



Parts Cleaning. Systems and Solutions.



High cleaning quality for upmarket special purpose machinery manufacture: MAFAC JAVA with vector kinematics at Eckerle Industrie GmbH



User report

High cleaning quality for upmarket special purpose machinery manufacture

In order to make cleaning gunmetal parts as efficiently as possible, Eckerle Industrie GmbH in Ottersweier uses a MAFAC JAVA type spray-flooding machine. In particular the new vector kinematics method is designed to meet the high cleanliness requirements of these customers from the medical technology industry with efficiency and reliability.

For over 50 years, Eckerle has been manufacturing complex assembly groups and system components that are used in a variety of industries. For the renowned medical technology company Maquet, for example, which has been part of the Getinge Group since 2000 (<https://www.getinge.com/de>), the CNC specialist manufactures three assembly groups for the electrical operation of operating tables. Production Manager Reiner Schäfer explains what is important for these high-quality components: “Modern operating tables are high-performance medical devices that use many sophisticated technical features to ensure safe and easy patient positioning. To ensure that they can be used reliably for a long time, all components must meet the highest quality standards in terms of materials, technology and workmanship. For our assembly group it is important that the surfaces do not show any contamination from machining and leave the cleaning process absolutely dry. This enables us to guarantee not only corrosion-free storage and shipping, but also trouble-free further processing at our customer’s site.” Up to now, the components have been washed in a simple cleaning system, then dried manually, stored, and cleaned and dried again shortly before shipping. “This procedure had since become

uneconomical and would not have been able to meet the increasing demands of our customers for much longer,” summarises Ferdinand Ernst, team leader at Eckerle.

Multi-faceted requirement profile for cleaning

The new machine is now meant to combine these work steps and make them more efficient. Before the gunmetal components reach the final cleaning stage, they pass through a multi-stage production chain. They are deburred and polished after the turn-milling process. At the end of the process, their surfaces show machining residues such as cooling emulsion, polishing dust and chips that must be carefully cleaned off. It is important that all regions of the component are free from particles, because even the smallest contamination can jeopardise the assembly requirements at Getinge-Maquet and prevent the necessary smooth running of the engines installed in them.

In view of these cleanliness requirements, the numerous boreholes and undercuts in the component parts and the now very small particle sizes of the contaminants pose a challenge. In addition, gunmetal creates further requirements because it is a rather soft material and, due to its high copper content, tends to stain and develop verdigris. For the cleaning process this means: It should be effective and at the same time very gentle and involve a drying system that releases components with stain- and moisture-free surfaces at reduced temperatures. For this reason, the Eckerle technicians decided to use the MAFAC JAVA spray-flood machine with two-tank technology.



Eckerle Industrie GmbH has been manufacturing a three-part gunmetal central body casing for the assembly of operating tables for more than 15 years. (Source of the image: Klaus Hohnwald/Getinge)



After CNC processing with subsequent deburring and polishing, the surfaces show contaminations like cooling lubricant, chips and polishing dust. Their complex geometries are an additional cleaning challenge. (Source of the image: Klaus Hohnwald/Getinge)

In combination with the technology options of vector kinematics and vacuum drying, it achieves high cleanliness values on the surfaces within a short time while being gentle on the material and reliable for all component regions.

Vector kinematics - even more movement for better effectiveness

In particular by choosing MAFAC vector kinematics, Reiner Schäfer and Ferdinand Ernst demonstrate their pioneering spirit and a far-sighted view in to the future. "What we are dealing with here is a further development of the patented process technology of counter- or co-rotation of the spray and basket receptacle system", explains Sascha Klos, sales representative at MAFAC. The new principle succeeds in achieving a greater and more uniform impact on the component parts during cleaning and drying with strong turbulence. For this extra movement, the nozzle tube performs both a rotating and a rocking movement. The rocking movement is performed around its own axis by 35° to both sides. The basket receptacle system rotates synchronously at an optimally adjusted speed. This results in an optimally coordinated interplay of nozzle tube and basket movement, with both synchronous and counter-rotating operation being possible. As a result, workpieces are impacted more evenly and hard-to-reach regions such as blind holes are reached even better. Due to the higher mechanical part, vector kinematics leads to the desired cleaning result in a shorter time. This improved flow effect both during the cleaning and the drying phase, which had already made a very positive impression on them at the parts2clean trade fair, finally convinced the two technicians to invest in the new MAFAC vector kinematics: "With this method, we do not only gain effectiveness. In future, we will also be able to respond more

flexibly to changes in the range of parts or to growing cleanliness requirements", says Reiner Schäfer.

Two-stage cleaning process with bypass filtration

Small batches of the parts, which measure approximately 500 x 200 x 200 millimetres (l/w/h), are fed into the cleaning chamber as sensitive components, where they undergo an approximately 11-minute treatment process with the sequence cleaning - rinsing - vacuum drying. During the cleaning phase from tank one, to which 2.5 percent of a mild cleaning medium is added, a spraying and flooding process alternate. Flooding is carried out cyclically, i.e. two-thirds of the water from the cleaning chamber are drained and then re-flooded. This process is repeated several times. Parallel to this, the nozzle and basket receptacle system carry out a counter-rotating movement, using a 35° rocking movement of the basket to protect the parts. The temperature of the entire wet phase is 60° C.

Before the process switches to the rinsing phase, a so-called lifting process (blowing off of the component parts) prevents the carry-over of particles and media. Afterwards, the parts are rinsed with demineralised water from tank two. This is particularly important because of the high copper content in gunmetal and the associated risk of oxidation. This means that the conductivity in the water must remain low, which is why the rinsing bath is also equipped with a rinse care module. This contains an activated carbon unit and two ion exchange units. In addition, it is permanently filtered with a resin cartridge in the bypass. "That such an additional component is recommendable and ultimately proves its worth was already apparent during the test cleanings in the MAFAC technical centre," explains Ferdinand Ernst. There it also became obvious that the cleaning

agent must be matched to the cooling lubricant so that the component parts leave the cleaning chamber without a grey haze. Therefore, the decision was made to use Kluthe's mildly alkaline cleaning agent HAKAPUR 56-170, which, in combination with the water-miscible cooling emulsion of the HAKUFORM range, also from Kluthe, produces high cleanliness values.

Vacuum drying - an important final step

The drying phase is an important stage of the treatment to ensure surface quality. To make sure that the components leave the machine without residual moisture, the MAFAC JAVA is equipped with a warm air impulse blowing system and a vacuum drying system. Warm air at 40 °C is first supplied to the treatment chamber via the impulse blowing system. Based on the basket-nozzle rotation, the rotational movement and the impulse-like impact ensure an efficient heat and mass transfer, achieving homogeneous heat distribution. In addition, the water droplets are broken up into many small units by the compressed air pulses. The resulting increased surface area means that the water can dry faster. With the subsequent vacuum drying process, which is particularly suitable for heat-sensitive materials such as gunmetal, the material to be dried is subjected to negative pressure. This leads to evaporation of the water at lower temperatures, as the boiling point of the water is reduced. Under this effect, the drying time is considerably reduced while the surfaces of the components are still absolutely dry and free of residues.

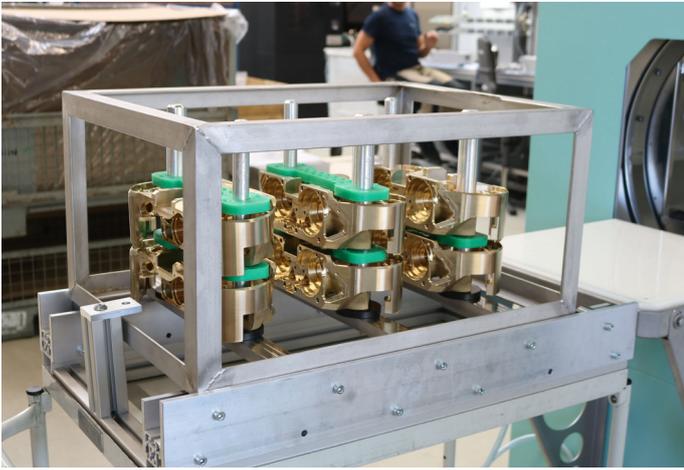
An important step towards the future

Now that the MAFAC JAVA has been in use for five months, the first positive effects in terms of economy and cleaning quality are already becoming

apparent. For Ferdinand Ernst and Reiner Schäfer this is an important aspect in view of the increasing cost and time pressure in the future. "The demands of our customers in the medical sector but also in all other sectors are very high and will increase in the future. As the parts produced are always custom-made products with high quality standards, we want to raise our standards in special purpose machinery manufacture and set them up safely for the growing demands. The acquisition of the MAFAC JAVA with the new vector kinematics was a significant step in this direction and is expected to increase our USP value in the industry and create a competitive advantage," says Reiner Schäfer.

The compact MAFAC JAVA with double-bath technology is equipped with the new MAFAC vector kinematics and ensures larger and more even impact on the component parts during cleaning and drying with strong turbulences.

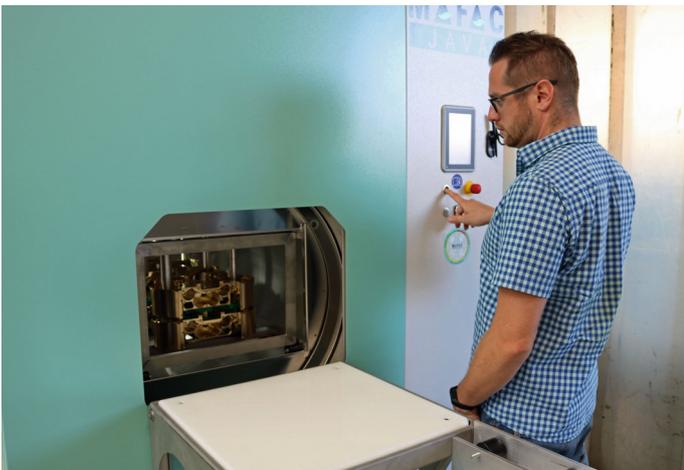




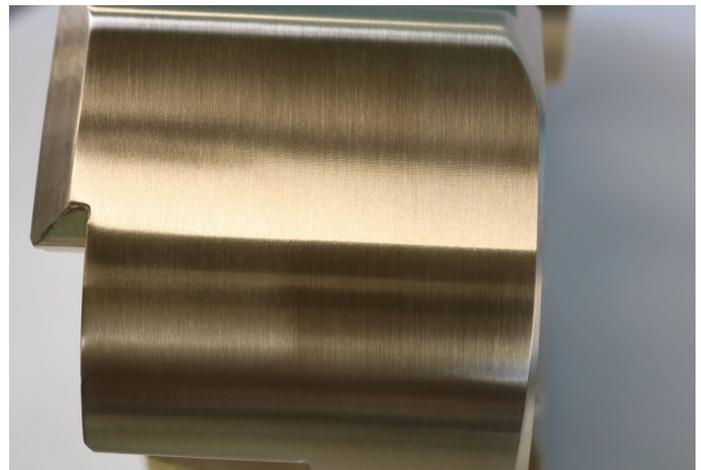
Small batches of the components are fed into the cleaning process as sensitive components.



The machine is loaded manually via a mobile transfer system.



An 11-minute cleaning and drying process under the impact of high turbulence frees the component parts effectively and gently from any contamination.



After cleaning and drying the surfaces of the component parts are free from residue and absolutely dry. The high copper content in the gunmetal could lead to oxidation if there is any residual moisture. This is meant to be avoided with additional vacuum drying.

Eckerle – expert for special purpose machinery manufacture

With its CNC machining division, Eckerle Industrie GmbH from Ottersweier near Rastatt offers the manufacture of individual parts and assembly groups according to drawings. Everything is possible, from prototypes and small series to the production of medium-sized series. The company was founded as a crafts enterprise in Bühl in the Baden region in 1968 and is now part of the family-run Eckerle group of companies, together with Eckerle Holding and Eckerle Automotive. It was taken over by the Prettl Group in Pfullingen at the end of 2019.



Eckerle Industrie GmbH
 Industriestraße 15 | DE-77833 Ottersweier
www.eckerle-gruppe.com



Parts Cleaning. Systems and Solutions.

MAFAC - E. Schwarz GmbH & Co. KG
 Max-Eyth-Straße 2, D-72275 Alpirsbach
 Phone + 49 (0) 74 44 / 95 09-0, Fax 95 09 - 99
 E-Mail: info@mafac.de, www.mafac.de

You can find more
 user reports on our website
www.mafac.de

