

## RESOURCE-FRIENDLY DOOR FINISHING LINE

Environmentally friendly and resource-saving finishing with a simultaneous increase in production requires the use of new technologies or an intelligent combination of patented technologies and processes. For the door manufacturer Garant, Venjakob as general contractor has created a door coating line that relies on a new circulating air process with state-of-the-art spraying technologies.

### CUSTOMER PROFILE



Core of the door finishing line

**GARANT Türen und Zargen GmbH**, founded in 1991, has established itself as the top producer of doors and frames in Germany. In 2021, the Garant plant in Amt Wachsenburg in the state of Thuringia produced around 800,000 doors and 700,000 frames to supply wholesalers and specialist shops. Sustainable, ecological and forward-looking — GARANT products and processes have been awarded a variety of certificates. In December 2016, GARANT became part of ARBONIA AG, a large European building component manufacturer.

### THE REQUIREMENTS

#### Energy-efficient production increase

By adding an automated “spray robot production line” GARANT was aiming to increase its production volume in order to ensure the availability of sufficient capacity until 2030 while maintaining the same high quality. The company wanted the production line to be equipped with new technology to allow more energy-efficient sanding, spraying and drying. Another crucial requirement for the customer was end-to-end recognition of the barcode attached at the foot of each door. This barcode had to be protected from paint mist to remain readable throughout the production process. So far the barcode had been covered manually, with removal of the protection strip after the coating process. An additional challenge was posed by the fact that the new line was to be installed very close to (1 - 1.8 meters from) the existing line that still remained active.

### THE IMPLEMENTATION



Recirculating air/humidification Unit

#### Plenty of savings, fewer pollutants

The complete coating system, in which doors are coated in throughfeed production, was designed to save time but also to protect the environment and save resources. Using a combination of innovative processes and established technologies, the new system reduces the energy balance per unit produced. For instance, the energy balance in the drying system improves as the production capacity increases.

#### Combined circulating air system saves heating power

In pure circulating air mode, heating power is required to heat up the fresh air that enters the system until it reaches the required temperature for coating. When using water-based coating materials, as Garant does, the circulating air flow would also have to be cooled, as it continues to heat up, which is not ideal for the coating process. Cooling would have consumed additional energy. The solution was a system combining circulating air with a special air treatment system for air moistening. The moistening system uses evaporation cooling to cool down the air flow while simultaneously providing additional moisture. In addition to the spray

# GARANT TÜREN UND ZARGEN GMBH | SUCCESS STORY

booth, the combined circulation system also provides moistened air to the 10-level dryer. No separate water circuit had to be installed. In addition to reducing heating energy and CO<sub>2</sub> emissions, this solution also decreases waste water pollution. The water leaving the air treatment system now only contains clay particles.

Combined with the high air humidity, the six AirCoat spray guns used increase the coating efficiency. Less coating material is used and, as a result, the consumption of filters for cleaning is reduced by 30 to 50 percent.

## **Reduced consumption through material recovery system**

Another technology for increasing sustainability is the integrated Venjakob material recovery system. It consists of a patented V-belt and allows the operating company to recover 90 % of the overspray from the conveyor belt. The system returns the recovered coating material to a central material container without significant losses due to material drying. The coating material can be reused without a decrease in quality. This can reduce consumption of the coating material used by approx. 30 percent compared with other recovery systems.

---

## **THE PROCESS**



VEN SPRAY BRUSH



VEN SPRAY PERFECT

## **Completely automated surface treatment**

Due to the available space determined by the adjacent line, the new coating line was designed in a U-shape with anti-clockwise circulation. The feed and discharge are directly next to each other. A feeding system with two robots is used at this location. One robot positions the arriving doors on the conveyor belt. The other robot removes the coated and dried doors from the belt and stacks them.

## **Pretreatment**

Once a door has been placed in the line by the robot, it is transported by a conveyor belt, top edge first, into the closed door edge sanding machine. In this machine the door is positioned on a roller conveyor and held in place by adjustable top pressure rollers. Sanding brushes sand the two longitudinal edges and the transverse edge of the door. It is then transported further to a closed wide belt sanding machine. A subsequent intermediate conveyor belt with a length of 3,500 mm makes manual sanding of V joints possible. The door then moves on a driven roller conveyor into the closed dust removal unit for intensive cleaning.

## **Coating**

After the preliminary work, the door is transported directly into the spray booth. In the booth, water-based UV coating material is applied by automatic AirCoat spray guns. Six guns are used for the faces and vertical edges, two additional guns coat the top edge. Thanks to the special design of the air channels, these light and compact guns ensure fine atomisation and reduce overspray. The spray guns have been adjusted so precisely by Venjakob that no coating material ends up on the barcode, which previously had to be covered manually. The automatic coating system, equipped with a quick paint-change system and dry extraction, is designed for throughput speeds of 10 m/min.

# GARANT TÜREN UND ZARGEN GMBH | SUCCESS STORY



Team of Garant: V.l.n.r.: Enrico Stephan,  
Maik Schönheit, Marian Möller

## Drying

The door is transported further on a closed conveyor belt with moistening and technical ventilation, which acts as a settling zone, into the 10-level dryer for evaporation. The next steps are drying in a high dryer on pallets, a jet drying channel and a UV drying channel. In the final step the doors are transported through a 6,000 mm jet cooling channel. To permit two-sided coating, the completely coated and dried door is turned by a conveyor belt drum turning unit prior to being discharged. If only one door face is supposed to be coated, the door passes through the drum turning unit without being turned. This step is defined using the control system and the corresponding recipe management. The completed door enters the removal station, is stacked by the robot or is returned to the system via a cross transfer.

## SPECIAL FEATURES AT A GLANCE

- Venjakob as a general supplier offers everything from one source
- Saved energy thanks to combined circulating air system
- Reduced CO<sub>2</sub> emissions and no pollutants in waste water
- Filter consumption reduced by 30-50 percent
- High surface quality
- Fully automatic handling with robot feeding
- Quick paint change
- Simple cleaning and maintenance of the extraction system using extraction boxes pulled out to the side
- Reduction of coating material consumption by approx. 30 percent compared with other coating material recovery systems
- Precise adjustment of spray guns makes protective strips for barcodes unnecessary
- Infinitely variable electronic power adjustment for UV dryer permits re-adjustment of lamp service life
- Effective power adjustment in UV dryer compensates for voltage fluctuations
- Remote maintenance system permits quick support in the event of a system malfunction

## FACTS AND FIGURES

### Operating width:

1,300 mm

### Door dimensions (L x W x H):

min. 1000 x 140 x 35 mm, max. 2500 x 1235 x 60 mm

### Spray medium types:

1-component water-based UV coating material

### Throughfeed speed spray coating system

10 m/min

### System cycle time:

Door-dependent (from 48 to 96 seconds)

### Conveying speed:

10 m/min like the spraying machine (but can be adjusted from 3 to 15 m/min as for all conveyors, including in the spraying machine)

### Drying time:

for 10 m/min, approx. 20 minutes

### Throughfeed per hour:

max. 75 doors per hour