



Parts Cleaning. Systems and Solutions.



Isabellenhütte Heusler GmbH
& Co. KG - Sophisticated process
engineering for optimum
anti-tarnish coating with MAFAC
PALMA and MAFAC JAVA



ISABELLENHÜTTE

Innovation aus Tradition

User Report

Isabellenhütte

At Isabellenhütte in Dillenburg, six MAFAC cleaning machines are on board for highly complex cleaning tasks

“The cleaning machines on our shop floor are no off-the-shelf models. They have been individually adjusted to our requirements,” says Michael Dickel, Process Developer at Isabellenhütte in Dillenburg. A separate building houses the impressive fleet of MAFAC cleaning systems. With three PALMA, two MALTA and one JAVA, six machines by the Alpirsbach-based expert for aqueous cleaning systems are running 24/7, performing highly complex cleaning tasks. The process comprises pre-cleaning and final cleaning with a stabilisation phase in between. When leaving the cleaning area, the parts must be absolutely clean and dry, and they must be covered with anti-tarnish coating. This is required as the cleaning stage will be followed by soldering, one of the most important steps in the manufacturing process.

Isabellenhütte

The workpieces manufactured in the Dillenburg Isabellenhütte may look quite inconspicuous, but they are in fact highly sensitive components. A family-owned business since 1827, the company is today managed by the eighth generation of the Heusler family. It is one of the leading manufacturers worldwide of electrical resistance materials, thermoelectric materials for temperature measurement, and passive construction elements. They make these products for renowned customers from the automotive, electrical, and electronics industry. The

main production site is the company headquarters in Dillenburg with a staff of 850.

When it comes to measuring current, voltage, and temperature in passenger cars and trucks, in hybrid and electric vehicles, but also in the field of industrial systems and regenerative energy generation plants, the Isabellenhütte sets the standards in respect of precision measurement engineering. Since vehicle electrification, in particular in compact cars, has increased significantly over recent years, this segment is booming. “We picked the right time to put our sophisticated technology on the market,” says Marketing Manager Rolf Viehmann. This is one of the factors that contribute to the success of the internationally renowned specialist company. Another main factor is the continuous development of new products, technologies, and manufacturing processes. This is complemented by a very high vertical range of manufacture, extending from the manufacture of the alloys to forming, etching, and assembly technology, up to the complex QA and packaging machines in the final inspection department.

Close cooperation with MAFAC

The close cooperation between the Isabellenhütte management and the company MAFAC started way back, about 15 years ago. After first contact was made at the Metav trade exhibition, the Isabellenhütte purchased two cleaning machines of the MALTA series in 2002 and 2003. To this day, both three-bath systems run 24/7, one in pre-cleaning and one in final cleaning. In 2011, the “wash plant” connected with a



manual roller conveyor was extended by a PALMA with three baths. It is currently used in pre-cleaning. In 2015, another PALMA was installed for final cleaning, as well as another JAVA currently used for drying in final cleaning only.

The most recent addition is another PALMA commissioned early this year in final cleaning. This new PALMA has a "loss rinse" with direct discharge to the customer-provided sewage system. Its rinse bath is equipped with an ion exchanger controlled via specifically developed software. It monitors the limit values for the rinse water. If they are exceeded, the ion exchanger is switched on automatically. Michael Dickel says: "This definitely is quite a significant quality increase in the water treatment within the system."

Pre-cleaning – The start of a complex cleaning process

The components cleaned in Isabelenhütte are made of nickel and copper alloys. At the pre-cleaning stage, oil residues and chips must



be washed off. The MALTA and the PALMA are equipped with three baths. The actual cleaning process takes place in bath one, an ultrasonic bath to which an alkaline detergent in a concentration of three per cent is added. Next, components are rinsed repeatedly with DI water supplied both from the cleaning system and from an external DI water rinse tank.

After cleaning, the components are dried by means of a hot air pulse blowing and a flow drying process. The workpieces are first blown off in a pulsed manner by a rotating blowing system with highly pure compressed air. Next, ultra-finely filtered hot air is applied to the parts. The PALMA additionally has a vacuum drying unit. A major part of the pre-cleaning time falls to drying. "The components must be absolutely dry after cleaning because they go on oven racks for intermediate storage," Michael Dickel points out.

Final cleaning – the most difficult part of the cleaning process

The final cleaning is the most difficult part of the entire cleaning process. Here, the anti-tarnish coating is applied. This is a highly important step: Any oxidation of the copper must be prevented to ensure optimum results of the subsequent soldering process.



The most important step – the application of the anti-tarnish coating "The next step is the most important," the process developer explains. The anti-tarnish coating is applied by means of the process technology of spray-flooding developed by MAFAC. The spray frame equipped with the spray nozzles rotates while the cleaning chamber is flooded simultaneously. Only this special MAFAC process ensures that every bit of the workpieces is covered in the anti-tarnish coating, Michael Dickel says. This step is followed by another rinsing with pure DI water supplied externally. The final drying of the larger parts is done in the PALMA or the MALTA. Smaller parts are dried in the JAVA.

Every week, between four and four-and-a-half million components undergo the cleaning process. Pre-cleaning and final cleaning take between 20 and 35 minutes each, depending on the component size and geometry. The smaller parts are filled in small baskets with a mesh

width of one to eight millimetres as bulk goods. Several small baskets are placed in a carrier and fed to the cleaning machine on conveyors. During cleaning of the small components, the movement of the conveyor system is set to rocking, while the spray and drying systems rotate. Another process technology developed by the MAFAC experts can be used for larger-sized components only: the rotation of the conveyor system with counter-rotation of the spraying or drying system.

All six MAFAC cleaning machines are fed by employees who have been specifically trained and who also do the final soldering tests. The maintenance of the cleaning machines is the responsibility of MAFAC: The Alpirsbach technicians visit Dillenburg twice a year to check and service the machines. "MAFAC offers excellent service. We feel that our machines are in very good hands with them," Michael Dickel says.



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