

CLOOS

Weld your way.

QIROX[®] Sensor systems

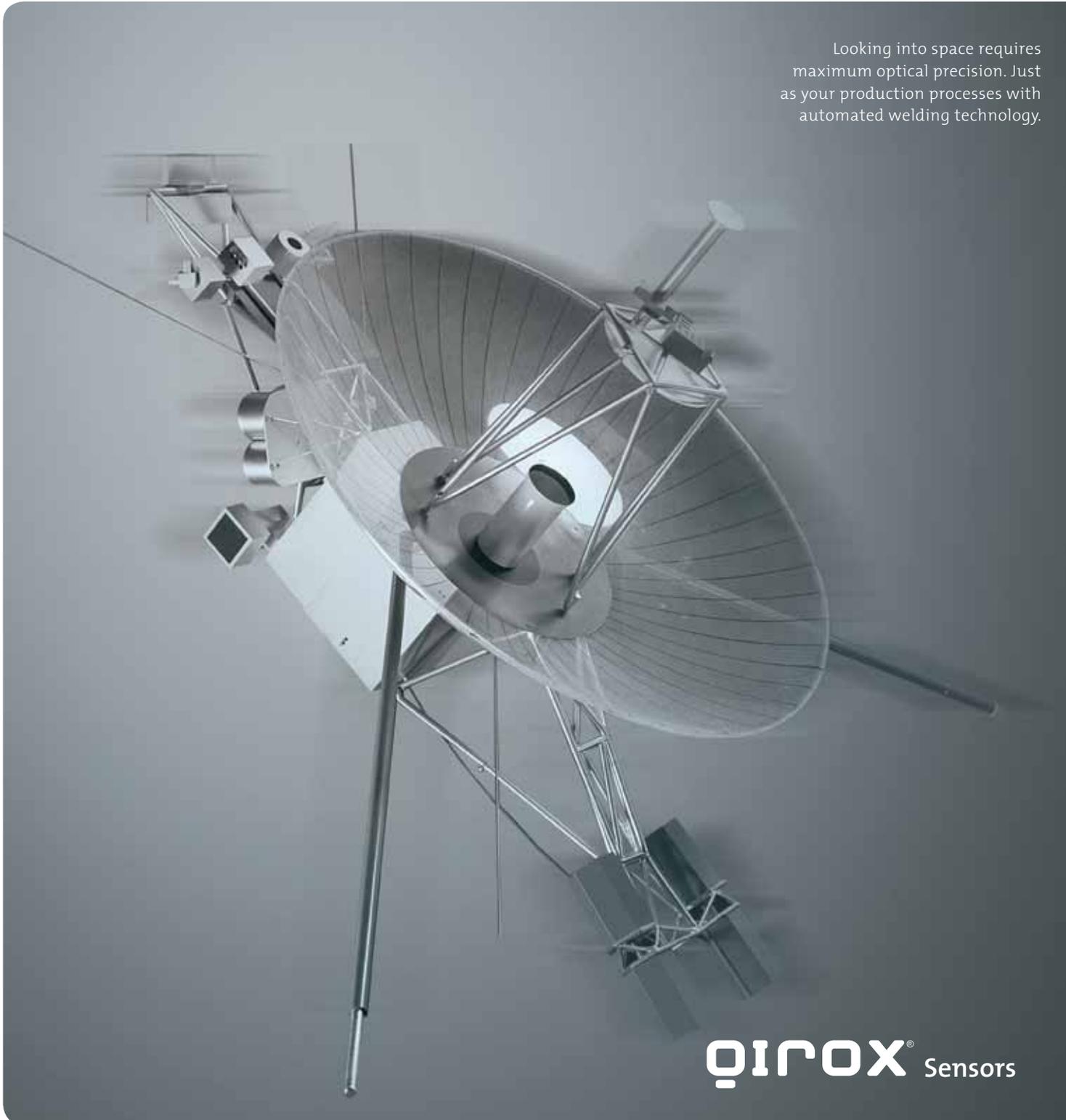
Top quality with each weld seam



QIROX[®]

Precision work!

Looking into space requires maximum optical precision. Just as your production processes with automated welding technology.



GIROX® Sensors

CLOOS: Your brand for innovative welding technology!

Providing added value for our customers! This is the motivational force behind our 700 employees.

We are constantly raising our bar by pushing ourselves to provide innovative welding processes and solutions that will contribute to the long-term commercial success of your company.

Our process competence is at the forefront in welding and cutting of various ferrous and non-ferrous metals. We offer our customers individual solutions which are optimized and adapted specifically to your product and production requirements.

CLOOS develops, manufactures and delivers innovative solutions to more than 40 countries worldwide. With our **QINEO®**, the new generation of welding machines for manual and automated applications, and **QIROX®**, the system for automated welding and cutting, our product range covers the entire spectrum of arc welding technology. Our product portfolio includes intelligent software, sensor and safety technology solutions – all of which are customised to meet your specific needs and requirements!

Leadership and competence equals process automation and welding at its best.

Whatever your needs are, we “Weld your way.”

CLOOS provides full service solutions – all from a single source!

Benefits of choosing CLOOS

- Unique and customised process and product solutions:
→ Delivering you more commercial success!
- High level of industrial and engineering competence:
→ We know what matters to you!
- Professional advice and a high level of global service quality:
→ From start to finish, we are with you all the way!
- Superior quality and technological know-how:
→ “Made in Germany” can be relied on

We offer optimised solutions with maximum efficiency and a high degree of welding and cutting products that are customised to your application: And we have been doing this for over 90 years!

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QIROX® The efficient system solution for increased productivity.

QIROX® is the new CLOOS product brand comprising all solutions for automated welding and cutting. Due to its modular design, the QIROX® system allows scalable solutions which can perfectly match your production requirements. The QIROX® system includes the robot technology, positioners, safety technology, software, sensors and the interface to the process technology. It is completed by an extensive range of options and complementary services. As a result of this comprehensive service from just one supplier, our customers can gain considerable economic and quality benefits.

Sensitivity to perfect welding processes

With our QIROX® system solution for automated welding and cutting we can integrate state-of-the-art welding technology into your welding production. The main task of our sensor systems is to ensure quality control through precise welding procedures. The flexibility of your systems increases due to the control and compensation of tolerances between the programmed paths and the real work-pieces. Four CLOOS sensors which have been proven in the field are available for the most varied materials and applications; these sensors are able to further improve automated welding due to their intelligent control and guidance. The optimised work flow minimises rework so that you are able to produce more efficiently and with excellent quality.



Plus factors for increased productivity

- Four proven sensor systems for the most varied materials, weld forms and applications
- Perfectly matched to the CLOOS system solution QIROX®
- Considerably improved weld quality
- Less manual work – minimum rework
- Opening up of new application possibilities using CLOOS sensor systems

The right sensor always available



With intensive consultation we can develop complete solutions to meet your requirements. To generate maximum efficiency and effectiveness by automating the welding processes, all components are individually matched to the relevant production conditions and requirements. This applies in particular to the field of sensor technology, where we have developed four products with different capacity ranges: tactile gas nozzle sensor, arc sensor, laser offline sensor and the laser online sensor. These sensors have different tasks depending on the production requirements. The tactile gas nozzle sensor and the laser offline sensor can also be combined with the arc sensor.



Tactile gas nozzle sensor

Using an electro-mechanical detecting principle the CLOOS tactile gas nozzle sensor can determine the start and/or end of the weld seam – any deviations due to material tolerances are corrected.



Arc sensor

During welding the CLOOS arc sensor measures whether the torch position is actually following the programmed path. If any deviations occur due to heat distortion for example, the robot tracks the real contour.



Laser offline sensor

The system detects the start and/or the end of the weld seam offline before welding and collects measurement data. Using this data the program is adjusted to the actual measured condition.



Laser online sensor

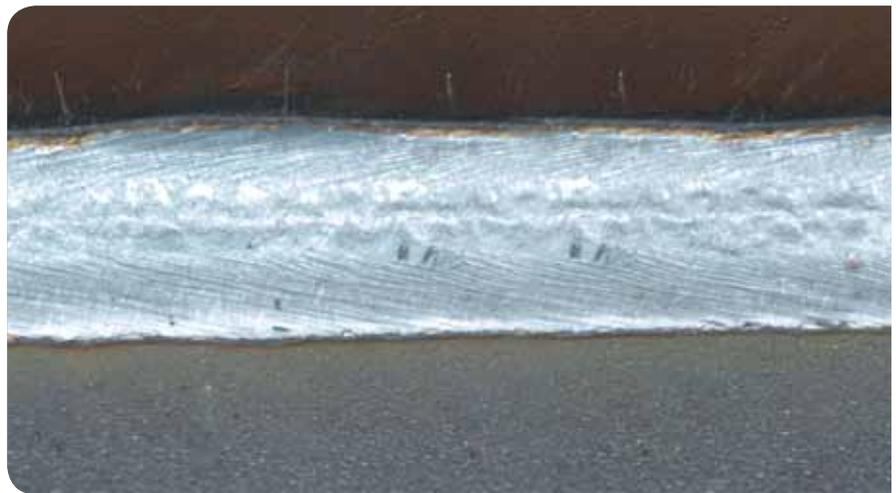
This high-tech sensor offers maximum flexibility. The section to be welded is measured online during welding – the position of the tooling, e.g. the welding torch or the laser beam, and the various process parameters are continuously adjusted to achieve an optimum welding result.

Start and/or end point exactly located

The start point and the workpiece joint contour play a special role in automated robot welding. Although the positions are defined by the relevant program which controls the robot, in practice deviations occur due to inaccurate settings or material tolerances. To enable these deviations to be quickly and accurately compensated for, the CLOOS tactile gas nozzle sensor checks the start and/or end positions – and corrects the programmed welding path correspondingly. The tactile gas nozzle sensor can be combined with the arc sensor.

Measuring the seam volume

If both positions are defined, the linear run of the weld seam is determined automatically. In the case of a V seam the tactile CLOOS gas nozzle sensor also measures the seam volume according to the same principle. After saving the information in the user program, the robot fills the seam along the optimised path. The main advantage is a perfect welding result as a basis for a reliable quality.



Optimum weld seam position

Electro-mechanical detecting principle

The CLOOS tactile sensor uses the torch gas nozzle or a separate tracer pin to determine start and/or end position. The robot moves the torch along the programmed seam tracking section. If the gas nozzle or a tracer pin touches the workpiece, a current flows, the robot stops and the position is stored. In order to define the X, Y and Z coordinates exactly, the workpiece is approached from three directions.

Tasks

- Detection of the start and/or end position
- Definition of the work-piece position
- Determination of the linear welding path
- Measurement of the seam volume in the case of V seams

Detectors

- Gas nozzle
- Free wire end
- Additionally mounted tracer pin

Materials

- All materials with electro-conductive surface

Advantages

- No interference from attached parts (except when using a tracer pin)
- Direct integration into the user program



Correction signals from the arc

The CLOOS arc sensor uses the arc to simultaneously weld and measure the joint position on the workpiece. The welding torch oscillates along the joint scanning the edges of the weld seam preparation. If the measured values, which are obtained electronically from weld current and voltage, are not the same on both sides, the weld seam position deviates from the programmed path. The computer-based robot controller adjusts the welding head position so that the seam is placed exactly in the centre of the joint. In addition, this procedure corrects the distance of the welding torch to the workpiece.

Welding and Measuring

As the arc sensor enables measurement and welding to be carried out simultaneously, the loss in time is minimal. At the same time workpiece distortions – for example due to heat expansion – are directly compensated for. In this way the CLOOS arc sensor combines productivity with optimum quality. No additional intrusive parts are necessary.



Weld seam – e.g. Speed Weld process

Saving the measured values

After the robot has welded the root seam, the correction data determined is saved and used for welding the cover runs ensuring that the build-up of these runs is continuously optimised. The final result is further improved when combined with the CLOOS gas nozzle sensor, which determines the start of the weld seam.

Tasks

- Correction of the torch position during welding for compensation of material tolerances
- Distance correction during TIG welding and plasma cutting

Arc operating modes

- Control Weld
- Speed Weld
- Rapid Weld
- Tandem Weld

Weld seam geometries

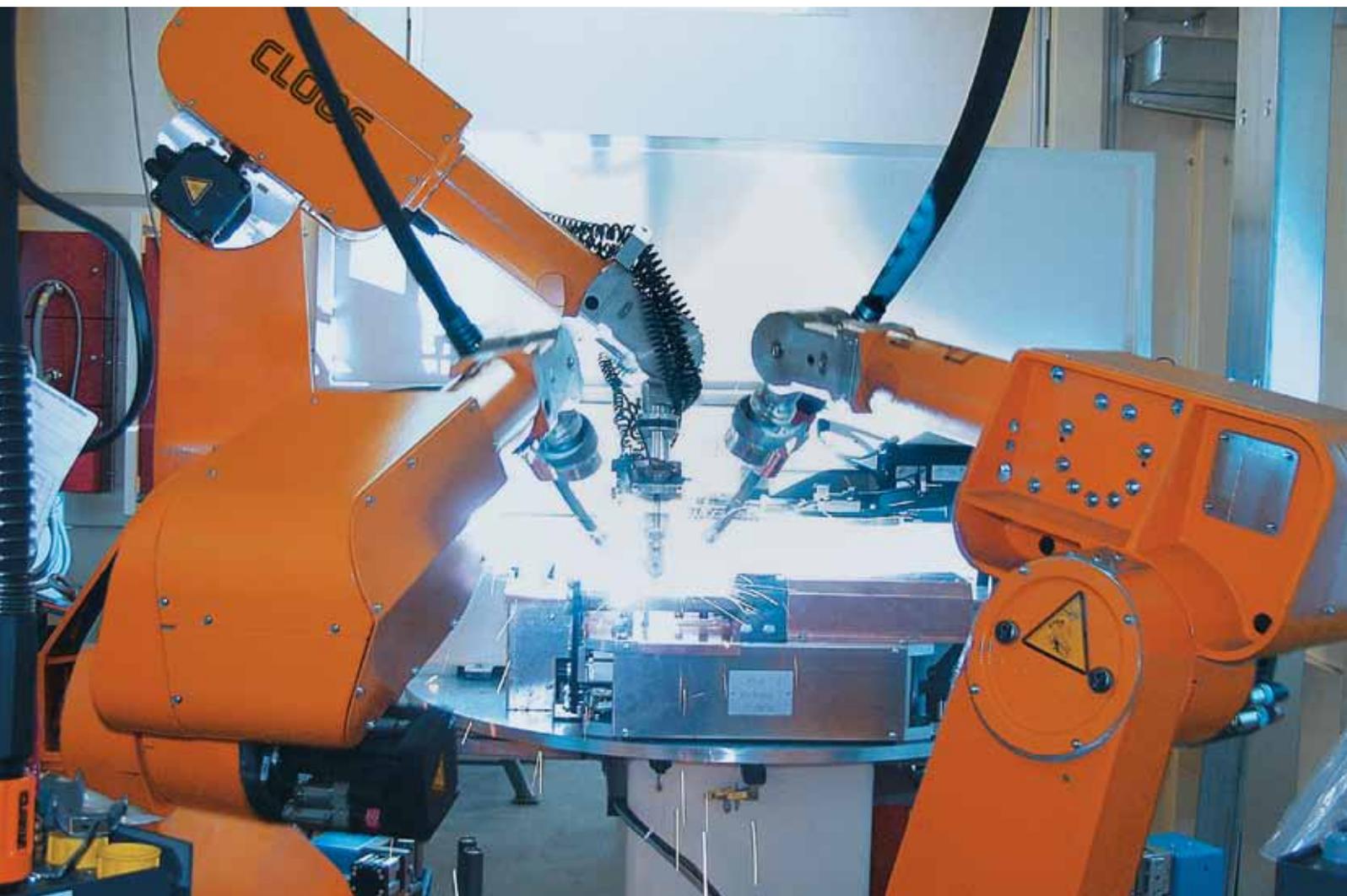
- Fillet weld
- V weld
- Y weld

Materials

- Steels
- Chrome nickel steels

Advantages

- Nearly no loss in time
- No interference from attached parts
- Direct connection to the robot controller
- Adaptation of the correcting sensitivity
- Memory function – data storage for welding of cover runs



Optically measured welding path

The laser offline sensor tracks the programmed path offline before starting the welding process. The sensor sends a light beam onto the material surface, receives the reflection and obtains every measurement information on the actual seam position and seam geometry. This procedure can be used for materials made of high-alloy steel and aluminium as well as for unalloyed steel and galvanised steel. The laser offline sensor can be combined with the arc sensor without any problems.

Short detection distance, low cycle times

In order to achieve very short detection distances, the sensor is located in the hand flange of the robot. The torch position for the tracking movement is nearly identical to the later welding position and compared to conventional sensors, which require additional robot movements, considerably lower cycle times can be achieved.

Programming adaptation

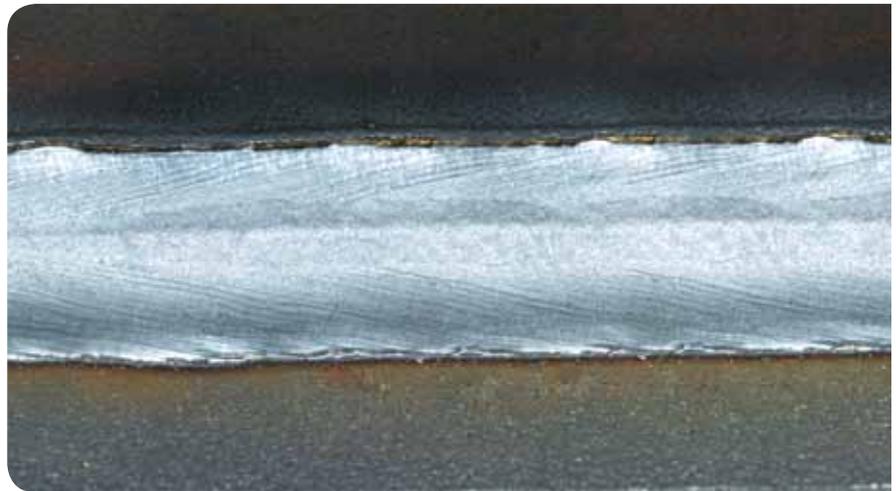
During scanning the laser sensor detects the position of the seam start and end, as well as the position of tubes and bolts; it measures gap widths, detects workpiece edges and recognises seam geometries. Following this measuring process the data which was sent to the robot controller is compared with the programmed values. Deviations are corrected in the program and the robot starts the welding process which has been matched to the actual workpiece situation.

Option: Monitoring Integrated video camera

- Programming aid where access is difficult
- Observation of the torch during welding

Measuring results

- Y and Z position
- Seam cross section
- Gap width bottom
- Gap width top
- Edge offset
- Edge height
- Aperture angle
- Orientation angle



Weld seam – e.g. Speed Weld process

Contactless measurement

As a non contact optical measuring system, the CLOOS laser offline sensor is largely independent of the material. The scanning process is quick and due to its high resolution and insensitivity to reflection can provide reliable details and data on positions as well as geometrical information on the different weld types.

Tasks

- Search for seam start and seam end
- Recognition of workpiece edges and seam geometries
- Determination of position of tubes and bolts
- Measurement of gap widths
- Seam preparation check

Weld types

- Lap joint
- Joint with air gap
- V weld
- Circular arc (concave, convex)
- Corners and cutouts
- Fillet weld
- HV weld
- Multi overlap weld
- Multilayer filling weld
- Tube and bolt joints
- Special seam types

Materials

- Structural steels
- Galvanised/electrolytic galvanised steels
- Organically coated plate
- Aluminium
- Chrome nickel steels

Advantages

- Short search intervals due to optimum sensor position
- Insensitive due to non contact measuring procedure
- Memory function – data storage for cover layer welding
- Maximum flexibility: can be used for nearly every material; scanning width adjustable
- Programming and analysis via the QIROX[®] robot controller teach pendant
- High workpiece accessibility due to compact design



Maximum sensor capacity

The laser online sensor first moves to the programmed start position. The tracking section is then measured online during welding. The laser head which is mounted parallel to the processing point sends a laser beam onto the workpiece surface, receives the reflected beams and transfers the measured results to the robot controller. Here the data is evaluated in order to compensate for material tolerances and heat distortion. Based on the new values the system changes the position of the welding torch and adjusts the process parameter. The online sensor carries out corrections immediately, thus ensuring optimum welding results.

New application possibilities

The operation of the CLOOS laser sensor opens up completely new application areas for automated welding without affecting the cycle times, and due to the wide application range offers maximum flexibility. The system to a large extent does not depend on the material – even where workpieces are coated or contaminated– and the scanning width and resolution can be adjusted to the most varied requirements.



Weld seam – e.g. Cold Weld process

Consistent quality

If the tolerance deviations indicated by measurements during welding are too high, the system interrupts the production run. This integrated quality control inhibits faulty welds, thus avoiding extensive rework.

Tasks

- Search seam start
- Correction of tooling position
- Adaptation of process parameters during welding
- Control of the edge offset in the case of butt welds

Weld types

- Lap joint
- Multi overlap weld
- Butt joint
- Butt joint with air gap
- Fillet weld
- V weld, HV weld
- Corner weld
- Flange weld
- Special seam types

Materials

- Nearly all materials
- Even coated and contaminated workpieces

Advantages and benefit

- Online compensation of workpiece tolerances
- Insensitive due to non contact measuring procedure
- Wide application range: largely irrespective of the material
- For the most varied weld types
- Direct connection to the robot controller
- Integrated quality control with interruption in the case of tolerance deviations



Advice on system optimisation

Our sensor specialists have many years experience in the application of QIROX® welding robot systems. Each component is perfectly matched to the other. Power source, sensor monitoring and welding robot communicate via an optimum interface. This ensures short robot reaction time and a high system efficiency. Just tell us the materials to be welded and the desired tolerance compensation and we will analyse all parameters and develop the practical solution for you.

Efficiency in use

- The installation of CST Flex sensors at Alstom in Kirchheim (F) enables side walls for railway vehicles to be manufactured in aluminium and steel with online use with the laser hybrid process.
- The company VLV Solel has had a good experience with CLOOS iCSE LD sensors. The sensors are used in the demanding production of solar power components to weld square joints on tubes of chrome-nickel steel.
- Siemens FFM have also benefited from CLOOS sensors. They ordered CST FLEX sensors for cover welding of control system parts made of chrome-nickel steel. Gap widths on overlap welds are now controlled online which has considerably increased the quality.



A detailed explanation of all the advantages and application ranges of the available welding processes can be found in the CLOOS special brochure "Welding".

www.cloos.de



Sensors

	Tactile gas nozzle sensor	Arc sensor	Laser distance sensor	Adaptive laser sensor
Tasks	Detection of the start and/or end position Definition of the workpiece position Determination of the linear welding path Measurement of the seam volume in the case of V seams	Torch guidance during MAG welding for compensation of material tolerances Height correction during TIG welding and plasma cutting	Search for seam start and seam end Recognition of workpiece edges and seam geometries Determination of position of tubes and bolts Measurement of gap widths Seam preparation check	Search seam start Correction of tooling position and process parameters during welding Offline measurement is also possible Control of the edge offset in the case of butt welds
Detectable geometries	all	Fillet weld V weld Y weld	Lap joint Joint with air gap V weld Circular arc (concave, convex) Corner weld and cutouts Fillet weld HV weld Multi overlap weld Multilayer weld Tube and bolt joints Special seam types	Lap joint Multi overlap weld Butt weld Joint with air gap Fillet weld V weld, HV weld Corner weld Flange weld Special seam types
Materials	All materials with electro-conductive surface	Structural steel Chrome nickel steel	Structural steel Galvanised/electrolytic galvanised steel Organically coated plate Aluminium Chrome nickel steel	Nearly all materials - even coated and contaminated workpieces

	Tactile gas nozzle sensor	Arc sensor	Laser distance sensor	Adaptive laser sensor		
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			iCSE LD	CST FLEX D	CST FLEX S	CST FLEX P
Mains connection	400 V AC / 0.2 A	24 V DC / 1 A	24 V DC / 1.5 A	24 V DC / 1.5 A	240 V AC / 3 A	240 V AC / 3 A
Dimensions (L x W x H)	380 x 210 x 300 mm	–	Ø 100 X 43 mm	33 x 58 x 107,5 mm	35 x 60 x 178 mm	35 x 60 x 178 mm
Weight	1200 g	–	600 g	450 g	600 g	600 g
Measuring voltage	60 V and 700 V	–	–	–	–	–
Weld current range	–	50 - 500 A	–	–	–	–
Min. side height	–	5 mm	1 mm	1 mm	1 mm	2 mm
Min. gap width	–	–	1 mm	1 mm	1 mm	2 mm
Tracking speed	approx. 30 cm/min	–	approx. 300 cm/min	–	–	–
Max. working speed	–	approx. 200 cm/min	–	approx. 200 cm/min	approx. 200 cm/min	approx. 200 cm/min
Min. measuring distance	–	–	310 mm	5,5 mm	5,6 mm	5,6 mm
Measuring range	–	–	0 - 170 mm	0 - 140 mm	0 - 65 mm	0 - 90 mm
Beam diameter / width	–	–	150 - 220 µm	27 - 76 mm	23 - 45 mm	37 - 83 mm
Resolution horizontal Ø	–	–	50 µm	50 µm	35 µm	60 µm
Resolution vertical Ø	–	–	100 µm	90 µm	75 µm	110 µm
Laser capacity	–	–	45 mW	80 mW	80 mW	80 mW
Spectral range	–	–	660 nm	660 nm	660 nm	660 nm
Laser protection class	–	–	3R	3B	3B	3B
Response time	–	–	–	60 ms	60 ms	60 ms
Working temperature	–	–	0 - 50° C	5 - 40° C	5 - 40° C	5 - 40° C

– not relevant

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Service

Active worldwide

There are more than 40 sales and service centres in our worldwide CLOOS organisation, which are at your disposal for sales and service. In addition, our experienced service team in Haiger can be called at any time for any problems. In this way we can ensure effective help on site if breakdowns occur.



Long service life guaranteed

With maintenance and inspection at regular intervals the technical availability of a CLOOS system is nearly 100 %. But if faults do occur, we can minimise downtime by means of a quick repair. This is ensured by well-equipped spare parts stores and a computer-controlled logistic system.

Always at your service

Our Service Hotline is free of charge and in the case of emergencies is always available for you. Even in the case of products which have been in use for more than 20 years, we have the expertise to answer all your questions.

Service Hotline

📞 +49 (0) 2773 85-132

Information about CLOOS welding power sources in the QINEO® range can be found at:
www.qineo.de

qineo®





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