

Intelligent Cut Sheet Media Handling

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Abstract

With the recent expansion of color digital presses and systems, the demand for expanded media (paper) handling capability has set unprecedented demands on suppliers of equipment to limit the need for time-consuming set ups and re-calibrations. In the Color Print on Demand market the customer not only needs excellent color quality but the systems must be reliable and have the capability to quickly respond to a wide variety of job demands and brands of media. The ability of a system to unobtrusively understand the media(s) properties that are going to be utilized for the jobs and make appropriate real time setups is the key to a quick reliable job turnaround. The Xerox iGen3 System possesses the ability to automatically recognize hundreds of media and provide initial registration and media handling set up parameters. In addition, the iGen3 system automatically corrects for lot to lot supplier variations to continuously maintain media output quality. Xerox developed the iGen3 System as a high-speed solution for a multidimensional market requirement for Commercial Print, CRD, and Quick Print markets. With the speed and the traditional Xerox excellent service and equipment reliability, the iGen3 System will offer customers a clear advantage.

Introduction

A market that has been traditionally dominated by offset printing, customer requirements for shorter production jobs, variable information printing, and less set-up time make digital color printing highly desirable. Digital color printing requires equipment that not only produces high quality output but also is highly reliable. Color applications demand a wide range of specialty substrates and coatings. Each media brings with it a unique combination of attributes that demand unique system settings to provide consistent quality and reliability.

Xerox has devoted considerable research and development to transform the industry and improve media handling for a wide range of media without manual adjustment or operator intervention. The continuous monitoring of sheet parameters and adaptive sheet-to-sheet adjustment enables the reliability of the iGen3 printer.

Igen3 Media Handling

Igen3 media attributes such as size, weight, grain direction, brands, coating, etc. are stored in the digital press's stock library. This provides the basis for total system control of feeding, image registration, image transfer, sheet registration, fusing, decurling, and sheet stacking. A short paperpath with gentle radiuses insure large media can be transported at high speeds reliably without sheet marking or damage. The paper feeder utilizes Smart paper tray technology that adjusts vacuum feed for paper weight and coating and incorporates automatic tray tilt control to adjust for paper curl. Image to paper registration is guaranteed by paper edge sensing and steering CCD accuracy. Same edge side 1 to side 2 paper registration provides crossover accuracy. Externally heated fuser rolls react to sheet weight and coating attributes. Automatic temperate adjustments are made based on inputs from the paper tray setting when a stock is loaded. Fused paper decurling is accomplished by automatically monitoring image coverage and other paper parameters. The paper can be curled up or down based on each individual sheet's combination of parameters. The Smart stacker steers and re-registers the media for stack squareness and set offsetting. In addition, an active static eliminator assists in maintaining stack quality. A top tray is provided for sample printing and proofing. Multiple stackers can be attached for un-interrupted printing.

Media Handling technology advances include the following highlights:

Smartpress Paper Tray

The key to optimum media performance is the "smart paper tray" which provides the system with important media attributes. Smart trays enable automatic feeder and air system settings for each paper type, size, and weight. New shuttle vacuum feed technology is gentle on substrates and includes a vacuum corrugator plate that provides bi-level corrugation for improved paper separation and feeding. Airknife and outboard paper fluffer heaters assist in single sheet separation, especially effective for coated stocks.

Features also include non-contact multifeed detection that automatically calibrates to the media.

The lead edge attitude sensor continuously monitors and compensates for paper up curl or down curl to improve paper feed reliability.

Up to six feeder modules provide continuous feeding of a variety of media, each module containing two paper trays

and 5000 sheets. Paper sizes range from 7x7 inch to 14.33x20.5 inches. Basis weights range from 60 to 270 gsm. (45# offset to 100# cover).

SmartPress Sheet Registration

Sheet registration requires no manual adjustments due to the use of adaptive, on the fly, electronic sheet steering controls for both process and cross-process directions. No fixed registration edge means no sheet damage or marking or edge wear. CCD sensing accuracy is within 14 microns (.0006") This level of accuracy assists in achieving our specification of 0 to 1.7 mm. image to paper registration in both process and cross-process directions. Each class of media is 'learned' and recorded each time it is run in order to minimize the registration error the next time that media is loaded. In addition, the learning algorithm compensates for sheet to sheet differences, component wear over time, and temperature effects.

SmartPress Decurler

Page adaptive active decurling provides optimum decurler settings on a sheet by sheet basis. The smart decurler utilizes paper attributes such as basis weight, image area coverage, and grain direction to optimize settings. The closed-loop control algorithm controls two independent decurling stations, one for toward image curl, one for away from image curl. Each decurler involves a unique indentation roll working in conjunction with a penetration shaft to curl the fused paper down or up. Automatic system

re-calibration compensates for roll wear ensuring consistent performance over life of the decurling rolls.

Conclusion

These are just a few of the multitude of breakthroughs and digital technology advances in imaging and media handling that comprise the iGen3 product. The closed loop controls of the smart paper tray, "on the fly" paper registration, paper adaptive fusing, page to page active decurling, and offset stacking provide the customer with prints that are predictable, economical, and saleable. Smartpress Media Handling works within the overall architectural controls to maintain consistent quality and reliability from sheet-to-sheet and job-to-job over a wide range of media.

Biography

Chuck Bennett holds Bachelors degrees in Mechanical Engineering from the Rochester Institute of Technology and in Business Management from St. John Fisher College. He has a Masters degree in Manufacturing and Engineering Management from Clarkson University. Chuck is a Motorola Certified Six Sigma Black Belt and is a licensed Professional Engineer by New York State. He has worked in the printing industry since 1984 in advanced engineering and product development. Chuck is presently the Media Handling Platform Manager for the Xerox iGen3 product.