Computer to Cylinder/Plate
The Next Generation

Presented by

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Abstract: A review of the challenges and solutions associated with workflow and productivity within the gravure, offset and flexo printing environments.

Although the "direct to" concept is new to many of the printing fields, it is not new to gravure. The gravure industry has been using a filmless workflow since the mid 1980's. Computer-to-cylinder technology emerged when electronic engraving systems were connected to computers, allowing the use of digital files instead of films and bromides.

Workflow in the printing industry evolved a great deal in the last fifteen years with great technological advances. In 1984, computer-based digital step-and-repeat became a reality. Although the source for images was still film-based, companies could now program and save jobs without having to rescan images. The computer also allowed such time-saving features as fast engrave carriage advance. In 1986, the first filmless engraving jobs were engraved, thus eliminating film and bromide as the image source.

Ohio introduced a new Unix-based system (Cylinder Composition System) in 1990 to take advantage of new hardware choices. From 1991 through 1993, filmless engraving progressed, supporting file input in Handshake format and PostScript®. Since then, technology has evolved in hardware as well as software. The past three years have been exciting with the movement toward full machine automation in electronic engraving.

The Challenge for the Future

While gravure has gone through some major changes in the past fifteen years, there are still many challenges to meet and overcome. One major challenge facing the entire printing industry revolves around workflow and workflow automation. With speed improvements applied in all areas, ever faster job turn-around times are now demanded. The gravure industry has also been challenged by a demand for shorter print runs, which require greater throughput and productivity. More tasks must be completed with less of everything including operators, production shifts and equipment.

Demands for better workflow have resulted in greater openness among system platforms. Today, there are more import and export capabilities running on cheaper hardware platforms than ever before. Hardware and software vendors were forced to become less proprietary, because Desktop Publishing (DTP) is now an indispensable part of the printing industry.

However, new software and hardware don't solve all production issues. The entire digital workflow is extremely complex, requiring that the operator thoroughly understand input formats, as well as the associated workflow.

Many Workflow Choices

In the packaging industry, most PostScript files are created by DTP systems such as Adobe Illustrator and Artwork Systems Artpro. Generally, PostScript files are transferred to PostScript RIPs for rasterization at the correct output resolution. PostScript files can be sent in either a full step-and-repeat format or as a single one up-image. In the latter case, the step and repeat is performed on the rasterized one-up and sent out to the desired output device. Advantages to the PostScript workflow include small files sizes (when in one-up format), fast network transfer, high quality output, as well as easy text and CT manipulation.

Although efficient, PostScript is not the only workflow used today. Many companies continue to use the Handshake and Extended Handshake format as their filmless method of choice. Systems such as Scitex, Barco, Contex as well as PCC and Dalim are capable of outputting Handshake. The general Handshake workflow is for the prepress system to create a Handshake or Extended Handshake file, then transfer the file via online connections, optical disk or tape to another system for step-and-repeat and output.

The Handshake format maintains linework images at a high resolution (40 pixel/mm) while CT images remain at a lower resolution (12 pixel/mm). Files are compressed when moved into the Handshake format to maintain the smallest possible file sizes. Separate file resolutions can have a significant benefit to the overall quality of a job when used properly. Ohio's systems automatically combine Handshake CT and LW together into one final file. During the auto-merge process, a separate gradation curve as well as sharpness curve can be selected for both CT and LW. By doing so, operators can create color specific gradation and sharpness curves for CT images as well as linework images. This allows for color fidelity as well text sharpness from image to image and job to job.

Tiff format is also used today as an alternative to other types of output. In terms of workflow demand and fast turn-around times, one must investigate very carefully whether Tiff is the best format. One of the biggest issues when using Tiff is the physical size of each output file. When a stepped and repeated file is output in Tiff, the file size can become quite large (gigabytes of data). Larger file sizes mean longer file creation times, higher network speed requirements for file transfer, and a more complicated archive process with data spread across multiple disks. With today's demand for higher productivity, Tiff may not always be the best output choice. Overall workflow must be carefully studied before a decision can be made.

The Need for a Common Workflow

The next generation for gravure, as well as the rest of the printing industry, revolves around systems capable of centralizing all workflow. Today, many traditional offset-, flexo- and gravure-only plants are branching into new markets, purchasing equipment outside their normal printing method. In many cases, the workflow for one printing environment may not flow into the new printing method. For example, a traditional gravure-only shop decides to purchase a flexo platemaker. The layout program used for gravure may not fit into the flexo workflow. In this case, time is spent investing in new equipment, hiring more people and establishing two different types of workflow. This obviously is not the best way to optimize money, people, or equipment.

Traditional prepress systems are often used to perform all the production steps necessary to complete a job, including stripping, trapping, proofing, step and repeat, and final output. They may also be used for preflight, RIPping, color manipulation, and touch-up. In most cases, the prepress system uses a "one size fits all" approach. Sounds like a lot to ask, doesn't it? Many shops have realized that one prepress system may not be the best choice for performing

all steps in the production cycle. They often find that they need to purchase additional workstations and software.

Ohio's approach has been to let a prepress system do what it was designed to do: prepress, and prepress only! As an alternative to using a prepress system for every step of production, Ohio designed a new system called the Collage Layout System. Collage provides a device independent workflow, which translates into one layout system for gravure, offset and flexo. This system provides several advantages. The operator does not have to worry about the final print process when performing the layout. Also, with only one layout system to learn, all operators have equal skills and can share the production load regardless of the final printing method.

Collage uses a client/server system, with Windows NT as the client and a Solaris 2.6 based server. For output to a device, the Collage Controller uses a Solaris 2.6 based computer for fast processing. For example, for electronic engraving, the Collage Engrave Controller uses a "Real Time" on-the-fly process to merge, screen, sharpen and apply gamma curves rev-by-rev as needed by the engraver. This approach eliminates the need to render the full step and repeat job to one large file. Instead, Ohio retains one-up image data throughout the entire process including layout, engraving, and archiving. This advantage allows for faster throughput, remakes and quick copy changes.

Early in 1998, Ohio acquired a German company called Schepers to form Schepers Ohio. The fundamental strength of this acquisition involves the Digilas Laser system. The Digilas System is the only system capable of exposing either flexo plates or gravure cylinders in the same machine. The benefit of the Digilas system for gravure customers is that there is no requirement to change plating or polishing systems. Cylinders produced for chemical etching or electronic engraving can be placed into the Digilas system

for laser exposure. Flexo plates can be mounted in traditional form and exposed digitally from a controller. Maximum resolution for this unit is 2500 dpi with a constant feed rate of 360,000 pulses/revolution. The unit can move at a speed of up to 40 mm/min regardless of circumference and includes a fast advance capability to rapidly advance through non-imaged portions of a job. The versatility of the Digilas system requires an equally versatile front-end system, such as the Collage system.

The Next Step: Full Automation

Other areas in the gravure world are also developing quickly. Being able to layout a job faster and easier with computer systems means we must look for other areas for speed and automation improvement. Ohio focused on the electronic engraver as an area for automation. Items of key concern for automation included cylinder loading and unloading, test cuts, and engrave head placement.

To automate test cuts, an engrave head that can "see" and monitor what it is doing at all times is needed. Ohio developed the Vista® Cell Sensing System for this stage of automation. The engrave head has a CCD camera mounted on it. Additionally, Ohio developed a complex set of algorithms that enable the system to measure engrave cells of all angles. This hardware and software solution allows an engraver to perform automatic test cuts and measure cylinder circumference and overall cylinder face length. By designing a closed-loop system, Ohio helps ensure consistency from cylinder to cylinder, day after day.

The latest development for gravure involves a new process to control an engrave head. Ohio developed the transCell™ Processing System to significantly improve details in both CT and linework images. This system involves digital signal processor technology. Traditionally, electronic engraving has a fixed grid in which to place images. This fixed grid requires

that the engrave head begin engraving at a fixed point on the grid. Ohio's transCell system removes the vertical portion of the engraving grid, thus allowing engrave cells to be placed exactly in the right position. The overall effect of transCell engraving is higher quality linework especially in fine text and UPC labels, as well as better detail within CT images.

Figure 1 - transCell engraving

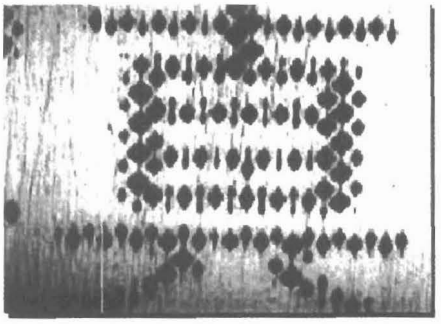


Figure 2 – traditional engraving

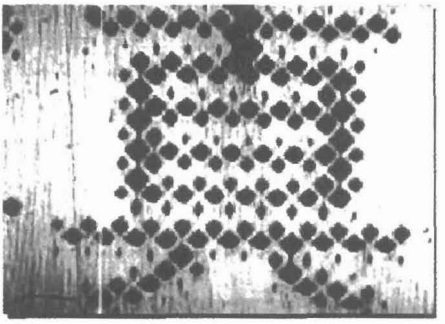


Figure 3 - transCell engraving

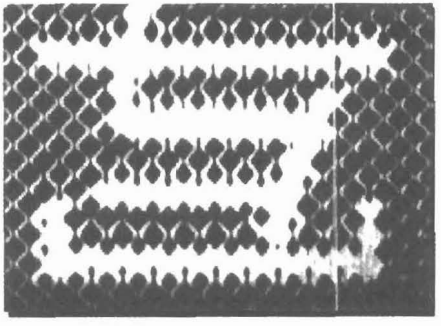
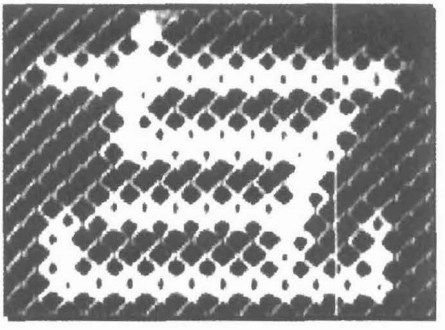


Figure 4 - traditional engraving



Preparing for Tomorrow

Key concerns for the future for the entire printing industry revolve around efficiency, flexibility, and speed. The digital workflow, whether computer-to-plate or computer-to-cylinder, must get faster and less complex.

The integration of different internal workflows into one centralized workflow is one answer. Systems such as Collage are designed to centralize workflow and combine

traditional multi-machine, multi-person tasks into single machine, single person tasks. Equipment with the flexibility of the Digilas system provide printing companies with multiple workflows and new sources of revenue.

Customers demand greater efficiency from engravers and platemakers, requiring faster turnaround time. Automation plays a large roll in a company's ability to streamline the process while maintaining the highest quality. Automation will occur not only in the handling of materials such as cylinders and plates, but also within the equipment itself, as with the Vista System for engravers. Many tools are available today to help any company prepare for tomorrow.