

Automatic on the Pan

As one of the leading manufacturers of high-quality cookware, Fissler is globally well known. The company develops its innovative coatings itself and also applies them to the products. Robots help with this. In the new facility, frying pans made of aluminium and stainless steel with a high variance are coated fully automatically.

Frank Reiter

Fissler GmbH in Idar-Oberstein, Germany, is a traditional German company that has been producing pots and frying pans for the whole world in Germany for over 175 years. The specialist for high-quality cookware relies on the in-house development of innovative coatings. For example, the Senso Red indicates the correct frying temperature by changing colour, and the robust Adamant non-stick coating is designed to ensure long use with easy cleaning.

Fully automatic coating line

In the course of optimising production, a completely new factory including a fully automatic coating line was built in Hoppstädten-Weiersbach, Germany. In the plant, several thousand frying pans

made of aluminium and stainless steel with different diameters and heights are automatically coated per day. The objective included the fast, fully automatic change of geometry, sizes and coating structures without interrupting production. Depending on the model and finish, the pans are coated in up to eight different process steps.

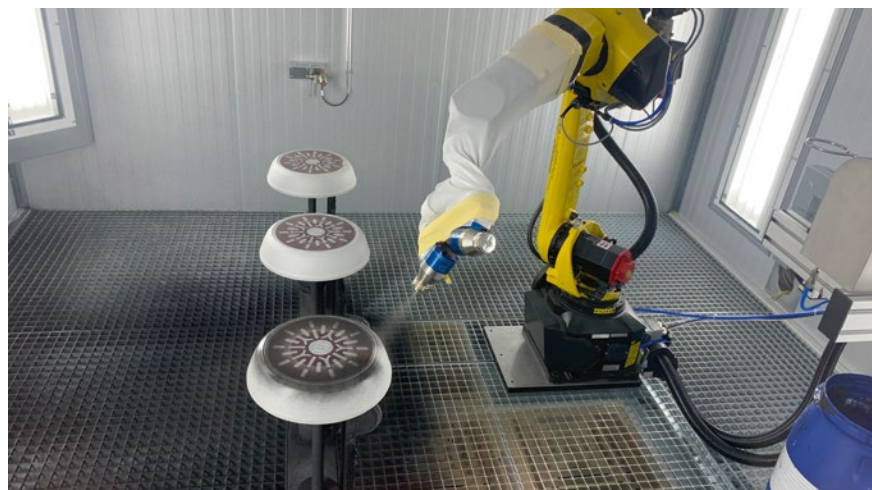
Tests in advance

The project was implemented together with Reiter GmbH + Co KG Oberflächen-technik. The project began with extensive tests in the technical centre of the surface technology specialist in Winnenden. Together with the technicians from Fissler, the design of the application technology and material supply were checked in de-

tail and finally determined. In addition, the quality, cycle times and application efficiency of the various processes for the defined sample part were determined in the technical centre.

Various paint systems and processes

The components are coated several times in the plant in different colours on the inside and outside. The interior and exterior surfaces can be finished in the same colour or in different colours. Water-based lacquers and SolGel/ceramic lacquers in high-gloss or matt finishes are used. Several robot painting booths were implemented for the coating process. The pans are placed in blocks of three on rotary stations by handling robots and manipulated automatically. The application



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Active painting in the paint booth for exterior coating.

is carried out with automatic air atomisers whose specification (air cap, nozzle, packing) was adapted to each paint material. Since several materials are processed in each booth, Reiter has developed an optimised duo adapter to accommodate two automatic guns with matching cleaning stations.

Application with process control

To ensure the required reproducibility and quality of the coating, the engineers rely on the monitoring of all process parameters. The air volume specified in the programme is monitored separately for the fan air and the atomiser air by means of flow sensors and deviations are evaluated. The desired material quantity is monitored via Coriolis measuring devices. Different quantities between only 5 and 250ml/min are applied, depending on the material. In addition, the temperature and density of the materials are measured, the correct rinsing and changing processes are monitored and evaluated for errors. The recording and logging of the consumption values for each coated component, together with the fault monitoring, allow an OK/NOK evaluation for each part and thus perfect process control.

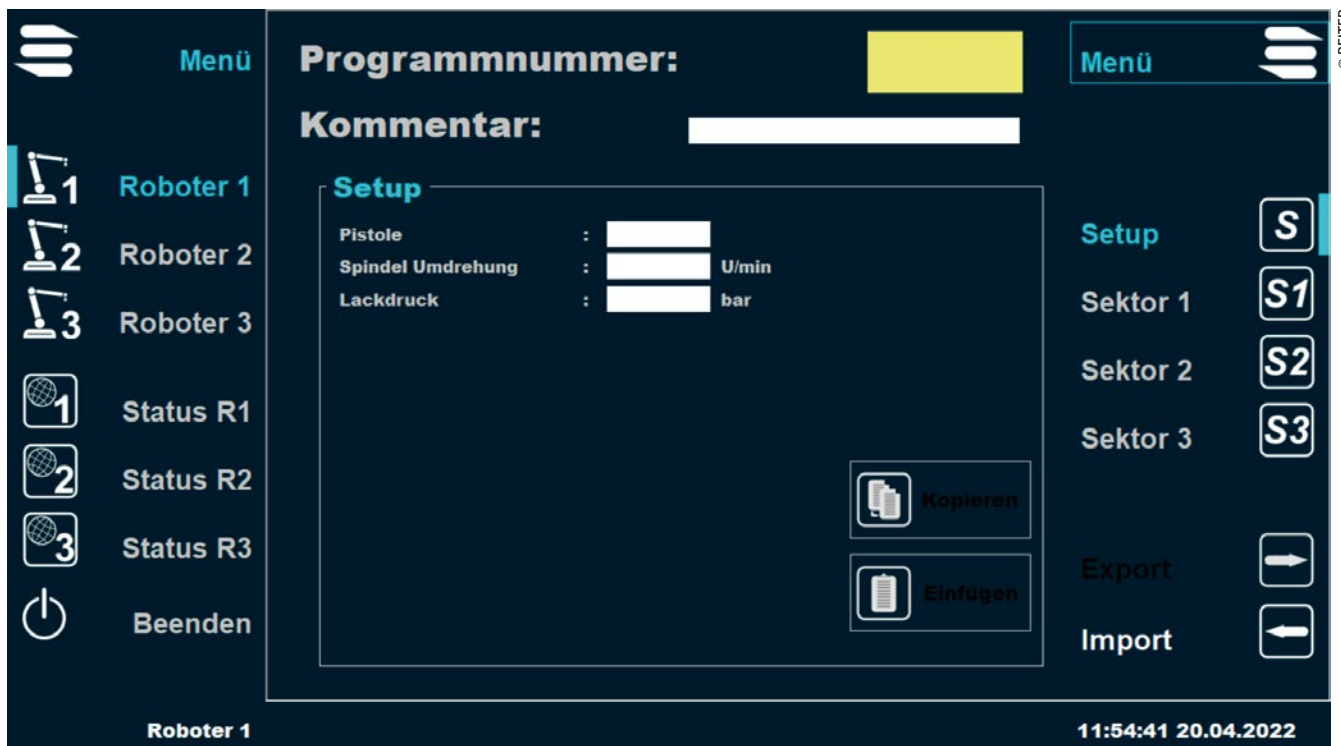


Dosing technology with Coriolis flow meter.

Robotics with innovative programming

Based on an analysis of the working range and the reach, the Fanuc M-10 robot with RJ30 control in zone 2 design was

selected for the task. During the trials in the technical centre, it was realised that the creation and adaptation of the coating programmes for the large number of variants in the normal programming tool is a very time-consuming and tedious



Configurator for interior coating.



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Material supply to booth on trolley.

process. In addition, it requires extensive training of several employees for the 3-shift operation in production.

The solution for Fissler was two configurators specially developed for the project. One configurator for the inner coating of the pans and a separate configurator for the outer coating. This makes it very easy to create new programs or adapt active programs via predefined interfaces on the tablet (HMI) by entering product dimensions. Problems such as axis limits and singularities when creating programmes via the standard software are automatically excluded. This also optimises the cycle time and accuracy of the programs. The navigation with the use of structured coating sectors that can be switched on and off allows the creation of programmes – outside of production – in a few minutes and also facilitates troubleshooting. Complex movements are automatically calculated by the stored algorithms and thus enable an even layer thickness distribution on the product. The configurators support very fast data exchange as well as copying and saving of the created programmes between several robot controllers integrated in a LAN network.

Material supply with adaptations

The design of the supply and application was adapted to the special requirements for processing PTFE lacquers and SolGel/ceramic lacquers. Several material stations consisting of pressure tanks in various designs and two rinsing agent stations supply the coating booths. All supplies are located directly behind the

coating booths to keep as little material as possible in the system. The material stations are also monitored with sensors and the fill levels can be checked and evaluated via the central control system. The electric agitators automatically adjust the speed to the fill levels to prevent quality problems caused by air in the material. All containers are designed as rollable racks with individual troughs in accordance with WHG (German Water Resources Act) with pluggable material lines and control lines. This means that the containers can be easily moved through the entire system and brought to the material store for refilling.

Automatic programme and material change

The data relevant for the coating process is transferred to each booth via the control system of the system technology when the components are placed on the booth and automatically processed. After coating, the actual data is transferred again for tracking and logged in a database for further analysis. Requested programme or material changes are carried out automatically and the components are coated after the process has been completed. The change between the guns takes place in a few seconds, including cleaning of the air cap and paint nozzle.

Control technology

Due to the extensive requirements, separate controls were set up for the inner and outer surfaces. An industrial WiFi network in the plant allows operation at

all action points using portable tablets in addition to the central PC visualisation in the plant's control room. The implemented remote maintenance concept allows access to all robot and PLC controls and thus a quick service in case of a plant malfunction.

The security concept implemented on the basis of a Siemens 1500F control system enables flexible implementation of the access controls required by current standards and integration with the booth technology, conveyor technology and fire protection system.

After the commissioning was completed, the staff was trained, and they were able to grasp the handling of the new technology very quickly. The implemented concept, which was developed together with the customer, features a variety of innovative solutions. This puts Fissler in a position to continue developing and producing coatings in the future. In this way, production for the world market can also be successfully carried out in Germany, a high-wage country.

Kim Kronenberger, the project manager at Fissler, is more than satisfied with the way the project went. "The possibility of being able to map our process in the run-up to the project in Reiter's technical centre simplified the project planning and ensured an efficient ramp-up," he states in retrospect and adds: "The adaptive application technology and the paint supply enabled the set-up process to be greatly optimised. By monitoring the process parameters, we were able to increase process stability and reduce the reject rate. In addition, the gun technology made it possible to achieve a much better surface quality." //

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