Abstract

In a time where there is an increasing demand for easily accessible and up-to-date information, digital printing has become a link between traditional printed media and electronic media. Over the last years, applications such as variable data printing, personalised printing and print on demand have changed the way in which printed matter is produced and handled. The print quality of products produced by digital printing systems has improved considerably in recent years. The main reason for this improvement is better printer hardware but the printing paper is still a very influential factor. The two major technologies, inkjet and electrophotography and their respective applications put very different demands on the paper, mechanically, chemically and optically. Nevertheless, the differences in print quality across digital printing systems are decreasing, except for one area – colour reproduction. The growth of the market of consumer colour imaging products, such as digital printers and desktop printers, has been enormous during the last years. As a consequence of this, consumer expectations on colour reproduction have risen significantly, as even very small failures in colour reproduction can drastically reduce the visual impression of an otherwise impeccably reproduced image. Therefore, as consumer expectations continue to rise, a high and repeatable quality of colour image reproduction is a growing challenge for producers of digital printing devices as well as for paper producers. However, this is impossible to achieve without precise methods and routines to measure colour reproduction quality. The use of spectrophotometers for colour measurements of printed substrates is widely spread among paper producers as well as within the printing industry. Spectrophotometers are precise instruments for point-wise measurements. However, the measurement procedure is very time-consuming and therefore, faster methods for colour measurements are longed-for. If the spectrophotometers used today could be replaced with trichromatic capturing devices such as flatbed scanners or digital cameras, colour characterisation would be not only faster, but also less expensive. In addition, if the trichromatic devices are colorimetrically calibrated, spatial image information can be combined with colour information, making it possible to measure quality attributes related to colour image rendering that are impossible to capture with point-wise measurements. Today, flatbed scanners and digital cameras provide robust and high-quality image capturing capabilities at a relatively low cost. Furthermore, scanner and camera-based systems for automated objective measurements of print quality parameters have already become widely used tools for print quality measurements of print-related properties such as print mottle, sharpness and bleeding. However, the colour calibration of trichromatic capturing devices is not free from obstacles. In colour calibrations, where the aim is to measure colour of printed matter, knowledge about the properties of the capturing device, the printing substrate, the printing process and the printer function are all of great importance. In the work presented here, methods for colour characterisation of printing processes are proposed as well as methods for colour characterisation and calibration of trichromatic capturing devices. Furthermore, the media dependency problem inherent to colour calibrations of trichromatic capturing devices is discussed. Examples are given on how properties of the printed substrate, such as the content of fluorescent whitening agents, influence colour calibrations as well as colour measurements in general.