Press release

Automated surfacing of rotationally symmetrical parts

Everything from a single source - it‘s more than just a marketing promise!

Over 50 drawings of various components served as the basis for the automation solution developed by EWM for pump protection valve manufacturer,Schroeder Valves GmbH. All of the leading specialist’s components did have one thing in common, though: they were all rotationally symmetrical. This was the starting point for welding machine manufacturer EWM in their mission to develop a custom automation solution tailored to this multifaceted challenge.

Minimum flow valves and non-return valves from Schroeder Valves are used all over the world for transporting liquids using centrifugal pumps. Their areas of application include refineries, power plants and nuclear plants, in the transport of liquefied natural gas (LNG), as well as in offshore rigs. They are also used throughout the chemical and manufacturing industry (steelworks, pulp, sugar, distilleries) and in the utilisation of renewable energies.

Different sizes – one application

“We’d love to weld all of these components automatically.” This was the request laid down by Jakob Frese, Welding Coordinator at Schroeder Valves, for EWM-EUEN GmbH Managing Director, Andreas Euen. The components in question were pump protection valves. These valves are connected to the pumpsand ensure continuous operation of the pumps to preventdry runs. The pump protection valve is largely made up of the valve body and the cone, which moves inside the valve body. The sealing surfaces between the valve body and the conemust be absolutely air and watertight. This is the only way to ensure proper functioning of the pump protection valve for decades to come. Normally, these components are made using low-cost construction steel 1.0460. The sealing surfaces are reinforced with stainless steel 1.4370. This process was previously performed manually, however, due to both the shortage of good welders and growing quality assurance requirements, automation of this step was crucial. The inner diameter of the valve bodies and the cone diameters

were between 32 mm and 400 mm. The components being moved also differed vastly in weight, ranging from a few hundred grams to two and a half tonnes. But all of the parts had one thing in common: they were all rotationally symmetrical, making them perfect for an automated process. With this as a starting point, Andreas Euen was able to get the system planning ball rolling.

From small to big – multiple processing stations

It soon became clear to Andreas Euen that only a robot system would fit the bill when it came to automating this particular process. Having to deal with so many different part sizes was a cause for concern for Euen. Large parts require a large positioner. These, however, cannot provide the dynamics required for the smaller components. This quickly gave rise to the idea of three processing stations: one large L-positioner with tilting function for the large valve bodies, one small turning/tilting positioner on a system bench for the small valve bodies, and a third station with a system bench without positioners for any other components. The height of the building was also a particular challenge. The parts had to be able to be placed on the benches with the crane. The crane hook, however, was only approximately three metres high – extremely small for an industrial application. To guarantee accessibility while ensuring extraction, either the extraction hood or the system benches were made to be mobile. The robot was fitted in an extremely small booth in the centre between the three stations. This booth also includes both the power source and a Titan XQ. These are positioned behind the L-positioner at the large processing station. The Rob 5 drive 4X wire feeder mounted on the robot arm ensures secure wire feeding. Access to the Fanuc Arc Mate 100 iD in all three stations at all necessary positions is also ensured thanks to the extreme arm length of two metres and optimised space inside the booths.

Special torch for extreme spaces

Each valve body is equipped with a cone guide which is welded from above. With an inside diameter of just 32 mm, access is extremely difficult. For manual welding, the welder is unable to see the weld seam and instead must rely on their experience. Even for automated welding, these spaces are very unusual. “I was only able to accept this job because we manufacture the torches ourselves,” explains Andreas Euen, emphasising the significance of the welding torch for this application. The welding torch for Schroeder Valves is a special construction with a particularly small torch head and unconventionally

long torch neck. Of course, the special application had to be adapted to accommodate this unusual design: because dilution between the parent metal and the armouring needs to be as low as possible, only a little energy is used. This ensures safe heat dissipation despite the extreme welding torch dimensions.

Secure welding results through defined parameters

As the parts were rotationally symmetrical, it was easy to teach the components; teaching is always based on the same programs. Even new components can be welded automatically quickly. Users simply have to set the radius, number of passes and the geometric dimensions of the surfaced partsand the robot control will take care of the rest. The desired welding result is always guaranteed because the welding procedure is defined with all of its parameters. The quality can also be proven retrospectively as all welding parameters are continuously monitored and recorded. Even though the system was originally designed and intended for one specific application, Jakob Frese is already thinking of new ideas and uses. First, he would like to try out some of the various welding procedures that are included in the Titan XQ welding machine as standard. This will allow him to further optimise different kinds of surfaced components. And then, as he is already thinking about, he will look to expand and improve the range of welding tasks. “It will likely then result in another system,” predicts Jakob Frese.

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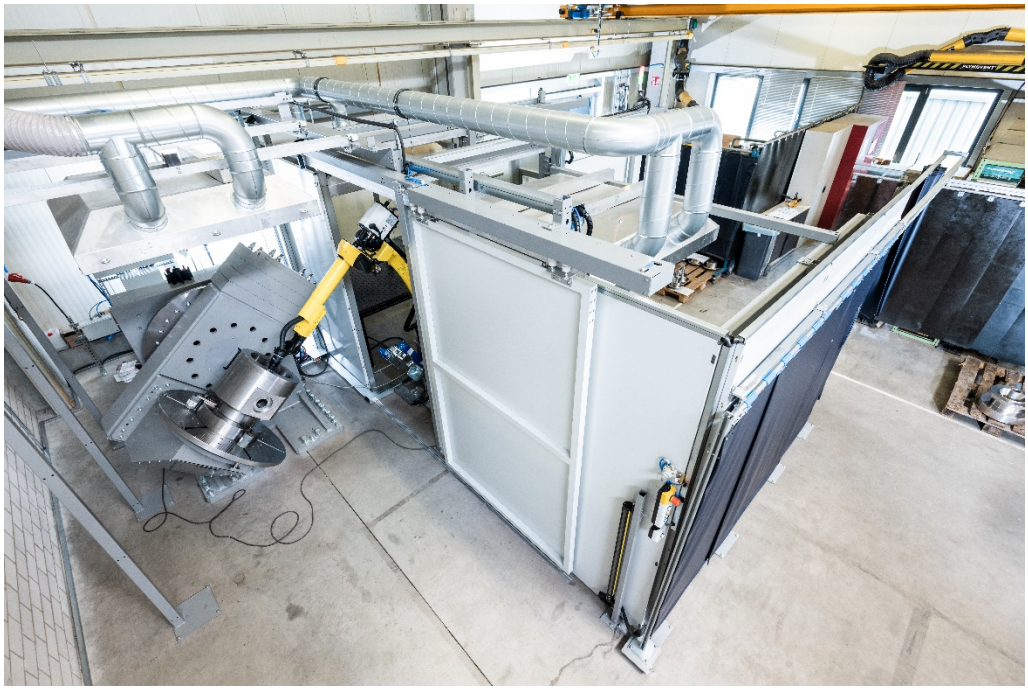
Fig. 1:
Image source: EWM



Confined spaces in the design of the robot system with three processing stations.

Fig. 2:
Image source: EWM

Surfacing of a valve body. The drive 4X wire feeder securely feeds the filler metal on the robot arm.

Fig. 3:
Image source: EWM

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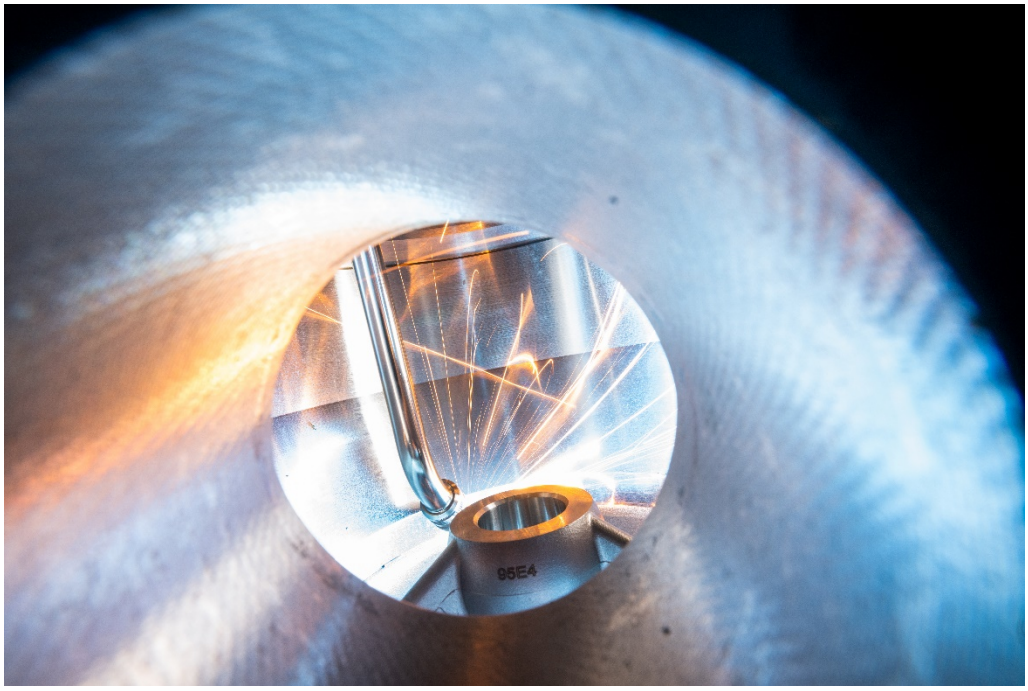
Schroeder Valves' range of parts is distinguished by its various components and component sizes.

Fig. 4:
Image source: EWM

Teach process on a cone

Fig. 5:
Image source: EWM



Secure welding despite confined spaces thanks to the new torch design.

Fig. 6:
Image source: EWM

Andreas Euen, Managing Director at EWM-Euen GmbH and Jakob Frese, Welding Coordinator at Schroeder Valves GmbH.

About EWM:

EWM AG is Germany's largest and one of the most important worldwide suppliers of arc welding technology. The family-run company from Mündersbach has been living its motto, "WE ARE WELDING", with a great deal

of passion for over 60 years, providing forward-looking and sustainable complete solutions for both industrial clients and craft businesses.
EWM develops high-end welding technology. The company, based in Germany's Westerwald region, offers complete systems that cover everything from high-quality welding machines (and all associated components), to welding torches, welding consumables and accessories for manual and automated applications.
Users praise the products' ease of operation and excellent results. Companies value the solid consultancy, service and enormous savings that come with EWM systems. The welding processes, some of which are patented, reduce the consumption of materials, energy and time during operation and produce up to 75 per cent fewer welding fume emissions.

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