THE TECHNICAL ISSUE

Clear the Way!

60m robot welding plant produces aluminium trucks for railway vehicles

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Photos by D. Holler/CLOOS

Modern aluminium assembly groups for the World market are welded on the 60m long robotic plant. With six internal and two external axes, the robot has optimum access to each required weld point.

NIESKY/HAIGER – In the production sector money can be saved through the correct choice of production technology. Instead of the supposed portal equipment, WBN is therefore welding its modern passenger carriage assembly groups on robotic equipment with a 60 m long track, one of the longest in the product portfolio of Carl Cloos Schweisstechnik GmbH in Haiger. Fewer costs and significantly shorter construction times convinced the experts of WBN Waggonbau Niesky GmbH..

The tradition of truck construction lies in the small Saxon town of Niesky. At the beginning of the industrial revolution prior to 1900 steam engines were already being built here. In 1917 the production of rail vehicles began with goods, post and passenger train carriages as well as trams. During the time of the GDR they specialised in goods wagons and bogies. After the reunification process began, the operation as Waggonbau Niesky became part of the DWA Group and in the following years ended up being sold to the Canadian Bombardier. "But with our goods wagons we were the exotics in this group", recalls Werner Weinhold, responsible for factory planning at Niesky. Thus two years ago – after the entry of the Investors SEA GmbH and Mitarbeiter (Employees) e.V – the result was a new start as an independent company.

Since then things have been looking up for the medium-sized business. Today 250 employees are working in a production area of over 36,000 m² and produce modern goods wagons and passenger carriage assembly groups made from aluminium and steel for the European market. "Our order books are well filled for the next few years" Weinhold enthuses. Several hundred wagons are in the finely tuned production plan just for the German Railways, the Swiss Railways and the Austrian Railways. In addition to this word has got around in this sector of industry about our competence and flexibility, so that we are in addition working as suppliers for other wagon constructors.

Supplier requires great flexibility.

Werner Weinhold and Klaus-Dieter Jeschke (in charge of welding at WBN) were looking for an efficient welding plant just for those orders which demand a high degree of flexibility, to be able to rationally produce the up to 20m long aluminium wagon assembly groups. "Since at other manufacturers portal plants have been successful, we also went looking with these requirements in mind", according to the Factory Planner. But when the offers arrived at Niesky, disillusionment spread. Even the lowest bidder was a good 30% above the calculated budget. Good advice didn't come cheap. "Furthermore the long delivery times and the expensive reconstruction measures in the existing production hall were not acceptable to us".

As an alternative a robot welding plant was on offer with floor mounted unit. But was that the cheaper solution? "Here we got into discussions with the experts of Cloos Schweisstechnik. In the shortest possible time they convinced us of a system, whereby the robot moves along a 60 meter long overhead mounted track unit", explains Klaus-Dieter Jeschke. "Since the customer orders were on our backs, within four weeks we had planned the project so much that we could make a decision and we gave Cloos the order."

The peripheral equipments precisely position aluminium extrusion press profiles of up to 20m long for the robotic welding process.

Overhead linear track unit quickly installed

What was very good for the people responsible at WBN: The overhead linear track could be installed during current production because it is only positioned on 9 supports at the side in the large production hall. Instead of an expensive machine bed in the floor of the hall only the supports which carry the 60m track had to be installed in the hall. This dispensed with a quantity of expensive, cumbersome reconstruction measures and the associated interruptions to production. "We could thus adhere to our delivery times to customers even during the reconstruction phase", according to Weinhold. "A further plus point for the Cloos solution is the better accessibility of the almost barrier-free plant. It is easy to insert the aluminium parts for roof, floor and walls of the carriages into the large equipment below the robot track above.

Just a good half year after the decision, it was possible to put the new robotic installation into operation. Weinhold: "The project ran smoothly hand in hand with us and Cloos". There was continuous flow of information between the Berlin branch of Cloos and the Saxon company, so that at all times at short notice any problems arising could be acted on. "Even on this important point we did not always have good experience with other suppliers" complains the Factory Planner. The decision to buy robotic and welding technology from one source has proved itself.

"All the components of the plant are very well matched with each other", says Jeschke, the Welding Engineer.

The laser sensor on the torch ensures optimum seam recognition and tracking and thus clean weld results.

Eight axes get everywhere

Two ROMAT robots type 350 move longitudinally on a 60m overhead track and 2.5m across on one arm each. The equipment works per robot with six internal and two external axes and reaches all necessary weld positions. Due to the wide swing of the six robot axes there results a spherical working area of 3500mm. Despite its slim and compact build, the ROMAT is designed very rigidly. Its digitally controlled drive technology, the clearance-free positioning of the six axes and its precise measuring system enable accurate and rapid positioning, shortest travel times and high track precision even at high travel speeds. The repeatability is below 0.1mm. Integrated retaining brakes in the motor work according to the normally energised mode and

even with no electricity supply prevent involuntary movement of the robotic arm.

The Quinto welding power source and the wire coil move economically in separate carriages parallel to the robot.

On a separate truck the GLC 603 Quinto welding power source as well as the heated, large decoiling unit for the welding wire travel parallel per robot. Two external coolers ensure safe cooling of the weld torch and the two CST lasers with which the online seam recognition and seam tracking is achieved.

The 6-axis robots weld, by the MIG process, the aluminium extrusion press profiles with wall thicknesses between 3 and 10mm under pure argon atmospheres with butt and fillet weld seams. 1.6mm welding wire is used in SAL 5183 quality, which is fed automatically to the robot from large 40 kg spools via the duo-drive system which ensures a secure and slip-free wire feed. By heating the large spool unwinding equipment, the wire is automatically pre-heated and the formation of moisture is effectively excluded. In order not to affect the air in the production hall, the plant has a high vacuum torch extractor. "Currently assembly groups for two complete coach bodies per week are being welded on the equipment" says Klaus-Dieter Jeschke. In addition the plant is sub-divided into working sections of 2 x 21m and 1 x 17m. Whilst welding is going on in two sections, the operator can insert new work-pieces in the other places or remove finished parts. Per part a good 200m weld seam length is produced.

The complete robotic plant is controlled via the compact operating unit.

Control Technology and operating station outside the robots

The Cloos experts have set up the control cabinet with the robot controller ROTROL below the track to save space. It is thus not in the way when handling the aluminium parts of up to 20m long and 3m wide. The multi-processor system reaches an extremely short interpolation cycle and guarantees a high track accuracy of the robot axes and of the externally connected equipment. Sixteen digital servo regulators are at the ready. The feed electronics are securely protected with protection type IP 54 and air conditioning against the effects of production.

High, reproducible seam quality with MIG aluminium welding with ROMAT industrial robots

In front of the robotic equipment there is a compact operating station as well as the teach pendant, via which individual welding programmes can be selected at the push of a button and which informs the operator via the 8" touch screen monitor about the progress of the equipment's programme.

"It gives us the necessary flexibility to react easily to the very different customers" sums up the Factory Planner Werner Weinhold, who every day can be happy about the courageous decision for the unique robotic equipment. "After all, the production quality, the price and the reliability are right".

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Enthusiastic about the advantages of the unique plant: Welding Engineer Klaus-Dieter Jeschke, Factory Planner Werner Weinhold and Cloos Branch Manager Volker Hedergott (from left to right).