

## **MAKE-READY FOR CUTTING AND CREASING PRESSES:**

### **CUTTING MAKE-READY FOR PAPERBOARD**

#### **The Purpose of Make-ready**

The purpose of make-ready is to compensate for variations in the material to be die-cut, in the press itself, or in the die.

#### **The Causes of Make-ready**

Variations in the material to be die-cut; i.e., moisture content, type of bonding material, thickness of material, grain, and composition.

Variations of the cutting knife in height, bevel, intricate bends, straightness, cutting edges, and deflection.

Variations in the press due to normal wear or unbalanced die cutting loads.

#### **Unnecessary Make-ready**

This type of make-ready can be avoided or reduced by careful inspection, and the establishment of standards in the selection of cutting and creasing rule, die design and construction, in the control of material variations, and in proper press maintenance.

The dimensional accuracy of all cutting rule in the die should be maintained at the selected height, and worn or bent rule should be replaced immediately.

Variations in material can be controlled by standardizing on bonding materials that do not vary in their characteristics. The moisture content and the material composition of the board should also be controlled.

Worn press parts and bearings should be replaced when first detected.

### **Normal Make-ready**

Normal make-ready is required for adjustments in relation to the compression and deflection of the press components caused by the load required to die-cut.

### **Perfect Make-ready**

Perfect die-cutting will result from perfect make-ready. A kiss impression is obtained and the cutting rules will not cut into the hard steel cutting plate at any time.

### **Minimum Make-ready**

Modern design and materials used in new Thomson cutting and creasing presses and extreme care of obtaining perfect impression in final assembly, results in reducing make-ready to a minimum of devoted make-ready time.

## **MAKE-READY SHEET**

Remove hard steel cutting plate from top of bridge and clean it thoroughly using boiling water and a lye solution. Replace plate. Have the die located in the center of the chase so that the center of pressure is in line with the center of the connecting rod pull.

Glue temporarily to the top upper edge of the cutting plate, either one or two sheets of 6 point (0.006" thick) hard finish Kraft paper. (Ordinary wrapping paper has been found to be excellent.) 12 point (0.012" thick) manila tag board is only recommended for light work as the spotting will sink or press into the board.

The use of one or two sheets is optional and depends on the type of work and tonnage imposed on the press. Most make-readys for corrugated work can be made with one make-ready sheet. Compact dies such as for jigsaw puzzles, folding box dies having a large number up, and any die that creates a maximum load on the press, should have two make-ready sheets.

With the impression set for a very light impression and the adjuster bar thrown into cutting position take a light impression on these make-ready sheets or sheet. (See Fig.9.)

The bottom and side guides can be set at this time to the outline of the make-ready sheet. For instructions, refer to paragraph heading Set Guides.



Place the make-ready sheet or sheets under the hard steel plate, making sure they are in register with the cutting die and located in place through the two dowel pins found in both upper sides of the bridge.

### TEST CUT

Take a test cut on the material to be used on the job. Adjust the impression until the desired cut impression shows in any one part of the die. A clean cut overall is not necessary.

If the impression is not fairly even all over, level as follows:

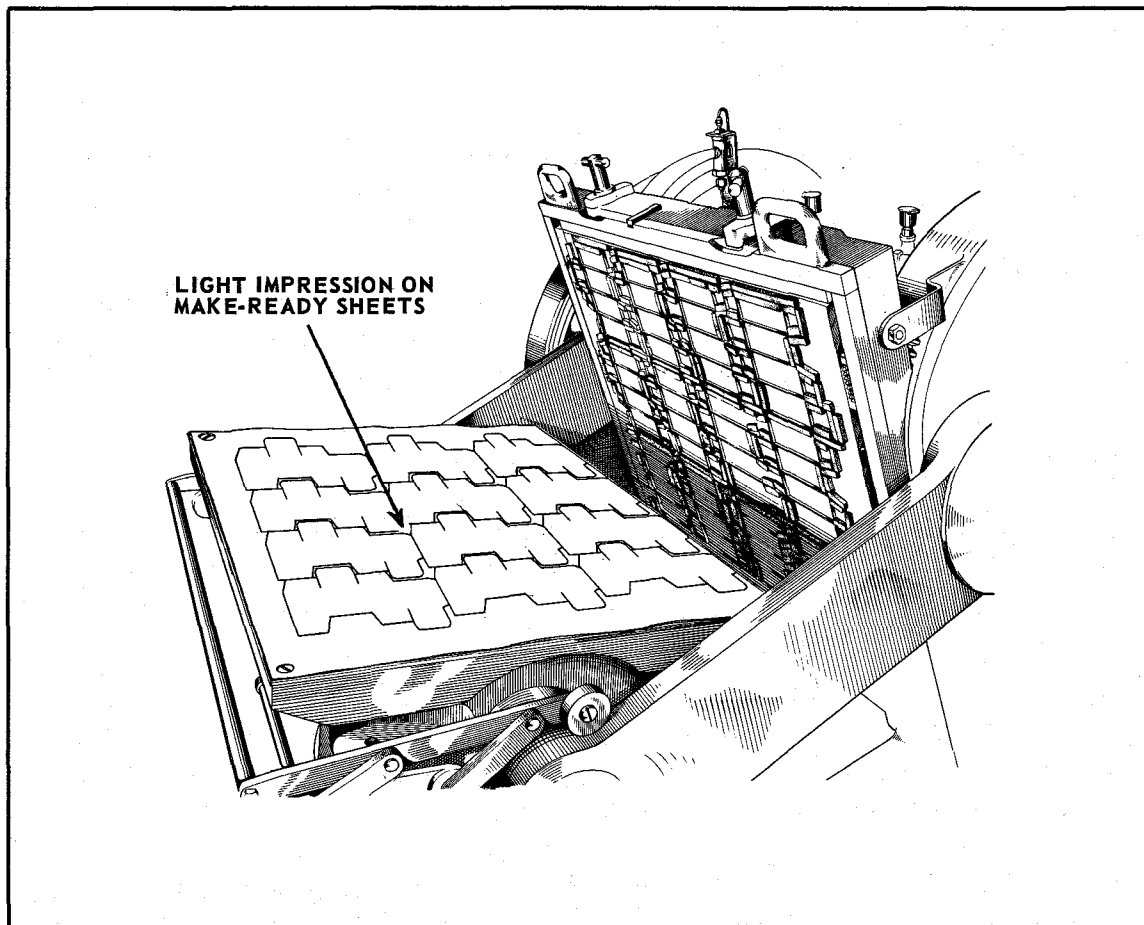
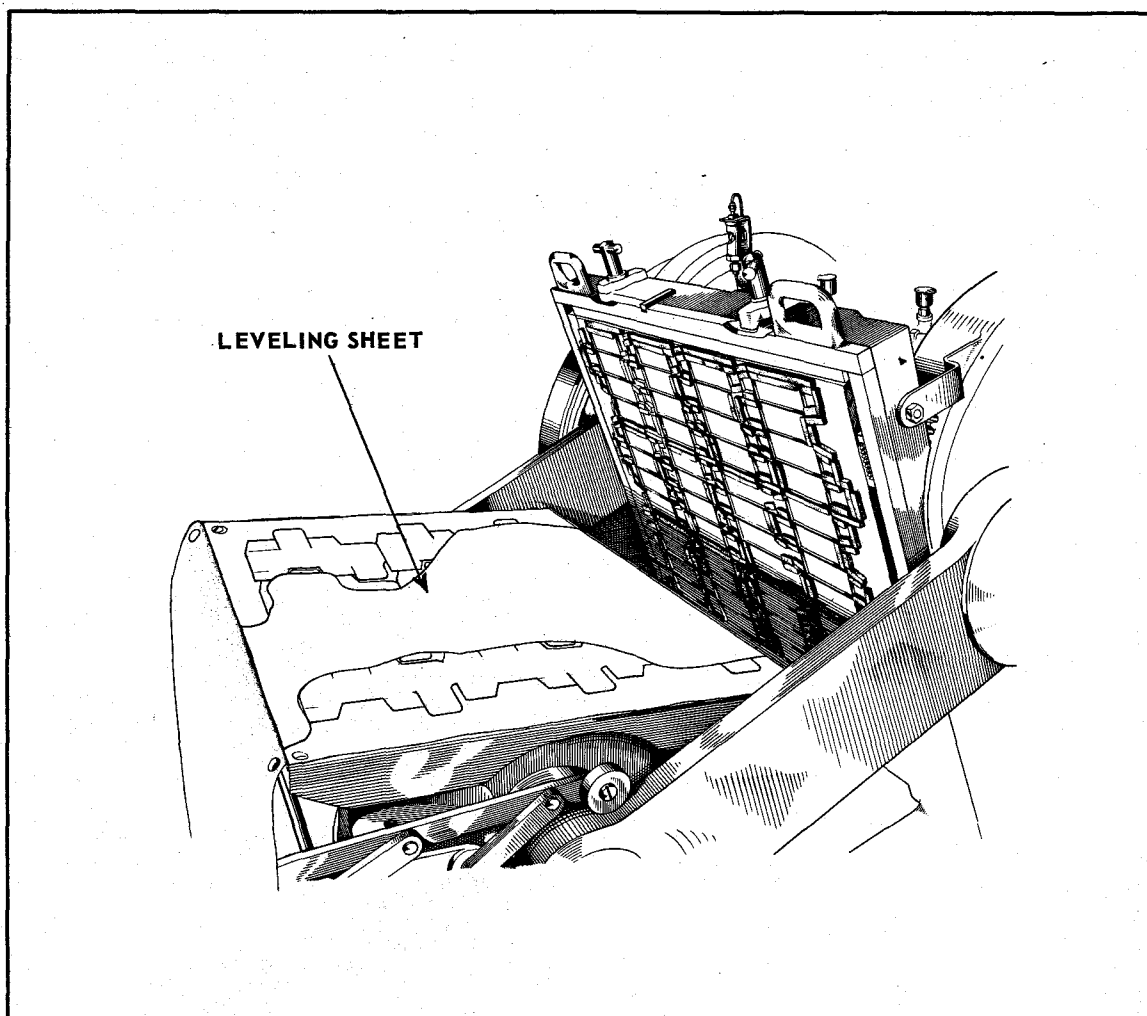


Figure 9

### LEVELING

The purpose of leveling is to eliminate large low areas that are not cutting and cannot be corrected as easily by spotting up. New machinery will require little or no leveling.

Mark the area which is low and cut a leveling sheet to this shape. The thickness of the leveling sheet should not exceed 0.003 inch in thickness.



*Figure 10*

Remove make-ready sheet or sheets from beneath the steel plate and glue leveling sheet in place on the second sheet of make-ready as shown on *Fig. 10*. If only one make-ready sheet is used, glue the leveling sheet to the back of the make-ready sheet.

Replace make-ready beneath the steel plate and take another impression on stock to be used.

Continue the leveling process if necessary, cutting each sheet to the shape of the low area.

Whenever possible, it is recommended that the bottom make-ready sheet be cut away in the high cutting area, which will eliminate a spongy make-ready if several leveling sheets are necessary.

It is necessary sometimes to advance the impression over the entire job area during leveling.



## SPOTTING UP

After proper leveling, the impression will show cutting fairly even over the entire job, but will probably have some low spots. Spot up on top make-ready sheet until a perfect cut is obtained.

When spotting up DO NOT use long strips of gum stock for this purpose as they will tend to create a sponginess that increases the press load.

It is better to use pieces of gummed stock one half inch square, spaced about one quarter inch apart. (See Fig. 11.)

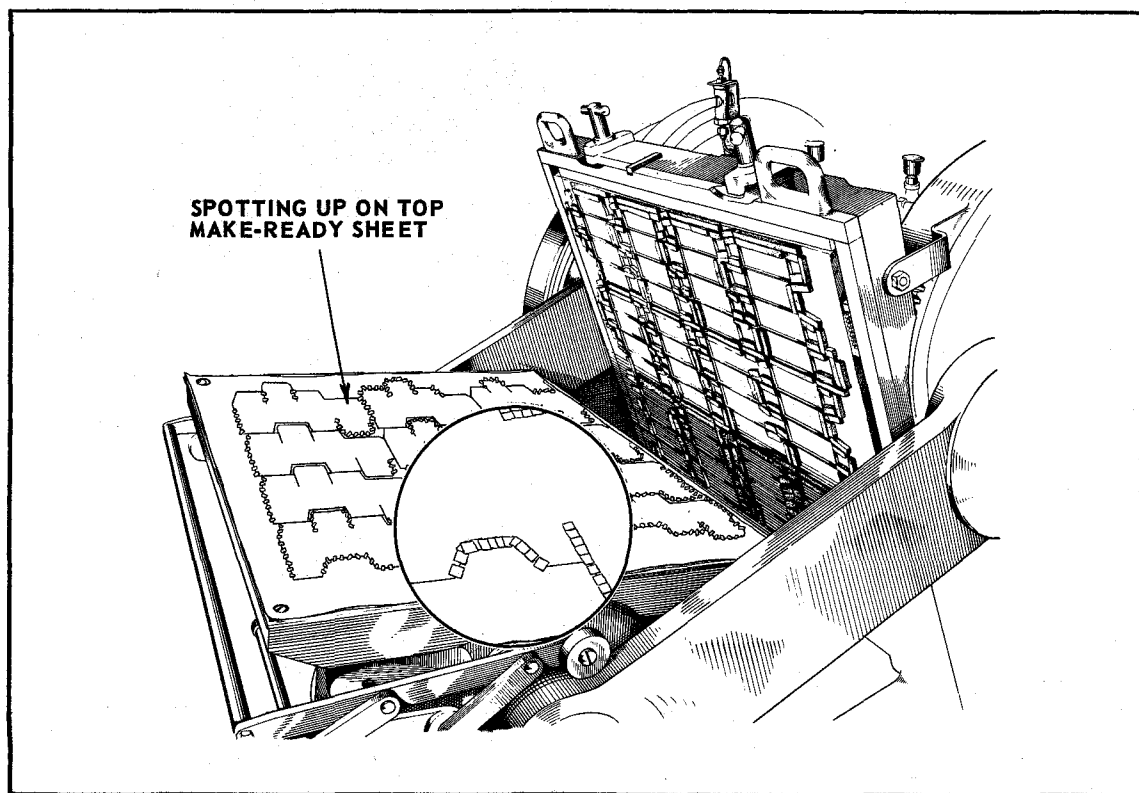


Figure 11

## IMPRESSION FADING AWAY

Should the impression fade away all over after running a few hundred sheets, advance the impression one division of the micrometer collar until desired cutting is obtained. Should it fade away other than all over the sheet, be sure to spot those places on make-ready as described above. Do not add an extra sheet.

## NICKING CUTTING RULE

Nick cutting rule as little as possible to have the sheet hold together, using a small grinding wheel or file. Do not use a chisel.

## SPONGY MAKE-READY

Do not continue to add sheets to make-ready in preference to advancing the impression. More than four sheets in make-ready will tend to create a spongy cutting condition which will dull the knives in the die and overload the press.

## SET GUIDES

Set side and bottom guides to register for run.

One method is to set the guides to the outline of the make-ready sheet at the start of the make-ready process.

Another method is to take a cut on a sheet of make-ready paper and strip, holding it in register by tape or steel plate screws. Lay sheet under stripped portion and set guides to register.

## LIFT METHOD

The entire make-ready sheet and steel plate with creasing make-ready can be stored for a future run of boxes at a later date. It is also suggested that the corresponding cutting and creasing die be retained in its chase with original lockup and filed away. In this way the entire job can be quickly placed back onto the machine, and started without delay or new make-ready.

## CREASING COUNTER

### COUNTER

Make sure that the hard steel plate is screwed down tight. Glue counter of hard press-board equal in thickness or less to that of job, or actual cardboard used for the job, onto the hard steel plate.

Ink the creasing rule in the die, and take an impression on the counter. If ink is undesirable, the creasing rule outline can be obtained by placing carbon paper over the counter and taking an impression. (See Fig. 12.)

Cut clean straight channels in counter approximately twice the thickness of the material being processed, plus the thickness of the creasing rule. (See Fig. 13.)

See page 71 "Disturbing Factors that Affect the Creasing of Cardboard" for other information.



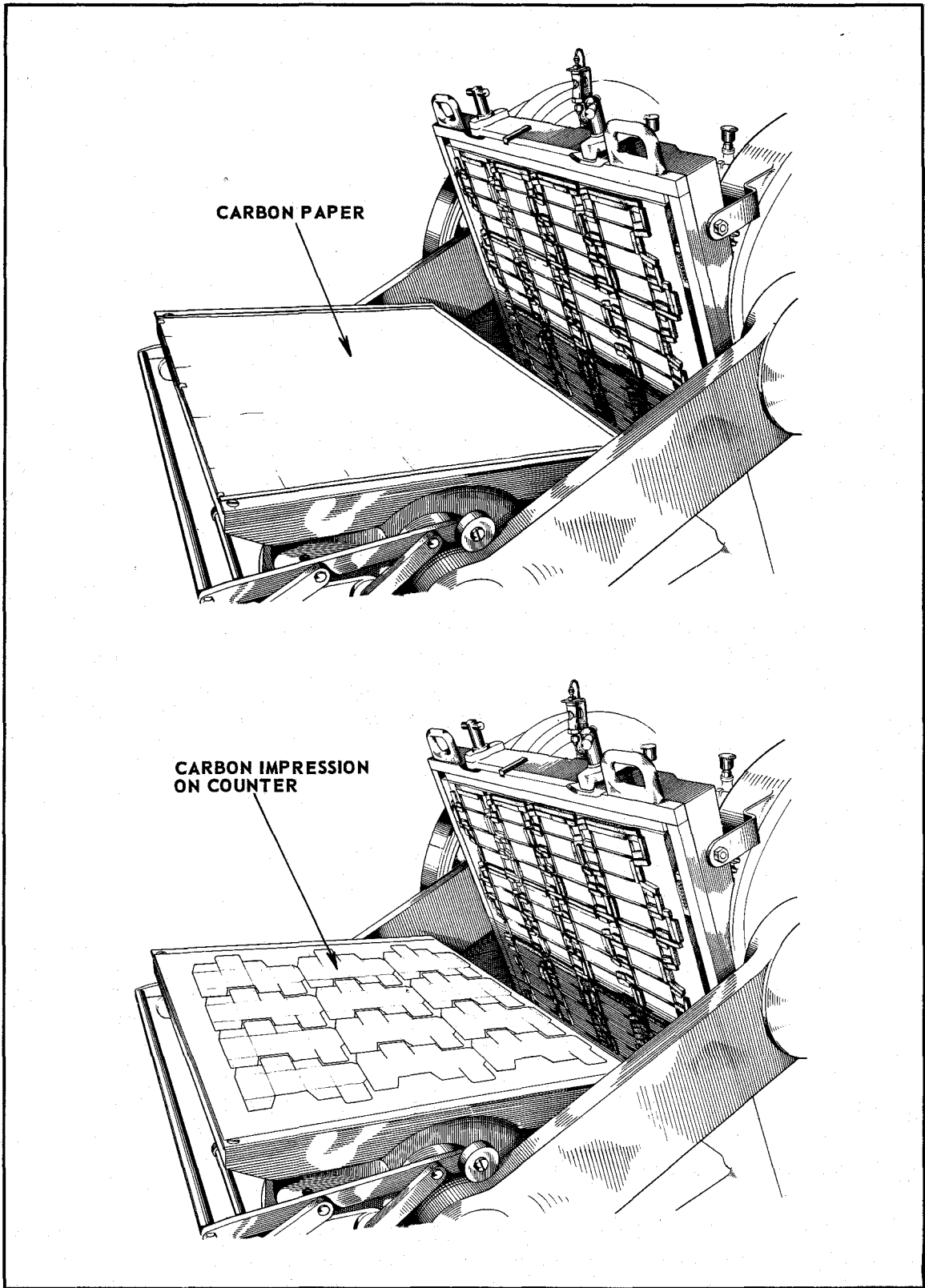


Figure 12

## CREASING RULE LOW

If impression on creases is low, build up creasing rule on back of die, taking care not to cover cutting rule or experiment with higher creasing make-ready.

## FINISHING COUNTER

Cut away all dead pressboard in the area where cutting rules strike. Be sure that clean bevel edges remain on pressboard, so that entire counter is neat and smooth.

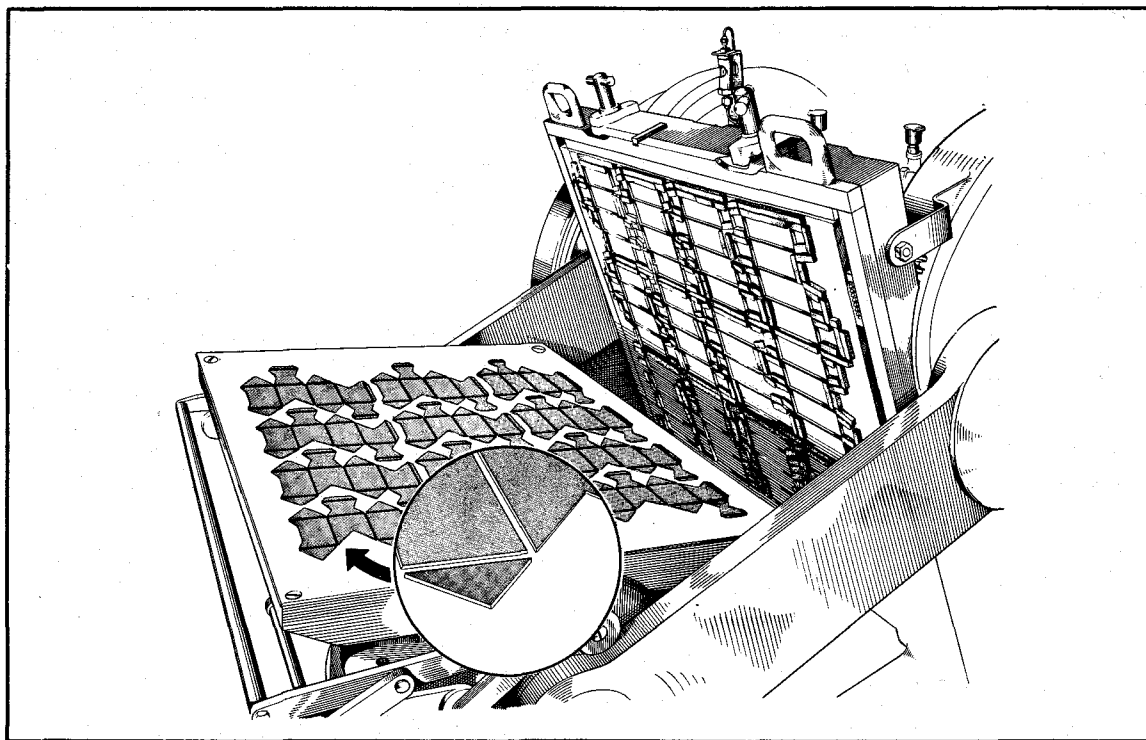


Figure 13

Coat entire counter with a good grade of orange shellac or light varnish to preserve until job is completed. This also makes possible later re-use of make-ready.

## MAKE-READY FOR CUT SCORES

### Cut Score Rule Height

The height of the cut score rule must be under the height of the cutting rule used, and it is determined by measuring the thickness of the job material, and deciding how deep the cut score is to be into the material.

### Make-ready for Cutting

Make ready for cutting and prepare creasing counter as previously outlined.

### Make-ready for Cut Score

Bring up cut score to desired condition by making ready on top of the steel plate opposite the cut score knives. Use thin sheets of narrow paper.





## MAKE-READY FOR DECALS

### **Cutting Rule Height**

The cutting rule must be of uniform exact height, and it is recommended that all rule used be ground to exact equal height.

### **Make-ready for Cutting**

Select three pieces of 0.003" and one piece of 0.006" thick hard finish Kraft paper, and glue temporarily to top upper edge of the cutting plate.

Take a carbon impression of the cutting rules, and place the make-ready sheets under the hard cutting plate in register with the die.

### **Test Cut**

Take a test cut on the material to be used, adjusting the impression until the desired cut impression shows.

Cut away the make-ready sheets on areas of excessive cutting. Make-ready on top of the steel plate can be used for this purpose also.

Low areas should be spotted up to obtain a perfect impression.

### **Variation in Cutting**

Because of the light loads that are imposed on a machine when die cutting decals, unless a sufficiently heavy impression is established during make-ready to take up the bearing clearances of the press, a variation in cutting will result.

If necessary, bearers can be used to establish a rigid impression. Please refer to section titled "Make-ready for Bearers" for other information.

### **Reverse Creasing**

Reverse creasing can be obtained by attaching a male creasing form to the hard cutting plate and inserting a female channel material in the die.

A plastic male can be attached to the cutting plate and rubber inserted into the die to create the female.

A wire or special made metal creasing form can also be used with a female channel constructed out of various materials.

## MAKE-READY FOR BEARERS

### Cutting and Creasing

The sides of the make-ready sheet should be cut away, and not extend out under the bearers.

Bearers must be made of hard wood or metal equal in height to the cutting rule, extending from the top to the bottom of the inside of the chase, and locked up in the sides of the chase with the die.

Apply ink to each bearer; take an impression and observe marking made against the hard steel plate on the bridge.

If not of sufficient height to overcome rocking action created by the job that has been placed off center, the bearer must then be made ready by spotting thin pieces of metal on the back of the bearers until they show to be of correct bearing height. After the proper height has been determined, new metal or wood bearers should be made and inserted in the die assuring no fading away of impression. (See Fig. 14.)

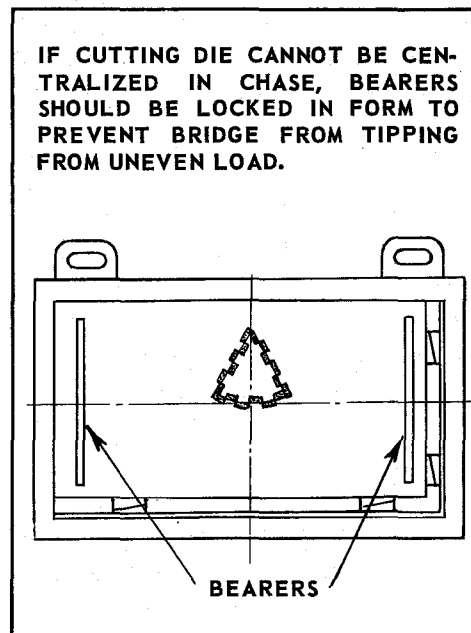


Figure 14

### Embossing

Please refer to section "Embossing on Platen Presses". Bearers for embossing should be approximately 1/16 inch higher than the embossing die to allow space for embossing foundation, make-ready, and board thickness.

## MAKE-READY FOR PUNCHES

Dies that are constructed with ejecting type punches for punching operations should be 0.005 inch lower than the cutting rule. Make-ready as usual, bringing up steel rules first, after which spot thin pieces of metal on the back of the punches, just enough to bring punches up to proper height for cutting.

These pieces of light metal may be glued on the back of the die itself, over the back of underside of the round punch. This eliminates extensive make-ready under the hard cutting plate for the punches.

Punches should be made of very fine steel and all very carefully ground to exactly the same height. Punches of varying heights will bear off the impression and spoil the entire make-ready.

Refer to "Bolster Die Instructions" for make-ready of open end punches.



## HELPFUL HINTS IN MAKING A LOOSE DIE

### LAYOUT

We will take for example a series of eight cutting dies for pictorial cardboard fans. The fans are to be pear shaped. The form of eight dies is to be run on a THOMSON Cutting & Creasing Press. Hard cutting rule will be required in making these dies, and the rules are to be inserted in a piece of laminated board cut to a size that can be conveniently locked up with quoins in a chase. The height of the die lumber should be about  $5/8$ " for .937" rule and  $11/16$ " or  $3/4$ " for 1.125" rule. We shall presume that the stock for this job has already been printed with the pictorial designs eight-up, on sheets 20 x 32 inches. One of the printed designs is carefully cut out by hand to the desired shape to form a pattern. This pattern is placed on the surface of the laminated block, and black pencil outlines of it are marked on the board in the proper positions to register with the eight designs on the printed stock. The blank margins between a series of dies of this class may be as close as  $1/2$ ".

### JIGSAW

After the eight pencil outlines of the pattern have been marked on the board, the next step is to saw out the eight shapes from the board. This process is to be done carefully and accurately with the use of a power jigsaw. This will leave open "slots" in the board for the insertion of the bent pieces of cutting rule. The cutting rule is bent to shape to conform with the shape of the pattern. After having been thus bent, the cut-out pieces of board are removed when the rule is inserted, and are then replaced. In some cases it may be necessary to sandpaper or slightly "trim" the edges of the cut-out pieces of board in order to make the rule fit into the slots. (See Fig. 15.)

### STRIPPING MATERIAL

The completed die is locked up with quoins located in one side and bottom of a chase, and then strips of sponge rubber must be glued to the surface of the die lumber, on either side of all cutting rules in the form. These rubbers are for the purpose of "pushing" stock from off the die form as each sheet is cut. Sponge rubber is supplied as regular stock for this work in sheet form which is cut up with a knife. Use  $1/4$ " wide x 1" long pieces of sponge rubber  $5/16$ " to  $3/8$ " high for  $5/8$ " lumber and .937" high rule; and  $3/8$ ",  $7/16$ ", or  $1/2$ " high for  $11/16$ " or  $3/4$ " lumber and 1.125" high rule. Do not compress the rubber more than one-half its thickness. (See Fig. 15.) Select die lumber height accordingly. Rubbertex material has exceptional long life.

### CUTTING RULE HEIGHT AND WIDTH

It is recommended that the cutting rule must be of uniform height and selected so that stripping rubber never compresses more than one-half its thickness. The length of bevel of the cutting rule should be equal to the thickness of the board being die cut.

It must be sufficiently thick to withstand bending and protect the cutting edges.

Do not use cutting rule from a cylinder press die as edges could be rolled over.

## CREASING RULE HEIGHT AND WIDTH

The height of the creasing rule selected must be lower than the height of the cutting rule used. This difference in height should be equal to the approximate thickness of the stock being creased. Select a set of creasing rule of uniform height.

Its width will vary with stock thickness. Follow manufacturer's recommendations.

## CUTTING OF RULE

The steel cutting rule can be cut to necessary lengths on a standard steel rule cutter. This device is designed somewhat like a regular hand lever lead and rule cutter. Clean and accurate cutting can be done on this device. When about to build a die or series of dies, the die maker first ascertains the exact lengths of cutting rule essential, and also the number of pieces of each length. This data is written on a sheet of paper. The rule is then cut to the proper lengths, and required number of pieces for the complete job, and the material is placed in systematic order ready for use.

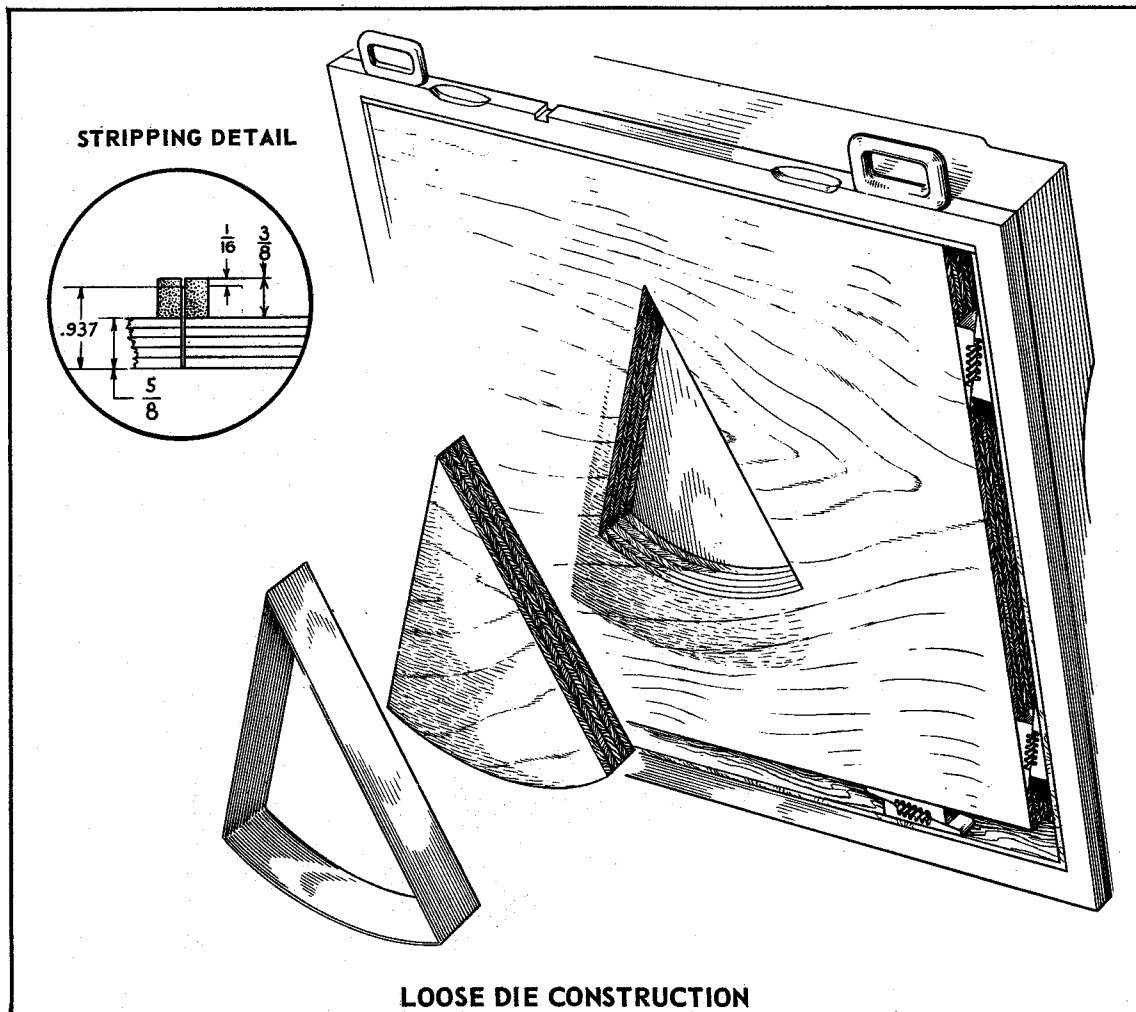


Figure 15



## HELPFUL HINTS IN MAKING A BOLSTER DIE

### USES OF BOLSTER TYPE DIES

Bolster type dies are used for self stripping operations where the die cut part passes through the die, and falls into open channels located in the back of the die. The bolster type die eliminates the troublesome problems of stripping from punches.

### DIE CONSTRUCTION

A Bolster die is composed of any standard design cutting and creasing die using open end punches mounted on a 3/8" soft steel support plate with drilled clearance holes for the ejected punchings. Such clearance holes should be of correct size to support the body of the punch. (See Fig. 16.)

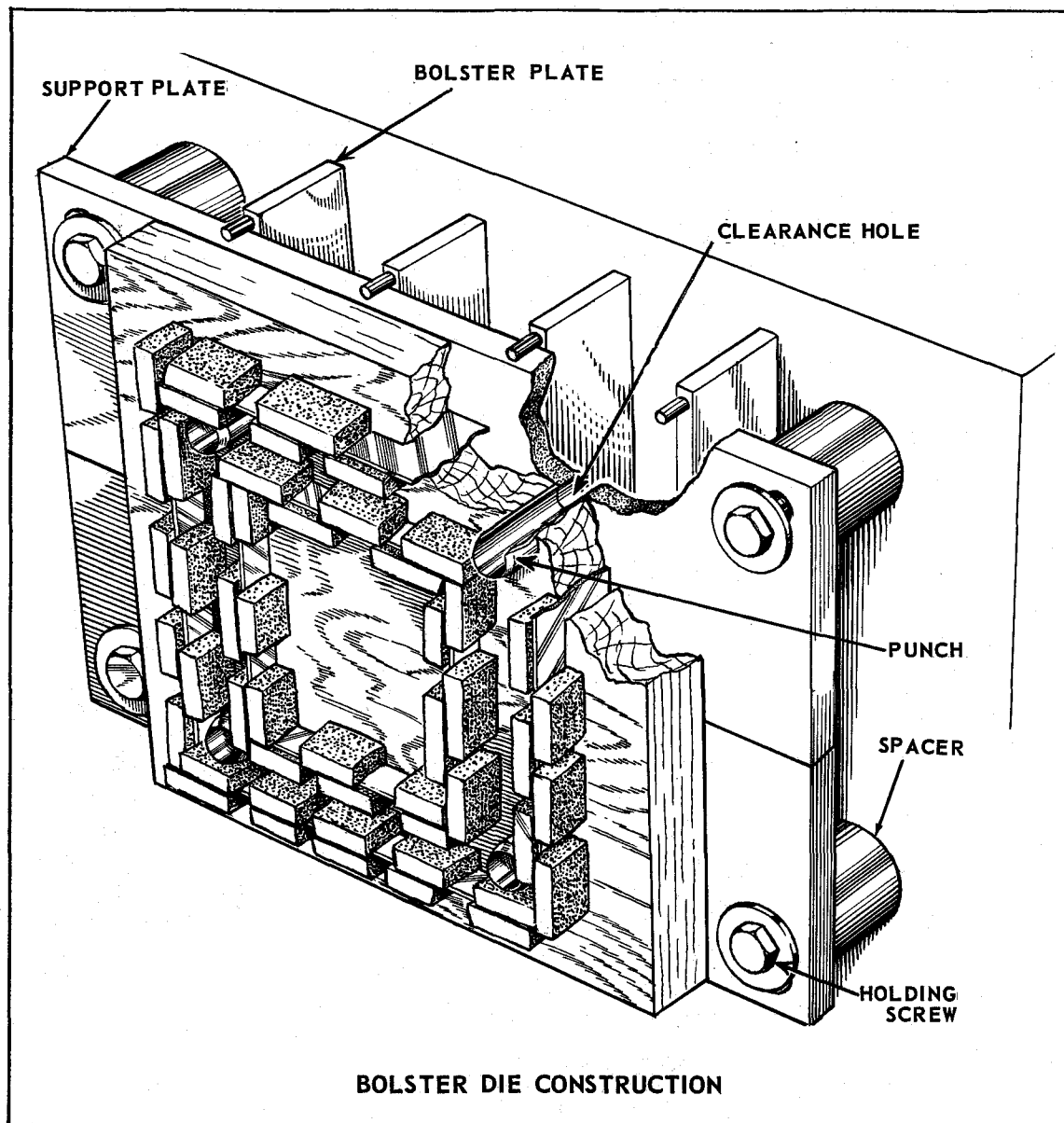


Figure 16

The ejected punchings are allowed to fall to a receptacle on the floor through channels made in the back of the die by bolster plates as wide as the design of die will permit. Three-quarter inch wide bolsters are desirable.

These bolster plates are located each side of the lines of punches in the die to support the entire die for cutting and creasing operation.

Bolster Dies are either constructed as one complete unit which can be locked into press with the chase latches, or are held into the press as an assembled unit by screws inserted in each corner of die, and threaded into special holes drilled into the face of the frame. Round or long side spacers the same height as the bolsters are inserted into the holding screws to support each corner or sides of the die.

The overall height of a typical bolster die would be  $2\frac{9}{16}$ ". This is arrived at by using .937" cutting rule,  $\frac{3}{8}$ " support plate, and  $1\frac{1}{4}$ " high bolsters.

If  $1\frac{1}{8}$ " cutting rule is used, the support plate is  $\frac{3}{8}$ " and the bolsters  $1\frac{1}{4}$ " high, and the micrometer adjustment is set or filler plate removed for  $1\frac{1}{8}$ " rule position.

## **PRESS CONSTRUCTION**

Presses must be constructed with a  $2\frac{9}{16}$ " impression opening instead of the standard .937" distance. One and one-half aluminum filler plates can be furnished to be used on the machine when bolster dies are not required. The frame face has a one eighth inch soft steel plate attached which must be removed for bolster die operation.

## **OPEN END PUNCHES**

The punches should be made of very fine steel and all very carefully ground to exactly the same height as the cutting rule. Depending on the nature of the material being die cut, it will be necessary to use punches that are tapered or counter bored inside clearance to allow the punchings to pass freely through the punch. Due to the clearance hole in the back of the punch, it will be easier to make-ready under the hard cutting plate in order to bring the cutting up for the punches.



## HELPFUL HINTS ON MAKING A BRIDGED DIE

A Bridged Type Die differs from a loose die in that the sawed slots for the rule in the die lumber are not continuous. The die lumber is held together as one piece by small bridges formed between the interrupted cut slots. The bridge is formed by drilling two  $\frac{3}{16}$ " holes  $\frac{7}{16}$ " apart. See "A", Fig. 17. At least two or more bridges should be cut out.  $\frac{1}{4}$ " wide and the depth of the die lumber. See "B", Fig. 17.

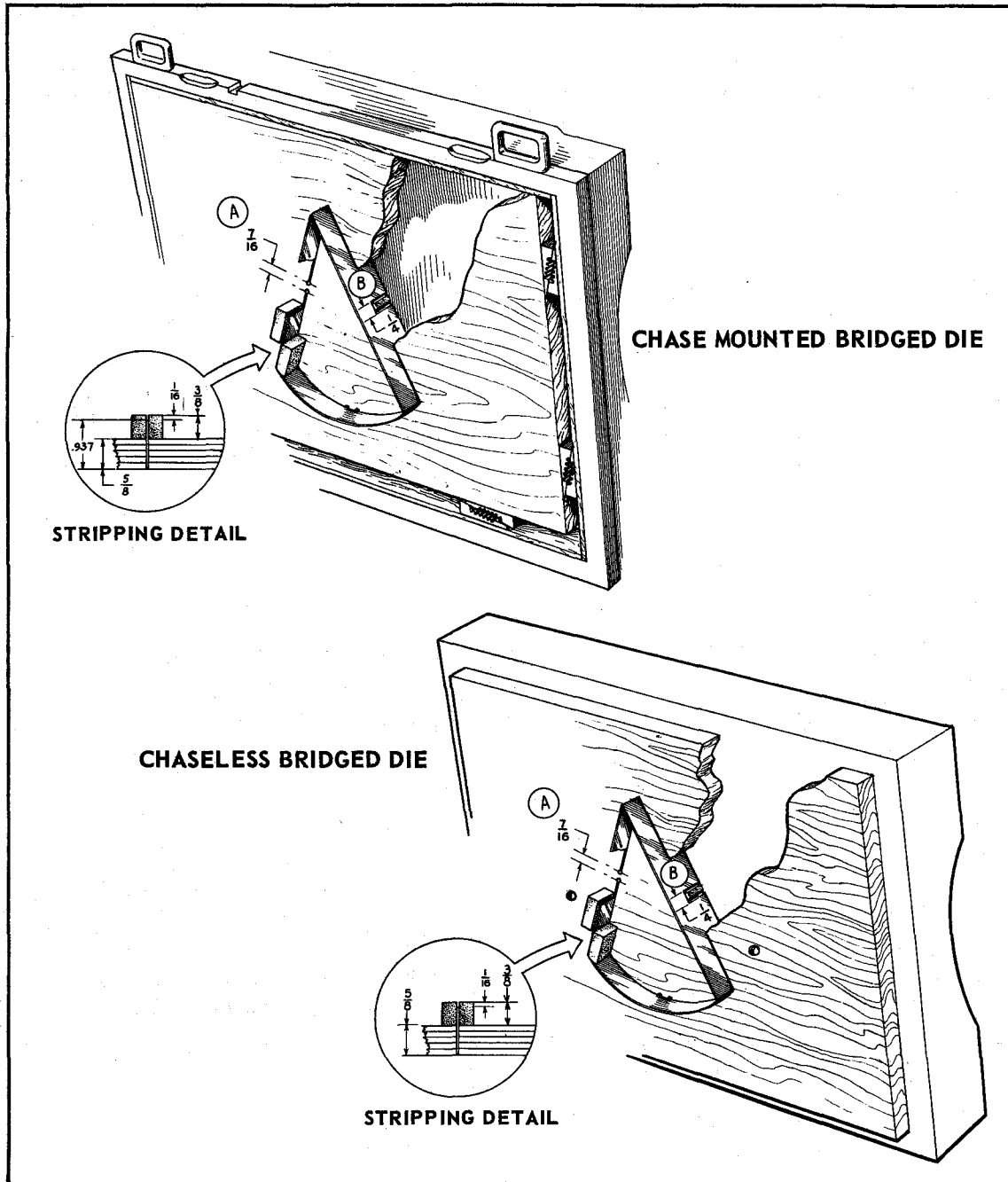


Figure 17

## CHASELESS DIES

The face of the press frame on large size machines has threaded holes for holding a heavy bridged die in place and eliminating the added weight of the chase. Clearance holes in the die lumber must be located from a template for alignment purposes.

## CUTTING WITH SERRATED RULE

Serrated rule is distinguished from perforating rule in that it is either 4 point or 6 point thick and is side face rule with the saw teeth ground into the bevel side of the rule.

The base or whole depth of the tooth must penetrate through the board in order to obtain a cut or board separation. To accomplish this the saw teeth must also penetrate into a rubber blanket at least the depth of the tooth.

Hard cutting plates cannot be used for this method as a kiss impression would only give a perforation of the board. The plates must be removed and the rubber blanket glued to the face of the bridge or a thin galvanized plate, for easy removal.

The minimum thickness rubber blanket is 1/4 inch with 3/8 or 1/2 inch preferred. The best rubber foundation seems to be conveyer belt construction with an outer layer of rubber and an inner layer of cord.

Creasing is not recommended against the rubber blanket which is not a firm foundation for this purpose.

Before attempting to design a serrated rule die, it is important to determine if sufficient clearance exists on the machine. This distance is measured by removing the plate or plates on the bridge, turning the flywheels until the bridge is on impression, setting the micrometer impression for its greatest open position and measuring the distance from the face of the frame to the face of bridge. This distance should equal the height of the rule plus the thickness of the rubber blanket. One inch high is a standard height for serrated rule; using a one quarter inch blanket this distance should be 1-1/4 inches to allow for impression adjustment.

## WIDE OPEN PRESSES

Presses with wide openings offer many advantages in the physical construction of a machine for the following uses:

### Roll Leaf Stamping and Embossing

The press construction has sufficient opening to include a Full Bed Size Built-In Electric Die Heater 11/16 inches thick including 1/4 inch cover plate, plus an insulating medium up to 1 inch thick to protect the basic press components from high temperature and a standard thickness (0.668 inches) honey comb base for die lock-up plus a 1/4 inch embossing die.





For conventional die cutting, (0.937/1.125"), the honey comb base with embossing die is removed. The built-in die heater is designed to hold a standard steel chase for die cutting. The bridge is equipped with a 1/8 inch hard plate and 3/16 inch soft filler plate.

Preferred 3-draw roll leaf devices up to 30 inch width with 34" pull (double trip) are available on all size machines except the 38 x 54 and 44 x 66.

### **Blister, Vacuum Molds, Deep Plastic Displays**

Wide opening presses with the proper clearance opening and working area for deep plastic displays and blister vacuum molds can convert this type of work using conventional .937" or 1.125" die construction.

Position the die on top of a proper thickness wooden contour template that will accept the deep configuration and in register with the die. This wooden spacer should be covered with a thin steel plate to resist marking from the die.

The die and template assembly can be installed on either the face of the frame or face of the platen. When placed on the platen, the hard steel cutting plate is attached to the frame face.

### **Hot Die Cutting of Film, Plastics, and Laminations**

Standard opening Thomson presses equipped with a 3/4 inch die heater including a 3/16 inch removable bunter post die plate allow for the use of 0.375 inch high cutting rule giving a cutting height of 1.125 inches. If the 3/16 inch bunter post die plate is removed 0.500 inch high cutting rule can be used with a total height of 1-1/16 inches.

A Thomson press designed with a wide opening such as 2-5/8 inches to the hard cutting plate allows for the use of 1 inch insulation, a 11/16 inch die heater attached to the insulated frame face and either 0.0937 or 1.125 inch cutting rule die attached to the face of the die heater.

Dual thermostatically controlled die heaters with temperature ranges of 200° F to 600° F is recommended. The die heater must overcome heat dissipation through the die construction and press as well as to achieve and retain the desirable "on die" temperature.

The impression dwell device allows for prolonged exposure and heat which is important for high quality creasing of plastic materials.

### **EMBOSSING ON PLATEN PRESSES**

The proper selection of dies as well as make-ready for hot or cold embossing on platen presses varies with the nature of the work. The following recommendations are for light design dies, bold design dies, heavy cover stocks and bristol boards, the use of premade counter mats and electric die heaters.

## **Embossing Dies**

Fibreglass, Bake-lite, Thermoset Plastic can be used either hot or cold for direct embossing and engraved brass dies for roll leaf transfer.

Plastic, lead base electros, and steel face dies should be used in general for cold or low heat embossing because of the low melting point of the lead base.

Fibreglass, Bake-lite, and Thermoset Plastic duplicate dies made with pressure and heat from originals are very accurate in fine detail.

## **Foundations**

Do not use strawboard at any time as it is of a brittle nature and not plastic.

### **Newsboard Foundation**

Newsboard, twenty-four points thick, coated one side, makes a desirable foundation. This board is usually used for car signs and display cards.

Glue this board to the platen, coated side down, making sure that the platen surface is free from grease.

Do not proceed until the glue has set, but not necessarily dry. Let the impression set to give a good contact, and let the press run while the glue continues to thoroughly dry.

LIGHT DESIGN DIES require another sheet of twelve or fourteen point newsboard glued over the foundation sheet. Do not change the impression setting.

RELIEVE the make-ready by cutting away the deadwork; edges to be cut close to the design and to be chamfered.

CORRECTIONS can be made with ordinary newsprint paper in spots where the detail is not brought out with sufficient clarity.

MAKE-READY PROTECTION can be obtained by brushing on two coats of sodium silicate solution:

This type of make-ready never breaks down as it is constantly shaping itself to the die and progressively gets better.

BOLD OR LARGE DESIGN DIES require twenty-four point newsboard foundation, but the impression must be set heavy enough to show marks of the design of the die. Without inking the die, take an impression on a loose sheet of newsboard which is slightly thicker than the depth of the deepest part of the die. The loose sheet printed will show white letters or designs with the same care and exactness you would find on a half tone. Cut these pieces to shape and glue to the foundation sheet in their proper places with a keen regard for register.



SET THE MAKE-READY by placing a loose sheet over the counter and pulling three impressions. Remove the sheet, and trim the edges of each character or design where they may have spread, chamfering wherever desired to produce rotundity of design.

PROTECT THIS MAKE-READY by coating the whole with make-ready paste; then lay a sheet of hundred pound manila or ledger stock over it.

BREAKING THROUGH the hundred pound manila or ledger stock paper is due to lack of impression where the break occurs. If the break occurs in several places, add more impression over the whole. If the breaks are slight, they can be eliminated by patching strips of newsprint adjacent to the break. Should breaks occur at the edges of the design or letters, add another manila sheet over the whole counter.

HEAVY COVER STOCKS AND BRISTOL BOARDS require a sheet of bristol board substituted for the newsboard as a foundation sheet. Proceed with the make-ready as outlined previously, cutting away the dead areas and allowing the relief to take the impression. Cover the entire surface with sodium silicate or an embossing compound that does not have a brittle nature.

#### **PREMADE MAT FOUNDATION**

Premade counter mats made from Fibreglass, Bake-lite, and Thermoset Plastic can be obtained in various thicknesses to suit the embossing requirements of subject and space. It is recommended that the counter mat be mounted on newsboard which is attached to the steel plate on bridge. Use adhesive to hold mat on newsboard and newsboard to steel plate. Newsboard and two layers of adhesive will be approximately 0.028 inches thick.

#### **STEREOTYPE OR DRY MAT FOUNDATION**

Stereotype mat instead of newsboard is preferred by many pressmen as a foundation and make-ready. The mat is formed on the press with moisture and pressure. Several thicknesses can be used to obtain the depth and detail of the embossing die. After each piece is added, the dead areas must be cut away.

A coating of embossing compound can be applied to the mat for hardness and to sharpen detail. A thin coat will be enough in most cases.

#### **CRONITE FOUNDATION**

Cronite board, either 40 point or 70 points thick is applied to the cutting plate, after which moisture and pressure is added. The DRY MAT material is next applied to the Cronite base and formed as instructed under DRY MAT FOUNDATION.

#### **HEAT**

Application of heat to the surface of the papers and board produces a beautiful sheen and brilliance.

## **BEARERS**

Because many times embossing dies have to be placed out of center of the connecting rod pull of the press causing an unbalanced load on the platen, especially when embossing greeting cards on Thomson Presses, the use of bearers as standard procedure is recommended. They should be 1/16 inch higher than the embossing die, made of steel, and mounted on the die heater and extend the length of the platen.

The impression should be adjusted very heavily against the bearers, then the counter mat formed to bring out depth and detail.

Please refer to another section of this book relative to the construction of bearers.

## **EMBOSSING HEIGHT**

Selection of the correct impression machine setting is important if the press is not to be unnecessarily overloaded and abused.

The thickness of the die heater, plus the embossing die, plus the embossing foundation and make-ready, plus the thickness of the job stock, plus the thickness of the bridge steel plate must be equal or less than the impression machine setting.

Please refer to the table of impression measurements in another section of this book.

## **ELECTRIC DIE HEATERS**

### **Embossing**

Embossing on any papers where a degree of permanency for the embossed design is desired should be done with the female die mounted on a die heater. Embossing is not wholly performed by pressure, but is a combination of pressure and heat. The heat acts as a shaping medium, shaping the fibre of the stock to the design, assisted by the correct pressure on the parts of the design to be embossed.

### **Micrometer Impression Setting**

It is necessary to set the micrometer impression control in the 1-1/8 inch position by removing the 3/16 inch filler plate when using a 3/4 inch thick die heater with 1/4 inch embossing dies.

### **Temperature Range**

Thomson die heaters can be supplied with automatic heat controls of either 100°F - 400°F or 200°F - 600°F depending upon the nature of the work.

### **Construction Height**

Removable electric die heaters are made 3/4 inch thick including a 3/16 inch bunter post die plate.



Built-in electric die heaters are made 11/16 inch thick with a 1/4 inch top plate included for mounting a cutting and creasing die or patent base against the die heater.

## **HOT STAMPING ON PLATEN PRESSES**

### **PRESSURE SENSITIVE MATERIAL**

#### **Die Definition**

Hot stamp flat dies are similar to a printing die. Modeled hot stamp die models simultaneously with leafing allowing leafing and embossing in one operation instead of two. Plastic counters have proven successful with this type of die.

#### **Dies**

A standard female stamping die (never a male die) constructed of either brass or zinc, mounted on a die heater should only be used.

The die should be relieved on all outside edges of stamped areas to eliminate any marking of the finished product.

The best stamped effect is obtained with a square rather than a line design die.

#### **Die Heater**

Critical control of heat is obtained in the advanced design zone control Thomson Die Heater. Recommended operating temperature is 200°F.

#### **Counter**

When making a counter, use only 28 point pressboard, never soft material which will detract from the quality of stamping.

If a counter is not used, be careful not to damage the die against the steel plate.

Level off the impression by making ready under the steel plate.

#### **Feeding**

In order to eliminate any unusual curl that could develop, it is recommended that a 50 per cent moisture content be maintained in the material.

#### **Material**

This material is sold under the trade name of 3M Pressure Sensitive Material #5410.

## COLD STAMPING

Material, known as Fas-cal, can be stamped either cold or hot using a 1/32 inch Bake-lite Mat. 5/16 inch high bearers are recommended with make-ready under the hard plate.

When stamped hot in a temperature range of 130°F - 180°F less pressure was required.

## ROLL LEAF TRANSFER STAMPING

A brass stamping die is desirable for heat transfer. Any type of counter mat can be used. Average heat required 220°F - 350°F depending upon leaf. Select leaf to suit paper used. Moisture content of paper affects acceptance of leaf, also leaf carrier, and laminations.

A clear shallow imprint is necessary when stamping lettering. Hardness of make-ready or counter mat is very important. Celluloid, pressboard, fibreglass, bake-lite, or formica will give a hard surface without indenting too deeply. Use of these materials will make roll leaf transfer on letters clear and sharp.

The roll leaf should be held taut and away from the heated stamping die during its unwinding movement.

Unnecessary marking of the stamped sheet can be prevented by attaching a sheet of Kraft paper over the tympan fingers and cutting out the sheet in the stamped areas.

## BEARERS

Because many times stamping dies have to be placed out of center of the connecting rod pull of the press causing an unbalanced load on the platen, especially when leafing greeting cards on Thomson Presses, the use of bearers as standard procedure is recommended. They should be 1/16 inch higher than the stamping die, made of steel, and mounted on the die heater and extended the length of the platen.

The impression should be adjusted very heavily against the bearers, then the counter mat formed to bring out depth and detail.

Please refer to another section of this book relative to the construction of bearers.

## IMPRESSION SETTING

Selection of the correct impression machine setting is important if the press is not to be unnecessarily overloaded and abused.

The thickness of the die heater, plus the stamping die, plus the stamping foundation and make-ready, plus the thickness of the job stock, plus the thickness of the bridge steel plate must be equal or less than the impression machine setting.

Please refer to the table of impression measurements in another section of this book.



## STAMPING - ROLL LEAFING E FLUTE CORRUGATED BOARD

### Press

The Thomson press required for this work is a standard machine equipped with a die heater and a roll leaf mechanism.

### Stamping Die

A brass flat stamping die and a plastic female mat or counter is recommended.

All lettering should be flat with no female relief in the counter. This prevents cracking of the board and edge bleeding of the roll leaf.

Edge borders should have a small detail female relief in the counter.

Large size subjects require deep relief in the male die with the mat made accordingly to bring out depth.

### Make-ready

Pressure should be applied in careful even increments so as not to crack the E Flute Board.

### Die Heater

A die heater with positive thermostatic control must be used maintaining an average temperature of 250 F for the roll leafing operation.

### Leaf

Because of the nature of the E Flute Board, it is recommended that a leaf that requires extreme pressure to transfer such as mylar not be used.

### Material

This material is identified as E Flute Corrugated.

## CUTTING AND CREASING OF FIBRE BOARD

Cutting and creasing dies constructed in accordance with the following suggestions have proven satisfactory in actual practice. It is recommended that a 3 point 1-1/8" cutting rule be used in preference to 15/16" above 75 point thick board, because it will

have more support and hold more securely in the higher die lumber, and the stripping rubber will not be compressed so greatly, which reduces press load.

Whenever possible, springs for stripping are recommended. Sponge rubber should not be compressed more than 50% of its thickness as at that point, it tends to become solid and will create an unnecessary load on the press. Do not use cork rubber, because it is hard to compress and not desirable with thick board. Neoprene rubber or rubbertex have proven very desirable.

The creasing rule should have a radius and will vary in thickness and height. The height of the creasing rule should be selected to give approximately 0.005" to 0.030" squeeze depending upon the thickness of the fibre board. Its width will affect the draw of the sheet and sheet size.

The creasing counter should be approximately 0.005" less than the thickness of the fibre board up to 100 point board; above this, it should be approximately 0.020" less.

It is recommended to use tagboard glued together to the proper thickness for a firm counter, as fibreboard will compress on long runs when used as a counter. Care must be exercised in make-ready to minimize the tendency of the fibreboard fibres to separate and draw near the edge of the sheet.

Thick fibreboard has a tendency to stick in the creasing counter and must be lifted out of the counter for hand delivery. This delivery inconvenience can be troublesome on automatic presses causing the sheet to pull out of the fingers.





## SUGGESTED DIE CONSTRUCTION

### FIBRE BOARD

#### 32 Point Fibre Board

##### Die Construction

1.125" high, 3 points thick centerface,  $\frac{3}{16}$ " long bevel cutting rule

1.100" high,  $\frac{1}{8}$ " to  $\frac{1}{4}$ " thick creasing rule

$\frac{11}{16}$ " thick die lumber with  $\frac{1}{2}$ " high sponge rubber

or  $\frac{9}{8}$ " thick die lumber with  $\frac{9}{16}$ " high sponge rubber

##### Counter

28 points thick. Channel width  $2\frac{1}{2}$  times board caliper plus creasing rule thickness.

##### Squeeze

$1.125" - 0.032" = 1.093" + 0.007"$  squeeze = 1.100" high creasing rule

OR

##### Die Construction

0.937" high, 3 points thick centerface,  $\frac{3}{16}$ " long bevel cutting rule

0.912" high,  $\frac{1}{8}$ " to  $\frac{1}{4}$ " thick creasing rule

$\frac{1}{2}$ " thick die lumber with  $\frac{1}{2}$ " high sponge rubber

#### 45 Point Fibre Board

##### Die Construction

1.125" high, 3 points thick centerface,  $\frac{3}{16}$ " long bevel cutting rule

1.090" high,  $\frac{1}{8}$ " to  $\frac{1}{4}$ " thick creasing rule

$\frac{11}{16}$ " thick die lumber with  $\frac{1}{2}$ " high sponge rubber

or  $\frac{9}{8}$ " thick die lumber with  $\frac{9}{16}$ " high sponge rubber

##### Counter

40 points thick. Channel width  $2\frac{1}{2}$  times board caliper plus creasing rule thickness.

##### Squeeze

$1.125" - 0.045" = 1.080" + 0.010"$  squeeze = 1.090" creasing rule height

OR

##### Die Construction

0.937" high, 3 points thick centerface,  $\frac{3}{16}$ " long bevel cutting rule

0.902" high,  $\frac{1}{8}$ " to  $\frac{1}{4}$ " thick creasing rule

$\frac{1}{2}$ " thick die lumber with  $\frac{1}{2}$ " high sponge rubber

## SUGGESTED DIE CONSTRUCTION

### FIBRE BOARD

#### 80 Point Fibre Board

##### Die Construction

1.125" high, 3 points thick centerface,  $\frac{3}{16}$ " long bevel cutting rule  
1.065" high,  $\frac{1}{8}$ " to  $\frac{1}{4}$ " thick creasing rule  
 $\frac{11}{16}$ " thick die lumber with  $\frac{1}{2}$ " high sponge rubber  
or  $\frac{5}{8}$ " thick die lumber with  $\frac{9}{16}$ " high sponge rubber

##### Counter

0.075" thick. Channel width  $2\frac{1}{2}$  times board caliper plus creasing rule thickness.

##### Squeeze

$1.125" - 0.080" = 1.045" + 0.020"$  squeeze = 1.065" creasing rule height

#### 90 Point Fibre Board

##### Die Construction

1.125" high, 3 points thick centerface,  $\frac{3}{16}$ " long bevel cutting rule  
1.055" high,  $\frac{1}{8}$ " to  $\frac{1}{4}$ " thick creasing rule  
 $\frac{11}{16}$ " thick die lumber with  $\frac{1}{2}$ " high sponge rubber  
or  $\frac{5}{8}$ " thick die lumber with  $\frac{9}{16}$ " high sponge rubber

##### Counter

0.075" thick. Channel width  $2\frac{1}{2}$  times board caliper plus creasing rule thickness.

##### Squeeze

$1.125" - 0.090" = 1.035" + 0.020"$  squeeze = 1.055" creasing rule height

#### 100 Point Fibre Board

##### Die Construction

1.125" high, 3 points thick centerface,  $\frac{3}{16}$ " long bevel cutting rule  
1.050" high,  $\frac{1}{8}$ " to  $\frac{1}{4}$ " thick creasing rule  
 $\frac{11}{16}$ " thick die lumber with  $\frac{1}{2}$ " high sponge rubber  
or  $\frac{5}{8}$ " thick die lumber with  $\frac{9}{16}$ " high sponge rubber

##### Counter

0.085" thick. Channel width  $2\frac{1}{2}$  times board caliper plus creasing rule thickness.

##### Squeeze

$1.125" - 0.100" = 1.025" + 0.025"$  squeeze = 1.050" creasing rule height

#### 120 Point Fibre Board

##### Die Construction

1.125" high, 3 points thick centerface,  $\frac{3}{16}$ " long bevel cutting rule  
1.035" high,  $\frac{1}{8}$ " to  $\frac{1}{4}$ " thick creasing rule  
 $\frac{11}{16}$ " thick die lumber with  $\frac{1}{2}$ " high sponge rubber  
or  $\frac{5}{8}$ " thick die lumber with  $\frac{9}{16}$ " high sponge rubber

##### Counter

0.100" thick. Channel width  $2\frac{1}{2}$  times board caliper plus creasing rule thickness.

##### Squeeze

$1.125" - 0.120" = 1.005" + 0.030"$  squeeze = 1.035" creasing rule height



## CUTTING AND CREASING OF CORRUGATED BOARD

### **Sideways Bridge Movement**

If the bridge or die moves sideways on impression, causing excess dulling of the cutting knives and troublesome die cutting, the following corrective suggestions should be carried out.

Precautions should be taken to have the chase securely locked in position, preventing any possible sidewise movement.

If a chaseless die is used, the die must be bolted or screwed to the face of the frame in a positive unyielding manner.

There should be a clearance of not more than 0.005 inch between the outsides of the frame rocker seats and the insides of the bridge wings. Excess clearance in this area allows sideways movement of the bridge.

The press must remain level at all times causing a normal straight away approach of the bridge on impression.

Certain types of corrugated board have a tendency to compress in a sidewise movement, creating a slurring action.

Very dull dies cause sidewise slurring when forced impression.

Poorly constructed dies having the cutting rule inserted at an angle instead of perpendicular also cause sidewise slurring.

### **Creasing Counter**

Depending upon the quality requirements of the job, a creasing counter can be used or eliminated.

### **Minimizing Press Load**

In order to minimize the load on the press, the following suggestions are offered:

1. Never compress stripping rubber more than one half its thickness.
2. Stripping springs on thick board are preferred to stripping rubber.
3. Die lumber can be counterbored to hold round springs or stripping rubber, allowing more compressing space.
4. Neoprene rubber has been proven very desirable.

### **Warped Dies**

If dies become warped, wet the backside before placing into the press.

### **Minimizing Make-ready Time**

Thomson single micrometer and double micrometer presses have greatly reduced the set up time by keeping make-ready time to a minimum and eliminating harmful spongy make-readies.

## SUGGESTED DIE CONSTRUCTION

### CORRUGATED BOARD

#### Single Wall Corrugated Board

**125 lb. and 175 lb. Mullen Test.** Approximate composite thickness 0.027" to 0.031".

##### Die Construction

0.937" high, 3 points thick centerface,  $\frac{3}{16}$ " long bevel cutting rule  
0.918" high, 4 points thick creasing rule  
 $\frac{1}{2}$ " thick die lumber (hard maple or birch) with  $\frac{1}{2}$ " sponge rubber  
or  $\frac{5}{8}$ " thick die lumber with  $\frac{3}{8}$ " sponge rubber

OR

##### Die Construction

1.125" high, 3 points thick centerface,  $\frac{3}{16}$ " long bevel cutting rule  
1.106" high, 4 points thick creasing rule  
 $\frac{11}{16}$ " thick die lumber with  $\frac{1}{2}$ " high sponge rubber  
or  $\frac{5}{8}$ " thick die lumber with  $\frac{9}{16}$ " high sponge rubber

##### Counter

If counter is used, make approximately 22 points thick.  
Channel width  $2\frac{1}{2}$  times composite board caliper plus creasing rule thickness.



**200 lb. Mullen Test.** Approximate composite thickness 0.033" to 0.039".

##### Die Construction

0.937" high, 3 points thick,  $\frac{3}{16}$ " long bevel cutting rule  
0.918" high, 4 points thick creasing rule  
 $\frac{1}{2}$ " thick die lumber (hard maple or birch) with  $\frac{1}{2}$ " sponge rubber  
or  $\frac{5}{8}$ " thick die lumber with  $\frac{3}{8}$ " sponge rubber

OR

##### Die Construction

1.125" high, 3 points thick centerface,  $\frac{3}{16}$ " long bevel cutting rule  
1.106" high, 4 points thick creasing rule  
 $\frac{11}{16}$ " thick die lumber with  $\frac{1}{2}$ " high sponge rubber  
or  $\frac{5}{8}$ " thick die lumber with  $\frac{9}{16}$ " high sponge rubber

##### Counter

If counter is used, make approximately 22 points thick.  
Channel width  $2\frac{1}{2}$  times composite board caliper plus creasing rule thickness.



## SUGGESTED DIE CONSTRUCTION

### CORRUGATED BOARD

#### Single Wall Corrugated Board

**275 lb. Mullen Test.** Approximate composite thickness of .049" to .055".

##### Die Construction

0.937" high, 3 points thick,  $\frac{3}{16}$ " long bevel cutting rule  
0.895" high, 4 points thick creasing rule  
 $\frac{1}{2}$ " thick die lumber (hard maple or birch) with  $\frac{1}{2}$ " sponge rubber  
or  $\frac{5}{8}$ " thick die lumber with  $\frac{3}{8}$ " sponge rubber

OR

##### Die Construction

1.125" high, 3 points thick centerface,  $\frac{3}{16}$ " long bevel cutting rule  
1.088" high, 4 points thick creasing rule  
 $\frac{11}{16}$ " thick die lumber with  $\frac{1}{2}$ " high sponge rubber  
or  $\frac{5}{8}$ " thick die lumber with  $\frac{9}{16}$ " high sponge rubber

##### Counter

If counter is used, make approximately 22 points thick.  
Channel width  $2\frac{1}{2}$  times composite board caliper plus creasing rule thickness.



**350 lb. Mullen Test.** Approximate composite thickness 0.063" to 0.065".

##### Die Construction

0.937" high, 3 points thick,  $\frac{3}{16}$ " long bevel cutting rule  
0.895" high, 4 points thick creasing rule  
 $\frac{1}{2}$ " thick die lumber (hard maple or birch) with  $\frac{1}{2}$ " sponge rubber  
or  $\frac{5}{8}$ " thick die lumber with  $\frac{3}{8}$ " sponge rubber

OR

##### Die Construction

1.125" high, 3 points thick centerface,  $\frac{3}{16}$ " long bevel cutting rule  
1.088" high, 4 points thick creasing rule  
 $\frac{11}{16}$ " thick die lumber with  $\frac{1}{2}$ " high sponge rubber  
or  $\frac{5}{8}$ " thick die lumber with  $\frac{9}{16}$ " high sponge rubber

##### Counter

If counter is used, make approximately 22 points thick.  
Channel width  $2\frac{1}{2}$  times composite board caliper plus creasing rule thickness.

## SUGGESTED DIE CONSTRUCTION

### CORRUGATED BOARD

#### Double Wall Corrugated Board

**200 lb. Mullen Test.** Approximate composite thickness 0.048".

##### Die Construction

0.937" high, 3 points thick centerface,  $\frac{3}{16}$ " long bevel cutting rule  
0.906" high, 6 to 8 points thick creasing rule  
 $\frac{1}{2}$ " die lumber (hard maple or birch) with  $\frac{1}{2}$ " high sponge rubber or  
 $\frac{5}{8}$ " die lumber with  $\frac{3}{8}$ " sponge rubber

OR

##### Die Construction

1.125" high, 3 points thick centerface,  $\frac{3}{16}$ " long bevel cutting rule  
1.093" high, 6 to 8 points thick creasing rule  
 $\frac{11}{16}$ " thick die lumber with  $\frac{1}{2}$ " high sponge rubber  
or  $\frac{5}{8}$ " thick die lumber with  $\frac{9}{16}$ " high sponge rubber

##### Counter

If counter is used, make approximately 22 points thick.  
Channel width  $2\frac{1}{2}$  times composite board caliper plus creasing rule thickness.

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**275 lb. Mullen Test.** Approximate composite thickness .052" to .058".

##### Die Construction

0.937" high, 3 points thick centerface,  $\frac{3}{16}$ " long bevel cutting rule  
0.895" high, 6 to 8 points thick creasing rule  
 $\frac{1}{2}$ " die lumber (hard maple or birch) with  $\frac{1}{2}$ " high sponge rubber  
or  $\frac{5}{8}$ " die lumber with  $\frac{3}{8}$ " sponge rubber

OR

##### Die Construction

1.125" high, 3 points thick centerface,  $\frac{3}{16}$ " long bevel cutting rule  
1.088" high, 6 to 8 points thick creasing rule  
 $\frac{11}{16}$ " thick die lumber with  $\frac{1}{2}$ " high sponge rubber  
or  $\frac{5}{8}$ " thick die lumber with  $\frac{9}{16}$ " high sponge rubber

##### Counter

If counter is used, make approximately 22 points thick.  
Channel width  $2\frac{1}{2}$  times composite board caliper plus creasing rule thickness.



## SUGGESTED DIE CONSTRUCTION

### CORRUGATED BOARD

#### Double Wall Corrugated Board

**350 lb. Mullen Test.** Approximate composite thickness .054" to .063".

##### Die Construction

0.937" high, 3 points thick centerface,  $\frac{3}{16}$ " long bevel cutting rule  
0.895" high, 6 to 8 points thick creasing rule  
 $\frac{1}{2}$ " die lumber (hard maple or birch) with  $\frac{1}{2}$ " high sponge rubber  
or  $\frac{5}{8}$ " die lumber with  $\frac{3}{8}$ " sponge rubber

OR

##### Die Construction

1.125" high, 3 points thick centerface,  $\frac{3}{16}$ " long bevel cutting rule  
1.088" high, 6 to 8 points thick creasing rule  
 $\frac{11}{16}$ " thick die lumber with  $\frac{1}{2}$ " high sponge rubber  
or  $\frac{5}{8}$ " thick die lumber with  $\frac{9}{16}$ " high sponge rubber

##### Counter

If counter is used, make approximately 22 points thick.  
Channel width  $2\frac{1}{2}$  times composite board caliper plus creasing rule thickness.



**500 lb. Mullen Test.** Approximate composite thickness 0.092" to 0.098".

##### Die Construction

0.937" high, 3 points thick centerface,  $\frac{3}{16}$ " long bevel cutting rule  
0.860" high, 6 to 8 points thick creasing rule  
 $\frac{1}{2}$ " die lumber (hard maple or birch) with  $\frac{1}{2}$ " high sponge rubber  
or  $\frac{5}{8}$ " thick die lumber with  $\frac{3}{8}$ " sponge rubber

OR

##### Die Construction

1.125" high, 3 points thick centerface,  $\frac{3}{16}$ " long bevel cutting rule  
1.056" high, 6 to 8 points thick creasing rule  
 $\frac{11}{16}$ " thick die lumber with  $\frac{1}{2}$ " high sponge rubber  
or  $\frac{5}{8}$ " thick die lumber with  $\frac{9}{16}$ " high sponge rubber

##### Counter

If counter is used, make approximately 22 points thick.  
Channel width  $2\frac{1}{2}$  times composite board caliper plus creasing rule thickness.

## SUGGESTED DIE CONSTRUCTION

### CORRUGATED BOARD

#### Double Wall Corrugated Board

**600 lb. Mullen Test.** Approximate composite thickness 0.099" to 0.102".

##### Die Construction

0.937" high, 3 points thick centerface,  $\frac{3}{16}$ " long bevel cutting rule  
0.860" high, 6 to 8 points thick creasing rule  
 $\frac{1}{2}$ " die lumber (hard maple or birch) with  $\frac{1}{2}$ " high sponge rubber  
or  $\frac{5}{8}$ " die lumber with  $\frac{3}{8}$ " sponge rubber

OR

##### Die Construction

1.125" high, 3 points thick centerface,  $\frac{3}{16}$ " long bevel cutting rule  
1.056" high, 6 to 8 points thick creasing rule  
 $\frac{11}{16}$ " thick die lumber with  $\frac{1}{2}$ " high sponge rubber  
or  $\frac{5}{8}$ " thick die lumber with  $\frac{9}{16}$ " high sponge rubber

##### Counter

If counter is used, make approximately 22 points thick.  
Channel width  $2\frac{1}{2}$  times composite board caliper plus creasing rule thickness.

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### CUTTING AND CREASING OF UNICELLULAR STYRENE

The paper liners on this material become excessively dry due to the absorbing of moisture by the foam center. Material more than one-eighth inch thick, encounters cracked creases due to board dryness. Excellent creasing results are obtained by applying moisture to the liners before the cutting and creasing operation. The material is sold under the trade name of Foamcor.

#### Suggested Die Construction

0.937" high, 2 points thick centerface cutting rule.  
0.895" high, 4 points thick creasing rule.  
 $\frac{1}{2}$ " thick die lumber (hard maple or birch) with  $\frac{1}{2}$ " sponge rubber or  
 $\frac{5}{8}$ " die lumber with  $\frac{3}{8}$ " sponge rubber.

##### Counter

Counter 22 points thick. Channel approximately  $\frac{1}{8}$ " wide.





## CUTTING AND CREASING SUPER DYLAN POLYETHYLENE

### Press

The machine required for this work should be a heavy duty air clutch press constructed to withstand the excessive creasing rule pressures developed when processing this material.

### Material

This material is identified as Koppers 50 mil Super Dylan Polyethylene.

### Die Construction

0.937" high, 3 points thick counterface cutting rule.

0.923" high, round face creasing rule, 8 and 10 points wide for 180° bends and 6 points wide for 90° bends.

5/8" die lumber with 3/8" high sponge rubber.

Recommend 3/8" high rubber, 1/2" wide adjacent to creasing rule to hold sheet flat.

The die must be constructed to compensate for the "flow" of the material when creased. The "flow" will depend upon the width of crease and will be approximately 1/8" in 10" between 10 point creasing rules. The design of the die to obtain the desired box shape will have to be decided from experience.

### Make-ready

Make-ready for cutting only as no creasing counter is required. Care must be exercised in spotting up on make-ready sheet low cutting areas rather than advance entire impression by micrometer adjustments which would unnecessarily overload the press.

If the job is out of balance, attach bearers to each corner of the bridge.

### Thickness of Crease

The minimum resultant embossed crease thickness should be between 0.014" to 0.018" thick to withstand the abuse of bending.