White Paper

# CtP – Reviewing the trends and the technology

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In Europe and North America CtP has become big business for the suppliers. For many printers, CtP is now definitely a case of 'when' rather than 'if'. In some areas of the print market the majority of the printers have already gone CtP and some of the first generation CtP devices are already coming up for renewal. The major saving reported by users of CtP is the savings on press, specifically the make-ready (or 'start-up') time. For colour printers, CtP gives almost instant colour register on the press and there is no need to worry about stopping the press to delete dust marks and scratches that sometimes came from the film. In a world where reducing run lengths mean that many press runs are getting shorter and shorter, the benefits of CtP are getting increasingly important – specifically the improved make ready times allows printers to get the jobs on and off the press faster. CtP allows printers to increase the yield and quality of their main asset – the printing press. CtP allows these improvements to be done without a need to increase labour costs, if anything the automation often frees up labour for other tasks.

Although there are differences between different geographical regions, there is a clear interest in CtP technologies from a high proportion of those printers that have not yet converted to CtP. With many of the larger printers telling us that CtP is now **definitely** part of their investment plans for the coming years. The only question is 'which technology?' In this review we hope to explain the different technologies in a simple and clear way. The good news is that the CtP technologies are now fully proven and widely available.

CtP as almost everyone now knows is the laser exposure of a printing plate, without the use of a film intermediate. This can happen on-press or off-press. It may happen with or without a plate processor. It may happen with a green laser, a violet diode, a thermal laser head or even a red laser. Even the type of imaging platform (internal drum, external or flat bed) has a part to play. Systems are now available for all plate formats, speeds, budgets and applications – and that partly explains why there are a wide variety of different types of CtP. The plates used in CtP are often referred to as 'digital' plates.

CtP first attracted serious discussion in the 1990's and since then has come a long way. Not all of the original products and suppliers seen at Drupa '95, for example, are still around. But many of the enabling technologies such as proofing and workflow automation software have received a great deal of investment and now offer very high levels of reliability and affordability. Competition from the suppliers is also good news for the buying public who now has a wide range of suppliers and technologies to choose from.

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But that can, and does, confuse would-be buyers. The new challenge for the suppliers is to ensure that the buying public understands the technologies, the differences between these technologies and how they are used. Let's explain more...

For a long time offset printing plates were imaged using traditional films and high power UV lamps – nowadays this is often referred to as 'analogue film and plate technology'. This was, and for many still is, a very good way of supplying plates to pressrooms. The technology is widely available, affordable, proven and robust. But the suppliers were quick to realise that no single analogue plate and film product/technology was able to meet the wide needs of an industry as diverse as ours. Differing features and benefits were needed according to the print application and customer, in fact analogue plate and film technologies were developed so that all the applications had products that met their needs. One of the important facts to remember today is that this same customer base has exactly the same wide range of applications from CtP systems as it had from analogue systems. **Therefore, it comes as no surprise that no single CtP technology is right for all customers.** A quick look at the market place today shows just that – a variety of CtP technologies has emerged, each with features and benefits that will closely match the needs of a particular printer. The challenge for the suppliers is to explain this technology in a coherent way so that the customer gets the best CtP technology for his business – be that violet, thermal, silver halide or any other technology.

But first a word about the business drivers for CtP. This also shows differences from customer to customer, and each reason is valid. Typical business drivers include, amongst others:

- **Labour costs.** Busy plate-making rooms can be replaced with a CtP device that may be fully automated and can operate round the clock. Some prefer a manual device where the purchase cost is lower, especially if people are available for plate loading and unloading of the CtP device. Some printers prefer the highest levels of automation possible. It all depends on the individual printer and how his workflow, business and people are organised.
- **The need to replace an imagesetter.** For some the move to CtP is sparked by the film imagesetter reaching the end of its natural life. Although imagesetter sales are still continuing, many are now looking increasingly towards a platesetter as a natural replacement.
- **Labour & skill shortages.** Recruiting and retaining skilled prepress technicians has been an issue for many printers. The automation associated with CtP means that many of the traditional 'apprenticed' prepress skills are being increasingly replaced by sophisticated workflow and CtP devices. Labour can be more effectively used elsewhere, or is simply made redundant.
- **Quality.** A first generation dot imaged directly on a plate bypasses the film intermediate and allows new levels of quality to be achieved. For some publications this means more advertising revenue since the overall print quality is superior.
- **Press productivity.** Particularly for colour work, the rapid make-ready and register means that jobs are turned around faster and the printers' main asset (his press) becomes more productive, increasing revenues and profits. This competitive edge given by CtP is often forcing the hands of those who fear being 'left behind'.

This list isn't exhaustive – but these are some of the most frequently quoted reasons to go CtP. A good supplier will help any CtP prospect to calculate the cost benefits of CtP. In the early

days the suppliers tried to make a 'one fits all' spreadsheet calculation to work out the financial benefits – this is easier said than done given that printers are different in the way they operate their resources, time, people, equipment and raw materials. It is futile to suggest that any single CtP technology will fit all applications – though it would make life easier (and less costly) for all the suppliers if it were true.

## Digital plate technology

The best digital plates use high quality grained and anodised aluminium substrate. This technology is well proven from the world of analogue plates. For the higher quality plate suppliers, good quality **electrochemical** graining and anodising ensures robust wide-latitude press performance, stable ink/water balance, good quality printed results and importantly it also ensures predictable press behaviour.

Next comes the surface coatings and here is where the diversification comes. Many analogue plates might have just a single coating layer. Digital plates may have **several** layers. The chemicals used in these layers determines how they respond to different laser wavelengths as well as how they will perform in different print applications. Research began typically in the 1980's on these higher-speed plate coatings. Back then the suppliers knew that the lasers might not be delivering the kilowatts of energy given by UV lamps in printing down frames – typically lasers would be operating with a few tens of watts, as is the case with thermal plates today. Beyond that there were even more possibilities if plates could be made to operate on lasers that were using just milliwatts. Photopolymer plates and silver halide plates have plate coatings that are even more sensitive than thermal plates and can be exposed by the new violet lasers for example.

The plate coatings undergo a physical and/or chemical change during laser exposure. This is a critical stage since it is important that the plate surface is not under-exposed or over-exposed. For a positive working digital (CtP) plate, 'over exposure' causes excessive sharpening of highlight details, the opposite is true for a negative working digital plate. One of the early hopes of the CtP suppliers was that thermal plates in fact might be **impossible** to over expose. The theory here was that thermal plates allow the image to form at a threshold temperature and so over or under exposure would be impossible.

Unfortunately for the suppliers this proved to be an impossible dream – a shame since all of the suppliers would have had a plate technology with the widest possible latitude that would be totally foolproof. In the real world however, thermal plates need precise exposure control to give optimum reproduction characteristics, just like any other type of digital (CtP) or analogue plate. That's why the manufacturers all recommend optimising exposure using specially designed exposure wedges. Thermal energy can be overdone... just like any other form of energy – just like cooking food at the wrong temperature. High-resolution imaging is a precise technology and requires careful control. The platesetters have to be consistent and the plates need to be consistent. But when a printer has decided on his preferred CtP technology and supplier, very few go back to analogue platemaking.

The correctly exposed plate is then developed. For digital plates this **may** (but doesn't always) involve a pre-heat before image development – in simple terms the pre-heat can be thought of as an 'image amplification' stage. Preheat is used in photopolymer plate technology from e.g. Fuji & Agfa, it is also used for some thermal plates. Pre-heating does use additional energy (kilowatts, perhaps) and is an additional step in the process, but with advances in modern plate processors it is a controllable process and isn't considered a major issue. Agfa, for example has sold hundreds of its :Polaris newspaper CtP systems to some of the biggest newspapers – most of these newspapers use photopolymer plates (though a significant number use silver plates) and the pre-heat section hasn't led to either product or system issues. The real issue for the suppliers is ensuring system stability and predictability, when they can achieve this they will have commercial success for one important reason – they have satisfied customers. Today the CtP market has shown that several different technologies have all led to satisfied customers in different applications. The three biggest selling CtP technologies are silver halide, thermal and photopolymer – all of which are well proven and available from different suppliers. All these technologies offer a proven route into CtP and are considered safe, reliable choices.

'On-press' is an area where digital plates really help printers save/make money. As the use of colour increases so does the need to get accurate register and 'make ready' as quickly as possible. CtP users typically report that this is an area that shows dramatic improvements when CtP is implemented. Specifically on-press deletions ('spotting out') is often dramatically reduced or eliminated. Register is very fast since the images on the different colour cylinders on press have been digitally registered. Make ready is achieved quickly and this ensures that the printers turnaround time for the job is improved. Newspaper printers report that that the better quality digital plates can run with lower damp levels, leading to reduced web breaks and therefore (again) higher press yields and faster turnaround time.

**Silver halide CtP plates** (from e.g. MPM or Agfa) are rated for runs of up to 350,000 and sometimes more. They have been a popular choice in both commercial and newspaper CtP, achieving high levels of quality – certainly on a par with thermal plates. Silver plates are also well matched to the new violet laser diodes, silver is still the fastest, most sensitive, digital plate technology. It is easy to sensitise to any convenient wavelength of light. Silver was used by the whole world for graphic arts film, so is well proven for laser exposure. Therefore, silver technology was a natural choice for CtP. However the silver halide plate manufacturers tend not to recommend silver plates for very long run applications nor are they strongly recommended for UV printers. Again, we return to the common theme... no single digital plate technology suits every application.

**Thermal plates** offer high resolution – equivalent to silver halide. Thermal plates are also typically bake-able for the longer run printers or for those with aggressive press conditions – such as UV. Typically the plates are sensitised to the 830 nanometre IR (infra red) wavelengths, and typically the plates are exposed on external drum platesetters. Thermal has been a good choice for many printers and has served the industry well, but there are areas where thermal hasn't been successful. For example thermal CtP has struggled to make an impact in the newspaper business – in fact the bulk of newspaper CtP installations has been with visible light (or 'non-thermal' CtP technology). Reasons for this are various, but the high speed of visible

light CtP (plates are typically thousands of times more sensitive than thermal plates) means that the high speed newspaper CtP devices have been better matched to silver and photopolymer plates. Unfortunately, and this question is often asked, thermal plates are **NOT** compatible with the violet diode CtP devices.

**Photopolymer plates** are most typically used in newspapers but have been successful in some commercial print areas as well. Typically, photopolymer plates are rated at lower resolution capability than silver and thermal plates – so photopolymer plates wouldn't be the best choice for the highest quality print. For example Agfa rate their :N91 photopolymer plate to a maximum of 175 LPI, but thermal and silver plates are able to image at 200 LPI (and above). Photopolymer plates do have a well-deserved reputation for being robust in use with wide working latitude on press, this perhaps explains why they have been such a popular choice in newspaper CtP. Why not thermal for newspaper? – Look at the benefits of thermal: high resolution, bake-able for 1 million+ runs, daylight handling for manual platesetters. These benefits are good benefits... but irrelevant for newspapers, so why pay for thermal? Again we return to the theme that each CtP technology has certain features and benefits suitable to certain applications. No single CtP technology can meet everyone's needs. A variety of technologies is required and that's exactly what the market place shows today – silver, photopolymer and thermal plates have all been successful.

## Violet vs. Thermal

Silver and photopolymer plates can be sensitised to the popular violet diode wavelength, but thermal plates can't. Thermal has certain features and benefits and so does violet. CtP systems based on the different technologies offer a range of productivity, differing degrees of automation and differing levels of resolution for a given range of plate sizes… and of course there is a system to fit your budget. A longer run printer, or a printer using UV inks might be advised to look closely at thermal plate technology – maybe getting a supplier to make you a set of (baked) plates to run on your press. A VLF (very large format printer) might well also consider thermal as the best option – especially if he needs a manual load CtP device that can be operated in daylight. A printer looking for fast platemaking with a low cost of purchase and a low cost of ownership might well look towards violet, especially if the run length requirements are not above the 350,000 region. Even small printers in the price conscious 2-up market have found that violet has not only driven CtP downmarket but it also offers incredible levels of laser reliability.

## A few more violet questions answered

The latest technology to see widespread CtP success has been violet diode technology. Violet was launched at DRUPA 2000 and has been well received ever since, the success showing no signs of abating. Violet diodes have been a spin-off from the DVD industry where the lasers offer incredible lifetimes – some expect 10-20 years! If true this will mean that the violet diode will probably outlast the platesetter itself. This may mean violet offers the lowest cost of ownership so far as laser maintenance/repairs are concerned and no doubt this contributes to

the ongoing popularity of violet CtP. The diodes are cheap to produce and offer high quality imaging. This has allowed manufacturers to offer affordable CtP for the 2-up and 4-up printer; furthermore the incredible reliability means low cost of ownership and worryfree CtP. A combination that has proved very attractive to many customers, and has attracted the obvious attentions of the suppliers as a result – many of who are now successfully marketing violet diode CtP systems. But, again, the competition is good news for the buying public who see competitive pricing, high-speed imaging and long-life lasers – all of which are making CtP increasingly attractive. Violet also offers the same high quality imaging characteristics as thermal, especially when used with silver plates.

## No processing?

Process-free CtP has been the topic of much discussion, the advantage of eliminating the processor and chemistry being advantageous to some. So far process-free hasn't gained widespread use. If process-free plates are to gain their place in mainstream success customers will want to see a combination of affordable pricing and robust press performance. To counter a common myth, process-free will not replace all other forms of CtP, but dependent on the performance it will **complement** the other forms of CtP.

There are several different possible technologies that might deliver process free, here we mention four of the most frequently discussed technologies for process-free CtP.

1. **The first one is digital UV.** Suppliers have made conventional plates (UV exposed) where the press damping system removed the non-image area, effectively 'developing' the plate on press. There has been some limited success for this technology with conventionally exposed plates, so this could be a possibility for a digitally UV exposed plate. The plate is digitally imaged with UV light and put on press where the damping solution removes the non image area.

2. **The second possibility is somewhat related to the first – violet photopolymer.** Surprising perhaps? Some companies claim that with (low cost) violet laser diodes increasing in power, and violet plate technology continuing to be substantially improved, processless is within reach. Not trivial perhaps, but at least one company, (not Agfa, incidentally), has expressed confidence that the combination of their high-speed photopolymer technology and higher power laser diodes will make it possible. This would mean that proven low cost imaging technology would be combined with processless plate technology.

3. **The third one is thermal.** Thermal processless technology exists, so there is no need to predict it will happen. And the benefits are clear. Thermal has proven its quality and performance. But there are also some less attractive aspects. Thermal imaging technology is not cheap. And today's processless thermal technologies are not 'general purpose' technologies. They fit certain applications, but many other applications can not benefit from them because of productivity, reliability, cost or other constraints. Remember, even though some suppliers might like it to be the case, no single technology dominates the world of CtP. Each technology has certain features and benefits.

4. **Finally, there is inkjet.** Inkjet CtP exists and is often seen at exhibitions, where the plate image is sprayed either directly on the substrate or on top of a 'carrier' layer that is later washed away. Inkjet has made remarkable steps forward in terms of quality and speed in recent years. Mass consumer applications have been a strong driver for technology development. Photo quality output is today within reach of many. And it can be expected that improvements will continue in the years to come. Furthermore, inkjet is a low cost technology. Inkjet hardware is relatively inexpensive. Inkjet is easily scalable in different formats and speeds, and therefore also an interesting candidate for future CtP. The most important disadvantage of inkjet today is probably its limited resolution and image quality when compared to laser imaging, but one has to wonder how long it will take before that becomes a non-issue. Therefore, inkjet certainly must be considered a viable candidate for processless ctp in applications where the requirements in terms of resolution and image quality are not the highest. Newspaper applications for example.

Process-free will take its own niche in the market, just like the other technologies. Meanwhile it's worth remembering that the 'regular' CtP technologies (silver, thermal, photopolymer) now all boast very simple, robust and reliable performance. Whilst elimination of the processor and chemistry does hold its attractions in CtP, perhaps it is no longer golden goal it once was perceived to be. This in part is simply because the 'regular' CtP technologies that exist today are now so reliable and offer strong financial incentives to implement. There are good CtP solutions available today for everybody from 2-up to VLF to newspapers. Many would argue that holding back and waiting for process-less would only be a benefit to a printer's competitor – especially if those competitors are already taking advantage of the CtP benefits.

Ecological issues are often discussed within CtP. Certainly this is an area where processless plates offer some attractions – but what of the other technologies? Many countries now see the environmental laws tightening with restrictions to any processor waste being discharged directly to drain, especially where higher pH developers are used. So containerised collection of processor waste is increasingly becoming the norm for many. But what about the differences between the waste from silver, thermal and photopolymer plates? This is a contentious issue for some. Some used to argue that any form of silver waste is to be avoided. Others argue that waste from silver plates is no longer an issue since a waste-stream containing silver allows the active ingredient in the waste (silver) to be recycled. In other words, silver CtP systems are desirable **because** they offer the unique advantage of being a CtP system that allows the active ingredient in the plate chemistry to be recycled. Remember that the graphics business has been using silver films for years and has been happily recycling silver without any problems. In reality those companies that market silver plates – such as MPM and Agfa – don't make any differentiation between their digital plates based on ecology issues. It's also worth remembering that simply by going CtP, there are already significant ecology advantages – since CtP eliminates the film, the analogue plates, the respective processors and chemistry anyway.

CtP has always attracted heated discussions between suppliers about which one technology is the best. Ultimately, the market place itself (rather than supplier hype and clever marketing) decides. The market today shows 3 mainstream digital plate technologies have been the most successful – silver halide, thermal and photopolymer. My advice for any printer looking at CtP

is to take technically unbiased advice from a trusted supplier on the different technologies before taking the plunge. Be suspicious if a supplier only offers one particular type of CtP technology and, after analysing your needs (surprise, surprise), tells you that his solution is the one you really need. In a sometimes-complexed world of CtP possibilities, the most important commodity is a fair explanation of the facts, followed by an honest recommendation on the best technology for you. For many printers the choice is becoming one of either thermal or violet. Make no mistake, violet is a tremendous technology that is in incredible demand right now and big names such as Agfa, Fuji, Heidelberg and others see violet co-existing alongside thermal. Most suppliers will be able to explain the potential benefits of violet and thermal, but here I would like to offer a hint. The only suppliers that are anti-violet are those that don't sell violet…and typically those suppliers will always recommend thermal irrespective of the printers real technology needs.

So with CtP increasingly becoming a logical business step for printers the question remains 'which type of CtP?'. With claim and counter claim from the suppliers being both frequent and at times contradictory, it is not an easy decision to make.

The best advice I can give remains this: Speak to suppliers that can answer your technology questions in an unbiased way. They will look at your needs, match them to the right technology and a good supplier will have the support and experience to guide you every step of the way.

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