WE ARE WELDING

CustomerStory

HÜFFERMANN
Transportsysteme GmbH

300 weld seams in 90 minutes

Hüffermann automates chassis production

Hüffermann Transportsysteme GmbH, with its production plant in Neustadt (Dosse) in the Brandenburg region of Germany, is a specialist manufacturer of container transport trailers, vehicle bodies and special vehicles for international container standards and load securing systems. All of these components, which make Hüffermann Transportsysteme GmbH what it is, have one thing in common – quality. That's why, at Hüffermann, from construction drawing to steel construction through the final assembly, the trailers are 100% Made in Germany. Therefore, it is very important for us to meet the requirements and criteria of the quality management standard DIN ISO 9001, according to which Hüffermann is certified, and to optimise them continuously.

It was primarily the high quality requirements and developing technology that motivated Hüffermann Transportsysteme GmbH to break new ground in chassis production. The lorry trailer manufacturer based in Neustadt (Dosse) in the Brandenburg region of Germany now manufactures 16 skeletal and container trailers using the EWM-Euen system every week, almost doubling its production while reducing manpower.

The same assemblies are always used to construct skeletal and container trailers: two longitudinal beams, a pivot support panel on the front, the tail area on the back, spring hangers to hold the axles and two locks which will later be used to secure the container on the trailer. In order to make welders' jobs easier, a new clamping device was planned for the 7-metre-long, 2.4-metre-wide trailers. It is intended to align the components with one another and hold them in position. The integrated longitudinal axis of rotation also improves accessibility, allowing almost all seams to be welded in the flat position. However, a question was raised during the planning of the clamping device: "Why not automate the welding process too?"

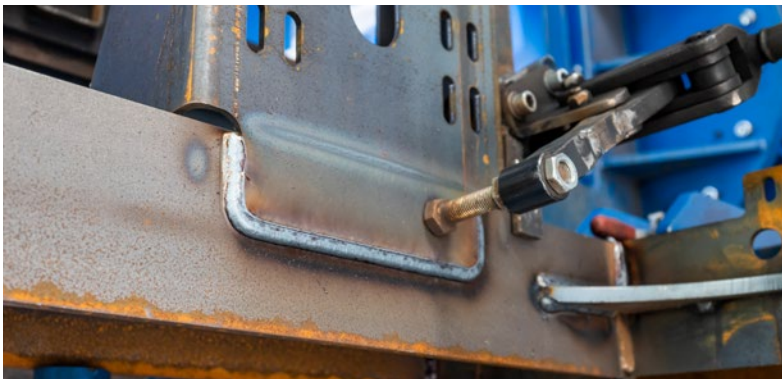
EWM automation solutions

In 2018, Hüffermann switched to EWM machines for its entire welding production line. As a result of their good experience with the Mündersbach-based welding machine manufacturer, it immediately occurred to them to contact the experts at EWM once more for this project – in this case the automation experts at EWM-Euen in Berlin. "The hall and the crane runways were already set up and the clamping was planned. Now it was up to us to plan the system", recalls Andreas Euen, Managing Director of EWM-Euen GmbH, looking back on the first meeting with the representatives at Hüffermann. They found the basic concept in no time: a gantry system with a welding robot on the gantry and two separate working areas: one side for skeletal trailers and the other for container trailers. The shared sliding door closes one section at a time and the robot can weld while the open side is being loaded.

The Phoenix puls welding machine with drum feed via a drive 4X wire feeder.

9-axis gantry system

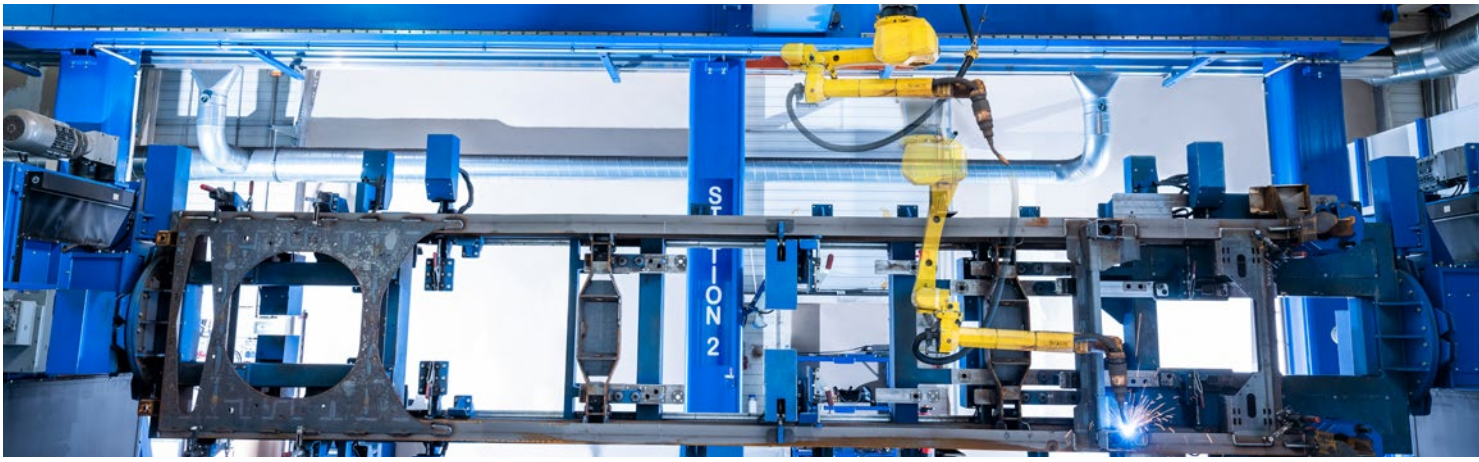
But special challenges also came to light in the detailed planning. The ceiling height was restricted by the crane runway on one side and the axis of rotation for the components on the other. The components are easily accessible from the ground in the starting position. However, after a 90-degree rotation, the component looms almost three metres in the air. The robot on the gantry system needs to adjust to this major height difference as well, so the solution must ensure that the crane runway and the welding robot don't collide. The control of the positioner takes place independently and couldn't be implemented into the robot control. Therefore, the entire welding unit has to be completely removed from the working area of the axis of rotation when positioning. This requires an additional z-axis, which is unusual in gantry machines. The system has a total of nine independently controlled axes: three axes for the gantry system (x, y and z) and six robot axes (x, y and z plus a, b and c). The high stroke on the z-axis also necessitated a special solution for extraction. It is split down the middle, thus leaving space for the axis.



The seams welded by the robot produce a high weld seam quality and extremely low weld spatter, thus reducing post weld work by 30 per cent and increasing productivity.

Phoenix puls and drive 4X

The welding machine, a Phoenix puls from EWM, is located at the partition separating the two sections. The drive 4X wire feeder is situated directly above the drums with the welding consumable and conveys the wire via the cable drag chain (which also carries electricity and gas) to the robot. forceArc puls is the only welding process used. The arc is powerful and deeply penetrates the material. At the same time, the heat input is reduced by the pulsing.



Via a long z-axis, the robot reaches operating points at both the top and bottom of the positioned chassis frame. In the high position, the z-axis is located up high, between the two sections of the extraction.

The welding speed and the adjustment of the parameters take place directly during teaching and depend on the material thickness and geometries.

Using main and auxiliary process times

The robot first welds the seams accessible from the top of the chassis. Meanwhile, the finished chassis can be taken from the other booth using the crane, and the clamping device can be loaded again. While all of this takes place, the z-axis of the gantry system is situated underneath the crane runway and the robot can reach every point in the working area. Before the z-axis travels upwards, a sensor monitors whether the crane is in the welding booth. In this case, the movement of the axis is temporarily halted. Once loaded, the crane is moved back out of the working area of the gantry system, thus clearing the way for the robot. It can be moved out of the working area of the axis of rotation via the extraction, and the component can rotate. Then the robot welds the remaining three sides. Meanwhile, the welders in the other booth tack weld the clamped chassis. They quickly weld the extra-short seams manually as it would take too long for the robot to reach these operating points for it to be worthwhile. The timing of the robot was a real challenge for the welders at first, but now the workflows are so well established that the welders can load and tack weld more quickly than the robot can weld.

Higher requirements for the assemblies

Preparation of the individual parts and assemblies massively helps to speed up the loading process. They have become much more precise. This high standard of precision is fundamental in automated welding processes. Due to the lack of space in the chassis, no seam finding or seam tracking systems are used, so the entire welding process is based on taught curves. Therefore, the robot always welds at the pre-programmed position, regardless of the actual circumstances. The weld seam needs to be where the robot's welding torch is, not the other way around. If the deviations or tolerances (which can of course be compensated for manually) are too big, the robot will simply weld next to the seam. This results in time-consuming post weld work, where the weld seam has to be ground out and reworked. Therefore, more precise preparatory work and smaller tolerances in the components will produce a better welding result. "It is essential to speak plainly beforehand about the robot's capabilities and limits", stresses Andreas Euen, Managing Director of EWM-Euen. These requirements apply to the company's own assemblies but must of course also be passed on to suppliers. "This initially sparked a lot of disagreements with suppliers, and it was often tricky", admits André Schneider, Divisional Manager of Steel Construction at Hüffermann.

The positioner has set the chassis upright, while the robot is welding in the flat position.

Programming the components

Even if the components are all very similar, each of the 20 chassis still has to be taught individually. Teaching in particular presents a real learning curve for the welders: the first component was taught completely and subsequently welded. The seams were initially made in the predefined positions,

but as the welding continued, the precision and quality of the result decreased. Could the robot have left its path? In the end, it turned out that the deviations were caused by thermal expansion due to heat input during the welding process. Therefore, it took a few passes for the welders to programme the components so that the weld seam was hit correctly at all times.

Keep your distance

The same rule applies in welding as in the pandemic: keep your distance! However, this altered approach to teaching the robot requires adjustment on the part of the welder. While they are used to keeping the welding torch as close to the weld area as possible, this is not necessary in automated welding. The increased distance in teaching and the distance from the weld seam provide an additional benefit: the tolerances of the components can be compensated for to a certain extent, and the welding result is reliable.

André Schneider is impressed by the quality of the robots' weld seams: "Weld seams made by welding robots are streets ahead in terms of quality." Of course, the welding machine control's continuous monitoring of all welding parameters, and the consistency this ensures, are a factor here.

Christoph Baller, Automation Department Manager and welding expert at Hüffermann, Andreas Euen, Managing Director at EWM-EUEN GmbH and André Schneider, Divisional Manager of Steel Construction at Hüffermann, are convinced of the benefits of automated robot welding.

Hugely increased productivity

Whereas the working time for a chassis used to be a whole day per welder, the loading and tack welding in the new set-up take a mere 90 minutes. While the robot welds the entire component in 90 to 120 minutes, the next chassis can already be prepared in the other booth. The post weld work is also greatly reduced. The robot produces a high weld seam quality and therefore extremely low weld spatter, which reduces the post weld work by 30 per cent while also increasing productivity.

Automation is a continuous process

However, once automation has been set up, it can't simply be left on its own. "The system is only as good as the work that goes into operating it. You have to keep monitoring the robots at all times", Christoph Baller, Automation Department Manager and welding expert at Hüffermann, adds for consideration. Baller sees one of his main tasks as constantly teaching and motivating each individual to work precisely.

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