HALFTONE GRAVURE: AN OPERATIONAL PERSPECTIVE

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The challenge for the rotogravure industry during the 80's is to preserve the press advantages of the gravure process and integrate the pre-press advantages from the offset process. There has not been another process that has been so readily accepted in the rotogravure industry as has been the conversion of to halftone gravure. The Gravure Technical Association has established procedures and guidelines for acceptance of films, production of progressive proofs and for engraving of printing cylinders.

History of Halftone Gravure

For many years the only method of manufacturing cylinders for rotogravure printing has been to utilize continuous tone films to acid etch or to electro-mechanically engrave the printing cylinder surface with a Helio-klischograph. Continuous tone films represent the image to be reproduced in shades of gray for the entire tonal range. Production of films for this process historically has been an inexact science at best and required considerable craft skills to produce accurate films due to the fact that there is still no accurate pre-press proofing system available to predict the final result on paper. In this process, the screen or dot structure is not introduced until the images are etched or engraved into copper cylinders or, in the case of service houses, into copper plates for proofing.

If the page in question were proofed on a gravure proof press on copper plates, the plates were color corrected by hand and reproofed until the customer approved the final proof. Before the final films were shipped, the service house attempted to incorporate all of the hand corrections done on the copper plates into the films for shipment to the printer. At best this was not a completely reliable process and was extremely time consuming as well as costly in labor and material to both the service house and the customer, who ultimately paid the price.

The current accepted method of proofing advertising pages is to utilize an offset proof press to manufacture progressive proofs. The cost to the service house is greatly reduced through savings in time required to produce the proofs and reduced material costs.

In recent years there has been considerable interest in lowering the cost of the rotogravure process through the use of halftone films.

Halftone films differ from those used in the continuous tone process in that the films are screened to produce dots in the images. The screened films can be made by contact screening continuous tone films or by utilizing an electronic dot generating color scanner. A set of screened films lends itself to pre-press proofing systems. Thus it is possible to predict the final result on paper before the print-

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ing cylinder is engraved and proofed. The greatest advantage is the fact that the films used to make the pre-press proof or the plates for the offset proofing press are the same ones sent to the printer. If several duplicate sets of films have to be manufactured for distribution to several printers, the screened films are easily reproduced by contacting.

While the conversion of screened films has been done by several different methods in the last several years, this report is concerned only with the current methods using the Helio-klischograph. Development of the electronic engraving machine is the driving force in halftone gravure. The Helio-klischograph consists of two equipment beds similar to a machinist's lathe. One bed has an equipment carrier that has engraving heads mounted for engraving the printing cylinder as well as mounting brackets to hold the printing cylinder. The second bed has a large scanning drum permanently mounted in the brackets and scanning heads on the equipment carrier to scan the bromides. During operation, the scanning side equipment carrier moves laterally while the scanning drum rotates. The scanning side of the machine digitizes the information from the bromides, sorts it to a printing press imposition and engraves the printing cylinder in a continuous operation.

In normal operation with continuous tone films, the scanning optic is in sharp focus to maintain the detail and sharpness of the original films. The Heil Company has developed an aperture for the scanning head that allows for scanning of screened films. The aperture is designed so that a certain amount of de-focus effect is built into the optical system, thus simulating a continuous tone condition when scanning screened films. The loss of detail contrast created by the defocusing technique has been compensated for by changing the circuitry within the engraving head to enhance the effect of the unsharp masking channel.

The primary advantage of the halftone gravure technique is that the films used to produce the pre-press proof or offset press printing plates are the same films used to contact onto bromide material for engraving. While the continuous tone methods also use a bromide, or opaque film for mounting on the scanning drum of the Helio-klischograph, the contacting process for halftone gravure is much more precise in representation of the tonal range on the bromide. In the process of contacting of continuous tone films, it is difficult to reproduce the entire tone range accurately; and frequently the photographer doing the contacting has to make a choice on whether to hold the end points of the tone scale or try to hold the mid-tone range in tolerance. Since the obvious choice is to hold the highlight and shadow ends of the image, the mid-tone values suffered and would drift as much as plus or minus .07 density from page to page.

The bromide materials used for halftone gravure are consistent in reproduction of tone values throughout the entire range and the result is predictable from page to page. All bromide materials used for this process make use of rapid access chemistry and the average processing time through a film processor is about ninety secnds per sheet of film. Processing of continuous tone bromides average four to five minutes per sheet.

When the halftone gravure technique began to be popular in the industry, gravure printers used two grups of inks that were vastly different from SWOP standards. GTA Group V inks were used for printing on coated or super calender paper and GTA Group I inks were used primarily for printing on lower grade newsprint paper. Both inks differ vastly from SWOP standards in that both sets of inks are not as clean in the blue and red inks. Because of these differences, new offset inks were developed to allow offset presses to be able to duplicate Group V and Group I strengths and hues. The Group V standards program was announced in the spring of 1984 and was an interim step for the companies involved.

The goal of the magazine publishers was to have "generic" films which would produce both offset and rotogravure printing.

The Gravure Technical Association and the SWOP Standards Committee has been able to meet on and modify the standards for each group towards a set of guidelines for production of films that both industries will be able to use. The GTA committees recognized the necessity of development of a new set of inks if generic films were to be a reality. The new inks were developed and were designated as GTA Group VI/SWOP inks for printing on coated paper.

The Group VI/SWOP inks match the maximum densities required for offset printing. Extensive testing at several gravure printers has established that these inks are competitive in cost with Group V inks. As a result, the Gravure Technical Association has published standards for GTA GroupVI/SWOP inks to provide assistance for those wishing to provide films to printers. These guidelines have established the goals for maximum density of the inks, procedures for inspection of films and press proofs and forms for reporting reasons of film rejection.

The standards for producing films for Group VI halftone gravure were established and made effective on August 15, 1985 and were fully implemented on September 1, 1985.

Standards for supplying films for GTA Group I inks were made effective November 11, 1985 with complete implementation by March 10, 1986. The released standards indicate the dot percentage needed to reproduce page 25 of the GTA Group I color reference book and include specifications to adjust for grey balance. Films made for Group I inks will not be compatible with those manufactured to Group VI/SWOP specifications.

The barriers to having generic or universal films for both the offset and rotogravure process have been eroded until there are very few of them left to overcome. The last large remaining obstacle is the gravure process needs to have a 5 percent dot for the first printing tone. The offset process can print satisfactorily down to a 2 percent dot. The Heil Company, manufacturers of the the helio-klischograph, has recently announced a new aperture for the Helio-klischograph that is capable of discerning the 2 to 3 percent dot on film and reproducing it as the first printable tone on the printing cylinder.

Experiences from the film separator

The film separators have been very successful in producing separations for the halftone gravure process. Compucolor International has been using pre-press proofs to verify the quality of the films sent to the printers.

For the few remaining GTA Group V customers positive Cromalin proofs are submitted for approval. Out of necessity, the color set up for the scanners is very different from the settings required for Group VI/SWOP or GTA Group I inks and can be used only for Group V customers. Production of proofs in accordance with equipment manufacturer's specifications is paramount to producing pre-press proofs that can be matched by the printer. For producing Cromalins, the device used is the Brunner target for control of exposure, measurement of dot gain in the proof and control of the maximum density for each color.

Most of Compucolor's production is for customers using GTA Group I inks. The proof system used for these customers is also DuPont Cromalin. To simulate the newsprint paper, a press finish toner is used to dull or de-gloss the proof to match press conditions.

For the Group VI/SWOP customers either positive Cromalin or the 3M Matchprint II sytem is used to provide pre-press proofs. The needs of the customer dictate the method of proofing as either system will provide the necessary means for matching of the inks used at a particular printing site.

The capability of using pre-press proof systems as a method of obtaining customer approval is critical in the halftone gravure process. Both systems mentioned are very reliable and have repeatability from page to page and on re-proofs following corrections on film. Both systems complement the electronic pagination systems by maintaining their repeatability in a production environment.

In producing work for advertising agencies requiring progressive press proofs, prior approval of each page is obtained through the use of pre-press proofing systems. The intelligent use of pre-press proofing systems, that were not available to the continuous tone process, and familiarity of customers with the offset printing process has resulted in increased trust and confidence in the imaging process.

Experience from the printers

Testing of the redesigned Helio-klischograph aperture began in printing plants in October, 1982. The equipment performed as advertised by the manufacturer and the conversion parts were ordered to adapt the K-202 Helio-klischographs in our Virginia Gravure Division. The aperture kits were delivered in March, 1983.

By the time the equipment was delivered, the requirements for films and proofing were determined and live production proceded immediately after installation. Subsequently another K-202 Helio-klischograph was installed at Kable Printing Company.

The Providence Gravure companies have developed a proprietary method of modifying the scanning head of the model K-193 Helio-klischograph, predecessor of the K-202, that allows for use of halftone films. This modification has proved to be very successful in the production environment.

The Cromalin system has been used for pre-press proofing. Adjustment of the helio engraving curves provides a wet cylinder proof that matches the pre-press proof. With this proven, the customer can be provided pre-press proofs in lieu of wet cylinder proofs.

Customers frequently remark on the ability to match press result to the pre-press proofs. Halftone gravure has allowed many of them to reduce lead times and to share in the reduced film costs.

The Providence Gravure Corporation has been successful in converting several catalogs and magazines to halftone gravure that had been previously printed on offset presses. About ninety percent of all customers now use the halftone gravure technique for all of their rotogravure printing.

The costs to produce printing cylinders are reduced because extensive hand corrections to the cylinders is not required. The number of wet proofs has been significantly reduced, resulting in greatly improved quality of the wet proofs and improved production press running effeciency. The improvement in production on the press is due to reduced alteration of the cylinder surface during the hand correction stage. The hand corrections done on the cylinder surface alter the depth of the cells either by etching them deeper or by reduction of the cell depth. Either method is a change of the cylinder surface and extensive alterations can effect the ability of the production press to perform to established goals.

Halftone gravure has provided the rotogravure printers the tool needed to be able to compete with other printing processes and has helped reshape the nature of the industry. The rotogravure printers will see more dollars spent in advertising because the customer is getting better value for each dollar spent in the print medium.

The printing dot structure of gravure utilizes dots of variable density and saturation. The resulting image on paper has greater fidelity and brilliance in the final reproduction than any other process. The inherent advantages of rotogravure over the offset process, superior laying of ink on paper and improved three-quarter tone shape, have been preserved by using the halftone gravure process.

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