



# THE TECHNICAL ISSUE

## **All weld seams in a good position to be joined**

Efficient welding of tractor components using a transportable robot compact system of the C series

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The component position to the welding robot can always be adjusted perfectly by turning and tilting the manipulator so that all welds can be welded precisely.

## Robot welding systems reduces production times by one third

# All weld seams in a good position to be joined

**A transportable CLOOS series compact system of the C series allows efficient robot welding. Thus the tractor manufacturer AGCO joins thick sheet parts considerably faster than with the robot systems used until today.**

Ludwig Litschko expresses it concisely: „The new robot welding system enables us to join our parts by one third faster on the average than with the robot systems we used up to now.“ The manager of the welding technology department of the tractor manufacturer AGCO GmbH & Co. OHG – formerly

Fendt – in Asbach-Bäumenheim talks about a transportable compact system of the C series from Carl Cloos Schweißtechnik GmbH, Haiger. It is completely from one manufacture and has been working since October 2005.

The robot and the workpiece manipulator of this equipment which is designed for universal application are mounted on a common 6 x 6 m base plate. The welding technology and the control cabinet are located outside the system thus facilitating the operation. The standard equipment includes the 6-axes industrial robot ROMAT® 350 with a max. load capacity of 15 kg and a high repeatability of be-

low 0.1 mm which is designed for the use in hard industry. Due to its large working range even big components are easily accessible for the robot. The system is designed for workpiece up to a diameter of 1400 mm.

The equipment is surrounded at the back and laterally by a safety fence and at the front by a light barrier and a light curtain. It disposes at present of 16 tractor components which are considerably different in size and weight. The spectrum comprises small parts as e.g. shift and deflecting levers, holding bows, flaps and bearings as well as big thick-walled axle supports. Usually, the piece numbers



are between approx. 30 and 150.

The parts are made of steel – St 37 or St 52 – in thickness ranges between 3 and 50 mm, the most common thicknesses are 10 to 30 mm.



**The robot welds on one side while on the other side the operator is unloading and reloading the workpiece manipulator.**

They are joined via MAG welding – also in multiple layer technique – using solid or filler wire; the welding times are between 5 and 15 min. The system is also suitable for other common arc welding processes and for high-capacity processes such as MIG/MAG Tandem welding.

To fulfil the joining tasks of AGCO the system was equipped with a 400 A GLC 403 Quinto high-end pulsed arc welding machine. This machine is trimmed to high capacity, quality and flexibility as well as to a high operational comfort.

This exactly tuned system allows the comfortable administration of all relevant parameters and adjustments via the portable teach pendant PHG – even during welding. The se-

lectable function SPAZ (low-spatter ignition) ensures a smooth and reliable ignition for all metal shielding gas welding processes.

After welding there is always the same free wire

length with a pointed wire end to guarantee a safe re-ignition of the arc. Due to the integrated self-learning weld data monitoring software the joining process and the process quality can be controlled and the reproducibility can be optimised. "No matter what material, plate thickness and welding task, the system provides good and reproducible results," Ludwig Litschko confirms.

The highly flexible welding system has five external axes for workpiece manipulation. The modular Orbit 5 DP 5000N HD manipulator is adapted to different workshop requirements and consists of two turn/tilt positioners on an indexing table and is designed for parts weighing up to 500 kg. Even for such loads stiff high-capacity drives shall ensure a high positioning

accuracy. All movements of the manipulator can be integrated in the controller thus allowing the simultaneous working run of robot and peripheral equipment.

The installation is designed for an efficient two-station operation. The robot welds on one side while on the other side which is separated by a light curtain the operator is unloading, checking and loading the workpiece manipulator. Then the indexing table turns by 180° in 6 seconds and a new part can be welded.

The operators being familiar with robot welding systems had been trained for one week at Cloos to handle the new acquisition. "We are reliant on a well-functioning team of man and robot", Mr. Litschko declares. "In this team the robot system takes on the hard jobs works such as turning, tilting and welding the component. The operator is in charge of loading and unloading, checking, adjusting as well as interpolation."

#### **Advantages in brief**

The Cloos robot welding system type C offers the following advantages:

- Considerable time and cost savings
- High availability of much more than 90%
- Joining with high quality and repeatability
- Workers are relieved by heavy works and are available for other tasks



This teamwork would be advantageous especially for big and heavy workpieces thus relieving the worker considerably. Compared to a common indexing table which can only be turned the use of the turn/tilt positioners has a positive economic effect. If required by the joining task, the component position to the welding robot can always be adjusted perfectly by turning and tilting the manipulator so that there is no „blind angle“ for the robot and all welds can be welded in optimum position.

„Beside the improved units of robot and welding technology the workpiece manipulator was the determining factor of the increased productivity when robot welding“, Litschko emphasises.

The increase of productivity let the welding technology director look ahead positively. He assumes that the system which cost about 130,000.00 Euro will pay itself off within the next one or two years. The payback period depends on how intensive the equipment which shall be available for more than 90 % will be used. At present there is a two-shift operation, the target is a three-shift operation on 6 days per week.

As an option the system can be equipped with the complete scope of sensor systems of the manufacturer. In this regard the

standard equipment which includes for example a gas shroud sensor is enough for AGCO’s requirements. „As the use of the sensorics means an increased expenditure we try to abandon it if possible“, remarks Litschko. „And when the pre-production is ok we’ll make it“.

Programming and software are also standard: The ergonomically designed teach pendant (PHG) with graphic operating surface allows menu-guided online generation, verification and correction of extensive programs. Although the unit offers all conditions to be connected to the offline programming system of the manufacturer, AGCO have only be programmed



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online until now.

In the case that the modularly designed system shall change its position, it can be dismantled easily and simply into the units robot and workpiece manipulator and moved via forklift truck. For production the system parts can be re-

flanged again easily and quickly. Clear mechanic and electric interfaces keep the assembly and commissioning times low.

The system was delivered in four months; the first commissioning only took a few days. A special in-house department is in charge of maintenance and simple repair works. „Only in case of serious problems we contact the Cloos representation near Munich“, Litschko says. However, until now there have been no problems requiring an external service operation.

Anyway the tractor manufacturer who has been CLOOS-customer for about 4 decades made good experiences with its numerous robot welding systems



from Haiger. For good reasons: „Cloos has much experience in the field of welding technology. We benefit from this fact“, Litschko explains. „Concerning robot systems for gas shielded welding this company is one of the leaders.