Digital printing and direct imaging technologies

Digital printing is an umbrella term used to describe all systems which use any one of a number of technical solutions to replace the traditional pre-press stage in which physical image carriers such as cylinders or plates are created for multiple prints. There is a difference between direct imaging technologies and masterless technologies. What they have in common is that the printing matter or image carrier is created inside the printing unit. However, digital printing in the true sense of the word only occurs when a digital image file replaces a physical image carrier as the master which enables variable data to be printed.

Direct imaging of a print master, film or plate, in the printing unit
The majority of these print engines are working with a re-imageable master directly from data files, not for each revolution of the printing cylinder, but for each new job. As they usually do not handle variable data throughout the print run, in a sense they are not primarily digital printing systems. They are mostly used for small- to medium-length repetitive print runs where the advantage lies in the machines fast make-ready time. Inking systems have much in common with other established printing techniques. As a result, demands on the paperboard’s surface characteristics are much the same as for conventional offset printing.

Masterless printing systems
With these print units the print master is truly the digital file and the image is created and positioned on demand for each sheet/revolution. These systems are usually based on dry- or liquid toner, electrophotography or drop-on-demand ink jet. The inking systems for these print engines differ greatly from conventional printing systems and place different demands on paperboard performance.

A few of the masterless printing methods have been around for years. The most frequently used are electrophotography with powder toner, thermography and ink jet in its simplest form. The development of computer capacity as well as fine-tuned imaging devices and ink jet head design has led to improvements in quality and speed. In turn, these have made possible the step from office print to industrial production. The introduction of liquid toner in electrophotography and UV-resistant inks in ink jet has led to further quality advantages and numerous new end uses.

Paperboard in digital printing
Due to the multitude of available technologies it is difficult to give specific recommendations. For all methods using electrical charges the moisture level of the substrate needs to be controlled, as a lower level has proved to give better results. For liquid toners and liquid inks, the surface chemistry and porosity play an important role in enabling sharp image reproduction and good ink adhesion. For end uses like displays, cards and covers in smaller volumes, paperboard is used successfully in various print engines. Consistency in thickness is an important feature in the feeding of the sheets as well as in the consistent transformation of toner and ink. Stiff paperboard might not be suitable for use if there are tight turns of the feeding paths in the machine. The finishing or converting equipment may also be too weak to process stiff and tough paperboard.