

# PRINTERS' GUIDE

Training Information & News in Printing and Paper Converting Technology

## Digital printing

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### 1. Overview and distinctive features in comparison with conventional printing methods

Within the history of the printing industry, digital printing is a very young printing method. The first computers found their way into the offices in the mid-1970s; shortly afterwards, the first laser printers (IBM, Siemens, Xerox) were available. Full-colour digital printing has even been in the market for only approximately 20 years.

The first digital printers (Xeikon, Indigo) for the production of colour prints were presented at drupa 1995. The printing experts were sceptical; a printing machine had to be made of steel, had to use printing formes. To a large extent, the industry did not take these copying devices seriously being of the opinion that they belonged into the office environment, not into a printing house.

drupa 2000 already presented a totally different picture; many renowned manufacturers like Canon, Minolta, Xerox showed their digital printers, and Heidelberger Druckmaschinen, too, was represented with the Nexpress. At that time, the number of digital printing systems installed around the globe was more than 10,000.

Since that time, the new printing method has continually improved, and the acceptance in the printing companies has grown and grown.

What do we actually understand by "digital printing" – how does it differ from other printing methods?

In general, a distinction between the printing methods is made with respect to their printing forme, i.e., in concrete terms, how the printing and non-printing areas are

separated from each other by means of the printing forme. We know relief printing with raised printing parts (letterpress printing, flexographic printing, letterset), gravure printing (gravure printing using a doctor blade, intaglio printing), planographic printing (offset printing), and the stencil printing method in which the ink is forced through a mesh (silk screen printing).

Figure 1 gives an overview of the printing formes used in the printing methods.

All these methods have in common that they need a printing forme in order to transfer the information onto the substrate. Depending on the method, e.g., offset plates, gravure cylinders or silk screens are required for the printing order and/or per colour separation.

This is different in digital printing: In digital printing, information is transferred dot by dot from a digital data storage directly onto the substrate.

This means that no (rigid, material or static) printing forme is needed. There is either a kind of printing forme which is rewritable (a dynamic printing forme), or there are printing forme elements.

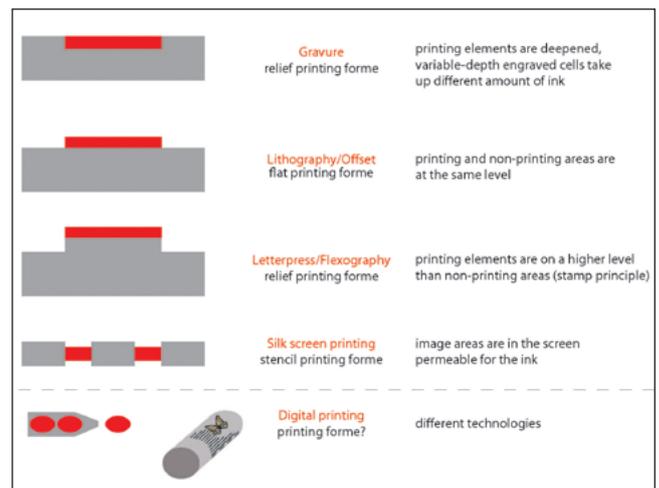


Figure 1: The different printing methods

An overview of the technology variants in the workflow is shown in Figure 2.

In the "Computer-to-Film" and the "Computer-to-Plate" process the conversion of the digital data into analogue information is carried out during the output on film as the intermediate medium and/or the printing forme. Often the variant "Computer-to-Press" is wrongly attributed to digital printing since the image remains digital all the way into the machine. The "Computer-to-Press" methods are the so-called DI (direct imaging) processes which, however, use conventional printing formes in the machine after the digital imaging process. There are different methods in the market (Figure 3). They all have in common that the printing formes are pro-

duced in the machine, which makes the process faster and simpler and reduces the setting times and start-up waste. Since the automation level of the conventional printing machines has also been optimised further and further (ink and format presetting, automated plate change, automatic washing devices), the set-up times as well as the amount of waste have been drastically reduced too, so that the advantages and the importance of the DI processes have decreased as well. The majority of the manufacturers no longer manufacture these machines. Therefore, these methods shall not be examined in detail here.

The digital printing methods are “Computer-to-Paper” and “Computer-to-Print”. These two variants differ insofar as they use a dynamic, rewritable printing forme (for paper) or don’t need a printing forme at all and only use printing forme elements (to print). The first group includes electrophotography (Xerography) or magnetography. The “Computer-to-Print” technologies are inkjet printing or thermography/dye sublimation printing. An overview of these processes is shown in Figure 4.

These technologies are also often referred to as NIP (Non Impact Printing) technologies. This term originates in the comparison between the conventional methods where the printing forme (intermediate medium) and the substrate must be brought into contact by the application of force in order to transfer the ink.

For industrial print production, above all electrophotography (in general called laser printing) and inkjet printing are of importance. The centrepiece of electrophotography is a photo semi-conductor drum (dynamic printing forme) which is charged electrostatically and imaged by means of light. Well-known manufacturers of such systems are Xerox, Kodak, Canon, Océ, Hewlett-Packard, Indigo, etc., to name just a few. A fast development above all during recent years could be seen with inkjet printing. With this technology, ink is sprayed onto the substrate by means of an array of jets (printing forme elements). In earlier years primarily used for photo printers and large-format printing, inkjet is now also of great importance to commercial and advertising printing. Inkjet printers are offered, e.g., by Agfa, Kodak Versamark, Océ, KBA, and many more.

The other digital printing technologies (ionography, magnetography, thermal processes) are used for special applications and are practically of no importance as industrial printing methods.

A comparison of conventional and digital printing methods shows the large advantage of digital printing due to the non-existent printing forme and the resulting

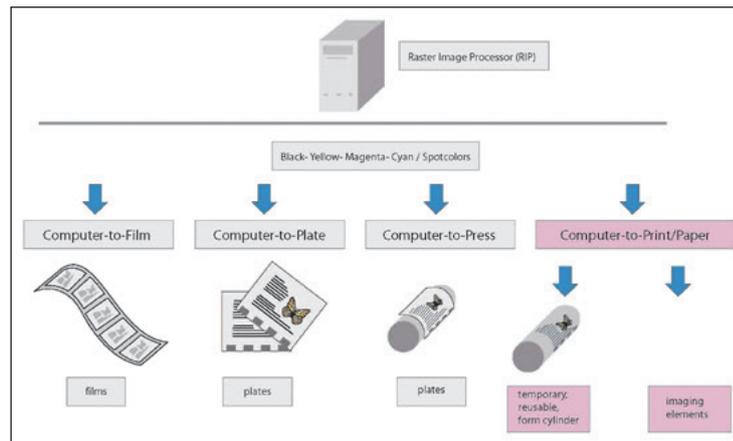
lower number of process steps. There are no expenditures – in terms of time and money – which arise in connection with printing forme production. No printing forme is needed, likewise no printing forme storage, no development chemicals, no printing forme installation and pre-setting, no set-up time and no waste. Therefore, these processes are considerably more flexible and profitable for even small numbers of copies, starting even from one copy. Hence, the fields of application for digital printing are:

- Short-run printing (short run colour): Short, full-colour runs, e.g. for business cards, posters, brochures – often also as preprints or as reprints of conventionally printed jobs
- Personalisation, individualised prints: highly individualised printed products with a target-group specific message (mailings), personalisation
- Print on demand: Continuous print production just in time with the option to make changes quickly and with short

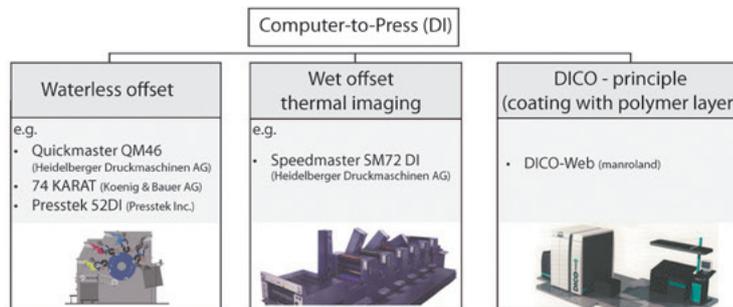
delivery times for regularly updated printed products which need not be stored, but are printed as necessity arises (e.g., book on demand)

- Distributed printing: Printing files are transferred via networks and output locally (e.g., in branch offices) on digital printing systems, which saves time and transportation capacities.

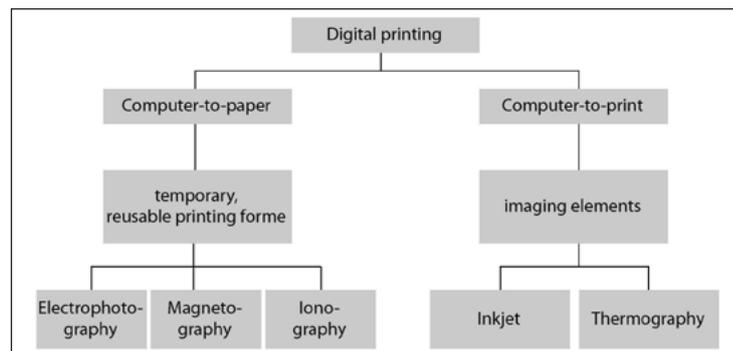
Of course, order acquisition for digital printing requires a different marketing approach. It is very important to show the customers the new possibilities and added values provided by this technology. And there are disadvantages, too, in comparison with the conventional printing methods – as regards quality, the variability of materials or finishing options and longer print runs. While there was some discussion in the past whether digital printing will supersede the conventional processes at some point in time, it is now undisputed in expert circles that the co-existence of these technologies can be mutually fruitful.



**Figure 2:**  
The digital printing workflow



**Figure 3:**  
The DI technology



**Figure 4:**  
The digital printing methods