



QIROX Cutting Solutions

Individual solutions for automated cutting

CLOOS

Weld your way.

www.cloos.de

We understand your business

Cutting technologies play an important role in modern production of many industries. The demand for it is continuously increasing, just like for welding. Cutting systems must become faster and more precise. The machining time for a component will be minimised and the material will be used efficiently - and all that with a perfect production quality. At the same time, user-friendliness, production reliability and energy efficiency are very important.

To meet these increasing requirements of efficiency and quality, innovative cutting technologies are in demand. When selecting a suitable cutting system it is important to match it perfectly with the respective task and to keep future projects in consideration. Therefore, CLOOS offers you three different cutting processes, Laser Cut, Plasma Cut and Oxy-fuel Cut, with special characteristics and individual advantages. Depending on the material type, plate thickness, geometry, quantity, cut quality and influence on the material, the advantages regarding efficiency vary from one process to the other. Benefit from our unique possibilities of combining cutting and welding. We always have the optimum machining technology for any welding and cutting task available.

With highly innovative products we work out individualised solutions for you to meet the growing requirements of the future.

Cutting Solutions Page **4**

Component examples Page **12**

Options Page **14**

Our customers Page **16**

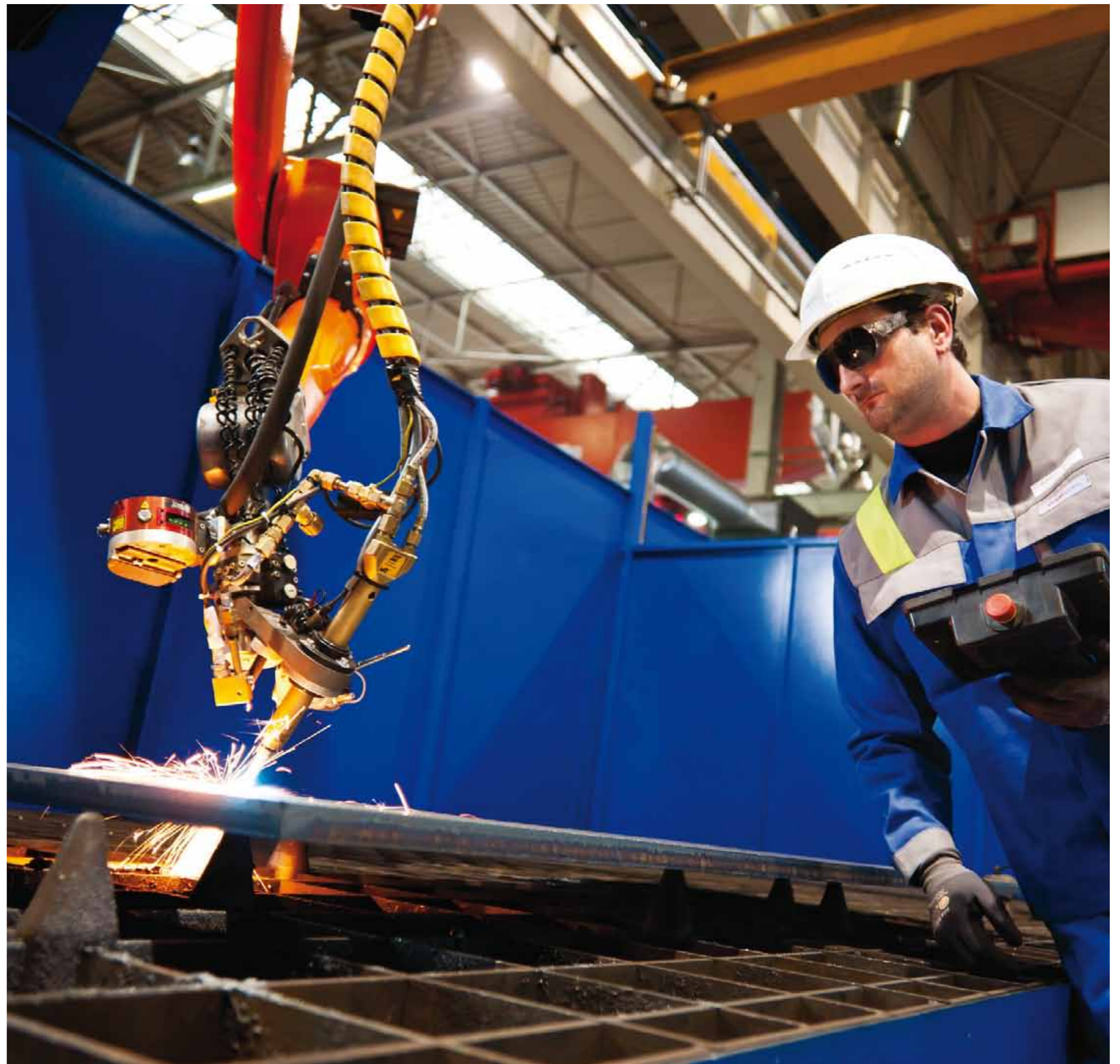
Cutting processes Page **17**

Welding processes Page **18**

From the idea to the component Page **20**

CLOOS – the company Page **22**

All over the world! Page **24**



Fully-automated to the tiniest detail



Project description

voestalpine Anarbeitung GmbH's cutting centre in Linz produces blanks cut to the customer's specific requirements on a CLOOS cutting system. The heart of the system is a six-axis QIROX robot which can alternate between the two stations on a linear unit.



The robot cutting system consists of two stations and has a laser sensor with an additional tracer pin. While the robot is chamfering the blanks on one side of the table, the other side can be reloaded.

Project description

The Moses software informs the robot controller precisely where the parts are. The robot then uses a laser sensor to record the precise position of the component that will be machined. Working with this information, the control system calculates the correct movement data for the robot and then cuts the blank out precisely.

The system offers maximum flexibility as the robot is capable of plasma and Oxy-fuel cutting. The cutting system reduces the machining time for weld preparation by 50 percent and increases the process reliability and quality considerably.



The robot uses a laser sensor to measure the precise position of the component to be machined. After that, the controller calculates the correct movement data for the robot and then cuts the blank out precisely. Then the station is released for workpiece removal and then reloading.



Another special feature: The automatic torch ignition with pre-ignition is a joint development by CLOOS and voestalpine.

Highlights

- **Reduction of the weld preparation** by 50 percent at increased process reliability
- **Increased process reliability** due to the big distance between laser sensor and working point
- **Loading and machining at the same time** because of an efficient two-station concept
- **Constantly high quality guaranteed** by using offline laser sensors
- **Maximum flexibility** as either plasma or Oxy-fuel cutting technology are used
- **Fully-automated, CAD-supported program generation** by MOSES software
- **Better working conditions for the employees** due to the change to new automated solutions



AMS designs and produces high-quality stainless steel containers and appliances, plus others for the chemical industry, medical engineering, biotechnology and food industry.

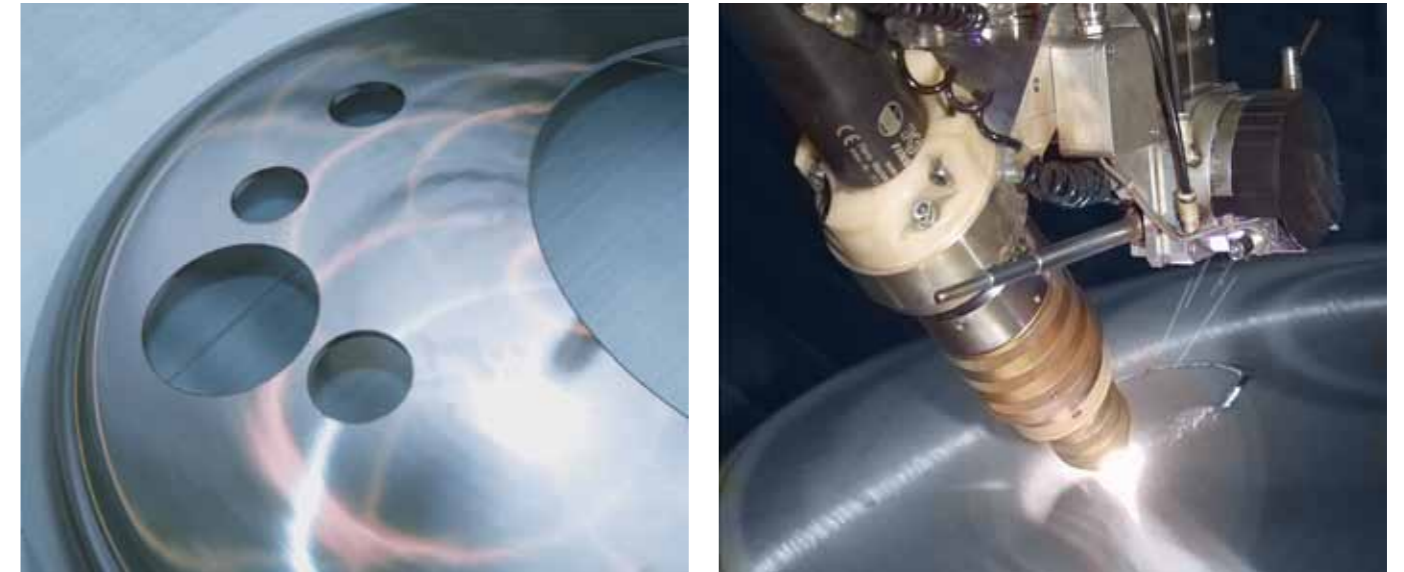
Project description

In the Saxon AMS Apparate-Maschinen-Systeme Technology GmbH production the time-consuming manual work of cutting the stainless steel material is done by a robot. Instead of the previous two days manual work, the robot only needs less than four hours. The robot is equipped with a tactile sensor which measures the workpiece exactly. Thus manual marking-out works are not required. And only a minimum of rework is necessary. The two-station system ensures the highest system efficiency possible because the operator works parallel to

the robot. Thanks to MOSES software the workpieces can be programmed offline on a PC during cutting. This considerably reduces the set-up and downtimes. In addition, there is a high level of conformity from the drawing to the product. In this way AMS can produce reproducible components which will make the subsequent exchange of containers simply possible.



The robotic system consists of an 8 m long and 3 m wide gantry with a lifting height of 1 m. Here the robot type QRC-350 places the holes and contours in the conical head of the stainless steel container.

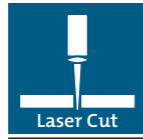


The container heads can have a height of up to 1,500 mm high and a diameter of up to 4,000 mm. The material thickness is then 25 mm.

A tactile tracer head at the arm of the plasma torch measures the torispherical, conical, ellipsoidal or hemispherical heads to be produced and marks them laterally. These marks help to position and weld the head on the container jacket exactly.

Highlights

- **Reduction of the production costs** by up to 20 percent
- **Quick production run** for smaller components due to two separate flame cutting tables of 4 m x 4 m each or combined to one table of 4 m x 8 m
- **Minimum tolerances** of 0.7 mm in a longitudinal cut through a stable steel construction
- **Fully-automated** three-dimensional cuts of the most different container heads incl. chamfering (weld preparation) are possible
- **Exact measurement** of the torispherical, conical, ellipsoidal or hemispherical heads by pneumatic tracer pin
- **Clear advantage speed advantages:** the time for automated production takes 4 hours compared to two days for a manual production



The Grove GMK4115 mobile telescoping crane with a max. capacity of 100 t, 11.3 m boom length and a boom angle of -1.5° to max. +82°.

Project description

The Manitowoc Group is one of the world's leading crane manufacturers. The US Group produces its GROVE brand auto-cranes at the Wilhelmshaven site. There, CLOOS realised a laser hybrid system for welding and cutting of the booms. The boom parts for mobile cranes which are up to 14 m long are welded from top and bottom shells and drilled.

The CLOOS QIROX robot with its 7 axes is suspended below a gantry which travels along a precise railsystem through the 26 m-long cabin. Processing is in the PC position, i.e. at 3 and 9 o'clock, so the boom does not need to be rotated. Via the automated changing system the robot can access the welding and cutting unit.



A mobile crane's booms comprise of a main element and up to 6 six telescopic sections, each of which can measure up to 14 m. The lower half is made of a thicker plate than the upper half. High-strength fine-graded steel with material thickness from 4 to 15 mm are used to produce the boom sections.



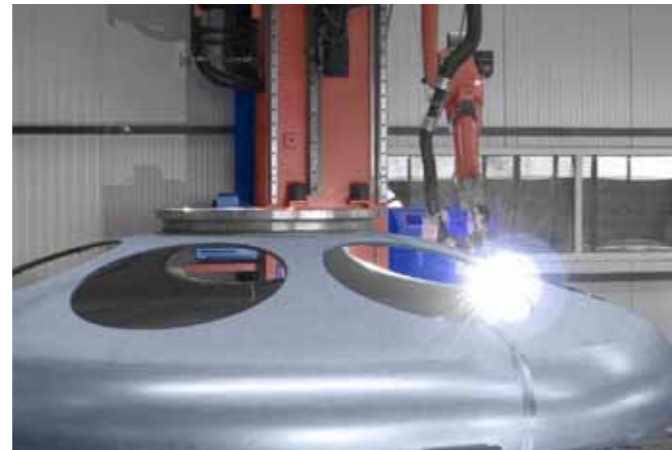
The automatic position for marking the holes is now 80 % faster compared to manual cutting.



By hand, each hole took 15 min. The laser produces up to 30 holes in the same time.

Highlights

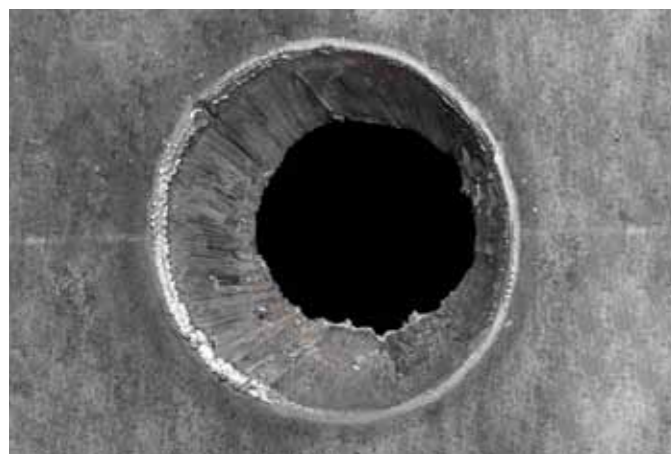
- **Flexible laser use**, also for automated position marking
- **Increasing the speed by 150 percent** compared to submerged-arc welding when using Tandem Weld:
Tandem Weld: 150 cm/min.
Submerged-arc welding: 60 cm/min.
- **Cost reduction** as there is no need for weld pool backing for the submerged arc weld, weld preparation, filler material, powder disposal and welding of several layers.
- **Quality guaranteed by the laser** allows very precise and reproducible welding results



Cutting 50 mm thick stainless steel containers using plasma cutting. For bevel cutting with an angle of 45°, components with a thickness of up to 35 mm can be separated. On average, the use of robot technology results in saving manufacturing costs of 15 to 20 per cent, with the same high quality.



The plasma cutting process is especially suitable for contour cuts on pipe joints which are joined afterwards. Previously the contour sections had to be done, with a lot of effort, manually using a template. The robot takes care of this in 15 minutes per contour.



Before: The support holes were made with a lot of work using a manual cutting method, which led to time consuming rework.

After: The holes are made automatically, in a fraction of the time, at a higher quality. The cutting edges are even and have significantly less burr or dross.



Oxy-fuel flame cutting of a special heat exchanger (cracked gas cooler) as a preparation for welding supports: Welding seam preparation is done when the holes are made by chamfering the sheet metal with a welding torch at an angle of 45°.



Left: With the Oxy-fuel flame cutting process pipes can be cut to specification and, at the same time, be chamfered as a preparation for the welding seam. The pipe connections can be welded without further preparation. Right: Flame cutting is optimally suited to preparing the components for the subsequent welding process. The welding seam has achieved excellent results in the helium leak test and fulfils the highest requirements for imperviousness.



An external pre-heating unit (left) prevents hardening cracks during the welding process. A special ignition unit fitted to the head of the torch (right) automatically guides ignition gas before the flame cutting and thus saves the use of ignition plugs, which are unreliable.

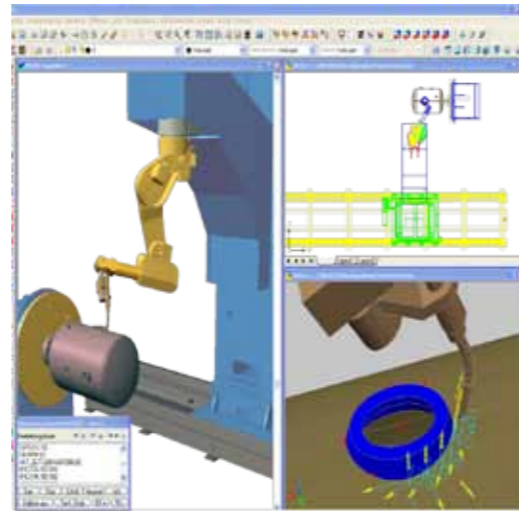
Offline programming software MOSES

- User-friendly, fully automatic offline programming without any knowledge of robots and CAD
- Graphic simulation with collision control and accessibility check of the points on the route
- Automatic generation of 3D-volume models of the components with chamfers to determine the cutting parameters and for simulation
- Automatic generation of all measurement runs for position measurement and compensation of the component tolerances
- Synchronous control of additional axes
- Cycle time calculation



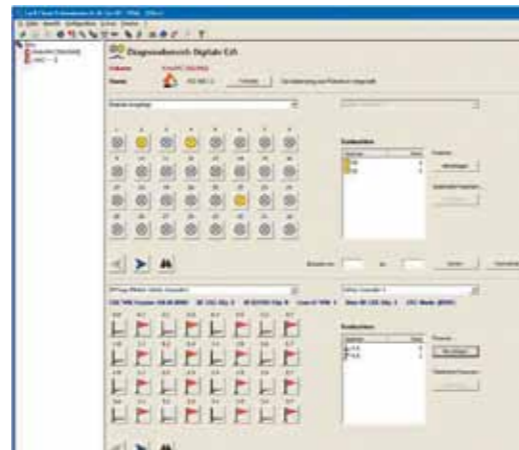
MOSES technology module

- Automatic robot program generation by entering the diameters, wall thickness and position of the pipes, casings and bottoms
- Library with different types of bottoms, standard pipes and attachments
- Marking functions simplify the positioning of the attachments
- Automatic calculation and display of CAD models including chamfers and penetration curves
- Simple import of 2D component drawings (e.g. DXF)
- Chamfer definition by entering the type of chamfer, angle, width and bar
- Cutting technologies: Oxy-fuel or plasma (with correction functions)
- Generation and administration of complete table assignments



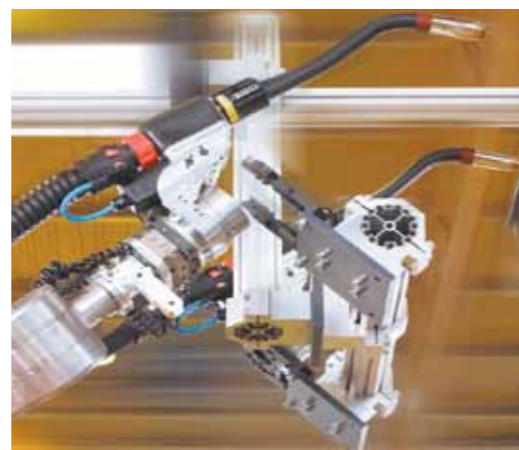
Robot technology hardware controller software

- | | |
|---|---|
| Robot technology Hardware <ul style="list-style-type: none"> ■ Input/output extension <ul style="list-style-type: none"> - Control cabinet extension - 16 inputs/outputs to be plugged at the control cabinet ■ Compressed air connection on face plate | Controller software <ul style="list-style-type: none"> ■ Parameter interpolation ■ Multi-layer technology ■ Programmable weaving patterns ■ Transformation and Mirroring |
|---|---|



Changeable tool

- Combining different manufacturing processes in a robot system
- Automatic torch change via programme command
- Flexible applications with one system
- Makes every robot a multi-talent



Cutting technology accessories

Oxy-fuel flame cutting:

- Gas and flame monitoring
- External ignition unit integrated in the head of the torch for optimal ignition
- Proportional valve technology for the fully automatic adaptation to the component thickness

Plasma cutting:

- Marking unit for plasma marking, punching and notching
- Gap control/height control for the optimal cutting distance between plasma flame cutters and the workpiece



Sensors

- | | |
|--|--|
| <ul style="list-style-type: none"> ■ Laser offline sensor <ul style="list-style-type: none"> - Contactless measurement - Flexible - Shortest search intervals ■ Arc sensor <ul style="list-style-type: none"> - Automatic torch correction - Seam tracking without attachments to the torch | <ul style="list-style-type: none"> ■ Tactile online sensor <ul style="list-style-type: none"> - Memory function - data storage for automatic cutting - Online compensation of workpiece tolerances ■ Collision sensor integrated into the torch |
|--|--|



Extraction technology

Extraction table with cutting support consisting of support rods, handle bars and guide plates

- Self-supporting construction without support frames, no welded frames
- Robust, pluggable material support
- Support can be completely disposed of after wear
- Optimal for loading with a magnetic crane
- Large slack basin
- Mechanical control of the extraction flaps in the individual table segments



Trainings

- Basic course part I
 - Users assigned to the generation, correction and maintenance of robot programmes
 - Robot programmers
- Basic course part II
 - Advanced course for stage 1



Our customers



Our customers: AMS Technology, Borsig, CATERPILLAR, CB&I, Eferest, Fortan-Systems GmbH, GEDE, Global Vessel & Tank, Huch, ILA-Langner, Manitowoc, Packo Inox, voestalpine

Cutting processes

The suitable cutting technologies for your materials

Oxy-fuel cut



Cutting economically

Flame cutting with oxygen has a tradition of more than one hundred years. Oxy-fuel cutting is a simple separation process, which heats up the position to be cut with a oxygen fuel gas flame, burns the material with the oxygen jet and removes the resulting oxides from the cutting kerf. Although it is a very old and well proven process, it is today still indispensable in the steel industry. Using modern torches with combined automation technology the relative slow cutting process is continuously improved.

- Application range from a plate thickness of more than 45 mm
- Economic use in the medium and heavy construction steel sector
- Economic use of a number of torches
- Chamfering with up to three torches

Plasma Cut

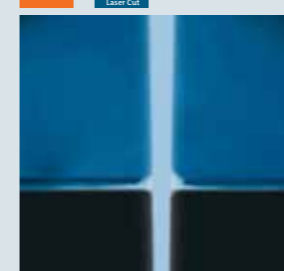


Perfectly suitable for robot applications

In the case of Plasma Cut the electric arc generates a plasma jet which is very restricted by a special nozzle and a focusing gas. Due to the high thermal arc energy and the high kinetic energy of the additional plasma gas the metal melts and is removed out of the cutting groove. The main advantage of this process is a very small heat-affected zone, a very good cutting quality and a high cutting speed. Due to the low heat input the component distortion is reduced to a minimum. The Plasma Cut process is perfectly suitable for automation.

- Application range up to a plate thickness of 50 mm
- High grade cut quality
- High cutting speed
- Narrow area of heat influence
- Low heat input
- Offline programming

Laser Cut



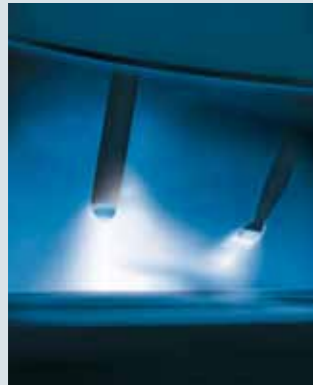
Excellent cutting quality at extremely high speeds

The Laser Cut process strongly restricts the light beam and generates a small focussed spot with a very high energy density. This energy melts the material and due to the kinetic energy of an additional cutting gas the molten metal is removed out of the groove. Laser cutting is characterised by an excellent cutting quality, an extremely high cutting speed and a very good automation capability. Depending on the requirement different laser types with different characteristics can be used.

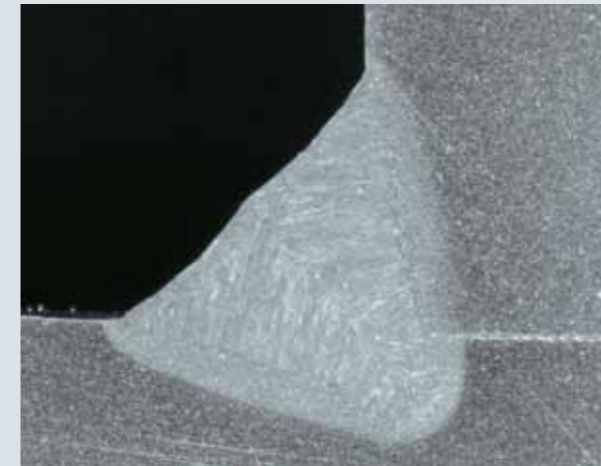
- Application range up to a plate thickness of 12 mm (solid-state laser)
- High grade cut quality
- High cutting speed
- Narrow heat-affected zone
- Low heat input

Welding processes

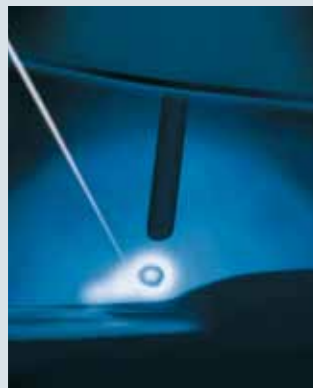
Tandem Weld



Microsections



Laser Hybrid Weld



Narrow Gap Weld



With CLOOS you cut and weld ...



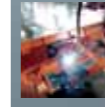
... all types of metal!



... any material thickness from 0.5 to 300 mm!



... with innovative processes



... just as you need it, manually or automated!



... efficiently and individually!



... and profit from many additional services!



... in all industries!



... all over the world!



... to your complete satisfaction!



... benefit from almost 100 years of welding experience!

From the idea to the finished component a whole product life...

1. Consulting

With this comprehensive "pre-service", we take care of your project from the beginning and transfer our integrated process expertise to your component. Thus we ensure you that crucial lead in technology.



2. Planning

Together we work out a solution proposal that is tailor-made to your individual requirements. We work hand-in-hand with our customers to guarantee you on-schedule project processing.



3. Design

From the cell to the fully-automated production line - due to the modular design of our product series we develop customised solutions which meet all your production requirements.



4. Production

The heart of our company are the manufacturing facilities. The welding system and robot technology is our strength - with integrated core competence: the arc.



5. Commissioning

Our specialists perform the installation step by step in your production facility and check the system for perfect functionality. We thus guarantee a trouble-free implementation and a fast start of production.



6. Training

In our modern training centre, we provide practical training for your employees and service technicians to master programming, operation and maintenance.



7. Service

Our competence team can be consulted for any extension, modification and overhaul of all your existing robot and welding systems. We offer you an extensive service package for inspection, calibration and maintenance.



... with our tried-and-tested products and systems - all from a single source!



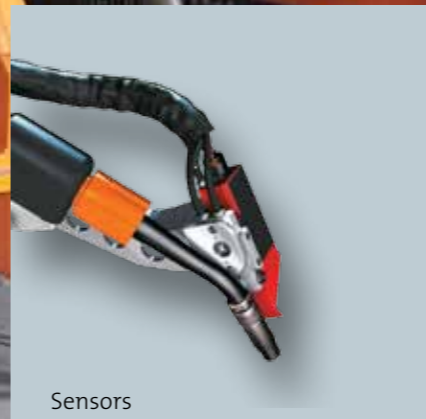
Robots



Power sources



Workpiece positioner



Sensors



Process software



Machine control system and user interface



Weld your way!

Providing added value for our customers! This objective drives our 700 motivated employees to achieve maximum performance. 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 optimised and adapted specifically to your product and production requirements. Leadership and competence equals process automation and welding at its best.

Whatever your needs are, we "Weld your way." Under the CLOOS umbrella brand we develop, manufacture and market innovative solutions worldwide in more than 40 countries.

With 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!

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

QINEO®

Arc welding at the highest level

- Power sources
- Wire drive units
- Welding torches
- Connection cable assemblies
- Accessories



QIROX®

Everything for automated welding and cutting.

- Robot mechanics
- Robot controllers
- Robot positioners
- Workpiece positioners
- Sensors
- Software



Service Hotline

☎ +49 (0) 27 73/85-132

Service

Service- The "Power Plus" for your production success:

- Efficiency check
- Simulation
- Test installation
- Training
- Hotline
- Spare parts management



All over the world!

Austria

CLOOS Austria GmbH,
A-2362 Biedermannsdorf
www.cloos.co.at

Belgium/Netherlands/Luxembourg

CLOOS Benelux N.V.
B-3300 Tienen
www.cloos.be

Brazil

CLOOS Técnica em Soldagem
Guarulhos / São Paulo
07240-180
www.cloos.com.br

China

CLOOS Welding Technology (Beijing) Ltd.
Beijing 101113
www.cloos.cn

Czech Republic

CLOOS Praha GmbH
CZ-25242 Jesenice
www.cloos.cz

Great Britain

CLOOS UK Ltd.
GB-Wolverhampton WV 10 6 HR
www.cloos.co.uk

India

CLOOS India Welding Technologies Pvt Ltd.
PUNE 411 014
www.cloos.in

Mexico

CLOOS Robotic de Mexico
Apodaca, N.L. Mexico
CP. 66600
www.cloos.com.mx

Russia

OOO CLOOS Vostok
RU-125445 Moskau
www.cloos.ru

Switzerland

CLOOS Electronic GmbH
CH-2400 Le Locle
www.cloos.ch

Turkey

CLOOS Kaynak Teknik Sanayi Ltd. Sti.
41400 Gebze Kocaeli Türkiye
www.cloos.com.tr

USA

CLOOS Robotic Welding Inc.
USA-Schaumburg, Illinois 60193
www.cloosrobot.com

Carl Cloos Schweisstechnik GmbH
Industriestrasse 22-36
35708 Haiger
Germany

Telephone +49 (0)2773 85-0
Telefax +49 (0)2773 85-275
E-Mail info@cloos.de
www.cloos.de

CLOOS

Weld your way.