CLOOS

100 1919 2019

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Dear employees and business partners,

As a pioneer in welding technology, CLOOS is celebrating its 100-year anniversary this year. We are continually rethinking what we can do better in terms of welding technology and automation, and have aligned these thoughts to the needs of our customers. Our success has proven us right. The high levels of international demand are safeguarding growth and jobs in the long term.

At this juncture, I extend my thanks to former as well as active employees. With their ideas, expertise, experience and creativity, they have made the worldwide success of the company possible.

And I extend my thanks to our business partners who have loyally supported us and who have been instrumental in our success story by challenging us, continually inspiring us and partnering with us.

The name CLOOS stands as an emblem for innovative, reliable solutions in welding technology and automation. Continual advancement and the courage to undergo change mean we can approach the future with confidence and optimism.

Warm regards

Carl-Eberhard Cloos
Managing partner of Cloos Holding GmbH & Co. KG

CONTENTS

100 1919 2019

For 100 years now, Carl Cloos Schweißtechnik GmbH has been instrumental in shaping its industry across the globe. An anniversary such as this one is special. It demonstrates that the company has been successful over the decades in consolidating its market position and taking this further. The name CLOOS is just as synonymous with history and Industry 4.0 as it is with courage and innovative skills, as well as being a beacon of internationalism and loyalty to the region.

It becomes evident here, for example, what differences the strengths of our state make compared to others, including businesspeople who take responsibility and who are shapers and investors, especially here in our home town, in our state. A mindset that also relies on the skills, motivation and commitment of employees, because it is precisely them who are instrumental in shaping the future of a company.

I warmly congratulate the company management and employees on their 100-year company anniversary.

Volker Bouffier
State Premier for Hesse

100 years of Carl Cloos Schweißtechnik GmbH – on behalf of my colleagues leading departments and the district committees, I would like to sincerely congratulate all employees and of course company management on this special occasion.

It is always something special when a company is able to celebrate a milestone birthday. This is because we live in a time in which things can change rapidly from one day to the next. What was new yesterday is old news today and tomorrow has long been history. In today's era, cutting-edge communication technologies and media mean our world is shrinking at an ever-increasing pace and distances are no longer relevant. This always becomes particularly clear when we reflect back on past decades for a special occasion – or even a century like in this case. 100 years – that is a time spanning more than just one generation for us people. The history and growth of a company are held in particular regard from this perspective.

CLOOS is a company that combines skilled manual traditions and innovative technologies and that has recognised that for the economy and positioning of a region and the companies based here, it is important to keep moving, coming up with innovative ideas and exploring new directions. CLOOS has set itself high standards of achievement, which it is committed to maintaining. Training and skills qualification for expert personnel form a basis for this. CLOOS takes its responsibility very seriously and is intensively championing the cause of keeping specialists in-house. By doing so, CLOOS, a company with long traditions, is also strengthening our economic region.

To all those involved, I trust the festivities go as planned. We wish you all the very best, plenty of success and trust that there continue to be committed, motivated people who contribute toward the innovative growth of the company.

Wolfgang Schuster
Lahn-Dill District Administrator

100 1919 2019

"Pioneers of welding technology. For 100 years. CLOOS – a story with a future!" Carl Cloos Schweißtechnik GmbH is adopting this slogan for its milestone anniversary celebrations in May 2019. In reference to the anniversary week, I as mayor of Haiger would like to express my heartfelt congratulations to the company and thank it first and foremost for staying loyal to our town for almost 100 years. Since 1924, CLOOS has been shaping the business fortunes of Haiger, thereby making a key contribution towards the dynamic development of our tradition-rich community.

1919 saw Carl Cloos establish a welding technology company in Weidenau (Siegen), which was relocated to Haiger by the engineer five years later. This injected special impetus into the commercial and industrial development of our town. As a result, CLOOS put Haiger on the map. Key factors in this success were innovative welding technology products and a forward-looking corporate strategy. Now, CLOOS is a company operating on a global scale, but also with local roots. These days, it is difficult to imagine Haiger without CLOOS – just as it is to imagine our coat of arms without the heron.

The special connection of Carl Cloos Schweißtechnik GmbH with our town continues to show itself. In this context, I must remind you of Haiger's bid for Hessentag (Hesse Day) 2022. A specially programmed CLOOS robot handed over the case with our bid documents to the Head of the Hessian State Chancellery, Minister of State Mr Wintermeyer. This spectacular action made a key contribution towards the success of the bid. In Wiesbaden, they are still speaking about the great idea and like mentioning it when other towns apply to organise the Hessian State celebrations.

Haiger has always enjoyed support from CLOOS. However, above all, the company has provided much valuable impetus for developing our communities. Today, Haiger is a tradition-rich, forward-thinking town with visions in which people like living and working. I would like to thank Carl Cloos Schweißtechnik GmbH for its key contribution to the positive growth of the town. I express my thanks to the courageous and visionary founder, Carl Cloos, its successors and the current management team, who have so successfully continued on the beaten path. Furthermore, on behalf of the town of Haiger and its citizens, I wish the company all the best for its anniversary and trust that the next 100 years will be just as successful as the last!

Mario Schramm
Mayor of Haiger

100 1919 2019

Pioneering achievements in welding technology and exemplary commitment in the vocational training of young people – this is what family-run business Carl Cloos Schweisstechnik GmbH stands for, even in the 100th year of its impressive company history.

Bold, forward-thinking corporate initiatives as well as innovation, professional expertise and loyalty of the workforce are the building blocks for achieving the pole position in terms of technology.

At home on the world markets and yet closely affiliated with the region, the company has for generations guaranteed jobs and apprenticeships and, as a result, income and social security.

The executive committee and management team at the Lahn-Dill CIC thank you for this fantastic achievement.

We look forward to supporting the continuation of this success story by pooling regional interests, and through our commitment to vocational training and consultation on all corporate issues through collaboration based on trust.

Eberhard Flammer
President
CIC Lahn-Dill

Andreas Tielmann
Chief Executive
CIC Lahn-Dill

What can you give to someone who has achieved everything? Who has carried out pioneering work in the field of welding and cutting, whose robots and power sources are known across the globe and who has always kept abreast of the times with its ideas in process and mechanical engineering? I would think first not of a gift, but of a heartfelt thanks.

Over the past 100 years, CLOOS has played an integral part in shaping and influencing the welding and cutting industry in Germany and around the world. For almost exactly the same amount of time as has passed since the company was formed, 99 years to be exact, CLOOS has been a member of the German Welding Society (DVS).

We at the DVS are delighted about the company's many activities and support for the work the association carries out. For example, CLOOS is actively represented in work group V2.6 “Mechanisation, Automation and Robot Deployment in Arc Welding” in the engineering committee, and in various sub-groups. CLOOS also opens its doors for developing the skills of our next generation. In 2018, for example, we held the popular DVS hands-on workshop in Haiger. The budding trainees were given hands-on insights into the exciting work processes of a company operating on the global stage.

Personally, I am pleased to meet the continually innovative CLOOS company and its representatives at the big welding technology trade fairs around the world every year, and to take a close look at the latest trends.

Finally, I would like to express my congratulations for the company's anniversary. May the innovative ideas for welding and cutting technology never dry up at CLOOS. Allow us to continue to be part of your forward-looking products and solutions, not only as an association, and stay true to your direction as a company. Or to say it in your words: “Weld your way.”

Dr. Roland Boecking
DVS Chief Executive

100 1919 2019

The electrical industry is one of the most innovative sectors, and its backbone is made up of small and medium-sized companies. Carl Cloos Schweisstechnik GmbH is an excellent example of this. The highly innovative company, like the ZVEI (German electrical and electronic manufacturers' association), can now look back on a 100-year history. But first and foremost, it is looking forward.

As a pioneer in welding technology, the company has consistently been a trailblazer for new technologies, such as robot welding, in-house robot controllers and programmable welding power sources.

Today, Industry 4.0 is part of everyday work – welding technology, robot mechanics, software and sensors are conceived in the system and implemented as customer-centric solutions.

Successfully – the original, regional company now has a network of 50 locations worldwide and can look to the future with confidence.

Many happy returns on your 100th birthday!

Dr. Klaus Mittelbach
ZVEI Chairman

OUR WORLD.
WELDING.

As far back as 5000 years, the Sumerians in ancient Mesopotamia were able to join together metals using thermal energy. Welding found its way to Europe via the Egyptians and Greeks. For a long time, joining processes only made scant advances – until it experienced a phase of speedy evolution in the 19th century with the invention of autogenous welding. There are now a whole array of processes and continual advancements to join metals together permanently.

THE HISTORY OF WELDING

Under the hammer: Forge welding experienced its heyday in the Middle Ages.

The first metropolises of mankind grew from the abundant, fertile marshlands of the Euphrates and Tigris. In ancient Mesopotamia (present-day Southern Iraq), the Sumerians constructed impressive monumental structures, invented script and made weapons and jewellery from gold, silver and copper. During the time around 3000 B.C., for this they were using the oldest method of thermal joining, hard-soldering. Finds from the tombs of Sumerian kings back this up.

With the hammer

Around 2700 B.C., the Egyptians used forged welding for the first time to make copper pipes. The welded pipes were used for the urban water supply.
Around 1400 B.C, the forged welding of iron, only practised nowadays by ornamental blacksmiths, was common in Asia Minor.

The process is based entirely on forging. In the simplest case, the glowing ends of the metal parts to join are placed on top of each other and joined by hitting them with a hammer. Because the temperatures at the contact surfaces could not be kept constant over distances of several decimetres, the quality of joints was neither constant nor reproducible. Therefore, forgers preferred a combination of adhesive bonding and form fitting by for example overturning the edges or ends and fitting them into one another to form an “s” shape, to then hammer them flat – with a sledge hammer or even mill hammer.
Forge welding experienced its heyday in the Middle Ages. Many examples, such as daggers, swords, armaments and chain armour attest to the excellently crafted achievements in forged welding. Even the German word for welding is derived from this

Blacksmith forging art from the modern era: This hunting sword was made in the mid 19th century.

technique – the material surface was “sweated” ("Schwitzen"), it became glazed and “welded” ("schweisste") the workpieces together.

Fire and flames

For a long time, forge welding was the only welding process. At the end of the 18th century, new technologies made better resource yields and higher steel qualities possible: the “puddling technique” (Henry Cort) in 1788, the Bessemer converter (Henry Bessemer) in 1856 and the open hearth furnace (Émile and Pierre-Émile Martin) in 1863 .
During the 19th century, industrial weapons production was instrumental in driving forward the development of welding technologies. Autogenous welding (gas fusion welding) was invented in 1840.
Using gaseous fuel and air, a flame could be generated that was so hot it made fusion welding possible without pressure being applied. Wassili Wladimirowitsch Petrow, a Russian, investigated the arc as far back as 1802, but it could not be utilised in technical processes for a long time.
At the end of the 19th century, a number of discoveries, inventions and chemical processes improved and simplified autogenous welding: the pressure reducer (Johann Heinrich Dräger) in 1889; calcium carbide, from which acetylene was created when combined with water (Edmund Davy) in 1836; air liquefaction (Carl von Linde) in 1895; the constant pressure torch for hydrogen in 1900; the injector torch for acetylene (Johann Heinrich Dräger) in 1901. Using an acetylene-oxygen flame, temperatures above 3000 degrees Celsius were possible – around 500 degrees Celsius higher than with a hydrogen-oxygen flame.

The industry energised

Briton James Prescott Joule was first to describe resistance welding as a possible process for joining metals. The definitive tests for inventing resistance welding were conducted by Elihu Thomson around 1877.
In 1897, Henry Kleinsmith used copper electrodes for resistance welding. This was the onset for the industrial breakthrough of the process.
In 1881, Russian Nikolai Nikolajewitsch Bernados invented arc welding, on which he had been working since 1855 and for which he registered a patent in 1885. In this process, he used an arc between a workpiece and a carbon electrode to fuse metals and alloys. Another Russian, Nikolai Gawrilowitsch Slawjanow, had the idea in 1891 of using the filler material, i.e. the welding wire, as the electrode at the same time, thereby considerably simplifying arc welding. When the first stick electrodes were used, however, the welding points were not protected from oxidation. When,

in 1907, encased electrodes started to be used to protect welding points from oxidation, the quality of welding seams greatly improved.
Using inert gases brought about another leap in quality for arc welding. Through the use of welding transformers as handy power sources, the arc method also found its way into smaller businesses and enjoyed broad proliferation. 1919 saw engineer Carl Cloos establish the company of the same name. Initially, acetylene gas generators and autogenous welding torches were made.

Blow by blow

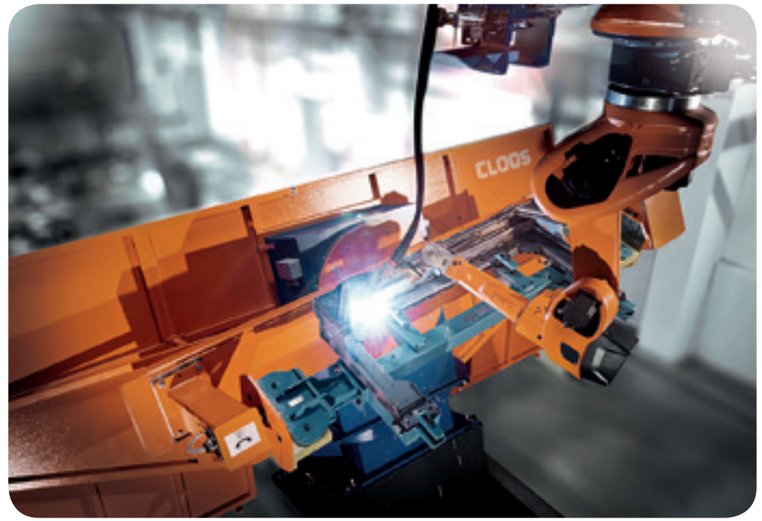
After the Second World War, arc welding developments came thick and fast. On the lookout for a welding process for joining highly flammable magnesium and its alloys, American Russel Meredith developed Wolfram Inert Gas (TIG) welding with a wolfram electrode and helium as the shielding gas in 1946. TIG welding is still regarded as one of the standard methods for manual and fully-automatic welding. Just two years later, Metal Inert Gas (MIG) welding was invented, which is used primarily for non-ferrous metals nowadays.
The pace did not abate in the 1950s and early 60s. In 1951, plasma welding followed and in 1953 Metal Active Gas (MAG) welding. The latter represents the counterpart to MIG welding and is used for ferrous metals. Gas and arc welding were complimented by completely different processes. Friction welding and ultrasonic welding were invented in 1956 and 1957 respectively. Initial laser welding tests were carried out in 1961, so in the year the laser was invented.

CLOOS the pioneer

In 1956, CLOOS introduced the first CO_2gas-shielded arc welding machine with an endless wire electrode for industrial use.
In 1958, CLOOS integrated welding power sources into production cells – the foundations for automated robot welding were laid. The first welding robot was introduced in 1960 in Halle (GDR).
During the 1970s and 80s, pulse variants of arc welding processes were developed. The reason was that the material transfer in MIG/MAG welding was irregular with the short arc. Using a pulse method, detachment of molten drops from the wire fed in could be controlled. 1968 saw CLOOS develop a new welding power source for this. Other high-performance variants of MAG welding were then launched onto the market during the 1990s.
In 1996, CLOOS assumed a pioneering role with the tandem welding process. In this new process, two arcs burn in a combined molten pool. The front wire guarantees reliable penetration; the back wire enables large joints to also be filled quickly with filler material. The high deposition rate shortens welding times. The process is suitable for thin as well as thick sheet metal.
The Laser Hybrid Weld which was introduced in 2004 combines a laser beam with a MIG/MAG arc in one common process zone. The strongly restricted light beam with focus on the welding point is characterised by a very high energy density. This energy penetrates the material deeply and forms a keyhole which is led through the component along the welding point. The additional MIG/MAG arc supports the process and causes a perfect side wall fusion. The two processes stabilise themselves mutually. The main advantages of Laser Hybrid Weld are a deep penetration, low heat input and perfect side wall joints. The quality and the productivity increase because of higher welding speeds.

The QINEO product line from CLOOS includes welding machines and controllers to address every need – from manual to fully-automatic welding.

In 1996, CLOOS assumed a pioneering role with the tandem welding process. In this new process, two arcs burn in a combined molten pool.



Automated welding and cutting with a system: CLOOS groups its robot solutions for automated welding and cutting under the name of QIROX.

Just a drop

The goal of new developments is always to attain clean weld seams with low heat input in order to minimise joint changes. The cold metal transfer and cold metal arc techniques, developed in 2005, achieve just this with a pulsed welding current and an additional wire, that is moved backwards and forwards at high frequency. This enables drops to be detached with precision. Reduced heat input is also achieved with the cold arc process, which also arrived on the market in 2005. In 2006, CLOOS introduced the GLC 353 Quinto CP pulse welding power source, which has established record performances particularly for thin sheet welding. Since 2008, CLOOS has been offering welding machines and controllers from the QINEO product line to address every need – from manual to fully-automatic welding. Robot solutions are grouped under the QIROX brand.

Networking

And there is still no end to the developments to perfect the welding process. The trends in the sector, as in many others, are digitalisation and networking for the intelligent factory. Industry 4.0 is also driving forward inventions in welding technology. The welding process can be controlled and monitored using network-capable welding power sources and data management systems. Algorithms proactively detect potential machine outages and maintenance needs.
The prerequisite here is that the controllers for the welding machines, and the data management systems, can be integrated and are capable of communication. This means they facilitate a key element of Industry 4.0, namely vertical integration, whereby real-time communication between the networked devices becomes a reality.
The new C-Gate gateway from CLOOS enables demand-based management of welding and robot data. All information is entered and processed centrally in an integrated information and communication tool. The customised representation of information enables detailed visualisation, analysis and continued processing of the operating and welding process data collected. The new C-Gate can be connected to existing Industry 4.0 environments. Using standardised interfaces, the data can be passed to higher-level, IT-based solutions, such as MES and cloud applications and other systems. This facilitates communication across all levels. CLOOS will be driving forward innovations and so continuing the company's 100-year success story.

THE DIVERSITY OF WELDING

In the welding process, components are transitioned to a liquid or plastic state by applying heat and/or pressure at the joining points, thereby joining them together so as to be inseparable. For most processes, a filler material exhibiting similar properties to the component material is added. The benefits are that the joints are inseparable, and compacted in the ideal scenario. The strength of the weld seam is often as high as that of the components.

BRAZING AND HARD-SOLDERING
Joining process for joining different metallic materials using a molten filler metal (solder), the melting temperature of which is below those of the base materials; the base materials are therefore moistened without being melted. In the soft-soldering process (normally electric), the solder melts at working temperatures below 450 °C, and for hard-soldering (usually with a flame) above 450 °C.

FRICTION WELDING, FRICTION STIR WELDING
In friction welding, the surfaces to be joined are plasticised by pressure and quick relative movement until a common joint zone is created. The difference between (pipe) friction welding of the fronts of cylindrical bodies (such as on a lathe) and friction stir welding of bodies of virtually any shape is the external, end-mill like tool (possible on a lathe).

FORGE WELDING (SMITHING)
The materials to be joined are placed into the smith's hearth for annealing, and are joined by hammer blows. To obtain a reliable connection, the parts to join are often also folded and interlocked for a form fit. Together with riveting, forge welding was the dominant joining technology for metals for around 4500 years.

RESISTANCE WELDING
Resistance welding is a mechanised electrical welding process for joining workpieces with thin sides. They are first pressed together using welding tongs or rollers, and then electrical heating is applied at specific places to melt them. This process is preferred in fully automatic large-scale production.

GAS WELDING (AUTOGENOUS WELDING)
Acetylene fuel gas combined with oxygen is normally used as the heat input in gas fusion welding. The welding filler material – bare wire – is added separately and melted in the welding flame at a temperature of 3100 °C (with hydrogen, about 2500 °C).

LASER BEAM WELDING
In laser beam welding, the heat required is generated using a laser beam. The beam penetrates into the workpiece surface, and the energy of the laser is absorbed into the material, converted into heat and used for the welding or cutting process. The lasers used predominantly are crystal, gas, disk, fibre and diode lasers.

ARC WELDING
Arc welding is currently the dominant method in industry and for skilled labourers. A distinction is made between several processes:

» In wolfram inert gas welding (TIG), the arc burns between the workpiece and a non-melting wolfram electrode in an inert gas (argon or helium, or a mixture of the two).

» In metal active gas welding (MAG), the arc burns between a melting wire electrode and the workpiece in an inert gas atmosphere (usually an argon-carbon dioxide mixture). Solid wires can be used, as well as flux-cored wires.

» Metal inert gas welding (MIG) is closely related to MAG welding; here however inert gases such as argon, helium and their mixtures are used as shielding gases.

» In addition to the classic arc types such as short, spray and mixed arcs, pulsed arc and different process control variants are increasingly being deployed.

» In comparison to the TIG method, the plasma process forms a narrower arc, which focusses the energy more intensively. A pilot arc helps in igniting the plasma arc, and thereby prolongs the life of the wolfram electrode.

VOICES FROM RESEARCH & DEVELOPMENT

IN YOUR OPINION, WHERE DO THE BIGGEST CHALLENGES FOR WELDING TECHNOLOGY LIE?

In recent years, innovative processes in the field of technology development, such as additive production using arcs and lasers, bonding and the “cold method”, with which even ambitious material combinations can be joined, have gained in importance. In parallel, we are seeing a continual broadening of the application areas for welding and cutting robots. However, increasingly strict demands are also being made of conventional joining processes, such as MIG/MAG welding and electrode manual welding. The backdrop to this, although not the sole reason, is the use of steels with increasingly specific properties. Their weldability is sometimes significantly limited and so key influencing factors in the welding process need to be taken into account for loading behaviour not to be adversely affected. Positive effects here are the continued development of equipment technology, in particular the faster compensation of the disturbance variables associated with digital power sources for welding, working robot systems and increasing automation as a key component for Industry 4.0.

PROF. HEIDI CRAMER, CEO AT INNOVATION/R+D, GSI MBH

WHAT OPPORTUNITIES DOES WELDING USING LASER TECHNOLOGY PROVIDE?

Laser technology has revolutionised welding. The laser beam is a highly accurate tool that uses energy with precision and with a tightly limited active zone to join components. Its special effect makes very high welding speeds possible and improves quality by reducing thermally related component distortion to a minimum. As a hybrid process in the combination of laser and arc, the welding process also has the required robustness and tolerance for application on large-scale structures in particular, meaning automated implementation of this innovation can be regarded as the secret to success in ship and crane construction.

PROF. C. EMMELMANN, HEAD OF THE FRAUNHOFER INSTITUTE FOR ADDITIVE PRODUCTION TECHNOLOGIES IAPT

WHAT DO YOU BELIEVE WILL HAVE AN IMPACT ON THE WELDING WORLD IN THE FUTURE?

Developments in welding technology are currently contrasted against the backdrop of digitalisation and Industry 4.0, which ultimately will mean disbandment of the classic automation pyramid and will result in (globally) networked systems. Therefore, in the future, we will increasingly be seeing companies become providers of software-based solutions that simplify process selection of certain welding tasks for the customer by accessing a large database, and autonomously determine suitable welding parameters. This requires methodical digitalisation of the welding production chain with access to information from process steps interfaced up and downstream and the semantic definition of these inhomogeneous data records.

PROF. MICHAEL RETHMEIER, DEPARTMENTAL HEAD, WELDING PRODUCTION METHODS, FEDERAL INSTITUTE FOR MATERIAL RESEARCH AND TESTING (BAM)

WHAT SPECIFICALLY ARE YOU WORKING ON IN WELDING AT THE MOMENT?

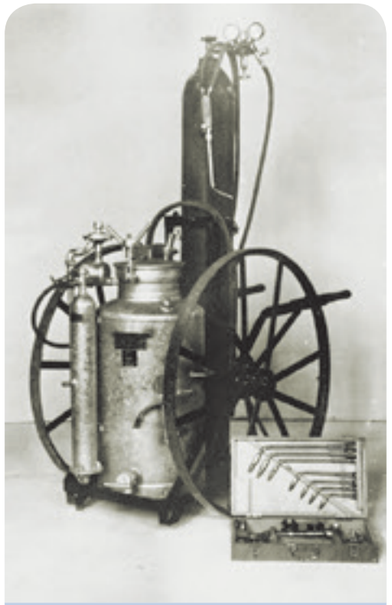
We are currently working on about 40 publicly funded research projects and 50 current industrial research orders. The bandwidth for these is very broad. It pertains firstly to processes in which we are looking at issues from soldering and bonding technology in addition to fundamental issues, such as the simulation of arc welding processes and the generation of internal stress in beam welding processes. The same applies for the application-based research projects in which the continued enhancement of well-known processes, the applications for new materials, and also the industrial realisation of completely new welding processes in collaboration with companies in all industries are part and parcel of our day-to-day activities. It would of course now be hard to imagine the portfolio without “Additive Manufacturing” or the implementation of Industry 4.0 in joining technology.

PROF. UWE REISGEN, HEAD OF THE INSTITUTE FOR WELDING AND JOINING TECHNOLOGY, RWTH AACHEN UNIVERSITY

CLOOS. PIONEERS IN WELDING TECHNOLOGY.

Carl Cloos Schweisstechnik GmbH belongs to an exclusive club. Only two percent of all German companies reach the age of 100 years and older. And, as reported by the Wirtschaftswoche publication in 2013, the 20 oldest companies in our state have medium-sized ownership structures. This also applies to CLOOS. The family-run business rich in tradition has always been synonymous with technological innovations and its actions are far-sighted and methodical. Creative minds and a loyal workforce are the key to success!

100 YEARS OF WELDING TOGETHER



Carl Cloos the engineer starts up the company in Siegen-Weidenau to manufacture acetylene gas generators and autogenous welding torches.

1919

Introduction of the CO_2 gas-shielded arc welding technology by Erwin Cloos. First instance of welding using an endless wire electrode.

1956

If he had been asked when he set up the company in 1919 what prospects he saw for his company, Carl Cloos (1894-1981) could not have conceived anything like Industry 4.0-capable welding power sources and robots. However, he drove forward technical advancements. And with his optimism and perseverance, he inspired and motivated many people, most of all his workers. The expression "business model" did not exist back then. But Carl Cloos had a clear picture of the technology he could use to provide solutions and to which customers he could offer it. He certainly covered all the bases with his specification of services, "Apparatebau, Maschinen- und Metallwarenfabrik" (Apparatus engineering, machine and metalworking factory). As is still normal for a start-up company, the initial years saw company name changes and changing partners. Carl Cloos advertised his services and did not want to rely on word-of-mouth recommendations. As such, attending exhibitions, such as in Leipzig, were important measures for publicising the company. The quality of workmanship spoke for itself.

Success in Haiger

Five years after the company was founded, Carl Cloos relocated his company from Siegerland to Haiger. A few years later, the company was already employing a workforce of 80. Concentrating on the production of acetylene gas generators and autogenous welding torches gave the company a solid foundation, all the more so as Carl Cloos developed his own patents. But he never took his successes as a cause to rest. His inventive genius drove on development, such as in the mid-1920s when he used acetylene technology on high-pressure systems for a central gas supply.
The company prospered. When Carl Cloos started with partners, he was the sole proprietor of the company listed in the commercial register as "Carl Cloos Autogenwerk, Haiger/Dillkreis". In 1936, the company moved into a new factory, and another building was constructed in 1939. Walter, Erwin and Helmut, the sons of Carl Cloos, grew up with the company. Erwin demonstrated technical talent at an early age. He was already building radio sets at school – so in the 1930s was a junior version of future engineers. Erwin Cloos set up his first lab in his father's garage.

Upturn after the war

After years of war, production slowly started to pick up again and, with the currency reform, the situation changed dramatically, as it did everywhere in West Germany. In 1948, CLOOS entered into operation a production line of welding systems for stick electrodes – the start of a new boom.

The second CLOOS generation (from left to right): Walter Cloos (1922–2003), Erwin Cloos (1924–2000) and Helmut Cloos (1926–2010).

Whilst the company had long operated as a skilled labourer business, Carl Cloos created industrial structures after the Second World War. His three sons also joined the company at that time. Walter (1922–2003) and Helmut (1926–2010), both businessmen, were involved on the sales side, and engineer Erwin Cloos (1924–2000) worked on the technical side. Again, the company exhibited at fairs, in 1949 in Leipzig and in 1950 at the industrial fair in Hanover.
During the postwar period, the third generation was already waiting in the wings. Grandson Carl-Eberhard Cloos (born in 1958) gained his first experiences with the technology from the family business during his childhood. That is to say his father, Erwin Cloos, had to get the electric welder to repair his son's go-kart. And even though engineer Erwin Cloos had mastered the technology, weld spatters found their way into the rubber boots of Carl-Eberhard, leaving marks that he could see and feel. The wounds are long healed, the fascination for welding has remained.

From innovation to innovation

Whilst in the company's initial years, it was tenacity with which Carl Cloos compensated for the upward and downward trends, after the Second World War it was the innovative spirit of his son Erwin that reaped dividends. When the first industrially usable CO_2 gas-shielded arc welder with an endless wire electrode was presented at the Hanover fair in 1956, its effect was two-fold: a milestone in the company's history and its establishment as a company at the forefront of technology. Just what effect this development had on the overall welding market is shown by figures from the DVS, the association to which CLOOS has always been closely associated. Whilst just 9% of all welded material volumes were carried out using mechanised welding processes in 1952, this figure reached 22% in 1966, with the figure for gas-shielded arc welding at 13%.
When innovator Erwin Cloos and his brother joined the company, it took up its position in the leading group of welding technology manufacturers. At the same time, the examples of successful innovations are an abstract of the history of welding technology – the integration of automatic gas-shielded arc welding machines in entire production lines (1958/59), the development of welding rectifiers with new silicone diodes (1961), the first pulse arc welding systems to improve aluminium welding (1968), the first contactless seam tracking system (1977) and pulsed power sources based on transistors (1981). There has been computer-controlled power programming in MIG/MAG pulsed power sources since 1996/97. CLOOS has assumed the role of world leader since the tandem welding process, heavily promoted since 1996. Also realised early on was the potential offered by the combination of gas-shielded arc

CLOOS manufactures CO_2 gas-shielded arc welding machines.

1968

Entry into robot production. CLOOS developed and manufactured their own industrial robots under the brand name ROMAT.

1981

welding and laser welding. The innovative technology developed together with FANUC was presented at Euroblech in 2004. After overcoming a few hurdles, mainly in regard to cost-effectiveness, hybrid welding is now an automatic part of the service scope provided by CLOOS.
The array of innovations, too countless to mention, has been actively shaped by many employees. All of them can look back proudly on a 100-year success story.

Entrepreneur with passion
The extent to which Erwin Cloos lived and breathed the company is evident from a letter to the editorial team printed in the "Schweissen und Schneiden" (Welding and Cutting) magazine from 1978. He started the text by thinking about "what is feasible for welding robots". This in itself is not remarkable, but the date was, because he wrote: "Today, on Christmas Eve in 1977, I have ... the need to set down a few lines given my successes in the field of gas-shielded arc welding." It becomes apparent in this letter to the editor that technological development played a big role for him and the company, and what constituted a convincing technical solution. "The simple, uncomplicated and 'natural' design has triumphed once again." He added a comment, that has often been seized upon in speeches for his milestone birthdays and the company anniversaries. It was about state funding in the development of new processes – and that the excise tax paid by CLOOS could just as easily have been used for the technological growth of the company.

Production of the computer-controlled and programmable welding power sources in the Quinto range.

1992

Into the future with high-tech
What began in the 1950s with automation of production lines by integrating welding power sources for gas-shielded arc welding found a logical continuation in robot technology. This fascinated Erwin Cloos and aroused his interest. In the then Mecca of robot development, he programmed his first hydraulic robot in 1977/78. This was very complicated. Perhaps this was the reason that value has always been attached at CLOOS to programming that is as convenient and clear as possible. The company entered into robot technology in 1978. The first robots developed by CLOOS were available three years later. In 1984, the company was one of 220 manufacturers in the Western world that entered into diverse cooperation with each other. In the industrial robot catalogue for the same year, in the CLOOS entry under "Comments": "The R55/56 robot is available with welding equipment and software, and from Jungheinrich as the R50 for handling. Price for the robot

Production of the Quinto 2.

2001

with 3 kg load: 134,000 D-Mark". Actually, CLOOS sourced robot controllers from Jungheinrich, and took over this role when the forklift manufacturer stopped building robots and controllers. From 1986 onwards, CLOOS operated its own controller development for robots and formed the Swiss subsidiary Cloos Engineering S.A. for it.
CLOOS is equipped for the future in terms of technology and has the infrastructure in place for continued growth. With high-tech products for all aspects of manual and automated welding, the company will set itself apart from the competition. Here, the focus will be on networking and digitalisation. The demand for cutting-edge automation systems and welding machines with high-value processes is very high in the era of Industry 4.0 and digitalisation, and is being addressed by CLOOS with subsidiaries in the East and West. The group employs a workforce of around 750 worldwide, 500 of which at the main Haiger plant, some of them completing apprenticeships in nine technical and commercial disciplines. Carl Cloos laid the foundations for this success. In 2017, the town of Haiger honoured the company founder and, after a unanimous vote by the borough council, renamed the old factory road as Carl-Cloos-Strasse. Credit where credit is due!

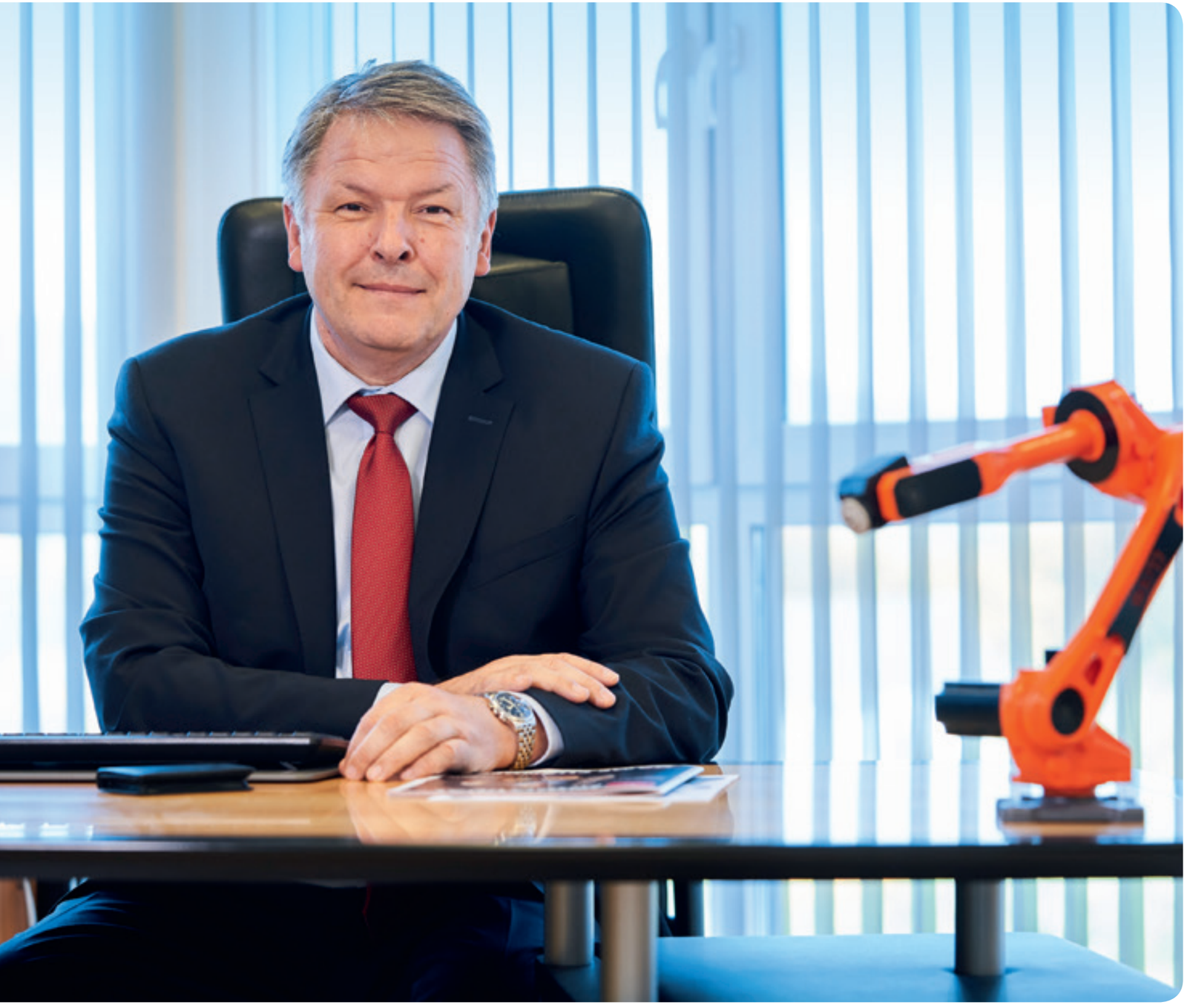
CLOOS moves over to production cells with the introduction of QINEO power sources.

2008

On the company's 100-year anniversary, CLOOS further consolidates its technical leadership. Complex, interlinked robot systems are becoming increasingly important for automated welding.

2019

CLOOS 2019
Visit our website for the anniversary, **100.cloos.de/en.html**. Or simply scan this QR code using your mobile.



COMMUNICATION CREATES SOLUTIONS

AN INTERVIEW WITH SIEGHARD THOMAS

Carl Cloos Schweisstechnik GmbH is a company with many constants. During the 100-year company history, continual development of technology takes centre stage. Sieghard Thomas is part of the company history.

After 45 years with the company, you have achieved what many employees achieved before you – a long period of service. But becoming CEO was not your goal when you started your apprenticeship at CLOOS in 1974?
It was not necessarily the case even back then that you stayed at the company where you completed your training until you retire. And it certainly was not my goal as a new trainee to become CEO. But, from my very first day, I was interested in many things happening at the company. Immediately after my apprenticeship, I was allowed to look after robots. I was assigned trips abroad early on, because I was qualified both technically as well as having the required language skills. I was then travelling round the world, putting robots into operation, training customers and providing services. At the start of the 1980s, there were still no separate departments.

Training for nine different professions is available at CLOOS currently – and very successfully, too. Which profession would you recommend to a trainee looking to follow in your footsteps?
I would advise learning for a lifetime. Part and parcel of this is a solid foundation in one profession in which you are interested, and you should always look behind the scenes. Of course, it is not possible to delve into any engineering subject as deep as you would like. But grappling for a good understanding of the contexts takes you further.

What do successors need to contribute?
He or she should be curious, and should be able to get people on side and inspire them. You must be able to bring people together on this journey. You must also be able to speak in front of others, because communication creates solutions. For me, it was always important to achieve the company goals together with people, thereby moving the company forward and heightening awareness for the whole entity. The success of the company is the sum of the successes of its employees. I can only advocate thinking outside the box and speaking to each other. When enough people in the company understand something that in itself is a big accomplishment.

You were also a customer service advisor. How do you think the job description has changed?
As a customer service advisor, I dealt with machines that were in the field. Customer service as an organisation was just being set up, and so I took on a wide variety of tasks. Our service points needed service technicians. They had to be trained so that they could gradually carry out robot services themselves. But when I recall individual tasks from back then, I can of course see a massive technical

transformation. For example, program memory at that time was always too small and also shockingly expensive. At the start, we fitted memory expansions of 16 KB to 32 KB. Note we are talking about kilobytes. This upgrade kit was a highlight of this period. It is difficult to imagine that we had to sort out printer drivers and interfaces ourselves. Something that has not changed – continual support throughout the entire life cycle of the machine and upgrades to the newest build levels were always important to customers. Although this is now called "performance check", we at CLOOS have always strived (and still do) to keep our customers' machines in perfect condition and up-to-date. This creates efficiency and thus satisfaction.

Not everything can be a success. Which technical development, product or trend would you have liked to have performed better?
CLOOS has achieved plenty of pioneering work in welding technology. Think of the introduction of CO_2 gas-shielded welding technology in 1956. In hindsight, it is usually easy to tell when a revolutionary step in terms of development has been taken. We should have marketed it more aggressively for stronger growth. I would also have liked more publicity early on for developments in robot technology, such as arc-controlled seam tracking. We were leaders in welding technology in the early years. Foreign markets initially only played a role in Europe. Now we are represented very successfully in every continent. But over all the years, CLOOS has found it difficult to "really go to town". I believe we have always been too modest and have not shouted loud enough about what we can do. We have great products and have made some remarkable achievements, but have beaten the drum too quietly. We are working on that.

You have worked abroad a lot and have visited 60 countries, including on your private trips. What experiences do you benefit from in your current work and what is your advice for young CLOOS employees?
Openness is a key attribute that is required both abroad and in management. You must have the courage and the will to approach people. I am curious, have an interest in other cultures and I am open to new demands and other opinions. If you want to have a say, you first have to listen.
I have learned something new from every trip abroad, especially in the early years. What I have learned about myself and others – you come back as a more self-reliant person with a different language understanding, but first and foremost also with a new horizon. Your own personality continues to develop.

You are the CEO of a company that has undoubtedly been shaped by the owner family. How much diplomatic aptitude does that require?
Nowadays, that is a quality I hardly need in contact with shareholders. It was certainly different 20 or 25 years ago. Back then all managers had to fight their corner for decisions. Nowadays, I have a relaxed, very frank and trusting relationship with our shareholders.

How are you getting the company into shape for the next 100 years?
We are currently becoming very successful in positioning ourselves better. Our revenues are testament to this. The remit in the future will certainly be to enter into further alliances. We must share our developments with our partners. We do not need to build every component ourselves, but will always keep our core expertise in-house. We are concentrating on continuous development of process technology and strengthening the benefits we bring. These include, for example, our welding processes, the integrated user interface and the programming systems as core elements. This is where our capabilities lie and where we have features that tower over the competition. Ultimately, we need to improve this with customers benefiting from added value, and so will consolidate the CLOOS leading edge in technology.

Given the sometimes archaic conditions in welding businesses, it is possibly a little difficult for outsiders to associate welding with Industry 4.0. How do they fit together?
Monitoring parameters and recording data in welding machines have long been standard practice for us. After all, robots and power sources deliver huge volumes of data about their operating status and process parameters. We have pushed forward a development whereby we package this data in useful analyses using a dashboard. What about the availability of the system? Which optimisation approaches are the result of this? We, and our customers, are now able to make reliable conclusions on system performance. We will be including algorithms that detect a need for optimisation themselves, and suggest or automatically carry out approaches to implement solutions. This is very important for fully inter-networked, highly automated systems.

To what extent will Industry 4.0 be attractive for China?
The level of system internetworking in China is sometimes higher than here. The requirements of our customers in some industries over there are in part stricter than would be imaginable by system operators in Germany or Europe. There is plenty of investment in automated factories. Then, of course, they need to know what the system can achieve. The level of digitalisation required for this is being demanded and driven forward in China to the same degree as it is here. The readiness to integrate a machine or system into a network is far greater in China. Here we are still a little apprehensive about the whole thing. This hurdle does not need to be overcome in China.

Let us suppose you really are going to retire one day. Which of your hobbies will you dedicate more time to – and do they have anything to do with technology?
I have kept abreast of technical developments in making and editing films. With my semi-professional camera

equipment, I am ambitious and interested enough to open up the user guide on a rainy day and try out some fancy features. Also, my lawn is mown by a robot, naturally installed by me and equipped with some of my own additional functions. This robot can then mow by itself while I take the odd trip for several weeks at a time.
But until then, we have plenty to do! CLOOS continues to have lots of potential and I am looking forward to realising it together with all employees.

EMPLOYEES OF YESTERYEAR & TODAY

MIRIAM MANDERBACH, INDUSTRIAL MANAGEMENT ASSISTANT, DEVELOPMENT DEPARTMENT (AT CLOOS SINCE 2009)

What does pioneering achievement mean to you at CLOOS?
For me, pioneering achievement is to approach every challenge together as a team to overcome it. You can't give up just because there are setbacks; instead, you should become strong, so you always come up with the best possible solution.

Why do you like working at CLOOS?
The work at CLOOS is a lot of fun. My co-workers are nice and the working atmosphere is good overall.

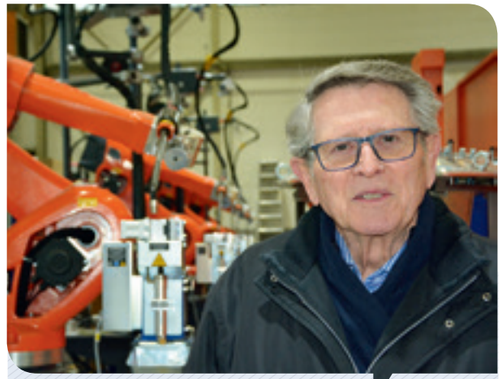
Is there a typical CLOOS employee? Which traits does this person exhibit?
C = Clever / courageous
L = Learned / logical / laughing
O = Open / organised
O = Optimistic
S = Scrupulous / social / spirited

ALBRECHT STIEHL, COMMISSIONING ENGINEER FOR ROBOT SYSTEMS (AT CLOOS SINCE 1971)

What does pioneering achievement mean to you at CLOOS?
For me, pioneering achievement means developing new technical solutions for customer requirements, such as tandem welding. This kind of thing has in the past always given us advantages over our competitors. I trust this situation will continue on into the future.

Which product or solution is your personal CLOOS highlight and why?
There are two products I regard as highlights for CLOOS. Firstly the robot, the development of which I have been overseeing for 40 years. Secondly, the new welding machine generation, the performance of which I find impressive.

Why do you like working at CLOOS?
I like working at CLOOS, because the work is demanding and varied, there are new challenges every day, and, last but not least, because of the great working relationship with my co-workers. It gives me great pleasure when the goals set have been achieved and the systems sold can be transferred to our customers on time with the guaranteed functions.



MANFRED SCHMIDT, FORMER TECHNICAL MANAGER AND AUTHORISED REPRESENTATIVE (AT CLOOS FROM 1963 TO 1999)

What does pioneering achievement mean to you at CLOOS?
When I started at CLOOS in November 1962 as a design engineer, we were just starting out with mechanisation of the arc. Using the simplest of resources, we were already making entire production lines for mechanical welding. Many equipment manufacturers missed out on this important trend and are no longer market competitors. CLOOS has continually enhanced the mechanisation of welding technology over the years.

Which product or solution is your personal CLOOS highlight and why?
The introduction of robot technology at the end of the 1970s is my personal highlight. The first Romat robots represented a ground-breaking development which characterises the company to this day. Now, the next step is full digitalisation.

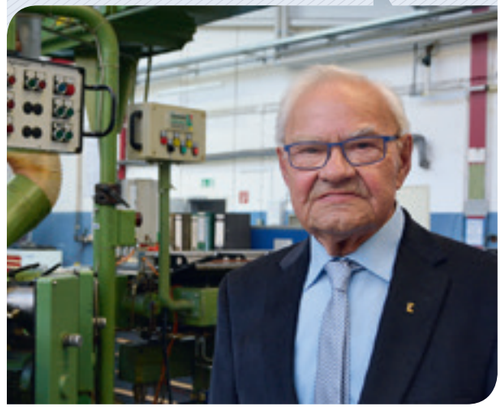
What has been your best experience or a special experience at CLOOS?
Although I regularly had long evening meetings with the three CLOOS brothers, my time at CLOOS was extremely varied and I liked working here. Employees had a family-like relationship and close collaboration between colleagues. I remember one late evening in the mid-1960s. Together with Dieter Schol and Erwin Cloos, we were installing a mobile circular welding machine in the welding lab. Mrs Cloos brought in hot pork sausages to recharge our batteries.

JOSEF SCHNEIDER, FORMER OPERATIONS MANAGER AND AUTHORISED REPRESENTATIVE (AT CLOOS FROM 1954 TO 1994)

Which pioneering achievements did you experience during your decades working at CLOOS?
After my blacksmith apprenticeship, I joined the company in 1954. Shortly afterwards in 1956, CLOOS introduced the first gas-shielded arc welding machine with an endless wire electrode at the Hanover fair – a milestone in the company's history. Pioneering achievements back then can, of course, not be compared with technical capabilities these days. CLOOS has always used cutting-edge technology to join the most varied of metals.

Which projects in your field did you drive forward? Is there anything you are particularly proud of?
I had the trust of the four Messrs CLOOS and was able to make decisions autonomously. In doing so, I always attempted to improve collaboration between people. This is because nothing works without employees. Therefore, I motivated my employees to strive together for the success of the company to secure our jobs in the long term.

You met the company founder Carl Cloos in person. How would you describe his personality?
Carl Cloos was a patriarch in the positive sense. He was often distrustful at the start. I too had to convince him at first that I was an honest person. Also socially, Carl Cloos was visionary and wanted employees to share in the company's success.



JONATHAN PAUL, MECHATRONICS ENGINEER, STUDIUMPLUS MECHANICAL ENGINEERING, DESIGN DEPARTMENT (AT CLOOS SINCE 2003)

What does pioneering achievement mean to you at CLOOS?
From our new QINEO NexT power source, our new QRC-290 robot and our new microcontroller to the new peripheral equipment for components weighing 125 kg to 60 tons, we are continually developing in all fields. In addition, we are developing innovative and highly complex system concepts.

Which product or solution is your personal CLOOS highlight and why?
Since I am responsible for designing laser systems and compact cells, these systems are also my personal highlights. During the last financial year, we sold more than 50 compact cells – the first time in the company's history.

Why do you like working at CLOOS?
CLOOS is like a big family where help is always available somehow. The diversity of products in the different fields of welding technology, robotics, controller technology and mechanical engineering makes work extremely varied and diverse.

PETR BOHÁČ, SERVICE TECHNICIAN FOR WELDING MACHINES (AT CLOOS PRAGUE SINCE 1994)

Which product or solution is your personal CLOOS highlight and why?
I like the GLC 353/MC-3 welding power source because of its excellent welding properties, sturdy design and simple maintenance. I also find the new QINEO NexT welding power source with the MoTion Weld process interesting due to its outstanding welding properties when used for thin sheet welding. Feedback from customers is also very positive.

What has been your best experience at CLOOS so far?
CLOOS is a family-run company where co-workers have a friendly working relationship. I like working in such a pleasant environment. I also enjoy tracking the development and successes of the companies welding with our welding machines and robot systems.

Why do you like working at CLOOS?
Next year I will be celebrating 25 years with CLOOS Prague. The work is a lot of fun and very diverse. I like our technical innovations and having direct contact with customers.

What has been your best experience or a special experience at CLOOS?
On my very first day in mechanical engineering, my colleagues gave me the nickname Hajo – I still have it to this day. Overall, I had a very good time at CLOOS. My job as a skilled machine fitter was very diverse. I always liked going to work and at 63 still did not want to retire.

You met the company founder Carl Cloos in person. How would you describe his personality?
I can still vividly remember my job interview in 1963. Excited and a little nervous, I waited with my father in the sparsely furnished conference room in the former office building. Then Carl Cloos entered and asked in typical Siegerland Low German: "Hi lad, you wanna start working for me?". After I answered Yes, I had to show him how to calculate a circle. Then he said: "Lad, you can start then." Shortly before the end of every working day, the top boss walked through the company. He talked to every employee personally and asked what they were currently working on.

HANS-JOACHIM SCHOL, PREVIOUSLY IN THE MECHANICAL ENGINEERING DEPARTMENT, HEAD OF FINAL ASSEMBLY FOR AUTOMATION (AT CLOOS FROM 1963 TO 2013)

JAN KLINGELHÖFER, MANUAL WELDER, APPLICATIONS ENGINEERING DEPARTMENT (AT CLOOS FROM 1995 TO 2004 AND SINCE 2006)

What does pioneering achievement mean to you at CLOOS?
This starts with the welding machine with an endless electrode and continues on to high-tech products used for all sheet metal of varying thickness. The interconnecting welding machine and robot is also a real pioneering achievement. In line with our slogan, "Everything from a single source".

Which product or solution is your personal CLOOS highlight and why?
Of all the new innovations that have kept coming over recent years, the QINEO NexT with its arcs and the MoTion process is one of my absolute top highlights. Why? Because the technology is continual development, enabling us increasingly to dare to approach the physical limits.

A lot of practise is involved with manual welding – what does that mean for you? And what do you particularly enjoy?
Manual welding requires a lot of experience and skill – changing processes, different materials, various requirements, devices and process training. I really like working with customers.

What has been your best experience at CLOOS so far?
What I like most is the special relationship I have with co-workers in my department. The fact that we help each other out and work together as a team.

What has been your best experience at CLOOS so far?
There have been a number of really great moments with immediate colleagues and co-workers from very different departments as well as with workers from subsidiaries and other offices around the world – Christmas and company parties, visits to exhibitions/fairs, department outings and meeting customers from different cultures. Off the cuff, I can think of a visit to a brewery with some Korean customers, an evening at the Tannenhof Hotel for a sales meeting during the carnival season (Fasching) and a department Christmas party which some Swedish customers joined.

Why do you like working at CLOOS?
Because the work at CLOOS is very diverse and challenging. I have contact with colleagues from many different areas and have colleagues from very different cultures worldwide. The working environment is very good and friendly. Employees help and support each other.

Is there a typical CLOOS employee? Which traits does this person exhibit?
For me, a typical CLOOS employee is closely associated with the company, enjoys the work, has already been with the company many years, is loyal to the company and is willing to take on tasks that are perhaps not directly in his or her field.

KERSTIN KRICK, INTERNAL SALES (AT CLOOS SINCE 1981)

ANDREAS DITTMANN, MECHANICAL MACHINING, WELDING PRODUCTS (AT CLOOS SINCE 1983)

What does pioneering achievement mean to you at CLOOS?
For me, the biggest achievement of CLOOS is that, over the 35 years I have been at the company, all the employees have been paid on time – in financially good times as well as bad.

Which product or solution is your personal CLOOS highlight and why?
My personal product highlight is the introduction of the welding robot. As a result, production capabilities have improved greatly over recent years. For example, in the early days an angled robot foot used to be made from several individual parts on different machines over several days. Nowadays, the same part is completely finished in an hour.

Which challenges do you face the most often and how do you overcome them?
My daily challenge is making robots and machine components with as much precision as possible. The most diverse of problems can occur in the process which are then clarified and rectified together with those responsible from the relevant departments.

NOÉ TORRECILLAS, SERVICE MANAGER (AT CLOOS ROBOTIC MÉXICO SINCE 2006)

Which product or solution is your personal CLOOS highlight and why?
For me, the QINEO welding unit with CLOOS seam tracking is the best product solution we can offer because of the excellent welding results and the reliability that seam tracking provides for customer parts in every weld process.

What has been your best experience at CLOOS so far?
Along with other good experiences at CLOOS, above all, it has been being part of the CLOOS team that implemented a large project for Caterpillar. For this, we set up one of our large systems in the building for CLOOS México and programmed it. Tests were performed, the customer parts were then welded and certification was carried out, meaning we were then able to install the system together with two more systems at the customer's production facilities. Now, three years on, we have a customer who is very happy with its production capacity: output is three times higher than before – in a smaller production area.

Why do you like working at CLOOS?
There are new challenges every day. I would say that is motivation for almost anyone.

GAN HAIPING, DEPUTY SERVICE MANAGER (AT CLOOS BEIJING WELDING SINCE 2008)

Which product or solution is your personal CLOOS highlight and why?
I think open source programming is our best product because it enables the welding process to be configured more easily in a way that different technical customer requirements are fulfilled.

Why do you like working at CLOOS?
CLOOS has a very good team, a good work ethic and our products have major benefits compared to our competitors' products. I have been fortunate to have been part of this team since CLOOS China was established. During all of the years working for CLOOS, I have been able to greatly improve my work skills, as well as my personal qualities. It is a great honour for me to work in this team.

WHAT IS SPECIAL ABOUT YOUR DIVISION?

Innovative solutions for flexibly configurable welding power sources and highly integrative, automated path welding systems – this is the work in which people at CLOOS have been pioneering over the last 100 years. Every single division has a special role in this.

“Provision of a reliable information basis for working together every day with company management, colleagues and business partners.”	“Reliability in the here and now, shaping the future together.”	“Confidential collaboration with innovative, flexible partners for the success of our customers.”	“Flexibility meets the diversity of customer needs.”	“Communication connects people.”
HOLGER WEIDMANN, DIRECTOR FINANCE AND CONTROLLING	RALF PFEIFER, DIRECTOR IT/ORGANISATION	CHRISTIAN ENDLICHER, DIRECTOR PURCHASING	MANFRED ZISSEL, DIRECTOR WELDING PRODUCTS	MICHAEL SCHMIDT, DIRECTOR CORPORATE COMMUNICATIONS AND STRATEGIC MARKETING

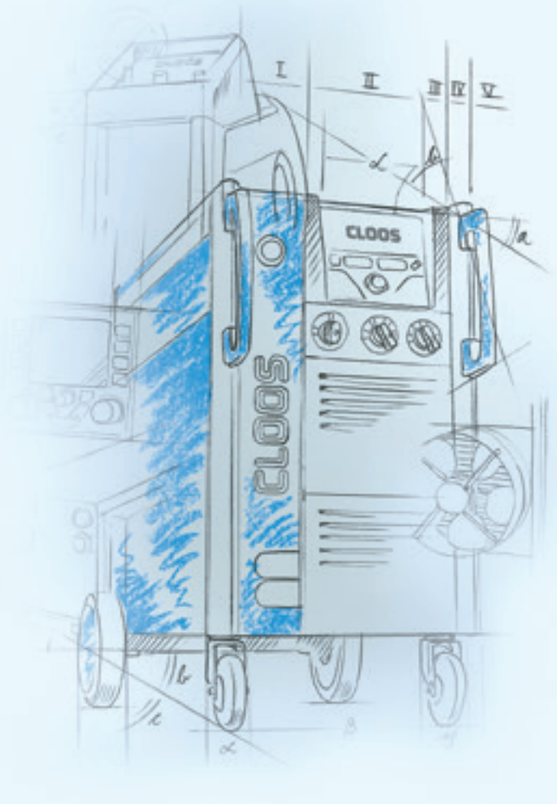
“Impress customers with custom, high-tech solutions.”	“Trust and communication form the basis for our human resources management.”	“Long-term customer loyalty and success through speedy, effective responses in emergencies and professionalc onsul-tation in after-sale support.”	“Commitment and creativity are the keys to efficient solutions.”	“Together translate the dynamic requirements of the market into products and solutions.”
CHRISTIAN LANDAU, DIRECTOR SALES	MICHAELA HANZ, DIRECTOR HUMAN RESOURCES	FRANK ZÖLLNER, DIRECTOR CUSTOMER SERVICE AND TRAINING	CHRISTIAN PAUL, DIRECTOR APPLICATION AND PROCESS DEVELOPMENT	STEPHAN PITTNER, DIRECTOR AUTOMATION

CLOOS. INNOVATIVE WELDING TECHNOLOGY.

CLOOS develops, manufactures and sells innovative solutions in over 40 countries worldwide. Three divisions have arisen from the company's core competence (arc welding) – Welding Products, Automation and Customer Service. With the QINEO and QIROX product lines, the CLOOS product spectrum covers the entire range of arc welding technology. Furthermore, the portfolio includes intelligent solutions from the fields of software, sensors and safety technology.

How these are used by customers is always the focus for all process and product solutions. The goal declared by CLOOS is to contribute significantly to the sustainable business success of its customers – by achieving perfection using process and mechanical engineering expertise: "Weld your way."

PREMIUM QUALITY WELDING MACHINES



ANDREAS STALP, HEAD OF DEVELOPMENT, WELDING MACHINES

What was the biggest challenge in developing the QINEO NexT?
The approximate direction for the development of the QINEO NexT was defined on a conceptual design day in July 2015. One of the key challenges was to develop a high-end device tailored exactly to market requirements, within budget and on time. Applicable standards were observed, no patents were to be infringed and our own patents were to be created, if possible. The excellent welding properties of existing power sources, some with analogue control, provided by CLOOS as standard, were even improved with this fully digital power source. We were dealing with far more complex technology which we used to achieve excellent performance. With it, we meet the strictest demands in terms of performance, speed and process quality and facilitate intuitive operation and control of the power source. Our fantastic team achieved all that. Such a complex and challenging development would not have been possible without the relevant skills and necessary experience.

JAN P. PITZER, GROUP LEADER FOR APPLICATIONS ENGINEERING MANUAL WELDING, PRODUCT MANAGEMENT FOR PROCESSES AND SENSORS

What are the standout features of the CLOOS arc?
The diversity of welding processes is immense. It would be a costly mistake if we only restricted ourselves to the MIG/MAG arc. CLOOS is the market leader in many joining processes and is driving forward various technologies. Nevertheless, the MIG/MAG arc is without doubt of particular importance for CLOOS. It is the core element of a welding task, and is therefore enormously important. The success and quality of a welding task often depend on the small blue flash which is not bigger than the wick of a tea light. For the assessment, objective requirements for a welded seam, and above all the many subjective requirements for welders in the welding process, play a role. “The arc must work!”. And we get it running. No matter whether it is for construction steel, chrome-nickel steel or aluminium and regardless of whether manual or automated welding is involved, the diversity of applications covered by our arc is absolutely huge. In conjunction with ease of operation and special robot functions, we address the needs of numerous users very precisely. We can be proud of that.

qineo

KIM DENISE MARTIN, CUSTOMER SERVICE TRAINING

How do you guarantee CLOOS products are used professionally by customers?
As a premium manufacturer, we attach great importance to customers undergoing well-grounded training. For over 30 years, we have been offering our customers located around the world a broad selection of seminars at our competence and training centre covering welding power sources, robot technology and process technology. This way, attendees acquire knowledge required for programming and handling to ensure that they operate our systems safely and without any problems. A trainer team with many years’ experience in all fields of manual and automated welding is available to our customers in-house and on-site for assistance. To communicate as much expertise to our customers as possible, seminars are only held in small groups and in real-world conditions. This enables knowledge acquired to be immediately put into practice. Around 20 different training programs, divided into Programming, Service, Software, Lasers, Welding Processes and Power Sources, enable us to address virtually all the needs of our customers. We also offer custom training which is tailored to the specific issues and needs of our customers. Furthermore, a busy flow of information via the CLOOS subsidiaries and branches at home and abroad keeps customers up-to-date.

FRANK SCHNEIDER, HEAD OF SALES, WELDING PRODUCTS

Do you have a favourite product – if yes, which one and why?
The QINEO NexT generation is currently one of the most innovative products from CLOOS. The market-oriented QINEO NexT technology is setting standards in welding technology and thereby making CLOOS the technology leader in the industry. It satisfies all requirements in both manual and automated welding. Future-oriented technology enables speedy continuous development in order to realise new welding processes, build levels, auxiliary products and digitalisation in the industry. It is motivation for everyone involved to see this product through, from the start of development to its market positioning, and also to be able to introduce ideas and visions in the future.

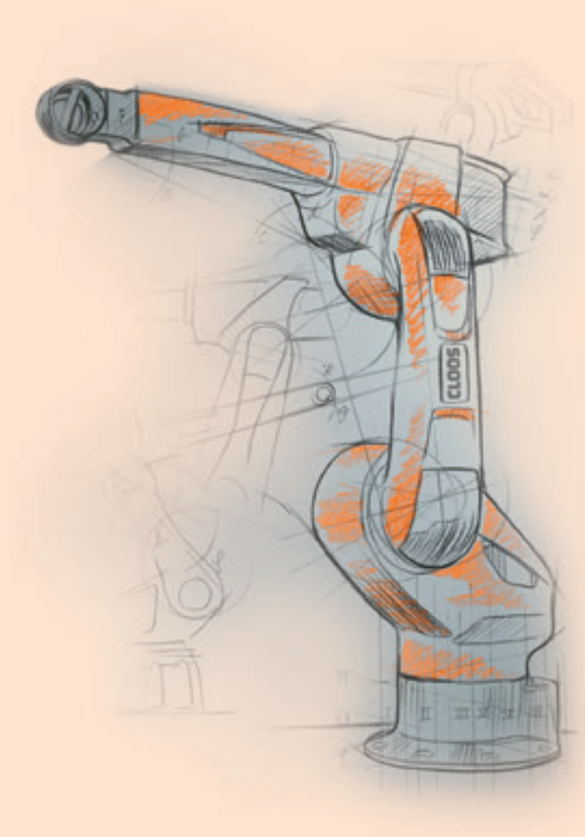
SYSTEMATIC AUTOMATED WELDING & CUTTING

SVEN MÜLLER, APPLICATIONS ENGINEERING

What is so special about RoboPlan?
In line with our “Everything from a single source” slogan, we also develop the RoboPlan offline programming software in-house. We can design functions that are perfectly tailored to CLOOS robots and that respond flexibly to special customer needs. Feedback from our customers is very important to us here. For this reason, we hold an annual symposium with our maintenance contract customers to obtain first hand information on improvements and future requirements for the software. CLOOS recognised the capabilities and benefits of offline programming early on. The cost-effective and simple generation of robot programs on a PC guarantees maximum productivity of the robot system and a minimum number of downtimes compared to the conventional teach-in process. We are now able to look back on 20 years' experience in offline programming software.

IVO BENNER, INDUSTRY 4.0 TEAM

What is so revolutionary about the new C-Gate gateway from CLOOS?
The C-Gate enables simultaneous access from anywhere to the operational and process data for a CLOOS welding robot for the first time. Using its IT configuration, the customer determines whether this information is only available on the system, across the entire company or from anywhere. Included in the data provided is system efficiency information, enabling our customers to optimise their production processes. As soon as particular data differs from a standard selected, the customer is immediately informed. A modern, mobile-optimised web interface enables easy use of the C-Gate, be it from a smartphone, tablet or PC. Cutting-edge technologies and current Industry 4.0 interfaces enable data interchange with other devices and integration into systems interfaced upstream (MES, ERP). The functional scope of the C-Gate is being continually extended by agile and test-driven development, meaning more features can be expected in the future in the areas of Production, Maintenance and Quality Management.



RENE KRING, PROJECT MANAGER AUTOMATION

What do your customers value about the automation solutions from CLOOS?
On a technical level, we win over customers with a system offering everything from a single source. We develop, plan and manufacture all the main components for our automation solutions – from power sources to robots with controllers and all peripheral components. We are able to look back on decades of experience in the development of innovative and interlinked solutions. Our employees have a vast amount of expertise in products, systems and processes with which they are able to impress customers during installation, start-up and programming work for the systems. This is continued in After Sales support. At CLOOS, a customer has one point of contact for the servicing of its system. The “everything from a single source” thought process is continuous, be it for power sources, robots or overall systems. Our customers particularly value direct support throughout the process – from the enquiry to the finished system in their own productionfacility. This end-to-end system creates trust and direct channels for all levels of communication. Both customers and CLOOS ultimately benefit from the business relations built over the years.

Where does the initiative for a (new) development come from?
Development is like swimming against the tide – stay still and you go backwards! And those not wanting to just keep still need to swim faster than the tide.
The technologies upon which we base our products are in continual development. This opens up the ability to implement things anew or more efficiently. Years ago for example, iPC, safety technology and I/O terminals were not as standardised as they are today. This enables us to start new developments based on technologies that allow us to design our products to be more cost-efficient and powerful.
New trends in mechanical engineering such as Industry 4.0 and digitalisation, the skills shortage and simply the changing expectations of users require us to go down this path. We are continually enhancing our products, driven by the requirement to provide our customers with competitive products and to generate new added value. Would anyone thinking about buying a new mobile really opt for a Nokia 5110? At the same time, in the era of the iPhone X, we do not want to leave behind customers still with working Nokia 5110 phones, and to offer them software updates and a new, fully graphic display. In other words, this means that old systems can be updated and can keep up with changes. Satisfied customers will also be customers tomorrow.

BJÖRN KINZENBACH, HEAD OF AUTOMATION DEVELOPMENT

CLOOS WELDING TECHNOLOGY IN ACTION

COLLABORATION BASED ON PARTNERSHIP

"FOR MANY YEARS NOW, OUR TWO COMPANIES HAVE ENJOYED A FRIENDLY RELATIONSHIP. COLLABORATION HAS BEEN TREMENDOUSLY SIMPLIFIED AND IS DOWN NOT LEAST TO PHYSICAL PROXIMITY."

RAPHAEL WILLGENSS
HEUN GROUP

For welding technology, the Heun Group in Dillenburg-Oberscheld has been placing its trust in CLOOS technologies for decades. 22 welding machines for manual MAG and TIG welding are deployed at the manual welding stations. To address increasing demand and guarantee high quality standards, the medium-sized contract manufacturer is investing more heavily in automated production equipment. As a result, four robot systems are making different types of components. One CLOOS robot is using the TIG process for circular seams on tank containers. Heun is also using two compact robot cells to weld different types of small and medium-sized components. There is also another robot system making ladders used in underground construction.

COMPLEX PRODUCTION LINES FOR HIGH-TECH TRACTOR CABS

"THE PRODUCTION LINES ARE COMPLETELY RELIABLE. SYSTEM AVAILABILITY, IN EXCESS OF 97%, MEANS WE CAN OFFER OUR CUSTOMERS THE HIGHEST POSSIBLE PRODUCT AVAILABILITY."

PETER BAUMGARTEN
WELDING AUTOMATION, AGCO/FENDT

AGCO/Fendt deploys CLOOS technologies for the welding of safety cabs for tractors. Robots, workpiece positioners, handling systems and manual welding technology work hand in hand on two complex production lines for welding the cabs. All systems are designed as multi-point stations, meaning the robots can travel back and forth between the individual stations. This guarantees high levels of flexibility and system availability. The partially automatic transport equipment enables smooth conveyance of components between the different production steps. This yields the best possible logistics channels, short cycle times and a lower space requirement for provision surfaces. The RoboPlan software from CLOOS is used for offline programming of the robot systems. A new program can be created in RoboPlan whilst production is running in the system.

HIGH-TECH MADE BY CLOOS

“THE QINEO NEXT BOASTS EXCELLENT ARC PROPERTIES AND PROCESS RELIABILITY FOR THE HIGHEST WELDING QUALITY. INTUITIVE OPERATION AND SIMPLE MAINTENANCE ARE ADDITIONAL HIGHLIGHTS OF THE NEW WELDING POWER SOURCE.”

NIKLAS TITZMANN
HEAD OF LIFTING GEAR PRODUCTION, LINDE MATERIAL HANDLING GMBH

Linde Material Handling GmbH manufactures more than 200 forklifts a day at its production facility in Aschaffenburg. Process reliability is always the focus to guarantee flawless product quality, which is the reason why Linde and CLOOS have enjoyed a trusting working relationship for decades. Around a dozen CLOOS robot systems weld different components for the forklifts. The company also deploys more than 20 welding power sources for manual welding. The manual welders use the new QINEO NexT high-tech welding power source from CLOOS to assemble particularly complex mast assemblies for the forklifts and special custom variants.

INTERLINKED ROBOT SYSTEM WITH INTELLIGENT SHUTTLE SOLUTION

“DURING THE DEVELOPMENT OF THE SYSTEM, CLOOS DEMONSTRATED THAT THEY WERE VERY OPEN AND FLEXIBLE TOWARDS OUR IDEAS AND SUGGESTIONS. TOGETHER WE CREATED A UNIQUE SYSTEM THE LIKE THE WORLD HAD NEVER SEEN.”

KAI KALLSEN
WELDING SUPERVISOR, LTI METALLTECHNIK GMBH

Increasing lot sizes, a broad range of variants, shortest delivery times and top quality – the requirements of the customers of LTI Metalltechnik GmbH are becoming increasingly stricter. In the welded production of ventilation wheels, the company deploys an interconnected robot system from CLOOS. The system has four loading/unloading and three identical welding stations. An intelligent shuttle system connects the individual stations together. The shuttle in the loading area uses a magnet code on the fixture to detect the welding station to which a component needs to be sent. LTI has been able to more than double welding speed with the new robot system. There are also time savings from using the fully-automatic handling system. Furthermore, the robots guarantee maximum process reliability. Not least of all, coding of the devices enables end-to-end documentation of which robot welded which seam using which program.

FAST, FLEXIBLE, COST-EFFECTIVE

“AS A PARTNER OF MANY YEARS, CLOOS IS WELL AWARE OF OUR EXPECTATIONS AND REQUIREMENTS. WE WANT TO CONTINUE BUILDING ON OUR TRUSTING WORKING COLLABORATION.”

MARTIN KINDL
PROGRAMMER AND DESIGN ENGINEER, MEILLER

Commercial vehicle specialist Meiller has been placing its trust in CLOOS welding technology for decades. At its Slaný site in the Czech Republic, the company deploys six robot systems with eight welding robots, and more than 300 welding power sources from CLOOS. A CLOOS robot system welds the sides for truck tippers using the Tandem Weld process. The high-performance welding process achieves highest speeds when the thin, lightweight components are welded, and increases production quality at the same time. Two 7-axis QIROX QRC-350-E welding robots are at the heart of the CLOOS system. Each robot is equipped with two welding torches, whilst the curved, single-wire torch is suitable for welding short, structured and difficult to access weld seams, the straight tandem torch can perform long, straight weld seams at high speed. Torches are changed automatically by a command from the relevant program, meaning the system can be deployed flexibly for different component variants.

TARGETING SAFETY

“PUKY IS SYNONYMOUS WITH UNRIVALLED SAFETY OF CHILDREN’S VEHICLES. FOR THE WELDING PROCESS, THE COMPANY HAS BEEN PLACING ITS TRUST IN CLOOS TECHNOLOGIES FOR DECADES.”

DANIEL BUNGARTZ
INDUSTRIAL ENGINEER, PUKY GMBH & CO. KG

Puky vehicles have high-quality, clever and child-friendly designs. Safety is the overriding priority for the company, with a long tradition and headquartered in Wülfrath, North Rhine-Westphalia. This is why all children’s vehicles are developed, designed and manufactured in Germany. Increasing order volumes have meant Puky has invested heavily in automated production equipment in recent years. Previously, all of the vehicles’ welding was manual. For the manufacture of cycle handlebars and frames, the company has been deploying two QIROX QR-CC-6 compact cells from CLOOS since 2015. These are turnkey systems each having a two station workpiece positioner with horizontal exchange and rotation/pivot movements. Deploying the two new compact cells guarantees a high level of process reliability and excellent product quality with welding results that are reproducible exactly. Furthermore, Puky is benefiting from the flexible applications of the compact cells.

CLOOS. A STORY WITH A FUTURE.

CLOOS has always been a pioneer in innovation. For 100 years now, we have been working on welding technology advancements, and Industry 4.0 has long been familiar territory for us. And the company will continue this success story into the future. The digital transformation with which the networking of production and supply chains is being driven forward, lies at the heart here. But it is also about utilising the diversity of social media platforms and the mobile web for successful corporate communication. Dialogue with customers, partners and employees will make a key contribution towards CLOOS staying at the leading edge of innovation.

DIGITAL TRANSFORMATION – MIND OVER TECHNOLOGY

Digitalisation, networking and corporate communication shaped by dialogue will determine the future

Nowadays, the digital structural transformation is an issue everywhere, with some even having had enough of the buzzword. But this is still a far cry from the process being understood. This makes sense because the change is complex, rapid and extensive. What is problematic, however, is that no strategy for the digital transformation can be devised, across the whole country or at individual companies, without an all-embracing understanding of the new framework. Decision-makers in particular should know what they are talking about. The "digital" buzzword is usually too much of a pointer to technical matters. It is quickly assigned to someone whose role is to deal with it and a "Chief Digital Officer" is appointed. This can be done, but may not be satisfying.

Dare to make changes

Comprehending the new framework for the network economy is necessary. It is only after we have succeeded with this mental transformation that all of the old DNA can be questioned. And this needs no less. According to this understanding, digital transformation is the all-encompassing alignment of culture, skills and processes across the entire company to the capabilities of the digitally networked era. The driving forces behind change that really affect all companies should be at the heart of our efforts. These can be seen in the triad of mobile web, social media and Internet of Things. Together they form a network structure – the "Internet of everything, everywhere and everybody". Whilst in the industrial era the normal scenarios were hierarchical processes in a company and for value-add chains, and asymmetric communication between a few senders and many recipients, the lower transaction costs of the digital world mean processes between different stages can pass off more quickly and transparently in all directions and without stop-offs.

Driving forces of digitalisation

The Internet of Things is just beginning to take effect, but is usually covered by buzzword "Industry 4.0" as the focus of German industrial companies. This networking of production and supply chains, however, only forms one of three digital driving forces that must be considered together. Much more advanced than the Internet of Things, but nevertheless understood to a lesser degree, or dismissed as marketing hype, is the combined impact of mobile web and social media. The mobile Internet removes the division between the online and offline worlds, between different channels and places. This omni-channel has long been the norm for those who are now 20 years old – the customers, partners and employees of the future. Social media is used mainly on mobile devices. People communicate via the social networks of Facebook, LinkedIn and WhatsApp with contacts they have selected themselves. They hold conversations without being limited by physical space or number of people involved.

Mobile communication

Mobile communication is about trivial matters, such as lunch and pets. But it is also, and that is the main thing, about opinions on, recommendations of and warnings about products and brands of every kind. Even brand "employer" is being addressed and appraised on social networks – giving rise to key changes for the recruitment of employees and partner firms. Nowadays, people have access all the time and everywhere to other opinions, which are more relevant to them in the event of doubt than the information provided by the classic media and companies. This shift in market power for information in favour of other market participants is forcing companies more than ever to learn to listen, to engage in dialogue and to attract the attention of customers and (potential) employees using good content. It is irrelevant whether we are talking about welding technology or trainers – the mechanisms of successful communication are identical for all products and target groups.

Success through dialogue

In the pre-digital world, companies sent their videos, posters, claims and press releases by post, but forgot about dialogue or reduced it to a chat in person or a phone call. But the digital world means interaction on an equal footing. Companies must understand that this discussion principle must take the leading role again – because human communication at its core was never about anything other than dialogue. Instead of bombarding customers with advertising slogans, companies must engage in interesting dialogues to get involved in the communication on social networks. The capabilities of using social media listening software to listen systematically have long been available, but the process is not been given any priority at most companies.

This must change because the advancing use of digital media is irreversible. Only companies who manufacture in close proximity to their customers, partners and employees where the under-30 generation communicates will make faster and better decisions to outperform competitors who are not as up-to-speed with the market. So the digital transformation is not a sub-project, but an essential, all-encompassing process in which competitiveness is established by means of newly defined, limitless market proximity. The technology for it is in place, the corresponding mentality change should follow on as quickly as possible.

Prof. Klemens Skibicki was born in 1972 and studied Business Administration and Economics at the University of Cologne where he was also awarded a PhD in Economic History in 2001. He has been a Professor for Economics, Marketing and Market Research at the Cologne Business School since 2004. Prof. Klemens Skibicki is a co-founder of and scientific director at DIKRI (German Institute for Communication and Law on the Internet) at the Cologne Business School and is a partner at strategy consultants Convidera GmbH. He provides consultative support to companies, from DAX groups to medium-sized businesses, on their journey towards digital transformation of the entire value-add chain. Since 2013, he has been a core member of the "Junge digitale Wirtschaft" (young digital economy) advisory board at the German Federal Ministry for Economic Affairs and Energy. 2014 saw him appointed to the Digital Ambassador Office of the Ministry of Economic Affairs for North Rhine-Westphalia.

NEXT GENERATION PIONEERS

Daniel Müller

I believe pioneering achievements result from the will to continually improve one's own efforts. Through innovations, CLOOS has been setting standards in welding technology for decades. Because production is trending increasingly towards full automation, Industry 4.0 will also be playing a major role in welding. In particular, it is the increase in cost-effectiveness and productivity of these fully automated welding systems that will bring about subsequent innovations in welding technology. The future is also likely to see innovations in laser welding, especially in regard to the cost-efficiency of laser applications. At CLOOS, the automation technology necessary in the future is playing a big role during apprenticeship training. This is why I have already taken part in various training sessions covering robot programming and PLCs. I was also able to familiarise myself with the programming of different systems over a period of several months in the Electrical Design Department.

Daniel Müller, Mechatronics Engineer, in the 3rd training year

Hannah Walz

The welding world of the future will be characterised by innovative technologies and the transformation to Industry 4.0. Major importance will be attached here to responding rapidly and flexibly to individual customer requirements. I made the decision to complete a training program at CLOOS more than five years ago. I regarded the subsequent dual course as an opportunity to study at the same time as taking a hands-on approach and to be able to gain additional vocational qualifications. By taking the course with a practical orientation, I had the opportunity to cover issues from which much potential for improvement can be derived. I like it when these issues are approached during projects in collaboration with colleagues. I believe this continual improvement is important at CLOOS.

Hannah Walz, Industrial Management Assistant, StudiumPlus Logistics Management, in the 6th semester

Simon Dietrich

For me, pioneering achievements at CLOOS mean continually striving for improvements and new innovations. I think the developments towards Industry 4.0, which have already gained a foothold in welding, will be gaining considerable relevance in the future. For weld process monitoring in particular, many more innovations are certain to change our day-to-day work. It will soon be completely normal to monitor a welding robot from home with a smartphone. I opted for a training place at CLOOS, because I am very impressed by the diversity of products and the complexity of the robot systems provided by CLOOS. Every system is unique and the process from planning to the finished product is always exciting. The training program at CLOOS reaches a suitably high and diverse level. It covers basic knowledge as well as more complex and particularly future-oriented topics.

Simon Dietrich, Electronics Engineer for Industrial Engineering, in the 2nd training year

Maik Schol

For me, pioneering achievement means progress – the continual advancement of products and programs to be well positioned in terms of future orientation and cost-effectiveness. Welding is and remains a key issue for all companies involved in joining together components. I believe the future will increasingly be about space travel. Good products and highly qualified specialists are required for this. I opted for a training place at CLOOS, because I have always wanted to work in a future-oriented company. From the very first day, I was integrated as a fully-fledged employee and have learnt a lot about our products and Industry 4.0. What I find good is that we take part in seminars and training programs to further our apprenticeships. I am looking forward to the time after my vocational training. Here too, CLOOS offers a broad spectrum of course places and advanced training programs. CLOOS is a company at which it is possible to develop continually.

Maik Schol, Industrial Management Assistant, in the 3rd training year

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