The Development of a System that Can Automate Printing Skills Using Digital Data for Wet Offset Presses

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Abstract

Historically, it has been difficult to scan an entire sheet in sheet fed printers. TrueFit Advance is a system that features a new design including an inline sensor that simultaneously scans both the color densities of points scattered throughout the image and a special patch that is designed to determine dampening water levels. TrueFit Advance can control the ink levels in real time, according to the ink density levels it detects in the image. TrueFit Advance can also be used to control ink levels using solid density patches in traditional control strips. Since TrueFit Advance can monitor dampening water levels using the special dampening water patch, if the operator sets an optimum dampening water value, it can be used to control the dampening water levels and maintain the specified printing conditions during printing. Its inline scanning enables TrueFit Advance to constantly monitor ink and dampening water levels. It also handles ink presets for upcoming jobs with great precision, enabling faster make-ready times when changing from one job to another.

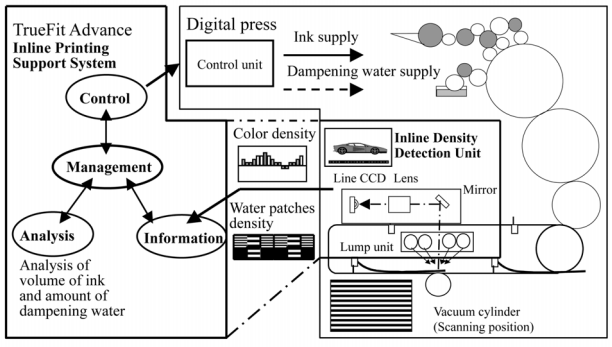

Figure 1. The Inline Printing Support System

Introductions

TrueFit Advance has the following printing control characteristics.

1. It can detect ink levels using traditional solid ink patches in control strips, display the densities it detects, and control the ink keys.
2. It can use the special dampening water patch to detect the amount of dampening water present, display the dampening water levels, and control the press to assure an optimal supply of dampening water.
3. It can read the entire image on a sheet using its inline scanner, and control the ink keys to assure that the density of specified representative colors in the image fall within the specified standards.
4. By analyzing the image coverage in the data for a new job and the ink densities at the end of the previous job, it can determine the ideal ink levels for use in starting the new job.
5. The image data scanned by the inline sensors during printing is continuously displayed and updated in the operation panel, making it easy for the operator to monitor.

Using Color Control Charts

One method of color control involves using a color control chart to convert the colors in the printed product to CMYK densities. Figure 2 illustrates the use of a color control chart for color control.

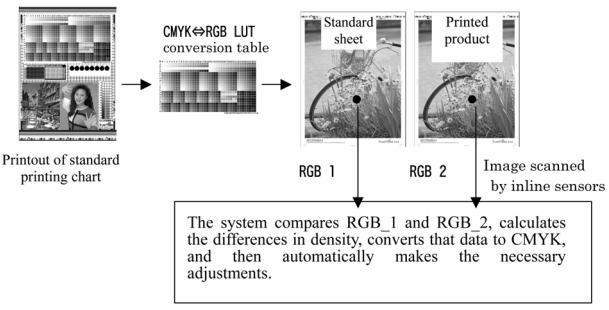

Figure 2. Using a color control chart

In this method, a color control chart is printed using standard operating conditions for the printing press. A CMYK→RGB density conversion table is created using the halftone dot percentages for 620 colors and the corresponding RGB densities, as scanned in by TrueFit

Advance. This CMYK→RGB conversion table can be used to control the densities of the halftone dots in the printed image.

Density Calibration Using a Color Control Chart

Plates are imaged and sheets are printed using the color control charts that have been created for the press, and the results are monitored. Once all the solid densities in the control strip are within acceptable standards, the operator presses the conversion table creation button in the GUI to finish creating the conversion table. This conversion table can be used starting from the next job to calculate the solid densities for the colors within the image, and to control the ink levels. The product is shipped with several pre-created conversion tables.

TrueFit Advance, An Inline Density Detector

The inline density detector is located at the paper delivery end of the press. It automatically reads printed sheets using inline CCD sensors that are synchronized to the rotation of the cylinders, as the printed sheets are being transported to the paper delivery shelf by the gripper attached to the delivery chain.

Operating the System

The operator can choose to use either a control strip or representative points from the image, when creating job settings.

Solid Density Control

The operator selects "Use control strip," and then selects the desired solid color patches.

Representative Points from the Image

When the system is set to use representative points from the image, the operator can select up to 2 points within each ink zone to function as representative points for color matching. If the operator doesn't select any representative points, the system automatically selects representative points for use in color control. The representative points that are selected are those that are considered to have the most influence on the overall color. Colors that encompass a large portion of the image, skin tones, and background grays are often selected as representative colors. Once the operator determines that an OK sheet has been printed and presses the maintain control button, TrueFit Advance's ink key control maintains the existing color densities for the represent-tative points. Both a control strip and representative points in the image can be used to maintain color density once the system has matched the desired colors.

Dampening Water Control

Dampening water control uses a special dampening water patch that can be scanned by TrueFit Advance. The operator can position the dampening water patch on the sheet while making imaging settings, and can also place it in the spaces between register marks and other patches. The value scanned in from the dampening water patch is displayed in the GUI. The operator can set the system to start dampening water level control when he or she determines that dampening water is at the optimal level. The system automatically maintains optimal printing conditions from then on.

The dampening water patch is composed of a solid color density patch and a set of lines of varying width. The patch is designed in a special way, so that the densities of the lines in it vary according to the amount of dampening water present. When there is more dampening water, the density of the thin lines approaches that of the thick lines. When there is less dampening water, the difference between the thickness of the thin and thick lines becomes larger.

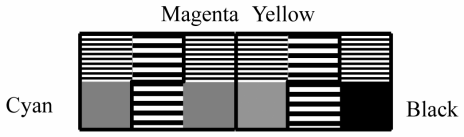

Figure 3. Water Volume Detection Patches

Conclusion

Highly accurate real-time color readings like those described above can be used to control the printing press, both to stabilize quality and during testing for printed products. These readings are also well suited for use with high-precision scanners, digital control systems, color analysis devices, test plates, and other technologies that have been fostered by Dainippon Screen.

In the future, the integration of printing support systems such as those introduced here will continue. The result is expected to be automated, consistently high-quality printing production.

Biography

Yukiyoshi Tanaka graduated from the University of Oregon in 1984. During his employment with Dainippon Screen, he has worked in the Overseas Department and Marketing Department. He also worked at Dainippon Screen Graphics (USA) LLC as a marketing manager between 2000 and 2003. He is currently the product manager for digital printing devices at the Product Planning Department.