An Investigation into the cost justification of computer-to-plate systems

Jessica Murphey

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An investigation into the cost justification of computer-to-plate systems

by

Jessica Murphey

A thesis project submitted in partial fulfillment of the requirements for the degree of Master of Science in the School of Printing Management and Sciences in the College of Imaging Arts and Sciences of the Rochester Institute of Technology

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Master's Thesis

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List of Abbreviations and Nomenclature

Platesetter—Another term for computer-to-plate which refers specifically to the unit.

DRUPA—The abbreviation for Druck und Papier which is the largest printing trade shoe in the world

Raster Image Processor (RIP)—The component that prepares data for a raster output.

ACROBAT-Adobe's document exchange software.

Portable Document Format PDF-Contains all the information about the appearance of a document.

Post Script Level 2-A page description language from Adobe.

Open System Interconnection OSI- An ISO standard for worldwide communications that defines a framework for implementing protocols in seven layers.

Integrated Services Digital Network ISDN- An international telecommunications standard for transmitting voice, video and data over digital lines running at 64 Kbits/sec.

Return on Investment ROI-An accounting principles that helps determine payback periods.

Transmission Control Protocol/Internet Protocol TCP/IP-A communications protocol developed to inter-network dissimilar systems.

FireWire-A serial bus that allows for the connection of 63 devices at speeds ranging from 100 to 400 Mbits/sec.

Serial Storage Architecture SSA-A peripheral interface that transfers data at 20 Mbytes/sec in one direction, but can operate full duplex.

Asynchronous Transfer Mode ATM-A high speed cell switching network technology for LANs and WANs that handles data and real time voice and video.

Electronic Data Interchange EDI-The electronic communication of business transactions.

Digital Workflow

Local Area Networks LAN-A communications network that serves users within a confined geographical area.

Wide Area Networks WAN-A communications network that covers a wide geographic
area such as a state or a country.

Ethernet-A local area network.

Thinnet-A type of Ethernet that uses a thinner coaxial cable than the standard Ethernet.

Institute of Electrical and Electronic Engineers IEEE.-Cabling standards for networks.

Small Computer System Interface SCSI-SCSI is a hardware interface that allows for the connection of up to seven peripheral devices.

Archiving Database- Holds data onto a different disk or tape for backup.

Jukebox-A storage device for multiple sets of CD-ROMs, tape cartridges or disk modules.

Tape Library-The use of magnetic tape for storing duplicate copies of hard disk files.

American Standard Code for Information Interchange ASCII-A binary code for text as well as communications.
Abstract

In the history of technological development, it is usually the case that the technology is available before mankind understands the full potential of its use. Thus it should come as no surprise that CTP (Computer-to Plate) technology is currently waiting for its advantages to be exploited by the graphic arts’ market. This was evidenced by the heavy saturation of platesetters presented at DRUPA 1995 (the largest printing trade show in the world), which demonstrated that CTP is no longer a research and development experiment but a marketplace reality and the topic of considerable discussion.

Surprisingly, the response of the printing industry to this new age of digital prepress which CTP systems were designed to facilitate has been rather restrained. Although most printers agree that digital formatting and output are the way of the future; printers are still uneasy at the prospect of investing in CTP systems.

This reluctance is certainly understandable, since anyone considering buying a platesetter (computer-to-plate system) will potentially have to reorganize and update their front end computer system and its accompanying workflow. To compound the issue, buyers need a pay back period three years or less to recoup their investment, due to the accelerated rate of computer obsolescence. And, as if this isn’t enough to think about, probably the biggest deterrent is coming from the manufacturers themselves. As platesetters begin to carve out market share from conventional imagesetter territory, the manufacturers have now modified the existing technology to work with thermal plates while
increasing their efforts to produce Direct-to Press technology. In such a climate of change, most printers would prefer to invest in a system that can prove its profitability along with its potential to upgrade rather than a system destined to be marked as a piece of transitional technology.

In an effort to understand and evaluate the aforementioned problems CTP systems are creating in the marketplace, this paper has analyzed a platesetter being used in production to determine the viability of cost justification proposals developed by the CTP manufacturers in order to maximize profits.

Several printing companies, who specialize in different market segments, have been interviewed in the data collection process. A comparison of these organizations has demonstrated under which circumstances the investment in a CTP system is justified and which environmental factors have to be considered for an ROI calculation. Among the local participants is the Webster Division of Thomson Professional Publishing—a parent company to five different publishing branches that specialize in legal publishing and book production. The Webster location has just recently installed its second CTP system. The other cooperating company is Canfield and Tack, of Rochester, New York—a high quality commercial printing company—that recently signed a letter of intent to purchase a CTP system. Additional interview sources will be industry consultants, printers, manufacturers and suppliers.

By doing a comparison of the considerations upon which each system was evaluated by the different firms, conclusions may be drawn as to the future of CTP in the marketplace, and more significantly, where cost justification fits into this picture of fast moving technology.
This thesis strives to secure the answers to three key issues: 1) Can cost justification, using the manufacturer's suggested model, provide potential buyers with enough information to prove that CTP systems are a good capital investment; 2) Are the cost benefits achievable with a CTP system enough to warrant such a radical restructuring of workflow; and 3) Does the issue of equipment obsolescence—and its economic impact—have a determining factor in the decision to install such a system.
Chapter 1

Introduction

Statement of the Problem

The printing industry is very interested in CTP technology. Whether people in the industry are advocates of CTP who believe apocalyptically that the digital age is upon us, or more likely than not, they are afraid of being left out in the cold—CTP has the industry's full attention. Unabashed by this inordinate attention, the manufacturers of such systems couldn't have asked for a better climate in which to sell their products. However, CTP has not been able to provide its captive audience with the kind of easy, unequivocal answers that potential buyers want to hear.

The issues behind the implementation of a CTP system are fairly complex and cut to the core of how an organization operates. One cannot simply purchase a platesetter and expect to have it produce perfect plates. A detailed analysis of the kind of work a company does and its projections for the future must be taken into consideration. Once these items have been reviewed, the company's whole workflow will have to be reorganized to accommodate the platesetter. Installation of a CTP system also involves a careful assessment of each company's front end computer system, the proofing devices, and specific job requirements. All of these components deserve careful scrutiny since CTP systems cost anywhere from $95,000 to $700,000— at those prices failure is not an option. Thus the overriding considerations for a CTP system are whether to computerize now or to wait for future developments.

1
Background and Significance

The background of CTP development and implementation is divided into three different aspects which are: 1) an understanding of what the product is, 2) where the machinery originated from, and 3) what CTP's impact on the market has been.

Computer-to-Plate is a term used to describe a system of output. The main component for any CTP system is the platesetter itself,—the actual piece of machinery that handles the presensitized plates and images the surface of the plates through the use of a laser (or multiple laser diode) head which transfers binary image information directly from the computer to the plate via the RIP (Raster Image Processor). The platesetters themselves are usually rather large self-contained units that can process film, polyester or metal plates for various printing processes. For the purposes of this paper, discussion of CTP technology will be limited to the use of aluminum plates used for the lithographic printing process. There are a wide variety of plates that can be fed into the platesetters either manually or with the aid of an automatic-feed attachment, depending on production requirements. Once inside the platesetter, the plate is set up for imaging in one of three ways: using a flatbed, internal drum, or external drum. Regardless of how the plate is positioned, it is imaged at high speed using laser light, usually in the spectrum of 480 to 700 nanometers, that transfer the image information directly on to the printing plate.¹

CTP was initially developed in an effort to eliminate the use of film from the print reproduction process. It allows for the direct imaging of printing plates with minimal preparation and greater editability so long as the digital files are properly formatted. As is evidenced in Figure 1, a CTP platesetter reduces a thirteen step process down to a six step
process. This reduction is achieved by keeping all files for the finished job in a digital format. The platesetter is accompanied with its own RIP (Raster Image Processor) which converts the files into Level 2 PostScript (A page description language that uses ASCII text which can be transported from one computer to another). Once the information has been "ripped"—or run through the processor, the data is then sent to the platesetter, where a laser head or multiple lasers image the plate at high speeds while achieving improved accuracy and resolution as compared to conventional systems.²

<table>
<thead>
<tr>
<th>Conventional</th>
<th>Computer to Plate</th>
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<tbody>
<tr>
<td>1 Analog signal</td>
<td>1 Analog signal</td>
</tr>
<tr>
<td>2 Color separations</td>
<td>2 Color separation per scanner or by PostScript</td>
</tr>
<tr>
<td>3 Scanner output</td>
<td></td>
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<td>4 Retouching</td>
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<td>5 Trims and Cuts</td>
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<tr>
<td>6 Production of final film</td>
<td>3 Digital page and sheet imposition</td>
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<tr>
<td>7 Proofing</td>
<td>4 Proofing</td>
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<tr>
<td>8 Drawing of imposition scheme</td>
<td>5 Digital recording on plate and in-line processing</td>
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<tr>
<td>9 Assembling film flat</td>
<td>6 Mounting of plate</td>
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<tr>
<td>10 Exposing plate to flat</td>
<td></td>
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<tr>
<td>11 Processing of plate</td>
<td></td>
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<td>12 Correction and coverage</td>
<td></td>
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<td>13 Mounting of plate</td>
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Figure 1 A Comparison of conventional and computer to plate workflow.
CTP technology was originally developed in the 1970's by “using scan-to-plate imaging of conventional plates which called for powerful lasers.” However there was no need for this technology since the printing industry lacked the kind of digital environment that computers created when they took precedence in the workplace around the late 1980's. Furthermore, ripping speeds had to be improved considerably before the technology would have a chance of working in a production environment. At DRUPA (DRuck Und PApier) 1990, many companies were considering how to bring updated CTP technology into production level environments, and by DRUPA 1995, the flood gates had been opened, with over 30 different models bursting onto the scene—most still in beta testing. As to be expected with developmental technologies, there were some technical bugs that needed to be worked out of the systems before they could really claim to be competitive in the marketplace. However, CTP quickly accumulated some impressive figures with the results it achieved in large run production. An example of this would be R. R. Donnelley's implementation of CTP technology to produce Scientific American. In 1992, “the publication printers R.R. Donnelley & Son Co. successfully produced 300,000 copies of a 200 page publication in its entirety with a computer-to-plate process, eliminating all film steps.”

This rather incredible introduction on to the printing scene has upset the market. Printers of all sizes are now considering the use of digital formats for their workflow, and with the advent of thermal technology, CTP systems offer an environmentally friendly alternative with what looks to be considerable cost reductions for many different kinds of printers.
Reasons for Interest

The primary reasons for the industry’s acceptance of this technology centers on a number of items. Most notable is the apparent savings the system provides and second is the increased efficiency and streamlining of the plate production process.

Notwithstanding the fact that market analysts have been great proponents of CTP for some time now, there has not been an overwhelming inclination on the part of printers to implement these systems. In evaluating two different printing companies—one that implemented the system and one that has not, it is possible to evaluate what the attributes and limitations of the current systems are in these examples.

If managed properly, there is no doubt that CTP systems can provide greater time savings, efficiency, and quality than conventional plate processing methods. However, the success of CTP has required continued investment from some of the largest printers and publishers in the industry, while the average printer can not afford to have an experimental piece of equipment in house that is subject to operating problems and could potentially cause unanticipated down time.
Endnotes for Chapter Chapter 1


4 Apple Computer and BBDO Forge Digital History with Scientific American in filmless Magazine Production.

Chapter 2

Theoretical Basis of the Study

The central issue behind all the debate over Computer-to-Plate systems is for most companies ROI (Return On Investment). This term defines the procedure that accountants use to determine whether a company can recoup the initial capital investment needed for purchasing new equipment. Until recently, most businesses sought a ROI, or the rate of return, within a five year period; however, given the speed of computer technologies’ obsolescence, most potential buyers now aim for a payback period of up to three years but preferably less.¹

It has become a major marketing tool for manufacturers to assist different printing companies in preparing a cost justification analysis to assess whether or not a company has enough experience handling digital files to implement such an expensive output unit.²

In doing a cost justification, many printers are not finding acceptable payback periods to make implementation sound appealing. Whatever the outcome, a by product of preparing such data is a heightened awareness of which areas of production are in need of change.² Several of the CTP manufacturers have gone so far as to work out cost justification spreadsheets for potential clients. Manufacturers have realized that as much as they would like to sell their systems to everyone, if the customer is not equipped to deal with the workflow, it will mean larger costs will be incurred by the manufacturer as they try to assist their clients. Therefore, under certain conditions, implementation is not universally cost effective.
Endnotes for Chapter 2


2 Limburg, Michael. The Essentials of Computer-to-Plate Technology GATF 1995
Chapter 3

A Review of the Literature in the Field

Even before DRUPA 1995 got under way, the manufacturers were busy holding press conferences to differentiate their product lines and equipment from the competitors. Consequently there is a myriad of literature available on CTP which highlights technological specifications and cost benefit considerations. Very little of this information is available in book format since the subject matter is still the topic of considerable debate; therefore, most material covered in this review comes from periodicals and trade journals.¹ There are five central issues concerning CTP systems which will be detailed here; they are 1) the platesetter technology, 2) workflow issues, 3) data transfer, 4) cost justification and 5) beta testing sites. Obviously there are several other topics concerning CTP, and a few will be mentioned where applicable, but the bulk of the literature concerns itself with these five issues.

Platesetter Technology

There is a plethora of material available on the platesetter units themselves—constituting some twenty articles. Manufacturing literature alone is exhaustive in its detailed discussions of available systems; however, a rough overview of the key components of the platesetter will help the reader to understand the various advantages and limitations of
such machines. Since the research related to this project focuses primarily on Creo products, the Creo 3244 (the model number comes from the maximum plate size that the unit can process—32”x 44”) platesetter shall be the focus of this discussion; however, specifications for the numerous other systems are presented in Appendix 1.

As discussed in Chapter 1, the primary goal of computer to plate technology was to reduce the number of steps needed in the reproduction process. The reason that platesetters have been able to bring about a faster transference of digital data is for the most part due to the advances in PostScript over the last few years.

It was not until the refinements of PostScript level 2 that the potential for direct imaging was harnessed. As a page description language PostScript can combine graphic images and text onto a rasterized page. PostScript examines each command and considers its relationship to the page and how it can be stored as a geometric shape. In Michael Limburg's book *The Essentials of Computer to Plate Technology*, he describes this relationship using the equation $y = mx+b$ which is illustrated in figure 2.

![Figure 2 Representation of a line in analytical geometry.](image)
The PostScript material once ripped or rasterized is ready to be transferred, this is done through the imaging engine which utilizes a series of lasers and a rotating drum. Lasers are used because they provide a high energy light source which can image an exceedingly small diameter. This accuracy makes it possible to get high resolution on light sensitive plates while greatly reducing the possibility of dot gain since this kind of imaging precludes the various steps of transferring an image from one media to another that was necessary in conventional practices.

The lasers which actually transfer the digital material are configured in a “multi-beam exposure head”\textsuperscript{4} The Creo 3244 uses a frequency-doubled YAG green laser. “YAG lasers operate at a normal wavelength of 1,064 nanometers, which is deep in the infrared part of the light spectrum. Frequency doubling is a natural phenomenon of certain crystals, that yields green light (532 nanometers), the trade off being greatly reduced power.”\textsuperscript{5} However, the YAG lasers are more reliable and have a longer lifetime then Argon ion lasers which are at present the only other alternative. (Doubled YAG lasts approximately 25,000 hours MTBF). When using the frequency doubled YAG, a series of small and similar laser diodes are arranged to form a matrix which allows 80 or more beams to image a plate simultaneously; thus, this matrix keeps the exposure time for each plate in the range of one minute.\textsuperscript{6} The reason for Creo’s use of this long life multidiode matrix stems from its external drum cylinder.

The 3244 uses an external imaging drum which means that the pre-sensitized plates are secured to and then wrapped around a large cylinder (similar to a press cylinder) in preparation for imaging. Due to the size of the drum, it is not possible for the rotation
speed to exceed 300 rpm (rotations per minute) without risking going out of alignment. The laser matrix mentioned above is able to compensate for the limited drum rotation without any loss to imaging time. The external drum method may appear cumbersome, but it allows for the lasers to be placed in very close proximity to the plate which helps to prevent the light from the laser heads spreading from the intended plate surface area, (see figure 3 below).

![Diagram of external-drum recorder with multidiode matrix.](image)

The laser and external drum which encompass the imaging engine that has just been detailed can do little without a RIP to feed them information. The data is controlled and delivered to the engine by a dedicated RIP. According to Creo product information, the Creo Harlequin software Allegro RIP is based on Harlequin ScriptWorks⁶ and is PostScript™ Level 2-compatible.⁷ The RIP handles the PostScript; thus this saves a great deal of time ordinarily spent creating PostScript files at individual workstations. However, the RIP must convert PostScript into high resolution pixel files that conform to
the specifications of the plate exposure unit. Even though PostScript is device independent, it still requires conversion commands since output units differ from device to device. Conversion commands are required to control the lasers—which ultimately control the format and the resolution of the final output which may vary in accordance with the specifications of the plate exposer. In order to give some indication of what effect this has on the final product, the Creo 3244 has a minimum resolution recording time of 1,200 dpi (dots per inch) in two minutes and a maximum resolution of 3,200 dpi in four minutes. Note that there is a direct relationship between the speed of the process and the quality of resolution required; this trade off shall be considered more carefully in the section concerning cost justification.

It is the printer driver software which instructs the exposer unit to translate the PostScript into pixels, giving each pixel its position and identity. Since the process of "ripping" a file can take a considerable amount of time depending on the complexity of the job, the Allegro is employed to optimize picture data as quickly as the Post Script signals are received."

Workflow Issues

Workflow generally refers to the routing of jobs through a companies production process. With the advent of CTP systems, workflow has become a major source of anxiety for both the manufacturer and the buyer as companies scramble to develop a mechanism that will catch and correct errors before mistakes get to the platesetter—causing
unnecessary and expensive wastage. All of the articles on CTP feel compelled to mention workflow, but few address it in concrete terms. Mainly, this is because workflow will always vary to the specifications of individual companies. However, it is possible to establish some basic criteria in order to evaluate one's specific needs. The NAPL (National Association of Printers and Lithographers) and GATF (Graphic Arts Technical Foundation) are actively trying to make the transition into digital workflow a color by numbers process for conventional printers. However, there is no agreement over which system will provide the most efficient workflow. Regardless of the selected method, certain peripheral material must be in place before one can consider a CTP system. There are six components necessary to manage the data before it gets to a platesetter which shall be very briefly outlined here: 1) workstations/scanners, 2) suitable network connections, 3) imposition and trapping software programs, 4) RIP hardware/software, 5) suitable digital proofing, and 6) data storage.

Beginning at the input level, it is important to consider what the requirements of a company's workstations are. If a great deal of rework or manipulation of incoming files is standard practice, each station must be equipped with a wide array of software and sufficient memory in order to accomplish the jobs. Furthermore, a certain amount of jobs will continue to come in the conventional format, and this may require the use of scanners to translate material into digital form.

The backbone of any front end system is the network which ultimately links all peripherals to a centralized database where users can send, edit, and output jobs as they are needed. Due to the fact that digital files for complete jobs can become very large—
eight megabytes or more, it is necessary to select a sophisticated server that is capable of managing the different data being relayed between devices.\textsuperscript{13}

The improved accuracy of imposition software such as Preps\textsuperscript{~} has greatly reduced the need for manual stripping in the printing industry today. Imposition software simply takes “job pages and automatically flows them through a layout in a template in the correct order for the binding style of your shops equipment.”\textsuperscript{14} Software of this sophistication allows for last minute alterations and offers OPI (Open Prepress Interface) to increase speed of transactions. Trapping software allows for the appropriate overlap in complex color work.

Dedicated RIP’s handle the transfer of the imposed PostScript pages to the platesetter units. It is the RIP that is actually doing all the work which can be interpreted by the imaging engine; therefore, every effort is made to streamline files before they get to the RIP as a problem here could create serious bottleneck issues.

An issue closely related to the RIP is the method of digital proofing selected. As Mr. Bowen points out in his article:

Current digital proofing products do a good job of accurately predicting color results on press and can provide “contract” quality proofs . . . . Content and screening are a bit more difficult to address. PostScript has provided a “standard” for the industry, but we are still not at a point where we RIP files with a 100\% success rate. There will be a certain percentage of files which contain problems. In a CTP environment these problems can become costly if they are not identified prior to producing plates. . . . As an alternative, a proofer can be used that contains the same RIP as the platesetter to minimize the potential for surprises.\textsuperscript{15}

However, William J Ray, President of Electrographics Inc., takes a somewhat more pessimistic view of RIPping inaccuracies. He speculates that companies using CTP will have
waste factors of at least 30 percent of their color plate output. A figure like this is unacceptably high by any standard, and the solution, so it seems, is to implement an "exhaustive preflighting step both on receipt of the job and just prior to imaging." However, even with this safeguard, Ray is still of the opinion that such a system would result in higher costs than the traditional PostScript to film job.

Finally, there is the issue of data storage. Archiving material and having ready access to files that may need to be reimaged are the two major considerations. When selecting a storage medium, one should evaluate the average size of customer files, the need for reworking those files, the time each file will need to be on line as a high resolution file, and whether access to the entire system is required from all workstations. Given these different needs, there are several options available, and final selection should be based on the volume and accessibility required.

Data Transfer

Directly related to the issue of workflow is data transfer. Here the pandora's box of standardization has been flung open. Everyone in the graphic arts industry wants an open architecture system in order to minimize the amount of reformatting necessary to send digital data to the platesetter. As noted earlier in this chapter, PostScript has become the de facto standard for storing data. These PostScript pages are then translated into PDF (Portable Document Format) files which are much smaller in size and are therefore more easily transferred from different locations across phonelines.
Adobe's Acrobat has become the software of choice as the translator since it runs on DOS, WINDOWS, UNIX and Macintosh computers. Acrobat allows documents created on one platform to be displayed and printed exactly the same way on another platform; this is done by converting documents into the Acrobat PDF which contains all the information about the appearance of the document. "However, the key feature that makes Acrobat so appealing to the graphic arts industry is that all images and text remain editable"—meaning that they can be collated, attached to other files, and then be printed out on the device of choice.

In CTP systems, the profits depend on efficiency; transferring the data of different jobs as quickly as possible is a major component in the organization. Therefore, choices need to be made about the way in which data is transmitted. In most cases, dedicated lines such as 1 base T to 10 base T will be essential. It should be noted that broad band services send digital signals along traditional analog phone lines which require more time than using an ISDN (Integrated Services Digital Network) line which offers simultaneous voice and data signals traveling on digital phone lines.

Cost Justification

Given the fact that the Creo 3244 can cost anywhere from $300,000 to $700,000, the need to cost justify a capital investment of such magnitude becomes very important.

Implementation is not just a question of machinery but also materials and employees. The basis of most economic analysis centers around ROI (Return on Investment).
However, this is not the only aspect to be considered in the potential purchase of a CTP system. Michael Limburg speaking for GATF feels that “the tasks, estimated costs, and the anticipated time expenditures have to be spread out over a number of different jobs.” Once redundancies in the system have been located, a comprehensive look at all areas effected by CTP implementation can be considered for estimating ROI.

Michael Vinocur writing for *American Printer* points out that CTP systems don’t offer any new products to the market, so the savings from such systems must come from a reduction of costs or increased efficiency. Nevertheless, most companies will have to maintain operations that will allow for both CTP and conventional platemaking for several years to come.

ROI for the platesetters comes from a reduction in consumables (i.e. film, chemistry), a reduction in the labor required to maintain the operation, and makeready times on the press. The overall goal being to generate faster turnaround times and reduced waste.

George Alexander, a regular contributor to the *Seybold Publications*, has been following the developments in CTP technology for several years. He has found that:

Companies that are considering CTP systems often find them difficult to justify on economic grounds, when compared with getting a large-format, film-imaging device and making plates conventionally from imposed film. While going direct-to-plate saves film costs, the requirement for more expensive plates more than offsets that saving. Alexander’s comments are in direct contrast to the notion that there are considerable savings to be had through the elimination of film and the accompanying chemistry. CTP plates are priced around $17 per square meter; whereas conventional plates are around $8 per square meter.”
Another issue that has serious connotations is related to the waste percentages. With a completely digital workflow, catching mistakes before they reach the platesetter is imperative to maintain scheduling times. Since the new workflow has reduced a thirteen step system down to a six step system, there is less chance of catching the mistakes before they are output to the plates—which are far more costly in terms of waste than film.

Nonetheless, there are some advantages of CTP systems over film; the primary one being that the machines have achieved productivity levels which by themselves should give the buyer an acceptable payback period on the investment. A byproduct of this increased productivity is the ability of printers to provide quicker turnaround times since a CTP system can get a PostScript file onto the press faster than using the conventional film based methods. Probably less critical to the buyer but certainly of benefit is the fact that CTP systems require less chemistry and the accompanying government regulations regarding the disposal of that chemistry. The elimination of film from the process removes the ancillary problems associated with image quality due to the imperfect contacting between film and plates which is no longer necessary; this means an improvement in image quality overall. Likewise, the system does not fall prey to other problems inherent with film such as scratches or dimensional stability.29

Frank Romano writing for Color Publishing believes that cost justification will come from “people savings”—meaning that at least three people in a conventional production set up will become redundant in order to achieve a three year ROI.30

In a recent study of CTP return on investment, GATF found that the material costs for conventional plate production was only $152,474 per year; whereas, CTP materials totaled $238,438 per year.31
This discrepancy will supposedly be made up for with the reduction of personnel. However, there is still a great deal of skepticism in the market place at the moment in deciding whether to go with CTP. Brian G. Eastman, President of Gerber Systems, offers the manufacturers perspective in five relatively concise terms.

1. What is the plate consumption of an organization in terms of square footage.
2. How many people are employed for each function, in terms of annual wages and benefits.
3. The investment cost of equipment plus amortization, and borrowing costs if applicable.
4. The cost of materials for both the conventional and the CTP processes.
5 And finally rent and utilities, because CTP units significantly reduce space requirements and this could mean important savings.32

However, this summation does not take into account the large transition required in the front end. In order to get a better idea of overall requirements, one should examine:

1. What is the make up of an organizations current order intake?
2. What portion of all orders are already received in digital format.?
3. What plate size will be exposed digitally?
4. Which proofing process can, or must, be used?
5. What resources are already in house and what resources must be brought in house?33

In conclusion, though the key points in these prior studies are plates, labor, and time, not all companies consider the complete range of items. This paper will focus on local companies concerns in order to reaffirm some key considerations, but also to suggest that cost justification may be a more random concern than is usually suspected.
Beta Sites

The aforementioned in depth analysis of the various issues concerning CTP would not have been possible without the extensive use of beta testing sites. These sites are generally companies picked by the manufacturers to test the ability of developing technologies to integrate into production level environments. R.R. Donnelley was one of the first publishers to install Creo 3244 platesetters. They worked closely with Creo engineers to iron out difficulties in the throughput mechanisms. In 1994, Donnelley produced 300,000 copies of a 200-page publication using CTP for Scientific American.\(^3\)

The Creo model 3244 Platesetter went into operations at the Portland plant on May 16, 1994. Donald N. Reeves, Senior Vice-President of Information Resources Sector, confirmed that the units were up and running and outputting plates within three days of installation. Reeves also said, “Integrating the Creo platesetters with our digital prepress and database operations will allow us to improve quality, compress schedules, and reduce run lengths as a result of shorter make-ready time on the press.”\(^3\)

“Rand McNally prints both sheetfed and web. It installed the Creo CTP and uses Kodak thermal plates. Rand McNally spent millions of dollars for several systems. Its customers asked them to install the systems. Rand McNally could not justify the systems using economics alone. Other factors were that CTP production uses less space and has shorter throughput times. Rand McNally customers have found that CTP saves them money and time.”\(^3\)
To conclude, the author would like to stress that the beta sites mentioned were large firms capable of spending the capital investment and writing that off as research and development. This thesis project differs in that it is evaluating the transition that the platesetters are able to make now that they are trying to capture a larger market share and are targeting midrange printers or potential clients that they once felt were out of reach.

As the industry precedes haltingly into the digital age, there are still some practical considerations that need to be made in terms of financial investment. Although ROI procedures from industry specialists demand a payback of three years and everyone is gravitating towards computer generated material, printers are not so convinced about whether or not these units are transitional technology, and further evidence suggests that different companies expect to have such systems in place for the next twenty years.
Endnotes for Chapter 3

1 Except where specifically sited, general information regarding Computer to Plate systems has been paraphrased from a comprehensive list of articles germane to the subject, please see Bibliography.


3 Ibid. p.24

4 Ibid. p 43


6 Ibid. p2.


8 Ibid. p 43.


12 Brian G. Eastman, “Computer to Plate: Tomorrow’s Technology Today!” *Outlook* 2, no. 1 (Feb 1996) p. 32

13 Daniel G. Bowen, “Imagesetting and Computer to Plate,” *Outlook* 2, no. 1 (Feb 1996) p. 34


17 Ibid.


26 Ibid.

27 p4 Alexander SEybold october 1995

28 Frank Romano, "CTP numbers don't yet compare," Color Publishing (Dec. 1995) p12

29 p16 alex 1994

30 Frank Romano, "CTP numbers don't yet compare," Color Publishing (Dec. 1995) p. 11
31 Ibid. p12

32 Brian G. Eastman, “Computer to Plate: Tomorrow’s Technology Today!” Outlook 2, no. 1 (Feb 1996) p. 33


34 “Apple computer and BBDO Forge Digital History with Scientific American in Filmless Magazine Production,” Color Publishing. p. 1

35 “Donnelley Starts Transition to CTP.” Graphic Arts Monthly (September 1994) p120.

Chapter 4

Statement of Problem

This paper set out to show that CTP systems are not cost effective and that this has not acted as a deterrent in the decision to invest in such systems for the printer.

The advantages and disadvantages of the CTP system have been detailed as determined by the two different companies under investigation. Further examination suggested that cost effectiveness was less a factor in implementation than is normally projected. To this end, the background and significance of this investment for each company was given in turn, and the similarities and differences between them explored in terms of equipment, facilities, and anticipated costs. Finally, the paper concludes with an observation relative to the partially random nature of selection and implementation processes.
Chapter 5

Methodology

In order to perform the proposed analysis, a considerable amount of time was spent at the two printing companies interviewing employees and observing workflow practices. There is a discussion of the different kinds of technology involved in CTP systems; implementation is discussed through an examination of 1) the front end computer system, 2) the CTP unit itself, and 3) the digital proofing system that will be used to accompany the platesetter. These segments have been discussed in detail since this is probably the most confusing area for potential buyers to understand.

The equipment to be specifically evaluated for both observation sites are from the Creo product line; models to be discussed are the 3244 and the Trendsetter. The equipment involved in the study is the CTP platesetters used at Webster manufacturing, a division of Thomson Legal Publishing, and the considered CTP unit for Canfield and Tack Planing and Printing Inc., plus all the ancillary equipment that is needed, such as 1) the front end computer system, 2) the CTP unit, and 3) the digital proofing system that will be used to accompany the platesetter.

Facilities consist of the two different printing plants. Thomson Professional Publishing’s Webster division being the first site and Canfield and Tack being the second location. Both sites are in the greater Rochester area and are easily accessible.

The anticipated costs of implementation will be discussed relative to each companies size output and general finances.
The time table for implementation of a CTP system varies with each company. Thomson has installed two platesetters in the last two years while Canfield and Tack have signed a letter of intent which has reserved a thermal platesetter for them once the machines have proven to be efficient at production level standards—which may not be for another year. Since this paper will consider a CTP system which has already been implemented, it will be able to contrast actual implementation procedures with the proposed implementation procedures of the CTP system for Canfield and Tack.

The time table for completion for both companies is somewhat vague. Full implementation at the Webster location is desired by May of this year. Canfield and Tack do not anticipate implementation of their system until next year.

In order to make an appropriate assessment of the different companies workflow and productivity requirements, on site interviews have been conducted with each printing company. Systems were evaluated on the basis of three criteria: 1) what are the anticipated modifications to the front end computer workflow that will be required to implement a CTP system, 2) what will they actually do, and 3) how do they view the products they will be using to move towards digitization and direct output.

In addition to a survey of the literature, in depth interviews have been conducted with plant managers of both facilities; these interviews will rely heavily upon Michael Limburg’s survey of CTP cost justification and will be augmented by other questions tailored to the local market.

Finally, manufacturer’s spread sheets were used to plot the estimated data into a pre-calculated equation from which cost justification can be deduced. Additional interview
and survey materials were integrated into general findings of current literature on the subject.
Chapter 6

The Results

As was evidenced in the literature review, there is a wide array of opinions upon the subject of computer-to-plate technology. This chapter will analyze both the positive and negative viewpoints of various specialists in the industry and compare those opinions with on site observations from different printing companies involved with CTP in the Rochester area. Starting with the advocates, it is clear that CTP can be cost effective. Interviews with acknowledged experts in the field of CTP at the Seybold Conference in Boston and at the DIRECT Conference in Dallas indicated that there are many users who are finding success with very little difficulty as well as an abundance of manufacturers who stress the most recent improvements to their product line.

Among the advocates is Andrew Tribute, European editor for Seybold Publications. His involvement with CTP goes back to its formative years. Tribute prefers to take the overview of CTP’s progression and thinks the possibilities in the future for CTP to be quite good. There is no doubt that if one looks at the improvements in CTP, it has come along way in terms of technology. Tribute chaired several sessions at the Seybold conference where users confirmed their economic success with currently available CTP systems. He believes that there is no turning back to the conventional format and that although sales of platesetters will run behind or parallel to imagesetter’s until the year 2000, the transition is inevitable. “Ideally small printers should be targeted to convert to film in the near future in order to adjust for digital origination.”
Jonathan Crutchfield, Director of Technology at Universal Press, was one of Tribute's eye witnesses to progressive success. Universal specializes in six, seven, and eight color jobs usually catering to the high quality art reproduction market. As of February, 60% to 70% of Universal's workflow capacity was going through their Komori digital platesetter. Universal is using Dupont Silverlith plates and the Kodak Approval digital proofing system.

"The technology is a reality, it is only a matter of what time you choose to get involved with it." Universal's initial investment in CTP was $450,000; however, that figure was just the beginning for them. "CTP will change the very construct of printing to the moment before it goes to press. It may take you six months to a year to align your workflow to CTP but you had better do it." Crutchfield discussed the early problems they encountered with memory requirements and bottlenecks created by the tremendous amount of digital data they were forced to put while trying to determine the needs and requirements of their system as they went along. However, even with these glitches, his company has seen considerable benefits. In Universal's case, the major restructuring of their system required that they:

- retrain people
- create a support structure for the CTP unit
- have complex, huge storage capabilities.
- servers
- complex networks
- digital proofing
- archiving and retrieval capabilities on a large scale (i.e. 1.5 gigabytes per job).
As of February the 28, 1996, Universal was still evaluating whether or not they achieved a return on investment in purely economic terms, but for Crutchfield, the savings are evident in the peak periods of operation when they are able to maximize through put. In assessing the individual components, Universal found savings in the elimination of having to do redundant proofing of film which gave them a noticeable material savings. They found that plates register perfectly on press which reduced wastage on make ready by 5%. Another observation they made was that the plates came up to color faster because of the improved image quality of the plates which meant that less paper was needed to prep a job.

Despite those advantages, Crutchfield was careful to stress that any plates that had to be remade by the platesetter needed to be done without reripping the files. This is due to the fact that the are still some idiosyncratic differences in rip patterns from one job to the next. Crutchfield is not convinced that PostScript is the answer to the digital imaging process and feels that page description could be a lot better.

Another example of successful CTP implementation was evidenced in GATF’s Satellite Symposium entitled “Mastering Digital Workflow: Breaking the Barriers to Profits in the Computer-to-Plate Age.” During this presentation, Mike Bowman, Quality Assurance Manager for Shepard Poorman Communications Corporation, George Fiel President and CEO of Image Systems Incorporated, and David Lewber, General Manager of Integrated Imaging Systems Division, Johnson & Hardin, detailed how their companies found profits through the implementation of CTP.
As David Lewber succinctly put it, “if you don’t have CTP, you will compete against it.” As the man in charge of generating the customer base through digital technology at Johnson & Hardin, he feels that the customer is definitely ready to make the transition to an all digital format; in fact, CTP technology has enhanced their customer base considerably as more people seek to receive the benefits of the process. These benefits include quicker turn around time and, to a some degree, savings for the customers, but Lewber intones that the savings are the profit to the company which aren’t necessarily passed on to the customer. The printers’ estimated savings range from 15 to 35%; any amount of which may or may not be passed on to the customer as the individual company determines. Customers are willing to deal with digital proofs if that means they will receive higher quality and lower prices. Lewber feels that it is the job of the printers to show the customer “what’s in it for them.”

George Fiel of Image Systems feels that there is no real point to discussing whether or not CTP should be used; he assumes that “once we are all using CTP, we can lock down some of the less satisfactory issues such as imposition and data transfer standardization.” Fiel feels that as CTP becomes the norm in the printing and publishing industry, companies will need to distinguish themselves from the competition through their value added services and customer satisfaction levels. “CTP is a ‘no brainer’; it is simply a matter of when do I go in for a system.”

All of the companies present at the symposium had a couple of distinct advantages which allowed them to embrace the technology which might not be the case for most printers. The most important of which is that they were able to make their customers
partners in the transitional process, thus, making it a learning experience for both parties as well as a profit making one.

From the standpoint of Bowman, the practicality involved in CTP is data communication which has become the backbone of this new process. High speed communication lines such as ISDN and T1 lines, facilitate the use of digital files while providing customers with internet access to send digital files. There was agreement among the panel members that in terms of data management, there are no real substantial problems with ISDN or with T1 lines. The problems of data lost in transmission can generally be isolated to files transferred via modems in the early days of experimentation, but with the more powerful lines, file integrity is not an issue.13

Digital files require “2 to 4 times the preparation time in prepress as compared to printing them”.14 It’s important to be able to track where jobs are in the workflow, especially with large files. In order to maintain scheduling, data must funnel down to the platesetter properly. There was general agreement that it was critical to use the exact same file from the same RIP for the proof and prints. If there is a need to remake the plates for a job, then the issue becomes how much memory must be available on line and accessible at any one given time. One example of this situation, illustrated by Fiel, shows that his company handles 20-30 jobs on average of several megabytes per file, his company, therefore, must multiply that figure by three and be prepared to keep that amount of data on line for two days or until all press runs are completed.15 Although this may appear to be a staggering amount of memory required to get the job done, there are some long term benefits from preparing a system to handle sustainable upgrades for long
term use. For one thing, in this new digital format, resolution capabilities are greatly enhanced and allow details down to twelve microns; whereas, with the conventional format, that figure goes up to thirty-five microns and higher. This means that stochastic screening becomes a much more viable method of screening since it eliminates some of the fundamental problem areas. Along the same lines, with tighter micron sustainability quality control has gained a tremendous opportunity to fine tune systems and isolate problem areas.

When looking at the ROI for such an investment, Fiel points out that “In a six month period, our stripping department was reduced from twenty-four to three, and in the following six month period, it went to zero.” There are definitely labor savings to be had with the elimination of steps in the conventional process.

Finally, one of the consistent concerns of the industry was voiced by having each of the panel members discuss his experiences with digital proofing systems. Although it is generally agreed that the Kodak Approval is the top of the line in digital proofing at present, not everyone is capable of meeting the capital expenditure of such a machine (equipment cost $250,000). Several printers are making due with dye sublimated proofs without complaint, usually the Iris or the 3M Rainbow (equipment cost $30,000) systems.

Lewber put it nicely when he stated, “CTP isn’t so much of a printing process as it is a business proposition,” and in most cases, one probably couldn’t afford not to have it. For those in doubt, Bowman suggested that, “before you go to plate you’ve gotta go out to film.” For all panelists, it was clear that their organizations had taken risks to imple-
ment such new techniques but that they had tried to minimize that risk as much as possible by finding an "integrator," whether that was a manufacturer or a customer who was interested in the process and became partner in such a venture. In these cases, the risks were worth it.

Providing a different yet still very positive approach to CTP, Dr. Seydel from Heidelberg Corporation, discussed the issues related to digital workflow for the growing number of CTP systems. He states that "with CTP you get two times the productivity at half of the labor". An interesting aside is that he felt that most of the errors which occur with CTP are through miscommunication more than mechanical error. In other words that it will take people a while to adapt to the new process both in terms of, the system operators, and for the customers to realize that last minute corrections are not as easily done without incurred costs. Another area he pointed to, was that of quality assurance—how is it achieved once traditional safety mechanisms have been eliminated?

A great deal of discussion seems to center around the RIP for such systems, not too surprisingly, since all data must flow smoothly through here in order to be processed appropriately. Current thinking is that the same RIP must be used for the files, especially in color work—this means that those files should be kept intact, on line until the job has finished printing. Another suggested alternative opinion is to use parallel processing of RIP's to get the improved output.

All of these opinions highlight the advantages of CTP, but to what degree can an individual printer distinguish whether or not there are profits for his own firm in CTP? Short of direct-to-press, this is the major topic in the printing industry. Probably more
so than digital presses since not all conventional printers can afford or want to imple-
ment or purchase that kind of equipment. On the other hand, it is never quite clear how
much vested interest is vailed within the various trade journals discussing this technolo-
gy, because everyone operates out of special interest groups. The media would have one
believe that the world is preoccupied with CTP, and it has simply become a matter of
time before anyone who is anybody in the industry will move to this format.\textsuperscript{20}

With this background, it now seems an appropriate time to introduce Thomson
Professional Publishing who was an early implementor of the Creo 3244 platesetter sys-
tem. As will be evidenced in Thomson's experience, there are certainly hazards that
accompany efforts towards productivity. Even as a success story, the costs have been
greater than anticipated, and the ROI harder to recoup.

**General Background on Thomson Professional Publishing**

Some of the first printers targeted for CTP were legal publishers, newspapers, and com-
mercial printers whose need for high volume throughput was acute. However, many
printers entering into this digital realm were unequipped with the appropriate front end
computers to handle a direct-to-plate system. Efforts made to implement such systems
on the fly proved to be very expensive, because production time was lost in the process.

Thomson's Webster manufacturing location is a major production printing site for
Thomson's numerous legal document publishers. In this regard, Webster's situation is
unique, in that they are an in-house service to a larger conglomerate.
The Webster location has a complete in-house operation, which means they have their own composition and printing units in the same building. Approximately 60% of all the material they print is from their own composition departments although they also do work for Thomson’s various branches elsewhere. Generally, they are a short run book production company, undertaking run lengths of approximately 1800 copies per book.

As a legal document publisher, Thomson’s production is almost exclusively in books and inserts or updates for books already in print. Therefore, 95% of the work printed in Webster is black and white, with the occasional use of spot colors. As is fitting for book production, Thomson relies largely on web off-set lithography. With several different locations feeding the Webster site material, they have a significant need to maximize their throughput.

Given these conditions, there are several reasons why Thomson considered the implementation of a CTP system. They needed a digital printing system for Thomson, that would facilitate composition, manufacturing and storage of Thomson’s broad product set. The idea was to implement a Computer-to-Plate system along with a PostScript Page Database (PPD) which would store and retrieve Thomson Products in an electronic format. By doing so, Thomson hoped to gain company-wide access to products from either composition or platemaking systems, provide secure storage while allowing the updating of products, and reduce the number of steps necessary to generate plates.

Thompson wanted to implement the platesetter in conjunction with the PPD system in two phases: phase one was supposed to be the storing of documents through the use of the PPD; this was not immediately successful because of some technical snags that will
later be discussed. Phase two was for the loose leaf publication, which would presumably provide access and editing of individual pages. The first phase would create a major storage and archiving area for material, while the second phase would allow quick access to and manipulation of individual files.

**Formation of the Database Network and Composition System**

The biggest obstacle that Thomson faced was the fact that although they have used computers for several years, there was no uniformity within the Webster sites various software and hardware specifications, nor was there any standard system that Thomson asked its subsidiaries to use in operation. This left them unaware of how critical PostScript and the operating system for the computer workflow would be, once it was put in place. The consequence was a very limited understanding of what changes would be required of them when they went to a PostScript format. So in this respect, they were caught unprepared to perform the necessary testing and approval of documents, that they would need to perform to implement the system, and thus, for the most part, had to create their own protocols as they went along.

An illustration of this point can be achieved by briefly examining the various types of input that Thomson is regularly asked to handle. With information being authored and collected throughout the United States, a system that could store and process Thomson's information at a central location seemed necessary for efficiency. Information created at remote sites had to be transferred to a central storage location for processing and pro-
duction. The PPD would allow the transfer of completed jobs as PostScript pages over electronic networks to this central location, with all information necessary to complete production for the end product. Although electronic files are preferred, there is also considerable use of Optical Character Recognition (OCR) software in conjunction with flatbed scanners and electronically coded documents; the remainder is 70 millimeter camera copy work.

Thomson's Webster location standardized their own composition department three years ago by converting to the Xyvision composition system; in this way, the Webster site has been able to streamline its own composition techniques into a format that conforms to the PostScript Level One, which is required by the CTP system. Unfortunately, it has not been practical to have Thomson's subsidiaries agree on a standard application, such as Xyvision for all locations, so it is common for the Webster location to handle large amounts of text that do not conform to Level One PostScript—meaning that they have been stored in several different formats.

Incoming files, once transmitted, may have to be composed, proofread, keyboarded, or scanned; it then becomes necessary to validate files, fonts, and graphics in PostScript for the Raster Image Processor (RIP). These converted files are now considered “clean” and go directly to a matrix which automatically feeds to the manufacturing division.

Currently, the Webster site is using the Ethernet network which supports IEEE802.3 cabling using 10 Base T (twisted pair wiring) that is fully installed and operational. Also available are the necessary taps to connect the components of the PPD System in the Webster location. The data communication protocol over the network is Transmission
Control Protocol/Internet Protocol (TCP/IP). Internet Protocol (IP) supports the network, or third layer, in the Open System Interconnection (OSI) seven layer model. The transport, or fourth layer, supports Transmission Control Protocol (TCP) and User Datagram Protocol (UDP). The higher protocol layers require either File Transfer Protocol (FTP) or Network File System (NFS). NFS has become the de facto standard for distributed file access in a heterogeneous network environment.22

Normally there is a specific set of criteria that a company should be able to confidently say they already have knowledge of and experience with. The criteria for whether or not Webster would be capable of integrating a platesetter are as follows:

1. Workstations
2. Scanners
3. Imposition Software
4. Trapping Software
5. Network Connection
6. Raster Image Processor (RIP)
7. Digital Proofing
8. Data Storage

Clearly, having all of these components in place makes the platesetters transition much smoother although a certain amount of training and restructuring is inevitable.23

A typical publication coming in to be printed may have several different people contributing sections from different locations around the country—meaning that the applications used to create the documents will be different as well as the format. This creates a need for a system like the proposed PPD, to merge all of these different formats into one understandable PostScript document format. In order to achieve this, there must be uni-
formity among the documents which, so far, Thomson has been able to accomplish with the use of the Portable Data Format (PDF). Recently Adobe’s Acrobat Distiller, Exchange and Reader, have become commonplace on the market for their ease of use as a converter in executing this function; thus, Acrobat’s utilization of PDF has become a *de facto* standard in the industry. Therefore, it has also become a vital link for Thomson’s new storage system. By using PDF, whole documents composed in different applications can be stored as one file, thus greatly reducing the amount of storage space required per document. A necessity for Thomson’s use of the PDF is to have all fonts embed with the accompanying pages. However, where PDF proves to be most valuable is in its ability to convert many different “flavors” of PostScript into the Level One format. This means that the idiosyncrasies of different application’s PostScript codes can be automatically converted to Level one protocols.

Unfortunately, a negative issue which has come up is the fact that PDF format was not intentionally designed for this sort of data transfer. At the beginning of the PPD’s implementation, Webster had a problem with Acrobat Exchange occasionally remapping and substituting fonts. The problem seems only to have occurred when a font had been modified in the text, in such instances, Acrobat Exchange would then make an additional modification to the text. This created a problem with the system for the PPD and, ultimately, has caused a slowdown in the anticipated returns and implementation that Thomson had anticipated from the system. Although they were forced to find a work around solution, the PPD has only recently become operational and is still in its trial period.
Preflighting

The preflighting department grew out of the necessity to check documents before they reached the platesetter. If files coming down to the platesetter are not clean, they simply cannot be processed, which means that a backlog is created in scheduling and wasted press time is usually the consequence. As explained by Mark Rabau, the CTP Project Leader in Webster, “the sole purpose of the preflighting department is to protect Thomson’s workflow.”

For reasons that are not entirely obvious, preflighting was not costed into the jobs and is at present an expense to the printing assembly system. Since this was an unanticipated cost for Thomson, they are trying to finance it by offering customers a new economy of scales program which encourages customers to have their files preformatted properly. The idea is to get corporate wide agreement from other divisions of Thomson to correctly prepare files, thus eliminating the need to rework jobs for the platesetter; and in return, those divisions would receive a price break—based on scale—for in coming jobs.

Probably the biggest problem that preflighting has to deal with is fonts. All fonts must be imbedded in the PostScript files in order for the jobs to be rasterized properly. With the current RIP, only Adobe Level Two is acceptable, and the system encounters considerable problems with other derivations of PostScript and cannot register True Type fonts if it is capable of running them at all. All PostScript must be Adobe DSC-compliant. Out of 7500 files, roughly ten percent need to be checked before going to platesetter operators; however, this average includes both the files for the conventional paginators and the CTP systems.

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Ideally, the concept that all customers will be able to store and download material into the PPD is sound; however, it has proved to be slightly more difficult to implement than anticipated. Once the technicalities have been worked out, the system should operate on faith, meaning that all Thomson subsidiaries will check documents for PostScript conformity before placing them in the PPD. Inevitably, some resources will need to be committed to check and maintain that everything is working properly.

As the jobs are processed, there is an arbitrary limit of eight files which can be sent to the platesetter. That is considered to be about the middle point for how many files the system can realistically handle at one time without slowing down. Offsets specifications for the bindery must be maintained on the templates. Macros are often written to catch consistent errors that occur due to the idiosyncrasies of a particular application. Due to the large volume and quantity of proofing required, preflighting is there to make sure the documents will conform to the imposition software for the platesetters.

All output to the platesetter is done through its RIP; the software which enables the form set up is called PREPS® 2.5. There are three workstations which become important in monitoring this transfer of data:

- The Imposition workstation
- The RIP
- The Softproofing workstation

PREPS® handles all of the imposition and stripping. On the screen there are three sub-sections available to the user that monitor the progression of the jobs: 1) "files"—creates templates which pre-calculate the imposition to match a given press; the required plate
offset is entered by preassigning the percent values that are required; 2) the “run list” will show the length of the entire document before the files are sent to the RIP; and 3) the “signature list” allows adjustments to be made to the flow of the document in the event that corrections might need to be made to an individual page.

At any of these workstations, it is possible to preview the input, which will show a directory for viewing any problems; then files are sent to the RIP and once rasterized, can be examined on the softproofing computer. Documents are viewed in the TIFF format to insure the proper input for rasterization. The software will state if the RIP was successful or not, previewing the output is then possible. One important consideration is that there is no really adequate trapping software on the system at present. Pagemaker 6.0 provides limited manipulation, but if increased color work comes in, this limited form of trapping will not be acceptable.

The Platesetter

Thomson made three considerations for platesetters before purchasing one of the available systems. They are:

- Resolution
- Dot size
- Repeatability

All three issues have an impact on the speed and quality that is desirable. The Webster location required a platesetter that could output resolutions of approximately one thou-
sand dots per inch (DPI) with as fast a driver as possible. (In terms of resolution requirements this is relatively low since text does not require high resolution capability). Since Thomson does not have maximum run length requirement, the long term repeatability of plates was immaterial. However, an automatic plate loading system was a necessity for the large amounts of throughput Webster would have to handle. After a review of the data provided by each vendor, Thomson purchased two Creo 3244 units. The Allegro is the accompanying RIP in the Creo product line; this is a Harlequin RIP modified to meet Creo's standards. They rely on the DEC-ALPHA chip which is exceedingly fast; however, in order to maximize speeds, the software must be compatible to the chip.

The platesetter itself has an external imaging drum. Completely automated by its auto feed system, all that is required is to have the plate packs opened, and they can then be loaded directly into the storage bays without further manipulation.

Obviously one of the largest expenses that will be ongoing is the cost of plates. This posed a problem for the Webster site, as they had initially hoped to go with Polyester plates. Unfortunately, polyester displayed dimensional instability and was therefore replaced with aluminum plates, which are much more expensive. The cost is approximately $10.50 per plate for the metal; this price is about $1.27 per square foot. The two main suppliers that Thomson uses are Hoechst and Agfa. As Thomson's needs have expanded in the last year and a half, so have the services provided by the plate manufacturers that distribute to them.

Not too surprisingly, it is the people who used to make the conventional plates—with their previous knowledge of stripping and imposition—that were trained by Creo to
manage the platesetter, and they have apparently made the transition with ease. Most of the prep work they do is with the softproofing units to check the offsets for the press and bindery and to create clipping paths which insure adherence to the plate size. It is rare that they need to redo a plate, as the system has been developed in such a way that most mistakes will be caught by the computers beforehand.

Productivity

Ellen Hoch, a Systems Analyst at Thomson, helped the company make the transition to this new technology. In her interview, she said the main reason Thomson went into CTP was to expand platemaking capacity despite being constrained by an antiquated process. The capital investment required for Thomson to overhaul its system was not there and, in fact, although outdated, all of their equipment runs well and is fully operational. Therefore, it would be unrealistic to replace their machinery with a new technology which is as yet unproven. A unique aspect of the Webster locations cost justification was not the film costs; since Thomson had previously used 70 millimeter film and a Rockwell step and repeat paginator, because of this, the expense of film and chemicals was not as great as it would have been for other commercial printers.25

Platemaking systems increase capacity by increasing throughput. Thomson has been able to gain exposure and build an exceptionally good relationship with Creo, the manufacturer. The Webster site outputs an incredibly high volume of plates for short run production. They used over 2.3 million square feet of metal plates last year on alone.26 This volume enables them to work on an economy of scale with their distributors.
The competitive edge which Creo's platesetter has given the Webster location in the production process includes:

1. High quality
2. Improved quantity of work
3. Higher volume throughput
4. Reduced costs
5. Increased flexibility

As stated earlier in this paper, Thomson seeks to minimize its use of preflighting documents. One solution to this issue as proposed by Mark Rabau, the Project Leader in charge of the Creo units, is that training for the other divisions of Thomson Professional Publishing, as well as outside customers, should be arranged to teach these newcomers to the system how to create compliant files to streamline the workflow so that documents can go directly to the platesetter. Rabau stresses the two main benefits from such a plan: 1) an increase in productivity; and 2) better customer relationships with the other branches that Webster works in close contact with, so that each division may access what it requires without the need for assistance and may thus reduce redundancy of tasks. Of course, preflighting is not what any company seeks to do, but it is a necessity to ensure the production schedule will be working on time. This is the essence of operating the platesetter units—to provide confidence for smoothly flowing operations.

Quality control is an issue that Thomson has yet to deal with. They do not have any department in place to oversee or evaluate the efficiency of the operation. Thomson Professional Publishing's philosophy is that everyone is responsible for quality control; therefore, no formal inspection steps are in place, and it is assumed that quality control is
handled as needed by each department. In practical terms, however, rework levels at the Webster location are currently unacceptably high. Which suggests that quality control issues may need to be reassessed in the future.

Cost Justification

It has always been the goal of print manufacturers is to go directly from input to output with as few steps as possible in between, thereby cutting production costs. At the moment such drastic reductions in the printing process are not feasible. This deficiency has given the platesetters a chance to establish themselves on the market place as the most realistic alternative.

There were several reasons for Thomson to invest in a Creo platesetter 3244, but a large determinant in their decision to go direct-to-plate was the fact that most of their documents were already in electronic format. With the direct-to-plate system, Thomson was able to keep what it already has in terms of presses, so this one piece of transitional technology allows them to keep their system intact, but also provides a viable transition into the digital age.

A Creo platesetter is in the ballpark of $600,000; however, with the supply and support, it probably works out to $1,000,000. Although the prospectus initially called for polyester plates, they proved impractical as the presses operate on a portrait format, which causes plate instability in the polyester; therefore, metal plates were used instead. Thomson chose the CTP because they have an enormous amount of material that needs
to be output, something in the realm of 2.3 million square feet. The Creo is a very robust machine that's fast and well made. It is able to RIP and image at the same time, a combination which gives improved throughput for jobs.

At this point 55% of the work at Thomson is being done by the Creo, and 45% is still being handled with conventional practices with 70 millimeter film. Within the next two years they hope to bring these figures closer to 65% Creo output and 35% conventional output.28

The prime justification for implementing the system is the cost savings it will generate. Initial savings, estimated at $353,000 were realized in 1994 during the ramp up of the full system capabilities. Full savings of over $900,000 annually were realized from combined equipment, platemaking, and work efficiency cost reductions. Given a rate of return of 10% and marginal tax rate of 40%, the Net Present Value (NPV) of the system is $1.4 million. Payback will be achieved in just over four years.

The PPD coupled with direct-to-plate devices will reduce platemaking costs and improve response time by increasing operational efficiencies, decreasing plate and printed page quantities and increasing platemaking yields.

The specific benefits to the Webster Manufacturing location include: 1) reduced plate production costs of up to $700,000 per year, 2) reduced charges of up to an additional $700,000 for the elimination of older computer service contracts with Triple I, and 3) a tighter integration with KEREN (a networking interface system). Efficiency will be increased with faster turnaround of print jobs and fewer production steps. Because page storage is independent of the final plate size or configuration, press scheduling will be
more flexible. Increased ability to send data for printing jobs to remote printing sites, automated looseleaf product updates, and the ability to print selected product revisions on demand: all add to the benefits for the Webster site.

Conclusion

Thomson Publishing’s Webster location has recently finished installation of their second Creo platesetter in less than two years from the time they decided to go to CTP. They have exceeded even the manufacturer’s expectations of how many plates can be output, managing 420 plates in a twenty-four hour period; and, at maximum operations last year, they produced 240,000 plates, a marked improvement from 133,000 which was the maximum output from their conventional Rockwell step and repeat system. Of those plates there was a 2% remake/wastage factor which totals to 4800 plates.

Fortunately for CTP systems the market favors its ability to merge conventional printing technology with digital file formatting and database building. It will be at least five years before the industry will be investing in new presses to accommodate the upcoming technologies, and CTP fills this gap.

Without a doubt, CTP is a transitional technology, and the ultimate goal, as far as research in the industry goes, is to master direct to press systems, so that all platemaking can be eliminated. CTP provides conventional printers with a way to increase their productivity and profitability in the meantime.
Understanding the existing relationship between research and development for industrial technologies and the market forces which ultimately decide their success is crucial to understanding trends in the printing industry.

The Manufacturer's Perspective

It is not always possible to know what the best course of action is in a given situation, in an attempt to complete the picture of Thomson's accomplishments the manufacturers were contacted to provide their input as to the situation out in Webster. In an interview with Dave Lemaster, the director of Sales for Creo, related that his company's viewed they felt that Thomson was an ideal candidate for a Creo platesetter, because they have good control of composition material and are a high production shop. The most positive aspect of Thomson in this regard is that they controlled such a large part of their own composition that Thomson was perfectly positioned to make all files conform to the systems requirements, which in the early stages was a critical criterion for the platesetters. Lemaster noted, "Thomson Professional Publishing is doing with one Creo platesetter what they used to do with eight Rockwell step and repeat units." Yet he also sees the two problem areas for Thomson being the plates they use and the front end system they went with.

As stated earlier Thomson relies heavily on the Hoechst N90 plates which are visible wavelength sensitive. These plates are notoriously unreliable, they are extremely sensitive to fluctuations in humidity which will change the plates imaging ability even within
one 20 x 31" plate. Given this high rate of instability it is not surprising to realize that
Thomson is paying next to nothing for the plates which has helped to offset the expense
of being forced to use metal plates in the first place. When one considers that the
throughput is considered to be approximately 450 plates on the Creo alone, that comes
to 3,000 plates a week. To use a plate that has shown greater stability Thomson would
have to pay $1.20 a square foot for an additional six square feet. That comes to:

$1.20 [the additional cost] x 3000 [the quantity] x 52 [weeks per year] = $187,200.33

This puts Thomson in a tough spot because they are used to paying a lot less. At present
it would seem that Thomson prefers to take the gamble on inferior plate quality rather
than to try and work a deal with one of the various plate manufacturer’s. If and when
they decide that this is an issue that needs addressing, finding another plate supplier
should not be a problem.

The second consideration is the PPD which Lemaster views as a rather clumsy work
around solution that Thomson went to, rather than paying the expense of using Creos
Meastro system. Since the workings of the PPD have already been discussed, a brief look
at the job management system supplied by the manufacturer might provide some inter-
esting comparative data.

Creo’s Meastro system automatically controls the workflow from the softproof to the
hardproof to the platemaker and finally to the archive. The key feature of Meastro is that
in Creo’s system there is no storage needed for the ripped files, because the equipment
can always rip a file faster than it can image. Using Prescript (which outputs industrial PostScript that is vector based plus line work) the RIP is responsible for interpreting, rendering, and screening the files; however, the Harlequin interprets the files before they get to the RIP, thus giving you editable PostScript files and embedded fonts for each file.

Differences in data become apparent in the process of interpreting the data. With the Harlequin the interpretation never changes. This stability means that the Creo is one of the only systems available that can RIP a file in real time without having to store the job. In order to RIP and image at the same time the imaging engine must be able to start, stop and to realign itself in perfect register without a buffer.

The Opposition

For every advocate of CTP there is a skeptic, who claims that the time is not right for such a process. This is not to say that the skeptics don’t think that CTP is an eventuality, quite the contrary, they believe that eventually CTP will be the main stay of the industry, but they also believe that printers should move towards this technology slowly and with caution. Are their fears warranted?

Bill Ray prides himself as being one of the leading curmudgeons on this side of the debate. Ray has two major objections with the CTP systems as they stand now. The first is that “people are incapable of not screwing things up.” He likes to call this weakness “original sin” which although a bit over the top does drive home the point that humans are fallible no matter what machines they are provided with. The second point is that the
Ray does not think the technology is perfected as it currently stands. To his mind improvements must be made to the RIP's and the placement of imposition into the files must occur before the data is sent to the RIP. Keeping the editability of these files is a key feature which is still lacking in the system. This omission does not make one confident with the workflow as it now stands. The suggestion here is that it is impossible to verify the quality job conclusively until its on press. Repeatedly Ray states that each condensed step in CTP creates greater risk for error. With a running speed of 3,000 rotations per hour, the expense of stopping a web offset press and having it sit idle, along with its crew, in order to re-imaged a plate or plates out weigh any savings that might be achievable in the prepress area.35

Ray states that “CTP workflow is all wrong” systems should operate on a networked database set up where presently they are modularized and isolated in their format.36 Citing a 1993 TAGA paper on statistical wastage for imagesetters where spoilage was placed around 1/3 of work for jobs Ray suggest that R.R. Donnelley is experiencing a spoilage ratio closer to 45%.37 If this is truly the case the next obvious question would be why?

The answer lies in the difficulties involved with systems integration. The amount of memory required to impose and image a four color eight-up flat is somewhere in the neighborhood of 500 megabytes at least. Files of this size require greater transmission time. Which then needs to be transported to an array and then on to the RIP where the time factor becomes critical.
Ray thinks that the problem stems from poor data management systems that are incapable of validating files before they get to the plate. Ray advocates a pointer relational database. Using "medadata" or a field with a pointer to the file (which would provide a more precise way of tracking documents). This would also provide a way to perform analysis of process differences in the current feed forward system. The input elements would go to a real database and would then be monitored throughout the processing there by supplying a feedback control system.

Using this medadata principle with one page at a time going from the RIP to the high resolution file allows manipulation of color and geometry before imaging, these files can be drawn from a validated storage container and printed. Medadata is simply a marking structure for registration and imposition in file control. Metadata also describes data for pagination description anywhere from 30 to 100 kilobytes. Implementation of such a process would require a hierarchical file management system. In such a system one would begin with an array, then move on to a jukebox, and finally to storage tape; scheduling and demand issues influence data transfer among these three. A storage area like this would cost $150,000 and upwards. The system layout is so that this process allows files to remain on-line thus giving printers rewrite capabilities.

Another issue which causes considerable debate is selective RIPping. With the use of displayless parsing or the "Amber" extension, page primitive cells become a PDF however Adobe still needs to work out the trapping issues related to color. There have been several improvements of late in RIP technology especially in the area of "load level technology" which makes it possible to time jobs for delivery—this is a feature that will soon be avail-
able. Advances being made with the new TIFF IT standard look promising because there is a greater need for fixed format with variable data. The TIFF IT would allow an easier transference of data from system to system.

Ray believes that the industry should get rid of the imposition software that companies are using now. Imposition is a problem waiting to happen. "No one can take a five meg file (standard for an 8-up) and image it straight from the RIP and slap it to press without a scheduling clog up. It simply can not be done." 40

Consultant groups are everywhere in the printing industry and one of the men who has made a name for himself over CTP is Bill Lamparter who works for PRINTCOM consulting group based out of North Carolina. Using their polling base PRINTCOM was able to make certain observations about CTP in the current climate. When comparing the cost of CTP to that of conventional platemaking 41 PRINTCOM found that there were reductions in labor, capital and materials in the conventional plan. This consisted of the elimination of film, along with the need for film exposure, film processing, film handling and flat assembly. The other major reduction area was centered around the plates with the elimination of conventional plates their exposure and processing systems as well as the cost of the square footage for housing the plateroom. PRINTCOM found that Computer to Plate systems added labor, capital and materials. This came in the forms of digital plates, plate exposure and plate processing which have the possibility of being offset by CTP’s savings in the pressroom by reducing make readies and there incurred costs. 42
His evaluation of metal CTP as compared to conventional platemaking is harsher still. Results of their analysis should that CTP requires higher capital expense, higher maintenance costs, somewhat higher to a equivalent material expense, somewhat lower to a equivalent labor cost, and slightly lower real estate costs. Overall from output to hanging the plate PRINTCOM found that there was no real savings in using a CTP system.43

Lamparter did mention the fact that CTP might bring some savings through quicker make ready on the press in terms of color presets, time, labor, and materials such as ink and paper but that these aspects were not quantifiable and therefore had not been calculated in PRINTCOM’s assessment.44

Lamparter suggest that the cost effectiveness of CTP is not clear. PRINTCOM’s conclusions were:

- CTP cost savings output to press are marginal to non-existent
- Makeready savings may exist but are generally unproven--not quantified
- If there are savings: they are small when spread over total print job costs45

The bottom line is that it is difficult to cost justify metal plate CTP. Computer-to-plate has few prepress benefits, and only marginal pressroom benefits.

Clearly there is disagreement over the capability of CTP systems. And although the skeptics are unsure of the implementation process as it stands today they certainly advocate that all printers in the industry begin the process towards digitization of their file handling capabilities. In such cases many of these skeptics suggest that printers create an interim step that would allow them to ease into this new process with only part of the
risk of going to a full blown CTP system. They advocate using film until the whole digital workflow has been achieved for each individual company and there by providing time for thinning out of the numerous vendors trying to provide service in this volatile new market.

Even if a printer knew whom to believe on the different sides of this debate the shear divergence of their data would have to make one suspicious of what the real cost savings are. It is with this heightened perspective of the abundance of conflicting information that Canfield and Tack shall be brought into the picture.

Canfield and Tack

Canfield and Tack Inc., Planning & Printing (C&T) is a general commercial printer in the Rochester, New York area. They have recently gone from being a privately owned to being an employee stock owned company. They handle everything from annual reports, point of purchase work, special sheets and envelopes, to business cards. The quantity of jobs they handle per year ranges from 3500 to 3800 with an average run length of 10,000 sheets per job. All of the work is high quality color work with 200 line screens as the standard. Last year C&T did eight million dollars worth of business with six strippers employed. This year that figure went to thirteen million as the number of strippers went down to three.46
Canfield and Tack use desktop workstations which feed to Scitex units that handle the trapping for all incoming jobs. At present their workflow is set up to accommodate three Scitex Dolev imagesetters, one of which is an 800 capable of imaging ilms up to 32x44. As is evidenced from a brief listing of their equipment Canfield and Tack are pretty much a Scitex shop.

Their equipment consists of:

* Scitex Prismax 2
* Scitex Blaze color retouching workstation
* 2 Scitex star PS/2/Pentium with postscript RIP-VIP
* 2 Scitex Dolev color imagesetters
* Scitex Dolev 800 imagesetter (32 x44)
* Scitex Class Screening
* Presses: Komori 28 x 40

Part of the reason that Canfield and Tack have invested so heavily in Scitex products is because of the manufacturers reputation for quality and service, which for them is a critical issue.

At DRUPA 1995 Canfield and Tack signed a letter of intent to buy the Creo Trendsetter (thermal technology) in part because the Trendsetter has received the most favorable press for its acknowledged capabilities. However, as a relatively small commercial printer with approximately 80 employees they are waiting to see how the Trendsetter preforms outside of beta testing. They would like to go direct-to-plate, probably in the next year or so, but at the moment there is no call for it from their customers. Initially C&T signed the letter of intent in order to reserve one of the machines which had not yet been built. However, C&T have no desire to be a test site they want a proven piece of
technology since they can't afford unexpected down time. In keeping with the Scitex equipment they want technology that they know will be around for a while.

The overriding goal of C&T is to get their work out in the most efficient way possible. Since 95% of their jobs come in as digital files C&T are currently investigating all sorts of data management system options. However there are a few aspects that are constant, one of which is that all of their incoming files require trapping. Several customers still send files with layout windows left open for scanned transparencies to be dropped in using Automatic Picture Replacement (APR).

Currently, they are using the Dolev 800 film plotter without an imposition workstation nor is any one at C&T familiar enough with any of the available imposition software to know what the programs are really capable of. C&T would prefer to stay with Scitex because they have been very satisfied with their product—it's simply a matter of whether Scitex can provide a turn key solution. What C&T wants is an imposition workstation that will handle 8-up pages and still be editable to a specific page once the files have been through the RIP. Since CTP works with imposed plate layouts, this can involve files from 20-80 Megabytes that need to be ripped.

In order to install the Creo Trendsetter they would need some sort of interface to link the Scitex equipment to the Creo, since they are not at present compatible. There would have to be a converter and C&T has had difficulty locating one that can serve both systems. Scitex does offer a server that would preform this function but at a price which is higher than C&T are interested in paying; for such a solution it would cost the printers $30,000 or more.
According to C&T technical advisor, Andy Cappi, the major area that will need restructuring to accommodate the platesetter is the communications network which will need to be enhanced. Fortification of their data management capabilities is another goal of the company.

Possible solutions focus on strengthening the backbone in their current communications network either by:

- Adding a central data warehouse server
- Using a shared SCSI multiple link up to a stack.

Their current network uses Thinnet 10 Base 2 (which is a type of Ethernet that uses thinner coaxial cable than the standard). They plan to move to 10 Base T with a switching hub that will give them full link up capability. Possible solutions to C&T’s network needs come in the form of three emergent technologies which are:

- **Fiber Channel** - A type of transmission path used as a network medium. It works with existing interfaces like SCSI and can be used as a high speed backbone. Speeds range up to 100 MBytes/sec using fiber optics.
- **SSA (Serial Storage Architecture)** - A peripheral interface from IBM that transfers data at 20 MBytes/sec in one direction, but can operate full duplex. SCSI software can be mapped over SSA allowing existing SCSI devices to be used.
- **FireWire** - A serial bus that allows for the connection of 63 devices at speeds ranging from 100 to 400 MBits/sec. Up to 1022 FireWire buses can be bridged together providing enormous capacity.

Each of these can be interfaced with C&T’s existing SCSI protocols. C&T’s immediate need is for a SCSI compliant interface that can grow into server. The system must be able to handle large amounts of data quickly.
To their advantage C&T are already using a Kodak Approval system for proofing which cost them $250,000. This has saved them a lot of time but has thus far not shown a monetary return. Along with the Approval they have a 3M Matchprint available for proofing since the Approval can only do a two page spread. It is normal for them to run proofs from both devices. They purchased the Approval two years ago and are satisfied with its performance. Another consideration for C&T is the purchase a large format ink jet printer which could provide full size imposed proofs in addition to the Approval system that they already have. “All customers really care about is whether you can match the color on the proof or not.”

If C&T does go CTP they will more than likely keep film for a while to run alongside the direct-to-plate system. Most printers are looking for the technological advances—better, faster, cheaper with less people. What does this really mean? A considerable amount of hidden costs incurred through constantly investing in the latest computer technology. For this reason there must be a clear upgradable path for each piece of technology in the system; management of the various components becomes vital for the survival of such a shop.

According to with Dan Mehaney, the President of C&T, the decision of whether or not to purchase the Trendsetter is strictly a matter of money, there is no perceived advantage in going to CTP that is great enough to make them want to switch over immediately so really it becomes an issue of achieving an acceptable ROI.
In evaluating the return on investment several things were taken into consideration.

Last years expenses are briefly listed here:

- Kodak plates—$120,000. At $12 dollars a piece that comes to roughly 9,664 square feet of aluminum.
- Kodak Film—$129,000.
- Overall spoilage factor of approximately 10% working within the 8-up format

Labor costs:

3 strippers for 2 shifts of 7.5 hours (possibly up to 12 hrs)@ $17.50
5 platemakers for 2 shifts of 7.5 hours (possibly up to 12 hrs)@ $13.50

A break down of jobs showed:

- Camera ready 6,959.00
- contact dup 2,203.1
- scanner 100,944.

Proofing:

- Kodak Approval @ $250,000. (Amortized over 3 yrs)
- Consumables @ $35,000.
- Service Contract@ $6,000. (per quarter)

When combining all of these different considerations in comparison with the initial capital investment of $200,000 for the equipment plus a $56,000 service contract and the added cost of digital plates an ROI of under three years does not seem feasible to C&T.

While C&T was evaluating these considerations and waiting for the platesetter to be made the contract had lapsed since the time had exceeded 120 days. Canfield and Tack will probably not renew the contract until there is some established record (one way or another) for the Trendsetter. C&T feel that this is to their advantage because in their esti-
mation there are too many vendors at the moment, which creates unease when investing over a quarter of a million dollars into a company with no assurance as to how long that company will be around. Given the blatant jockeying for position by the plate dealers one can hardly blame them for feeling this way. “Printers must be confident of their manufacturer’s staying power.”

C&T’s general manager Gary Cevjic said:

If your companies financially unstable it not advisable to get involved with this technology, the technology is not going to save you one way or the other but you have to be willing to make the commitment to spend the money.

Canfield and Tack is willing to make that kind of a capital investment but they do not feel that CTP is really profitable for them at this time. Eventually they feel that the cost will be worth it.

Most printers want proven technology. Due to this desire C&T are not really on any time line for putting in a CTP unit. However Cohber Press, another commercial printer in Rochester, is the first commercial printer in the U.S. to install the Trendsetter. The unit went in at the end of February and as of the 8th of May is still not fully operational. As more news of Cohbers success or failure with the Trendsetter comes to light, Canfield and Tack may be prompted into action. Despite such prudent skepticism, the conversion to such a technology seems a foregone conclusion.
Endnotes for Chapter 6

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Chapter 7

The Summation

As has been evidenced throughout this report CTP is a costly investment in a time of financial uncertainties. However the technology is there and most, if not all, of the problem areas associated with CTP have been solved. As this knowledge gains wider acceptance it is likely that as more work comes to printers in digital form the interest in purchasing CTP systems will increase. There are several possibilities available to printers which range from getting a complete system solution, to creating a hybrid system, or to the possibility of organizing one's data to go through the required workflow but still relying on a filmsetter to handle the imaging. Establishing the unique requirements for a company necessitates a close examination of:

- Assess equipment needs to achieve long term objectives.
- Determine which plates available on the market will meet the printers needs and get a quoted list price from the supplier in order to calculate costs.
- The inevitable changes in workflow should be figured out on a cost basis both for the sections being eliminated and for the new departments that may be needed to handle the system.

Note: Some suppliers suggest a 20% premium for their CTP plates, which in several cases eliminates the savings earned by the overall investment.
With these points in mind CTP's major assets lie in its ability to increase productivity while streamlining the printing process. At present CTP is a viable option for people who desire:

- Increased productivity
- Reduced costs
- Increased flexibility
- Achieved better quality²

**Return on Investment**

In calculating a return on investment (ROI) it is necessary to assess the cost per page for a fiscal year under existing practices and then approximating those costs with a CTP system. It should be pointed out that this can only provide an organization with a guide to what the actual cost might be but it should provide evidence as to whether CTP is an economically sensible move for a company to invest in at the present point in time. To be effective ROI analysis must examine all prepress steps which are currently in practice (i.e. the costs of labor, materials, waste, depreciation, space rental, etc., as well as an allowance for interest earned if the money spent on CTP were to be invested elsewhere).³

Variables differ for each organization but "should include fixed and variable costs of material, labor and capital involved in producing pages."⁴ It is assumed that each shop will have facilities in place to accommodate analogue material although work going to the CTP unit should definitely already be in digital form. In this way it is possible to make an approximation of the anticipated time payback. As evidenced earlier in this
paper there are printers who have implemented CTP units and found savings of at least 15%.  

If after one examines the above requirements payback on a CTP unit appears unrealistic for a particular company's needs a hybrid or film imposetting compromise may be an alternative. Regardless of the method a company chooses digital origination should be one of the long term goals for any printer who wishes to remain in business. The fewer steps it takes to bring that file to press the greater the potential for savings due to reduced unit cost.  

The primary considerations for return on investment are:  

1. Plate usage—calculate the annual plate consumption of the work that will be transferred over to the CTP broken down by square footage. Include a waste factor of 5%.  
2. Personnel—quantify the number of personnel employed in the conventional function, by job, an the annual wage bill.  
3. Investment—taking into account the investment in hardware, compare a CTP system with that required for conventional output, amortized over 4 years.  
4. Material costs—Be sure to ascertain an actual CTP plate cost from suppliers when carrying out an ROI calculation.  
5. Rent and heat—Assume a reduction of 50% in the amount of space required for the CTP system over conventional operations.  
6. Interest—The cost of CTP vs. the potential interest that could be earned from the capital investment if that money was not spent on CTP.  

Conclusions  

In order to draw conclusions about this investigation a recap of the initial hypothesis is required to assess the information collected. This paper set out to show that CTP systems are not cost effective and that this has not acted as a deterrent in the decision to invest in
such systems for the printer. Further examination will suggest that cost effectiveness is less a factor in implementation than is normally projected. Finally the paper will conclude with an observation relative to the partially random nature of selection and implementation processes.

In essence the research in this paper disproves the general hypothesis. Computer-to-Plate systems are here to stay in large part because they are cost effective, however, up until recently this finding has only been applicable to a small portion of the printing and publishing industry; for the average printer CTP systems are workable but too expensive to be show immediate profits. In the meantime, the platesetter manufacturers are busy in diversifying their product lines to accommodate this larger market segment and it is anticipated that the price will have to come down.

At the same time there seems to be an undercurrent of resistance to this technology which comes in the guise of over cautious projections about the use of imagesetters to master imposition and digital workflow techniques. At first glance this appears to be the voice of reason suggesting the middle path in investment, however this makes less sense when one considers that all of the people and watchgroups who advocate slow transitions acknowledge that CTP is an eventuality. If this is the case, why then would a printer choose to delay learning to implement and optimize such systems?

The relationship between any developing technology and its acceptance or rejection in the marketplace has always been a complex issue. It is usually the case that technological development is more readily available to larger companies for whom the capital investment is not so critical an issue since they are able to cover any extra expenses
involved. However, the current developments in communications have opened up several opportunities for smaller companies. Advances in communications are the major element driving the printing and publishing industry's network development—which will ultimately reduce costs within the industry since all companies will have access to the same services.

In light of the various aspects involved in the purchase and implementation of a Computer-to Plate unit some conclusions can be made about the systems and their place in the market. It is clear that there are misgivings in the industry about computer-to-plate. It is that the technology isn't there but that the people are not able to adjust to the elimination of the various measures for quality control that assured them of an optimized process that will provide consistent results.

Feeding these fears are continued discussions of the last remaining bugs to be worked out of the digital workflow to ensure the transfer of information. The issues related to RIPping PostScript files change on a monthly basis and as yet have not been settled in any substantial way however, at the present time RIP's do an adequate job for most companies using CTP. And although Adobe has not yet tackled the color issue related to Acrobat, file format converters are an extremely good way of transfer exact pages, especially with the new amber extensions but as with anything they are not 100% reliable, leaving a small margin for error.

When one takes into consideration the immense progress that has come about in the last ten years just in terms of data communications it is impressive to note that the integrity of transferred files is a given in data management today. What with the advance
of ISDN lines and T1 lines the future of quick efficient data transfer seems assured.

Another issue is the use of multiple RIPS to organize and send data. All users at the satellite conference said that they felt that users should only RIP the files once and then rework them as necessary because of the a certain degree of shift from one ripped file to another.9

Unfortunately plates have become a huge factor in the purchase of the platesetter systems. Not only in the inconsistency of the ones currently out on the market but the wastage ratios of the innovators in this area are still far too high to actually be comfortable in a production environment.

Capital investment is still prohibitive because once committed to this system there is no turning back and it is unlikely that normal shops can afford to have two units with one as a back up. Service contracts and down time due to maintenance is another big issue.

The competition needs to thin out considerably before the market will see big investment in these systems. There are too many vendors currently for buyers comfort. Once it gets down to the big competitors there will be more consumer assurance that these companies will be around long enough for the print shops to recoup their investment and get what they need from the systems.
Misinformation

One aspect that is needs to be mentioned is the role that the media have played in creating pandemonium in the marketplace. There is aurge of literature available that discusses issues surrounding CTP without giving potential customers any of the specifics or the hard line facts. In their rush to print out the latest press releases they have contributed to a growing pile of contradictory information and possible inaccurate information about the effectiveness of the products available. Whether or not this frenzied promotion helps the economy is an open question however it does draw into question how expert the authorities in the field really are. Due to the highly specialized needs of each printer there is no formula that will tell potential buyers whether CTP will bring profits for a particular company. A final reservation about those reluctant to indorse CTP wholeheartedly lies in their own possibly tainted objectivity due to heavy financial investment in prior and current systems.8

Marketing

Creo was commissioned by the one of the printing industry most influential publishers to help tackle the issue of through put. This done they have branched out to accommodate a larger section of the printing market. However their efforts to win over the smaller printers have met with limited success. As a result they have resorted to pulling the market in a way that is not particularly likely to win them many friends in the midrange market.10
They have gone to the customers of those printers and are beginning to get the customers involved in the process. To make them understand that if their printers use CTP systems there are tremendous material savings that could directly effect the prices that they themselves are forced to pay.

In order to understand some of the intricacies of the market analysis one must take into consideration the manufacturers approach to the current climate was taken into consideration. It is clear that the biggest complaint that the salesmen have without trying to sound cynical is the people who either want to use or are using the CTP systems don’t really know very much about the systems themselves. Many of the so called experts in the field have never seen a CTP system in operation nor do they understand what is actually involved in the running of such a system. However it is the same individuals who are leading the media campaigns to discuss the viability of these systems. Whether this is through vested interest in preserving the conventional system or to capitalize on this transitional phase is not a question that this paper seeks to answer.

Most manufacturers of CTP units will tell potential customers that it is absolutely untrue that mistakes are only spotted on press. The truth (for them) is that more mistakes are caught before hand with greater savings to the printer since the errors are caught on screen without the expense of materials being wasted. Lemaster gives an example of this with R.R. Donnelley whose spoilage has reported dropped a full percentage point overall which on the scale they operate at is a sizable difference.

There are several reasons which would indicate an overall savings, for one thing there is a great savings on film and the cycle of proofing with film that is pretty much standard
at present. Traditionally you make a film, print a proof, show the customer—make another film, then make another proof, then show it to the customer, etc. . . these repetitive cycles of proofing with film are eliminated there by reducing the overall spoilage for a firm because materials and time have been saved while diminishing the redundancy of work necessary to output the final product.

Lemaster, Director of Sales for Creo, likes the fact that there are several competitors in the field at the moment, this adds validity to the technology and makes it easier for him to sell his product on a backdrop of different providers. So although the high number of vendors is a source of anxiety to the buyer the manufacturers are enjoying the competition and are in no hurry to see the level of providers go down.

Looking specifically at Creo’s pushing the market towards thermal technology it is clear that manufacturers are going after the bigger market of smaller printers. In Creo’s case they offer a fully automated systems for plates and or films in the visible or thermal spectrum for sizes anywhere from 58x80 to 32x44 with the smallest size for either setter 17x22. The idea being that if a companies plate usage is above 100 per day the automatic system is recommended. In an environment where plate usage is under 100 per day the semi-automatic is recommended. At present Creo’s market focus mainly on printers with large through put needs. They have several CTP units installed with printers for weekly and monthly periodicals, Book and financial publishers, commercial printers, packaging, and commercial inserts. In the short term they are targeting newspapers and trying hard to position themselves for the commercial market with advertising agencies.
They have been very lucrative in getting the end customer enquiring about the possible advantages of CTP with their printers. An example of this would be that recently Walmart called a meeting of its printers and told them that if any of them had not gone CTP by the time the contracts were renewable they would no longer work for Walmart. This mandate was due in part to their realization—from the publicity and promotion of providers like Creo—that there is a possible savings of up to 12 million dollars on film alone. Time magazine is another example of a publisher who will be 100% CTP by the end of the year. These are not isolated situations, customers are seeing tremendous savings with the use of CTP and that is sometimes just in considering the cost of film. Businesses like Time Magazine realize that there are also paper savings to be had through quicker makereadies.

At least in the case of Creo their sales force has grown from one sales rep to twenty since they started marketing their CTP products and it needs to be said that they are selling defensively. Meaning that they have been forced to add those people to keep up with demand. However there is a large difference between people enquiring about what Creo has to offer and actually closing a sale; at present sales cycle run approximately twelve months which is longer than the manufacturer would like it to be but most likely that will change as there is broader acceptance of the products along with more regionalized sales. To use an example of this in the Rochester area, Cohber Press is the first commercial printer to install the Creo Trendsetter. Their success or failure in implementing such a system at cost savings will help other companies such as Canfield and Tack justify the expense of such a system and prompt them to move in one way or another. In this way a
regionalized word of mouth goes a great deal further than simply singing the praises of such systems on a trade show floor.

To a certain extent Creo and other manufacturers are trying to pull the market by influences the customers of their customers as noted briefly before. They have gone after the publishers and advertisers who have large accounts with various printing companies, and are explaining the various savings possible by implementing CTP technology. In this way they are creating a demand among the customers for CTP that will ultimately force the printing industry into compliance since it is after all a service industry. It is this authors opinion that working around the intended customer is not the greatest way to build strong relations with those that will be buying your products. If the manufacturers worked harder to set up user groups and a clearly line of product information which gave printers the technical details of what their products have to offer there would most likely be less resistance to the product line.

Instead they choose to remain passive in their relationships with the printers despite their aggressive targeting of the end customers and as a result they will wait for people to come around to the technology on their own terms. This progress will obviously take longer as there is so much product information and so many changes taking place that are directly related to the various aspects of digital workflow that it is hard to build confidence in a constantly changing environment. In the meantime contradictory information is rampant in the trade journals and slows the process of educating the buyers market.
How does this strategy translate in terms of numbers? More likely than not sales for CTP manufacturers will remain low for this year. Creo expects that they will sell somewhere in the range of 100 units this year and that next year they anticipate that figure will go up to about 300. In the meantime it is estimated that in conventional imagesetter expenditures for this year there will be sales for about 2000 8-ups, 4000 4-ups and 15000 capstans—all of which require the same organization of a computerized front end system as a CTP unit. Why? Because industry is being told that there is too much money to be lost in CTP if a company's front end is not organized accordingly. But one has to question the logic of purchasing an interim system so that digital imposition and workflow management can be learned when all companies are expecting to move into CTP within the next five to ten years. This prospect certainly sounds to be a fantastic deal for the suppliers of imagesetters and film makers who often times are one and the same.

Is CTP a transitional piece of technology? Of course it is. However given the trend towards direct to press imaging and the ever increasing demands of immediate turn around in the market place it is one of the few viable options for printers whose presses are conventional equipment. The platesetter helps printers to redefine their front end thereby adding years to the life of the presses they have to use and providing upgradable capabilities towards the future.

If one were always to wait until there was a sure thing there probably wouldn't be very many printers left around. The printing and publishing industry has always embraced change at the expense of convention and CTP is not some foreign element thrown into the picture to fool printers out of business. It heralds a change in the way
that we do things in the same way that photolithography brought about the end of typesetting. Change is neither good or bad it is just a constant for our consideration.

Peter Passel, who writes about economics for the New York Times, has named the technological advantage that one company may have over another and the example of path dependence. He defines the term as a situation in which “small, random events at critical moments can determine choices in technology that are extremely difficult and expensive to change.” 19 He presents as an example a situation or a climate in which either producers of a particular technology or its consumers perceive one technology in the field as superior: “production costs fall with greater experience and manufacturing, and consumer acceptance grows with greater familiarity.” 20 And somewhere along the way, he claims, “the weight of numbers makes the leading product more valuable than one based on competing technologies.” 21 In the case of Creo the situation is beginning to mimic this process the more publicity CTP garners the more people will demand it and tailor their printing process to the CTP’s production needs, which in turn will set up for the expectations of converting to the CTP system.

Suggestions for Further Study

In the course of conducting the research for this paper two aspects of CTP seemed to be ripe for further investigation. The plates currently used for CTP units vary greatly in terms of quality and consistency. Research into the problems the plate vendors are having standardizing the system is a much needed project but would also lead directly to the
second area of research; which would be in the area of quality control. With so many of
the conventional controls eliminated in the new process the industry is struggling to find
new ways to monitor this process effectively.
Endnotes for Chapter 7

1 Romano, Frank, *Computer to Plate: Automating the Printing Industry*. GATF. 1996 p. 62
2 Romano, Frank, *Computer to Plate: Automating the Printing Industry*. GATF. 1996 p. 62
3 Romano, Frank, *Computer to Plate: Automating the Printing Industry*. GATF. 1996 p. 62
4 Romano, Frank, *Computer to Plate: Automating the Printing Industry*. GATF. 1996 p. 62
5 Romano, Frank, *Computer to Plate: Automating the Printing Industry* GATF. 1996 p. 62
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8 PIRA publications, *Communications 2000*
9 Michael Bowman, "*Mastering Digital Workflow: Breaking the Barriers to Profits in the Computer-to-Plate Age,*" Satellite Symposium sponsored by GATF, Pittsburgh, Pennsylvania, 1 May 1996.
10 David Lemaster, interview by author, written transcript, Dallas Texas 3 May 1996.
11 David Lemaster, interview by author, written transcript, Dallas Texas 3 May 1996.
12 David Lemaster, interview by author, written transcript, Dallas Texas 3 May 1996.
13 David Lemaster, interview by author, written transcript, Dallas Texas 3 May 1996.
14 David Lemaster, interview by author, written transcript, Dallas Texas 3 May 1996.
15 David Lemaster, interview by author, written transcript, Dallas Texas 3 May 1996.
16 David Lemaster, interview by author, written transcript, Dallas Texas 3 May 1996.
17 David Lemaster, interview by author, written transcript, Dallas Texas 3 May 1996.
18 David Lemaster, interview by author, written transcript, Dallas Texas 3 May 1996.
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Appendices
Appendix A

Selected Computer-to-Plate comparisons.
<table>
<thead>
<tr>
<th>Model</th>
<th>CTP System</th>
<th>Engraver</th>
<th>Engine</th>
<th>Laser</th>
<th>Laser Wavelength</th>
<th>Laser Power</th>
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<th>AcoustoRegistration</th>
<th>System</th>
<th>Processor</th>
<th>Medias</th>
<th>Plate Thickness</th>
<th>Max. Plates on Line</th>
<th>Price</th>
<th>Wet or Dry</th>
<th>Also Sold By</th>
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<td>Creo</td>
<td>PlateSetter 3244</td>
<td>YAG Green or Therm</td>
<td>532 or 830 nm</td>
<td>488 nm</td>
<td>488 - 1064 nm</td>
<td>670 nm</td>
<td>1</td>
<td>Yes</td>
<td>3min @ 2400 dpi</td>
<td>External Drum</td>
<td>Creo Allegro</td>
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<td>0.9 - 1.1</td>
<td>10 - 11 mil</td>
<td>50 NA 100 100 50</td>
<td>5200 - 700000</td>
<td>No 5.95 6-9</td>
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<td>488 nm</td>
<td>488 - 1064 nm</td>
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<td>1</td>
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<td>Creo Allegro</td>
<td>IP Alum, Poly Film</td>
<td>0.9 - 1.1</td>
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<td>Creo</td>
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<td>CoStar ES 8000</td>
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**SELECTED CTP COMPARISONS**

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Appendix B

Manufacturer's ROI for Thomson Professional Publishing Company.
# Financial Analysis Including Tax Consequences

**Customer:** JLM  
**Company:** Thomson Publishing  
**Laser Plates Used:** Hoechst N90

## Computer to Plate Annual Costs

<table>
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<tr>
<th></th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
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## Conventional Annual Costs

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<td>Punche vinyl mask</td>
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<td>2 sided dylux</td>
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## Cost Savings/Loss

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<th>Year 1</th>
<th>Year 2</th>
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<th>Year 4</th>
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<td>Net Cost Savings/Loss</td>
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## Cumulative NPV (10%) 

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<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
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<td>$3,075,896</td>
<td>$3,886,623</td>
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</table>

Payback (Years): 1.11

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Appendix C

Manufacturer’s ROI for Canfield and Tack Planning and Printing Inc.
# Financial Analysis Including Tax Consequences

**Customer:** JLM  
**Company:** Canfield and Tack  
**Laser Plates Used:** Kodak

## Computer to Plate Annual Costs

<table>
<thead>
<tr>
<th>Year</th>
<th>Capital Cost</th>
<th>Service Contract</th>
<th>Additional Training</th>
<th>CTP labor</th>
<th>Plates</th>
<th>Plate chemistry</th>
<th>Plate chemistry disposal</th>
<th>Utilities</th>
<th>Laser Paper</th>
<th>Item x</th>
<th>Item x</th>
<th>Item x</th>
<th>Total Op. &amp; Cap. Cost</th>
</tr>
</thead>
<tbody>
<tr>
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<td>$0</td>
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<td>$0</td>
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<tr>
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## Conventional Annual Costs

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<th>Service Contract</th>
<th>Additional Training</th>
<th>Conventional labor</th>
<th>Film storage space</th>
<th>Film</th>
<th>Film disposal</th>
<th>Film chemistry</th>
<th>Film chemistry disposal</th>
<th>Plates</th>
<th>Plate chemistry</th>
<th>Plate chemistry disposal</th>
<th>Total Op. &amp; Cap. Cost</th>
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</thead>
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</tbody>
</table>

## Cost Savings/Loss

- **Cost Savings/Loss:** ($130,212)  
- **Tax:** $53,906  
- **Net Cost Savings/Loss:** ($184,118)

## Cumulative NPV (10%) and IRR

- **Cumulative NPV:** ($184,118)  
- **Cumulative IRR:** N/A

## Payback (Years)

- **Payback:** 2.19

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