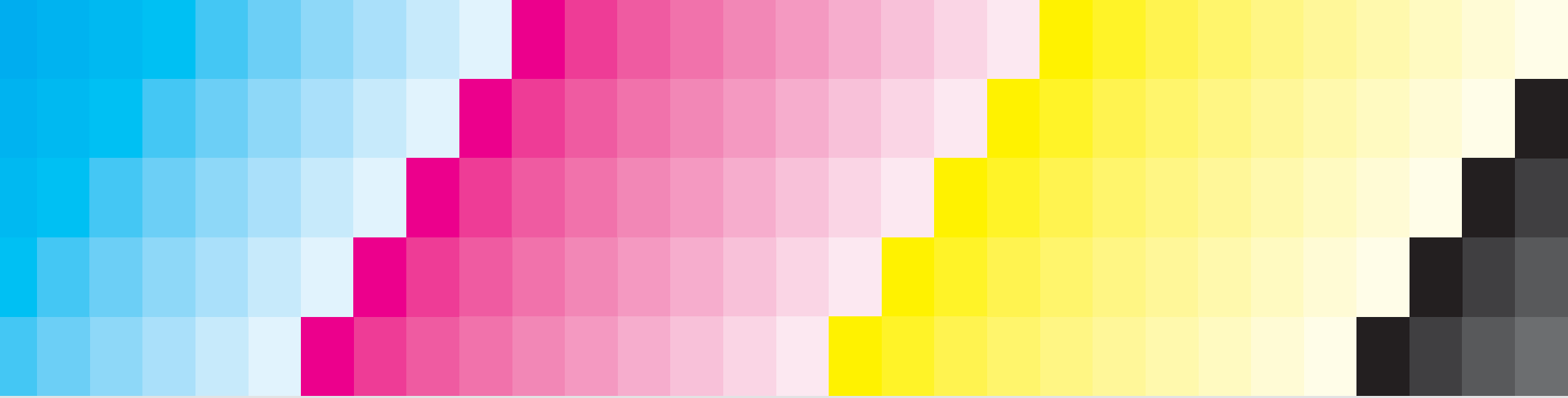
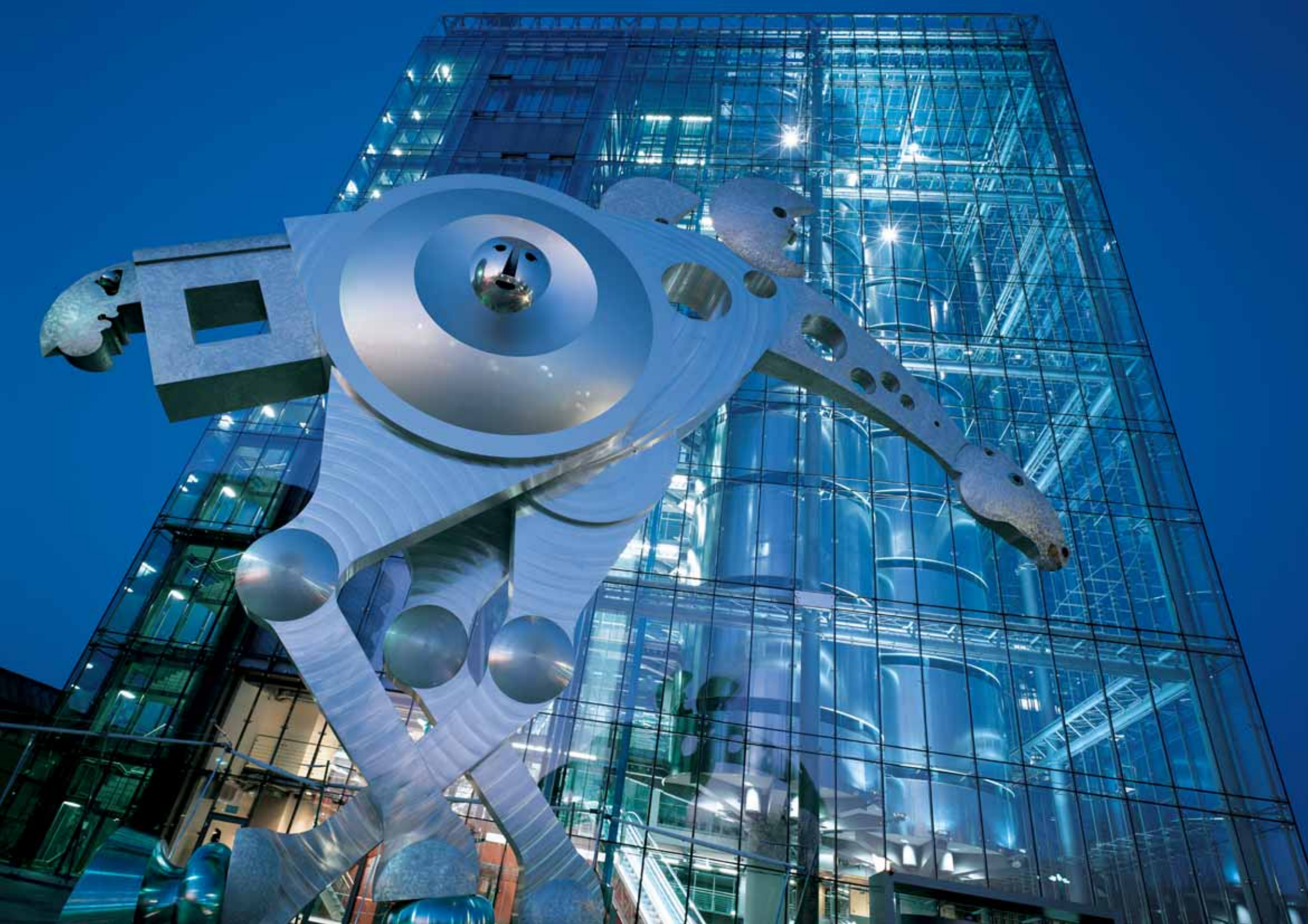


Expert Guide No. 1

Plate Imaging with Computer-to-Plate

HEIDELBERG



Contents

1 Printing: More popular than ever

Who could forget the vision of the "paperless office" that captivated the trade press and unsettled many printers in the 1980s? A similar effect is currently being created by alternative "electronic media" but this does not mean that the print media industry should regard the future with uncertainty. Printing is more popular than ever.

Job structures have changed considerably in recent years. Obvious trends are towards more color and shorter job run lengths. As a result of this, and because of the increased pressures of shorter deadlines and maximized cost-saving, modern presses are being equipped with an increasing number of printing units. Printing a job in a single pass makes the best use of the short amount of time available and is the most cost-effective production method. This means: there is a much greater demand for printing plates within the same period of time.

The new demands on the print process are accompanied by tremendous demands on the prepress stage. A high level of automation is becoming essential so that similar production stages, which in the past had to be worked through sequentially, can now be automated by workflow systems. This saves time and minimizes sources of error. The digitization of data, and the integration of processes into a single workflow, makes this an ideal solution for the future.

Of course, the quality of the printed result must also be assured. With increased competition, top quality is a requirement for all printshops and cannot be the exclusive reserve of industry giants. In this brochure, Heidelberg® details its solutions for all types of printshop and offers guidance for selecting a suitable Computer-to-Plate (CtP) system. As an integrated workflow is so important for achieving the best results with CtP, this topic is also discussed at length.

2 Computer-to-Plate offers Key Competitive Advantages

Computer-to-Plate offers businesses in the print media industry many advantages. Converting to CtP does away with a number of operations including, for example, the need to image pages or page sections onto film, manual impositioning, analog plate copying and offline punching for on-press registration. This opens up a range of direct advantages and cost reductions, which the user can turn into tangible results and use to give his company's market profile a significant boost.

2.1 Competitive advantage 1: Top quality

The first generation screen dot on any CtP printing plate is composed of imaged pixels and is razor-sharp. This degree of quality cannot be achieved with Computer-to-Film (CtF) processes where, in extreme cases, dots may be copied several times. Even if the utmost care is applied, this can lead to unavoidable losses in detail. With CtP, no specks of dust or cut edges can impair the result. Bad copies are ruled out and excellent on-press register accuracy is guaranteed.

Thermal CtP plates offer extremely precise imaging. Silver halide plates with their high resolution and photopolymer plates with their extremely steep gradation curve satisfy even the strictest quality requirements. The imaging quality of CtP means that frequency-modulated (FM) screens, that previously delivered good results only under extremely stringent conditions, can now be used with ease.

The greater range of tonal values, with enhanced detail in the light and shadow areas, ensures that this precision imaging offers an immediate improvement in print quality. The dot gain on the press is significantly reduced – not least because of the ability to precisely calibrate each individual printing unit – even with ultrafine screens. Higher color densities are possible, with more brilliance.

Summary: Because significantly improved accuracy is made possible with digital printing plates, a higher, more consistent and more predictable standard of quality can be achieved.

2.2 Competitive advantage 2: Shorter production times

With an end-to-end digital workflow, production times can be reduced in prepress. Following on from the digital plate imaging stage, a number of significant time and cost advantages can then be gained in the production process.

Because each printing plate is of a very high quality, manual plate correction that was previously routine is now no longer required. Digital presetting data reduces press setup time and ensures that the job gets to color faster. If a printing plate should be damaged during clamping, an identical replacement can be created quickly and because the job data can remain stored in the CtP recorder's processing queue, this is also possible if the prepress department is not fully manned. The unique Plate-on-demand feature developed by Heidelberg means that plates can now be released for imaging, directly from the CP2000 Center® of a Speedmaster® press.

A clear marketing advantage can also be gained through the faster completion of the printed job. Faster delivery times can often set a printshop apart from its competitors and provide a key to winning further orders. When print products such as reports, newsletters or newspapers depend on speed-to-market, shorter production times allow editorial deadlines to be pushed back as far as possible.

2.3 Competitive advantage 3: Competitive production

To calculate the savings that can be made with CtP, both the workflow and the prepress equipment need to be taken into account. When a manual sheet assembly process is replaced with a powerful workflow system, including digital impositioning, considerable savings can be made in terms of labor and materials costs. Outputting print-ready flats on a large format filmsetter can also offer savings, but end-to-end process automation will ultimately only

be possible with the integration of digital plate imaging. In other words, the most competitive production is achieved when the prepress, press and postpress stages are combined into a fully integrated production line.

By taking the CtP and workflow route, the costs of film and film developing disappear and savings are generated by no longer having to rework poorly-copied plates. The higher quality of the plates imaged with CtP and the opportunity of digital press presetting means that far less print waste is generated. As a result, the consumption of ink, dampening solution and paper is noticeably reduced.

Whereas in the past printing presses could not operate if there was a wait for last-minute manual corrections to the printing plates or for new printing plates to be copied, this is no longer necessary today.

The final key factor for cost savings lies in the boost to overall productivity achieved by greater process automation. Whenever it is possible to increase the utilization level of a state-of-the-art offset press, even by a small percentage, there will be a clear and positive effect on profit margins.

Potential savings:

Example	CtP	CtF
Press utilization	83 %	80 %
Make ready time	25 min	30 min
Cost per plate set	207 €	215 €
Print jobs per year	2.300	2.100

10 percent additional press capacity with CtP = more profit

2.4 The competitive advantages at a glance

Advantage 1: Top quality

- Ultra-sharp dot with digital plate imaging
- Accurate on-press registration
- No negative effects from dust, cut edges or bad copies
- FM Screening
- Increased range of tonal values, with enhanced details

Advantage 2: Shorter production times

- Reduced preparation times thanks to 100% digital workflow
- No manual plate correction required
- Faster press setup with digital presettings
- Faster to color on-press
- Trouble-free re-imaging of replacement plates
- Faster delivery times for the final products

Advantage 3: Competitive production

- Maximum cost savings in labor time and materials
- Costs for film and film developing disappear
- Lower levels of waste reduces the consumption of ink, dampening solution and paper
- Minimization of press down times caused by manual correction or plate remakes
- End-to-end process automation in prepress, press and postpress
- Increased utilization of presses and postpress
- CtP as a key selling point

3 Digital Workflow: Essential for the Use of CtP

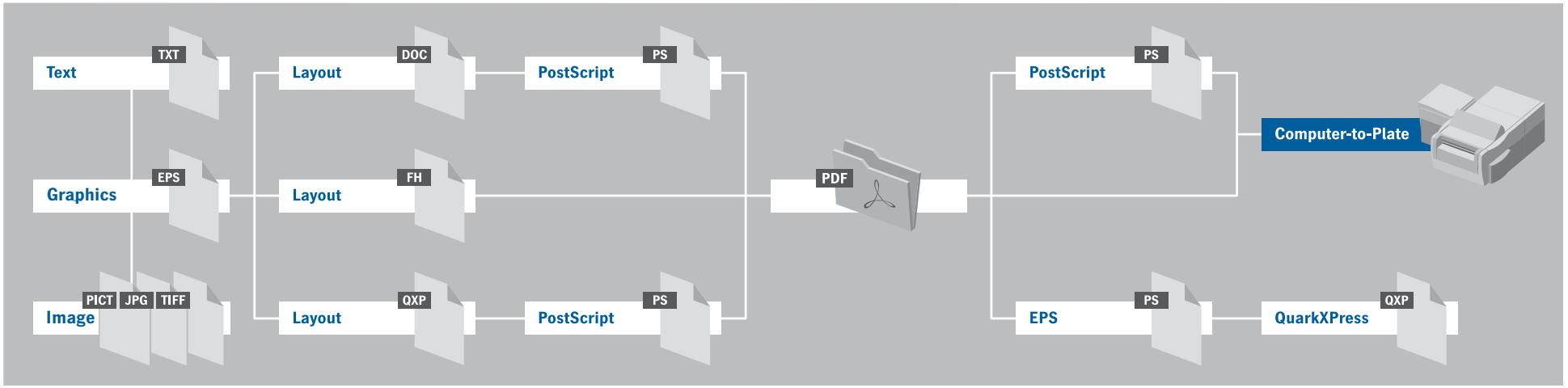
A digital workflow is vital to ensure that the best results are achieved with Computer-to-Plate. This workflow system needs to be configured to best meet the needs of each individual customer. To ensure success, a good working relationship and excellent communication with data suppliers are essential.

3.1 PostScript and PDF

Until recently, most prepress service providers and printshops received files that had been generated from application programs. This involved a number of risks, however, as further processing was often complicated by incomplete high-resolution data for images, differences in the fonts used or incompatibilities between program versions. PostScript® data, with its device-specific commands, was often responsible for errors on a job. In addition, PostScript files are large, leading to long transfer times for digital data.

A new international industry standard, established and approved for the exchange of advertisements and print pages, provided the much sought-after solution – namely, the Portable Document Format (PDF) from Adobe® Systems. From Version 1.3 onwards, PDF documents contain all the key information required for prepress production. The format has since developed to become the universal standard for exchanging print production pages. This standardization offers greater security for everyone involved. PDF is therefore the ideal basis for state-of-the-art workflow systems aimed at automating the output process.

It is important to note that anyone can generate PDF files. Data created in any layout or graphics program can be output as PostScript files and converted into a PDF file using the Adobe® Acrobat® Distiller®. Some application programs also allow data to be exported directly as PDF files.



JDF supports the cross-platform definition of all production steps.

3.2 JobTickets & Job Definition Format

Unlike a PostScript file, a PDF cannot contain device control commands. For this reason, Adobe developed a new method for PDF, which allowed control information to be stored in such a way that it had nothing to do with the page content. The Portable Job Ticket Format (PJTF) was born.

Separating page content and processing instructions leads to greater flexibility in production. In the event of any subsequent changes, the individual data elements no longer have to be opened in the original application for adaptation. Instead, only the information in the job ticket is changed.
A portable job ticket could define information such as imposition layout, trapping rules and, in particular, output parameters such as screen ruling, screen angle or resolution.

The desire to integrate the individual job processing steps – from job acceptance through production and invoicing – led to the foundation of the independent CIP4 organization. All the key manufacturers in the print industry supported the CIP4 initiative and came together to work towards a common, agreed standard, the Job Definition Format (JDF).

In addition to the information in a PJTF, a JDF can also contain information and setting values for the entire manufacturing process:

- Default values for the press such as ink zone values or paper grades
- Folding and cutting information
- Supply data such as addresses or number of copies
- Planning data (e. g. deadlines)
- Administration data (e. g. customer or order number)
- Material data (e. g. description, size, weight, color)

3.3 Preflight

To verify supplied files, “preflight” programs can be used to check the transferred PDF files against an agreed checklist. This enables data to be “repaired”, according to rules set down in advance by the user. The following criteria are important when PDF files are preflighted:

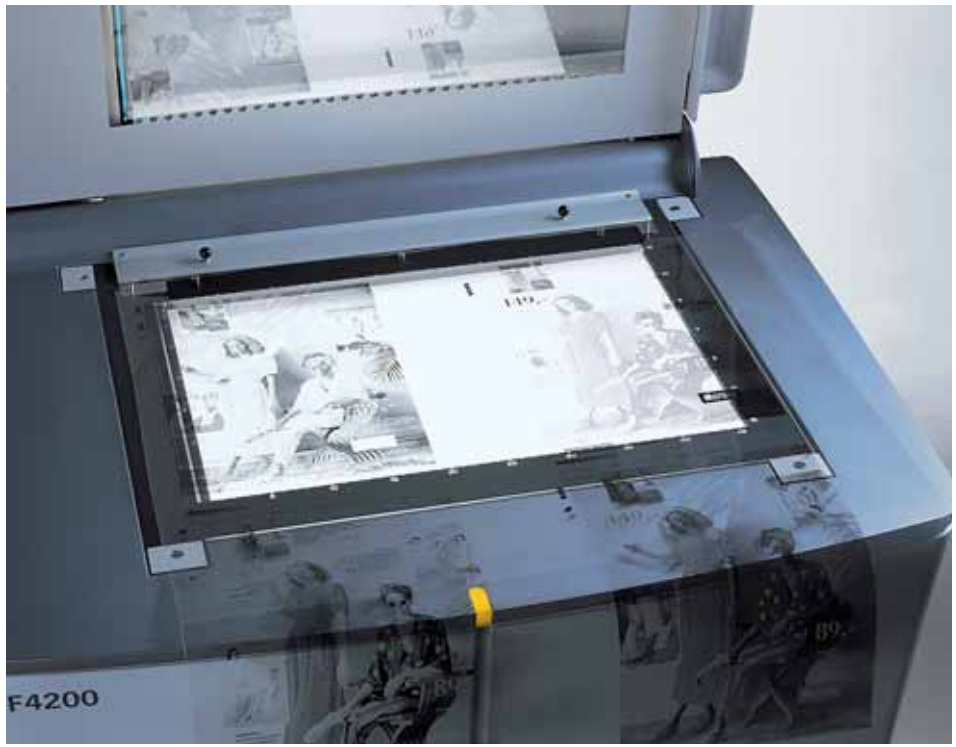
- PDF version
- Data format (binary or ASCII)
- Reliability (printing/editing)
- Font embedding (all/subgroups/none)
- Font types (Type1, Type3, Truetype etc.)
- Color models (CMYK, RGB, LAB)
- Special colors
- Image resolution (color, grayscale, images etc.)
- Image rotation/scaling

Checking and certifying the PDF files for compliance with the PDF/X ISO standard is highly recommended. This ensures that it is possible to produce the PDF files.

3.4 Redigitization

The full advantages of an integrated process chain can only be harnessed with complete digitization as digital plate imaging requires 100% digital data, but what happens with archived films?

Scanning and redigitization enable a fully digital workflow.



What if an original is supplied as a finished separation on film, perhaps in a different resolution?

It is possible to run a twin-track system for a certain period of time – i.e. outputting one order as a full sheet on film while outputting another directly on the CtP recorder.

A number of anda number of printshops are using this approach to support their customers needs. To achieve this, the scanners in many printshops are equipped with an add-on function for redigitizing existing or supplied films. From a technical perspective, redigitization is possible in excellent quality. However, because of the additional workflow stages, this is not really a long-term solution. Ideally, jobs should therefore be received as PDF files.

3.5 Trapping

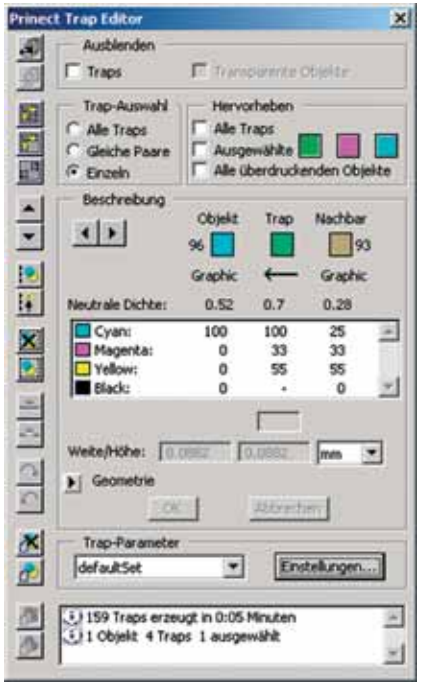
Trapping is the process in which color elements are slightly enlarged and positioned over each other with the aim of preventing white spots from occurring in the event of a press registration difference.

Trapping should be delayed until the end of the prepress process, preferably until just before the imaging stage. This way, the printer knows for definite which print process and which trapping rules are required. As a result, the right trappings can be easily generated for each print process using the same master data.

3.6 Color Management

The production processes in the prepress and press stages must be closely coordinated with each other. The open workflow systems provided by Heidelberg and the opportunity to use ICC profiles fully meet the challenge of ensuring high levels of color fidelity. ICC stands for "International Color Consortium", a group of numerous leading hardware and software manufacturers, which includes Heidelberg, who are striving towards the development of a non-proprietary standard for exchanging color information. ICC profiles are responsible for mutual color using conversions that take place automatically in the background in the Color Matching Modul (CMM).

Heidelberg Prinect Trap Editor offers object-oriented and interactive trapping.

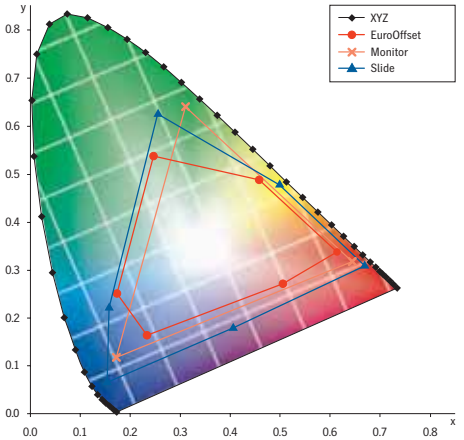


3.7 Digital proofing

Proofing is one of the most important stages in a digital workflow. Because CtP does not use films, from which analog proofs could be created, digital proofs are used instead. In order to find a process that satisfies both the customer and the printshop, countless samples and much discussion have been needed. This can still be a complex process, and even the introduction of the Cromalin system, which has been accepted as standard for decades, has had its problems.

The development of inexpensive units for printing out continuous-tone (contone) proofs and devices for generating true halftone (raster) proofs has already come a long way.

Provided that the color management principle is applied correctly, an excellent match with the print result is ensured. The proofer's output performance is adapted so that the proof exactly mirrors the print result, taking into account the properties of the paper used in the production run.



Units can display all colors that are within their color space.

Nobody need be without the familiar "blueprint", not even in the digital workflow. Provided a large-format plotter is available for the sheet proof, complete print sheets with all printing, folding and cutting marks can be output as a final check – possibly even including perfecting – before the digital printing plates are imaged.

The following variations of the digital proof are available within the digital workflow:

- On-screen soft proof (use as a single-page proof or for the entire print sheet; also as a "remote proof" at the customer's)

The digital proof is the key to quality assurance in the CtP workflow.

- Color proof as a truecolor page proof up to A3+ format on inkjet or thermal sublimation printers
- Halftone proof for checking the color "feel", including screen structures and effects using systems with color films and thermal transfer
- Impositioning or sheet proof as a simple plotter printout or as a truecolor contact proof on large-format inkjet printers.

A number of printshops are currently offering their key customers digital proofing equipment, so as to achieve fast and seamless coordination.

3.8 Digital impositioning

The PDF data format is ideal for imposing everything from single pages to entire print sheets. Object-oriented data storage enables PDF documents to be separated into single pages and individual PDF pages to be grouped in any order to form a single file. All the associated resources (e.g. fonts, illustrations) are delivered with each page.

During PDF impositioning, entire pages are assembled into PDF sheets without going via an intermediate format. These sheets can then be checked on the screen and sent for outputting.

3.9 Archiving

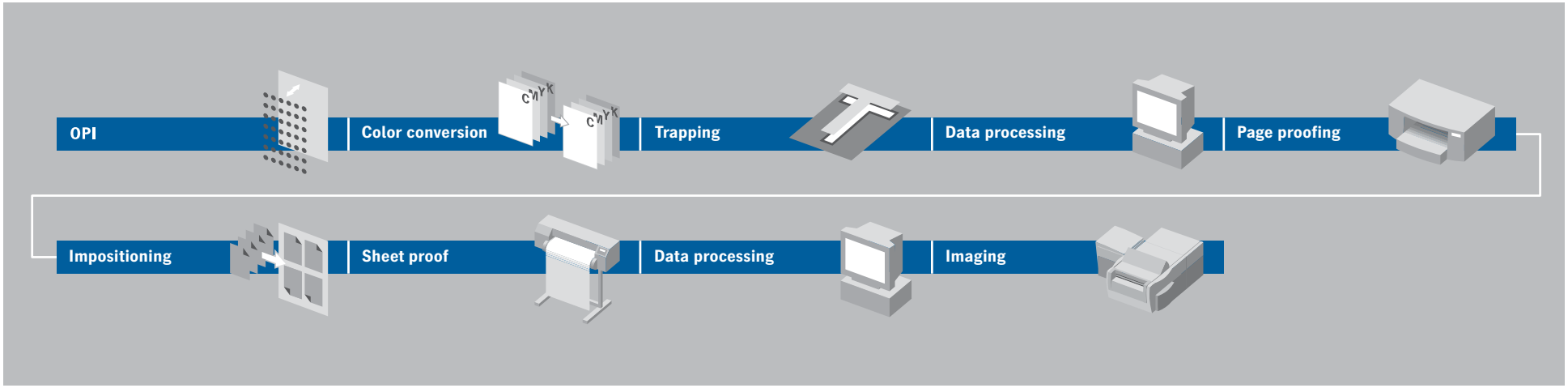
The most commonly used archiving medium in the printing industry until now has been imaged film. But when data is processed digitally, this film has to be replaced with other tools and media. A distinction needs to be made between short-term storage/backup during the production process and long-term archiving. In the first case, the data is mostly stored on large hard disks. Long-term archiving involves media such as CD-ROMs, DVDs or magnetic tapes.

When a decision is being made for a specific archiving system and the calculations for the storage space and transmission speeds required are being made, a decision also needs to be made regarding whether the data involved in the individual print jobs is to be returned to the customer after production or whether it is to be archived as an additional service provided by the services department or the printshop.

Impositioning is one of the first steps in the production of printed goods.

3.10 Output workflow

The implementation of an integrated complete process chain naturally does not end with the digital imaging of the printing plates. Process integration results in new, improved organizational structures in the customer's workflow and within the company's workflows, and continues with order planning, the output workflow in the prepress stage and data archiving. Then comes the data transfer for the press presettings and finishing. Last but not least, it can be extended to complete order management with costing, invoicing and distribution logistics for the finished print product. The goal is to regard printing as an industrial process instead of seeing each stage as a manual operation that is a goal in itself.

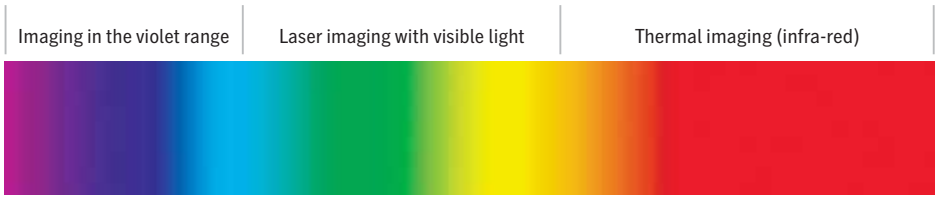


4 Computer-to-Plate Technology

The first CtP solutions were unveiled at the end of the 1980s and, by drupa 1990, they were the focus of tremendous interest. Even in the early '90s, investment in a CtP system provided printshops with scope for better market positioning and enabled them to differentiate themselves from their competitors. However, it should not be forgotten that the early adopters had to struggle with a number of uncertainties. It wasn't just the equipment and imaging techniques that were new – the CtP printing plates, their chemicals and the right developing equipment were also still being developed.

These teething problems are now a thing of the past. CtP has become firmly established as a standard process in all industrialized countries. And the first users have long since switched to the workflow and output systems of the latest generation.

The first CtP recorders were categorized depending on their design, into internal drum, external drum or flatbed devices. Today, the categorization is better determined by the imaging technology.

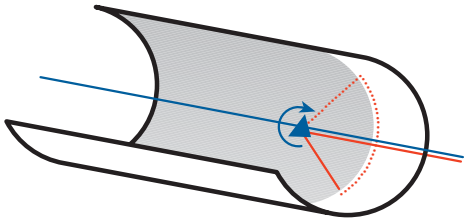


4.1 UV imaging of conventional offset printing plates

There are only a few systems on the market to digitally image conventional printing plates (CtcP). Such systems use the light from a UV lamp which travels via a lens and micro-mirror chip, as used in video projectors, for example, and is then directed onto the printing plate. With each imaging pass, partial images are projected onto a fixed plate, as with a copying frame. As the imaging head travels back and forth, the partial images are built up to form an overall image. The process requires considerable technological input. For the user, however, the advantage lies in the ability to image conventional offset printing plates inexpensively.

4.2 Imaging with visible light

In the early years of CtP, expensive lasers had to be used for imaging the plates that were available at the time. These lasers emitted light in the blue and green ranges of the spectrum. Gradually, the use of significantly cheaper laser diodes took hold. In addition to the red light diodes which operate in the 633 – 670 nm range and are used primarily for small-format, flatbed CtP



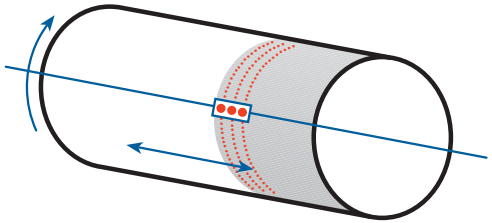
Functional principle of an internal drum recorder.

recorders, very inexpensive violet light diodes have introduced. These diodes operate in the 400 – 410 nm range and are now delivering an output of at least 30 mW. These 30 mW diodes can image both highly-sensitive silver halide plates and photopolymer printing plates.

For most of these CtP recorders, the plate is secured in an internal drum via a vacuum during the imaging process. Digital imaging generally takes place using a single beam shone over a mirror or polygon that rotates at very high speed.

This reliable, proven technology has been tried and tested in filmsetters. Plate handling is relatively easy, and the manufacturing costs for CtP recorders are low, thanks to the use of inexpensive violet light diodes.

A few CtP recorders with violet light laser diodes also use a rotating mirror or



Functional principle of an external drum recorder.

polygon, but instead of an internal drum, they use a flatbed construction. The disadvantage of this type of construction is the long imaging distance from the center to the plate edge, which can only be optically compensated within a limited plate format. This leads to lower quality.

4.3 Thermal imaging

During thermal imaging, large amounts of energy are used to effect a physical change on the surface of digital thermal plates. Depending on the plate type, this can be a primary cross-linking or the dissolution of existing polymer cross-linking in the aluminum plate coating. The soluble or dissolved components are then washed off in the subsequent development process.

Thermal CtP recorders are usually external drum recorders, where the plate is clamped onto a rotating external drum. The imaging process generally uses a multi-beam technique with a large number of laser diodes that emit in the 830 nm range of the spectrum. The main advantage of thermal technology lies in the fact that thermal printing plates make almost exclusive use of binary principles. In contrast to "lithographic" plates, an image is only generated once a specific heat threshold is reached. This facilitates razor-sharp dot formation.

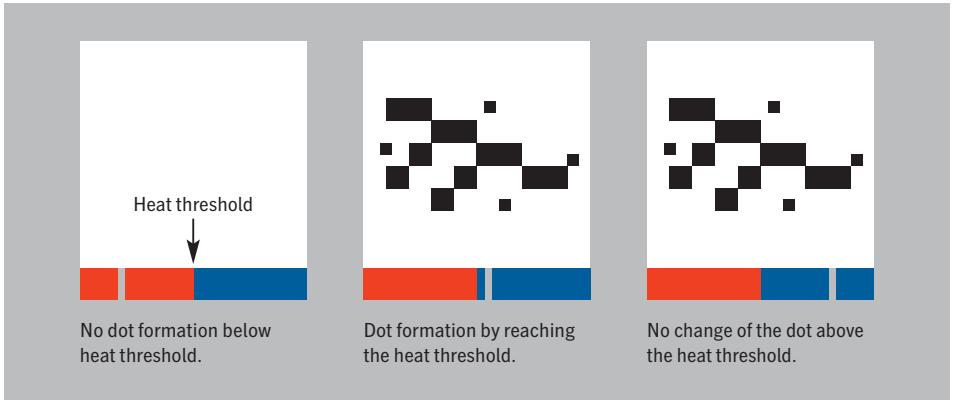
Some thermal CtP recorders use the internal drum principle. Similar to CtP systems which use light-sensitive plates, the imaging process uses a single beam shone onto a fast-spinning mirror or polygon. Because of the longer light path from the mirror to the plate surface, intricate high-power lasers with a wavelength of 1064 nm must be used.

Further design principles for thermal CtP recorders include an internal drum with a diode imaging system in an internal "imaging drum" or a flatbed recorder principle.

CtP thermal recorders, especially those with an external drum design, have established themselves well on the market and have won a market share of more than 60 percent.

Since drupa 2000, there has been an increasing trend towards CtP systems with violet laser diodes. This trend is primarily based on the systems' low price, coupled with high plate productivity and excellent quality. Heidelberg offers a complete range of CtP recorders with both imaging technologies. The section entitled "Heidelberg CtP Solutions" describes these in detail.

Dot formation with thermal imaging – heat threshold principle.



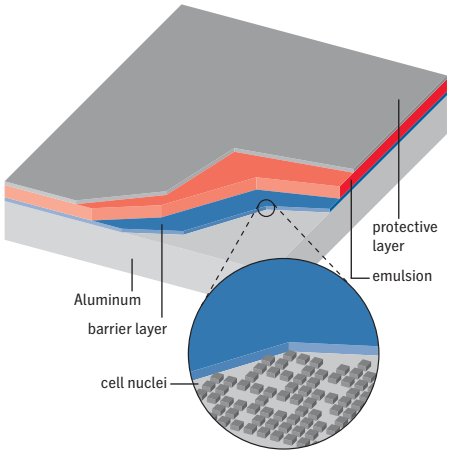
5 Computer-to-Plate Printing Plates

5.1 CtP printing plates for violet laser diodes (405 nm)

Violet recorders use light-sensitive plates based either on silver halides or photopolymers. Both plate types have been around for many years, and their use has been proven in practice with imaging systems that work in the visible light range between 488 nm and 670 nm. The latest development is further sensitization to violet light with a wavelength of 400 to 410 nm. The extreme sensitivity and high resolution of silver halide plates are retained, as are the durability and job-run stability of photopolymer plates.

Silver plates enable large job runs of up to 350,000 prints. Further post-baking to increase the size of the job run is not possible. UV inks greatly reduce the run length and are not recommended with the silver based plates.

Violet-sensitive photopolymer plates, however, can remedy this. Imaging these plate types requires just one laser diode with a higher output power of 30 mW. The job run size for photopolymer plates is a maximum of 200,000 prints. To increase the job run size and to use UV inks, a post-baking process can be used. The maximum achievable resolution for photopolymer plates is somewhat lower than for silver halide plates.



Agfa Lithostar Ultra-V. Structure of coating of the silver halide plate for imaging with a violet laser diode with output of 5 mW.

Silver halide plates belong to the class of positive plates, i. e. the imaging takes place on the non-printing area of the plate. Photopolymer plates, on the other hand, involve a negative process – i. e. only the printing areas are imaged.

5.2 Thermal printing plates for infra-red laser diodes (830 nm)

For thermal plates too, a distinction is made between negative and positive processes, the appropriate switchover being effected simply by the digital printing plate's definition and by the RIP.

For negative processes, polymers are cross-linked during the imaging of the image areas that will be printed. This takes place when the laser beam energy exceeds a certain threshold. This primary cross-linking must then be reinforced via additional preheating of the entire plate before the non-cross-linked polymers are dissolved in an alkaline development process and the hydrophilic aluminum is exposed.

In the case of thermal printing plates using the positive process, the polymer cross-linking of the non-printing areas

Suprasetter uses thermal laser imaging heads developed in-house by Heidelberg.

is destroyed by the laser's high energy. The polymers which have already been dissolved are then removed in the alkaline development process. The advantage of this is that no further preheating is required.

A further advantage of the now well-established thermal plates available from all major manufacturers is that they can be post-baked after development using a further heat treatment process, and are thus also perfect for very large job runs with more than a million impressions. This post-bake option also makes them ideal for use with UV inks.

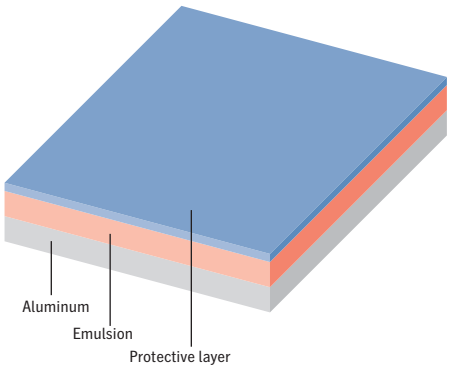
For many years, "processless" thermal printing plates have been on display at trade shows. Covering layers are either dissolved or parts of the coating are burned off in the printing areas of these plates. The dissolved areas of the covering layers are then either washed off or removed via the dampening rollers in the press. Burned-off particles are suctioned off in the recorder. Currently, only a few processless plates are available for practical use. However, these plates usually require more energy than "normal" thermal plates and the imaging process therefore lasts longer. In the future, it may be possible to switch the processes from non-printing to printing by means of phase-changing "switchable" polymers. With only a few exceptions, most of these plates intended for use with CtP recorders are still at the development stage. Processless CtP plates for imaging in DI presses are already available, however, and are being used successfully.

Digital imaging of printing plates for waterless offset printing is still only possible using thermal technology.

5.3 Printing plate development

The development of all of the printing plates mentioned above also requires a processor specifically configured for the plate and the use of special chemicals. It is advisable to provide a plate delivery table or automated stacker at the end of the processing chain.

Developers for digital printing plates are also available specifically for smaller plate formats. This is definitely advantageous for printing exclusively in small to medium formats, or where space restrictions mean that large equipment cannot be installed.



Layer structure of a thermal printing plate for infra-red laser diodes (830 nm).

Alkaline positive and negative development is used for thermal plates and photopolymer plates for imaging with violet laser diodes. Silver halide plates, on the other hand, require a special development process which includes development, a subsequent diffusion process, washing off and finishing. The final stage involves the plates being gummed for a few days to prevent oxidation.

Processors for positive thermal plates often also facilitate the development of conventional positive plates that use the same chemicals. In any case, however, the plate supplier's technical services department or expert advisors should be consulted for a full explanation.

Development processors for digital printing plates, add-on equipment such as stackers and tables for plate delivery and post-baking ovens, along with the relevant developing chemicals, are supplied from printing plate manufacturers and suppliers, and are available via their specialist dealers. There are also a number of independent suppliers who also supply equipment for plate development.

"Raptor" online processor from Glunz & Jensen.

6 Heidelberg CtP Solutions

Heidelberg has developed integrated solution concepts for introducing Computer-to-Plate in all sizes of company and for all tasks. Heidelberg solutions offer far more than just the digital imaging of printing plates. The solutions aim to integrate the entire workflow – including the transfer of data, its processing and preparation into print sheets, the output of digitally-imaged printing plates and the transfer of data for presetting presses and finishing equipment. This means that they form the backbone of any end-to-end print media workflow.

6.1 Heidelberg workflow solutions

Operating complex workflows quickly, reliably and smoothly is essential for ensuring the best possible flow for a CtP production process. All the workflow components and systems outlined below are able to meet this challenge head-on. They are scaleable, thus representing solution concepts for even the most diverse demands in terms of productivity, levels of automation and universal access to production data.

A number of highly important options and add-ons for CtP output are discussed below and a brief description provided of each.

6.1.1 Prinect Printready System

Prinect Printready System™ is a complete PDF workflow system for the high-performance sector. It is fully JDF-based. Printready® automates every single step of the prepress stage and every stage of the workflow is completed in the compact PDF data format. The system is open and accepts standard data formats such as PostScript, PDF, EPS or JDF. One particular advantage lies in the fact that workflow stages are combined into group sequences which are then executed automatically in JDF processors.

Prinect Printready System, the automatic JDF-based prepress workflow, revolutionizes prepress work. Modules can be added to the basic packages at any time.

1. Qualify

Data optimization (preflight check), normalization to PDF, color management, trapping, thumbnail generation.

2. Impositioning

JDF files generated by Heidelberg Prinect® Signa Station® assign the PDF pages manually or automatically to an impositioning layout. This can either be done just-in-time or immediately before output.

3. Proofing

Soft proof on the monitor, digital proof, form proof.

4. Output

Output is either via a Prinect MetaDimension® which also calculates the plate data or a special MetaDimension preparation workstation.

MetaDimension converts the PDF pages according to the JDF information into a bitmap for the recorder.

5. Forwarding

The CIP4 data created in the workflow is sent in its entirety to the press and finishing stage. All processing records and data are archived.

The Prinect Printready JDF database provides transparency for the progress of the individual workflow stages and analyzes all records using business management criteria.

Data can be accessed in every work phase and from any location. This ensures better communication and thus more balanced utilization of the prepress, press and postpress stages.

6.1.2 Prinect Signa Station – Impositioning and more

Prinect Signa Station is the Heidelberg solution for digital impositioning and is essential for end-to-end, digital production. It prepares the entire print sheet digitally for print-ready output on CtP recorders or other output devices. The main strengths of Prinect Signa Station include full visual control, maximum flexibility and efficient automation, plus the option of being able to intervene manually at any time. One of Prinect Signa Station's key functions is its support for the Print Production Format (PPF) and the JDF/CIP4 format.

Prinect Signa Station is able to process all the information required in the following stages of the processing chain. This information includes the job name, sheet number, ink coverage information, location of the positioned autoregister and color control marks, plus cutting, folding and collating information, enabling it to be used on any system for printing and finishing.

6.1.3 Prinect Profile Toolbox

Prinect Profile Toolbox consists of PrintOpen®, the proven professional software for creating ICC profiles, and Quality Monitor, a program for checking and monitoring color quality in the print and proof. This ensures a high degree of reliability and flexibility. Improved profile calculation enables the proof to be color matched with the subsequent print result with even greater accuracy.

Once created, a profile can also be recalculated step-by-step with increasing precision and an average deviation of the proof from the finished product which can barely be perceived by the human eye as a color difference. This color accuracy can also be documented. ColorProof Pro enables a media wedge to be applied to the proof sheet. An additional tool, Quality Monitor, is then used for exact comparison of the proof and print/print standard. This analysis and the proof provide the customer with evidence of quality.

Furthermore, a profile can be adapted to last minute changes to print parameters at any time. If for example another type of paper is selected or a new batch of ink is used, the existing profile does not have to be created from scratch. This saves a lot of time and reduces the technical outlay.

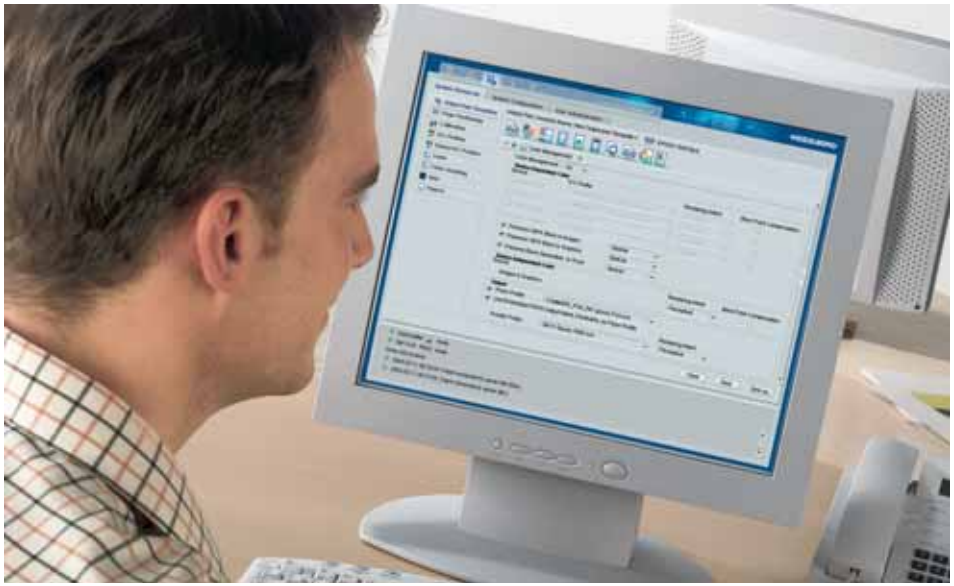
Prinect Profile Toolbox supports a variety of coordinated test forms and measuring devices, including Mini Spots which can be evaluated using Prinect Image Control. Measurement values can be averaged over several measurements and, where necessary, can be automatically corrected and smoothed.

Comparison of three-dimensional color spaces in proof and print.

The software package can be installed on any PC. Quality Monitor, specially developed for process control, allows deviations between proof and print to be objectively quantified rather than relying on intuition. It is also possible to measure whether or not the print lies within the tolerances of a defined standard. Long-term observations can aid early recognition of deviations from the standard. This enables corrective action to be taken in good time and the level of quality to be maintained in the long term. This in turn reduces the risk of complaints.

6.1.4 Prinect MetaDimension

Prinect MetaDimension provides the ideal gateway solution to a perfect PDF scenario with all the benefits of job ticket processing. The modularity of this RIP workflow means that it suits any volume of jobs. It can be added to at any time with InRIP Trapping, InRIP OPI, InRIP page positioning or InRIP Color Management. If the functions provided by all these InRIP modules still are not enough, specialist software from Heidelberg or other software manufacturers can be integrated as an Acrobat plug-in.



MetaDimension can be used as a PS or PDF RIP. This way, the functions of PDF are incorporated in the existing prepress workflows. Of course, Prinect Signa Station can also be integrated into the workflow in order to harness the benefits of the Print Production Format (PPF) and Job Definition Format (JDF), and to transfer information such as the ink zone presettings, to the press, or on to the finishing stage.

The ability to export and import 1-bit TIFF files also means that MetaDimension can be used in virtually any workflow. This approach combines the benefits of the TIFF-B workflow with the flexibility of the PDF-based workflow.

6.1.5 Digital proofing

Digital proofers from many manufacturers can be integrated in the Heidelberg Color Management system. Prinect Meta Dimension and Prinect Printready System use ICC profiles to adapt to the relevant print process and the true-color output.

Prinect Printready ensures that proofing is productive, since Color Management is carried out as early as the preparation process. In addition to simulating the print result for page and form proofers, it also converts to the output device's color space. Special colors can either be converted into process colors or kept as special colors. After the PDF pages have been assigned to an impositioning layout, a soft proof can be output on the monitor, a printout made of single pages on a color proofer, or a printout made of the entire print sheets on a form proofer – all automatically and depending on the process plan options.

Provided MetaDimension is equipped with the right options, the proofing process is totally user-friendly. In addition to the on-screen soft proof, the job can be output at any time on a connected color proofer or as a form proof, on e.g. HP DesignJet or Epson inkjet printers.

6.1.6 Prinect Calibration Toolbox

Prinect Calibration Toolbox is a specialist tool for performing and checking linearizations of CtP systems and adjustments to the printing characteristics. It is used for precise plate calibration for the required dot gain in print, thereby enabling optimized color management.

One of Prinect Calibration Toolbox's key strengths is its capability to simultaneously provide several CtP systems with printing characteristics with the help of a central calibration database. The fact that the latest characteristics are always available on all the systems ensures that the same print result is achieved even if different presses are used. If the software is installed on a central computer,

Tonal value corrections for an optimum print result with the Prinect Calibration Toolbox.

the CtP system's performance is no longer hindered by the management and creation of new characteristics.

Prinect Calibration Toolbox has been designed specifically so that fine adjustments and corrections can be performed on the basis of existing calibration data without having to print a specific test form.

Quality Monitor is integrated to monitor and analyze the quality of printing plates and printing characteristics. If the dot gain is altered by a change of ink or paper, Quality Monitor recognizes this at an early stage and it is then possible to make the appropriate corrections in the next plate set.

6.1.7 Prinect MetaShooter

Prinect MetaShooter® receives digital imaging information in TIFF-B data format, processes it and forwards it to the CtP recorder. This means that the CtP recorder can be set up separately from the prepress department. This saves time, since the plates can be output in the immediate vicinity of the press. MetaShooter also facilitates the chronological separation of data interpretation/screening and plate imaging. The screened data is saved in TIFF-B format and can be called up at any later point in time. This enables individual plates or an entire job to be reproduced simply and reliably.

If necessary, Heidelberg CtP recorders can be connected to third-party workflow systems via MetaShooter.

6.1.8 Heidelberg screening technologies

Choosing the right screen system is crucial for the quality of a print product. Heidelberg has developed world-renowned screen technologies that form the basis for all Heidelberg workflow systems:

- HQS Screening® (High Quality Screening).
- I. S. (Irrational Screening).
- Satin Screening (frequency-modulated screening).

For a more detailed description with print samples, refer to the special technical volume entitled "An Introduction to Screening Technology".

6.1.9 Prepress Interface: The CIP4 interface

Frequent job changes and ever shorter print runs are increasing the demands on printshops in terms of shorter setup and run times, higher quality and improved workflows.

Systematic integration such as that provided by the modular Prinect system developed by Heidelberg means that printshops are able to satisfy these demands. Prinect Prepress Interface links the prepress, press and postpress stages. To use this software, a workflow component is required that generates CIP4 data in the standardized Print Production Format (PPF) or JDF format. This is exactly what MetaDimension and Signa Station do.

6.2 Heidelberg platesetters

Heidelberg develops workflow solutions that cover every section of the prepress, press and postpress chain. In this sense, all Heidelberg CtP solutions represent end-to-end, fully-integrated solutions that ensure top-quality offset printing.

6.2.1 Complete solution packages for every market segment

Different market segments have very different needs. Whatever these needs are – fast, flexible and cost-effective processing of polyester printing plates in small offset, high system throughput for medium-sized job runs in the 70 x 100 cm sector, or printing plates that can be post-baked for rough printing materials, UV inks and long job runs – Heidelberg has special solution packages for each:

- Digitization and automation of the printing plate production process
- Shorter setup times and a more reliable, automated flow of data
- Time savings through fewer workflow stages
- Environmental protection through reduced material consumption
- Cost benefits in the prepress and press stages

6.2.2 CtP with polyester printing plates

Computer-to-Plate with polyester plates is an inexpensive alternative that is mainly of interest to small printshops and quick printers, in particular for single and two color work. Because of the lower dimensional stability of polyester plates compared to metal plates, four-color printing should be approached with extra care, though excellent results can certainly be achieved.

It is also theoretically possible to produce single-color prints and prints with registration-tolerant spot colors up to 70 x 100 cm formats when using 0.30 mm-thick polyester plates. A maximum job run of 20,000 prints is recommended for all format ranges.

The Prosetter can be fitted with a Multi Cassette Loader to deliver fully automatic processing.

6.2.3 CtP with metal printing plates

Because of the differing needs in the various market segments, Heidelberg has developed two different CtP recorder families for digital imaging of metal printing plates.

- The Prosetter family for violet-sensitive printing plates
- The Suprasetter family for thermal printing plates.

The user therefore has every option he needs to configure his workflow and the digital plate imaging process with its associated printing plates and level of automation according to the relevant operational requirements.

6.2.4 The Prosetter family

The Prosetter™ family is the answer of Heidelberg to the trend towards inexpensive CtP recorders and the use of violet laser diodes. Low investment costs and inexpensive running and maintenance costs make the crossover to CtP technology possible for everyone – without any compromises in terms of quality or performance. Prosetter's compact construction with its small footprint also helps minimize the costs of providing sufficient space.

The highly-flexible format range of the Prosetter models covers the plate formats for all Heidelberg sheetfed offset presses and the majority of other makes of sheetfed offset presses.

The Prosetter series uses proven internal drum technology developed specifically for imaging metal plates. A deflecting prism, which is very small due to the violet laser beam's short wavelength, is rotated at high speed by a spinning motor and thus facilitates a high output speed.

A 30 mW laser diode is used, which generates light in the visible violet range of 405 nm. This enables highly-sensitive silver halide printing plates and photopolymer printing plates to be imaged with very high resolution in outstanding quality.

Because of their high sensitivity, both types of plates are processed in daylight conditions with a yellow safety light. There is no need for a darkroom.

The plate simply has to be placed in position using Prosetter's plate loading guidance system. It is then automatically drawn in, centered, imaged, punched (if required) and ejected. Prosetter achieves very high productivity. The fast versions of Prosetter - the F74 and F102 - deliver an even greater rotational speed, and consequently, even greater productivity.

The Single Cassette Loader makes Prosetter fully automatic and also allows for full daylight operation. The Single Cassette Loader can hold up to 150 printing plates depending on the plate thickness. After imaging, the plate is transferred to the processor by an integrated conveyor.

The Multi Cassette Loader can load up to four cassettes and up to 600 plates with a range of formats and transports the plates, fully automatically, to the recorder. Fully automatic plate production can even be performed during the nightshift.

After the cassette carriage has been docked onto an SCL or MCL in horizontal position, the cassette is simply unlocked – this makes the operator's work far easier.

Once the cassette has been unlocked, it can be inserted easily into the loader. The plates are then fed automatically to the recorder.

Manual plate handling on a Suprasetter is equally convenient with 4- and 8-page formats.

Prosetter plate formats

	Prosetter 52	Prosetter 74/F74	Prosetter 102/F102
Min (mm)	370 × 323	370 × 323	370 × 323
Max (mm)	670 × 525	670 × 750	811 × 1,055
Min (inch)	14,567 × 12,717	14.567 × 12.717	14.567 × 12.717
Max (inch)	26,378 × 20,667	26.378 × 29.528	31.929 × 41.535

Suprasetter plate formats

	Suprasetter 74	Suprasetter 105
Height (in circumferential direction, mm)	370 to 680	370 to 930
Width (in direction of axis, mm)	323 to 750	323 to 1,140
Height (in circumferential direction, Inch)	14.567 to 26.772	14.567 to 36.614
Width (in direction of axis, Inch)	12.717 to 29.528	12.717 to 44.882

Prosetter units can also accommodate a punching system with up to four punch modules for Heidelberg presses and presses made by other manufacturers. The integrated temperature compensation ensures added precision and maximum register accuracy – especially for plate repeats.

6.2.5 The Suprasetter family

When developing Suprasetter, particular store was set by perfectly tuning all the technical components to each other. This means that Suprasetter has outstanding features in terms of compact design, speed, reliability and simple operation.

- Compact design
  In spite of all the high-tech features it offers, Suprasetter remains very compact, making it a real space-saver compared to other devices in its class. One advantage of the manual configuration is that it can be positioned against a wall.

- Transport unit with swiveling table
  The key technical feature of Suprasetter is its dual-level swiveling table. Thanks to this movable transport unit, Suprasetter is very flexible. This process separates loading and unloading procedures and speeds up plate throughput. In conjunction with the external drum, this ensures manual, semi-automatic or fully automatic plate handling. The plate cylinder with its innovative clamping bar also ensures a minimum clamping area and a maximum imaging area.

- Top punching precision and versatility
  Suprasetter has been designed to create top-quality print-ready plates with a minimum of time and effort. In order to achieve this objective, a

precise internal punching system is essential. The new punching method used in Suprasetter ensures that punching is performed with maximum register accuracy for both Heidelberg and other printing presses on the market. Other punch types can be retrofitted.

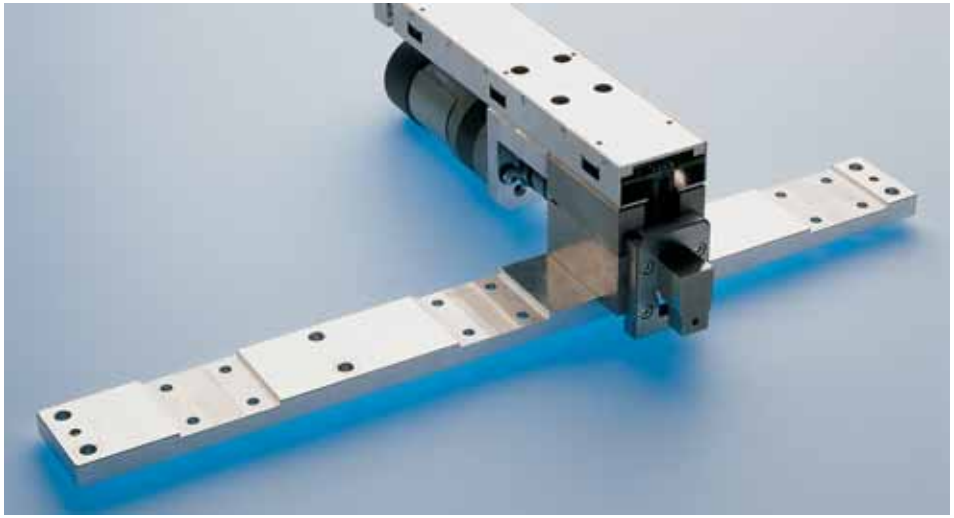
- The new lasers from Heidelberg
  The new laser system developed by Heidelberg ensures a combination of excellent imaging quality and maximum productivity. Its modular concept means that productivity levels can be selected to meet specific needs. Thanks to its compact design, upgrades can be carried out without lengthy periods of downtime and with minimal service intervention.

Why temperature compensation?

Aluminum printing plates are sensitive to variations in the ambient temperature during the day and to changes in temperature during imaging. In the case of a 0.30 mm thick printing plate with an edge length of a meter, the printing plate grows 0.13 mm per 5°C increase in temperature.

A temperature compensation system can be used to prevent registration errors as a result of temperature variations. To achieve this, the temperature is precisely measured in the recorder and the imaging area of the printing plate is automatically adjusted in the case of a change of temperature. This ensures consistently precise imaging and absolute register accuracy even with trapped image elements. This function is particularly important if, for example, a single plate from a four-color set has to be repeated due to mechanical damage.

Integrated punching systems ensure high register accuracy



The new laser modules are guaranteed to impress with their compact design, flexible upgrade options and speed. The intelligent diode system also offers unique reliability.

Flexible level of automation

Manual mode

The plates are loaded and unloaded manually using separate loading and unloading tables. While one plate is being imaged, the next plate can be loaded – thus saving time.
The plates can also be punched automatically (optional).

Semi-automatic mode with online processor

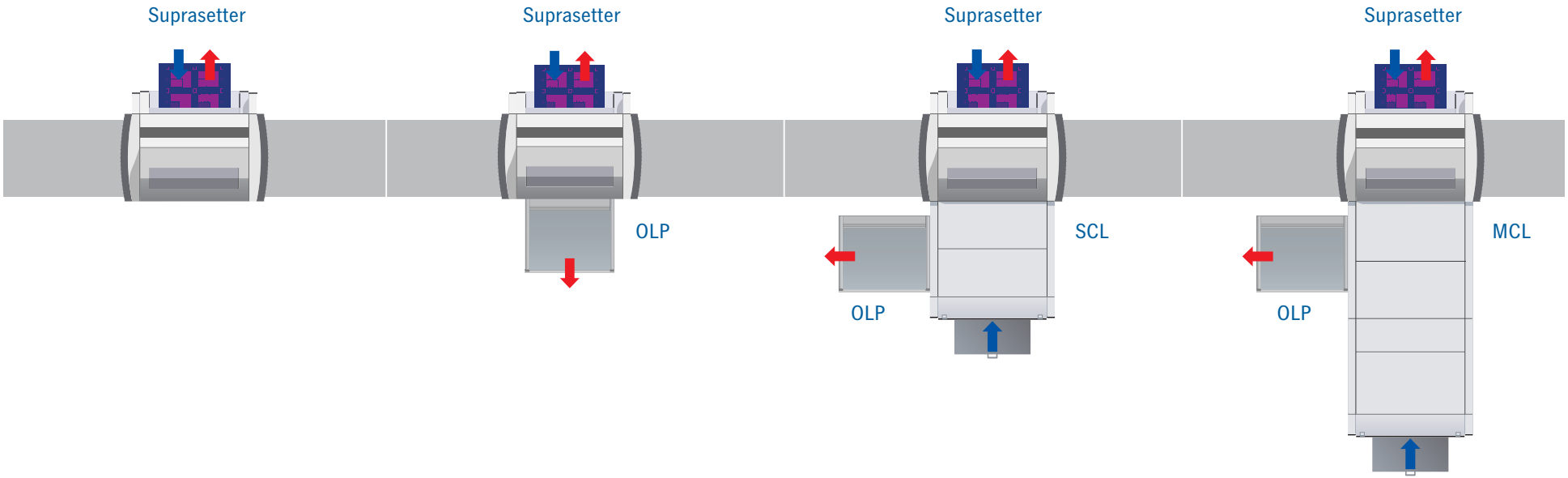
The plate that has been loaded manually is transferred to the drum automatically, and after imaging is transferred to the connected online processor. The plates can also be punched automatically (optional).

Automatic mode with one cassette

The printing plates are loaded automatically from a cassette that can hold up to 150 same-format plates. The interleaf paper is removed as part of this process. The punched and imaged plates are also fed automatically to the online processor. If a job needs to be done quickly but has a different plate format, manual mode is possible. The plates can also be punched automatically (optional).

Automatic mode with multiple cassettes

The printing plates can be loaded automatically from three or four cassettes, each of which can hold 150 same-format plates. This means that a total of up to 600 plates are available online, in up to four different formats. The plates can also be punched automatically (optional).



Fully automatic operation and manual production of individual jobs are no problem for a Suprasetter with a Multi Cassette Loader. Manual loading can be carried out easily and conveniently at any time.

7 Overview of Prepress Workflow

Prinect Prinance
Management information system

Prinect Signa Station
Impositioning software

Prinect Printready System
Fully JDF-based prepress workflow

Prinect MetaDimension
RIP and workflow solution

Prinect MetaShooter
Interface for integration of CtP technology in workflows

Prosetter
Violet CtP recorder based on internal drum design

Suprasetter
Thermal CtP recorder based on external drum design

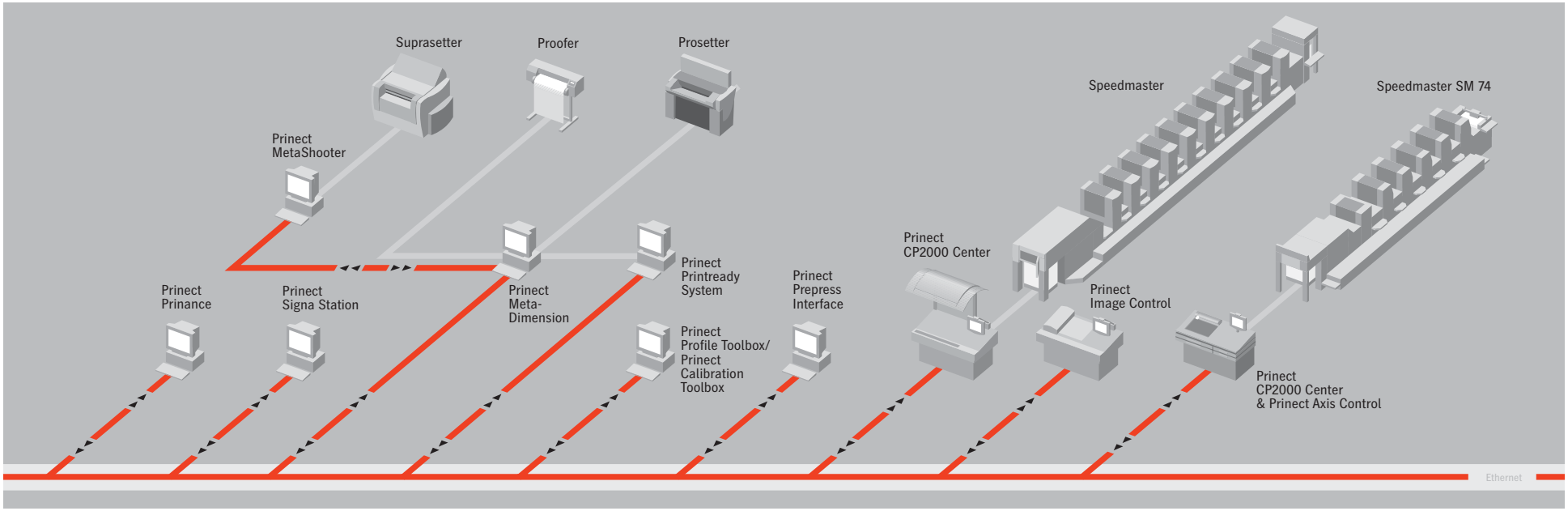
Prinect Calibration Toolbox
Software for linearization of CtP systems and matching of print characteristics

Prinect Profile Toolbox
Software for creating ICC profiles and quality control of proofs and prints

Prinect Prepress Interface
Interface between prepress, press and postpress for presetting ink zones, cutters, folders and gang-stitchers

Prinect CP2000 Center
Machine operation with remote ink control system for Speedmaster presses

Prinect Image Control
High-end color measuring system



8 How can I find the right CtP Solution?

Finding an optimum, long-term solution for the highly-specialized needs of each user must take precedence over any technology discussions. The first task is to weigh up carefully where the focus for the system's use will lie, and what decision criteria, if any, would justify the crossover into a more expensive investment class. The Prosetter and Suprasetter families from Heidelberg offer both violet and thermal imaging. A potential buyer can use the following criteria to help him make the right decision for the company's needs:

- Job run length
  The silver halide plates available for violet technology cannot be post-baked. Manufacturers specify that the job run should be a maximum of 350,000 impressions. The limit for violet-sensitive photopolymer plates and for thermal plates depends on the manufacturer and plate, but is typically between 150,000 and 250,000 impressions. This can however be extended through additional post-baking to up to a million impressions or more.

- Use of UV inks and rough printing materials
  The use of silver halide plates should be avoided for UV inks. The solvents are too aggressive. Even when printing on rough paper, e. g. in packaging printing, a printing plate that can be post-baked is more effective.

- Space requirements
  The construction of the Prosetter family is designed to offer a particularly small footprint. The Prosetter 52 can also be used with a special model for small-format offset printing up to a plate format of max. 670 x 525 mm.

- Level of automation
  The Prosetter family and the Suprasetter basic model are suitable for use with flexible, manual and semi-automatic modes.
  Both families can be delivered with Single or Multi Cassette Loader and these options can also be retrofitted in the field.

- Investments
  The inexpensive violet laser diode, in conjunction with the simple imaging principle, means that the Prosetter models represent a low-cost investment with low running and maintenance costs.

- Print behavior and quality
  In terms of print behavior (clean running of the plate, ink/water balance, ink feed, dot gain) and the achievable print quality, there is no real difference between violet and thermal technology. The plate throughput and the price of digital printing plates for both processes are also about the same.

- Differentiation criteria at a glance

Recorder features

	Prosetter family	Suprasetter family
Light source	1 violet laser diode	2 to 6 thermal laser modules with 64 emitters
Imaging system	Single-beam technology, internal drum	Multi-beam technology, external drum
Space requirements	Depends on configuration	Depends on configuration
Level of automation	Manual to fully automatic	Manual to fully automatic
Plate throughput	12 – 24 pph	14 – 30 pph
Investment costs	Minimal	Depends on configuration

Printing plates supported

	Silver halide plates	Photopolymer plates	Thermal plates
Sensitivity	At 405 nm	At 405 nm	At 830 nm
Conditions	Daylight brightness, yellow safety light; daylight for fully-automatic mode	Daylight brightness, yellow safety light; daylight for fully-automatic mode	Daylight
Job run length without post-baking after post-baking	 350,000 n/a	 200,000 ~ 1 million	 150,000 – 250,000 ~ 1 million
Use of UV inks	No	Yes, after post-baking	Yes, after post-baking
Rough printing materials	No	Yes, after post-baking	Yes, after post-baking
Behavior during print	No difference to conventional printing plates	No difference to conventional printing plates	No difference to conventional printing plates
Print quality	No difference to conventional printing plates	No difference to conventional printing plates	No difference to conventional printing plates
Price of printing plates	No difference to conventional printing plates	No difference to conventional printing plates	No difference to conventional printing plates

9 Time is Money: So why wait any longer?

Digital workflow systems and CtP recorder technology are highly advanced. An investment in a high-performance workflow that ensures the complete automation of the entire prepress stage and leads on to the next stages (press and postpress) is therefore a key step towards competitive production. Heidelberg offers solutions for all requirements. Of course, for a printshop, the print process is the most important stage, not prepress. However, printing begins with prepress. Therefore, most of the advantages of a modern workflow and the level of automation that comes with it are reflected in the printing stage. In other words, the press room and the quality of the goods produced in it are the real winners!

This statement of course has to be qualified with a number of requirements, and these will be discussed again briefly below:

1. For entry into CtP, there must be a sufficient number of jobs for producing digital plates if this investment is to be justified. This number averages around six to ten four-color jobs per day/shift. However, this figure is heavily dependent on the mix of customers and jobs, and also on the current workflow configuration.

2. From a business management perspective, a sufficiently large printing capacity also plays a key role. When a feasibility study is being drawn up that is tailored to your company, Heidelberg can provide you with the expertise needed.

3. Trained staff with excellent experience in the PostScript sector – possibly also with PDF – should be available or training must be possible within the planned time period. Crucial factors in this context include existing experience of digital proofs and a positive response from the customer's staff. These requirements will play a key role in defining a schedule for the changeover to an automated overall workflow.

4. A willingness to accept change (both internal and external) must, in principle, be present. This requires good, all-round communication between all the departments within a company, including the field sales team, and open communication with the most important customers regarding the planned changes (such as data supply, correction cycles, proof).

5. The goal will only be achieved through clear specifications and their on-schedule completion. A precise plan of the necessary steps (see also section entitled "Checklist") and the creation of a timescale and finance plan are essential milestones.

10 Checklist

This checklist is intended as a planning aid for investments in a digital workflow with CtP output. It makes no claim to be complete, nor does the implementation of all the steps have the same importance for every size of company. The details of the current snapshot and the target analysis are intended exclusively for you at this stage. They provide you with assistance in creating the transparency needed for your future plans. If you wish to disclose the data contained in this checklist, it will definitely provide a valuable basis for further advice from your Heidelberg sales partner.

Status quo

- Existing prepress equipment
- Analysis of the current workflow
- Number of staff in the prepress stage, including plate copy. What activity?
- Number of jobs per year, per month, per day, per shift
- At what times do peak loads occur?
- Number of pages, print sheets, sheet format
- Which data do you receive in digital form?
- Which data is supplied as film? Page parts, finished page films, full-sheet films.
- Number of films supplied. Percentage requiring redigitization.
- Page films imaged in-house, full-sheet films, number, square meters, annual film costs
- Is analog proofing used? Systems, units, annual costs
- Is digital proofing already being used? Devices, annual costs
- Acceptance among staff of digital proof (as percentage)
- Number of printing plates to be copied per year, per month, per day, per shift
- Number of remakes, percentage, reason for remake (last-minute corrections, faulty plates, other reason)
- Number of remakes when job already on press
- Press downtimes, reason
- Level of utilization of press(es)

Target analysis

- Detailed description of the planned workflow
- Network planning
- Planning of data communication
- Necessary server capacity. Tools for backup and archiving.
- Redigitization of existing films and those supplied, volume, tools
- Implementation of digital proofing
- What existing equipment is to be/can be used further in the digital workflow?
- Number of staff available, new activity, costs
- Total investment according to quotations(s)
- Technical scope, level of investment
- Planned film costs. Planned plate costs or digital/analog plates
- Planned savings or added capacity in print
- Feasibility study with TARGET/ACTUAL comparison

Interior and/or building design

- Designing the interior and awarding contract for its execution and assignment of implementation
- Award of contract for network and data communication
- Planning for air conditioning of sections. Full air conditioning including award of contract.

Finance planning

- Evaluation of investment aid, regional economic subsidies
- Evaluation of regional aid for introducing new, eco-friendly technologies

Time planning, security

- Total timeframe with checkpoints for individual stages of CtP introduction
- Member of staff or team responsible
- Plans for the end of twin-track operation (security)
- Disaster plan (worst case). Back-up planning

Training

- Training for a system administrator, appoint representative
- Training for further technical staff
- Training for the field sales staff
- Training/support for customers (generation of PDF files, network, communication, proof)

Advertising

- More capacity, order planning
- Enhanced quality to be communicated
- Image brochure
- Internet

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