Success Story

CLOOS robot welds compact cargo bikes

Automation ensures flexible production and highest weld quality at muli-cycles

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Cologne/Haiger – A cargo bike that is fast and agile, that can easily be taken on the train and parked in a normal bicycle cellar – its compact design makes the muli ideal for everyday use in the city. For welding, muli-cycles GmbH in Cologne relies on an automated solution by CLOOS. Thanks to the flexible design of the system and the use of different welding processes such as MoTion Weld and Vari Weld, the robot can weld different steel and aluminium components with consistently high quality.

An alternative to the car

"Our bicycles are compact and at the same time can easily transport large loads," says Jonas Gerhardt, who runs the start-up company together with his brother Sören Gerhardt. “We want to get more people excited about cycling and drive cars further away from the city centres." In 2015, they began developing the muli. At that time, Sören Gerhardt was about to complete his master's degree in product design. Industrial mechanic Jonas Gerhardt, who had completed his apprenticeship and first years of work at CLOOS, was just doing a technician apprenticeship. "Our goal was to offer an alternative to the car and to transfer the benefits of large cargo bikes to a compact bike," Jonas Gerhardt explains. "We then designed and built the first prototypes. The riding experience was so great that we kept working on it."

Since the start-up capital was initially lacking, the two brothers started a very successful crowdfunding campaign in which they more than doubled their funding target. From this project muli-cycles GmbH emerged in 2017, which initially produced in Driedorf in the Westerwald. The company moved to Cologne at the beginning of 2021. In the meantime, the muli is firmly established on the market and is considered a pioneer in the compact cargo bike segment. The Gerhardt brothers are continuously developing their cargo bike, not least because of personal motivation. "We both have small children who we cycle through the city every day," explains Jonas Gerhardt. That is why the muli is now, for example, the first cargo bike with an optional hammock seating system that can be integrated in both directions of travel.

Photo 1: The two-station design allows loading on one side while the robot welds at the other side.

Sustainability in focus

"Our customers very much appreciate that we are committed to the ideal of sustainability with the concept, the production and the entire business model of muli-cycles," Jonas Gerhardt emphasises. “This allows us to guarantee fair working conditions and high environmental, social and quality standards." For example, the production of the muli – from frame manufacture to powder coating to final assembly – takes place entirely in Germany. In addition, the Cologne-based company relies on local suppliers.

In the first year, Jonas Gerhardt built the bikes himself. In the meantime, the company employs 16 full-time and nine part-time employees in different areas. The distribution network now includes almost 100 specialist dealers around the world. "The boom is huge," Jonas Gerhardt says happily. “We can hardly keep up with the production.” Since its founding in 2017, the company has grown by more than 100 percent every year, so that it now produces wheels in the 4-digit range every year.

Photo 2: The robot system is characterised by maximum flexibility so that a change between different components is possible quickly.

Automation ensures growth

"With this growth, we can only keep our production in Germany in the long term if we automate heavily," explains Jonas Gerhardt. “We took this into account from the very beginning of the design process." The first tests for an automated welding system started in January 2020. As a former CLOOS employee, only CLOOS welding and robotics technology came into question for Jonas Gerhardt. During the development, design and production of the robot system he maintained a close exchange with his former colleagues. He is more than satisfied with the result.

2-station system with QIROX welding robot

The robot system consists of two opposite welding stations, each of which has a horizontal swivelling axis with an L-shaped extension arm. The counter bearing stabilises even long workpieces during welding. The station change is made by a horizontal rotation. Because of the two-station arrangement, the machines can be loaded mutually. Thus the employee on one side can remove the welded components and reload the systems whilst the welding process takes place at the other station. This results in an enormous saving on time for the whole process.

The heart of the system is the QIROX QRC-350-E robot. The six-axis articulated arm robot has an excenter axis 7 which is integrated between robot base and centre point of axis 1. The seventh axis extends the working range for optimal positioning of the welding torch. The overhead positioning of the robot allows optimum accessibility to the workpiece

and facilitates the welding of complex workpieces.

Photo 3: Among other things, muli-cycles welds side rails of the aluminium transport basket with the robot system.

MoTion Weld and Vari Weld for excellent welding results

The QIROX QRC-350-E robot has a classic wrist with a maximum payload of up to 15 kg. The integration of a changing tool on the wrist allows the application of more processes with a robot. For this, muli-cycles mainly uses the CLOOS welding processes MoTion Vari Weld and Vari Weld.

Vari Weld is a MIG/MAG pulsed arc for a very wide range of applications. The current-controlled MIG/MAG pulsed arc process allows controlling the penetration profile at a multitude of materials and applications. The material characteristics remain nearly unchanged, particularly in the case of heat-sensitive materials.

MoTion Vari Weld is particularly suitable for fine plate applications and applications in the lowest capacity ranges. The welding processes provide advantages everywhere where special demands to weld surface and appearance are made – as with the cargo bike from muli-cycles. MoTion Vari Weld is a combination of the proven CLOOS Vari Weld process and reversing wire. In the process, the wire is drawn back and forward at a frequency of up to 180 Hz which results in an extremely high process stability to the lowest capacity range.

With these innovative welding processes, spatters are reduced to a minimum, eliminating time-consuming rework. Even with the demanding components with thin wall thicknesses and round tubes, muli-cycles thus achieves optimum welding results.

Photo 4: The MoTion Weld process provide advantages everywhere where special demands to weld surface and appearance are made.

Flexible application possibilities and high quantities

Due to the flexible design, the system is suitable for different production requirements. At the moment, muli-cycles welds the side rails of the aluminium transport basket and steel housing parts for the electric motor, among other things.

Photo 5: The muli cargo bike is characterised by its compact design.

"Regardless of whether steel or aluminium, large or small components – we make full use of the flexibility of the robot system," says Jonas Gerhardt. “Today we produce with the robot in a day what we previously produced in a week.” Without the investment in the robot system, the company would not have been able to produce the high quantities. Due to the positive experience and the steadily growing demand, the Gerhardt brothers are planning further investments in automated welding technology in the short term.

Photo 6: muli-cycles managing director Jonas Gerhardt hands over a muli to CLOOS managing director Stephan Pittner for use at the Haiger manufacturing site.

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