PRESSTEK
A SMARTER WAY TO PRINT

FOREWORD: TRULY CHEMISTRY-FREE CTP

In 2003, Dr. John Zarwan published his benchmark study of operating costs for CTP – "CTP Plate Making: Understanding the Real Costs." Dr. Zarwan's study revealed some important truths about CTP plate making – that incremental post imaging costs for CTP systems were neither well tracked nor fully understood.

At the time that Zarwan's study was published, Presstek was the only manufacturer offering chemistry-free CTP plate products. Now, fast forward three years and all of the major plate manufacturers are offering CTP plates with some degree of chemistry-free functionality, and all have installations in the field. And interest in chemistry-free CTP systems is increasing among print service providers.

It is appropriate at this time to take a reading on actual field experience with these plate products – how they perform, the benefits that have been realized and any trade-offs printer service providers have had to make—in short, a measure of promises made and promises kept. Once again, Dr. Zarwan has gone to the marketplace and captured the voice of the customer, which is the only true measure of value.

The customer feedback captured in this study clearly shows that all of the plate products currently in the market are functional and that customers using these products are realizing the many benefits of chemistry-free plate making.

But with multiple products from multiple manufacturers in the market, there is a lack of consistency around the terminology being used to describe these new platemaking processes. As the inventor of the concept, we at Presstek believe it is appropriate to establish some standards for terminology around chemistry-free platemaking. The term is used somewhat loosely by some plate vendors. There are so-called "chemistry-free" plates that have consumable "photo-chemical aqueous solutions" used to rinse and finish the plate after imaging. Other manufacturers are offering plate solutions that develop on the printing press by reacting with fountain chemistry and ink at the start of print. The term "processorless" could apply here, but developing (on–press or off) is still developing.

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At Presstek, where chemistry-free platemaking was invented, the term "chemistry-free" has real significance. When we use this term to describe the functionality of our plate products and plate making systems, we mean it literally. At Presstek, "chemistry-free" means that the product is completely free of chemistry – that no consumable chemistry or solutions are required during imaging and post-imaging, and that no chemical waste stream is generated during plate making.

We are extremely pleased to see that major plate manufacturers recognize the value of chemistry-free platemaking and continue to work toward delivering chemistry-free products. The current Zarwan study shows that the benefits of these products are real, and that printer service providers are taking advantage of these benefits. Print as a communications medium faces more competition now than ever before, and any efforts that can be employed to ensure that it remains a competitive, viable communications alternative will benefit the entire industry. The production synergies and cost efficiencies that print service providers can achieve by transitioning to chemistry-free platemaking are a key contributor to the achievement of this goal. Thanks to Dr. Zarwan for documenting field results of the adoption of plate making systems that are faster, more cost-effective and better for the environment. These types of solutions will ensure that print remains a viable and sustainable communications medium far into the future.

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CHEMISTRY-FREE CTP TECHNOLOGY: THE CUSTOMER'S PERSPECTIVE

J Zarwan Partners

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INTRODUCTION

It has been three years since the research for our paper *CTP Plate Making: Understanding the Real Costs.* In that time, the importance of eliminating chemistry and processing was validated by the introduction of a number of chemistry-free plates at drupa 2004. Until 2004, the only supplier offering chemistry-free plates was Presstek, the pioneer in chemistry-free and processless plates and which, at the time, exclusively offered this type of plate. In the last two years, the other major plate manufacturers have recognized the benefits of chemistry-free plates and introduced their own offerings. The next offering to be commercialized was the :Azura plate from Agfa, followed by Kodak's Thermal Direct and, most recently, the Fuji Brillia Pro-T.

These plates all work. Manufacturers are delivering product and meeting printers' needs. All have many satisfied customers in a range of operations around the world. It is clear the category delivers. While the plates share many performance characteristics, each technology has advantages and disadvantages. To learn how printers are implementing their choice of plates, we inter-viewed at least six printers for each of the three technologies; most were vendor reference sites.

This paper briefly reviews the different technologies and discusses how customers have adapted to the issues each presents.

While the plates share many performance characteristics, each technology has advantages and disadvantages.

OVERVIEW: *CHEMISTRY- FREE PLATEMAKING BENEFITS*

The move to computer-to-plate has increased the productivity and efficiency of printers by simplifying the production process and streamlining workflow. Despite the cost savings achieved by moving from film-based plate making to CTP, there are still important costs incurred in getting the plate from the platesetter to the press. Most printers accept these as unavoidable costs of doing business and therefore do not track these costs very carefully. As the pressure on printers to increase efficiency and speed continues to grow, understanding these costs and their implications becomes increasingly important. It is absolutely critical for printers to identify and evaluate *all* their costs and processes and to continue to make improvements.

Many, if not most, printers tend to underestimate the total cost of chemistry, processing, and maintenance. Our discussions with printers (*CTP Plate Making: Understanding the Real Costs,* available at no charge at www.johnzarwan.com /pubs/ctp plate.pdf), and confirmed by the major plate manufacturers, has shown that chemistry and processing typically adds from 10% to more than 30% of the cost of the plate.

THE COST OF CHEMISTRY

Once the plate is imaged, it needs to be processed. The cost of processing is not trivial. This is a real cost center; whether or not you choose to track these costs, you must be aware of them.

These costs include:

- The cost of the processor, including floor space.
- Cost of chemistry
- Cost of maintaining the processor
- Inventory costs
- Baking
- Waste disposal and environmental compliance

In addition to the direct and indirect costs of material and labor associated with plate processing, the extra steps have the potential to introduce variation in process control, stability and consistency. One of the principal attractions of chemistry-free or processless plates is the streamlining of workflow and elimination of variables associated with plate development and processor maintenance. Process-free eliminates almost all of the non-plate costs.

THE TECHNOLOGIES

All currently available chemistry-free plates use thermal lasers to form the image on the plate. They differ, however, in how the image is formed and what needs to happen to the plate before it can be used to product saleable sheets. These plates use three basic technologies: thermal ablation; on-press development; and thermal coalescence.

THERMAL ABLATION: PRESSTEK ANTHEM PRO

While almost all thermally imaged plates have some ablation, the term thermal ablation usually refers to the process in which the thermal laser ablates (removes) areas of the emulsion while the plate is being imaged. It is the method employed in Presstek's plates. Plates that are imaged using thermal ablation typically consist of a basic substrate such as a grained aluminum plate, an oleophilic (ink receptive) imaging layer, and an ink-rejecting micro porous hydrophilic layer. The high-powered laser of the computer-to-plate system selectively burns tiny holes in the thin plate coating, causing it to burst away from the base. This technique thus requires the platesetter to be equipped with a means of collecting the debris, typically a vacuum with filters, to prevent it from settling on the platesetter's mirrors and lenses. Presstek's Anthem Pro plate must be run through a processor that uses tap water to rinse away any removed coating left as a residue on the plate. This results in a high contrast image that can be examined and measured.

"Absolutely you can see image. The plate is jet black. The wonderful thing about the plate is you can take it outside and not expose it. It's not light sensitive in any way."

With the longest experience in selling chemistry-free plates – more than 15 years, if we include on-press imaging – the issues and concerns regarding Presstek plates are fairly well known.

Ablation

Most thermal plates remove some emulsion, have some ablation, albeit unintentional, and require some filtration. Those digital plates whose principal method of imaging is ablative, however, require a filtration system that is capable of removing the greater amount of debris. This means that thermal ablation plates do not run on all platesetters without some adjustment, both to the laser, which is normal, but also to the filtration system which may require substantial retrofit. The Presstek Dimension systems all have vacuums and filters to remove the debris. Filters need to be changed after approximately 10,000 plates.

"It's not a problem. It's easy to do. [Every 10,000 plates] you just unsnap the filters and snap in a new one. It can be done in 5 or 10 minutes, a quick clean in 2 or 3."

"It really works fine… We just let the machine go, clean it every five weeks."

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Processing

The Anthem Pro plate, while chemistry-free, is not processless. It requires a water wash to remove the residue of the coating after imaging. Presstek users clean the washer every week or two, although some report doing so monthly. Cleaning takes about 15 to 30 minutes. As the only thing in the processor is water, and the only thing that comes off the plates is carbon black, disposal is completely safe.

> *"We liked that Presstek's system is chemical-free and environmentally safe, not only for the sake of state regulations, but for my guys who work here as well."*

> *"We clean the [water wash unit] processor once a week, drain the water and fill it up. Maybe every 3 or 4 months, we drain and scrub."*

Plate Characteristics

Ablative plates are daylight safe and produce a clearly visible image. The ability to check the image is one reason many printers use these plates.

> *"Absolutely, it's important to be able to see the image. We like to make sure the device is in calibration."*

> *"It's extremely important. We do one last check before it goes on press. There are a lot of costs associated with correcting an error once it's on press.".*

Ink/Water Balance

Many of the Presstek customers with which we spoke had recently transitioned from the older Anthem plate to the new Anthem Pro. The Anthem Pro uses an improved graining structure which holds water better and therefore does not require as much water at start-up.

> *"New [Anthem] Pro runs better because [it] requires less water. It helps a lot, even on the new press."*

> *"When running [original] Anthem plates, we ran a lot more water … The [Anthem] Pro is grained, so the gamut is wider, it requires less water. It's easier to maintain consistency and balance. You still have to get the plate good and wet before printing. We've been running [these plates for] four years, on four different types of presses. It's not an issue."*

> *"The grained [Anthem Pro] plate makes a big difference…the dot on sheet prints cleaner; the water balance is night and day. We didn't have a problem before, but it's so much faster getting up to color with the Pro."*

In talking to customers, we got some feedback about potential incompatibility of the Anthem plate with Komori presses with the Delta dampening system. The Presstek plate carries slightly less water, which exaggerates the more aggressive Komori Delta dampener. Nevertheless, there are printers who have been able to use the plate in this environment.

> *"The Presstek will run on the Komori if [we] use the right type of fountain solution."*

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THERMAL COALESCENCE: AGFA :AZURA

Thermal coalescence, also referred to as latex coalescence, thermal fusion, and wash off plates, all describe a process currently used by Agfa, which calls it ThermoFuse. A number of Agfa plates are based on ThermoFuse technology. Although ThermoFuse is often positioned as "chemistry-free", only the :Azura is specifically listed on Agfa's website as a chemistry-free plate. Nevertheless, it still has a processor and requires a chemical solution. Although not expensive, it does entail a cost. The Agfa marketing materials note the plate "reduces [not eliminates] waste and disposal costs associated with chemicals."

With this process, a standard anodized grained aluminum plates is coated with an ink receptive latex emulsion. The heat of the laser melts the plastic, fusing a printable image directly on the plate. The unfused emulsion in the non-image areas must be cleaned out in a separate processing unit. In this processor, an Agfa proprietary solution dissolves and removes the unexposed latex emulsion from the non-imaged area of the plate and protects the aluminum. During the process, the image becomes visible.

The nature of the latex thermal coalescence provides the :Azura plate with many of its positive characteristics, such the ability to see and measure the image after processing, storage, and daylight handling. Most customers also say that it runs well on press. But the process has other implications and presents some important challenges to printers.

Processing and Waste Disposal

The :Azura plate requires a separate processing unit to remove the unfused latex using a mild detergent solution (Agfa Wash Gum WG100) and clean the plate, flushing away the unwanted material. The solution must be obtained from Agfa. Some :Azura users have tried using water and conventional gum but "it didn't work."

Like any processor, it has to be maintained; filters need to be changed, the waste latex removed. Unlike traditional chemical developers, however, the maintenance and filter and chemistry change is quite simple. The frequency of change of the Agfa gumming solution is both time and volume dependent; customers say it should be changed at least once a month, more if required. There is no replenishment. Most customers clean the processor every week or two; it is relatively quick and easy, taking 10 to 20 minutes. Filters are usually changed monthly, with a major cleaning twice a year. Unlike chemical processors, there is no penalty for lack of use.

Of course, there is still the waste to dispose. The method for proper disposal depends on local regulations. Most :Azura users we talked to report they put it down the drain.

> *"Agfa said it was O.K. to put it down the drain, but we pay for disposal. I have kids and care about the environment."*

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Resolution and Run Length

One of the reasons it is important to change the solution and clean the processor regularly is the potential for re-depositing of the latex on the plate. During the processing cycle, the unfused latex is "washed" off the plate and is suspended in the cleaning solution. As the solution is "used up", the concentration of latex increases and can redeposit on the plate. Customers report this is an intermittent issue. They deal with this in various ways. Some actually process it twice, running through a separate bath; others run the water rollers longer to remove the re-deposits, which generally can be seen on the plate. It generally is not a problem in printing, as it washes off quickly.

> *"If we leave the gum on plate too long, you can see some fog, residue. Once on press, it washes right off. It's not a problem in printing."*

Customers with presses that have both conventional and integrated dampening systems report more problems with spotting and redeposit on presses with non-integrated dampeners.

> *"The gumming unit doesn't get everything off. It takes a while for the press to come up to color."*

:Azura customers are almost uniform in their praise of the plate's consistency, quality, and resolution. Nevertheless, the forming of the image by melting plastic granules has some implications and consequences that they have had to deal with in day-to-day operation. One relatively common problem is a loss of dot structure during the print run.

> *"You can't use low VOC roller and blanket washes. The plate went sensitive. It turns out it's from redeposit… Low VOCs have residue oils that get in the water system. So when the oily roller comes down on the plate, it goes after the re-deposits and makes them sensitive. It looks like someone took a dirty rag and rubbed it across the plate."*

> *"My real problem with the plate is that the image … is soft. So when we try and clean the plate we can rub off the image…It sometimes breaks down."*

> *"Our pressmen tell me that the :Azura plate is more stable with the ink and water balance. The plate also cleans up better but you have to clean it [the press] immediately after you take it off… We do not see a gradual reduction in dot; rather the dots start to flake off when the plate reaches its end of life… It reaches a breaking point. The dots actually flake off. The dots don't shrink but actually break off. You lose dots. When depends on the job."*

Plate Care

In general, :Azura plates do not require any special handling; it does not require safe light and can be handled without gloves. Printers using :Azura report no issues with scratching. Customers report the WG100 solution is not long lasting, and they need to get plates on press within a few days to a week after imaging and processing.

Moisture is a potential issue that appears to be unique to the latex coating. Excessive dampness or a water spill causes spots or even the latex to come off.

> *"We have to watch out for water falling on them. The latex rubs right off, even from a wet finger."*

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ON-PRESS DEVELOPMENT: KODAK THERMAL DIRECT AND FUJI BRILLIA PRO-T

Two plates that are developed on press have been introduced and available for purchase in the last year, the Thermal Direct from Kodak and Fuji's Brillia Pro-T. The plates have somewhat different characteristics and technology, but they essentially work in a similar manner. The thermal laser writes the image on a thin polymer coating on the plate, making the coating in the imaged areas non-soluble in the press fountain solution. The plate is mounted on the press, without any additional processing. As the press starts up, the dampening rollers are engaged and coat the plate with fountain solution, which dissolves the non-imaged areas of the plate. The imaged areas can immediately begin picking up ink. With the engagement of the press ink rollers, the plate is initially covered with ink. The fountain solution plus the ink transfers the dissolving coating to the blanket, and then to the first sheets of paper. The make-ready sheets carry the dissolving coating out of the press as the job is brought up to color and into register. Depending on conditions, this happens within 100 press sheets.

Although, strictly speaking, developing a plate on press is neither chemistry-free nor processless, as a practical matter, it offers the printer many of their advantages. It appears to be processless. As one customer says, "Out of platesetter on to the press." Moreover, there is no chemistry to store, processor to take up space and clean, and no waste to dispose. "It got the EPA off our backs."

These plates also can be imaged in most available thermal computer-to-plate systems with only the normal adjustment of the lasers and calibration curves. On-press development technology does present some challenges for printers in their every day operation.

Image Visibility

The most obvious issue that printers must address is image visibility. The image contrast on both the Kodak and Fuji plates when they come off the platesetter is not as great as either conventionally chemically processed or other chemistry-free plates. The imaged plate has been described as showing a "ghost" picture. They cannot, therefore, be visually checked or measured. Once the plates are mounted and running on press, full-contrast images can easily be seen. Industry observers and articles about these plates have questioned how well that would work in practice at a printing plant if the plates were made a day prior to the print run.

> *"It's not too bad. It's barely enough to determine which ink color the plate is for… It's not much of a contrast, but it's enough to [make it worthwhile to] get rid of the chemistry."*

The relevant question, of course, is how important this is, and, how those printers who have adopted the Fuji and Kodak plates have adapted to it. Kurt Wolf, writing in the December, 2005 *Seybold Report,* believes "Examining the plate image has only psychological value: It is just something people get used to from dealing with chemically developed plates. These plates have so many advantages that printers who run the numbers correctly will rapidly switch to them, even if the lack of post-exposure quality control takes some getting used to."

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Certainly, some printers who use these plates agree.

> *"It is an issue. But that's the old paradigm. The printers that are still checking plates to blue lines and color proofs need to get on the bandwagon and soft proof. Yes, visual contrast on the plate is lousy. You can see the image, but you can't proof read it. You just have to figure out a way to get around it. It's not at all important. It's not an issue. You can tell the seps by the order it comes out. We take a sharpie and mark them…You've got to get around plate inspecting, you need to trust your prepress people. It's the first tim I haven't had a processor and it's the best. I wouldn't go back."*

Nevertheless, the ability to see the image on the plate remains important, both to those who have adopted the technology as well as to those who have opted not to.

> *"What we don't like about that is the fact that the plate is not very readable for content checking. We like to check corrections at plate stage as well."*

> *"It's pretty important, mostly to set the fountain, and for some quality control. We always mark the plates [with the separation] anyway."*

> *"The image can be seen. You can't proofread it, but you can see it under a light. It's somewhat important if you're trying to find a particular issue… but otherwise, not very… I can see [what I need] if I know what I'm looking for."*

> *"Yes, we were concerned. You want to the hang right plate; spot plate problems before hanging, register, things like that. You can spot problem right off bat.… [But we] can't hard proof from the computer that's running the RIP, so not we're not proofing forms. We still have lots of problems with plates. So seeing the image is important…form work still soft proofs."*

Storage and Handling

A second issue that printers using these plates have to address is storage and handling. The plates have limited life, both before and after imaging, depending on lighting conditions. Both plates can be stored up to a year prior to imaging. The Kodak Thermal Direct can be left up to an hour in white light or four hours under a yellow safelight, while the Fuji Pro-T is said to be daylight-safe for four hours. After exposure in the platesetter, the latent image is very stable and can be kept in a dark environment for up to two weeks.

For most printers, this is not a problem. Most just keep the imaged plates in a drawer until they go on press, often using now unused film filing systems.

> *"We put everything in cardboard sleeve anyway, we're already doing that. We may move a rack of flat files into the pressroom. We don't have many jobs ahead of time; we usually make the shift before. It's the way we treat plates now, so it's the same handling process."*

> *"They are light sensitive. We [put the plates into] a custom-made light-tight box [after imaging]. It is an issue. But we have imaged and kept in a box for a week without problems."*

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Integrated Dampener

The manner these plates are developed could, in theory, cause problems on presses with integrated dampeners. An integrated dampener insures that the ink and fountain solution mix into a working emulsion by connecting the inking and dampening system. Some plates have a lower tolerance for working with the emulsion and require the constituent components to arrive in the correct order. Developing the plate, removing the emulsion, and ensuring it is removed safely without contaminating the press requires everything to happen in sequence: plate, fountain, ink, sheet. There needs to be enough dampening before the arrival of the ink to properly develop the emulsion and dissolve the non-image area. The tackiness of the ink facilitates the transfer to the paper. If the ink gets to the plate too soon, the plate does not develop properly.

In practice, however, this has not been a significant issue for the few customers interviewed. All presses require some adjustment when switching to a different plate, and not every plate will run equally well with every press. Many presses with integrated dampeners can be adjusted to allow the dampening system to engage first, and a number of those who have adopted the technology have presses with integrated dampeners. Before switching to plates that are developed on press, make sure they will work with your press.

> *"We have to run the water for a minute or two before engaging the ink. It's not a big deal. Even with on-press development, it's still faster."*

> *"We have to wash the blanket after every job; we have a contamination issue. The coating continues to build up, gets stuck on the blankets. We can't get it off, it doesn't print."*

To at least one customer, however, the plate performance is worth it. This early adopter has switched plates for four of their presses but continues to run the former "chemistry-free" plate on those presses with integrated dampeners.

It should also be noted that many customers have no issues.

SUMMARY

No one plate is suitable for every printer, in every environment. Even with all of the advantages of chemistry-free and processless plates, many printers are simply unable to use them. For the right environment, however, the benefits of chemistry-free plate technology are compelling, both financially and environmentally. A number of factors go into the selection of a plate supplier. These plates all work on press; each of the technologies has satisfied customers, many with years of experience printing with them. Each has its advantages and disadvantages, issues that must be addressed. The drawbacks are not insuperable. In most cases they can be accommodated. For some printers, the advantages of a particular technology or plate make it worthwhile. For others, however, their concerns have led them to choose a different path. In this brief paper, we have outlined some of the issues associated with each of the alternative technologies available today, and discussed how printers have addressed them. Even so, all things being equal, the benefits of chemistry-free make it worth considering.

Attributes	Presstek Anthem Pro	Agfa :Azura	Fuji Brillia PRO-T	Kodak Thermal Direct
Applications	Commercial CTP	Commercial CTP	Commercial CTP	Commercial CTP
Technology	Thermal Ablation	Coalescence	Thermal Polymerization	Thermal Crosslink
Sensitivity	830 nm	830 nm	830 nm	830 nm
Exposure Energy	400mJ/cm2	300mJ/cm2	120mJ/cm2	300mJ/cm2
Post-imaging Requirement	Water rinse only	Aqueous Photochemical Solution (Agfa WG100)	N/A	N/A
Safelight	Daylight	Daylight	2 hrs w/ filtered UV	Daylight 1 hr; 4 hrs yellow
Latent Image Stability	2 years	Unknown	1 week	1 year
Baking	None	None	None	None
Color	Black	Very light green	Green/Gray	Pale Blue
Imaging Contrast	Black on silver	Green on silver	Visual	Medium Blue- visual only
Imaging Mode	Positive	Negative	Negative	Negative
Resolution	2%-98% @ 200 lpi	2%-98% @ 200 lpi	2%-99% @ 200 lpi	2%-98% @ 200 lpi
Run Length	100,000	100,000	100,000	100,000
FM Capability	20 micron	No (?)	20 micron	20 micron
Shelf Life	2 years	Unkown	1 1/2 years	1 year
Chemical Life	N/A	2 Weeks	N/A	N/A

ABOUT J ZARWAN PARTNERS

J Zarwan Partners works with a limited number of companies to develop and implement market strategy and improve business performance. John Zarwan, managing partner, is the author of *CTP Plate Making: Understanding the Real Costs* and has written for WhatTheyThink.com, *American Printer, Canadian Printer, PrintAction,* and other publications. Prior to founding J Zarwan Partners, he was principal of State Street Consultants and held senior management positions in finance, marketing, and product management at NEC and Agfa (Compugraphic). Dr. Zarwan attended Grinnell College, Stanford University, and Yale University, and was on the faculty of College of Charleston, University of Wisconsin-Madison, and University of Prince Edward Island, where he currently teaches marketing.

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