

## Dürselen presents a global innovation in packing technology

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**Dürselen, global market leader in paper drilling machines, has revolutionised the production process for printed matter with a new packing system. Using the VA.02, for which a patent application has been filed, piles of print products can be packed automatically into containers for the first time. This closes the gap that previously existed in the otherwise automated workflow of brochure production. The new automatic packing machine is a global first, permitting an automatic changeover of container and paper formats at the touch of a button. This is made possible by the use of Mitsubishi Electric servo motors.**

Another globally unique feature for which Dürselen has filed a separate patent application is the process of aligning the pile of print products to be packed. Using a motion controller from Mitsubishi Electric, the print products are moved into free fall and aligned in the state of weightlessness thus created. In addition to exact alignment, this process offers extremely gentle product handling, which is particularly important for high-quality print products. The VA.02 from Dürselen is thus the first automatic solution available on the market for packing brochures into telescopic containers.

### The challenge

The production of printed matter in industrial printing presses and bookbinding shops has long been automated. Brochures, catalogues and leaflets are manufactured in a wide variety of formats and processed further, for example by stapling, binding or perfect binding – all highly automated processes. At the end of the process chain, too, the finished print products can be packed into boxes for dispatch by palletizing robots. In the middle of this automated workflow, however, the brochures have to be packed manually into containers. No machine has previously existed to carry out this physically demanding work. Precise alignment of the individual brochures in the pile to be packed could only be carried out manually.

In Germany, Austria, Switzerland and the Nordic countries, telescopic containers are used as standard to pack the finished brochures. The two-part containers made of boxboard or micro corrugated cardboard guarantee the ideal protection for print products against damage and UV radiation. Telescopic containers require no additional aids such as glue or adhesive tape, and thanks to their standard dimensions they are economical and easy to palletize, factors which benefit the value creation chain of printing presses. The environment is also protected through the use of recyclable packaging, some of which can also be disposed of easily by the end user.

At drupa 2008, Dürselen presented an automated packing machine that could pack finished DIN A4 print products, for example piles of brochures, into telescopic containers for the first time. The VA.01 was of enormous interest to the graphic arts industry and was used by Dürselen as a prototype for canvassing the requirements and requests of potential customers in industrial printing presses and bookbinding shops. In the course of these surveys, common requests were for automatic changeover for different brochure and container formats, larger storage capacity in the container magazine and the packing of brochures with the front page on top.

### The solution

In response to the specifications formulated by the customers, the VA.01, which could only be used to pack one format, was developed substantially further. The result of that development, the VA.02, is much more complex than its predecessor and can pack print products of dimensions 210x210 to 250x350 millimetres in suitable standard telescopic containers with different grammage. Half-formats can also be made up, such as two DIN A5 piles in one container for DIN A4 formats. The format changeover takes place automatically at the touch of a button, enabling the conversion to a new container size to be made in the minimum time.

The capacity of the VA.02 container magazine is sufficient for an operating time of approximately one hour before it has to be topped up again. The mechanical output of the automatic packing machine is around 700 brochure piles per hour, independent of material and format.

Before packing of the pile of print products commences, the VA.02 first turns the pile 180 degrees, so that a front page is on top when the container is later opened. The four sides of the pile are then aligned and the bottom of the telescopic container is drawn over the pile. The filled container base is turned over and the paper pile aligned again. In the last station, the lid of the container is drawn over the pile. The ready packed container can then be palletized.

The VA.02 is easily integrated into existing automated printed matter production lines. Both the product supply and delivery can be tailored to the specific requirements of the user. Depending on how the pile of finished products is transferred from the upstream machine, the VA.02 rotates and turns it over into

the correct position for further packing. The delivery system can be configured individually, for example by means of passive roller tracks or a driven conveyor belt depending on whether further palletizing of the ready packed containers is automatic or manual. A labelling or inscription system can also be easily integrated into the VA.02.

Dr. Anja Dürselen, Executive Board, Dürselen GmbH, says: "The production of printed matter is already highly automated with the use of adhesive binders or saddle stitchers. Palletizing can also be carried out by robots, but between the two stations the material still had to be packed manually in containers. This heavy physical work can now be automated with our VA.02, facilitating a continuous automatic workflow for the first time, for example in brochure production."

Hans-Joachim Dürselen, Executive Board, Dürselen GmbH, comments: "Mitsubishi Electric has always taken us seriously, even as a small family firm. The company has recognised the market potential of automatic packing machines and has lent the project active support with its know-how. We were thus able to design the VA.02 jointly, precisely to meet the requirements of customers in the graphic arts industry and realise the desired automatic format changeover, for example, with a motion controller and servo motors from Mitsubishi."

Marek Krogel, Head of Design, Dürselen GmbH, adds: "The small dimensions and compactness of the servo motors in Mitsubishi Electric's MR-J3 family helped us in particular in designing the VA.02. Using these we were able to install the individual modules of the different stations in the minimum of space. The System Q Motion Controller has made it possible for us to execute the unique alignment process in free fall."

#### Implementation

26 different movements are required for the alignment, turning and packing processes of the VA.02. These are realised using servo motors in the MR-J3 family from Mitsubishi Electric. Their compact size makes it possible to implement the different alignment, drawing and turning stations of the automatic packing machine in the minimum of space. The MR-J3 series is ideally suited for use with print materials, because the servo motors have an extended vibration suppression capability, facilitating exact alignment of the brochures for packing. These Mitsubishi Electric servo systems also have an auto tuning function. The drive is practical and self-configuring, adapting itself to the various moments of inertia of the different print product piles.

The individual servo amplifiers are networked with the Motion Controller and the programmable logic controller (PLC) via the SSCNET (Servo System Controller Network) from Mitsubishi Electric. The bus system utilises optical data transmission by means of fibre optic cables, reducing the wiring and thus minimising the space required in the switching cabinet. At the heart of the VA.02 is the System Q Motion Controller from Mitsubishi Electric. This controls all 26 servo motors of the packing machine, guaranteeing that the axes of the two alignment and drawing stations for the bottom and lid of the telescopic container run exactly parallel and in synchronisation.

Accurate control and adjustment of the individual axes and servo motors is also crucial for the complete automatic format changeover. As well as the time saving, the automatic changeover between different formats means that set-up errors are minimised compared with manual changeover.

In addition, the System Q Motion Controller can help to master the greatest challenge in the automated packing of brochure piles: optimum orientation of the print products. For improved protection, only 2 millimetres of space remains between brochure and container. In the alignment station of the VA.02, the piles to be packed are accelerated to such a high speed that they are in free fall for 0.15 seconds. In this weightless state, no friction forces exist and the pile can be aligned on four sides using synchronously switched stop motors.

The operator panel of the VA.02 is implemented using the GOT 1000 series from Mitsubishi Electric. Three different user levels are applied as standard here: the basic operator can only start preset programs; a supervisor can edit these and make program changes (password protected); and a service function makes it possible to control individual drives and carry out reference runs. Programming is the responsibility of Mitsubishi partner ATS Orgassa, which has focused primarily on minimising incorrect operation. Prior to the start of each program, the user must confirm the correct presets, supported by the graphics, and is reminded for example to insert the right container material.

By design, the VA.02 is a maintenance-free system with no lubrication points. On completion of every cycle, the suction units of the drawing stations are automatically cleaned of any container or paper dust sticking to them by a pulse of compressed air. For software updates or fault detection the operator panel has a direct interface for remote service to keep downtime and service costs to a minimum.

#### Outlook

The VA.02 is a global innovation for the graphic arts industry. The packing machine is attracting considerable interest from industrial printing presses and bookbinding shops. In addition to the market potential that exists in countries that already work as standard with telescopic containers, Dürselen hopes to penetrate further markets worldwide with this packing variant, which is environmentally friendly compared with film packaging.

In the course of possible further development it would also be conceivable to remove individual stations from the automatic machine as a whole and use them singly. For example, alignment of the pile in free fall could also be used for other process stages. The applications of the VA.02 don't have to be restricted to the graphic arts industry, either: it is conceivable that consumer goods or food could also be packed into telescopic containers in future using the innovative VA.02 automation technology.

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