and HA-12 exhibited the best results of resins tested.

3. Fiber

   a. Higher temperatures (250 and 300°F.) cause browning of the viscose.

RECOMMENDATIONS:

1. Evaluate various paper at 24 hrs. - 350°F. - 300°F.
   250° - 200°
   Art Fabric and resins and fiber
   Rives
   Whatman
   Strathmore - 240#
   Alexis
   Aqua Bee
   Fabriano
   Kosho
   Art Fabric(light, medium, & heavy wts.) Current and early samples

2. Evaluate HA-8 and HA-12 in Art Fabric.

P. H. Carey
Gift Wrap & Fabric Laboratory
27-1

O. M. Wiste
Gift Wrap & Fabric Laboratory
27-1

PHC:OMW:seg

September, 1962
Supersedes August, 1962

PROCESS SPECIFICATIONS
Art Fabric #8400
Light Weight
PM 3029

Reason for change:
Modify sampling procedure

A. WEB MAKING PM 3029

The purpose is to prepare a resin bonded fiber web for subsequent retreatment.

Fiber: RM 4965, Viscose Rayon Tow preshrunk, 1.5 dpf dull, cut to 5/8 - 3/4" staple - opened on KD machine - 4# on conveyor.

Impregnation Solution:
19.5% solids, 58# solids per batch of 36.5 gallons

RM 6288	Rhoplex B-15	5 gallons
RM 3896	Rhoplex AC-33	10 gallons
RM 1868	Igepal CO630	163 ml.
RM 3172	Triton X-100	163 ml.
RM 3012	Hydrogen Peroxide (30%)	325 ml.
RM 92	Ammonium Hydroxide	65 ml.
	Water	15 gallons
RM 1980	Acrysol ASE-60	2500 ml.
	Water	5 gallons

Dilute RM 1980 with 5 gallons of water. Add slowly and with good agitation to mixture of rest of ingredients. Rapid addition causes precipitation of acrylic latex. Solution is 19.5% solids or 58# per batch.

Rando: 27 pounds per ream (25 - 29# range)
Free from foreign matter, uniform fiber distribution

Speed	30-34 feet per minute
Width	40"
Sample	Take sample at start of run

Impregnation:
Adjust nip pressure to give 300% pickup of solution (approximately 35 psi) 13#/ream resin solids

Sample	Take sample every other jumbo as follows: Tear out three samples of impregnated web, right, center, and left and weigh. Completely rinse resin out with water, then rinse sample with alcohol and dry in oven. Weigh dry sample. Using wet and dry weights on conversion chart, find add-on and record on run sheet.

Oven Drying Temperature:
No jets - ducting full open -- heat off - fan on slow

Hot Can Drying: Minimum steam pressure

First can	Wrap with scrim, no more than 2 layers - 2 - 4 psi
Second can	6 - 8 psi
Third can	6 - 8 psi
Fourth can	6 - 8 psi
Fifth can	6 - 8 (drying felt only) psi Do not let fabric touch the fifth can. Wrap with tape, sticky side out. Adjust pull roll to give minimum wrinkles. Be sure cans are clean.

Windup: 10 - 15 psi on press roll
600 - 650 yards per jumbo
39" minimum width
Mark run, jumbo number, weight and PM 3029 on ticket - insert in core - wrap jumbo with brown kraft paper and insert core ends to protect roll edges - store on end

B. WEB RETREATMENT:

This part of process is to retreat the previously made web to give controlled penetration.

Retreating Solution:

RM 6292	Triton GR-5	158 grams	.07%
	Water	496 pounds	99.03%
			100.00%

Impregnation:
Adjust nip pressure to give 120% pickup (35 psi pressure)

Sample	Die cut 3 - 8½" x 11" samples once each jumbo. Weigh and record each weight.
Speed	30 - 34 feet per minute - Sample before and after impregnation and calculate the pickup. Record on run sheet.

Oven Drying Section:
No jets - all ducting full open - fan on slow - air temperature 135 ± 15°F.

Hot Can Drying:

First can	Cool - wrap with scrim - 2 - 4 psi
Second can	6 - 8 psi
Third can	2 - 4 psi
Fourth can	6 - 8 psi
Fifth can	6 - 8 psi (blanket drying only) Wrap with tape, sticky side out.

Wrap dirty hot cans with no more than two layers of scrim. Use flannel texture wool felt. Adjust speed to give minimum wrinkles and 39" maximum width. Fabric is pulled by windup - adjust tension to eliminate cockling and wrinkles - avoid over tension.

Sheeting:

PM 3035 15" x 19" Lightweight .220 yard^2/sheet

Slit fabric into two webs, 19" +3/16", - 1/16" width. Cut fabric into 15" +1/4", - 1/8" length - stack sheets into 2 piles and remove to shipping pallet when 500 sheets are counted. Discard sheets of reject quality, when observed. Sample 10 sheets per jumbo - identify top sheet as PM 3035, run number _____, jumbo number_____. Hold for G. W. & F. Lab testing.

PM 3036 19" x 23½" Lightweight .345 yard^2/sheet

Slit fabric into two webs, 19" +3/16", - 1/16" width. Cut fabric into 23½" +1/4", - 1/8" length - stack sheets into 2 piles and remove to shipping pallet when 500 sheets are counted. Discard sheets of reject quality, when observed. Sample 10 sheets per jumbo - identify top sheet as PM 3036, run number _____, jumbo number_____. Hold for G. W. & F. Lab testing.

PM 3043 30" x 40" Lightweight .925 yard^2/sheet

Do not slit. Cut fabric into 30" +1/4", - 1/8" length. Stack sheets in one pile and remove to shipping pallet when 500 sheets are counted. Discard sheets of reject quality, when observed. Sample 10 sheets per jumbo - identify top sheet as PM 3043, run number _____, jumbo number_____. Hold for G. W. & F. Lab testing.

Shipping:

PM 3035

Place 3/4" thick plywood 48" x 42" size on wood pallet, cover with poly film. Stack PM 3035 into 6 piles - with no more than 3000 sheets per pile. Cover with clean poly film - place a 48" x 42" x ½" plywood sheet on top and wrap and tape poly film and strap plywood to pallet.

Mark with PM number
Run number
Sheet size
Number of sheets

Hold for G. W. & F. Lab release.

PM 3036

Place 3/4" thick plywood 48" x 42" size on wood pallet, cover with poly film. Stack PM 3036 in four piles - with no more than 3000 sheets per pile. Cover with clean poly film - place a 48" x 42" x ½" plywood sheet on top and wrap and tape poly film and strap plywood to pallet.

Mark with PM number
Sheet size
Run number
Number of sheets

Hold for G. W. & F. Lab release.

PM 3043

Place 3/4" thick plywood 48" x 42" size on wood pallet. Cover with poly film. Stack PM 3043 in one pile with no more than 3000 sheets per pile. Cover with clean poly film. Place a 48" x 42" x $\frac{1}{2}$" plywood sheet on top and wrap and tape poly film and strap plywood to pallet.
Mark with PM number
Sheet size
Run number
Number of sheets
Hold for G. W. & F. Lab release.

Shipping:

Pallets will be shipped to Fairmont for inspection, warehousing and order filling upon release by Lab testing.

Testing:

Use samples obtained in sheeting process.

1. Drop Test: Carefully place a drop of distilled water on top sheet of 3 layers of fabric and measure and record time to completely wet out.

Ageing	None	3 days (70°F. - 50% RH)
Minimum	6 seconds	5 seconds
Maximum	14 seconds	11 seconds

Test should be done on each jumbo as it is manufactured and on samples after three days of ageing. Lab acceptance must be given before material is used for packaging.

2. Use Test:
Use solution Grumbacher Academy Thalo green
1 gm/30 gm water
Arista brush #7 or brush of comparably quality
Evaluate for: Wicking
Rapid leveling
Dry color
Retain sample in file.

3. Visual:
Evaluate samples for:
Dirt
Cockles
Wrinkles

4. Physical Properties:

Finished weight	40# nominal (37# - 43# range)
Caliper	.007" - .009"
Tensile strength	M.D. 16#/inch - rge. to be estab.
	C.D. 11#/inch - rge. to be estab.

Written by:
P. H. Carey
Gift Wrap & Fabric Laboratory
27-1

cc: A. W. Boese - 220-8W
C. W. Bohn - Fairmont
R. I. Coulter - 220-12W
H. R. Courtney - 27-1
D. J. David - Fairmont
P. E. Hansen - 219
G. W. Miller - 27-1
H. B. Walden - 27-1
O. M. Wiste - 27-1
R. N. Sussman

September, 1962
Supersedes August, 1962

PROCESS SPECIFICATIONS
Art Fabric #8400
Medium Weight
PM 3030

Reason for change:
Modify samoling procedure

A. WEB MAKING PM 3030

The purpose is to prepare a resin bonded fiber web for subsequent retreatment.

Fiber: RM 4965, Viscose Rayon Tow preshrunk, 1.5 dpf dull, cut to 5/8" - 3/4" staple opened on KD machine - 4# on conveyor.

Impregnation Solution:
19.5% solids 58# solids per batch of 36.5 gallons

RM 6288	Rhoplex B-15	5 gallons
RM 3896	Rhoplex AC-33	10 gallons
RM 1868	Igepal CO630	163 ml.
RM 3172	Triton X-100	163 ml.
RM 3012	Hydrogen Peroxide (30%)	325 ml.
RM 92	Ammonium Hydroxide	65 ml.
	Water	15 gallons
RM 1980	Acrysol ASE-60	2500 ml.
	Water	5 gallons

Dilute RM 1980 with 5 gallons of water. Add slowly and with good agitation to mixture of rest of ingredients. Rapid addition causes precipitation of acrylic latex. Solution is 19.5% solids or 58# per batch.

Rando: 48 pounds per ream (43 - 53# range)
Free from foreign matter, uniform fiber distribution

Speed	20-22 feet per minute
Width	40"
Sample	Take sample at start of run

Impregnation:

Adjust nip pressure to give 270% pickup of solution (approximately 35 psi) 21#/ream resin solids.

Sample	Take sample every other jumbo as follows: Tear out three samples of impregnated web, right, center, and left and weigh. Completely rinse out resin out with water, then rinse sample in alcohol and dry in oven. Weigh dry sample. Using wet and dry weights on conversion chart, find add-on and record on run sheet.

Oven Drying Temperature:
No jets - air flow on high - 220° - 250°F.

Hot Can Drying:

First can	8 - 10 psi Not more than 2 layers of scrim
Second can	8 - 10 psi
Third can	6 - 8 psi
Fourth can	8 - 10 psi
Fifth can	8 - 10 psi (drying felt only) Do not let fabric touch the fifth can. Adjust pull roll to give minimum wrinkles. Be sure cans are clean. Wrap with tape, sticky side out.

Windup: 10 - 15 psi on press roll
450 - 500 yards per jumbo
39 1/4" minimum width
Mark run and jumbo number weight and PM 3030 on ticket - insert in core - wrap jumbo with brown kraft paper and insert core ends to protect roll edges. Store on ends.

B. WEB RETREATMENT:

This part of process is to retreat the previously made web to give controlled penetration of water base paints.

Retreating Solution:

RM 6292	Triton GR-5	158 grams	.07#
	Water	496 pounds	99.03#
			100.00#

Impregnation:
Adjust nip pressure to give 120% pickup (about 35 psi)

Sample	Die cut 3 - 8½" x 11" samples once each jumbo. Weigh and record each weight.
Speed	22-24 feet per minute - sample before impregnation and calculate the pickup. Record on run sheet.

Oven Drying Pressure:
No jets - air flow on high - 200° - 250°F.

Hot Can Drying:

First can	Cool - wrap with scrim 8 - 10 psi
Second can	8 - 10 psi
Third can	6 - 8 psi
Fourth can	8 - 10 psi
Fifth can	8 - 10 psi (blanket drying only)

Use flannel texture wool felt. Adjust speed to give minimum wrinkles and 39 1/4" minimum width.

Sheeting:

PM 3047 35" x 40" Medium Weight

Do not slit. Cut fabric into 35" ± 1/8" lengths. Stack sheets in one pile and remove to shipping pallet when 350 sheets are counted. Discard sheets of reject quality, when observed. Sample 10 sheets per jumbo and identify with jumbo ticket. Hold for G. W. & F. Lab testing.

PM 3045 31" x 40" Medium Weight

Do not slit. Cut fabric into 31" ± 1/8" lengths. Stack sheets in one pile and remove to shipping pallet when 350 sheets are counted. Discard sheets of reject quality, when observed. Sample 10 sheets per jumbo and identify with jumbo ticket. Hold for G. W. & F. Lab testing.

PM 3037 15" x 19" Medium Weight

Slit fabric into two webs, 19" + 3/16" - 1/16" width. Cut fabric into 15" + 1/4" - 1/8" length. Stack sheets into 2 piles and remove to shipping pallet when 350 sheets are counted. Discard sheets of reject quality, when observed. Sample 10 sheets per jumbo. Identify with jumbo ticket. Hold for G. W. & F. Lab testing.

PM 3038 19" x 23½" Medium Weight

Slit fabric into two webs, 19" + 3/16" - 1/16" width. Cut fabric into 23½" + 1/4" - 1/8" length. Stack sheets into 2 piles and remove to shipping pallet when 350 sheets are counted. Discard sheets of reject quality, when observed. Sample 10 sheets per jumbo. Identify with jumbo ticket. Hold for G. W. & F. Lab testing.

PM 3039 30" x 40" Medium Weight

Do not slit. Cut fabric into 30" + 1/4" - 1/8" length. Stack sheets in one pile and remove to shipping pallet when 350 sheets are counted. Discard sheets of reject quality, when observed. Identify with jumbo ticket. Hold for G. W. & F. Lab testing.

Shipping:

PM 3037 Medium Weight

Place 3/4" thick plywood 48" x 42" size on wood pallet. Cover with poly film. Stack PM 3037 into 6 piles with no more than 2000 sheets per pile. Cover with clean poly film. Place a 48" x 42" x ½" plywood sheet on top and wrap and tape poly film and strap plywood to pallet.
Mark with PM number
Run number
Sheet size
Number of sheets
Hold for G. W. & F. Lab release.

PM 3038 Medium Weight

Place 3/4" thick plywood 48" x 42" size on wood pallet. Cover with poly film. Stack PM 3038 in four piles with no more than 2000 sheets per pile. Cover with clean poly film, place a 48" x 42" x ½" plywood sheet on top and wrap and tape poly film and strap plywood to pallet.
Mark with PM number
Sheet size
Run number
Number of sheets
Hold for G. W. & F. lab release.

PM 3047, PM 3045, PM 3039

Place 3/4" thick plywood 48" x 42" size on wood pallet. Cover with poly film. Stack PM 3039 in one pile with no more than 2000 sheets per pile. Cover with clean poly film, place a 48" x 42" x ½" plywood sheet on top and wrap and tape poly film and strap plywood to pallet.
Mark with PM number
Run number
Sheet size
Number of sheets
Hold for G. W. & F. Lab release.

Shipping:

Pallets will be shipped to Fairmont for inspection, warehousing and order filling upon release by Lab testing.

Testing:

Use samples obtained in sheeting process.

1. Drop test: Carefully place one drop of distilled water on top sheet of 2 layers of fabric and measure and record time to completely wet out. (Repeat test 5 times).

Ageing	None	3 days (70°F. - 50% RH)
Minimum	5.5 seconds	4.5 seconds
Maximum	12 seconds	9 seconds

Test should be done on each jumbo as it is manufactured and on samples after three days of ageing. Lab acceptance must be given before material is used for packaging.

2. Use Test:
Use solution Grumbacher Academy Thalo green
1 gm/30 gm water
Arista brush #7 or brush of comparable quality
Evaluate for: Wicking
Rapid leveling
Dry color
Retain sample in file.

3. Visual:
Evaluate sample for:

Dirt
Cockles
Wrinkles

4. Physical Properties:

Finished weight	70# nominal (63 - 77# range)
Caliper	.015" - .018"
Tensile strength	M.D. 30#/inch - range to be estab.
	C.D. 22#/inch - range to be estab.

Written by:

P. H. Carey

P. H. Carey
Gift Wrap & Fabric Laboratory
27-1
PHC:bcf

cc: A. W. Boese - 220-8W
C. W. Bohn - Fairmont
R. I. Coulter - 220-12W
H. R. Courtney - 27-1
D. J. David - Fairmont
P. E. Hansen - 219
G. W. Miller - 27-1
H. B. Walden - 27-1
O. M. Wiste - 27-1
R. N. Sussman - 27-1

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751

September 10, 1962

SUBJECT: Multi-art Paint Physical Properties

OBJECT: To determine the per cent solids in multi-art paint (Nu-Media) by weight

CONCLUSION: By laboratory methods we found the per cent solids dry weight to be 15 to 18%. This compares with the volumetric procedures for mixing described by Mr. Wilson G. Dietrich in patent No. 2790726 entitled "Silk Screen Paint Materials."

REPORT: Percentage by weight of solids was determined by weighing the volumes of the materials required for mixing as suggested by Mr. Dietrich. Also, samples of pre-mixed Nu-Media were weighed, dried in an oven at 120° F., and reweighed and the percentage of solids calculated.

DATA

PRE-MIXED NU-MEDIA

Average Mixed Weight	Average Dry Weight	% Solids
7.8 grams	1.2 grams	15%

DRY NU-MEDIA

Average Weight of 1 Volume Dry Nu-Media	Average out of 4 Volumes of Water	% Solids
215 grams	960 grams	18%

O. M. Wiste

O. M. Wiste
Gift Wrap & Fabric Laboratory
27-1

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795-4

November 5, 1962

SUBJECT: Water Painting Fabric Equipment

OBJECT: Report on experiment run on Sasheen maker in Fairmont to retreat Art Fabric

REFERENCE: No. 795-3

CONCLUSION: It is possible to retreat Art Fabric using the Sasheen maker for saturating and drying. It also appears possible to use the heat splicer in continuous operation with the aid of double-coated tape or a heat-seal resin.

REPORT: The fabric was mounted on one of the regular unwind stands and threaded through three full passes in the pan before being squeezed at 50 p.s.i. pressure. It was then threaded straight through the top of the oven (150° Temp.) and around the hot cans after which it was wound up. Full steam pressure was used on the first two cans and the third was cold. Saturating solution used was .09% and pick-up was 92%. Tension control was set at 8 p.s.i. and it was possible to run at 35 f.p.m. Width of the material going in was 39½" and winding up was 38½". By reducing tension to 4 p.s.i. on the control, width was increased to 39 1/8" but apparantly this was insufficient to hold the material against the hot cans and the material came out wet. This could possibly be adjusted by finding a point at the tension control that balances between width and drying ability. Also, it might be possible to use a press roll against the can to press the material against it.

Acting on the suggestion of Mr. Carl Bohn, samples of the material were tried on the heat splicer. By itself, the material did not form a strong splice but by interleaving the joint with double-coated tape or Sasheen resin, excellent water resistant splices were obtained.

Roger F. Merrill
Gift Wrap & Fabric Laboratory
27-1
RFM:bcf

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November 13, 1962

TO: RECIPIENTS OF GIFT WRAP & FABRIC LABORATORY REPORTS

Due to previous errors in numbering, please change the following Gift Wrap & Fabric Laboratory Research Report numbers so they correspond with the dates as follows:

729-9	September 28, 1962
742-2	October 16, 1961
773	January 16, 1962
773-1	March 8, 1962
773-2	April 16, 1962
773-3	April 23, 1962
773-4	May 10, 1962
773-5	June 22, 1962
773-6	September 14, 1962

Sandra E. Greeder

Sandra E. Greeder
Gift Wrap & Fabric Laboratory
27-1

SEG:bcf

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#790

November 29, 1962

SUBJECT: Multi Art Paint Formulation

OBJECT: To determine if it will be necessary to have separate formulations in regard to the percentages of ingredients, and if so to determine these formulations.

CONCLUSION:

It was determined that for each of the three colors of Multi Art Paint mixed a separate formulation will be required. In each case, however, it will only be necessary to vary the bentonite-water concentrations. The pigment and sodium borate concentrations will remain the same.

The formulations were adjusted to obtain a viscosity in the mixed Multi Art Paint of 90,000 to 100,000 centipoises.

REPORT: Sodium borate, pigment and bentonite were mixed dry according to approximate concentrations suggested by Wilson Dietrich of Nu Media. The dry mix was added to a known quantity of water with constant stirring. When the paint was mixed as thoroughly as possible with the paddle stirrer the mixture was passed through the paint roller mill once and the viscosity measured.

By adding known quantities of water or bentonite to the mixture the viscosity was adjusted to 90,000 to 100,000 centipoises. It was found that in the three colors mixed, brown, black, and rust, there was only a minor difference in concentrations in relation to percentages of bentonite and water.

DATA: Pigments were from the C. M. Williams Company and are listed as:

Brown Pigment	B-5095
Black Pigment	BK-247
Rust Pigment	R-2199

Thickener used was a 200 mesh bentonite.

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Formulations

Black	Water	82.5%
	Bentonite	14.1%
	Pigment	3.2%
	Sodium Borate	0.2%
	Total	100.0%
Brown	Water	83.9%
	Bentonite	12.7%
	Pigment	3.2%
	Sodium Borate	0.2%
	Total	100.0%
Rust	Water	83.0%
	Bentonite	13.6%
	Pigment	3.2%
	Sodium Borate	0.2%
	Total	100.0%

O. M. Wiste

O. M. Wiste
Gift Wrap & Fabric Laboratory
27-1

OMW:seg

GIFT WRAP AND FABRIC LABORATORY
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797

December 6, 1962

SUBJECT: Multi Art Paint Equipment

OBJECT: To determine the best and most inexpensive method of mixing Multi Art Paint in production quantities

CONCLUSION:
The quickest and most efficient mixing has been accomplished using a homo mixer. To date all other methods tried have either been too slow or do not do a satisfactory job. Other mixing equipment used to date has been a pony mixer, a paint roller mill and a lightening mixer.

REFERENCE:
Report #790, Multi Art Paint Formulation, dated 11-29-62

REPORT: Two methods for mixing Multi Art Paint in production quantities have been considered. One method involved the use of a homo mixer in conjunction with a lightening mixer and the other was roller milling.

The first method tried was mixing with the homo mixer (1 HP - 3 3/4" head) in a lined 55-gallon drum. The charge was introduced as follows:

300 lbs.	Water
11½ lbs.	Pigment
1 lb.	Borax

The homo mixer was then immersed in the mixture and allowed to run a minute or two to thoroughly mix and wet out the pigment. The next step was the slow addition of the bentonite until the paint has reached the desired viscosity. The amount of bentonite required varies slightly with the color. (Refer to Report #790.) As the paint approaches the desired viscosity circulation begins to slow, and more time is required to thoroughly mix. A lightening mixer was immersed in the paint along with the homo mixer, but did not reduce the mixing time to any significant degree. Mixing time was 1½ to 1 3/4 hours including cleanup.

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It was later found that by removing the orifice plate on the head of the homo mixer greater agitation resulted but the mixing time was still approximately $1\frac{1}{4}$ to $1\frac{1}{2}$ hours including cleanup.

Arrangements were made at Chemolite with Mr. Kenneth Fehring to mix a batch of paint on one of their roller mills.

It was necessary to do preliminary mixing to bring the viscosity of paint up before it was introduced into the roller mills. We tried to accomplish this on a pony mixer, but because of its slow speed the bentonite agglomerated and settled to the bottom of the mixing tub. We transferred the mixture to a 55-gallon drum and intended to mix the paint with a homo mixer just long enough to break up some of the larger agglomerates. The homo mixer used was driven by a 5 HP motor and had a 6" shearing head. This is considerably larger than our homo mixer and we found that we could obtain the desired consistency and viscosity in the paint in less than 15 minutes using the larger model.

It was decided that it would not be necessary to use the roller mill in view of the results obtained. I concluded that in view of the low output (300 to 600 pounds/hour) and the chargeable cleanup time (4 hours) it would be more economical to go in our original direction and continue using the homo mixer until we have an opportunity to examine the possibility of using other high viscosity mixing equipment.

O. M. Wiste

O. M. Wiste
Gift Wrap & Fabric Laboratory
27-1

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790-1

December 11, 1962

SUBJECT: Multi Art Paint Formulation

OBJECT: To determine the production formulations of the individual colors

REFERENCE:
Report #790, Multi Art Paint Formulation, dated 11-29-62

CONCLUSION:
As described in Report #790 it is necessary to adjust the water-bentonite concentrations to obtain the desired consistency and viscosity. The variation in each case is slight and will not change raw material costs to any significant degree from one color to the next.

The formulations are recorded in the data of this report.

REPORT: Pigments are listed as follows:

From C. M. Williams Company

RM 92797	Brown pigment	B-5095
RM 92798	Black pigment	BK-247
RM 92799	Rust pigment	R-2199

From E. I. duPont de Nemours & Company

RM 1531	Blue pigment	BL-220D
RM 92795	Green pigment	GM-543D
RM 92796	Green pigment	GE-478D
RM 92793	Red pigment	RL-554D
RM 92794	Yellow pigment	YL-465D
RM 9817	White pigment	Ti-pure R-500

Other raw materials required are:

RM 322	Colloidal clay (bentonite)
RM 268	Borax, technical grade

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Procedures for mixing:

Add the water to a lined 55-gallon drum. Next, add the pigment(s) and borax. Mix for a short time with the homo mixer to thoroughly dissolve borax and to wet out pigment.

Mount a lightening mixer on the drum and with both the lightening mixer and the homo mixer operating add the bentonite slowly. Mix until all agglomerates and lumps have been removed from the paint and a smooth, creamy consistency is obtained.

DATA:

Color	RM	Description	Wt.	%
Turquoise	--	Water	300 lbs.	83.4
	1531	Blue pigment BL-220D	3 lbs.10 oz.)	
	92795	Green pigment GM-5340	5 lbs.10 oz.)	3.2
	9817	White pigment Ti-pure R-500	2 lbs. 4 oz.)	
	268	Borax	1 lb.	0.2
	322	Bentonite	47 lbs. 8 oz.	13.2
		Total	360 lbs.	100.0
Green	--	Water	293 lbs.	82.8
	92795	Green pigment GM-534D	3 lbs. 3 oz.)	
	92796	Green pigment GE-478D	8 lbs. 5 oz.)	3.2
	268	Borax	1 lb.	0.2
	322	Bentonite	49 lbs.	13.8
		Total	354.5 lbs.	100.0
Blue	--	Water	300 lbs.	83.8
	1531	Blue pigment BL-220D	11 lbs. 8 oz.	3.2
	268	Borax	1 lb.	0.2
	322	Bentonite	46 lbs.	12.8
		Total	358.5 lbs.	100.0
Red	--	Water	293 lbs.	82.8
	92793	Red pigment RL-554D	11 lbs. 8 oz.	3.2
	268	Borax	1 lb.	0.2
	322	Bentonite	49 lbs.	13.8
		Total	354.5 lbs.	100.0
Yellow	--	Water	293 lbs.	82.8
	92794	Yellow pigment YL-465D	11 lbs. 8 oz.	3.2
	268	Borax	1 lb.	0.2
	322	Bentonite	49 lbs.	13.8
		Total	354.5 lbs.	100.0

Color	RM	Description	Wt.	%
White	--	Water	300 lbs.	83.5
	9817	White pigment Ti-pure R-500	11 lbs. 8 oz.	3.2
	268	Borax	1 lb.	0.2
	322	Bentonite	47 lbs.	13.1
		Total	359.5 lbs.	100.0
Black	--	Water	297 lbs. 8 oz.	83.2
	92798	Black pigment	11 lbs. 8 oz.	3.2
	268	Borax	1 lb.	0.2
	322	Bentonite	48 lbs.	13.4
		Total	358 lbs.	100.0
Rust	--	Water	299 lbs.	83.8
	92799	Rust pigment R-2199	11 lbs. 8 oz.	3.2
	268	Borax	1 lb.	0.2
	322	Bentonite	46 lbs.	12.8
		Total	357.5 lbs.	100.0
Brown	--	Water	300 lbs.	83.6
	92797	Brown pigment	11 lbs. 8 oz.	3.2
	268	Borax	1 lb.	0.2
	322	Bentonite	46 lbs. 8 oz.	13.0
		Total	359 lbs.	100.0

Each of the above charges will have a volume of approximately 40 gallons after mixing.

Viscosity of mixed paint should be 100,000 cps. At the present time we do not have a viscometer that will give us reliable viscosity measurements. Because of Multi Art Paint's thixotropic nature, special apparatus to determine its viscosity is necessary. A search for this apparatus has been initiated.

O. M. Wiste

O. M. Wiste
Gift Wrap & Fabric Laboratory
27-1

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#748-6

December 13, 1962

SUBJECT: Artist Painting Media

OBJECT: The appraisal of water color fabrics as a result of painting and drawing on them during the summer of 1962

CONCLUSION:

While the heavy weight of Art Fabric #8400 remains my personal preference, equally good results were obtained with the medium weight also. Concern with the tendency of the Fabric to absorb moisture diminished as my ability of adjusting to the needs of the material increased. Find this Fabric increasingly stimulating to work with. The textured Fabric was found to be too "sieve-like" and difficulty was had in depositing and retaining sufficient pigment on the painted surface.

REPORT: During the summer of 1962 painted several hundred water colors and black ink drawings on both medium and heavy weight as well as on textured samples of Art Fabric #8400.

Water color paintings made on very damp days in the summer of 1961 often tended to vanish into the depths of the Fabric. This hazard was overcome to a satisfactory degree during the summer of 1962 by immediately turning the painting over face down onto a clean surface such as newspaper, waxpaper, polyethylene, mylar, etc. By this method the water color tended to migrate back down to the originally painted surface rather than to the backside of the Fabric. Retarded drying due to unlimited stacking of painting over painting (leafed between) only helped to even out the penetration and keep the pigment on the painted surface.

Another method experimented with to overcome "sinking" was to force dry water colors immediately upon returning back to camp by swaying the painting back and forth over an open flame of the campstove. This method was not as satisfactory because it seemed to have tendencies both to pucker the Fabric and to retard the thorough penetration of the water color, resulting in a somewhat dry look. Natural air drying was the most satisfactory method resorted to.

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While I, personally, still prefer the "feel" of the heavy weight Fabric, equally good results were achieved with the medium weight material. Switched from one to the other without any noticeable need to readjust.

Also painted on the water-color Fabric embossed by the use of #40 resin coated 3-M-ITE emery cloth made in an attempt to approximate the "Indian Skin" texture discovered in the fall of 1960 and which we deliberately experimented with at Fairmont in 1961. The rough texture did have some pleasing qualities especially when the brush was used fairly dry, skimming over the high spots, thereby emphasizing the texture. However, when water color was used more fluidly the Fabric seemed much more absorbent than normally and found myself piling layer upon layer of color with no appreciable evidence of the amount of pigment used. It is very possible that the grit in the emery cloth punctured the Fabric creating a sieve allowing the water color to fall through to the back of the Fabric. This supposition may be supported by the fact that painting on the backside of the textured Fabric (where the puncture was at the summit of the mound rather than at its base) did not remedy the situation.

Another explanation for this"sieve-like"escape could be that texturizing (even without puncturing) breaks down the fibers, thereby stretching and opening up pores in the Fabric and might explain a certain limpness experienced while painting on this material. Texturizing may have the same effect on Fabric as pounding with a patterned hammer has in tenderizing meat; the toughness of the fibers being broken down also breaks down the inner resistance of the material.

In contrast, the "Indian Skin" experiments, I believe, came into being in much the same way as the drying of the earth's surface. The relaxed, tension free drying, allowed the fibers to shrink into endless mounds and valleys creating a rough surface of interlocked tensions that make for a tougher, rather than a limper, product.

The clips used to hold the grit textured material to the drawing board smoothed out the texture at those spots and raises the question of the permanency of this method of texturizing.

As in 1961, black ink drawings, like the water colors, also worked out very satisfactorily this past summer. My rapport with the Fabric became increasingly stimulating; felt absolutely no frustration with achieving the maximum of clean, sharp detail. This does not mean, however, that the same type of sharpness obtainable with ink on a smooth surface such as Strathmore Bristol Board is possible with our open non-woven Fabric.

Best results are obtained on our material when the ink is used as generously as water colors resulting in a rich "black-in-depth". This, however, poses somewhat of an economic problem to those accustomed to working on paper, where its relative non-absorbency uses much less ink than #8400 Art Fabric. It would be helpful if we could develop a very economical black India ink.

While our material remains more susceptible to dirt than paper, and more difficult in its removal, the realization of its essential ruggedness and ability to withstand much abuse added another degree of confidence this past summer and contributed to the increased rapport between myself and the Fabric. Where, with paper one must always be on "tiptoes" lest another sheet of paper put over the painting before dry will smudge it, or the least tipping of the paper will cause runs, the complete freedom from worry on these accounts leaves added energy for the creative impulses.

Richard N. Sussman

Richard N. Sussman
Consultant
Gift Wrap & Fabric Laboratory
27-1

RNS:seg