Headquartered in Löhne, north-west Germany, Koenig & Bauer Kammann makes printing machines for a number of sectors

HIGH SPEED SCREEN PRINTING FOR PREMIUM GLASS BOTTLE DECORATION

Axel Bohlmeier from Koenig & Bauer Kammann highlights technical advances in the field of industrial decoration of glass packaging using screen printing, and shares the development process for a machine targeting the premium decoration market

In recent years the development of digital printing process steps, in order to achieve a stable and repeatable process for commercial industrial printing, has received much attention. Less attention has been drawn to the quantum leaps that the screen-printing process has been making. This is not a comparison between digital and screen printing: both have their own right to exist and this can be done another time. But the advancements in the field of screen printing deserve a closer look.

Screen printing has been 're-discovered' as a tool for producing premium decoration on glass vessels. It has shown growths rates that go above and beyond the average.

These types of bottles are, with almost no exception, round and have a volume between 200ml and 700ml. Since this is a very clear definition/specification of the products to be decorated, it is possible for a manufacturer to design a machine customised to this application.

PROCESS

Before starting the design of a screen-printing machine, the process to use – ceramic or organic (UV/LED) – must be determined. For Koenig & Bauer Kammann it was an easy decision for various reasons. First of all, UV/LED inks do not meet the criteria for adhesion during the filling process; only ceramic thermoplastic inks offer the required adhesion and strength against abrasion.

Secondly, although UV technology has matured and cures at production speeds of 100 pages per minute (ppm), it is still not possible to cure at much higher speeds, especially on a machine with continuous motion articles transport. This brings us to the next point…

PRODUCTION SPEED

The average production speed of screen-printing equipment currently on the market is less than 150ppm, whereas the next generation of machines offers double speed: 300ppm. Why 300ppm? This figure has been

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identified as the most desirable printing speed because, on one hand, this is the speed at which inline decoration becomes viable with glass production and, on the other, the known and proven infrastructure can be used or upgraded for integration of the new high speed printing machine. By 'infrastructure' we mean existing screen-making processes can be used; the same ink suppliers can offer modified versions of standard inks and, if necessary, down flow equipment such as stackers can be upgraded to meet the higher speeds.

MACHINE CONCEPTS

The choice between two common concepts – an indexing and a continuous motion design – is not difficult to make. Machine speeds exceeding 100 cycles per minute typically prohibit the use of indexing-type machines because of the extremely high forces applied during acceleration and deceleration. This leaves us with a continuous motion process, which safely allows article transportation at 300ppm and higher.

FEATURES AND BENEFITS

As one of the leading manufacturers of glass container decoration equipment, Koenig & Bauer Kammann's screen-printing machines offer various features and benefits:

Optical/camera registration – lightweight glass bottles, which are produced to use less energy and material, make it impossible to use mechanical-type registration which uses a lug/ramp on the base or on the side of the bottle. Contactless optical/camera systems are necessary to replace the old process. A long-awaited improvement, which goes along with the implementation of optical/camera systems, is perfect colour-to-colour registration, which mechanical systems simply cannot offer.

Dual squeegee – at speeds of 300ppm, the use of a dual squeegee is strongly advised. The reason is that with two squeegee heads per print station, the relative printing speed (which is the rotational speed of the bottles relative to the squeegee during the printing process) is almost the same as the relative printing speed of 150ppm machines. Existing screen technology, squeegees and set-up procedures can all be used; with a dual squeegee, wear and tear on the screens (which can occur at higher speeds) does not increase.

The HS 300 is a high-speed printer for decorating glass packaging, such as beer and soft drink bottles

Ink pumps – the use of ink pumps, (which is very rare on standard-speed machines with an output of max. 100ppm) becomes mandatory on a high-speed printer. Ink pumps serve a dual purpose. Firstly, they supply the precise amount of ink required to the printing station via programmable dosing. Secondly, they maintain a correct temperature by means of a controlled heating system in an insulated container. Depending on the print image, consumption of 1–4kg of thermoplastic ink is not uncommon.

Print image inspection – another mandatory feature is the print image inspection system. Fortunately, existing systems used on standard machines offer a good base for the development of a high speed system. However, there are differences. In order to match the high speeds without scarifying inspection accuracy, the print image is looked at by the inspection system in six segments. These 60° segments are inspected individually and put together by software, allowing the operators to easily identify potential or actual quality problems. This greatly reduces reject rates and increases customer satisfaction.

In one minute, Koenig & Bauer Kammann's HS 300 can print 300 glass articles with ceramic thermoplastic inks

SUMMARY

To position premium products in the highly competitive field of beer and soft drinks, brand owners have rediscovered screen printing as a means of decoration, one that consumers can easily identify as 'high end'. At the same time, glass manufacturers and decorators are compelled to offer this kind of decoration at the lowest possible price. To make this possible and profitable, glass manufacturers/decorators must use state-of-the-art equipment.

Koenig & Bauer Kammann offers equipment that meets the criteria for implementing this process successfully. ■

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