

# HYBRID MACHINES ON THE RISE

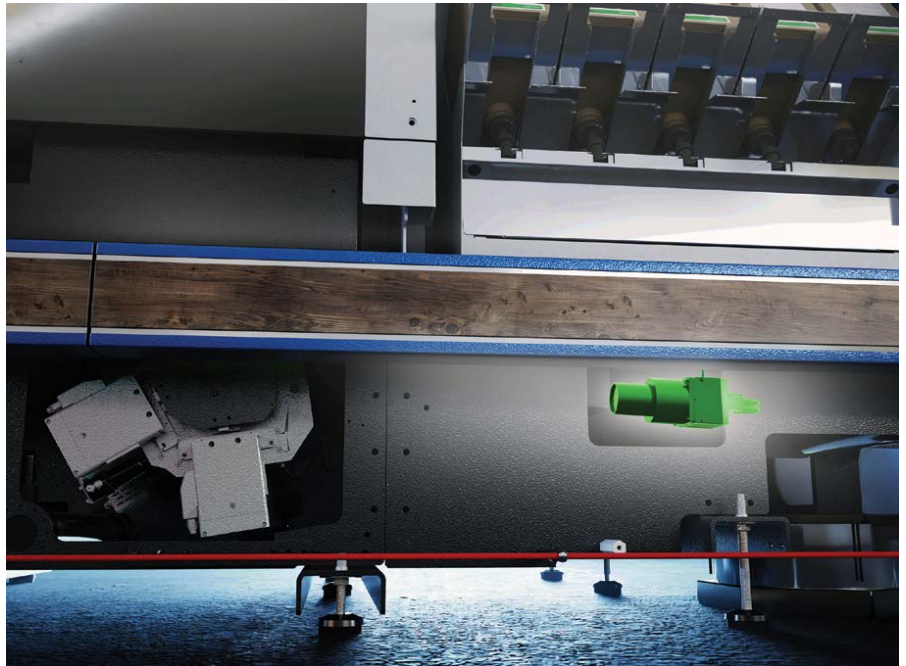
## Dieter Finna, of pack-consult, discusses the factors driving the development of hybrid, digital-flexographic presses

Reliability and speed of printing are no longer limiting factors for hybrid, digital-flexographic presses. They are, in fact, pushing their progress. Swiss press manufacturer Gallus Ferd. Ruesch AG, has always pursued the inline concept. Gallus states that in its development of new hybrid solutions, three phases have shaped its digital development.

Looking back at the design of Gallus presses, the production of labels and packaging, in a single pass, is in the DNA of the St. Gallen-based press manufacturer. This did not change even when electro-photographic, digital-printing processes and production methods – with stand-alone machines – made their way onto the label-printing market.

### THE BASIS OF CURRENT HYBRID SOLUTIONS

Gallus brought the Labelfire onto the market in 2016. The machine is a hybrid, digital-flexographic printing system and was introduced at the outset of the company using digital printing. In the following years, the Labelfire underwent significant development and is now used by high-performance operators in continuous, 24-hour operations. In today's market, the Gallus Labelfire is used equally for labels, folding cartons and specialist packaging. Having reached this stage, the company can look back at three development phases in the design of hybrid-machine systems.



Defects caused by missing nozzles, as well as density inconsistency, are monitored by a camera and compensated for using algorithms (Source: Gallus Ferd. Ruesch AG)

### PHASE ONE

Gallus describes the first phase in its development of digital printing as the innovation step. This involves the challenge of integrating inkjet printing into a hybrid digital/flexographic-printing system. The starting point was the initial lack of consistency in the performance of inkjet, compared to conventional processes. This

made it necessary to integrate improved printhead technology into the machine's design. With this integration, Gallus then succeeded in significantly expanding the process window in which inkjet printheads function reliably.

### PHASE TWO

In 2019, due to a lack of existing solutions on the market, Heidelberg/Gallus decided to carry out numerous in-house developments. These changes heralded the stabilisation – and thus the second phase – of its hybrid digital-flexographic printing system. The focus was on the camera-based 'Vision System' for artefact compensation and the associated development of necessary algorithms. These were installed to counteract detected errors, such as missing nozzles and density inconsistencies in solid areas.

**“Gallus describes the first phase in its development of digital printing as the innovation step”**

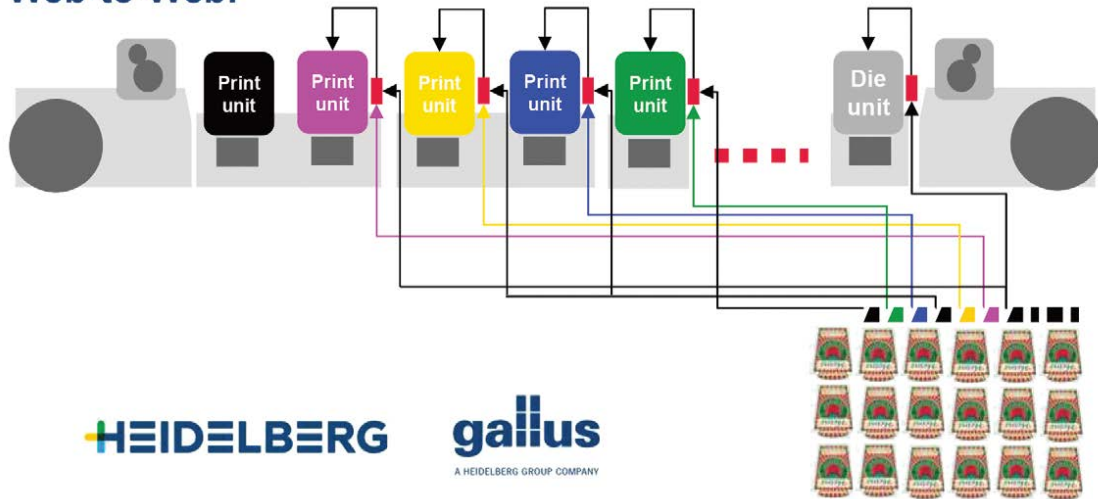
A major leap in print quality was also achieved by lowering the printheads nearer to the substrate. This significantly increased the jet accuracy of the ink droplets. In turn, the lowering of the printheads, prompted the installation of an automatic, splice-detection

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For cleaning, boxes with flood cleaning and ultrasonic cleaning units move under the fixed printheads (Source: Gallus Ferd. Ruesch AG)

## Web-to-Web:



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With web-to-web register control, sensors measure the distance between register and reference mark (Source: Gallus Ferd. Ruesch AG)

system. This system uses sensors to trigger an increase in the distance between the printheads and the substrate at short notice – when splices are detected in the web – and to protect the printheads from damage. This phase is generally referred to, at Gallus, as the period in which the company implemented fundamental development steps. These led to stable, continuous operation of the hybrid-printing systems and ensured Gallus a leading position in the elimination of process errors.

### PHASE THREE

In 2022, backed by the established Labelfire technology, the start of the third step focused on innovative, ease-of-use concepts. Developments that simplify digital printing and take the strain from operators is an increasingly important aspect, particularly at a time of a shortage of skilled workers. This included the further development of the 'Vision System' into a highly automated variant. The 'Vision System' enables a test chart that can be printed between each job, as opposed to manually once a day. This automated solution provides the operator with quick assistance when 'weak nozzles' occur. This only becomes apparent during day-to-day operations. In turn, direct elimination affects the print quality through the greatest possible process stability and consistency.

### **“A major leap in print quality was also achieved by lowering the printheads nearer to the substrate”**

Greater user-friendliness and standardisation are also achieved by cleaning the printheads in a fully automated cleaning process. In addition, the operator is able to activate an ultrasonic cleaning step. In practice, this design solution has proven itself to such an extent that physical contact with the printheads is no longer necessary

and is proving to be groundbreaking.

The fixed installation of the print bars and printheads also contributes to its ease of use. Permanently mounted printheads minimise the need for servicing and, thanks to this lower maintenance requirement, lead to significantly higher machine availability and an increase in productivity.

In general, all these design solutions are based on a high degree of automation with defined standards that enable the efficient integration of digital printing into hybrid-machine systems.

### CONVENTIONAL INFLUENCE

However, it is not only digital printing that has gained in performance for hybrid-press solutions. In parallel, the conventional basic/carrier press has evolved and its level of automation increased in favour of user-friendliness. For example, a press pre-set enables a job to be set up quickly by retrieving all press setting data from the job file. This allows for pre-set, including format length and format-length correction, substrate data with substrate type, web thickness and width, as well as web transport settings with web tension and stretch.

In addition, automation includes longitudinal and cross-register pre-setting, for each printing unit on every job. It also enables permanent register control and regulation during the run. This is a

highly convenient feature that frees the press operator from the task of constant monitoring across the entire run.

With web-to-web control, sensors measure the distance between the specially designed register marks and react precisely and quickly to deviations in the print image/register. Since the press automatically

adjusts the register as soon as the register marks are in the catching area, this mode of operation significantly contributes to the reduction of waste.

### CONCLUSION

Looking at the increase in performance in digital printing and the higher degree of automation of conventional press parts, a coherent picture in the construction of hybrid systems can be seen. The market is currently witnessing an increase in the development of new hybrid digital-flexographic presses. Digital presses, with inline finishing and/or flexographic units, are also on the up. However, various finishing processes, such as screen printing, hot-foil stamping, digital foiling and digital varnishing continue to slow down the inline process.

### **“... the start of the third step focused on innovative, ease-of-use concepts”**

Depending on the order structure, the future can lie in inline operation, especially for medium to long runs and an average degree of finishing. In this process, it is not surprising that the Gallus One, recently presented as a stand-alone machine, also follows the hybrid DNA of the St. Gallen mechanical-engineering company. Moreover, it includes expansion capability to become an inline or hybrid, digital-flexographic printing machine. ■

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