



WELDING

Securely welded

ARC Mate robot used in production of lifting equipment

Task Axzion is a manufacturer of load receptacles. It distributes and produces trusses, coil hooks and grippers and pliers. In the segment of the crossmembers, Axzion also offers the so-called H-cross beam, spreader cross beam, cross beam and different beam crossbars.

Solution Portal system for welding components up to 10 m in length and for weights up to 5,000 kg. It was important that the robot should work with both a single wire and a tandem torch. The package should also have the possibility of offline programming.

Result The ARC Mate robot pulls the weld seams of the gripping elements in an efficient manner, so that the saving effect is clearly within the double-digit percentage range compared to manual welding. The delivery times have been improved through the robot implementation. With the tandem torch, the robot can produce up to 11 kg per hour at wire feed speeds between 11 and 13 m / s. Very good welders are able to achieve 15kg per layer.



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When Axzion's lifting equipment is used, there is no room for error. Because when the foundations for offshore wind farms, weighing hundreds of tonnes must be safely lowered on to the seabed, there is no second chance. The welded seams of these gripping elements are performed by a comparatively slender ARC Mate robot from FANUC.

It performs this task so well, compared to manual welding, that the effective cost savings reach well into the double-digit percentage range. As Ray Baumann, welding engineer at Axzion in Neustrelitz comments: "At the very least, we win back our leasing charge for the system." This seems to be a relaxed attitude, but



it is primarily a result of the high technical standards in the welding area and the decision to rely on a high-performance welding system with FANUC robots.

The central focus of the production in Neustrelitz is lifting equipment and transport cradles with larger dimensions. Such cradles are required, for example, to safely transport rotor blades for onshore and offshore wind turbines. Grippers are one of the most

spectacular pieces of lifting equipment, and they are used to lift pipes, for the foundation of offshore wind turbines, from transport ships and position them on the "construction site". Such pipes can have a diameter of six metres and a length of 30, 40 or even 60 metres. Such lifting equipment can often be a one-off, for which Axzion has gained a good reputation for quality in the industry. Approximately 40 percent of production is accounted for by such special structures and one-off items. Development, design and the complete production at Axzion are all contained in-house - not least due the required certification in accordance with EN 1090-2 EXC 3 and DIN EN ISO 3834-2. Approximately 60 percent of the production is based on classical beams and repeat orders. Ray Baumann: "These are standard products for us."

The availability of such beams within a short lead time - just two and a half weeks according to Baumann - is also down to the use of robots in production.

Following previous experience with a welding robot from Cloos, Axzion has been working with a new system since 2016, which was implemented by the Berlin based systems integrator H. Euen GmbH. Axzion only had a few requirements: It should be a portal system for welding components up to 10 m in length and with a piece weight of up to 5,000 kg. An EWM welding current source should also be used for automated welding, as the best experiences with manual welding had been shown by the EWM "forceArc" process. There was also another aspect that spoke in favour of an EWM/FANUC combination: As all the approvals (WPQ) for welding processes are laid down using EWM current sources and the



corresponding processes have been certified, it was desirable to remain with this and use this experience.

It was also important for the task at Axzion, that the robot should work with both single-wire and tandem torches. Axzion did not specify the brand of robot.

Ray Baumann: "The package should also have the option of off-line programming included in it. And we also got that from Euen."

The robot hangs on a traverse with a ten metre

traverse distance.

The positioner on which the clamped workpieces can also be rotated is correspondingly large. Traverse and rotation axes are integrated as servo axes directly into the robot controller and can be controlled by the R-30iB. Ray Baumann classifies the control of the workpiece axis of rotation as "very tricky". Even with the centre of gravity lying outside the axis of rotation, the axis rotates entirely evenly so that the welding robot can also perform its work evenly. Baumann: "That is where Euen did a good job."

Workpieces with a piece weight of up to 5,000 kg can be welded on the system.





Baumann: “We do not carry out any out of position welding.” Nearly all welded seams are welded in PA and PB positions. For this purpose, a single-wire torch or a tandem torch is used on the robot, which are located in a changeover device on the portal. There are two corresponding torch cleaning stations. A torch cleaning procedure takes place at the tandem torch approximately once every hour.

An indoor crane is used to place the pre-tacked workpiece on the rotary table. Different mountings, holders and clamping elements hold the workpiece in such a way that it can be welded free of distortion. In order to really be safe, operator Ronny Hahn sometimes makes an additional welding point. Finally, the free access of the robot to the workpiece must not be made more difficult by clamping elements. And the operator must ensure clamping that is suitable for the robot, so that it can also reach the weld seam with the best possible angle of incidence of the torch.

Thicker steel plate - in the case of Axzion plates thicker than 30 mm - are preheated to 100 to 130°C.

Ray Baumann: “Increasingly we are going in the direction of thermomechanical rolled steels.” The advantage of such sheets is that plate thicknesses of up to 60 mm do not have to be preheated. “This is very important for automated welding.”

Simple cross members are now welded fully automatically and without further supervision.

Apart from this, if something were not right, the experienced Ronny Hahn would already hear it from the noise of the torch. But what does “simple” mean

at Axzion? Ray Baumann considers, “Many metres of a straight weld and a potential level of automation of 85 percent”, as optimum. He has just one further “qualification feature” for automated welding work: “The level of programming should not exceed more than 20 percent of the process time.” Only if several identical parts were welded, would a higher programming effort be worthwhile.

While the robot is working on one part of the system, the other part of the system can be fitted with components that are not too large or the next



workpiece can be tacked. Sometimes, the ARC Mate robot from FANUC still needs a bit of support and oversight from Ronny Hahn.



By observing the process through the welding goggles, he can improve the torch angle here and there, or help the seam tracking sensor via the iPendant programming hand tool.

The question remains as to whether a system with this size of traverse could not have been equipped with two robots, as a dual arm system, from the start? For large components, the entire processing time could be significantly shortened by the parallel welding with two robots.

Ray Baumann confirmed that this option had been discussed in advance: "A lot can be added on to

more than 1,000 tonnes are handled with their grippers and lifting beams.

Why FANUC?

It was the system integrator that chose the FANUC ARC Mate 120iC/12L. A successor to this robot, the ARC Mate 100iD, was already on the market at the time of the selection, but only available in the basic and not the long-arm version. The "ARC Tool" software option used is the latest version.



our system. But now we want to build up further experience and gain process reliability. Then we will take the next step." Last but not least, the budget should also be adhered to. The rest of the production as well as fabrication must also be able to keep up with additional capacity. But expansion is not excluded, according to Baumann. Unlike straightforward robot handling, you also need qualified personnel who understand something - both about programming and about welding.

About Axzion

Secure and safe welded seams are required everywhere, also at Axzion in Neustrelitz, Switzerland, a manufacturer for the lifting of equipment. Loads of