

Today's printers need a bridge from manual stripping to fully electronic digital imposition. They do not want to render obsolete their existing film preparation and platemaking equipment, and yet they want to reduce stripping costs by accepting PostScript™ page layouts and imposing them electronically. With the ready availability of reliable digital imposition programs, the challenge that now faces the graphic arts industry is to integrate these programs into the production workflows that involve both manual and electronic techniques. One way to achieve this goal is through the use of pin register systems.

Productivity

Holes are punched in films to increase productivity. They can reduce or eliminate the labor involved in manual stripping. Punched films may be quickly aligned on register pins without having to visually align register marks. Improved registration during the film preparation and platemaking processes translates into quicker make-ready times on press. Faster make-ready means less paper is wasted. However to be useful, pin register holes must be effectively integrated into the production process in a given shop.

Press-ready flats

In many shops today, films are created using an imagesetter, and then passed to a manual stripping department. In this scenario, the role of the imagesetter is simply to create the films. However the role of the imagesetter can be much broader. An imagesetter or recorder that can punch films is able to produce press-ready flats that may need no additional stripping.

Pin register holes provide continuity between film preparation and presswork. The holes punched in the film are used to position the image when a plate is exposed. These holes take into account press characteristics like the plate bend and gripper margins. Once the image is linked to the position where it will fall into on the press, the whole process is simplified. Finally, an imposition software program is the key that allows the image to be placed accurately in relation to the pin register holes.

Imposition

Imposition can be defined as the relationship of an image to its position on press. This holds true whether this image is a poster or a booklet with numerous pages. Figure 1 (see page 38) shows some examples of work-and-turn impositions of 2-up (two page), 4-up (four page), and 8-up (eight page) layouts.¹ Imposition must not only take into account the size of the individual pages, extra space left over for folds, trims, gripper margins, creep, etc., but also the imaging area of the imagesetter and of course the printing area on the press.

Imposition is a complex subject involving factors from every part of the production process. For more information on imposition, please refer to the following two booklets from the Linotype-Hell Concepts and Solutions series:

- #3, *Imposition in Computer Publishing*
- #10, *Digital Signature Production: Streamline Production*

These booklets are available through the Linotype-Hell Information Center (800-842-9721).

¹ The terms '2-up', '4-up', and '8-up' are most often used to describe two page, four page, and eight page layouts in which the same page is repeated two, four, or eight times. Often however, the terms are used to describe any layout containing two, four, or eight pages.

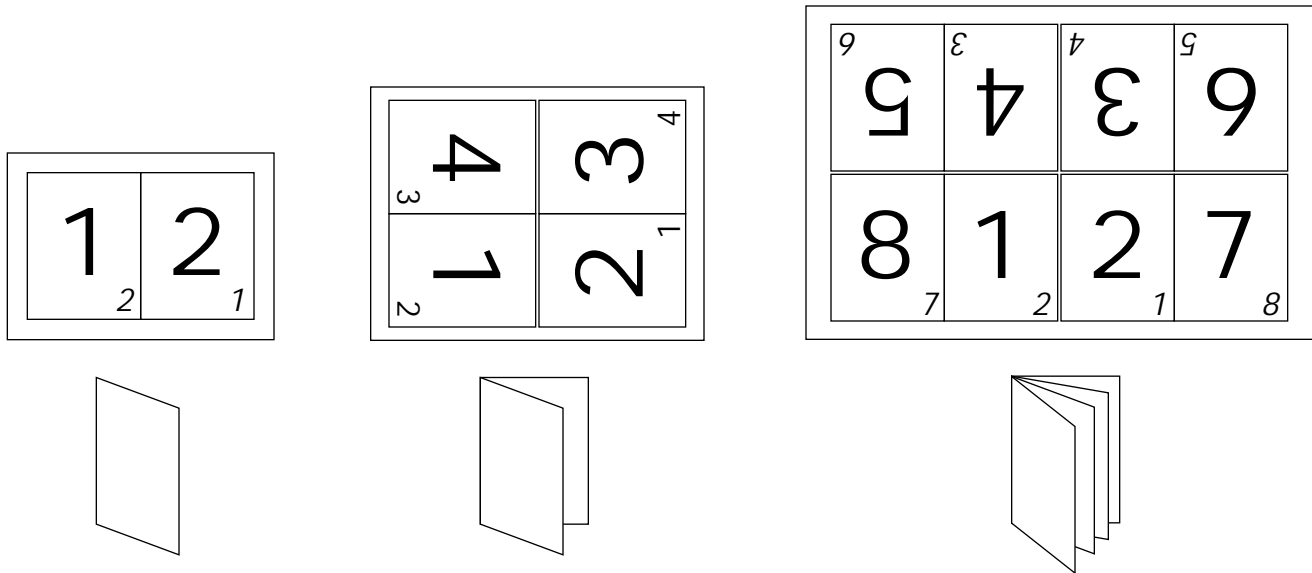


Figure 1 – 2-up, 4-up, and 8-up work-and-turn impositions. In a work-and-turn imposition, the press sheet is printed and then turned over and printed again. The examples shown here are done to scale using 8.5 x 11 inch pages. The bold type indicates the page number and the small italic type indicates the page number on the reverse side. The 2-up example (left), fits easily on a 14 x 20 inch press sheet (which is the press size of the Heidelberg GTO™). The 4-up example (center), fits easily on a 19 x 25 inch press sheet (another common press size). The 8-up example (right), fits easily on a 25 x 38 inch press sheet. The 4-up and 8-up examples include extra space (1/4 inch) to allow for a fold and a trim. There are, of course, other ways of imposing pages besides work-and-turn (for example, sheetwise and work-and-tumble). In the case of work-and-turn, each press sheet will produce two complete documents once the press sheets are folded and trimmed.

Pin register “standards”

The positioning and the shape/size of the pins used to register film are not governed by any industry standards. What exists are the configurations preferred by manufacturers of pin systems or of presses. And, since some of these companies have a large share of the market, that fact alone may make them the ‘standard’ in a shop that owns a particular piece of equipment. Each manufacturer chooses a pin configuration to assure maximum stability of the film. These configurations must also serve a wide range of film sizes. (Examples of two pin configurations are shown in Figures 2 & 3.) In addition, pin configuration conventions differ between the United States and Europe.

The holes are usually positioned on the film so that they fall in the plate bend, a non-printing area of the printing plate. For some presses, this may be as close as 7/16 of an inch to the image area. (The plate bend area is used to secure the plate to the impression cylinder of the press.)

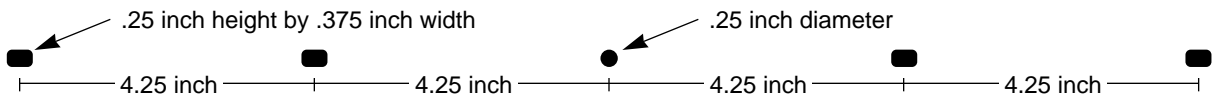


Figure 2 – One common configuration of pin register holes is used by the Stoesser register system. Note that the center hole is circular while the outside ones are not (these oblong holes are called slotted holes). Distances from hole to hole are measured from the center of each hole. The 4.25 inch distance from hole to hole corresponds to the distance from hole to hole in a loose leaf 3-hole binder. This system is well-suited to these common page widths: 11 inches, 14 inches, 17 inches, etc.

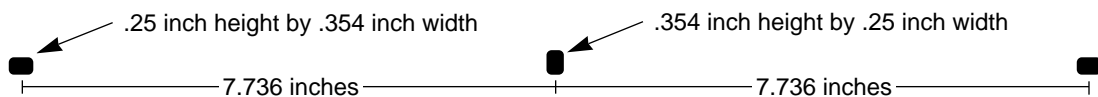


Figure 3 – Another common configuration of pin register holes is the Bacher Control 2000™ register system. Note that all the holes are slotted and the center hole is rotated 90° compared to the two outside holes. Again, distances from hole to hole are measured from the center of each hole. The measurements for this configuration are based on the metric system.

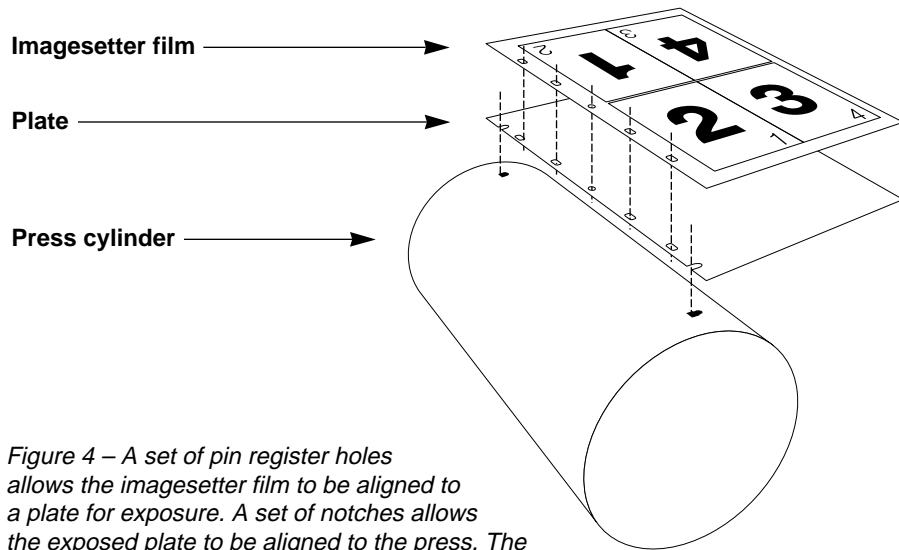


Figure 4 – A set of pin register holes allows the imagesetter film to be aligned to a plate for exposure. A set of notches allows the exposed plate to be aligned to the press. The plate is punched with both the imagesetter pin configuration and the notches that are used to align the plate on the press.

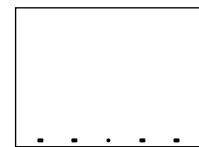
Many pin configurations contain a circular central hole combined with one or more slotted holes. Sometimes the central hole is also slotted. (See Figure 3.) The size, shape, and distance between the holes vary depending on the particular shop requirements.

It is not uncommon to find more than one pin configuration used in a shop: one for film preparation, and another for press register. The second set of holes are generally press notches which are used to align the plate on the press. The holes generated by the imagesetter allow the film to be accurately aligned to the plate. The notches on the plate connect the plate to the press. (See Figure 4.)

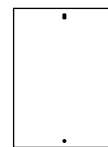
Pin register basics

The placement of the pin register holes in the film may be categorized as shown in Figure 5:

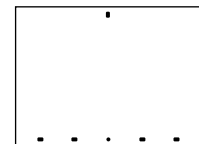
- Pin register holes along a single edge are called an **in-line** configuration.
- Single pin register holes along opposite edges are a **two point** or **chase** configuration. Some also refer to it as a **radial pin register** configuration.
- An in-line configuration with a single tail punch is called **triangular control**.
- In some special cases a **side punch** may be included along with a head and tail punch. (This is one possible pin configuration used by the Linotype-Hell Herkules™ imagesetter.)



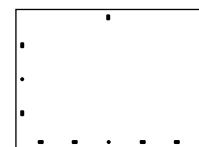
In-line



Two point or chase



Triangular control



Side punch

Figure 5 – Four types of pin register configurations: in-line, two point or chase, triangular control, and triangular control with a side punch. The pin register holes in these illustrations are enlarged to make them more visible.

Centering

The page (or multi-page layout) is usually centered on the center pin register hole. This act of centering makes it easier to do things like work and turn imposition, because the relative position of the page is known. Once holes are punched in the film, the holes become the standard used to measure position of the image on the flat.

Sometimes, however, centering can cause confusion for people who are not used to measuring from the center of the image. In general, those who produce film may tend to think in terms of the distance from the edge of the film to the image, while printers and strippers measure from the center of the image. Measuring from the center of the image is a more reliable method because if the film is trimmed, the edges no longer provide a good point of reference. On Herkules several options exist for the placement of the image relative to the pin register holes. In one option, the image is automatically centered on the center pin register hole.

Web and sheetfed

While much of this discussion concerns pin register configurations for sheet-fed offset printing, many of the same pin configurations may also be used for half-size and full-size web presses. The actual configurations depend on web-specific factors like cutoffs, plate bend areas, and web widths.

Three techniques

In this article, three pin register techniques will be discussed:

- Using a **transfer punch** for a chase automatic photocomposing stepper.
- **2-up or 4-up** using materials punched to pin configurations from the Linotype-Hell Herkules imagesetter.
- **8-up** using two 4-up layouts imposed on Herkules. The 4-up layouts are registered and exposed on a special tiling board register system within a vertical draw system on a vacuum exposure frame.

These methods focus primarily on techniques that are possible using punched films from a Linotype-Hell Herkules imagesetter along with Stoesser pin registration devices. Each category will be examined separately.

Transfer punch

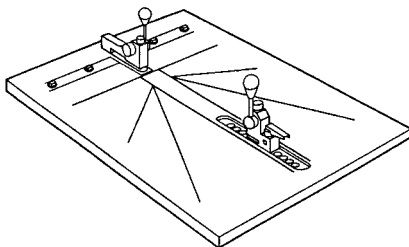


Figure 6 – A transfer punch.

The purpose of a transfer punch (see Figure 6) is to punch existing punched imagesetter output so that the films may be used with the pin register configurations on an automatic photocomposing stepper. A photocomposing stepper, which may also be called an automated imposer, takes punched films and automatically exposes them on plate, film, or proofing material. (Some examples of automated photocomposing steppers include those from Opticopy, Misomex, Dainippon Screen, and Krause.) The device which picks up the film, moves it, and then holds it during exposure is called a chase. If the existing pin register holes in the imagesetter film don't correspond to the holes in the chase, a transfer punch system may be used to create a second set of holes. The transfer punch has pins corresponding to the imagesetter film. (See Figure 7.) A piece of imagesetter film is aligned on the existing pin register holes and then punched with the second set of holes.

It is important that tight register is maintained during the transfer punch process. Inaccurately punched holes will translate into misregistration later in the process.² Manufacturers generally prefer that there is no more than 1/2 mil misregister. (1/2 mil is 5/10,000 of an inch, or 517 microns, or .0127 millimeters.)

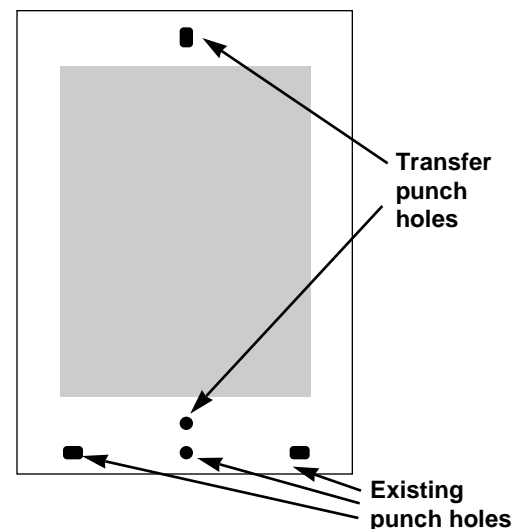


Figure 7 – Position of holes created by a transfer punch in comparison to the existing pin register holes.

² The handling techniques used in positioning the film material for punching play an important role in the resulting accuracy of the punched films. This is particularly true in the case of large films.

To maintain good register, only one piece of film material may be punched at a time. (Multiple layers of film have a tendency to shift during punching.) Once the films have been transfer punched, they are trimmed to fit in the chase. More than one piece of film may be trimmed at a time because the required accuracy is not as great. (Remember, the edges are not used for alignment, the pin holes are.)

2-up or 4-up

Some of the most common small and mid-size press formats are very well served by film that is prepunched by the imagesetter. When plate and masking materials are punched with the same holes, film preparation is greatly simplified. The accuracy of the punching by the imagesetter is excellent and it avoids time-consuming manual stripping work. Plate and masking materials may be punched with a device like the one shown in Figure 8. This allows users to continue using existing photocomposing steppers, vacuum frames and exposure units.

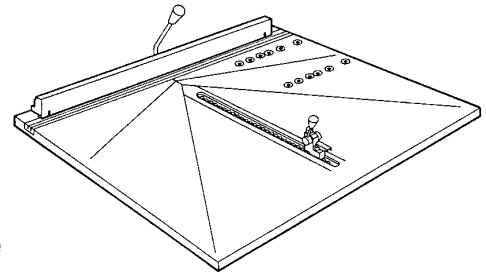


Figure 8 – A punching device

8-up

8-up work is not solely limited to imagesetters that have an imaging area that will fit an 8-up layout. It is quite easy to create an 8-up layout from two 4-up films. If these are imposed properly and set side by side in the exposure frame, the result is an 8-up layout. (See Figure 9.) Stoesser offers a special stepping register board with movable pins that makes this kind of 8-up layout possible. (See Figure 10.) This stepping register board fits in a vertical drawdown vacuum frame.

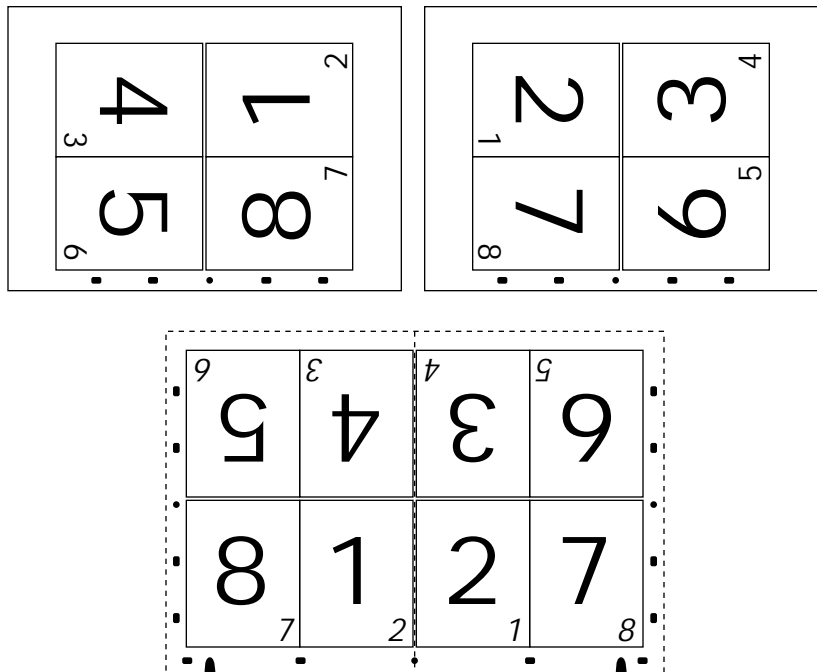


Figure 9 – Two separate 4-up punched imagesetter films (top) may be combined to create an 8-up layout (bottom). The 8-up layout is then exposed on a pre-punched plate (see pin holes and notches on the gripper edge at the bottom of the illustration). Proper planning in terms of page placement, plus a suitable vacuum frame registration system make this possible. In addition, a mirroring capability in the imposition program is necessary to allow the flats to be rotated and placed in the correct position relative to the pin register holes.

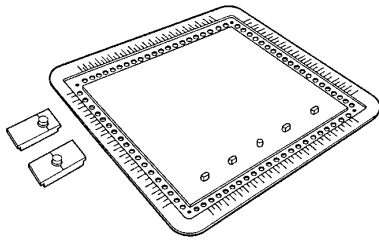


Figure 10 – A stepping register board as used in a vertical drawdown vacuum frame.

A 4-up format imagesetter like Herkules offers considerable benefits when used in conjunction with a stepping register board:

- Large format imagesetters cost more, take up more space, and require a larger film processor than a 4-up format imagesetter. And, a back-up device is correspondingly more expensive.
- The dimensional stability of the film material is more of an issue on large films. Changes in temperature or humidity may cause registration problems. (See the Linotype-Hell technical information article entitled, *Humidity, Dust, and Temperature* for more information.)
- Making last minute corrections on large format imagesetters is more difficult because corrections involve the use of more film, and RIPping large files takes longer because of larger format size.
- Large format imagesetters or recorders may not have punch capability.
- Large films must be handled very carefully to avoid kinks.

Herkules

There are two Herkules devices: Herkules and Herkules M. The Herkules imaging area (29.5 inches x 21.7 inches) is big enough to easily fit a 4-up layout of 8.5 x 11 inch pages. The Herkules M imaging area (21.3 inches x 21.7 inches) is big enough to easily fit a 2-up layout of 8.5 x 11 inch pages. A 2-up layout from the Herkules M with the Bacher (Control 2000) pin configuration may be directly used for the Heidelberg GTO.

The Herkules line of imagesetters from Linotype-Hell offers a variety of pin options, both standard and custom. Standard systems include those from Stoesser and Bacher (Control 2000). Punches may be placed on the long and/or the short format side. An optional tail punch is also available. Customized pin register systems are also available on special order.

The head and the tail pin register holes fall outside the image area on Herkules. The tail punch falls on the image centerline perpendicular to the head punch. The tail punch can be turned on or off, but when the tail punch is used, the entire imageable area of the drum must be used.

The side punch of Herkules falls just inside the image area. This reduces the image area by slightly more than a half inch.³ The side punch of Herkules may be used as the head punch in special situations where production requirements dictate that the pin register holes fall on the short format side.

³ It is actually possible to image between the holes of the side punch, but this is only useful for reference notes, register marks, or small quality control marks.

Conclusion

Pin register streamlines the process for stripping, proofing, and platemaking. By taking full advantage of the capabilities of a punch imagesetter, both manual stripping and pressroom costs may be significantly reduced.

Stoesser

For more information on the Stoesser devices described in this article, please contact Stoesser Register Systems at 800-877-1283.

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