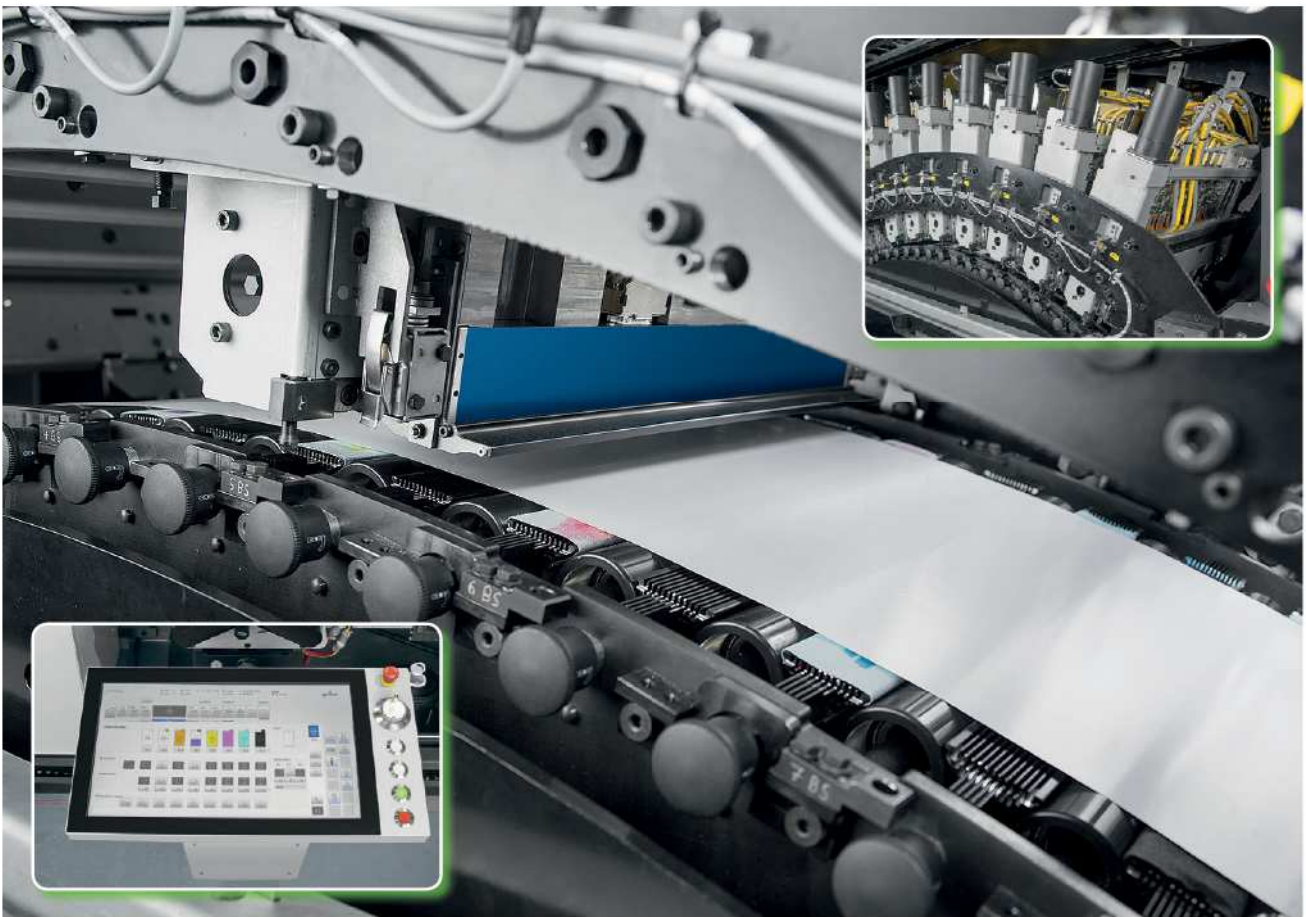


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Late stage customization in narrow web packaging printing

Dieter Finna

An option for the needs-based management of packaging processes in flexible mass production is late stage customization. This enables the individualisation of products integrated into the production phase as late as possible. Swiss company Hapa AG specialises in these types of solutions and offers tailored solutions for a range of packaging applications.

Due to a steady increase in product variations, packaging processes are experiencing increasingly shorter production runs. In addition, growing strict regulatory requirements and the demand for traceability have more and more impact on manufacturing processes. This further increases the standards required from production meaning that packaging processes are being increasingly scrutinised by supply chain managers. Their aim is to keep stock as low as possible despite greater diversity of product ranges. However, the capacity to deliver must be guaranteed as customers expect products to be available on supermarket shelves – an expectation that determines the competitive landscape.

Availability in supermarkets

Reconciling these aims is not always possible. It is generally be-

lieved that in a supermarket 8.2% of all products are not available at any given time. According to a 2009 study of GS1 Austria GmbH/ ECR Austria^[1], the customer reaction will depend on whether the products are temporarily unavailable or for a longer duration. If the product is only temporarily unavailable, the consumer will either

“If unavailability is prolonged, 70% of customers will choose to purchase products from a competitor.”

buy another product under the same brand (16%), return later (17%), buy nothing (9%), buy another brand (37%), or buy a competitor's product (21%).

If unavailability is prolonged, 70% of customers will choose to purchase products from a competitor. Customers satisfied with the new product will be lost to the

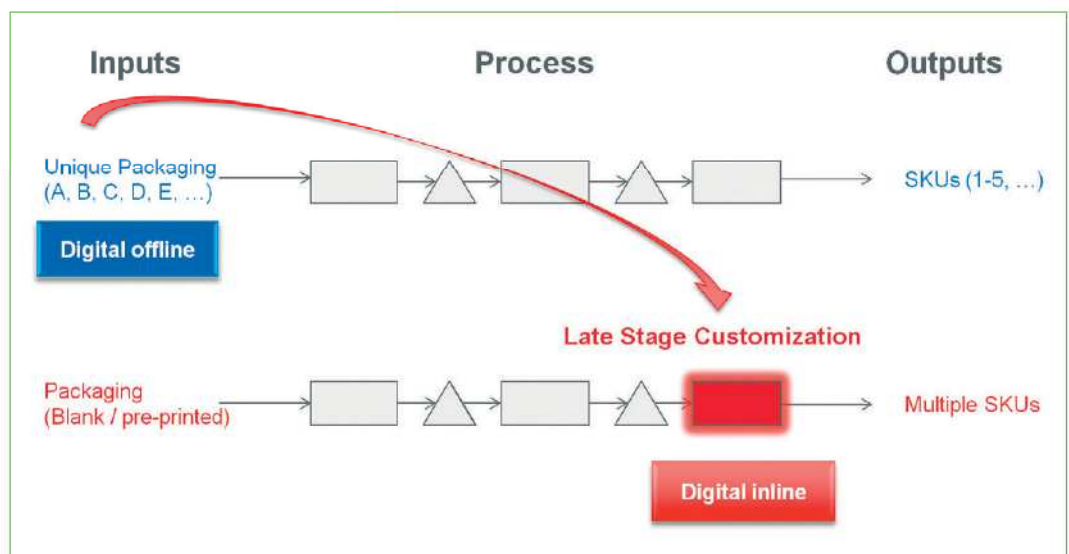
manufacturer for a longer period of time. Despite their best efforts with respect to the supply chain, this problem arises from time to time and is a serious issue for manufacturers.

The minimisation of the risk of delivery problems and the associated loss of customers through correspondingly high quantities of stock is contingent on capital being tied up in the amount held of the respective product value. If the stocked product is phased out, the remaining stock must be sold off and the packaging material that is no longer required must be destroyed. This results in write-offs that reduce company profit. In order to avoid this, it is necessary to closely adjust the provision of stock to actual demand.

Shorter lead times through digital printing

Production of packaging materials using offline digital printing offers a way of reducing the stock of such materials and the associated capital commitment. Simultaneously, the delivery time can be shortened and both the amount of packaging stock and the individual products can thereby be reduced accordingly. However, offline digital printing only enables the partial optimisation of the process chain, because the number of products to be stocked remains the same, though at a smaller quantity per product.

Late stage customization^[2] takes a different approach. The process



Adjusting the production process to demand using late stage customization

Source: Hapa

Reducing items using late stage customization



Source: Hapa

chain is supplied either with blank or preprinted packaging material. In contrast to conventional conversion, the specification of the exact products takes place at the end of production process, which means at as late a stage in the entire manufacturing process as possible. Digital printing is also used in this process chain, which, in contrast to the

Producing consumer goods

The example of Nivea diamond gloss illustrates how late stage customization impacts upon the manufacturing process of consumer goods. Suppose a conventional supply chain contains 25 country-specific variations and four different hair types: In that case, the shampoo would have 100 different packaging products, each of which would have to be managed in stock. In order to circumvent this, the manufacturer uses labels on which the diamond gloss graphics and the blue Nivea brand logo are preprinted. As soon as an order arrives from one of the 25 countries, the order amount with the correct country-specific information and relevant hair type information is produced.

One question that may arise: Why isn't all of this printed digitally? There are two reasons for this, namely the precise rendering of the brand logo colours and cost aspects.

Printing quality and costs are core considerations

The standards of current packaging printing are predominantly influenced by the properties of analogue printing processes. These standards have yet to be defined for digital printing. For branded companies, it is a basic requirement that digital prints should be of the same quality as an analogue print if they want to establish themselves as a leader in packaging printing. This presents an obstacle for digital printing, as this

Hapa Universal Label Printer for printing of laminated tubes, integrated into a PackSys Global AG laminated tube line

"One question that may arise: Why isn't all of this printed digitally?"

first variant, is integrated inline into the packaging process. Through this integration, the production quantities of each item can be kept small and variable until the last moment. Furthermore, unlimited variations can be produced with a very small amount of stock.



Source: Hapa

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eDossier “Environmental impact of ink systems”

Comparison of different ink systems on the market – how to reduce the environmental impact of ink systems.

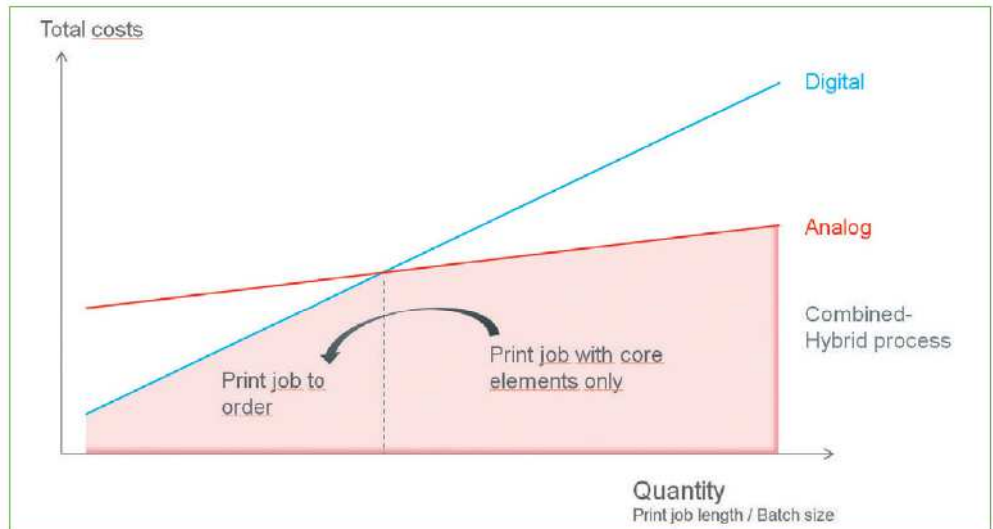
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process has its own printing profile and the consumer could spot visual differences. These challenges also exist in the other direction, if digital printing has provided the specification for a short run of a product for a market introduction then analogue printing has to replicate this on a larger scale.

In terms of cost, analogue printing is characterised by fixed costs resulting from the preprinting stage and the set-up times, which are reflected in comparatively high total costs in the case of short runs. In such a situation, digital printing is more cost-effective because it has very low start-up costs.

However, unit costs are higher for digital printing. It is therefore sensible to preprint items above a certain cost cut-off point using analogue printing, and then to subsequently insert the variable information using digital printing.

Value creation using analogue and digital printing



Source: Hapa

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UV DOD inkjet systems

The development by Hapa relies on two digital printing systems for the integration of digital printing mechanisms in packaging lines: the Universal Label Printer and the printing module “redcube plus”. Both systems are based on piezo inkjet technology and work with UV inks in a drop-on-demand (DOD) process.

The Universal Label Printer prints onto all labelling materials, such as paper, transparent or white plastic films, aluminium, plastic films for in-mould labels, and laminates for the production of tubes. Using a vacuum conveyor belt, an exact material-independent fit is guaranteed and inseting to a pre-

The Swiss company Hapa AG employs about 190 people in their headquarters in Volketswil near Zurich, as well as in its sales and service centres in the USA, Great Britain, Germany, India, Mexico, Brazil and Japan. Hapa is a member of Coesia Group, a group of innovation-based industrial solutions companies operating globally, and headquartered in Bologna, Italy.

Founded in 1933, the company supplies late stage customization and on demand printing solutions for packaging processes in the pharmaceutical industry. The developed printing solutions are applied in the cosmetics, food and medicine industry. The printing systems comprise UV Flexo, UV Inkjet and hybrid systems. Designed as in-house-printing solutions, they enable lean production in the packaging processes.

cision of 0.02 mm (0.000787") is possible.

The digital printing systems can be constructed using a single colour or up to four process colours, plus white and lacquer. Due to the company's in-house production of inks, UV inks can also be integrated directly into customer-oriented solutions.

Compliance with legal requirements and demands of branded companies regarding the migration and odour of colour components are of great significance in this context. Hapa takes these issues into account by using inks that have a very low tendency to migrate, contaminate, and give off

"The digital printing systems can be constructed using a single colour or up to four process colours, plus white and lacquer."

odours. These inks contain only substances from the Nestlé positive list, without exception.

Direct printing onto labels & more

The fully digital printing module "redcube plus" prints directly onto item surfaces, regardless of their size, format, or surface characteristics. This module can be used for direct printing onto labels, films, cartons, and objects such as bottle closures and other plastic items. The product can be expanded with additional modules from one to a total of seven colours, also in combination with process colours. The printing speed is set at up to 60 m/min (196.8 fpm) at a resolution of 720 dpi.

The inclusion of an automatic print head cleaning and an automatic flushing system is also an advantage, because operators in industrial production plants are often not sufficiently familiar with handling digital printing units. Us-

er-friendliness presents an important factor for the acceptance of digital printing machines in the production process.

Conclusion

The supply chain focusses on the cost efficiency of manufacturing processes. This will grow further in the future, forcing packaging lines to be redesigned as lean production processes. Inline digital printing systems offer solutions based on the possibility of late stage customization in production processes, thereby supporting this transition. Since late stage customization brings fundamental process changes, its introduction into production plants is not a straightforward step. A reason is also that the supply of packaging lines with analogue preprinted materials is economical for larger production series.

However, as a result of the known trend towards smaller production batches and greater variations in products, inline solutions will be increasingly required, in future, to produce efficiently and to ensure fast market entries. In general, the presence of certain obstacles regarding print quality and the conformity of inks affects the growing use of digital printing in flexible packaging. Thus, this technology has continued to develop further in recent years and will increase its efforts in the future. With this in mind, it is reasonable to expect that this will also pave the way for greater inline digital printing for late stage customization.

Resources

^[1] GS1 Austria GmbH/ECR-Austria, ECR Efficient Consumer Response, page 199, Table 9.1, Vienna 2009

^[2] Peter Schkoda, Hapa AG, Late Stage Customization – Zero Lead Time, Zero Material Waste and Product Personalization, Digital Print for Packaging 2016, Berlin



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