Success Story

Automated Welding Technology "Made in Germany"

Robots increase productivity by more than 50 percent

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HAIGER/ZHENGZHOU – Increasing demands for productivity and quality in combination with rising wages and a lack of well-trained specialists present new challenges for China's industrial companies. That is why the Zhengzhou Coal Mining Machinery Group Ltd. have commissioned 25 automated welding systems from Carl Cloos Schweisstechnik GmbH in the last 5 years. In the future, the company is planning further major investment in automating the manufacturing processes.

With economic growth at 7.4 percent in 2014, China is still the fastest growing market in the world. The demand for automated production solutions is enormous and still rising. This is principally caused by major investment in the automotive industry, from which numerous other branches of industry profit. According to the World Robotics Industrial Robots Report 2014, there are currently about 30 robots per 10,000 employees in China. Compared to Germany (280 robots per 10,000 employees) or Korea (440 robots per 10,000 employees) the number of robots is comparatively low. In order to ensure their competitiveness, Chinese companies must also meet increasing demands on productivity and quality. This is a major requirement because wages are rising. In addition, well-trained specialists such as welders are hard to find. That is why, in the medium term, up to a million robots must be installed in order to maintain their international position.

Photo 1: Zhengzhou Coal Mining is one of the world's leading manufacturers of longwall equipment in the mining sector.

Converting from manual to automated welding technology

The welding technology as a very modern process is an important part of the production chain. That explains why, in the last few years, robots for arc welding have been the most requested applications in China. Welding technology is also in the focus of production at Zhengzhou Coal Mining. With around 4,000 employees, the company is one of the world's leading manufacturers of longwall equipment in the mining sector

"In order to stay in the global market, we are currently using automation in almost all areas of production", explains Fu Zu Gang, Managing Director of Zhengzhou Coal Mining. "By changing from manual to automated welding we have found a reliable partner in CLOOS." In the last five years, the company has invested in 25 robot machines with a total of 52 welding robots for the production of hydraulic safety shields.

Photo 2: The Chinese company uses 25 CLOOS robot systems for the production of hydraulic safety shields.

52 CLOOS robots in 25 welding systems

In 2011 Zhengzhou Coal Mining started operating its first automated welding machine. Here, four QIROX QRH-E 410 robots weld the "Base Frame" foot sections of the safety shields. 21 identical machines, each with two QRH-E 390 robots are available for the production of the "Link" connecting components. In addition, three machines, each with two QRH-E 390 robots, weld the "Root" sections of the connecting components. The use of the Rapid Weld process enables one hundred percent penetration with the result that the internal layer no longer has to be welded separately.

The range of the 7-axis QIROX welding robots simplifies and accelerates the welding of the complex workpieces. Furthermore, all robots are equipped with an arc sensor. So the arc is used to simultaneously weld and measure the joint position on the workpiece. This saves time as, at the same time, workpiece distortions, e.g. due to thermal expansion, are directly compensated for.

Photo 3: The range of the 7-axis welding robots simplifies the welding of the complex workpieces.

The production lines must work in groups, in varying batch sizes and variants. The positioning devices can be set for different sizes and bring the complex work pieces into the ideal welding position. In order to allow rapid re-setting, the offline programming of the robot systems is achieved with the RoboPlan software from CLOOS. While the system is in production, a new program can be simultaneously produced in RoboPlan.

Quality and productivity increased

By investing in the modern robot welding systems, Zhengzhou Coal Mining was able to speed up the production processes overall by more than 50 percent and at the same time achieve exactly reproducible results. Before automation, a manual welder needed eight hours to make the “Link” part but the robots now only need four hours. Formerly, the "Base Frame" component was welded by four welders within two working days. Now four robots weld the component in one working day. As the robots now carry out the physically heavy work, the general danger from arc radiation and welding smoke is much lower. The welders can concentrate more on monitoring the processes. The staff got intensive training from CLOOS China, in order to be able to use the innovative technology to the full. In total, around 400 welders work at the site, of whom 20 are now trained in the use of the welding robots.

Photo 4: Overall, the robots speed up the production processes by more than 50 percent.

Because of the good results, the company is planning further major investment in automating the welding technology and in other areas of production. "Our aim is Industry 4.0. We want to automate all production stages and fully integrate the information systems into our processes in order to guarantee error-free production 24 hours a day and seven days a week." Fu would like to achieve this in co-operation with CLOOS. "If you want to hunt the biggest animal, you just need the best weapon."

Photo 5: By using the modern welding robots, the company now achieves exactly reproducible welding results.

Video on YouTube

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