PROJECTION PLATEMAKING - AN INTERFACE TO THE FUTURE

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Abstract: The modern printer is faced with a variety of competitive economic and technological pressures. To survive, his operation must be more cost effective and productive. In the pre-press area, the focus is on reducing material costs required to make a plate and automating the operation so that each employee becomes more productive. In addition, the printer must be ready for the day when low cost, highly capable electronic publishing systems will proliferate within the printing industry.

Projection platemaking addresses the concerns of the pre-press area with the automation of image assembly and platemaking functions -- drastically reducing the cost of materials and eliminating many time-consuming functions. This advanced technology represents a major breakthrough for the medium and high-volume black and white and spot-color printer and is gaining worldwide recognition.

Alternative Methods of Platemaking

There are many key reasons why conventional platemaking techniques need to be replaced by a more productive system. Traditionally, full-size film has been employed to record and store information for the eventual purpose of preparing a printing plate. This method, however, is inefficent in terms of cost-effectiveness and productivity:

- The hand assembly of full-page negatives into flats is labor intensive and time consuming.
- The conventional method is difficult to schedule accurately because of the variables inherent in the photographing, opaquing and hand-stripping processes.

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- Flats are cumbersome to store.
- Flats are not compatible with multiple signature formats; flats have to be broken down and re-stripped in order to accommodate a different signature for a different press.
- Materials are expensive (about $0.40 to $0.80 per page.
- The conventional method does not allow for efficient integration with electronic publishing.

The Concept of Projection Platemaking

Figure 1 provides an overview of the process of projection platemaking. The objective is to provide an answer to the limitations and inefficiencies of conventional methods. Its concept is simple and extremely straightforward:

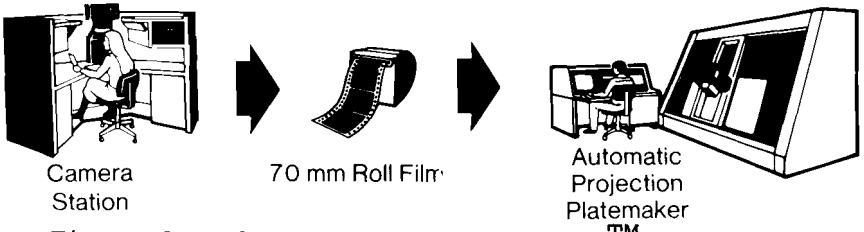


Figure 1: The Super 70 Paginator™ projection platemaking system

In a manual camera operation, full size copy from a phototypesetter is photographed in page-order sequence at the camera station onto 70mm roll film. The output (70mm film) can hold from 1 to 500 8- 1/2" X 11" or 1000 6" X 9" pages of copy.

The film goes to an automatic film processor; then the developed film is placed in the projection platemaker. The operator inserts a magnetic memory disk containing such data as imposition instructions, plate size and margins into the computer control console. S/he also places an unexposed plate against a set of guide pins on the vacuum platen, and presses a button to activate the computer-stored program.

The projector steps around the plate to expose each image in its proper position. Once the first plate is exposed, the operator can remove it and replace it with an unexposed plate. In this manner, the platemaker can run continuously until all the pages on the roll of film have been exposed.

The Camera Station

Figure 2 shows a woman at the camera station which provides a comfortable working area for handling copy. The operator places copy on the backlighted electrostatic hold down device prior to photography. Copy is aligned either on guide pins or over a grid. After it is in position, the operator presses the foot button which then turns off the backlighting, opens the shutter, closes the shutter, and moves the film to be

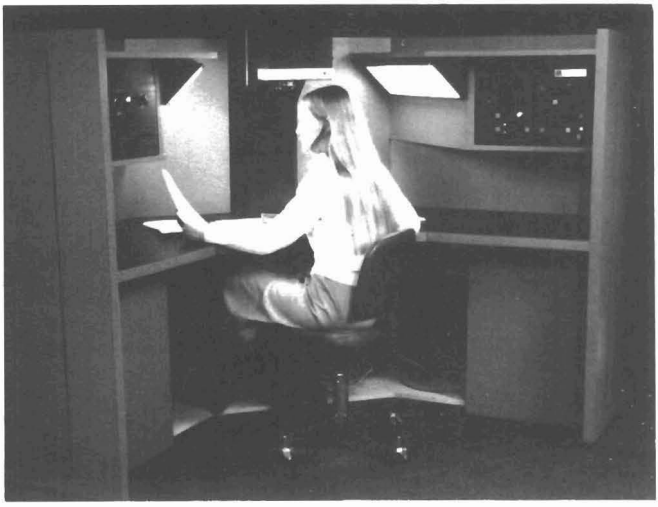


Figure 2: Camera Station

ready for the next position. Text material and line art, halftones (screen prints) can be photographed with a single exposure.

An operator can photograph about 100 to 200 pages per hour when aligning copy over a grid. Prepunched copy aligned by pins can be photographed about twice as fast.

Because the camera station employs green light which precisely matches the film, high-intensity flood quartz lights are not required. The result is less operator fatigue and a cooler working area. Additionally, the camera station's electronics automatically change the camera height and lens focus so that copy can be reduced 50% and enlarged 200%.

Film Processor

The 70mm roll film is then processed automatically. This process is approximately eight times faster than processing individual negatives. Also, because the 70mm frame is one/tenth the size of the sheet film, the processing requires one/tenth the chemicals. The dry developed roll of film is now ready for making plates.

Control Console and Projection Platemaker

The platemaking system consists of a computer control console and a projection platemaker, as pictured in figure 3. The control console automatically and completely controls operation of the projection platemaker. It includes a computer, color video terminal, dual floppy disk drive, and manual control panel. The color video terminal displays programming and system instructions. The floppy disk stores program and diagnostic information and makes it available to the computer instantaneously.

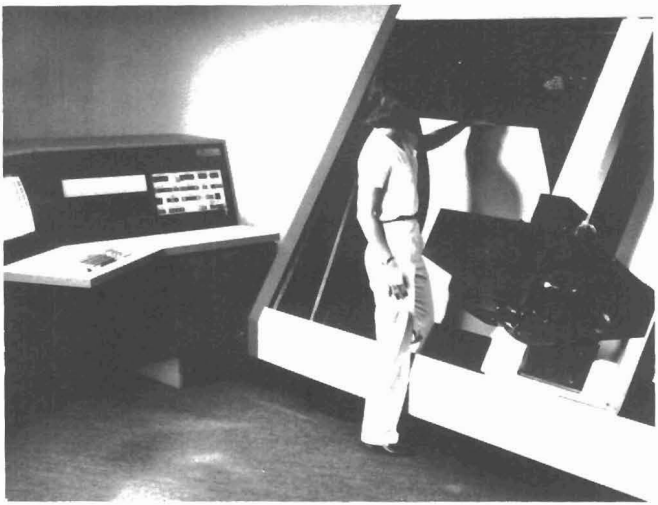


Figure 3: Control Console and Projection Platemaker

The operator prepares a job plan for the projection platemaker on the system's color terminal. The interactive computer color display completely automates the preparation of job plans and permits the rapid modification of existing job plans.

On the left of the color screen (shown in figure 4), we have all the job information required to specify the job, i.e. the plate size, the paper size, the finish size, the text size, the trim and the margins. Furthermore, there is a provision for shingling, a process which moves the page over slightly to accommodate for thickness of different weight papers. This can be specifically programmed to accommodate a customer's specific needs.

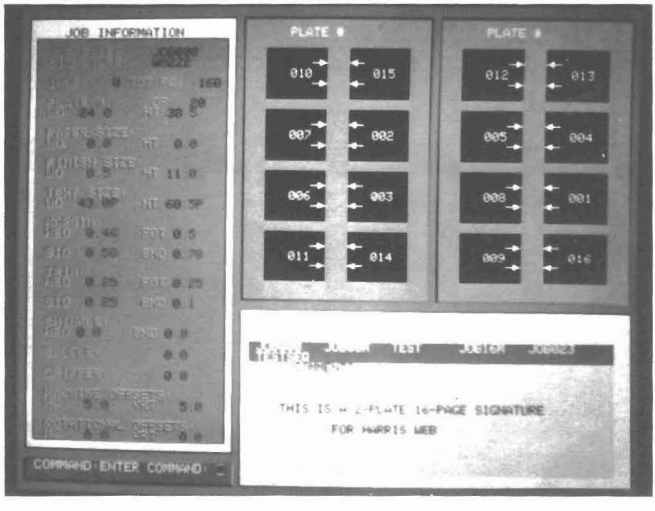


Figure 4: Interative Computer Color Display

The imposition shown is for an eight-page, two-plate job. The front plate is shown on the left and the back plate is on the right. The head of each page is indicated by arrows. The numbers inside the black boxes indicate the sequence of pages. A new job plan can be created automatically in about five minutes (vs. one to two hours manually). An existing job plan can be modified in less than one minute (vs. about an hour manually).

Once the operator calls up a job plan on the color terminal and verifies that it's correct, s/he then loads the film in the projector, places a plate against the backboard of the platemaker, and presses the RUN PLATEMAKER key.

The projector's film transport system moves the film at high speeds until the proper frame is in position; simultaneously, the projector moves to the required position on the plate and rotates to the appropriate head position. Its shutter opens and an image of the page is enlarged and projected onto the plate, with exposure carried out typically in less than five seconds. The shutter closes and the procedure is repeated for the next page. An eight page plate can be exposed in this manner in one and a half to two minutes.

No Opaquing Required

One of the important advantages of projection platemaking is the ability of the system to photograph copy with many layers of paste-ups without showing any cut lines. The projector will not project a cutline that has a density on the 70mm film slightly higher than that of the copy. This has been possible to achieve in nearly every copy tested to date with the use of high quality film and the uniformity of the camera station's side and back lights -- without detuning the optics.

On the left of figure 5, we see the original copy, black type on strips of creased and torn silver paper taped to white board. A considerable amount of opaquing would have to be performed on a conventional equipment to handle this copy. On the right, we see a clean plate made with the Rachwal system.

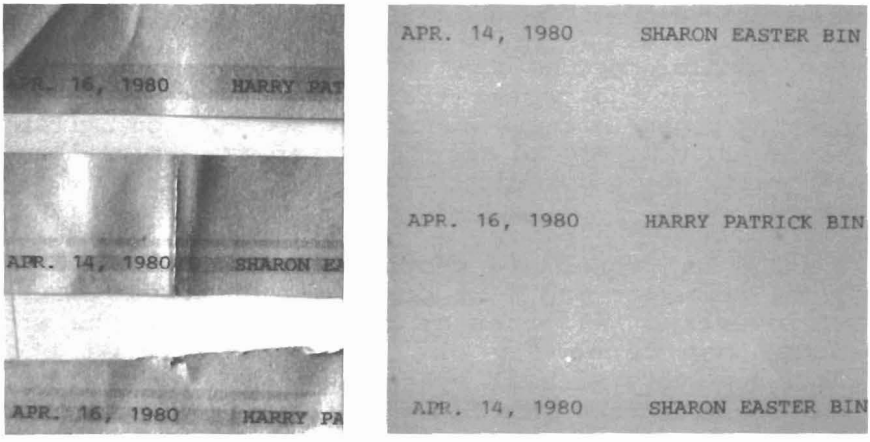


Figure 5: Test Sample -- Black type on silver strips

Plates

The system can image a wide variety of UV sensitive plates. Standard metal wipe-on plates work well with the high-speed coatings and developers supplied by Rachwal and other manufacturers. Nearly every manufacturer of additive and subtractive presensitized plates currently produces a plate compatible with the system at competitive prices with run lengths to 500,000 plus impressions.

Proofing Copy

There are two convenient proofing methods for obtaining hard copy from images on 70mm roll film.

1. Proof paper can be laid directly on the backboard of the platemaker and imaged just like plate. This method will provide each page in position in the customary blue line that many customers require.

2. An off-line device is available that will image plain paper directly from 70mm roll film. This computerized machine can automatically make multiple copies of sequential imagesfrom a roll of film. The quality is excellent and the machine can be used for making short-run copies of a book, for example.

One thing that should be borne in mind is that with the Rachwal system, proofing copies are generally not required. This is because the machine automatically takes care of the problems that cause most errors in conventional platemaking.

For example, because copy is photographed in page order sequence at the camera station, the common error of placing pages in their incorrect sequence on a flat is extremely unlikely to occur; therefore, a blue line is generally not required to check for proper sequence of pages.

Because halftones are photographed as screen prints along with line and text copy, the other common error of inverting halftones or placing them in the wrong order can be easily checked. Because of these factors, every Rachwal system user no longer finds it necessary to make blue lines on a routine basis.

Interface to Electronic Publishing

The Rachwal System can provide anefficient interface to electronic publishing. Figure 6 shows how 70mm film can be imaged directly by a high-speed photocomposer, bypassing the steps of generating RC paper and subsequent manual camera operation.

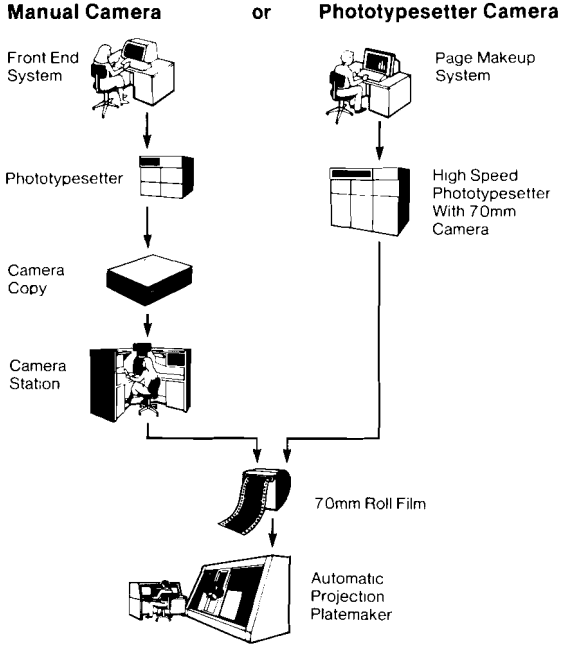


Figure 6: Manual and Phototypesetter Cameras

Rachwal has developed a camera specifically to be mounted inside certain high-speed phototypesetters. (See figure 7). This camera replaces in concept the standard RC paper transport. The image from the CRT tube is simply recorded onto the 70mm roll film instead of full-size RC paper. In the future, 70mm roll film could be similarly imaged by laser phototypesetters.

A Paginator system has been doing just that for over three years. A major U.S. corporation generates nearly all the text and drawings for its manuals with an extensive page makeup system and outputs them via an Autologic APS 51 MRU Microfilm Recording Unit onto rolls of film. The rolls are mailed to the printer located 800 miles away who inserts them in the platemaker for imaging the plates.

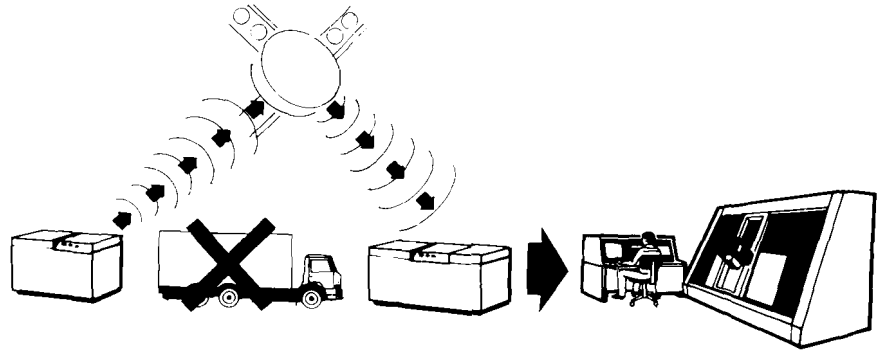


Figure 8: Publisher to Printer via Satellite

The Benefits of Projection Platemaking

There are many benefits to using a projection platemaking system over conventional methods:

Productivity: As the chart on Figure 9 indicates, four out of the seven steps in a conventional platemaking operation are eliminated. Because copy is shot in page-order sequence at the camera station, collating of pages into signature order is not required. In addition, because of the use of extremely high-quality film and because of the nature of the physics of projection platemaking itself, opaquing is not required with the system.

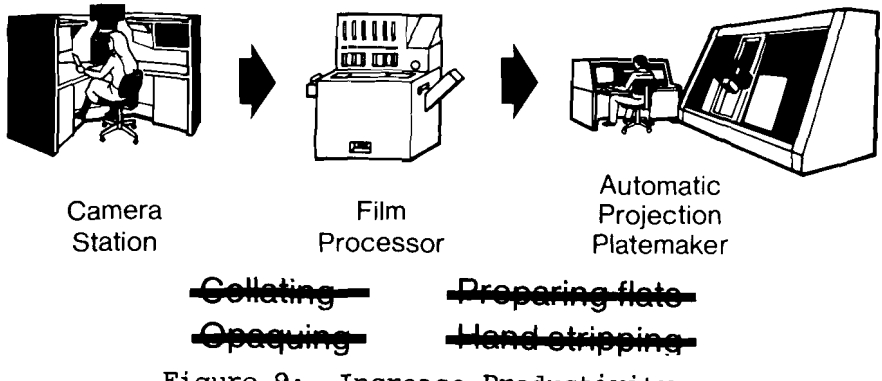


Figure 9: Increase Productivity -- Eliminate 4 out 7 Steps

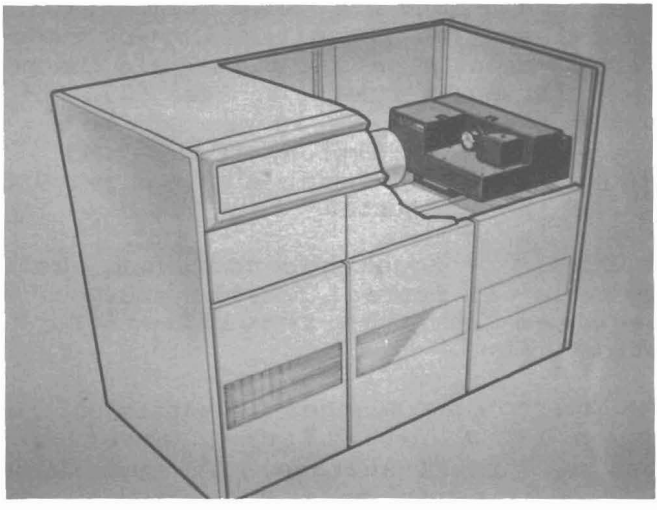


Figure 7: Photocomposer Camera mounted inside Phototypesetter

There are some obvious benefits to this link with the phototypesetter. The cost of RC paper and the manual camera step are both eliminated. Thus, the time to get from phototypesetter to plate is significantly reduced.

Why Integrate Projection Platemaking with Electronic Publishing

The question is often raised, "In the 'digital' era, why do we need to use film at all?" First, there is almost always a requirement for buffer storage between front-end systems and platemaking. There are several reasons for the need for storage:

1/ The typesetter and platemaker are often located many miles apart and may be owned by different companies. The logistics of tying together directly can be impractical.

2/ Digital transmission times can vary from minutes to hours depending upon the data rate of the carrier. The need to remake a plate quickly and in an emergency may preclude the possibility of relying upon retransmission.

3/ The typesetter invariably outputs a page at a different rate than the platemaker. In the conventional system, for example, many pages can be imaged simultaneously onto a plate. In the projection system, a page can be imaged in less than 1.5 seconds. A CRT typesetter can take 30 seconds to a minute to produce a page. In addition, it can take as long to convert data from the front end system to the form required for the typesetter.

David McDowell of Kodak has addressed the issue of expense of digital storage for the enormous amount of data required for high-resolution graphic arts applications. (1)

An 8-1/2" X 11" page, scanned at sufficient resolution to carry a 133-line halftone, would require 22 megabytes of digital storage. This works out to be about $140.00 if stored on a 300-megabyte removal disk pack or $3.00 to $10.00 per page if stored on magnetic tape. On the other hand, one page of 70mm film costs only about $.08.

In terms of writing the image onto the plate, film has a major advantage in that the information is given to the plate in a parallel form, that is, the entire image is transferred to the plate at once. With electronic information systems, on the other hand, the information is usually transmitted serially, that is, one bit of information at a time. A laser device is capable of transmitting 6 million bits of data per second to the plate. At that rate, it would take 40 seconds to image one 8-1/2" X 11" page. With the Super 70 Paginator projection platemaking system, all the information is delivered in parallel and that same page could be imaged in just 1-1/2 to 8 seconds, depending on the plate sensitivity.

Satellite Transmission

Eventually, publishers will be able to generate copy at their studios, transmit it via satellite to the printer who would have a receiving device with a phototypesetter that would image 70mm roll film for projection onto a plate. (See Figure 8)

Platemaking, as a computerized operation, eliminates preparing flats and hand-stripping. These operations require highly skilled personnel and are ideally suited to automation.

System users report that one of the greatest adavantage to projection platmaking is that it allows them to set standards and define methods. The end result is the ability to set up prepress production as a manufacturing process -- greatly increasing efficiency and accuracy.

Speed of Throughput: Two people can handle between 800 and 2000 pages per shift depending on whether the copy is prepunched or not. In addition, the first set of plates can be made rather quickly. One person could photograph, process and project 16 pages on a plate in ten to fifteen minutes.

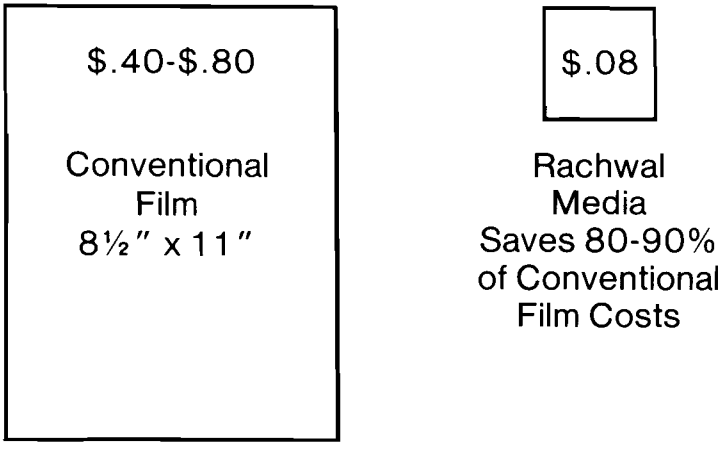
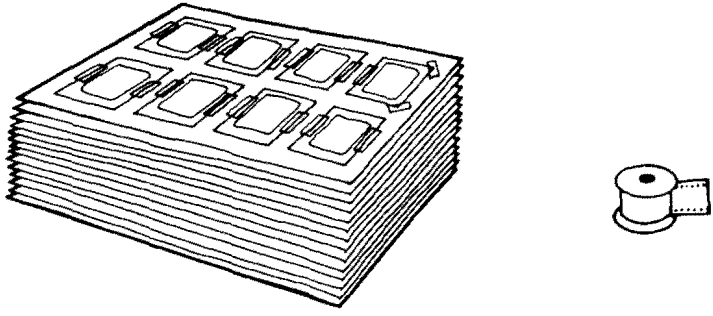


Figure 10

Cost of Materials: (Figure 10) The cost of a conventional 8 X 10 page is $.40 to $.80. The Rachwal system reduces that cost to $.08 per page (or $0.04 for a 6" x 9" page). The savings from the use of reduced size film are sufficiently substantial in many cases to justify a system for that reason alone.



A file cabinet instead of a warehouse

Figure 11

Storage and Handling: (Figure 11) The cumbersome nature of traditional flats not only makes them difficult to handle but requires considerable space for storage. The use of 70mm roll film makes preserving and retrieving information easy. A few file cabinets containing 70mm roll film can replace a warehouse full of flats.

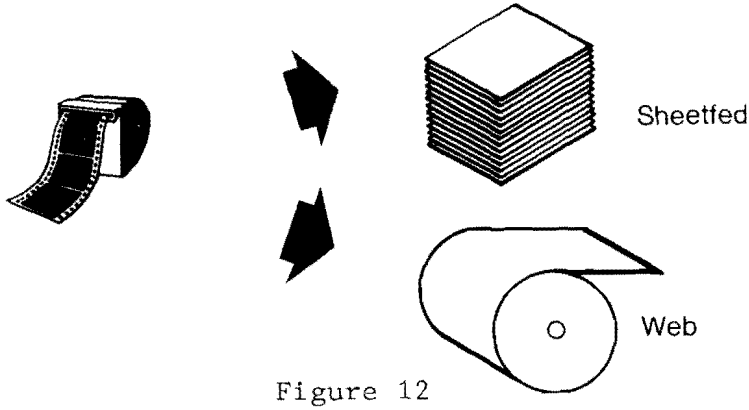


Figure 12

Flexibility: (Figure 12) Little flexibility for reprints and emergencies is available with conventional methods. The same roll of 70mm film can be used to image different plates for a variety of presses.

REFERENCE

1. D. McDowell, 1982 T.A.G.A. Proceedings, p. 121.