



MHF
MASCHINEN- UND ANLAGENBAU

IN MOTION

Best Practice

Examples of realized industry solutions

Contents of this edition

- 360° wrapping system for the furniture producer Ecolor
- Groove cutting system for the Dutch door manufacturer Berkvens
- Complex packaging line with robot technology
- Double-end tenoner



Materials competence in timber

- Chipboards and MDFs, also coated and lacquered
- Plywood panels
- OSBs
- Coated profiles
- Sandwich panels

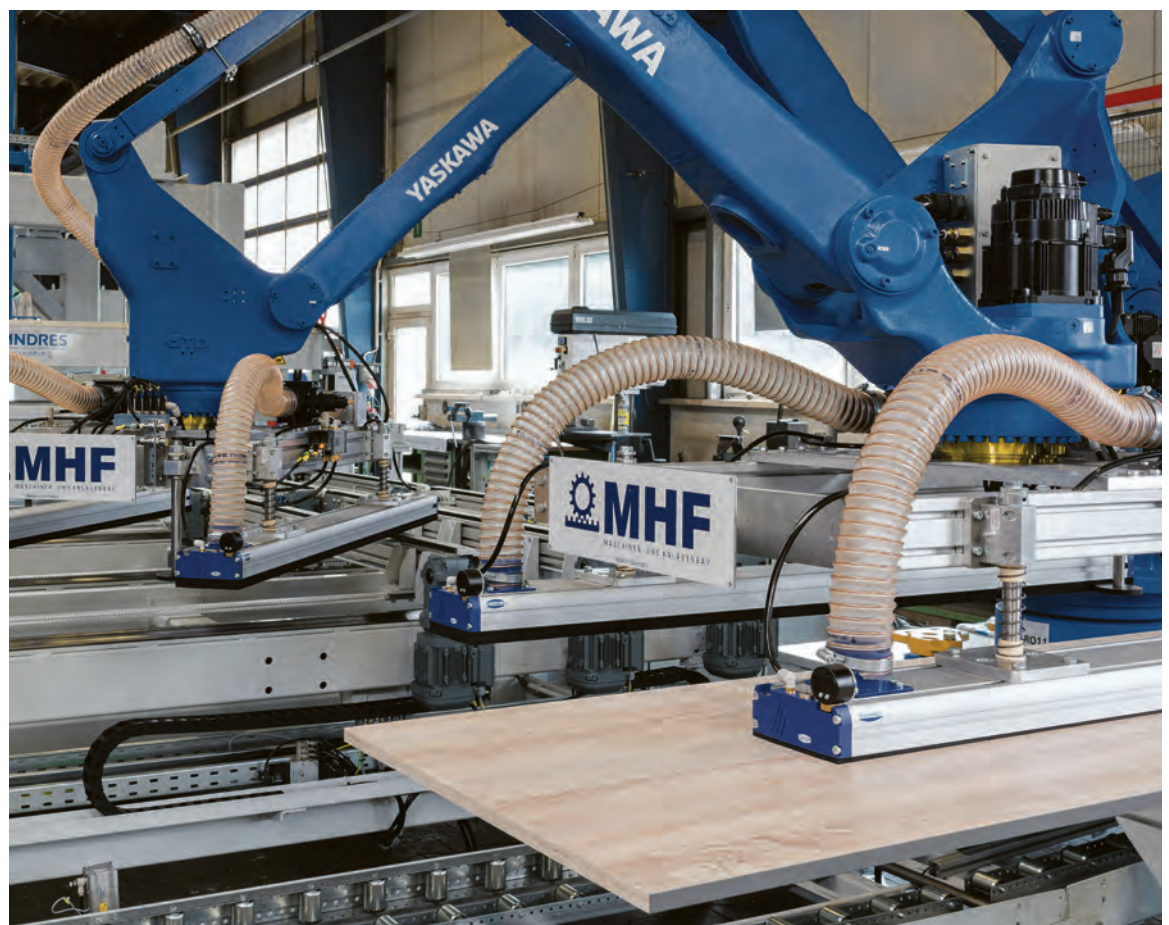


Materials competence in construction materials

- Cement boards
- Gypsum fiberboards
- Gypsum plasterboards
- Fiber-cement boards
- XPS boards

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MHF – SPECIALIZED IN INDIVIDUAL PLANT ENGINEERING FOR MORE THAN 35 YEARS



We optimize production flows with **commitment and competence**.

LONG-STANDING EXPERIENCE IN THE REALIZATION OF COMPLEX TASKS

We develop innovative plant solutions adjusted to customer-specific requirements. MHF plants are in operation worldwide. In any cooperation, we consider it essential to optimally integrate existing manufacturing components or standard modules from subcontractors. In close dialog with our customers we pursue the objective to achieve the highest possible degree of economic efficiency and perfect production flows. Our customers value us as a one-stop supplier where they can get everything from engineering through to delivery from one source. To optimize assembly times during production, we test the complete functionality within the scope of our quality assurance at our production site in Rietberg/Germany. On the following pages, we describe four realized projects for different lines of business. We are looking forward to discuss your individual tasks with you.



Handling technology

Robot technology

Sawing and milling technology

Wrapping technology

Everything from one source
– prime contractorship
convinced our
customer Ecolor.

Wrapping line
360° wrapping line with
intelligently arranged roller
track.



360° WRAPPING LINE – SMOOTH QUALITY EDGES FOR BEAUTIFUL FURNITURE

The furniture producer for renowned brands, Ecolor, ordered a 360° wrapping line with automatic feeding and stacking system.

Customer requirements

Ecolor's customer requested smooth, closed-cell edges at the profiled MDF or chipboard edges featuring a width of up to 300 mm. To ensure that this quality requirement could be met, the subcontractor Ecolor decided to order a completely new wrapping line with the following components:

- Automated raw board feeding
- Multi-blade dividing saw
- Edge profiling system
- Belt magazines
- Edge sealing
- Wrapping
- Chop saw
- Automated sorting and stacking system

Application description

MHF realizes all tasks acting as a prime contractor. The machine for

dividing the raw boards and the profiling machine were provided by the customer and integrated in the process by MHF. The workpieces featuring a width of up to 300 mm are wrapped on four sides in a single process. To ensure smooth, closed-cell edge quality, the two longitudinal edges are sealed with a suitable filling adhesive.

Technical competence

MHF has long-standing experience in the planning and realization of wrapping systems. The workpieces pass through the wrapping line horizontally, i.e. flat. Both narrow sides are simultaneously sealed; 360° wrapping is performed right thereafter. The decisive advantage is that the parts are sealed at both sides and directly wrapped on four sides in a single production step.

Seized opportunities

The approach as described above yields the following results:

- Space-saving solution due to

compact dimensions

- Smooth workpiece guidance optimizes the surface quality
- The wrapping speed including edge sealing is up to 55 m/min

Customer satisfaction

The total system designed by MHF convinced the engineers at Ecolor. Midyear 2017, the mechanical engineers in Rietberg were awarded the contract for the wrapping technology including the integration of the two existing system solutions. After a very short assembly and commissioning time, the equipment went successfully into operation at the end of 2018. The customer is delighted with the achieved quality of the smooth, closed-cell edges.

PRODUCTION SEQUENCE

- Stack delivery via forklift (raw chipboards).
- Stacks are automatically conveyed to the bottom of the feeding system.
- The top board is removed by the feeding system by means of vacuum suction cups, placed on a roller table, aligned and conveyed through a dividing saw.
- After separation, the cut strips are transversely singulared and conveyed to a belt magazine.
- The belt magazine conveys the parts seamlessly to the milling machine, from where the parts are transferred to another belt magazine.
- From another belt magazine the parts are conveyed seamlessly with a feed rate of 20–70 m/min to the wrapping system and wrapped at four sides.

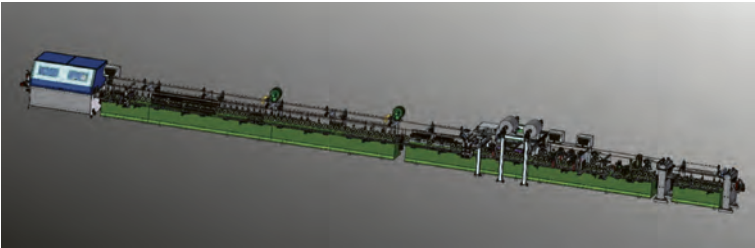
The workpiece consecutively passes the following zones in the wrapping system.

- Length measurement of the components to enable separation in the outlet area by means of a flying saw.
- Edge grinding unit with one left and one right belt sanding device.
- For edge sealing with sealing EVA, rollers with active cooling are installed behind the application nozzles to ensure quick hardening.
- Foil unrolling unit with two foil rolls to ensure quick roll change.
- Infrared preheating for workpiece and foil.
- Glue is applied through a slit die with infinitely variable width. The unit can be laterally moved for cleaning purposes.
- Wrapping line with hot air nozzles.
- Edge finishing unit with active cooling.
- Surface finishing rollers.
- After leaving the wrapping line, the parts are cut to length at the joints by means of a saw (flying saw). The saw features a feed rate of max.120 m/min. The cutting tolerance of the chop cut is +/- 2 mm.

Subsequently, the parts are collected on a timing belt conveyor and stacked on base boards by means of a gantry stacking unit using vacuum suction cups.



Double foil unrolling with automatic transport connection and infrared heating.



Wrapping line with flying saw.

WORKPIECE PARAMETERS

MATERIALS DATA RAW BOARDS

Length:	min. 2500–5600 mm
Width:	min. 650–1500 mm
Thickness:	min. 12–40 mm
Material:	HDF/MDF/chipboard

MATERIALS DATA PREFABRICATED COMPONENTS

Length:	min. 2500–5600 mm
Width:	min. 65–310 mm
Thickness:	min. 12–40 mm

GENERAL DATA

Feed rate:	20–70 m/min
Adhesives:	Wrapping adhesives EVA Sealing of edges with sealing EVA
Wrapping material:	Foil and paper
Max. foil width:	700 mm

GROOVE CUTTING SYSTEM FOR THE DUTCH DOOR MANUFACTURER BERKVEN'S

Technical data

Total length: approx. 7500 mm

Total width: approx. 3500 mm

Roller length feed roller:
approx. 2700 mm

Working height: approx. 980 mm

Conveying speed v_{max}: 5–20
m/min, adjustable via frequency
converter

2 pairs of rubberized feed rollers,
motor-driven, infinitely variable
height adjustment by 100 mm.
Driven by asynchronous servo motor.

4 milling units, motor-driven,
steplessly movable in X direction
via gear rack with a positioning
accuracy of +/- 0.2 mm.

Height adjustment of milling units
via positioning drive and spindle –
positioning accuracy +/- 0.03 mm.

4 milling units 3 kW each, max.
rotational speed 4,800 rpm with
workpiece downholder and
pressure shoe, mounted resiliently
to the workpiece. The pressure shoe
can be adjusted by means of adjust-
ing screws and indicating gage.

4 grinding units 0.25 KW each,
max. rotational speed 500 rpm
with standstill monitor, flanged
onto the milling units. Each grin-
ding unit has an additional lift of
20 mm for inserting and removing
the grinding tool.



Customer requirements

Ensuring consistency and straight-forwardness of the design is particularly essential for smooth door surfaces. This is why it comes down to the precise manufacture of grooves in terms of width and depth. Based on MHF's longstanding experience regarding precisely fitting processing steps, we were awarded the purchasing contract in the second quarter of 2018.

Application description

The system cuts up to four grooves simultaneously in one throughput into doors, door blanks or HDF/MDF/chipboards and grinds off possible protrusions of the resulting contour in a further processing step. The components can be processed in longitudinal and transverse throughput.

Technical competence

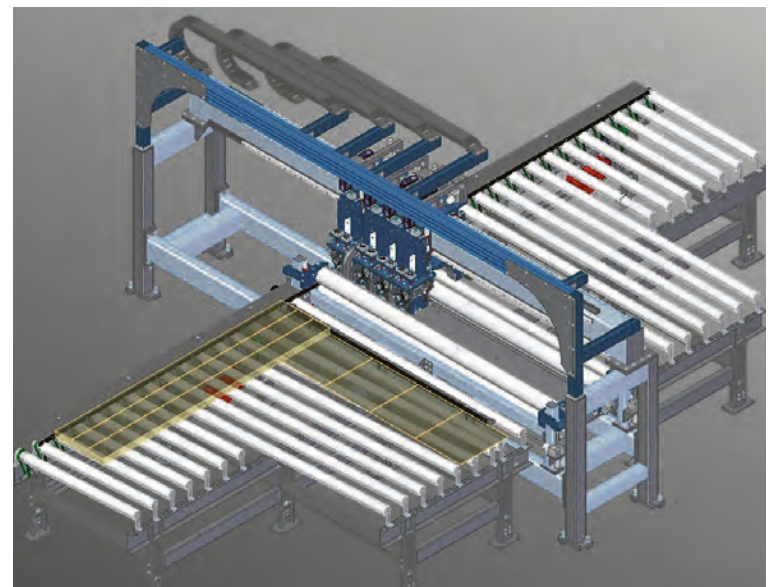
The system is operated as a stand-alone machine and is loaded and discharged by an operator. Other options for loading and discharging are employing robotics technology or integrating the plant component in a manufacturing line. The existing database connection transfers the required process parameters by means of a barcode scanner. The setting of groove distances and cutting depth is fully automated using positioning drives. In terms

of production technology, a size-1 batch is possible without presenting any problems. To balance tolerances in the raw material the groove cutting units are resiliently mounted.

Production sequence

The machine operator scans the product to be processed and the machine adjusts to the preset process parameters without requiring any further effort. After the machine operator has placed the product onto the roller table, it is automatically conveyed to an alignment stop. The feed roller conveys it

through the resiliently mounted cutting units. Subsequently, another feed roller conveys the product through the grinding units. According to the customer's wishes, the system can be operated with or without grinding. Now the component is conveyed to the removal position, where it is removed by the machine operator and stacked on a lifting table.



Full view of the individually planned groove cutting system.

WORKPIECE PARAMETERS

MATERIALS DATA DOORS

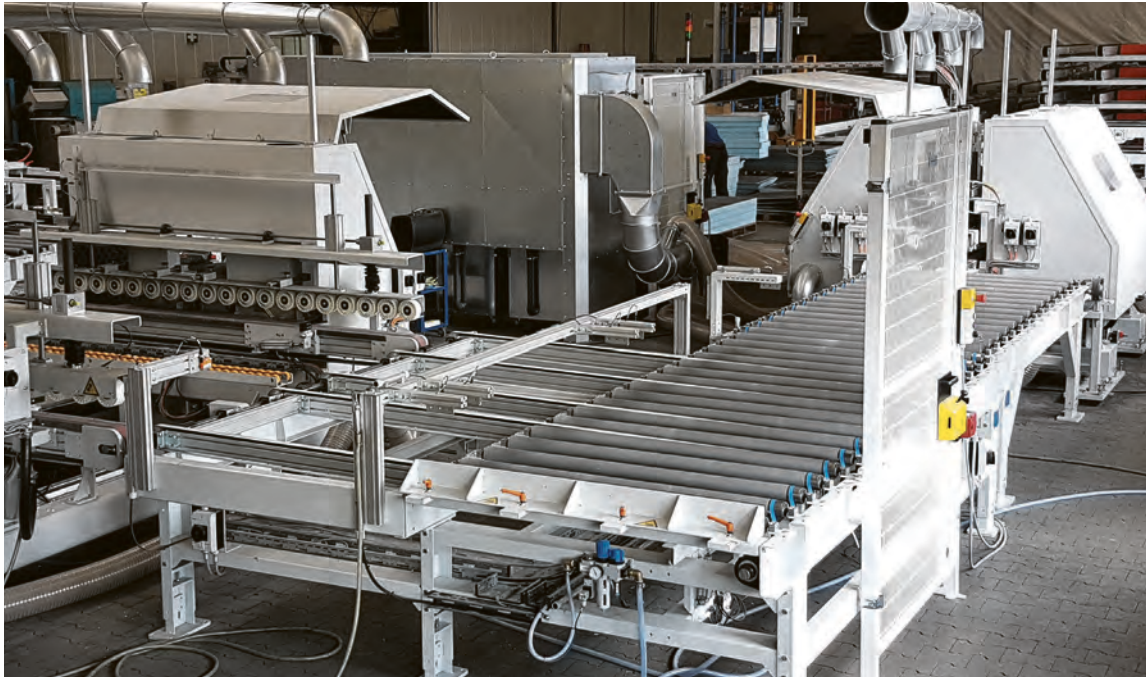
Length:	min. 1500–2600 mm
Width:	min. 550–1250 mm
Thickness:	min. 38–60 mm
Weight:	max. 50 kg

MATERIALS DATA DECKS

Length:	min. 1500–2600 mm
Width:	min. 550–1250 mm
Thickness:	min. 2,5–10 mm
Weight:	max. 30 kg
Material:	HDF/MDF/chipboard

CONTOUR

Groove depths:	min. 0,35–1 mm
Groove widths:	min. 6–30 mm
Smallest possible distance in processing with four grooves:	1 × 75 mm, 2 × 200 mm



Angular system for four-sided processing in one throughput.

DOUBLE-END TENONER FOR A RENOWNED GERMAN CONSTRUCTION MATERIALS MANUFACTURER AT THE PRODUCTION SITE IN THE US

Customer requirements

The objective is to process construction panels that feature a very brittle surface on both sides into tear-free panels cut-to-size on four sides to be transferred to surface printing. The high predefined cycle time requires smooth passage and processing of the panels during their passage through the system.

Application solution

MHF has already manufactured, delivered and commissioned several systems for the processing of construction panels. This is why we were able to convince the renowned construction materials manufacturer by our concept with trimming saws including scoring technology for longitudinal and transversal processing as well as up- and downstream conveying technology. The angular transfers and trimming saws were individually adjusted to customer-specific

requirements at the production site in the US.

Production sequence

After all guard doors and protective caps have been closed, the machine operator selects the planned article number on the panel. The system is then automatically preset to the corresponding panel length, widths, and height.

The machine operator positions the construction panels, coated on both sides, onto the non-driven roller conveyor against the longitudinal stop on the right, until the top roll pressure of the longitudinal saw has reached the panel and conveys it automatically through the system.

Once the incoming panel has left the longitudinal stop on the right, the next panel can be loaded. A fence protects the hand from reaching into the space between top roll

pressure and panel. The construction panel runs through the longitudinal profiling equipment and is cut to the preset width at the longitudinal edges. Any protrusions are completely cut.

After the panel has left the top roll pressure, it is accelerated and conveyed to the transversal stop at the end of the roller conveyor. The transversal stop had also been set to the excess length to be cut off on the following profiling machine during machine setting. Timing belts lift the panel and align it in transversal direction against two stop panels coming up.

When the panel is positioned in front of both stops, the stop panels swing out of the way and the panel is conveyed by the transversal saw and cut to the predefined length. Subsequently, the panel is conveyed by means of timing belts

WORKPIECE PARAMETERS

Longitudinal and transversal processing of panel-shaped workpieces

DIMENSIONS

Width: 550–1250 mm

Length: 1100–2750 mm

Thickness: 4–80 mm

PANEL PROTRUSION

10–15 mm at the longitudinal edges (completely cut)

15–20 mm at the transversal edges (completely cut)

PANEL WEIGHT

max. 25 kg

WORKING HEIGHT

900 mm +/- 30 mm

CYCLE TIME

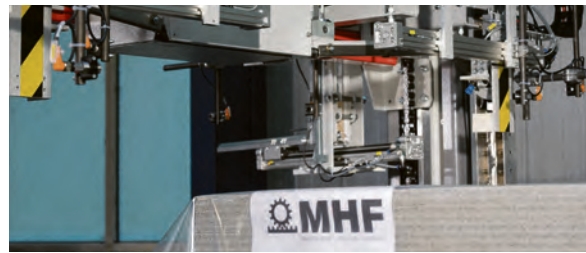
7 panels per minute

and placed on the roller conveyor. Through minor tilt of the rollers, the panel is conveyed to the stop ruler and transported in longitudinal direction via roller conveyors. During this process, it is guided through a printer and a labeling machine. These additional modules were supplied by the customer and integrated in the systems engineering.

At the end of the production line, behind the protective fence, is a non-driven roller conveyor from which the panels are removed manually. In case removal is delayed, sensor technology will shut down the machine.

Customer satisfaction

For more than one year now, with this manufacturing equipment the customer has achieved tear-free edge quality while the rectangularity of the panel is well within the required range.



Packaging line with edge and corner protectors.

Technical data

Pallets

Width: 1250–1350 mm
Length: 1000–3000 mm
Height: 120–155 mm

Stacking height

390–800 mm including pallet

Stacking weight

3000 kg

Labels

Four different DIN A3 templates are stored in a magazine drawer of the printer. The label is sprayed with a pressure-sensitive adhesive and fastened on the left of the stack below the first strapping, approx. 200 mm away from the front edge of the stack.

Edge protection

The vertical edge protection is glued to the top foil on top of each stack edge and attached to the bottom of the pallet with a staple.

If the stack width is smaller than the pallet, a short edge protector is attached and no staple is used at the bottom. The protectors at the bottom are attached manually by the employees.

Adhesive

Hotmelt adhesive

Foil

The top foil lies unfixed on the stack and is included in the strapping. The vertical edge protectors are glued onto the top foil at the stack edges.

Capacity

90 seconds per pallet

PACKAGING LINE WITH ROBOT FOR A GERMAN MANUFACTURER OF CONSTRUCTION PANELS

Customer requirements

Construction panel stacks of most different sizes and in most different sequence come from a cut-to-size plant. The technical challenge is to find a solution for providing and fastening the following four items:

- Fastening a label indicating article number, number of panels per stack, panel dimensions, etc.
- Placing the top foil as a protection against the rain
- Placing two to four strapings depending on the stack size with edge protection
- Attaching edge protection to all four corners of the stack

Application solution

Manufacture, delivery, mounting and commissioning of a complete packaging line for construction

panel stacks including control and safety devices.

Production sequence

The construction panel stacks with most different formats and mixed sequence are made available on a conveyor.

- 1 Input buffer space – transfer carriage passes on the stack of construction panels to the first modular chain conveyor
- 2 Modular chain conveyor II and label applicator
- 3 Top foil dispenser with modular chain conveyor III
- 4 Stack strapping with modular chain conveyor IV

- 5 Station for attaching cardboard protectors and robot control with modular chain conveyor V

- 6 Removing of the stacks through modular chain conveyor VI

- 7 Control and control cabinet

- 8 Safety technology including muting system, light barriers, safety fence, and safety door

Customer satisfaction

The total system designed by MHF optimally meets all customer requirements. Based on the convincing results, subsequently further projects were realized.



Packaging line – fully automated packaging line with labeler.