Screen Process Printing:
Hand-Cut Film
Single Color Pennant

Introduction

Screen process printing, often referred to as silk screen printing, transfers an image using a ***screen image carrier*** that consists of a stencil which has been attached to a piece of fabric stretched on a ***frame.*** A ***squeegee*** is used to force ink through the open areas of stencil, which are the image or printing areas.

Screen process printing is a versatile printing method that is used when large amounts of ink are required to maintain a solid image area or when the product receiving the image is of an unusual shape. It can be used to print on a wide variety of ***substrates,*** such as wood, plastic, glass, cloth, and metal.

The ***stencil*** for screen printing can be created by a variety of methods. These methods include paper, hand-cut film, and photographic stencils, both direct and indirect. For this activity you will be preparing a hand-cut stencil using ***lacquer film.*** This film consists of a thin layer of gelatin on a plastic backing. The film is lacquer ***soluble,*** which means that it will melt or dissolve when ***lacquer thinner*** is applied to its surface. This softening of the gelatin layer is what adheres the stencil to the screen fabric. ***Aqua film*** is also available; because it uses water as its adhering liquid, it may be preferable for use in the classroom.

Job Description

For this activity package, you are going to design and print a school spirit pennant. Since screen process printing allows you to print on a variety of materials and shapes, this process is ideal for printing your pennant. Screen printing also allows heavy deposits of ink to be applied to the material. Because your pennant will be made from a felt material that is rather absorbent, a heavy deposit of ink will be required to produce a solid image.

Pennants are commonly used to promote spirit for athletic teams. They are often attached to a staff and flown like a flag; however, they can also be mounted flat on a wall. A pennant usually contains the logo of the team and lettering that calls attention to the team name, and is printed in the team colors.

In this activity you will design a pennant, prepare the artwork, cut a stencil, and print the pennant design on a felt pennant blank. Since this is your first screen process project, the design will be limited to one applied color. This means that you will print a single color onto the pennant blank; the color of the blank will serve as the second color for the design.

Materials and Supplies

To complete this activity, you will need the following materials:

- completed design for your pennant
- felt pennant blanks
- masking tape
- lacquer film
- stencil knife
- adhering liquid
- screen fabric
- screen frame
- squeegee
- textile ink
- newspaper
- mineral spirits
- screen base

Preparing Your Design

The first step in the design of your pennant is to draw a series of **thumbnail sketches.** (See

Figure 1.) This will give you the opportunity to explore design ideas. Begin by sketching the triangular pennant shapes on a sheet of drawing paper. Sketch in the location of the team logo or mascot. Since these are thumbnail sketches, details are not necessary at this time. Letter in the team name. Notice that the shape of the pennant may require that the lettering take a perspective style, getting smaller towards the point.

A note about copyright: Be careful in your selection of design materials. If you are going to reproduce your design in quantity, you may be infringing on a copyright of a design. Most professional and college athletic team logos and mascots are copyrighted, which means that you cannot use their design or logo without permission. However, you can create your own designs for your school teams, using your school's logo or mascot.

After you have several possible thumbnail designs, select the "best" thumbnail; that is, the design that you feel will make the most attractive pennant.

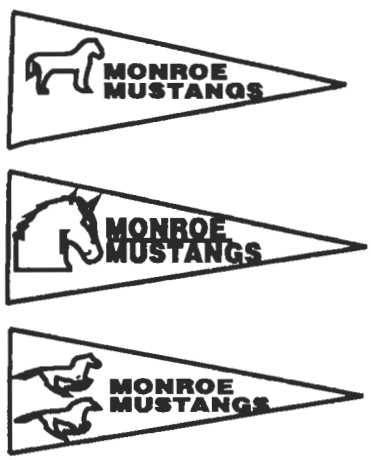

Figure 1 - Thumbnail Sketches

The next step is to prepare a ***rough layout***. On a sheet of drawing paper, lay out a "full size" pennant. Use drawing instruments to draw the shape of the pennant. Consult with your instructor to determine the size of the pennants you will be producing. The size will be determined by the material or the screen frame size available in your lab.

The rough layout should be considerably more detailed then the thumbnail sketch. Draw your design full size in pencil, with typefaces hand lettered. Sketch in your logo or mascot.

Figure 2 - Rough Sketch

After your rough sketch has been approved by your teacher, your next step is to prepare a ***mechanical layout*** on illustration board. Final paste-up is done after all the design elements are completed.

The type for your pennant is best prepared by using a typesetting device. If you have a computer with a typestyling program such as *TypeStyler, Ready Set Go,* or *PageMaker,* you can set your type using this method. Included in the sample illustrations in this package are some variations of type styles done with *TypeStyler.*

The artwork for your mascot or logo needs to be done full size, so that it fits the area on your pennant. You can use the "grid" drawing method to enlarge or reduce drawings of the logo or mascot. Another method is to scan your image, and then use the computer program to modify, enlarge, or reduce the image. The copy elements, printed out on a laser printer, will give you excellent artwork for your pennant and a professional appearance.

When positioning the ***copy elements,*** a T-square, triangle, and rule must be used. A light blue pencil is used to draw layout and guidelines. Tape your illustration board to the drawing board and lay out your triangular shape. Rubber cement should be used to attach elements to the illustration board.

Preparing Your Stencil

1. Cut a piece of film about 2" larger on all sides than your design.

2. Attach your design to the back of the film using masking tape. Be sure that the film is centered over the actual design.

3. Using a sharp stencil knife, cut out your design, peeling up the film only from the areas to be printed. You must use a light knife pressure, cutting through the top layer of the film only. Do not cut through or ***emboss*** the backing sheet. You should check your work occasionally. Run your finger over the back of the stencil; you should not be able to feel the lines cut into the film. Too much pressure on the knife will cause ***embossing,*** raising the surface of the film. The film will not adhere to the screen if this occurs.

Printing Equipment

The ***screen frame*** is a wooden or metal rectangular frame, similar to a picture frame, that holds the screen fabric tightly stretched. ***Screen fabric*** must be a porous mesh material that will allow the ink to pass through. Screen fabrics which can be used are silk, organdy, nylon, polyester, cotton, and fine wire mesh. The size of the mesh, or weave opening, is indicated by a number, with the most commonly used being a 12xx fabric.

There are two common methods of stretching the fabric over the frame. They are the ***staple method*** and the ***tite-stretch,*** or cord method. Which method you use will be determined by the types of frames you have available in your lab. Your teacher will demonstrate the correct method for stretching fabric on the frame. Remember that the fabric must be tightly stretched on the frame and that new fabric must be washed or "prepped" to remove the sizing from the fabric.

The ***screen base*** provides the flat surface on which you will place your pennant blanks. You must position the stock to be printed using ***registration guides.*** Three guides will be required for your pennant blanks. These will insure that each blank will be placed in the proper position on the base to receive the image from the screen.

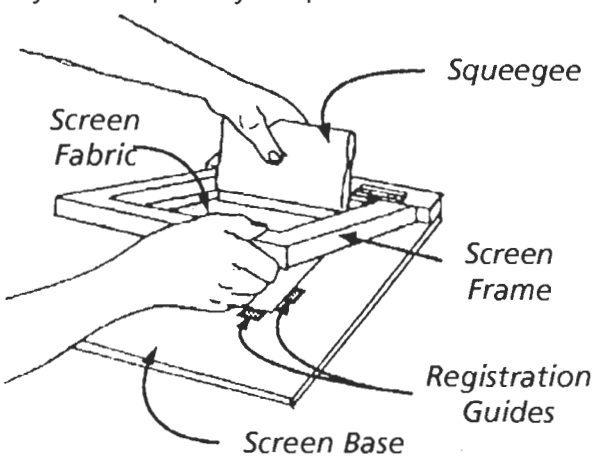

Figure 3 - Typical screen printing set-up

The ***squeegee*** is the rubber-bladded tool used to force ink through the stencil. An ink knife is used to remove ink from the can and place it on the screen, as well as to remove excess ink after printing.

Adhering the Film to the Screen

Select a screen frame that is at least 2" larger on all sides than your film. Place the frame over your stencil, with the stencil right reading side up. To insure that there is a good contact between the film and the screen, place several layers of newspaper under your stencil. The paper must be smaller than the inside of the frame, but slightly larger than your stencil.

Use two clean cloths or cotton pads to adhere the stencil. Moisten one with ***adhering liquid*** and wipe it over a small portion of the stencil. Immediately wipe the area with the dry cloth. The gelatin is softened by the adhering liquid, and applying downward pressure on the frame will force the film to stick to the screen. Continue wetting a small area at a time and drying it until the entire stencil has adhered.

The stencil will darken in color when adhered to the screen fabric properly. Too much adhering liquid and rubbing will destroy the stencil. If a small area has not adhered, you may go back over that area carefully. When the stencil is dry, which takes about 15-20 minutes, slowly peel off the plastic backing sheet.

Printing Your Pennant

Before you can begin printing, you need to prepare your work area. It is a good idea to place newspaper or some other protective paper on your work surface.

Attach your frame to the printing unit. You will need to center your image on practice paper cut the same size and shape as your pennant. This can be done by placing your original design or

paste-up under the frame, aligning the image on the paste-up with the image on the stencil.

Use small pieces of cardboard taped to the printing unit alongside the left side and top of the pennant blank. These ***registration guides*** will help you to position each blank correctly.

Place a sheet of practice paper cut to the pennant shape on the printing base, snug against the registration guides. Lower the frame. Using an ink knife, place a small amount of ink above the image. Select a squeegee that is slightly wider than the width of your image area. Holding the squeegee at a 30 degree angle, pull the squeegee across the screen while applying downward pressure. To avoid smearing your image, go over the stencil only once for each print.

Raise the frame and remove your print, placing it on the drying rack. If your copy is accurate, continue printing by placing your next pennant blank in position and repeating the process until you have printed the required number.

Clean-up

When you have finished printing, remove any excess ink from the frame and the squeegee using the ink knife and placing it back in the can. If a paper mask or masking tape was used, remove it from the frame at this time. Wrap the discarded tape in newspaper and dispose of it properly.

Using a cloth and ***ink solvent*** (water or mineral spirits, depending on the type of ink used), clean the remaining ink from the squeegee and ink knife. Place newspaper under the frame, and pour a small amount of the ink solvent directly onto the screen. Wipe the screen with the cloth, pouring more solvent as necessary. You may need to change the newspaper several times during this process. Continue until all ink has been removed. Check that the screen has no clogged areas by holding it up to the light.

Once the stencil has been cleaned properly, it may be saved and reprinted at another time, or it may be removed from the screen so that a new stencil may be ahered.

Ecology

Read labels on solvent cans, and dispose of used solvents correctly. Do not pour solvents down the sink drain. Dispose of oily rags and materials correctly.

Vocabulary

Screen process printing
substrate
squeegee
registration guide
image area
lacquer film
adhering liquid
image carrier
soluble
thumbnail sketch
rough layout
mechnical
paste-up

Safety

Stencil knifes and cutters are very sharp; handle with care. Always cut away from hands and fingers. Never cut on your desk; always use a cutting surface.

Be careful when working with solvents. Wipe up spills immediately, as solvent spills on floors are dangerous. Do not "sniff" solvents to determine contents of a can.

On Your Own

1. Find examples of products that have been screen process printed. Bring them to class and set up a display in your display case or lab. You may want to include a sample screen, squeegee, and other screen process materials, as well as a written explanation of the process.

2. Select the mascots and/or logos used by professional sports teams or sports equipment companies. See if you can find out what their significance is.

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TEACHER GUIDE
SCREEN PROCESS PRINTING: HAND-CUT FILM SINGLE COLOR PENNANT

Objectives: Upon completion of this assignment, students will be able to:

- Design a sports pennant, utilizing the design process by creating thumbnail and rough sketches.
- Complete a mechanical layout and paste-up of the pennant design.
- Prepare a screen frame for printing.
- Prepare a single color hand-cut stencil.
- Adhere the stencil and prepare the screen for printing.
- Make multiple copies of a sports pennant.

Helpful Hints:

1. Visit a local sports shop and obtain a few copies of some sports pennants to use as examples. These pennants usually contain authorized copyrighted materials from agencies such as the NFL or NBA and collegiate agencies like the NCAA. You should discuss the use of copyrighted designs, logos, and logotypes with your students.

2. The material the pennants are printed on is a stiff felt; a similar material can be found at most fabric stores. It is easily cut and does not require seams. It will stay flat and accepts any textile ink very well.

3. Most pennants have a sewn strip along the left-hand edge of the triangular shape. This allows a small dowel rod to be placed in the pennant. A small hand held battery operated sewing machine is available at most discount stores for about $20.00. This will sew the band along the edge of the pennant easily if you desire to "finish" the pennant this way.

4. Obtain several copies of your school mascot. Make photocopies of the designs on a copy machine. Enlarge and reduce the mascots for use as design materials for your school pennant. For those students who have difficulty with freehand drawing, these can be traced on a light table.

5. For lettering on your pennants, a computer program such as *Typestyler* is really helpful. This will give you the desired effects necessary for fitting type to the pennant shape. While most programs will print out on a single 8 1/2" x 11" sheet, these pages can also be enlarged on a copy machine if necessary.

6. Another computer program that will give you excellent sized type in a wide variety of styles and shapes is *Bannermania*. The size of the "banner" can be set from a single 11" sheet to any multiple of 11" sheets. Printed out on a laser printer, this program provides very professional lettering for your pennants.

TEACHER GUIDE
SCREEN PROCESS PRINTING:
HAND-CUT FILM SINGLE COLOR PENNANT (Cont'd.)

7. If you have access to a scanner, scan examples of your mascot or school seal. These can then be manipulated, enlarged, or reduced using a graphics program and printed out on a laser printer.

8. This project can be a good "fund raiser" for your class or club. Coordinate the printing production with a "home game" or homecoming event. If printed well, this project will be a good seller. Use 3/16" dowel rods for "sticks" for the pennants.

9. A flock adhesive ink will allow you to "flock" the pennants in a variety of textures and colors. *Dick Blick* is a good source for flocking materials, as well as blank pennants which can be purchased in bulk amounts. These already have the pole strip sewn on. Most art teachers have a *Dick Blick Catalog,* or 800-number phone directories will list the contact number for *Dick Blick Art & Graphic Arts Supplies.*

10. This project is meant to be a single color print. Printing in one color on a second color blank will give the appearance of two colors. White on a solid color will work very well; flock adhesive ink in white will give you a good solid layer of ink.

11. If you do not wish to spend the money on felt blanks, the project can still be done on colored construction paper or colored index. Because the index paper is stiffer, it will retain the shape better.

12. An alternative is to use a white trash bag material (polypropylene) for pennants. However, suitable ink will have to be used that will "stick" to the plastic bag material.

LANGUAGE ARTS APPLICATION
SCREEN PROCESS PRINTING: HAND-CUT FILM SINGLE COLOR PENNANT

_____
Student Name

In all types of jobs you will find that you need the ability to communicate your ideas effectively. Writing skills are necessary in all occupations. Here are a few examples of how writing skills are related to this activity.

Pennants often contain messages related to the team they are designed to represent. These can also be used to "commemorate" some special event like a championship or season. For this assignment, you will be designing a pennant representing the school mascot or a team sport at your school. You might also consider a "commemorative" pennant. For example, if your school's football or basketball team won a state championship, district title, or other special recognition, it would be appropriate to design a pennant to recognize that achievement.

1. In the space below, list the accomplishments that team sports have achieved at your school this year.

_____

_____

_____

_____

_____

_____

_____

_____

_____

2. Write three different lines of copy that could be used on a pennant design that would recognize one or more of these achievements.
   Example: "Home of the State 4A Champions"

1. _____

2. _____

3. _____

MATH APPLICATION
SCREEN PROCESS PRINTING: HAND-CUT FILM SINGLE COLOR PENNANT

_____
Student Name

In all types of jobs and occupations you need the ability to apply mathematics effectively. Here are a few examples of how math skills are used in relation to this activity.

While working in the area of screen process printing, you may need to make an estimate of the materials required to complete a project. When estimating sums, differences, products, or quotients, you may have to round a decimal to the nearest whole number, tenth, hundredth, or thousandth.

To round a number, point to the place to which you need to round. Then look at the first digit to the right of that place.

If it is 5 or more, round up.
If it is less than 5, round down.

Example:

Round 6339 to the nearest thousand.
3 < 5 Round down to 6000

Round 873.24 to the nearest hundred.
7 > 5 Round up to 900

Now try these:

1. A factory sold $3913.35 worth of red inks and $14,329.57 worth of blue inks last month. Estimate the total value of the two inks sold last month. Round to the nearest hundredth.

2. The factory produced 715.25 gallons of green ink last week. To the nearest gallon, how many more gallons must it make next week to fill orders for a total of 1823.75 gallons?

MATH APPLICATION
SCREEN PROCESS PRINTING:
HAND-CUT FILM SINGLE COLOR PENNANT (Cont'd.)

3. Working at top speed, the factory can make 671.50 gallons of paint each hour. Estimate the maximum number of gallons that it can make in 8 hours. Round to the nearest 10 gallons.

4. Last year the company made a profit of $1736.29 on 868 gallons of yellow ink. To the nearest cent, what was the profit per gallon?

5. Last year the company's total profits came to $1,438,279.28. This year the profits totaled $1,873,796.15. What were the total profits for the two year period? Round to the nearest dollar.

6. This year a senior ink mixer at the factory makes $16.50 per hour. If the mixer works 36.5 hours per week, what is the person's weekly wage to the nearest cent?

7. It takes 3.168 ounces of a special red pigment to make each gallon of scarlet red ink. To the nearest hundredth, how many ounces of this pigment are needed to make 67 gallons of scarlet red ink?

8. Last year the company spent $1258.72 on yellow pigment and $1462.39 on blue pigment to make green ink. Estimate to the nearest hundred dollars the cost of making the green ink for the year.

9. This year the company declared a dividend of $.15 per share. Estimate to the nearest dollar the amount that a person owning 1475 shares would receive.

QUIZ
SCREEN PROCESS PRINTING: HAND-CUT FILM SINGLE COLOR PENNANT

_____
Student Name

True or False:

_____ 1. Hand cut stencils can be blocked out using tape or blockout fluid.

_____ 2. The image area on a stencil is removed or cut away.

_____ 3. The squeegee is used to force ink through the screen.

_____ 4. Solvents can be disposed of by pouring them outside on the ground.

_____ 5. Unused ink should be thrown away, rather than returned to the can where it will ruin the whole can of ink.

_____ 6. Registration guides are used to hold the receiver material in place on the screen bed.

_____ 7. Pressing hard on the stencil with the knife will emboss the stencil, making it adhere to the screen more easily.

_____ 8. When printing, make several passes with the squeegee to make sure enough ink is transferred to the blank.

_____ 9. You can copy any sports logo with no copyright infringement, since these are for sports teams.

_____ 10. The best way to determine what is in a solvent can is to sniff it.