Technical whitepaper

HP One Package Workflow Solutions for Web-fed Corrugated

Delivering efficient short and long runs with digital preprint

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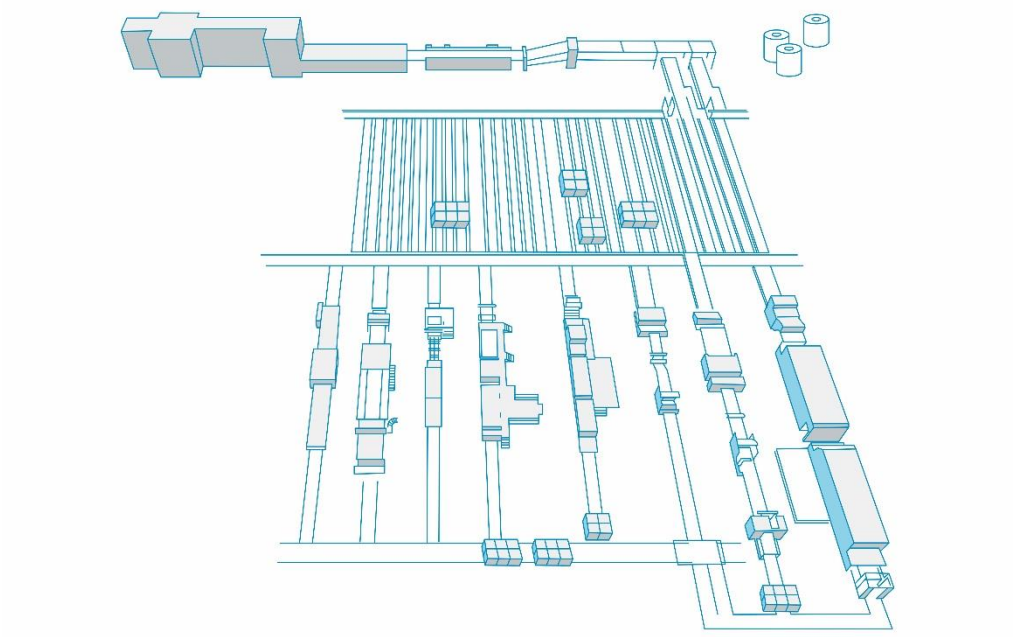
BACKGROUND

Digital preprint with HP roll-fed digital presses offers box-makers new opportunities to take out cost and time in the printing process and improve the efficiency of downstream processes.

Efficient production of jobs shorter than one roll is possible when analog plates and make-ready time are eliminated. This addresses the customer trend for short runs. Fast turnaround time and just-in-time production delivers supply chain agility to brands, eliminating the need for inventory. Because digital print uses no plates, it is possible switch from one artwork to the next without stopping. This means that a roll can contain multiple artworks or orders. This batching of orders is a key driver of production efficiency.

The challenge is to introduce this multi-job roll into the production system without negatively impacting downstream processes. The digital printing process needs to take place under the control of the existing factory management and planning systems. Other processes within the production system may need to be informed about the digital rolls in order to handle them efficiently.

This document explains how HP's One Package Preprint workflow software enables the HP PageWide T1195i T700i, and T470S Presses (T-Series presses) to deliver short runs and fast turn-around-times whilst contributing to the efficiency of the box plant.



THE CORRUGATED PLANT WORKFLOW

Corrugated Plant workflow

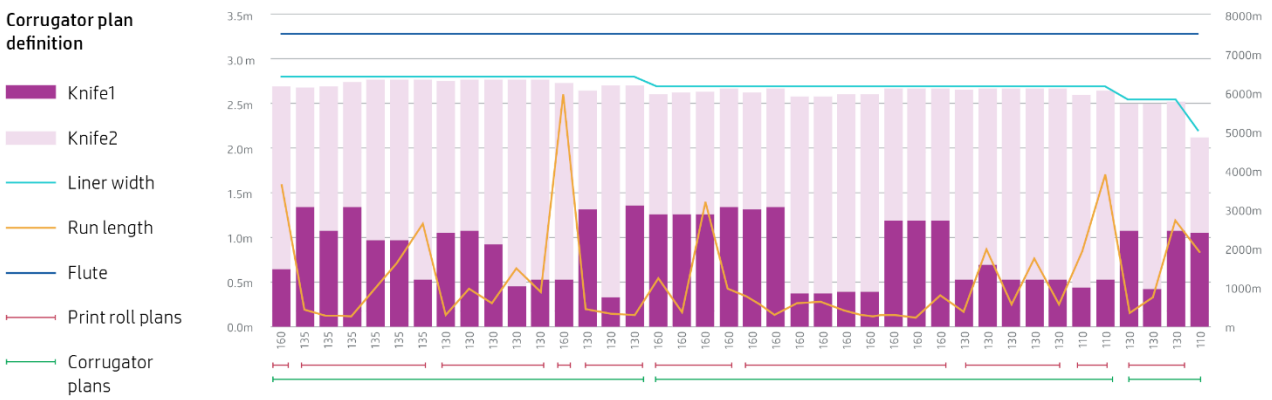
The Planning/ERP System

Most box plants are controlled by a Corrugator Planning System from suppliers such as Witron, Kiwiplan, DR Software Solutions. The function of these systems is to manage resources and material flows in the box plant and to plan jobs on the corrugator in an efficient manner.

When planning jobs on the corrugator, a sophisticated algorithm is used to find the optimal sequence of jobs so that flute changes, wet-end changes and dry-end changes are sequenced to minimize waste and maximize productivity.

The concept of a 'digital roll' needs to be handled by the planning system. Assuming that the corrugator will continue to manufacture un-printed sheets as well as printed, then the planning system needs to separate digital orders from the rest. It will organize the digital orders into one or more digital rolls. These digital rolls will then be moved into the corrugator plan in between conventional un-printed rolls. The planning system will control the conventional order changes on the corrugator, but when it loads a digital roll, the process changes slightly.

One Package will be integrated with the Planning System. It will query the planning system and obtain the roll plan which describes the organization of the orders on the roll or sequence or rolls.



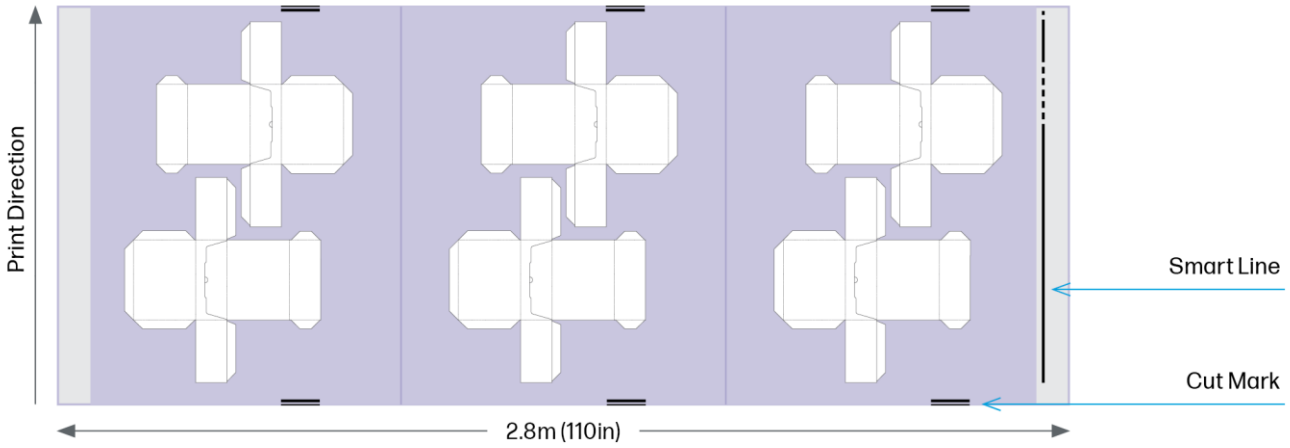
Graphics and Prepress

Artwork defining the graphics to be printed will be prepared by the prepress department. They will take original customer artwork and check it for completeness and consistency. They will need to add marks or furniture that control downstream processes such as corrugation and converting. In parallel, they will create the structural CAD files that are necessary to match with the die-cut tool or order a new tool.

They will also color manage the files to ensure accurate reproduction on the chosen liner. If making die-cut sheets, they will step up the box to fit the format of the diecutter. Finally, they will output a CMYK PDF file of the manufacturing sheet and store it on the production server ready for the next stage.

There are many prepress workflow automation systems available, including Hybrid PackZ® and Hybrid CLOUDFLOW®, which can save time and reduce errors by automating these repetitive processes.

One Package is tightly integrated with GMG Color Server and provides tools to streamline and simplify the process of creating profiles for the press. We are building a tool that enables the operator to see the delta E of spot colors within the artwork and to compare performance in different color modes.



Serialization

One advantage of digital print over analog printing is that each print can be different to its predecessor. This means that it becomes possible to place variable codes, barcodes or data matrices on the print. We will describe later how variable coded marks are used to control the corrugator with a sort of 'count-down' to the next order change.

This concept can be extended to use these marks to control downstream converting processes, for example setups on a folder-gluer. Increasing digitization of the production process means that control of this data is an essential tool in driving plant efficiency. The serialization codes can carry production information, or they can provide a look-up into a production database contained within One Package.

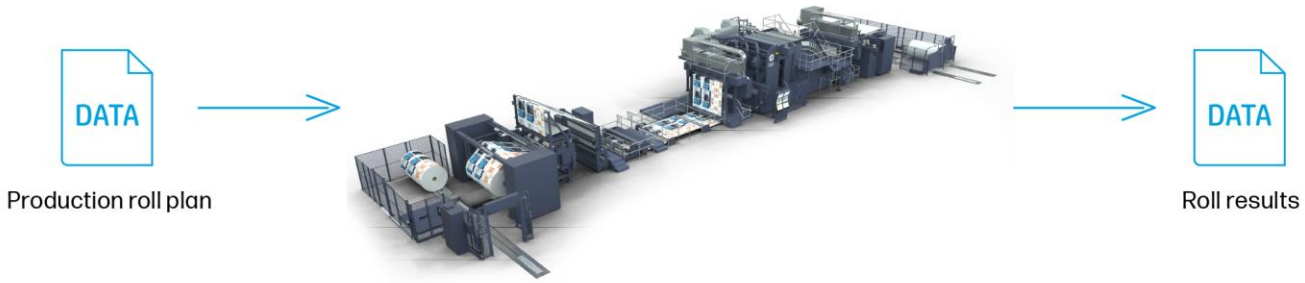
Reading the code on the brand's fill-line can also open up opportunities for instant feedback on usage of the boxes which could drive automatic stock replenishment scenarios. Increasingly, brands are recognizing the power of variable data to uniquely mark boxes for track-and-trace applications. It is also possible to add unique codes for customer use such as competition codes, digital activation, etc.

The Digital Printing Press

HP's One Package preprint workflow suite provides the interface with the T-series press. One Package takes the Roll Plan and merges it with the PDF artwork to provide a print-ready job that can be submitted to the press. One Package will assign the marks needed to control the corrugation process which may either be outside the job artwork or inside it. In addition, it is possible to add roll-level components such as roll header sequences, inter-job spacers, roll trailers and even roll-wraps to add job identification for the roll.

If required, the roll can also be printed in reverse sequence to corrugation.

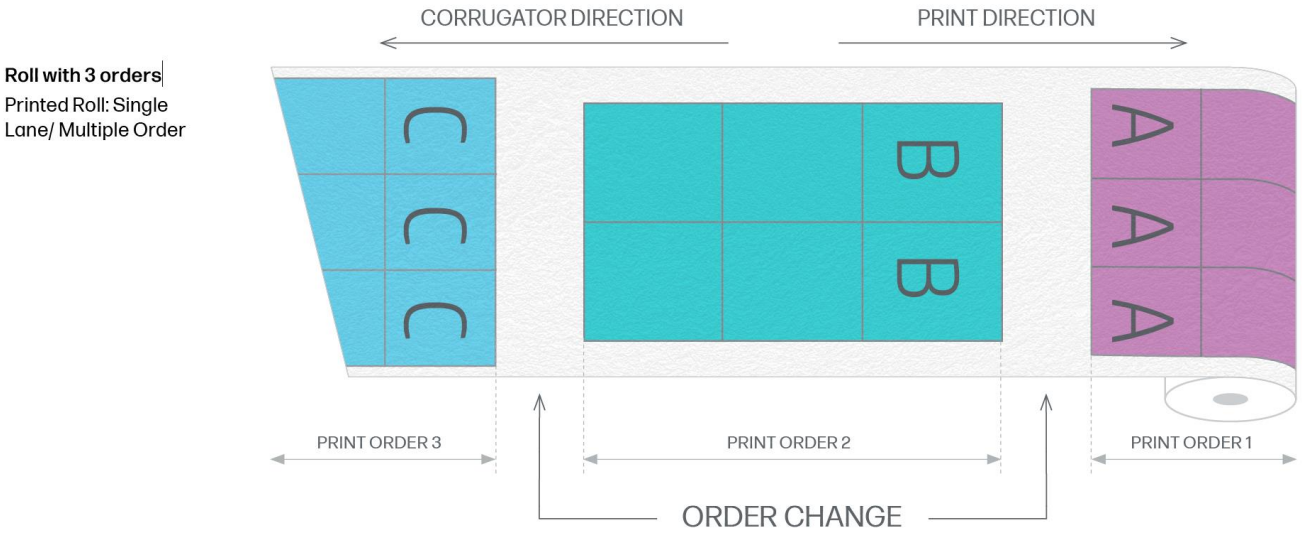
After printing, the press will create a Production Data report file that provides a precise report on exactly how many products are on the roll and detailing any gaps and anomalies.



Corrugation and Conversion

Printed marks are commonly used in corrugation, lamination, and folding-carton manufacturing to control downstream processes such as sheeting and converting. These marks can be enhanced using digital printing technology and used for additional processes like editing, job batching and sorting.

Many corrugators are fitted with two or even three knives so that increased planning efficiency can be achieved by pairing different orders side-by-side to optimize deckling efficiency. Those paired orders will have different widths and different cut-lengths. HP's T1100 series presses can easily print such multi-lane jobs and the Digital Corrugator Control System will address the needs of each paired order.

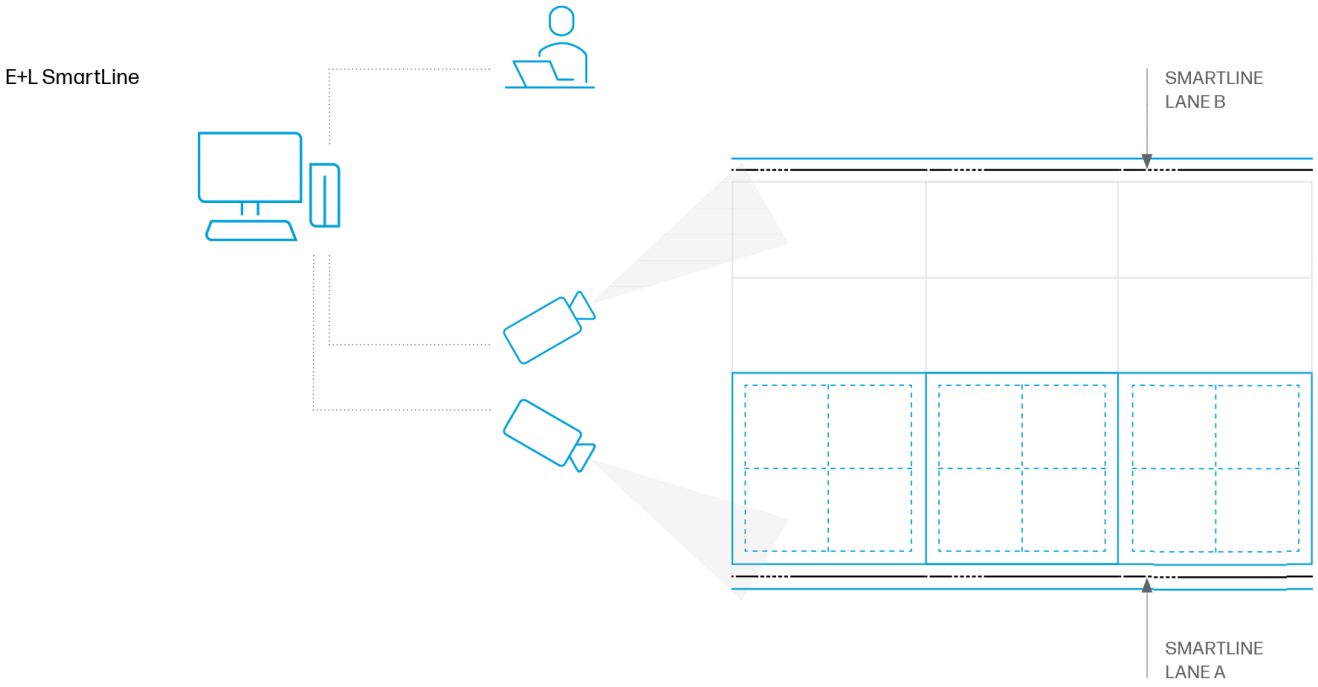


Corrugator Control System

The corrugator must be fitted with a system that reads marks printed on the roll and uses these to control order changes. The marks can take the form of 2-D barcodes, lines or other marking schemes.

One such system is SmartLine, manufactured by Erhardt+Leimer (E+L). The normal follower line that is common in flexo preprint is replaced by a special follower line containing coded data which describes each job and identifies order changes in the roll. This system is being used by multiple HP T-Series customers around the world. There are other systems available that can trigger a job change on the corrugator via a printed mark.

One Package is pre-configured to support E+L SmartLine. Support for other schemes can be added if required by customers.



Trial rolls with E+L SmartLine in edge trim line

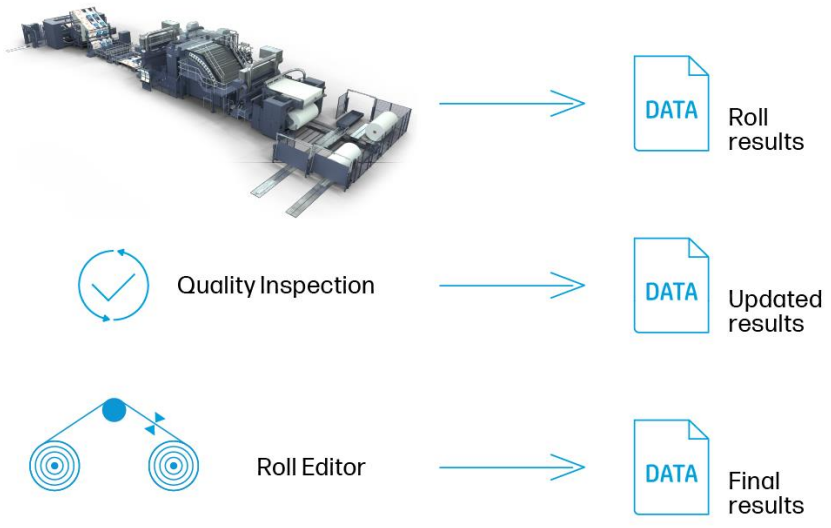
Inspection System

The digital press will often be fitted with a full-web inspection system. This system can be programmed to detect defective print within the print run. These systems are commonly fitted to CI-flexo printing systems. The inspection system will be set up at the start of the run and the operator will tell it to start inspection as soon as good print is attained. A CI-flexo system can only print the same job over-and-over, so the inspection system only needs to be set up once per run.

In a digital workflow, the printed orders are much shorter, and it would be impossible for the operator to reprogram the system in time for each new order. To resolve this, One Package preloads the setup information for each job into the Inspection System. This means the system knows exactly when each order will begin and will automatically inspect it from the start.

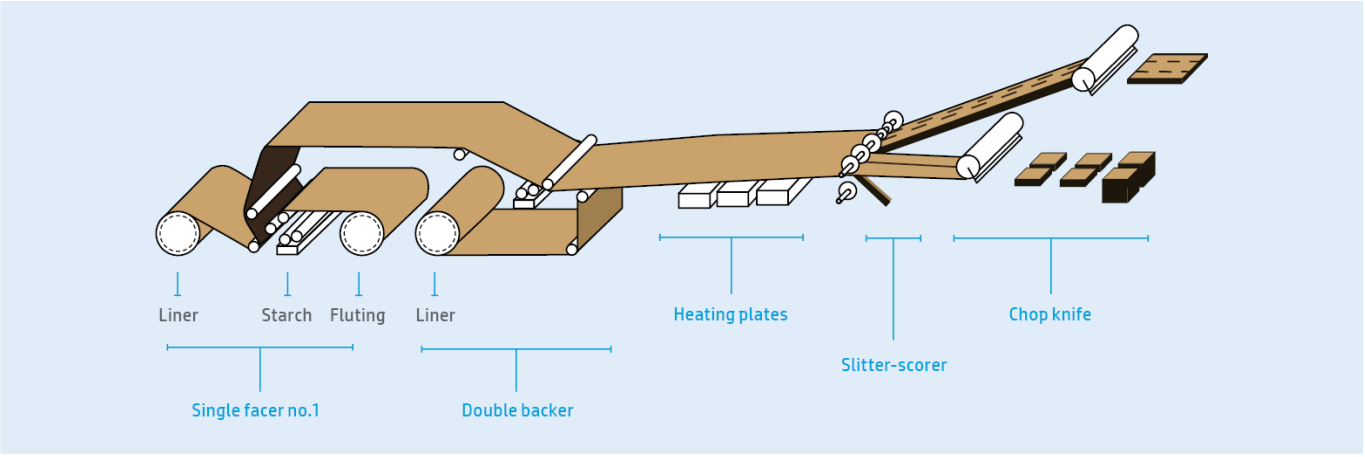
The system will provide the operator with live data to enable him to decide if he needs to stop and rectify a problem or if he can ignore the defect and continue. When the Inspection System finds defective print, it will allow the operator to decide if the defect is relevant and will then report location data back to One Package which will update the Production Data report accordingly.

One Package is pre-configured to support iPQ-Center of BST GROUP. Support for other inspection systems can be added if required by customers.



Waste Removal

A roll editor is commonly used to remove defective print from a roll before corrugation. Another method to remove waste is with an extractor after the chop knives on a corrugator. In both scenarios, the Production Data report available from One Package can complement the solution.



Reporting

Often the Planning System or ERP will expect a report detailing what was printed. One Package can provide this based on the information contained in the Production Data report file. Sometimes, the ERP will want to know detailed information about non-product print, waste, and ink usage. Again, this can be provided by One Package.

Trade Sales

Some HP customers sell printed rolls or sheets to trade customers. One Package adds support for this business model by offering a client mode. The Roll or sheet producer opens up a client access to the trade customer so that he can submit production data, including roll plans and PDF artworks directly into One Package, enabling them to batch orders according to their own production criteria.

SUMMARY

One Package is the solution that enables the corrugator to deliver short runs efficiently, without creating unnecessary waste and without disrupting the corrugator's productivity. It acts as a hub for all the information being passed to and from all the different components of the system. It is a highly customizable solution and HP's customer engineering teams will be happy to discuss the special requirements of each customer.

Learn more at:
hp.com/go/corrugated

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