Automated Image Quality Control on Weboffset Presses without any need for Special Strips and/or Patterns

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Abstract: Underneath described inline fullcolour printcolour measurement and control system is invented to control and adjust inline the print quality on weboffset presses, without needing any printed colour bars, -patterns or strips. Specifically applicable in situations of fullcolour printed news-papers, untrimmed retail print and application of narrow gap presses. This Dutch invented system measures the real printed images and adjusts the printed colour accordingly. Gains for printers are less human eye-, but more system controlled colour quality maintenance. A two way use of the system is possible: either the system controls and guides the web printing press to the right colour based upon the ripped document, or guides the print production based upon the print sample signed for 'okay' to print the order.

Introduction: Inline fullcolour measuring printingquality on all types of offsetpresses has a long history. Mid eighties some systems were launched unsuccessfully and until now the only available system comes from Dainippon Screen and is dedicated for only doing inline fullcolour inline measuring on its 344 sheetfed presses. In the most automated scenario sheetfed presses are colour controlled off-line by measuring directly in the printed image, without needing printed colour pads or strips on the sheet.

For commercial weboffset, fullcolour printingquality control systems are available since late nineties, but they need special strips and/or patterns/targets to be printed within one print-revolution. For printed products like newspapers and some retail-print coming untrimmed from the press, ready for delivery, such special strips for colour measuring are not allowed in the net product. In the end, these products are produced without any automated fullcolour printingquality control. Printers inspect these products by human eye; but they have a lack of standardisation and no facility for closed-loop quality control and adjustment for the inking fountains on the press.

Although there are inline quality control systems in packaging print available, these systems cannot handle the speed and the closed loop follow-up necessary for newspaper and commercial weboffset presses that are running up to 15 metres per second. So, there still is an increasing need for automated quality improvement in fullcolour newspaper printing (coldset) and fullcolour untrimmed retail printing (heatset).

Invention: A Dutch patented invention from about 2004 does respond to afore mentioned automation requirements by making use of the original printed image data without needing special printed strips or so. The basic platform comprises the following elements:

1. A pair of CCD camera's scanning across the recto and verso side of the running printed web, immediately after releasing the printing tower. The web is enlightened by stable white Led-exposure
2. A so called Reference Analysing System, for interpretation of the 1 bit Tiff data in the (prepress) rip, in order to find the CIElab target values of any relevant image location
3. The neural network in which press characterisation is learned by printing a special 8.700 colour patterns comprising printform and stored (= the press profile). In this network the real image data are compared with the target data. An adjustment value is sent to the press manufacturer's inkfountain control system, which executes the required change in ink volume
4. A human interface console facilitates the printer to apply the system in various ways:
   - To set a starting press, based upon automated matching the reference values derived from the 1 bit Tiff ripped image document
   - To keep the press automatically running and matching the values of the 'okay-print' e.g. after the customer's signature
   - Inspect a soft-proof before manufacturing printing plates. The soft-proof colour-representation of the 1 bit Tiff data will be given as a screen-representation and will show the expected print result, profiled according to the learned profile stored in the neural network. That means according to the characteristics of press and paper

For printed image inspection the system automatically selects in the most interesting areas in the RGB-image coming from the press and divides these into selected mini-squares, which are matched in CIElab with the 1 bit Tiff CIElab colour representation of the ripped image. Uninterested colour areas, e.g. like white spaces or just text columns are used for calibration
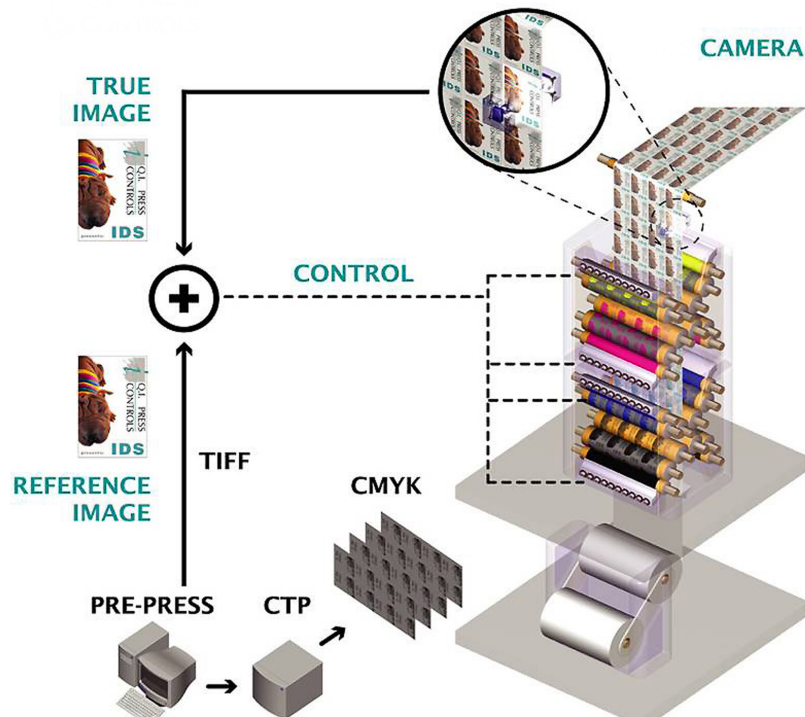
The systems can coop with conditions where a printing plant works according to ISO 12647-2 standardisation, but can function also fruitfully where such conditions are missing. During prototype tests on a commercial 32-page heatset press, the system checks the incoming colour-data by matching a pre-ripped version with learned profile from the press. In case of unacceptable preview-results, the final ripping will be executed by taking into consideration a necessary curve. For ink key setting the press manufacturer's CIP4 connectivity is applied

Patent: pending number USA 10/830 856 is held by Erik van Holten, Q.I. Press Controls, Oosterhout – The Netherlands

Literature: due to newness of the principle no literature else than patent description available yet