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## **Flock Craft in Industrial Arts**

Albert A. Malvern

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FLOCK CRAFT IN INDUSTRIAL ARTS

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FLOCK CRAFT IN INDUSTRIAL ARTS

By

Albert A. Malvern

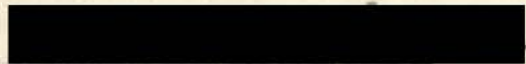
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A THESIS SUBMITTED IN PARTIAL FULFILMENT  
OF THE REQUIREMENTS FOR THE DEGREE OF  
MASTER OF SCIENCE  
in the  
GRADUATE DIVISION  
of  
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August, 1953

APPROVED:

Thesis Adviser



Date

August 1953

#### ACKNOWLEDGEMENT

The writer wishes to express his appreciation to Mr. A. I. Thomas for his helpful assistance in the development of this study.

#### DEDICATION

This thesis is dedicated to my wife, Iola  
Lee Malvern, whose understanding, sacri-  
fices, and encouragement made this work  
possible.

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## CHAPTER I

### INTRODUCTION

Every since early times man has found it necessary to know some type of industrial arts, and ever since then he has tried to improve on its technique and application. Almost two hundred years ago Europeans practiced flock finishing by using chopped up rags for flock and slow hand methods of application. Unlike other finishes that originated as a novelty, the use of flock has increased to such an extent that it is now considered as a standard finish.<sup>1</sup> Flock is composed of millions of fine filaments cut from cotton, wool, goat's hair, rayon and plastic, ranging in length from .09375 to .25 of an inch.

Because of the professional appearance imposed by flock finishes, most amateurs get the impression that applying flock finishes is a difficult operation. This is not true. With reasonable care it is quite easy to apply flock.

With comparable experience it is easier to do flock finishes than any other type of finish, including such easy to apply finishes like wrinkle, lacquers, etc. Many small items like ash trays, book ends, table lamps, etc. require some type of cushion or cloth finish on the bottom. There is at present nothing which can compare with flock for ease of application, rarity of beauty and durability.

#### STATEMENT OF THE PROBLEM

During the past few years the application of flock finishes has

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1. W. E. Porter, "Success in Flock," Blasto Spray Gun Manufactures, Bulletin No. 62, p. 87.

taken a new step forward. This has been largely due to the improvement in quality and appearance of the short fibers which make up a flock finished surface. The result is a soft yet brilliantly smooth finish which is durable as well as pleasing to the eye. These fibers are available in many colors and when properly applied a very useful finish for a specific purpose will result. The field of flock craft is wide open and growing every day. On the basis of this evidence the problem is to indicate the significance of flock craft in high school industrial arts courses.

#### HYPOTHESIS

Flock craft is now used on furniture, radios, phonographs, jewelry boxes, greeting cards, airplanes and many other things. Flock craft is a significant part of industrial arts education. Industrial arts considers those phases of general education dealing with industry, -- its processes, problems, products and procedures. If flock craft is an industrial product, in great demand, used every day about us, and more and more uses in all branches of industry are being discovered every day, then, flock craft should be taught in high school industrial arts courses.

#### PURPOSE OF STUDY

The purpose of the problem is to show how flock craft can be used as a finish in industrial arts. In order to accomplish the purpose of this study, it will be necessary to answer several questions: (1) What is the function of education in a democracy? (2) What is the function of industrial arts in education? (3) What is

the art of flock craft? and (4) How Flock Craft can be taught in industrial arts?

#### METHOD OF PROCEDURE

The information concerning this problem is based on documentary evidence which was obtained by: (1) Consulting technical literature and authorities to secure technical data on flock craft. (2) an analysis of the views of leaders in the field of education as to the the function of education in a democracy. And, (3) An analysis of the views of leaders in the field of industrial arts in education. The evidence on flock will include: (1) Technical information on flock, (2) The physical facilities necessary for handling flock craft in industrial arts education, (3) Flocks used in flock craft finishing, and (4) The evaluation of work in flock craft in industrial arts education.

#### REVIEW OF LITERATURE

A review of literature has been very helpful in the following respect: (1) An article by Behr-Manning, Corp., entitled, "Progress with Flock," gave one of the latest methods of producing flock, and the use of flock in the shoe industry. (2) An article in Electronics Magazine, entitled: "The New Flock," by Behr-Manning Corp, offered information on the electro-static method of applying flock. (3) Articles from the book Modern Methods of Flock Craft, by Nels Irwin presented many of the simplest means of handling flocks. This review of literature also indicated that the supply of technical in-

formation is inadequate and information concerning the application of flock in industrial arts shops in the schools is very limited.

#### LIMITS OF THE STUDY

For the purpose of this study only grades nine, ten, eleven, and twelve will be considered.

#### DEFINITION OF TERMS

"Flock" refers to the fibers cut into uniform lengths, from cotton, wool, goat's hair, rayon, and plastic. These fibers in bulk resemble a fine fuzz or lint.

"Flock Craft" is the art of applying flock to a surface.

"Industrial Arts" refers to those phases of general education dealing with industry, its processes, problems, procedures and products.

## CHAPTER II

### EDUCATION IN A DEMOCRACY

The purpose of this chapter is to establish a set of objectives for general education, and to offer information so that one may see that the objectives of industrial arts are a part of general education.

A thoughtful consideration of the purpose of schools in American society should be undertaken only after one has formulated clear concepts regarding the orientation of education in any society and the peculiar characteristics and ideology of American culture.<sup>1</sup>

Although these two types of analyses are frequently omitted in published statements of general educational objectives, the fact authors have kept them in mind is evident in the nature of the objectives which they have prepared. Since education cannot proceed intelligently in any country unless its purposes, its objectives, the direction in which it is going, have been clearly defined, and since the question of clearly defined purposes of education is particularly difficult in a complex democratic society, it is not surprising that the problem of general purposes in education has received much attention in the professional literature of this country. An evolving, changing society automatically precipitates the need for periodic reconsideration and reformation of its educational objectives. Unless such periodic evaluations are made the schools cannot keep a-

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1. B. F. Pittenger, Indoctrination for American Democracy, p. 43.

breast of the changing roll in society.

Although a treatment of the changing functions of education in the United States would be of interest at this point, space cannot be given to it, but to get the consensus of current thought on the function of education in this country, one may review the following ideas. The Educational Policies Commission set up four major groups of objectives which were identified as:<sup>1</sup> (1) the objectives of self realization; (2) the objectives of human relationship; (3) the objectives of economic efficiency and (4) the objectives of civic responsibility.

The President's Commission offered the following as objectives of general education:<sup>2</sup> (1) to develop a code of ethics to regulate one's civic and personal life. (2) to participate as a responsible citizen in solving the social economic and political problems of one's community. (3) to recognize the interdependence of the different peoples of the world. (4) to understand the common phenomena in one's physical environment. (5) to understand the ideas of others and to express our own effectively. (6) To attain a satisfactory emotional and social adjustment. (7) To cooperate actively and intelligently in solving current health problems. (8) To understand and enjoy cultural activities. (9) To acquire the knowledge and attitudes basic to satisfying family life. (10) to choose a socially useful and personally satisfying vocation.

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1. Committee on Education Policies, Education for All American Youth. Government Printing Office, p. 7.
  2. The President's Commission on Higher Education, Higher Education for American Democracy, p. 50.

According to Olsen, the objectives of general education are:<sup>1</sup>

(1) To aid in attainment of fundamental skills, (2) To develop desirable personal character traits, (3) To challenge the civic patriotism of youth, (4) To arouse interest and ambition in selecting a vocational career, (5) To stimulate a realistic understanding of the national and social environment, and (6) To make concepts more accurate.

The National Education Association set up the following objectives for general education:<sup>2</sup> (1) To explore higher and increasingly specialized interests, aptitudes, and capacities of the student, (2) To satisfy the important immediate and probable future needs of the student, (3) To establish and to develop interest in the major fields of human activity as a means to happiness, to social progress and to continued growth, (4) To guide students on the basis of exploratory and revealing courses, and (5) To reveal higher activities of an increasingly differentiated type in the major fields of experience and culture.

Another group of general education objectives may be stated as follows:<sup>3</sup> (1) To equip people to earn a living, (2) To participate intelligently in government, (3) To enjoy literature and the arts, (4) To contribute, if possible, to man's increasing store of knowledge.

In analyzing the objectives set up by the five authorities it was found that the following objectives appeared in some form by each

1. Edward G. Olsen, School and Community, p. 29.

2. Fay Adams, "What the School Should Do for Children," National Education Association, Bulletin No. 64, p. 31.

3. Edward Lineman, Democracy's Challenge To Education, p. 71.

author: (1) the objectives of economic efficiency, (2) the objectives of civic responsibility, and (3) to understand and enjoy cultural activities. The next two were stated by four of the authors: (1) To develop desirable personal character traits, and (2) the objectives of self realization. Each of the following statements was made by only one author: (1) To understand the ideas of others and to express our own effectively, (2) to attain a satisfactory emotional and social adjustment, (3) To recognize the interdependence of the different peoples of the world, (4) To aid in attainment of fundamental skills, and (5) To make concepts more accurate.

On the basis of this analysis it is concluded that the objectives of general education should be: (1) to develop a means of efficiently participating in government, (2) To select a worthwhile vocation, (3) To develop an appreciation for fine arts and culture, (4) To promote and encourage human relationships, and (5) To establish and develop interest in the fields of human activities, health and happiness.



## CHAPTER III

### THE PURPOSE OF INDUSTRIAL ARTS IN EDUCATION

A careful study of our American democracy reveals that it may be accurately characterized as an industrial democracy. It appears that industrial arts should be included in the school curriculum to orient youth to living in this highly industrialized society.

The further objective of improving and extending the objectives of general education seems to indicate a need for critical thinking and problem solving. While all school subjects should contribute to this end, industrial arts activities seem especially adapted for teaching by the problem solving technique. The industrial arts program also may make substantial contributions to the meeting of the basic requirements of individuals in the fields, group status needs, personal needs and economic vocational needs.

In the final analysis general education has five principal aims or objectives. They are: (1) To develop a means of efficiently participation in government, (2) To select a worthwhile vocation, (3) To develop an appreciation for fine arts, (4) To promote and encourage human relationship, and (5) To establish and develop interest in the fields of human activities, health and happiness. These are the over all aims that should characterize and direct the progress of all phases of education which can be classified as general. Each branch so included should have its own specific objectives and state-

ments of values to be achieved. These should be in keeping with, and should grow out of the aims of general education. Any branch of learning the aims of which conflict with those of general education or do not grow out of them should be classified as special education. In like manner, if one accepts the improvements of the emergent culture as a defensible aim, then it is essential that the basis for such improvement be clearly evident.

The implications evident in meeting the needs of individuals has been shown to be a knowledge and understanding of how such needs are determined. The contribution of the basic sciences have been indicated. In following each of these implications further it has been shown:<sup>1</sup> (1) That important features of the American way of life relate to the fact that it is both democratic and industrial; (2) That improvement of the emergent culture depends on having students face problem situations and on providing them with specific training in thinking at their own level; and (3) That the sciences which contribute most directly to determining the basic needs of individuals are psychology, sociology, and biology.

Turning now to the fact the American way of life, in addition to being democratic, is also highly industrial and technological, one finds many implications for education through an industrial and technological arts program.

Each of the various subjects comprehended within the curriculum

1. Gordon O. Wilber, Industrial Arts in General Education, p. 34.

of the public school has its own specific objectives. The subject of industrial arts is no exception. Some of the important objectives of industrial arts, as shown by the analysis of the purposes of general education are:<sup>1</sup> (1) To explore industry and American industrial civilization in terms of its organization, raw materials, processes and operations, products, and occupations, (2) To develop recreational and avocational activities in the area of constructive work, (3) To increase an appreciation for good craftsmanship and design, both in the products of modern industry and in artifacts from the material cultures of the past, (4) To increase consumer knowledge to a point where students can select, buy, use, and maintain the products of industry intelligently, (5) To provide information about, and -- in so far as possible -- experiences in, the basic processes of many industries, in order that students may be more competent to choose a future vocation, (6) To encourage creative expression in terms of industrial materials, (7) To develop a certain amount of skill in a number of basic industrial processes, and (8) To develop desirable relationships.

According to Newkirk the objectives of industrial arts should be:<sup>2</sup> (1) To develop the ability to plan and build projects, (2) To give experience that will increase understanding of modern industry, (3) To develop the ability to read and make working drawings, (4) To develop the ability to recognize quality and design in the products

1. Gordon, Ibid., p. 42.

2. Louis V. Newkirk, "Teaching Aims of Industrial Arts," American Vocational Journal, December, 1946, p. 12.

of industry, (5) To develop the ability to maintain and service the common products of industry, (6) To provide a medium for experiences in mathematics, sciences, languages arts and the social sciences, (7) To develop an interest in crafts for an expansion in leisure time, and (8) To give experiences that will develop social understanding.

The following aims of industrial arts were suggested by Smith:<sup>1</sup>

(1) To develop skill in the use of common tools, (2) To afford industrial information and social intelligence, (3) To foster appreciation of good materials and workmanship, (4) To further intelligent choices of life occupations, (5) To inculcate worthy personal traits and attitudes, and (6) To provide a measure of specific occupational training.

The objectives of industrial arts according to the U. S. Office of Education are:<sup>2</sup>

(1) To aid in the discovery and realization of interest and talents, (2) To develop worthy qualities, (3) To teach an appreciation of good products, expert craftsmanship, and functional design, (4) To provide a better understanding of the materials and processes of industry, and (5) To offer experience in creative accomplishment.

According to Struck<sup>3</sup> the objective of industrial arts should be: (1) to offer self realization and happiness through creative thinking and doing, (2) To make for uprightness and morality, (3)

1. Homer J. Smith, "Industrial Education In The Public Schools of Minnesota," Educational Monograph No. 6, p. 125.

2. U. S. Office of Education, "Education For All American Youth," Bulletin No. 34, p. 87.

3. F. T. Struck, "The Challenge of Industrial Arts," Industrial Arts and Vocational Education Journal, p. 12.

To make possible guidance that goes beyond shop instructions, (4) To develop socially significant habits, and (5) To teach individuals that in the last analysis, the best interest of individuals and of the larger group are one and the same.

In analyzing the objectives presented by each author it was found that the following objectives were listed by each of the five authors: (1) To give experience that will develop social understanding, (2) To develop the ability to recognize quality and design in the products of industry, and (3) To aid in the selection of worthy life occupations. The next two objectives were stated by four of the authors: (1) To give experience that will increase understanding of modern industry, and (2) To develop worthy traits and attitudes. This statement: To develop the ability to maintain and service the common products of industry was stated by three of the authors. Each of the following objectives were stated by only one author: (1) To encourage creative expression in terms of industrial materials, (2) To develop a certain amount of skill in a number of basic industrial processes, (3) To provide a medium for experience in mathematics, arts, science, language, and social science, (4) To develop the ability to read and make working drawings, (5) To develop skill in the use of common tools, and (6) To provide a measure of specific occupational training.

On the basis of this analysis it is concluded that the objectives of industrial arts should be: (1) To give experiences that

will develop desirable social understandings, (2) To promote health and safety attitudes, (3) To develop an appreciation for good craftsmanship, (4) To develop an interest in crafts for leisure time use, (5) To offer experiences which will aid in understanding modern industry, and (6) To aid in the selection of a worthwhile vocation.

## CHAPTER IV

### TEACHING FLOCK CRAFT IN INDUSTRIAL ARTS

The subject matter of industrial arts courses is of two types: First, there is the work which is largely manipulative. This includes all the constructive activities carried on with tools and machines. The tangible results are the projects which the student produces or the job which he completes. The second type of subject matter is usually designated by such terms as related subject matter. This includes all the lessons and concomitant learnings which take place in the industrial arts class and cannot be classified as manipulative. Such topics as the names of tools and materials, how to figure a bill of material, how to make a working sketch, and countless others would appear under this heading.

There is one primary purpose of all subject matter.<sup>1</sup> That purpose is to achieve the objectives of the particular course. This fact holds true that outcomes which are beyond and aside from the expressed objectives may be achieved, yet these are incidental, and the subject matter is not chosen with these extraneous ends in view. Subject matter should be chosen or rejected exclusively on the basis of whether or not it contributes toward meeting the specific objectives which the teacher or administrator has in mind for that group of students.

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1. Gordon, O. Wilber, Industrial Arts In General Education, p. 57.

The test for judging whether any specific item or subject matter should be included in a given course is to ask the following question: "Does it contribute significantly toward bringing about one or more of the desired objectives of the course as a whole?" If the answer is yes, then that item may well become a part of the subject matter.

In order to show that flock craft is a finish that should be taught in industrial arts, the following facts about flock craft are presented: (1) The art of flock craft, (2) Techniques of flock finishing, (3) Work processes, (4) Tools, equipment, and supplies, and (5) How to evaluate work in flock craft.

#### THE ART OF FLOCK CRAFT

Flock craft is the art of applying finely cut fibers onto any surface, to provide a soft, velvet-like, luxury finish in almost limitless variety of colors. Although flock craft is a most versatile finish, and a series of different techniques are involved, it is still very easy to learn.<sup>1</sup> Through the proper procedure this finish can be made to simulate plush, mohair, velvet, velour and other finishes. It can be used on wood, metal, cloth, plastic, paper, rubber, glass, tile or practically any substance. The surface may be smooth or rough, flat or irregular, fine grained or porous. Flock craft is clean, economical, and requires very few special tools. Not only can an old surface be made completely new looking

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1. W. E. Porter, Success in Flock, p. 1.



but also rich and expensive by employing the proper flock craft procedures.

The art of flock craft requires many of the basic fundamentals which occur in the finishing of a project in woodwork. Sanding, sealing cracks and filling holes are a part of the fundamentals of a good flock job just as they would be to woodwork. However, wood is by no means the only surface flock can be applied, any surface that will take paint, varnish, and etc. will also take flock of some type.

The art of flocking is broken down into three major fields; custom finishing, automotive finishing, and production finishing. Custom finishing is the art of re-finishing old surfaces, and it is the easiest to set up and operate. The space required for this type of activity is very small. An area five feet by ten feet will be very adequate, since no elaborate racks or special tools are needed and a few supplies will enable the flock crafter to do a variety of jobs.

Automotive finishing may be described as the application of flock to any part of the car. This may include such parts as the dash board, upholstery, headlinings, door panels, trunk compartments, and accessories. The automotive field is a challenge to the flock crafter's imagination, for it is wide open and by far the fastest growing field in the whole flock craft industry. One of the latest developments is the flocking of overhead valve covers to eliminate

the annoying noise of the valves in overhead valved cars.<sup>1</sup> The whole automotive field opens up wider every day, and the amount of progress made by the flock craft finisher usually depends on the amount of time he is able to devote to this type of service.

Interesting and extremely profitable describes best the production finishing field. However, this field might be better described as the flocking of manufactured products, such as toys, game boards, figurines, radios and many others. This field like the others, is uncrowded and open for much creative work on the part of the flocker.

#### FLOCKS USED IN FLOCK CRAFT FINISHING

Light, powdery and dust like, flock resembles fuzz to a great extent. It comes in a large variety of colors, materials, lengths, meshes and fiber thicknesses.

The manufacturing procedure is basically, to precision cut long, continuous strands of materials into uniform fiber lengths. These fibers are then dyed the desired color. The most important factor responsible for determining the quality of flock materials is the precision cut uniform lengths.

#### RAYON FLOCK

Rayon flock consists of very fine rayon fibers .04446 of an inch long and 5.5 denier thick. While fiber length can vary from .0223 to .1 inch and fiber thickness from 1.1 to 10 denier, .03334

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1. Porter, Ibid., p. 19.

to 3.0 denier and .04446 to 5.5 denier are the standard sizes of rayon flock.<sup>1</sup> For all round work .03334 inch rayon flock will give the smoothest and silkiest surface possible.

Because rayon flock has a slight sheen, it is most popular among the many types of flocks for general purposes. However, it is the hardest flock to manufacture. It must be cut with sharp knives in machines, which can maintain uniform length for flocking standards. Rayon flock colors are reasonably resistant to sun-fading and color running in water. However, when absolute color fastness is desired regardless of conditions, a rayon flock which has been colored with vat dye must be used. Sixteen colors of rayon flocks are made in both standard and fast color dye.

A special after processing renders rayon flock free flowing in all types of equipment, even under adverse and unfavorable conditions. This after processing eliminates the pilling or balling up which annoys operators and often affect job quality.

#### WOOL FLOCK

Wool will produce a flock material which will give surface like that of cotton flock. But, due to the high cost of wool, this flock seems to be practically obsolete. Wherever the use of wool flock seems to be indicated, a substitute cheaper and just as effective cotton flock can be used.

#### GOAT'S HAIR FLOCK

Goat hair flock is a comparatively recent development. It is

1. Irwin Nels, Flok-Kraft Finishing Methods, p. 32.

used most extensively in the automotive field. It is a natural color, cut animal hair flock, and is rapidly gaining favor in a wide variety of automotive uses. Automobile trunk compartments, floor mats, kick plates, bottoms of door panels and rear shelves readily take surfacing with hair flock. It produces a rough, tough surface, which does not soil easily and which is extremely abrasive resistant.

Goat's hair flock cannot be applied very easily with hand equipment and produce a good job. However, with the proper air tools a very effective surface can be made. Goat hair flock is made from selected goat hair, cut washed and carefully sifted to eliminate dust. This assures clean, free flowing fibers with which to work. Fiber length runs approximately .06250 inch, which is generally used for all round work.

#### AUTOMOTIVE RAYON FLOCK

From the automotive field itself came the demand for an especially designed automotive rayon flock, color-styled and treated to fulfill the wear and tear of use in the automotive field.

Coast Industries developed an auto flock to meet these new specifications.<sup>1</sup> First color blends were developed that are suitable for any and all automobile interiors. Next came special sizing processes to make auto flock far superior in resisting marking, crushing, and scuffing. Precision cut .04446 inch fibres is

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1. Porter, *Ibid.*, p. 35.

the most practical size for general automotive work.

#### PLASTIC FLOCK

Flock plastic, or artificial snow, consist of fine, plastic shavings. White is the most popular color among these flocks. Although only the largest compressed air power equipment will spray plastic flock, many novelty effects can be obtained by simply spreading it around or throwing it by hand for artificial snow. Miniature model displays, window and store displays, signs and backgrounds can be treated in a similar manner. Plastic is vermin proof, fireproof, and non-crushable, clean, sparkling white and flakey. It costs very little, and realistic winter effects can be protected the year round.

#### WORK PROCESSES

Flock can be applied in any school shop without a special area set aside for it. One of the ways to illustrate the simplicity of applying a flock finish is to set up the steps involved in finishing an ordinary project made of wood.

The Operation: To flock the non-porous top of an end table.

Many times in carrying out our color ideas in a particular room it would be to an advantage if the tops of certain pieces of furniture could be changed in accordance with the rest of the room. To be able to perform a job of flock finishing would be of great benefit to the individual.

### TOOLS AND MATERIALS NEEDED

Twelve inch double cut, half round file. One sheet of 0 and 2 sheets of 00 garnet sandpaper, 1 tackrag, 1 card board box large enough to hold the table top, 1 flock gun, 1' -2" paint brush, an ample amount of the desired flock and matching adhesive and 1 table top.

### PROCEDURE:

1. With the file round off all sharp edges and corners.
2. Sandpaper the top first with number 0 then with 00 sandpaper to remove the bumps, uneven spots and chips in the surface.
3. Rub briskly with tackrag to clean the surface of all grease and wax.
4. Set up card board box with one side removed and the top cut to form a hinge.
5. Fill the flock gun about  $3/4$  full with flock.
6. Stir the matching undercoat adhesive well.
7. Brush a full flowing coat onto the surface of the top.
8. Brush away all runs and sags which may form.
9. Immediately begin spraying the flock onto the wet adhesive, holding the flock gun at an angle of about 30 degrees from the top of the table. Be sure to keep the nozzle from 6 to 8 inches from the surface.

As quickly as possible, spray the flock all over the surface of the article. When the spray gun is empty, use it as a blow gun, to remove any piled up flock. Then refill the gun and go over the whole job again. Place gun closer to work. As the flock builds up a deeper pile, keep the nozzle about three to four inches away from the work.

Change the angle of spraying to the left and to the right, on the surface of the top then up and down on the edges. Be sure that every square inch of surface has flock blown on it from at least two different directions, preferably from all four. This is important. This action fills in any light spots, prevents shadowing, and makes the pile full and uniform.

When sprayed from at least two different angles of attack, preferably four, set the project aside to dry over-night, or a minimum of eight hours. When it is dry, blow off the excess flock into your application booth or brush it lightly with a soft brush. It takes three or four days for the adhesive to age-harden completely. But by then, if the above instructions have been followed carefully, your flocked surface will withstand many hard knocks and long wear.

Save all the excess flock collected in the collection booth thoroughly before working with another color. These are the steps necessary for a simple job in flock craft. However,

all of the flock processes are not that easy and examples of a few of the most commonly used processes for other type of surfaces follows.

Porous material has a tendency to suck in adhesives and drain them away from the surface. Examples are plaster of paris, wood (especially end grain) cork, papier mache, cloth, earthenware, pottery (unglazed), some soft pasteboard (particularly the edges), cellotex and other wall boards, and sound proofing materials in general. An example of flocking a porous surface follows.

The Operation: To flock a 22" x 28" pasteboard card.

During the holiday seasons many different types of decoration are being used and flocked paper items are very helpful to carry out many of these themes. Being able to do a flock job on a porous surface would enable one to produce many different effects that would otherwise be too expensive to have a professional crafter to do.

#### TOOLS AND MATERIALS

One flock gun, 1" x 2" paint brush, an ample amount of quick dry sealer, the desired flock and matching undercoat adhesive, 1 sheet of 00 garnet sandpaper, 1 sheet 22" x 28" pasteboard card, an ample amount of adhesive thinner.

#### PROCEDURE:

1. Brush on a coat of full strength quick dry sealer.
2. When the sealer is dry (15 or 20 minutes), sand



the surface lightly if it is rough.

3. Inspect the surface to determine if it is completely sealed, or to see if the sanding operation has broken the sealed surface anywhere.
4. In some cases it might be necessary to apply another coat of sealer. If in doubt, apply a second coat of sealer. However, first dilute the sealer with 25 percent thinner.
5. Fill the flock gun about  $3/4$  full with flock.
6. When the surface is dry brush on a good heavy coat of undercoat adhesive.
7. Spray the flock onto the surface before adhesive has time to get hard. Use method for spraying non-porous surfaces.
8. Set aside and let dry.
9. After the surface is dry, blow off excess flock.  
The empty gun may be used to do this.

For applying flock to a hard glazed surface such as tile, lucite, glass, polished metal, masonite, glazed pottery, and plastics the flock crafter would use these steps.

The Operation: To flock the outside of an ordinary drinking glass.

Being able to apply flock to these types of surfaces would be beneficial to one in that it would permit him to do

many small jobs around the home for special occasions, such as parties, socials and so on.

#### TOOLS AND MATERIALS

Two sheets of 00 garnet sandpaper, tackrag, 1 - 2" paint brush, an ample amount of quick dry primer, the desired flock and matching adhesive, flock gun, ordinary drinking glass.

#### PROCEDURE:

1. Roughen the surface somewhat by sanding (this is very important).
2. Remove all traces of wax or grease by wiping with tackrag.
3. Brush on a coat of quick dry primer.
4. When the primer is dry, sand lightly, then inspect for runs. If runs have formed sand them off.
5. Fill the flock gun about  $3/4$  full of flock.
6. Brush on a coat of adhesive.
7. Spray the flock onto the surface before the adhesive gets hard. Use method for spraying non-porous surface.
8. Set aside to dry.
9. With empty flock gun blow off excess flock.

All plastic surfaces respond admirably to the preparation

described above. For even better results, substitute plastic primer for quick dry primer. This primer is ready mixed and ready for use. All the preceding instructions apply only to materials and surfaces which are not to be unduly flexed or bent after flock finishing, and may all be put in the same group as far as determining the quality of work done on the job. To determine the quality of work done on a job it is best to place the object in bright sun light or very strong artificial light. Examine the surface for shiny spots, uniformity of fiber application, sags, runs, pile of flock and tear drops. If none of these are present the job is good, but if any of the defects are present they should be corrected before the job is considered completed.<sup>1</sup>

#### QUESTIONS

1. Why is it necessary to remove all scratches from a surface to be flocked?
2. Why is it necessary to round off all sharp edges?
3. Why are sealers applied to porous surfaces before the adhesive?
4. What is the disadvantage in using the dipping method?
5. Name some of the causes for shiny spots.

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1. Nels Irwin, The Approved Flock Craft Finishing Method, pp. 50-55.

Where extreme flexibility is required, or when applying flock to any of the rubber derivatives, use flexicoat adhesive. For sponge rubber, ordinary rubber, paper, tightly woven smooth cloth, smooth (but not polished) leather, other additional steps will be needed. An example of flocking a flexible surface follows.

The Operation: To flock an ordinary sheet of paper.

One of the benefits of the knowledge of flocking on paper is the privilege of being able to individualize cards of expression. Many of the commercial cards are alike but with the application of a little flock they would become entirely different and exclusive.

#### TOOLS AND MATERIALS

One sheet of 00 garnet sandpaper, flock gun, one 2" paint brush, tackrag, an ample amount of flexicoat sealer, pasteboard box that will hold sheet flexicoat adhesive, the desired flock, and one sheet ordinary paper.

#### PROCEDURE

1. If the surface is smooth, roughen slightly by sanding lightly.
2. Brush on a coat of flexicoat sealer.
3. Fill flock gun about  $3/4$  full with flock.
4. Set up pasteboard box with one side removed and top cut to form hinge.

5. Brush on a coat of flexicoat adhesive.
6. Spray on the flock before the adhesive has time to set.  
Use method for spraying non-porous surfaces.
7. Set aside and let dry.
8. Use the empty gun and blow off the excess flock after the project has had ample time to dry, check under good light for burns, piles and any uneven spots. Be sure to check closely for cracks. If none are present the job is good and the sheet is ready for use. If cracks appear in the surface usually the sheet is discarded and the whole job is done over.

#### QUESTIONS:

1. How is full flexibility maintained after being flocked?
2. How is flexicoat adhesive thinned?
3. What are the two kinds of flexicoat adhesives?
4. Why must smooth surfaces be roughened before applying flexicoat sealer?
5. What happens when the adhesive forms a surface film?

Porous or fuzzy materials, open-weave fabrics, suede leather, felt, or materials that have a high pile nap such as velour cloth, must be sealed with flexible sealer in order to maintain full flexibility. Apply sealer with brush, dip or spray application,

whichever is most convenient. After it dries it is ready for the first coat of flexicoat adhesive.

Fabric materials present a variety of surfaces, from a tightly woven, smooth to a loosely woven heavy nap fabric, and each one needs special attention and usually a slightly different treatment. It is the task of the flock craft finisher to reduce all these types of surfaces to a uniform quality so that the same type of surface is presented to the adhesive every time, regardless of the porosity of the material he started out with. Sealing is unnecessary except on fabrics that have a very high pile nap such as velours, plushes, and etc.

The most universal sealer for these high pile velour fabrics is flexible sealer, which may be applied in a heavy coat, either by brush or spray gun. It must be understood, however, that when a heavy overall flock craft coating is applied to any fabric, some sacrifice of original flexibility must be made. This does not hold true when a design, or lettering, or partial covering of flock craft is applied. In these cases flexibility is impaired so slightly that it is usually unnoticed. When it is necessary to apply designs, lettering, etc. to fabrics, the sealing method would be impractical. Here one application must seal and act as the adhesive too. The adhesive must stay on top and not be absorbed into the fabric. To accomplish

this, the adhesive must be rendered non-absorbent. Silk screen adhesive has been formulated to fill this need. Silk screen stencil application is the most practical for designing and lettering.

When comparatively large surfaces, such as lamps shades, car dashboards, waste baskets, large picture frames or luggage interiors are to be flock finished with the hand gun, or when the adhesive is to be applied by the brush method, some means of breaking down the surface into smaller sections or panels must be devised. Otherwise, if exposed too long in the air, the adhesive might start to form a surface film and resist the flock, thus resulting in a poor quality job. While the panel method is not difficult to master, some practice on inconsequential objects is advised, in order to be sure that inconsequential objects is advised, in order to be sure that no unsightly ridges or joints show in the finished surface.

If the objects chosen is too large to fit into the corrugated box used as a flock reclaiming booth, spread papers around to collect the excess flock and keep it clean so it can be sprayed again. After the surface has been prepared in the necessary manner, according to texture of the object, proceed by brushing the proper adhesive on the section of the surface which has been previously determined as the first panel.

Spray this section with flock, but take care to avoid the last

few inches where the two panels will join.

When the first panel is completely covered with the flock(except for the last few inches) start immediately to brush the adhesive on the adjoining panel, and be sure to overlap the adhesive on the first panel. At the same time be sure not to touch the previously flock covered surface. Repeat these procedures until the completed surface is covered. Where it is possible the panels should be marked off before the first flock is applied. The secret of a good panel job is speed. The whole job must be completed once it is started.

Some times it will be necessary to renew old, worn flocked surfaces or perhaps change the color of an article to make it fit in more readily with new furniture or other changes that have been made. Often in the case of window displays one may run into these renewing and color changing jobs. In any event, when faced with such problems, there is a choice of two methods he can use to solve his problem.

#### THE STRIPPING METHOD

Apply a coat of stripper on surfaces which have been flock finished by using undercoat adhesive or waterproof adhesive. For surfaces where flexicoat adhesives have been used, use flexicoat stripper. If the original adhesive used on the flock is unknown, try the stripper first. Pour out an ample amount of the proper stripper, in a shallow pan. Begin by dabbing the surface with strip-



per, using an old brush. Let the stripper soak into the nap for a full minute. If at all possible do not perform this operation in the sun.

Simply push the saturated flock off with a putty knife or dull chisel. Wipe the surface with a tack rag and allow to dry. The surface will be free of sealer and primer. If one or both were previously required they must be applied again. Little, if any sanding will be necessary, however. The surface is now ready for a new flock craft finish, which should be applied according to the forestated procedure.

#### THE RECOVERING METHOD

In the recovering method there are two procedures open to the flock crafter, depending on the flexibility of the original material and the type of adhesive use to cover it with flock.

##### Procedure No. 1

For use on all hard, firm material such as: metal, wood, glass, masonite, plastic, etc., begin by sanding the old surface with a medium coarse grade sandpaper. Apply a heavy, flowing coat of quick drying sealer. When the surface is dry, sand lightly and inspect for smoothness. If acceptable, apply a medium light coat of quick dry primer and again sand when dry. The surface is now ready for the new flock finish. Use the same adhesive that was originally on the material. If an unknown adhesive was used, then it is best to use undercoat adhesive.

## Procedure No. 2

For use on all flexible materials such as cloth, rubber, leather, etc. The original adhesive used either white or beige flexicoat. Begin by sanding the old surface with a medium coarse sandpaper. Apply a heavy flowing coat of flexible sealer. When surface is dry, sand lightly and inspect for smoothness. If threads of the old surface still show through, then a second application of flexible sealer may be necessary. The surface is now ready to receive the new flock finish. Use the same flexicoat adhesive that was used originally on the material.

These recovering methods are very effective and useful on large surfaces, large pieces of furniture, display stands and other large areas.

Flocked effect patterns are generally produced by preprinting a sticky lacquer or the like, and dusting or blowing the flock over the printed areas. However, the use of lacquers is expensive and usually involve risks because of their flammability.<sup>1</sup>

This patent proposes the use of a paste containing a solvent or swelling agent for cellulose as an adhesive layer. Pastes of that type have the property of dissolving partly and superficially the printed portions of the fabric as well as the flock dusted thereon. A modification of this process consist of printing the paste on nonswelling fabrics and dusting the cellulosic-comminted fibers

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1. A. G. Heberlein, "Flock Printing," The American Dyestuff Reporter, April 28, 1952, p. 275.

on them. The flock also adheres under these conditions and a two-tone effect may be obtained in dyeing the fabrics. Zinc chloride is a suitable swelling agent in this method, and it is inflammable and also relatively inexpensive. This method can also be used for flocking open mesh materials which can be used for many purposes.<sup>1</sup>

Ornamental effects can be produced by leading the fabrics in a predetermined state through the electrostatic flocking unit.<sup>2</sup>

In the manufacturing of norzon, a base fabric is coated with durable, wet proof adhesive.<sup>3</sup> Then, fine rayon filaments, known as behrlor fibers are dyed and cut to uniform length. A potential difference of sixty thousand volts is maintained between the fibers and the fabric as they enter between electrodes. The base fabric receives a negative electrical charge while the fibers receive a positive charge. Since opposite charges attract, the fibers jump towards the adhesive surface backing and are embedded permanently in on-end position. Because every fiber has the same charge, they repel each other and arrange themselves automatically with great density and uniformity.

The patent process produces a densely flocked surface of approximately 550,000 fibers per square inch of fabric.

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1. A. G. Pecker, "Flocking Devices," The American Dvestuff Reporter, November 3, 1947, p. 644.
  2. Otto Freiberg, "Ornamental Effects of Flocking," The American Dvestuff Reporter, June 13, 1949, p. 479.
  3. Behr-Manning, "X-Rays Identify Flock Fabrics," Electronics, December, 1949, p. 162.

## TOOLS, EQUIPMENT AND SUPPLIES

Flocking is unique in the respect that it can be performed in the same finishing room that is used for finishing with paint, varnish, and etc. No tools other than those already in the wood-work shop are needed for the application of flock. However, in order to produce some of the many special effects that are sometimes done by flock finishing, some special types of equipment is necessary.

A list of equipment to make flock finishing easy and effective in the school shops follows:

- 6 - 1 gallon jars with 1 piece tops
- 1 - Turntable with 30 by 30 inch top
- 1 - Jig of at least four item capacity
- 1 - Drying rack of at least four item capacity
- 2 - 1 inch paint brushes
- 2 - 2 inch paint brushes
- 1 - 3 inch paint brushes
- 4 - .25 inch round paint brushes
- 1 - Gallon lacquer thinner
- 1 - Gallon Primer
- 2 - Gallons sealer (fast dry)
- 2 - Gallons sealer (flexible)
- 1 - Gallon each, undercoat adhesive blue, red, yellow
- 2 - Gallons each, undercoat adhesive black and white

- 2 - Medium cut wood files
- 2 - Fine cut wood files
- 5 - Pounds each, rayon flock in red, yellow, blue, white, and black
- 1 - 1 inch putty knife
- 2 - 2 inch putty knives
- 2 - High velocity hand flock spray guns
- 100 - Sheets of fine garnet sandpaper
- 50 - Sheets of coarse garnet sandpaper
- 100 - Sheets of medium garnet sandpaper

Although it is not necessary to use any power tools to produce an excellent flock finish, there are some tools which can be used for speed and less effort. Some of the commonly used power tools that would be needed in the shop are:

- 1 - .25 H. P. portable air compressor
- 1 - Conventional air transformer
- 1 - Air regulator and pressure guage
- 1 - Respirator
- 1 - Dusk gun
- 1 - Air flock gun
- 1 - Production flock gun
- 1 - Combination sealer and adhesive gun
- 10 pounds each, cotton flock in blue, red, yellow, black, and white
- 2 - Gallons waterproof adhesive

## CHAPTER V

### S U M M A R Y

In developing the idea, that flock craft should be taught in high school. It was brought out that the purpose of this problem was to show how flock craft can be used as a finish in industrial arts. To develop this problem it was necessary to consult the views of authorities in the field of education to establish a set of objectives for general education and authorities in the field of industrial arts in order to set up the objectives of industrial arts. The technical information on flock was obtained from technical literature on that subject. In securing this information it was discovered that technical literature on the subject of flock was adequate and literature pertaining to its application in industrial arts was very limited. For the purpose of the problem, flock was defined as, fibers cut in uniform lengths, from cotton, wool, goat's hair, rayon and plastic. Flock Craft was defined as the art of applying flock to a surface and industrial arts was defined as a study of industry -- its processes, problems, procedures and products.

In analyzing the views of leaders to determine the functions of education, the following set of objectives were established:

- (1) To develop a means of efficiently participating in government,
- (2) To select a worthwhile vocation, (3) To develop an appreciation for fine arts, (4) To promote and encourage human relationship, and To develop an interest in human activities, health and happiness.

The objectives of industrial arts were established as follows:

(1) To give experience that will develop desirable social understandings, (2) To promote health and safety in industry, (3) To develop an appreciation for good craftsmanship, (4) To develop an interest in craft for leisure time use, (5) To offer experiences that will aid in understanding modern industry, and (6) To aid in the selection of a worthy vocation.

The information on flock indicated that the field of flock craft is wide open and growing by leaps and bounds. It is divided into three areas: custom finishing, automotive finishing and production finishing. Examples of jobs were illustrated to show the ease in which flock can be applied, along with a list of tools, equipment and supplies needed for the shop.

In view of the evidence presented in this paper it is concluded that the objectives of industrial arts make up a part of the objectives of general education. And both are concerned with the advancement of the student, in both industry and the development of its products. Since flock is one of these products of industry, it is evident that the art of flock craft should be taught in high school industrial art courses.

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