# AN UPDATE ON LASER IMAGING FOR THE GRAPHIC ARTS

S. Thomas Dunn, Ph.D*

Abstract: 1982 can be said to be a pivotal year in the evolution of electronic prepress. Many incremental steps were taken since the 1981 TAGA conference that are each directed at the total automation of the prepress production area. During the preceding 12 months, many companies either made new decisions for laser based imaging systems or reinforced previous commitments to laser based imaging. Every day it becomes more apparent that the laser as a digital imaging tool will dominate the progress in electronic prepress, at least for this decade.

The importance of laser imaging to electronic publishing of text, line art, and pictures is now generally accepted. This presentation will provide an overview of the significant developments since the 1981 TAGA meeting, as well as projections for the progress and direction of future developments in laser imaging systems. Topic areas will range from newspaper platemaking to process color imaging.

## Introduction

During the past year, new and major commitments to laser imaging were made by DS, PDI, Eikonix, Crosfield and HCM. Interesting is that all of these products are high quality color imaging systems. Most of the lasers are in the blue/green region of the Argon laser, with some initial work on HeCd.

Also, during the year, we have seen the evolution of the split-apart color scanner for independent input and output.

*President, Dunn Technology, Inc.

Further, the Kodak and Agfa-Gevaert acquisitions of Atex and Compugraphics respectively, have placed the consumables suppliers squarely in the electronic prepress area. With Hoechst (EOCOM), 3M (Autologic joint venture and Comtal), this leaves only duPont (of the large suppliers) in the USA without an electronic hardware prepress venture. Chemco is rumored to be close to making a deal with Dow Jones for their laser platemaker and Polychrome (Dainippon Ink and Chemicals) and Fuji Photo do not appear to have ventures ongoing in electronic prepress, although both are very active in laser compatible materials.

On another front, the electronic page make-up suppliers are, in general, getting into the typesetting business, while at least one of the laser platemaking (facsimile) suppliers is also trying to get into the typesetting business. Thus a field already in trouble (typesetting) faces entries by 6 to 10 new competitors.

Since the last TAGA meeting, low resolution typesetting has begun to penetrate certain printing markets as well as provide useful low cost proofs. These devices are, in general, based on laser imaging.

Thus, from color separations, to typesetting, to platemaking, to proofing, the laser, as a digital imaging device, is finding wide spread acceptance.

## Platemaking and Facsimile

Over the past decade, newspapers have been trying to use various laser scanning techniques (Reference 1) to scan paste-ups at one facility and image printing plates at a remote printing plant. The dominant effort has been to use Argon UV lasers and modified Diazo and Pholopolymer chemistries. In 1974, these chemistries typically had a sensitivity of greater than 50 millijouels per square centimeter, while the laser scanners being developed delivered about 5-10 millijou'es per square centimeter. As plate manufacturers improved the sensitivity of their printing plate coatings, the resultant press life (run length) and shelf life (after coating) did not meet the requirements of the medium to large size newspapers. Some 10 newspapers in the US and Canada have attempted to transmit to UV receivers

imaging printing plates . Only three of these newspapers are still attempting this at this time, and the current results are not all that encouraging. Problems remain in press life (approximately 50,000 impressions), shelf life (hours to days) and in reliability and maintainability of the UV laser tube (rebuild after 500 to 1500 hours).

In the same vein, the standalone UV platemakers have had similar problems. Two medium size U.S. newspapers are continuing with standalone UV platemakers; here the main problem is laser tube life (since press run lengths are shorter).

During 1981, one large U.S. newspaper committed to electrophotographic printing plates at the receive site, and The Wall Street Journal has an 8 year old development program with electrophotographic printing plates at the receive site. Between these two efforts, there are some 18 receiver units installed in this mode of operation. The main advantage of this approach is the use of low power, visible (blue/green) lines of the Argon laser (same laser as used in color scanners) resulting in excellent laser performance. The main disadvantage of this approach is the cost of the photoconductive printing plates, which are 2 to 3 times as expensive as conventional newspaper wipe-on UV Diazo based printing plates.

However, it is our projection that electrophotographic platemaking will be the dominant direction for future facsimile and CPU-to-Plate applications for newspapers (Reference 2).

Already there are a variety of vendors providing (developing) electrophotographically based platemaking systems (Figure 1).

| Toner Use | Company | Type of Plate | Type of Intermediate | System | Status |
|---|---|---|---|---|---|
| Photo Mask | Nippon Paint/NAPP | Relief | Reusable | Camera | Dev. |
| Etchant Mask | Fuji Chemical | Coated Offset | Reusable | Camera | Dev. |
| Etchant Mask | Konishiroku | ? Offset | ? | ? | Dev. |
| Etchant Mask | Chemco | Presensitized Offset | None | Camera | Field Trials |
| Etchant Mask | Chemco/Dow Jones | Presensitized Offset | None | Laser | Installed |
| ? | Howson Algraphy | ? | ? | ? | Dev. |
| Etchant Mask | Azoplate: Elfasol | Presensitized Offset | None | Camera | Installed |
| Etchant Mask | EOCOM/Muirhead: Elfasol | Presensitized Offset | None | Laser | Installed |
| Etchant Mask | Mitrak | Presensitized Offset | None | Camera | Field Trials |
| Etchant Mask | Polychrome | Presensitized Offset | None | Camera | Dev. |
| Print With | 3M - Pyrofax | Toner on Aluminum | Partly Reusable/ Reclaimable | Camera | Mature |
| Print With | Agfa-Gevaert | Toner on Aluminum | Reuseable | Camera | Field Trials |

**Figure 1: Electrophotographic Developments for Newspaper Printing Plates**

From Figure 1 it is important to take notice of those systems that utilized reusable intermediates and toner on aluminum for printing. These systems are limited to 3M-Pyrofax and the recently announced Agfa-Gevaert Electroplater. In fact, the Electroplater goes the furthest in providing the requisite overall lowest cost approach. This statement of cost effectiveness depends on the actual rental charge made by Agfa as well as the charge made for each image. Agfa does not currently plan to sell the hardware.

Figure 2 is a block diagram of the Electroplater. Without going into full detail here,

3: is copy board

2: is camera lens

1: reusable photo conductor

4-5-6-7-18-17-16: is the path of the photo conductor running on air bearing slides where it is charged, cleaned etc. in the return direction, and toned, cleaned, and off contact transfer of toner to wipe-on offset aluminum at the top drum 8 in the forward direction.

13: is facilities for 3 different size plates (up to

25 x 36 image area)

14-15-8-9-10-12-11: is the progress of the aluminum plate which is toned, fused, gummed and dispensed.

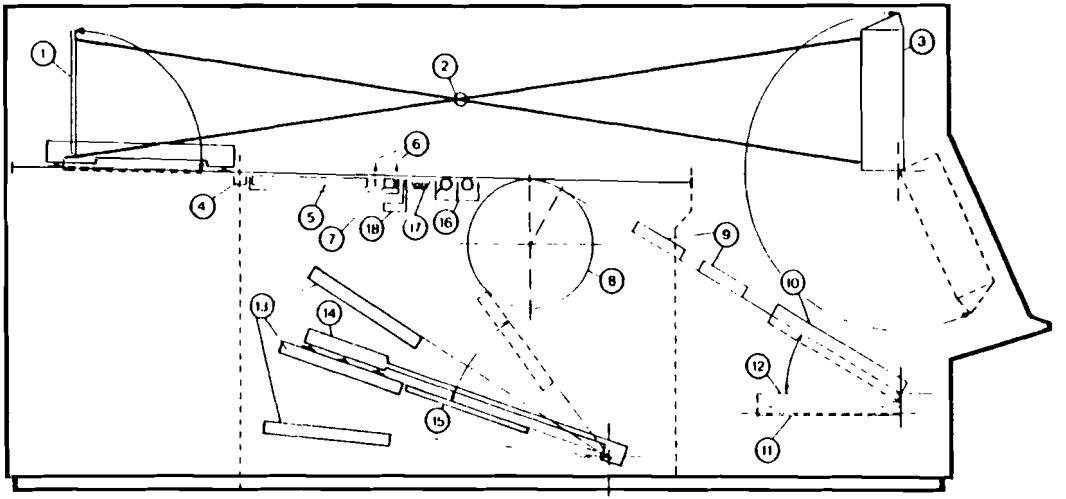



Figure 2: Agfa-Gevaert Electroplater

Thus, with the Electroplater, one should approach wipe-on offset printing plate costs, and with a stated throughput of 200 printing plates per hour, this system should prove viable for medium to large size newspapers. It should be noted that all of the printing plates given in Figure 1 are sensitive to either the Argon, HeCd or HeNe low power (cost) lasers. Further, it is probable that several of these photoconductors can readily be sensitized for use with short wavelength semiconductor lasers.

Two thermal technologies exist that may compete favorably with the electrophotographic techniques (Figure 3).

| Technology | Type of Plate | Type of Intermediate | System | Status |
|---|---|---|---|---|
| Chromium Dioxide | Offset | Reusable | Laser | ? |
| Lasermask | Offset | Non-Reusable | Laser | Installed |

**Figure 3: Thermal Technologies for Newspaper Printing Plates**

In the Chromium Dioxide system, the Chromium Dioxide is reusable, as with the photoconductor in the Electroplater. This technology is currently in use for the production of printed circuit boards. Magnetic charge is used to transfer toner to the aluminum printing plate. Again plate prices with this technology could approach wipe-on offset pricing. The Lasermask® carries the toner on a plastic substrate; the toner is transferred by laser heating to the aluminum plate. With this technology, a lasermask is required for each printing plate to be made. It should be pointed out that the Lasermask® , after imaging leaves a plastic sheet which can then be used as a negative for conventional UV exposure of printing plates.

From Reference 2 we have projected system-to-typesetter facsimile as the means to optimize required bandwidth and achieve optimum quality at reduced commu-

®LogEscan Systems

nications costs. This remains true and is utilized by the national news magazines with their Triple-I systems.

However, newspapers are still precluded from this path due to lack of availability of the full page. In most cases, full page text is not available, and in the U.S. only one newspaper has digital news pictures available , and no one has found a satisfactory solution to the provided prescreened display advertisement.

One final issue concerns those laser imaging systems that go to plate-ready film; waiting for the correct solution to digital platemaking. Here, several products use the HeNe laser, while others use low power Argon and HeCd. The trade-offs are straight forward. Laser costs: the Argon is about twice the cost of the HeCd which in turn is some 6 times the cost of HeNe. On the other hand, red sensitive film is from 15 percent to 50 percent more expensive than equivalent blue/green sensitive film. This film pricing situation is probably not permanent, as red films do not appear to be substantially more expensive to manufacture. The current pricing differential more likely reflects limited competition and limited volume. One other difference between the two regions is that blue/green lasers deliver more power than the HeNe laser, and the films are typically more sensitive in the blue/green than in the red region.

Thus, one can expect to see Argon/HeCd lasers in the more expensive, higher productivity systems and HeNe lasers in lower cost, lower productivity systems.

Regarding laser platemaking and facsimile, the following Figures 4 through 9 provide information on the market and are self explanatory. (Note this does not cover the external drum facsimile provided by Muirhead, Rapicom, Matsushita, and NEC such as the Rapicom/Muirhead order with U.S. Today - Gannett's evolving national newspaper.)

| Customer | Senders | Receivers | Senders/Receivers | Application |
|---|---|---|---|---|
| New York Times (FL) | | | 2 | Facsimile |
| St. Paul | 2 | 2 | | Facsimile |
| Gotesborgs Posten | 1 | 1 | | Facsimile |
| Osaka Yamatoya | | | 1 | Demonstrator |
| Totals: | 3 | 3 | 3 = 9 | |

Figure 4: Unit Orders for LogEscan - 1981

| Customer | Senders | Receivers | Application |
|---|---|---|---|
| Baton Rouge | 2 | 2 | Facsimile/Film |
| Asbury Park | 1 | 1 | Facsimile/Film |
| La Prensa (Mexico) | 1 | 1 | Inplant/Film |
| Autologic | | 1 | |
| New York Times (LIT) Management System for LogEscan | | | |
| Totals: | 4 | 4 = 8 | |

Figure 5: Unit Orders for Muirhead - 1981

| Customer | Senders | Receivers | Senders/Receivers | Application |
|---|---|---|---|---|
| Phoenix Gazette | | | 4 | Two Units to Film; Two Units to UV Plate; Facsimile |
| Reno | | | 2 | Inplant Facsimile to Plates |
| Toronto | | 4 | | Facsimile, Film |
| San Francisco | | | 4 | Facsimile, Film |
| Totals: | 0 | 4 | 10 = 14 | |

Figure 6: Unit Orders for EOCOM - 1981

| Company | U.S.A. | International | Total |
|---|---|---|---|
| EOCOM | 10 (43%) | 4 (44%) | 14 (44%) |
| LogEscan | 6 (26%) | 3 (33%) | 9 (28%) |
| Muirhead | 7 (31%) | 2 (23%) | 9 (28%) |
| Totals: | 23 | 9 | 32 |

Figure 7: Unit Orders - 1981

| | 1978 | | | 1979 | | | 1980 | | | 1981 | | | 4 Year Total | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | US | Int'l | Total | US | Int'l | Total | US | Int'l | Total | US | Int'l | Total | US | Int'l | Total |
| EOCOM | 20 | 8 | 28 | 18 | 19 | 37 | 2 | 9 | 11 | 10 | 4 | 14 | 50 | 40 | 90 |
| LogEscan | 10 | 2 | 12 | 15 | 0 | 15 | 7 | 2 | 9 | 6 | 3 | 9 | 38 | 7 | 45 |
| Muirhead | 2 | 0 | 2 | 0 | 2 | 2 | 14 | 2 | 16 | 7 | 2 | 9 | 23 | 6 | 29 |
| Totals: | 32 | 10 | 42 | 33 | 21 | 54 | 23 | 13 | 36 | 23 | 9 | 32 | 111 | 53 | 164 |

**Figure 8: Total Unit Orders - 1978-1981 (Exclusive of Dow Jones and Japan)**

| Company | Units | Customers |
|---|---|---|
| EOCOM | 47 (44%) | 13 |
| LogEscan | 41 (39%) | 8 |
| Muirhead | 18 (17%) | 4 |
| Totals: | 106 | 25 |

**Figure 9: Market Share for U.S. Newspapers (March-1982)**

At this time there are estimated to be some 193 systems, with the following major delineating characteristics (here the 10 units returned in 1981 (by our counting system) have been factored out):

- 80% for facsimile (up from 73% as of January 1, 1980):

  86 units with sending capability and 112 units with receiving capability (for a total of 155 units)

  49% of the exposures to film

  20% of the exposures to UV printing plates

  61% market share for EOCOM (down from 64%)

- 19% for non-facsimile (down from 27%):

  38% of these for UV exposure (down from 51%)

- 85% of systems ordered are estimated to be operational

**What's the matter?**

For the past 24 months we have been projecting the downturn in the market.

- In January of 1981 we projected 1981 to be the same as 1980, which came about.

- Further, EOCOM still does not have a satisfactory UV laser/printing plate combination for over 50,000 - 75,000 impressions.

- LogEscan has not made substantial inroads in the USA with the direct-to-plate version of the laser-mask

- Muirhead's Chicago Tribune installation is only just coming online with the Elfasol plate.

The net sum of it is that the technology has become satisfactory for facsimile use (intra and inter-plant) to film. 1982 will likely follow the patterns

of 1980 and 1981, with no significant inroads in standalone platemaking, or direct platemaking at the receive facsimile site.

Pagination with text, halftones, and line art in place, will be a new driving force for the technology, but this is not likely to occur in any substantial form before late 1983 and/or 1984.

The development of this pagination application is primarily paced by solutions to:

Picture Processing
Provided Display Ads

## Color Scanning

In this market, developments are keeping pace with our 1980 projections (Reference 1). The trends are very clear and well focused around electronic color page make-up systems.

- Split-Apart Scanner: During the past year, Crosfield has evolved the 530/540 split scanner into the 640 series scanners to support their page make-up system. DS upgraded its split-apart scanner. HCM announced a standalone output record, Scitex upgraded its ELP output recorders to the ERAY output with 4 beams in place of the previous one-beam system to improve output speed.

- Electronic Halftone: Crosfield announced electronic halftones for 2 of 3 output recorders of the 640-series, DS announced electronic halftones (with 23 by 23 matrix) for its 708 and 808 scanners, and HCM brought out the DC350 electronic halftones at conventional angles.

- Argon Lasers: Following HCM's decade ago decision, Crosfield, Scitec, PDI and DS all now offer the Argon laser for output. The DS decision was a shift from HeNe, partly caused by the high red film prices discussed above.

- HeCd Lasers: Eikonix is at least one (of several) of the color scanners manufacturers who are seriously evaluating the HeCd laser as a lower cost alternate to the Argon laser.

- Laser: With exception of Linotype Paul, all scanner manufacturers are including lasers and electronic dot generation in their premium scanners. Linotype Paul is rumored to be working on a contact screen Argon laser output.

- Digital Color Proof: HCM is to show a Direct Digital Color Proofing System at DRUPA. Here, 3 laser lines are used to image Kodak R-19, R-14, and other color papers. The output media for the Digital Color Proofer has not been announced. This $375,000 device will probably find its best use within the gravure industry, where no film is required in those electronic systems driving Helioklischographs or laser gravure. Crosfield and Scitex are rumored to be close behind HCM in digital color proofing. Look for a future trend to electrophotographic-based digital color proofing systems. One example is KC film, but others should surface.

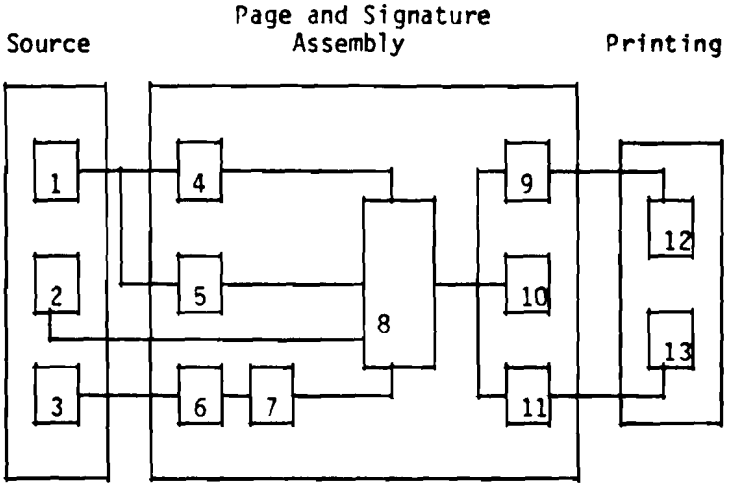
- Large Format Output: HCM, Scitex, Crosfield, and DS now all have standalone output drum capacities to cope with at least an 8-page imposition, enabling the outputting of a fully plate-ready signature.

- Flatfield: The developing Eikonix technology is based on a flatfield input scanner using linear arrays.

## Page Make-up Color

The evolving color page make-up systems are also following the 1980 predictions (Reference 1).

In the 1980 TAGA proceedings, we projected the split-apart scanner and the evolution of many new components for use in optimizing the digital production of process color pages including text. As we move into DRUPA this year, we find many of the components falling into place. Just to review from 1980 (Reference 1), we repeat Figure 15 herein as Figure 10.




1. Original graphics
2. Page layout
3. Text composition
4. Large format drum scanner for pages 11x17"
5. High-speed flatbed scanners for pages 11x17"
6. Digital input of text composition
7. Font library and font generation interactive with No. 8 and providing text in bit map form
8. Page make-up terminal with soft proof
9. Large format output drum scanner, capable of film or intermediate and hard copy proof
10. High-speed flatbed scanner (11x17") for hard copy proofing
11. Digital or other storage media to allow printer to make litho plates in No. 13
12. Conventional plate-making with film
13. Platemaking from output of No. 11 or directly on-line if page make-up is at printers 11x17" flatbed stepping scanner, capable of imposing the elements of the signature on the required size plates.

Figure 10: Components of the Future Commercial Electronic Publishing System

- Screen Resolution: Crosfield is about to begin shipment of their 1024 x 1024 screen which should help in soft color proofing and is part of a basic systems strategy (see later). Scitex has upgraded to 512 x 384 and HCM is at 512 x 512.

- Hardware Assist: Scitex, with its new imager terminal, provides hardware assisted page composition calculations, thereby speeding up tasks such as rotation, sizing, and changing line screens. Crosfield, in its 860 system provides two levels of hardware assistance, one for the display files and an array processor for the page composition calculations. HCM provides hardware assistance for the display files.

- Text: We had previously projected viable text on these systems for 1983 (Reference 1). We continue to hold to that projection. Scitex is acquiring text from Bitstream (a Mergenthaler spin-off). Crosfield has a cooperation with III for text, and HCM already makes typesetters. Look for the beginings of viable text at DRUPA. However, most companies are underestimating the text problem and really viable text (with hyphenation/ justification, kerning, etc. on the system) will be delayed to 1983, or later. Look for a Scitex/Atex interface at DRUPA.

- Viable Archiving: The 6250 bits per inch, high speed tape recorders allow for viable archiving of production work in progress. A full 300 megabyte disk can be copied to tape in approximately 15 minutes (two tapes). HCM, Crosfield and Scitex are committed to this tape recorder.

- New Entrants: In addition to the initial three suppliers, PDI, DS, Eikonix and Coulter Information are at various stages of providing systems. Also look for more entrants on the vendor side.

- Productivity: It is our general conclusion that productivity needs to be improved by a factor of 2 to 4 for these systems to be truly economically viable as "production tools".

Figure 11 delineates the estimated population for these products as of January 1, 1982.

| USA/Canada | | Worldwide (Estimate) | |
|---|---|---|---|
| Crosfield | 13 | Crosfield | 80 - 90 |
| Scitex | 22 | Scitex | 40 - 50 |
| HCM | 8 | HCM | 20 - 30 |
| Totals: | 43 Units | Approx. | 165 Units |
| | January 1, 1982 | | |

**Figure 11: Estimated Population (On Order or Installed)**

With this population in the first 2 years of these products, and continued technical progress in the systems as pointed out herein, we continue with our projection of some 300 units installed in the USA by the end of 1987.

Substantially lower pricing (possibly as early as 1985/86) could significantly increase this projection, whereas failure to increase productivity by 2 to 4 times will decrease this forecast.

System strategies of the three current suppliers differ significantly and require potential users to carefully evaluate system performance against actual production jobs to be placed on the system. Careful analysis of which jobs to place on such a system can go a long way toward increasing productivity.

Regarding system strategy, the following is a very brief introduction to the file handling strategy of the three current systems.

Figure 12 is representative of the HCM strategy (to be updated at DRUPA).

Here an input/output station is tied to the CP340 or DC350. Upon input, two files are developed; one being the fine file, which is representative of the

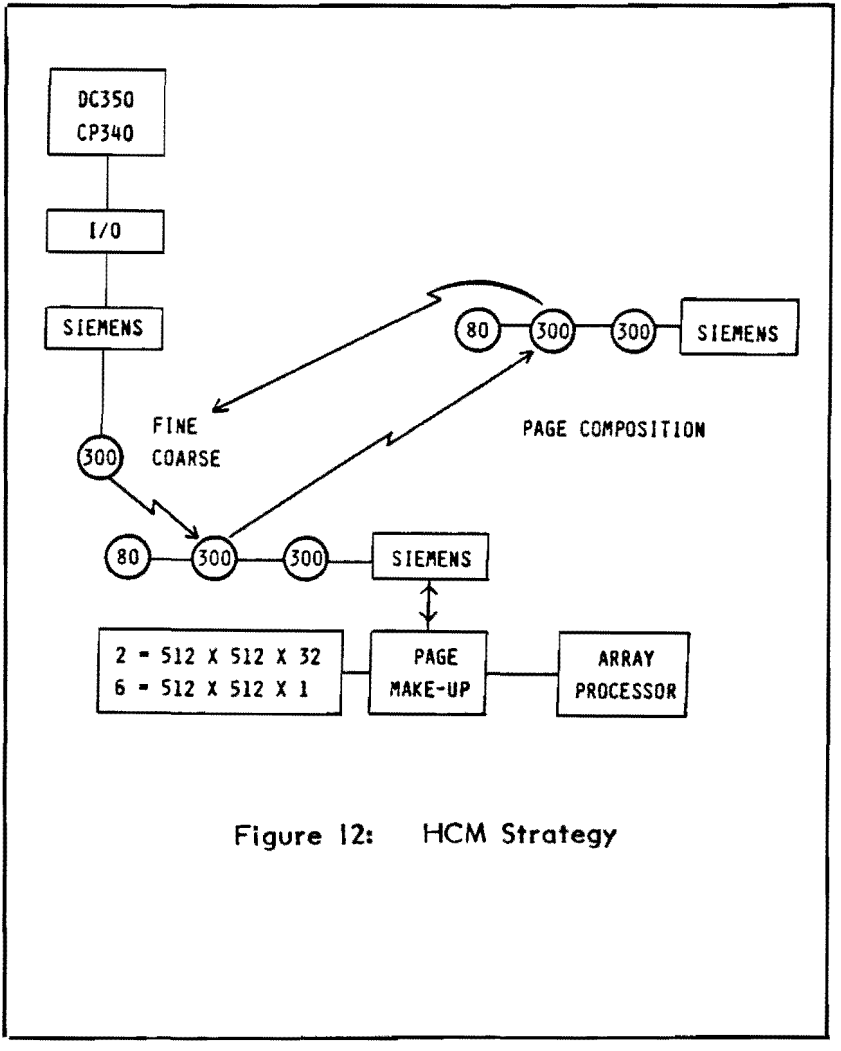



Figure 12: HCM Strategy

full resolution of the image at output, the other being a view (coarse) file whose resolution (size) is determined by page size parameters. Typically this view file is about 1/50 of the fine file.

The 300 Megabyte pack is then carried to a page make-up terminal where the view file is used for stripping, page composition, rotation, etc. When outline, color correction, silhouetting functions are used, the fine file is accessed, manipulated and when the desired effects have been achieved, the fine file is recalculated. The acquisition of the fine file for display work and the recalculation of the fine file; both slow down the productivity of the color terminal; HCM has improvements on the way.

When the page(s) is(are) completed, the pack is then carried to the page composition computer where all the remaining calculations to compose the page are carried out. This time can vary from 20 minutes to over 1-1/2 hours, depending on the complexity of the job, number of rotations, etc. After this activity, the pack is carried back to the input/output station for final plotting.

Figure 13 provides a general schematic for the Scitex system. Here, there is an input station, output station, and page make-up station. The Scitex 300 megabyte disk drives are dual ported to allow for access of data on any drive by two computers. This facilitates redundancy, foreground/background use of the computers to archive to tape and to do page composition calculations while the three main computers are servicing their main functions.

On input, Scitex only accesses and stores a fine file. When view files are needed for the display, they are recalculated for each acquisition by the display terminal.

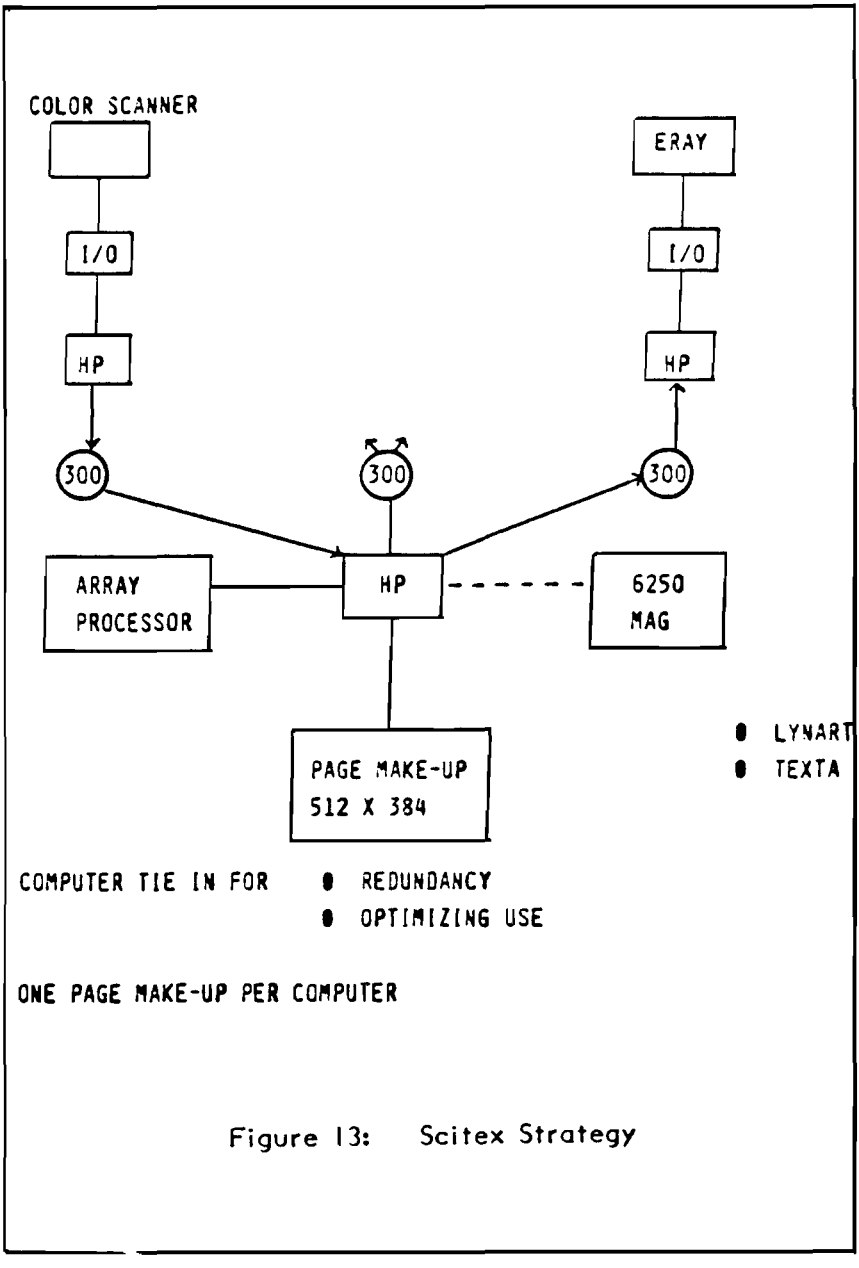



Figure 13: Scitex Strategy

As with HCM, certain functions are performed on the fine file immediately after manipulation on the display; in this case, rotation, color correction, silhouetting, etc. As with HCM, this reduces the productivity of the display terminal as it waits for these calculations to be accomplished on the fine file. With Scitex, these calculations appear to go faster due to the use of the array processor on the fine file.

In theory, no disk packs have to be carried around in the Scitex system. In practice, since it can take 6 minutes to copy from one disk to another, disk packs are still carried around the Scitex system.

Once the page is completed on the display, the Scitex system has the capability of doing page composition on any computer that has access to the disk pack where the data resides. This can be done in the background on the least busy computer tied to the right disk.

After page composition, the disk pack is carried, hooked to, or transmitted to the output station for final plotting.

Crosfield's basic strategy differs in several significant features from its competitors. Figure 14 is a block diagram of the 860. First, there are four computers in a basic system: input, output, file manager (page composition), and page make-up. Their strategy seems to be intimately tied to the 1024 x 1024 display and its presumed ability to be of sufficient resolution to allow color correction, silhouetting, at the screen resolution, thereby not dealing with the fine file at these display iterations.

At input, two files are developed, the fine file and a view file. The purpose of the Winchester disk on the input station is to allow calculation of the view file. Here, the view file is calculated to be a 1024 x 1024 file (if the fine file is that size or larger). That is the view file will fill the color display and typically represents 1/5 to 1/10 of the pixels of the fine file. Immediately after input to the Winchester, the view file is recorded on the 300 Megabyte pack

which is then carried to the file manager. Note the file manager supports up to four page make-up terminals. When one wants to work on a page, all the view files of the elements of the page are called from the file manager and stored on a 160 Megabyte Winchester at the page make-up terminal. Page make-up proceeds as with other systems, but instead of modifying the fine file, the view file is modified, potentially saving significant display terminal time. Once page make-up is complete, the page composition commands are sent back to the file manager where in a foreground/ background mode, the fine files are manipulated into the final page(s). When this is complete, the pack is carried to the output station for final plotting.

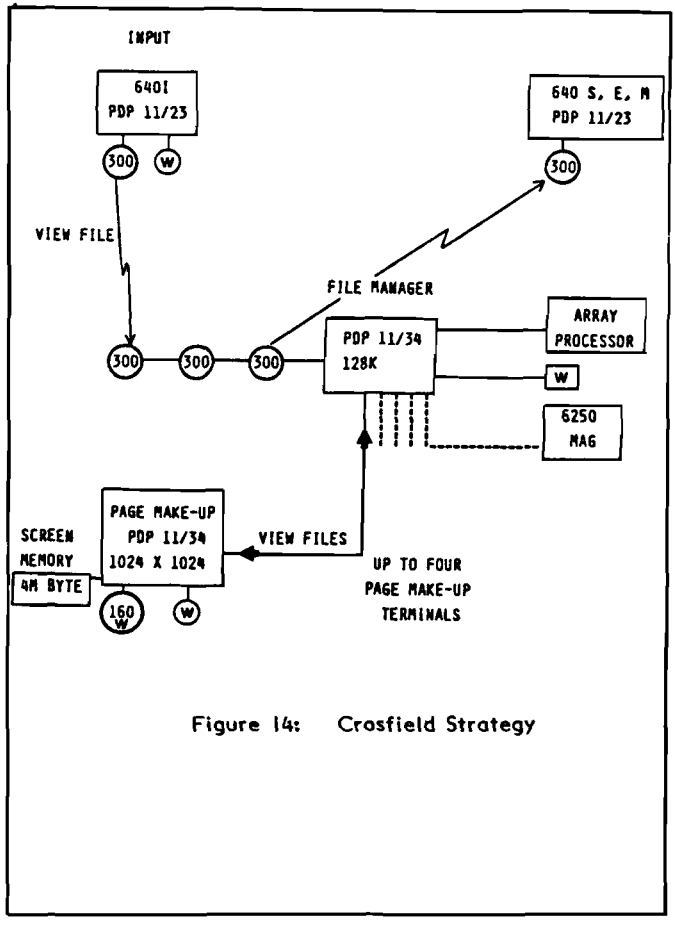



Figure 14: Crosfield Strategy

Since none of these systems (Crosfield, HCM, and Scitex) are fully operational at this time, one is forced to look at evolving strategies to estimate potential productivity. Further, pricing has not stabilized in the industry, thus it is next to impossible to determine productivity/cost merits. Based on strategy alone, we would rate the likely ultimate productivity of these systems in the following descending order:

Crosfield
Scitex
HCM

Based on usable functions (by existing customers) we would rate the competitors in the following descending order:

Scitex
HCM
Crosfield

### Low Resolution Typesetting

We have previously reported that some 50-plus (Reference 3) companies are in various stages of consideration and/or development of various technologies for non-impact printing (NIP). The dominant technology being considered is laser-based intelligent copiers, with other technologies such as ion beam, magnetography, thermal magnetic, ink jet, etc. also being considered. The prime driving forces behind laser-based systems can be summarized as:

- Highest ultimate quality
- Moderate relative capital costs
- Lowest cost consumable (plain paper plus toner)
- High speed

We have previously reported on Tropel, Honeywell, and Litton (Reference 3) as sources of laser scanning modules to be used with slightly modified copier engines. These electro optics houses provide design,

development, and OEM quantity manufacturing to potential system houses. Their designs range from galvanometer to polygon to holographic scanners with polygon scanners remaining the current most popular choice.

We have also previously reported on the Canon, Data Point, Hewlett-Packard Xerox, IBM, Siemens, General Optronics, Konishiroku, Mita entrants into the laser imaging- electrophotographic-based systems (Reference 3). One serious deficiency of all of these systems is a lack of good typeface design used with these machines.

This is being slowly rectified as various leading suppliers of these new imaging systems announce typeface supply agreements with historic typesetter companies (such as the recently announced Mergenthaler/Xerox deal). Look for more such announcements in the near future, such as Monotype who claims large unannounced contracts in this area.

But even more important to the lower cost laser-based NIP systems is the lack of an appropriate image driver for the NIP subsystem. Canon, General Optronics, etc. all suffer from the fact that their laser-based NIP systems are basically dumb bit map video plotters with no capability to receive word processor front-end system codes and set type. These devices are analogous to buying a daisy wheel printer without the daisy wheel.

What is needed is an image driver for these devices, preferably one that can handle typesetting functions, line art, and halftones. Xerox appears to have the lead here with its continuing product announcements. Imagen, a Standford University spin-off, has developed such a device for the Canon LBP-10 system.

Despite the general lack of an "image driver" (i.e. interface with at least typesetting capabilities), the number of OEM suppliers of scanner subsystems is multiplying rapidly.

- Chesapeake

Brad Merry, formerly of Isomet and Kodak, has formed a new company to provide laser scanning modules based on low cost, solid state (acousto-optic) scanners (Reference 4). These developing products are focused on the 240 lpi, 30 page per minute market. They claim that at this speed range, they can use standard video circuits to reduce the price of the power supply, which has previously caused high prices for this scanning technique.

- Lincoln Lasers

We have previously covered Lincoln Lasers as the leading manufacturer of polygons (Reference 4) for laser scanning as well as a developer of an internal drum scanner intended for laser platemaking type applications.

Now Lincoln Lasers has entered the laser scanning subsystem market with its own "off the shelf" polygon laser scanner, primarily intended for use during the development phase of a new scanner sub-module. It has variable resolution and scan speed to aid in development testing programs. Primary design features include a 2 to 3 mil spot, video rates of 7 to 10 MHz, a digitally driven AO modulator (50 nanosecond), and running at 1200 lines/sec. (or 30 pages per minute). This versatile prototyping scanner is estimated to sell for $24,000.

- Newport Electro-Optics

Eddie Young, formerly with Harris, has formed (with the support of Newport Research) another company to provide a scanner subsystem based on a variety of scanning mechanisms. Like Chesapeake and Lincoln, Newport will initially focus on the 240 - 300 lpi scanners for the laser NIP market. All three companies are said to be interested in the 1000 lpi-plus area for the graphic arts.

- General Scanning

General Scanning is also rumored to be entering the OEM and systems scanning business. General Scanning is the leading supplier of optical galvanometer scanners, such as used in the initial EOCOM Laserites (as provided to The Los Angeles Times).

E. Summary - Laser NIP

Figure 15 summarizes the OEM suppliers of laser scanning subsystems.

| | |
|---|---|
| Honeywell | Chesapeake |
| Litton | Lincoln Lasers |
| Tropel | Newport Electro-Optics |
| General Scanning | |

**Figure 15: OEM Suppliers of Laser NIP Kits**

Note in Reference 2, we made the case that laser NIP kits, in quantity, can be procured for around $3,000. More importantly, it is not expensive to increase the resolution of these devices to 500 lpi. At 500 lpi, these devices, as producers of originals, will compete favorably with the printed result of offset, where the original imagery is typically 1000 lpi, but then is degraded by 5 or more image transfers in going from typesetter output to ink on paper.

If one extends these types of costs versus performance data, several things can be projected:

- 500 lpi proofing devices will be capable of high quality proofing.
- 500 lpi direct original copy devices will compete favorably against short run offset.
- Laser typesetters, when mature as a technology, will cost less to manufacture than CRT typesetting.

- Combined with the ability of current laser typesetters to set text, line art and halftones at text speeds, bodes well for laser typesetting technology, as well as laser NIP for proofing and original copy generation.

## Typesetting - More Suppliers

As the industry struggles to make the transition to full page output of text, line art, and halftones, very interesting things are happening. First, concurrent with the development period for new full page devices, the typesetting industry is undergoing a significant stabilization in the markets for 2nd and 3rd generation devices. The result of this is curtailed R/D dollars for the transition to full page devices inclusive of halftones, thus historic suppliers of typesetting equipment are trying to milk current technologies which are not suited to the evolving digital printing and publishing industry.

This is leading to some strange developments in the typesetting industry.

- At least four front-end page make-up suppliers have active programs to build output laser scanners that will, in the end, be typesetters; setting type, line art, and halftones at the same speed.

- EOCOM, through its Raster Image Processor development, plans to move into the typesetting business.

- Kodak and Agfa are likely to support their recent acquisitions with laser compatible materials. Both Kodak and Agfa have experience in laser scanning; and both have a vested interest in the laser NIP market.

- Scitex, HCM and Crosfield are bringing text into their color page make-up systems.

Thus, a field already in trouble, will see a real increase in vendors, with the new vendors depending on full page output and 4th generation technology for their success.

## References


1. Dunn, S. T., "Current and Future Directions of Digital Prepress", 1980 TAGA Proceedings.

2. Dunn, S. T., "Continuing Evolution of Electronic Publishing", 198 TAGA Proceedings.

3. Lasers in Graphics, Quarterly Report Service, Dunn Technology, Inc., 1981, 1131 Beaumont Circle, Vista, California 92083.

4. Lasers in Graphics, Quarterly Report Service, Dunn Technology, Inc., 1979/80, 1131 Beaumont Circle, Vista, California 92083.