

Hightech from HOMAG for bespoke special-purpose doors

HOMAG BOF 523 – Stationary cell for extreme requirements

Door manufacturers, particularly in central Europe, are facing increasing product diversity, stagnating sales figures and consequently dwindling batch sizes. The large number of additional routing operations required when producing functional or special-purpose doors mean that these can only be processed on an order-by-order basis. Taking into account factors such as extreme dimensions and fully automatic operation, it quickly becomes evident that extensive demands such as these can only be economically met using a stationary CNC processing cell.

Terms of reference for processing operations

Functional doors have to comply with widely different requirements:

- Fire protection
- Smoke protection
- Radiation protection
- Sound insulation
- Burglar resistance

Alongside standard processing operations, a range of additional trimming processes are necessary on almost all sides of the door leaf:

- Additional sealing grooves on the threshold side and also peripherally around all sides
- Palusol grooves in fire doors
- Multiple locking on the longitudinal sides and also upward and downward locks
- Recesses for special lock cases including flush mounted rosettes
- Special hinge configurations
- Recesses for glazing panels, ventilation grilles, spyholes or panel

inserts

- Applications on the surface
- Additional trimmed recesses on blanks required for cable channels or stabilizing frames.

To achieve the required degree of flexibility, all these processing operations must be capable of being performed without manual intervention, for example for changing tools.

Requirements imposed on the stationary cell

All listed trimming operations must be performed in one and the same machine. In order to achieve the high degree of flexibility required, both the processing machine and the handling device have to be equipped for a high level of automation. This also calls for the production cell to be integrated into the producing company's data processing network. Given the widely differing door blanks being processed and the necessity for 6-sided processing, a highly flexible handling system needs to be integrated in the line control which is capable of dealing with dimensions of up to 5,000 x 2,000 mm, door thicknesses of 120 mm and maximum weights of over 300 kg.

Technical implementation

Due to serious space limitations and given the extreme workpiece dimensions involved, a stationary cell encompassing the following components was engineered and implemented:

- Gantry-type vacuum feeder with integrated turning device and lateral alignment
- Moving gantry series 500 router with 3 processing spindles and throughfeed table
- Gantry type vacuum stacker with integrated flipping device

The stack of already sized or unprocessed door panels with cover layer overhang in different dimensions is automatically transported by the

transverse shuttle onto the stack roller conveyor under the gantry feeder once the suction beam has removed the dummy panel from the previous stack and deposited it on the dummy panel stack.

During the feed process, the barcode on the threshold side of the door panel is scanned in. This then affects the further handling sequence and all the processing operations. If applicable, the door panel can be flipped underneath the gantry feeder so that the underside is facing upwards.

The scanned part ID initiates CNC data integration for the door leaf, allowing the process to start immediately once the door has been transported into the processing machine. The router with its processing depth of 2,000 mm is structured on the basis of the mobile gantry principle. The machine bed made of the innovative material SORB TECH[®] permits highly dynamic processing and even better processing quality.

SORB TECH[®] provides maximum stability, absorbing almost all vibrations, even during the most demanding processing operations. As a result, the processing centre achieves a higher mass which allows faster acceleration processes and consequently improved productivity. Particularly where high levels of stock removal are involved or when hard woods are processed, this allows optimum workpiece surface quality to be achieved even at high feed rates. With these benefits, the HOMAG BOF 523 sets whole new standards in terms of rigidity and precision, as well as bringing about an impressive increase in tool life.

The two 28 kW HSC processing spindles and a compact 5-axis trimming head permit economical high-performance vertical and horizontal processing of door leaves up to 120 mm in thickness.

A total of 110 tools can be placed ready for automatic tool change. Each of the HSC processing units is fitted with a proven spindle tracing system (Sensoflex) for application processing operations and a measurement sensor system.

Following a maximum of 5-sided processing, the door leaf is transported out of the router into the stacking system, while the next door leaf is normally being guided into the processing machine. Any door leaf requiring 6-sided processing can be dealt with in one of two ways:

The door leaf is transported into the stacking area, where it is flipped and fed back into the router for processing the sixth side.

If 6-sided processing is required on several door leaves, they can be stacked in a specially selected location and then flipped over either during the destacking process or when they are fed back into the machine. This stack is then returned to the feeder and the door leaves processed on what was previously the underside. Before stacking, a repeat flipping process is possible to return the door leaf to its original position.

During transportation of the door leaf out of the processing machine, both surfaces are cleaned by means of tornado nozzles and sword bushes, and if necessary a label can be applied again on the threshold side. During the stacking process, the waste pieces cut out during processing are automatically disposed of in waste piece containers while processing operations continue uninterrupted. Smaller waste materials produced during processing at the router drop onto the chip belt and are transported into the container. The finished stack comprising doors of different

dimensions which have undergone various processing operations can be transported out of the stacking area once full, to leave space for uninterrupted continued processing of the next door leaves.

Scope for intervention in processing operations

If the operator notices during processing in the router that an additional processing operation is necessary, or that the door leaf has to be deposited on a different stack than originally planned, this can be changed or added and immediately executed by the operator during running processing operation. This means that even a fully automatic sequence can be influenced by the operator.

The machine control system is linked by an online connection with the customer's own ERP system, from which prepared data for each door leaf can be accessed on the basis of the production list.

In the event of orders involving somewhat larger batch sizes, it is also possible to work through a production list.

Summary

An extreme part and processing spectrum does not need to pose an unsolvable challenge. The wide variety and flexibility provided by the HOMAG's different router series can be put to optimum use here. For workpieces with extreme dimensions, mobile gantry machines offer an ideal solution: Their rigid structural design and HSC processing spindles permit high routing speeds coupled with optimum processing quality. The two HSC spindles offer a similarly high degree of flexibility. As these spindles can access the same change changer, maximum scope for different processing operations is offered with a given number of tool slots. Also important to remember are the handling devices which permit one-man operation throughout the entire processing cell. In conjunction with the moving gantry router, this permits the space requirement to be minimized relative to the extreme workpiece dimensions. Another aspect of flexibility in this context is the ability of operators to intervene in a

running processing operation and undertake changes. Man and machine work together to form a perfectly coordinated unit.



Fig. 1:
HOMAG BOF 523 – Stationary cell for extreme requirements



Fig. 2:
Gantry design using patented **SORB TECH**® technology from HOMAG



Fig. 3:
Electronic spindle tracing (Sensoflex) for application processing



Fig. 4:
Compact 5-axis processing unit



Fig. 5:
Light recess processing



Fig. 6:
Hardware processing

For more information, contact

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