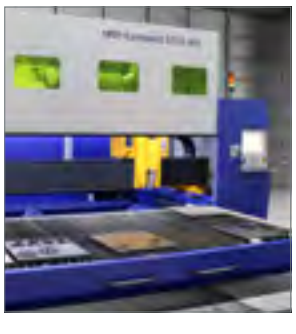
MicroStep®

SOLUTIONS

Automatic weld edge preparation

3D processing with plasma, laser, waterjet and oxyfuel P. 8

PREMIERE: MSF Compact
Fiber laser reimagined



Affordable entry into high-quality fiber laser cutting offers the ultimate power package: with its compact footprint and low maintenance and operating costs, the new MSF Compact is perfectly suited for production of highly precise parts at high cutting speeds.

P. 30/31

Here come the robots:
Cutting range expanded

Our comprehensive product line of components for robotic working cells utilizes robots for manipulation, welding and cutting. Concurrently, a new area unveils its potential – direct integration of robots into CNC machine gantries for a variety of structural steel applications.

P. 36

Dome processing:
Save valuable time now

The basic step in production of pressure vessels is precise cutting of tank ends. Automating this process to a high degree while delivering high-precision cutting results without the need of additional surface finishing provides manufacturers with a clear advantage and saves them a lot of valuable time. P. 20/21

The right solution

for every cutting task

2D cutting

Bevel cutting

Pipe & profile cutting

Dome cutting

Plasma **Laser** **Oxyfuel** **Waterjet**

Supplemented with additional technologies:

- Drilling, tapping, countersinking
- Marking
- Scanning
- Material handling

www.microstep.eu

Headquarters of MicroStep in Bratislava, Slovakia is the home of company's extensive R&D teams working on integrated development of mechanical and electronic nodes of CNC machines and control systems.

"We provide solutions"

MicroStep's Managing Directors Alex Makuch and Eva Stejskalová on the strengths of the company

The company MicroStep has already been active in the cutting business for more than 25 years. Since our beginnings in 1991, and more so since the beginning of our involvement with CNC cutting in the following year, our professional academic background from the fields of automation and regulation has allowed us to seek different approaches from those of traditional machinery enterprises. MicroStep has pioneered and successfully implemented a handful of novel solutions that helped to improve the end user experience: a control system interface running on Microsoft Windows®, a laser pointer for convenient tracking of cutting tool position, automatic plate edge detection and plate size measurement on plasma machines, auto-calibration of bevel tool stations (ACTG®) that not only guarantees long-term accuracy but also immensely simplifies their maintenance, bevel tool stations with auxiliary axes for accurate parallel cutting, Additional Beveling Process (ABP) for beveling of thick parts that saves a great amount of material, mScan technology for 3D mapping of real dome shapes, advanced remote diagnostic and remote control tools that reduce machine downtimes and many more. Several of our solutions are patented.

We are delighted that many of our ideas and visions find appreciation by the industry, and that even some of the more recent ones are already becoming reality:

- to establish automated bevel cutting as the process of choice for all who require weld preparation on parts – in 2018 alone over 50% of MicroStep machines were supplied with bevel cutting technology
- to deliver multi-functional solutions that streamline the production process and save time for our customers – almost 50 % of machines delivered in 2018 integrated several different technologies
- to make bevel cutting a simple, fast and reliable process with unified control for plasma, laser, oxyfuel and waterjet – our unified interfaces and patented ACTG® technology delivered with all MicroStep bevel heads make beveling with our machines a highly precise and stable process, without maintenance downtimes
- and many others: multi-functionality in laser cutting, large-scale fiber laser machines, ABP with all cutting technologies, automatic material handling systems

Our philosophy is to deliver machines that are not isolated tools but form an organic part of the production workflow by exchanging information, predicting breakdowns and automating the material flow throughout the customer's production cycle. The key areas include automation of processes in line with the ideas of IIoT and Industry 4.0, and activities that improve the consistency of cutting quality, reduce the impact of human errors and increase machine productivity.

Our customers who operate highly-advanced manufacturing facilities search for complex solutions of automation of cutting machines where the inputs are material and task entries from their ERP systems and outputs are processed and sorted high-quality parts, with an update on their status sent back to ERP. Efficiency and reliability of the process is considered a matter of course.

Realization of such complex projects depends on exceptional technical solutions, reliability of their operation and top-level service. Achieving of such goals would not be possible without a strong developer base, strong partnerships with our suppliers and global business partners and most of all with the valued members of our distribution network. Together we make it happen.

We hope you find inspiration while reading our magazine!

MicroStep spol. s r.o.

Alex Makuch
Managing Director
MicroStep

MicroStep spol. s r.o.

Eva Stejskalova
Managing Director
MicroStep

MicroStep®

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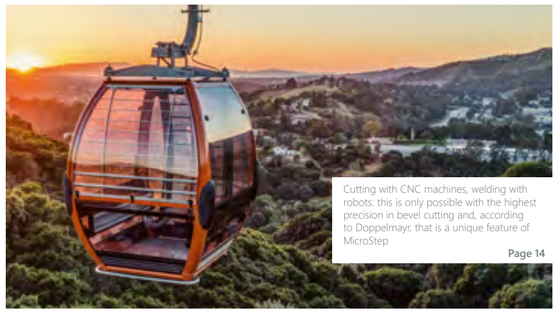

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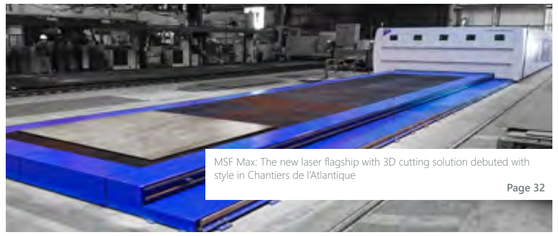

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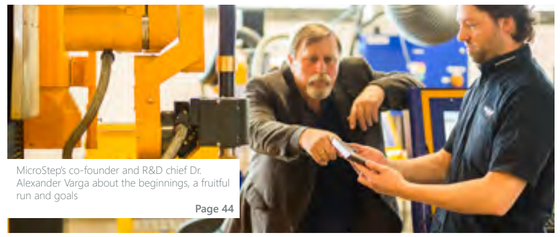

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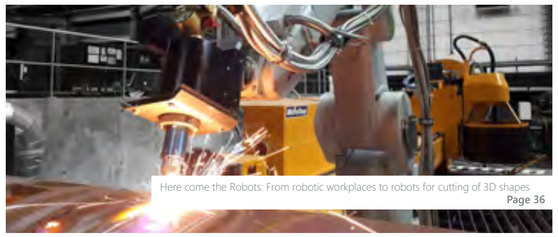

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Transforming the European manufacturing industry

An interview with Eva Stejskalová, Managing Director of MicroStep and leader of company's software development teams

Eva Stejskalová,
Managing Director of MicroStep

Mrs. Stejskalová, you are MD of MicroStep and from your position you supervise the areas of finance, innovation and software. In your opinion, what are the factors that make MicroStep one of the technology leaders in the cutting industry also in future?

Eva Stejskalová: MicroStep entered the cutting business as a university spin-off with extensive experience and know-how in automation technology. With its strong research and development capabilities the company was able to meet even those customers' requirements which were previously considered unfeasible by incumbent companies. Until now the most innovative solutions result from close cooperation between customers with visionary concepts of their production facilities and MicroStep which is ready to take challenges and turn their visions into reality.
However, at present the pace of technological change is faster than ever and particularly digital technologies have already shown immense potential to shape manufacturing industries. This trend can shatter the position of innovation laggards who will fight to stay relevant in the long term. For MicroStep it is a huge opportunity, as the company has always been investing heavily into development of its own control systems and software, and so it is well prepared to take the path to digital innovation.

> "At present the pace of technological change is faster than ever..."
>
> **Eva Stejskalová**
> *Managing Director MicroStep*

Digital innovation – what does it mean in context of cutting business?

Eva Stejskalová: Digital technologies can address all sorts of challenges that cutting businesses face nowadays – demand for productivity and quality enhancement, or lack of skilled operators. Some concepts like the "connected factory" are widely known and accepted already. Real-time production and inventory data enable efficient planning and scheduling processes. People responsible for monitoring cutting production can do so remotely without being physically present on the shop floor. MicroStep delivers such functionality with its Machine Production Management software and the MicroStep Dashboard. But digital technologies can offer much more. Machine learning will compensate for the lack of skilled operators as decisions and actions can be based more on data analysis and less on experience. Parameter adjustment or tool wear forecast is an example. In order to gain insight a big amount of data must be collected from the process and analysed through complex mathematical models and algorithms to identify patterns and trends. Based on the results the machine can make autonomous decisions. In case the correct algorithms are used, machines will learn faster and more reliably than a human being.

Do your customers realize the potential of digital technologies for their business?

Eva Stejskalová: Yes, the vast majority of companies realize the benefits, but many of them think they lack the resources needed for their digital transformation. It is necessary to understand that fully digital factories are still rare and the digital transformation can be phased depending on the possibilities of an individual company. For example, hardly anyone would challenge the fact that unexpected equipment breakdown is a major threat to manufacturing revenues. Advanced data analytics together with machine learning can be used to monitor whether a piece of equipment is prone to failure and predict when it will breakdown, thus preventing unexpected downtime. However, relatively simple centralized monitoring of operating hours and scheduling of preventive maintenance can also bring major benefit.

I can see that digital technologies are an extremely complex topic. How will MicroStep cope with research and development in so many areas?

Eva Stejskalová: This is the age of open innovation. MicroStep has a long history of collaboration with the Slovak University of Technology in Bratislava and our joint projects significantly supported product development in our company.
Nowadays open innovation goes beyond simple collaboration between two entities and that is why MicroStep actively participates in designing a pan-European innovation community of 50 companies, universities, and research institutes focused on added-value manufacturing. If the project succeeds in receiving funding from the European Institute of Innovation and Technology, MicroStep will have a chance to contribute to the concerted effort aimed at transforming the European manufacturing industry into the most sustainable and competitive industry world-wide.

Respected Expert: As a member of the High-level Strategy Group on Industrial Technologies within the EU Research and Innovation programme Horizon 2020, MicroStep CEO Eva Stejskalová is advising the EU Commission on Key Enabling Technologies (above). Great honor for MicroStep: Eva Stejskalová and company founder Dr. Alexander Varga were announced EY Entrepreneur of the Year™ 2014 in Slovakia by the "Big Four" consulting and auditing giant EY (below).

Factories of the future

The inevitable challenge: Digital transformation of production machinery in line with IIoT, Smart Industry and Industry 4.0 initiatives

During recent years, while facing ever-growing demands for greater efficiency, faster manufacturing, further cost reduction and resource conservation, the industry has witnessed a paradigm shift concerning the future development of industrial engineering. Digitalization and digital transformation are the buzzwords, along with IIoT, Industry 4.0 and others, that fuel the underlying discussions and activities both in academic and commercial spheres. More precisely, a change for the better should come as a result of smart project management and transformation of the production process towards automation and interoperability of production means, as well as the ability to implement predictive maintenance. There is a long way ahead but the foundations have already been laid – MicroStep has been building its systems with these basic ideas in mind for at least a decade.

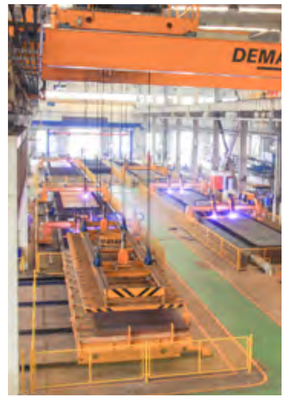
Over the past years, the company's in-house developed solutions for machine-to-machine and machine-to-enterprise communications have been winning increasing interest and gaining adoption in enterprises throughout Europe, Asia, America and Australia. Integration of our equipment with existing production workflow and ERP systems allows our customers to interconnect MicroStep cutting machines with their existing machinery by both hardware and software interfaces and to exchange data. We have implemented a number of automation solutions and machine-to-machine interfaces, especially in large-scale productions, integrating several cutting machines along with automated material handling systems. Further such projects, and more complex ones, are scheduled for delivery in the near future.

Flexibility is another trend shaping most industries. It is a result of increasing demands for a wide range of more customized product variants. "Lot size 1" is the ultimate goal. To be able to realize diverse projects in production efficiently, it is advisable for a manufacturer to have a set of versatile means of production that ensure smooth production transition between different projects. Additionally, a high degree of automation, a good selection of technologies and the capability to process various sizes of workpieces are required. In line with the abovementioned trends, MicroStep's cutting machines are designed to be actively integrated into centrally managed production systems by automating the material flow (e.g. via feeding/lifting equipment and conveyors) and by software that enables the machines to communicate with different applications of the production management system, such as stock-, order- and part databases as well as with external ERP systems. The goal is for the machine to be able to quickly adapt to different cutting/processing requirements, increase work efficiency, optimize the production process and minimize costs and risks – the whole production should be fast, smooth and transparent, monitored (at first) from the corporate network.

An example of such project is a modular combination of cutting/marking machines and an automatic pallet exchange system with a storage tower, which is successfully running at one of MicroStep's Dutch customers – the maritime service provider Neptune Shipyards. The system significantly reduces manipulation time and allows for expansion with other cutting machines and storage towers in the future. The automation is in loading of particular pallets with pre-loaded plates into two cutting machines automatically and unloading of the pallets back to the storage tower after the cutting/marking processes are finished. The prerequisite for such automated material handling is the ability of the machine to automatically measure the location and rotation of the plate on the table by a plate edge detection sensor. Integration of a CAPP software is also recommended as it allows to automatically load cutting plans generated for the currently loaded material and to initiate the cutting process automatically, if required. MicroStep supplies its own production management software under the name Machine Production Management (MPM, for more info see p. 39). Thanks to the automation, technologies that do not require the oversight of an operator (e.g. inkjet marking) may run completely without supervision – all the plates that are loaded in the storage tower can be marked automatically during the night. In case of a forced interruption of the process, the machine will notify the operator via an e-mail or text message.

Another example of such a complex solution is a fully automatic cutting/marking line consisting of eight cutting machines, an automatic crane, a loading wagon and two output conveyors, that is fully managed by MPM software and capable of processing 500 tons of steel per day (for more info read the story about our Chinese customer ZMJ on p. 38).

It is understood that digitalization of production means is a matter of broad consensus on standards within the industry and beyond. At this stage, MicroStep has had several years of experience in interfacing to third-party machinery such as automatic cranes, storage towers, loading and conveyor systems as well as controlling these processes and exchanging data with different devices, ERP systems and cloud solutions. Our machines are ready to provide detailed data to the upper control level. We are closely watching the developments in the field and also actively participating in several related initiatives, with the aim not only to be prepared for the upcoming challenges but also to help shape the industry of the future.



Above right: A production line interconnecting cutting machines with an automatic pallet exchange system and a tower pallet storage for plates allows for 24/7 operation.
Above left: CAPP-enabled MicroStep automatic production line uses advanced machine management software MPM to boost production efficiency.
In the middle: Representatives of MicroStep at the annual congress focused on Industry 4.0 solutions „Fertigung 4.0" in Bavaria, Germany (2017).
Below: Automated laser cutting machine with automatic material loader and additional input conveyor managed by MPM.

Industry-proven beveling solutions

3D processing with plasma, laser, waterjet and oxyfuel

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The area of bevel cutting has been one of priorities and an integral part of MicroStep's R&D for many years. We acknowledged the importance of this technology for streamlining of the production process and realized that many fields of the engineering industry would greatly benefit from its proper development. Thanks to our long-term focus and experience we were able to continuously innovate the equipment and, furthermore, develop new technologies that secured MicroStep a stable place among market leaders in bevel cutting.

According to field studies, up to 50 % of parts produced in the CNC cutting industry worldwide need to have beveled edges, yet only a considerably smaller percentage of machines is equipped with bevel tool stations. The reason may be the additional cost of this advanced equipment, but mainly it is still a relatively low awareness of decision makers in engineering companies about the possibilities, availability and reliability of contemporary beveling tool stations. The benefits – greater precision along with significant savings of production time and capacities – easily outweigh the higher initial investment. Moreover, in automated preparation of beveled edges on 3D objects such as domes, pipes, rectangular or IPE profiles, the use of specialized tool stations on gantry-based machines brings a great financial benefit compared to the commonly used robots.

Since the introduction of our plasma rotator in 2000 and a waterjet rotator in 2001, MicroStep has made continuous efforts to establish automated CNC bevel cutting as a common and highly efficient production technology for preparation of weld edges on different types of materials. Our goal is to deliver cutting machines that can produce cut parts with bevels in convincing quality and precision, yet the operation of the machines is kept reasonably simple. Throughout the years, improvements of mechanics and motion control of our rotary- and 3D tilting tool stations went hand in hand with the third-party development of energy-beam sources and our implementation of the latest cutting technologies developed by our suppliers. Thanks to this background, we are today able to offer a comprehensive bevel cutting solution for a wide range of materials and thicknesses.

Our comprehensive beveling function and supporting functions such as torch geometry calibration and adaptive bevel compensation allow our customers to cut bevels in a convenient way using different cutting technologies – plasma 1, laser 2, waterjet 3 and oxyfuel 4 – as well as to create bevels in a wide material thickness range reaching from 5 mm to 300 mm (depending on the used cutting technology). Furthermore, thanks to unique features of our in-house developed control system iMSNC and a profound knowledge of different cutting technologies, MicroStep machines are capable of combining various technologies (e.g. plasma and waterjet) within a single cutting plan 5.

MicroStep spol. s r.o.

Alexander Varga, Ph.D.
Head of R&D
MicroStep

"In the development of our bevel cutting equipment, the requirements of high precision, repeatability and long-term process reliability have always been at the forefront."


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MicroStep machines provide two types of beveling processes:
DBP – Direct beveling process – represents the classic way of bevel cutting where the bevel is cut directly into the raw material (sheet 6, pipe 7, profile or dome). The cut edge of required shape – A, V, Y, X or K – is created via multiple consequent transitions of the cutting tool (at different angles) along the cut edge. MicroStep machines with two rotators allow cutting of two identical parts using two rotary heads at once 8. The current maximum bevel angle of supplied tool stations is: 52° for plasma, 45° for laser, 65° for oxyfuel and 45° for waterjet.
ABP – Additional beveling process – enables adding of bevels to parts that have already been cut with a straight tool by plasma, laser, oxyfuel or even waterjet (for further information see page XY).

Generally, the accuracy of bevel cutting is determined by mechanical accuracy of the cutting machine, accuracy of the cutting technology and the stage of development of applied algorithms of control of the torch distance from the cut material.
Apart from consistent use of high-quality components, the mechanical accuracy of MicroStep bevel cutting machines is provided by several advanced solutions:

ITH – Intelligent torch holder – ensures protection of the torch in case of an accidental collision. Its slip-back function ensures return of the torch into the correct position after elimination of the collision. The ITH body includes an advanced sensor system for detection of the exact torch position and provides also the endless rotation function.

ACTG – Auto-calibration of tool geometry 9 – secures that during rotation and tilting of a rotator the torch tip always stays in the required (exact) position. The ACTG system consists of a calibration station 10, a torch extension probe and advanced control software. ACTG eliminates the necessity of mechanical adjustment of the bevel head and significantly reduces setup time of the machine from several hours to a couple of minutes.

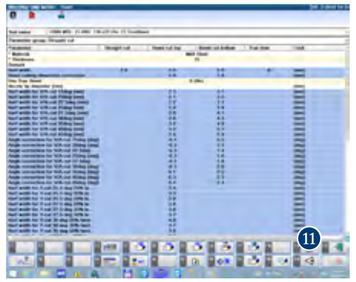
Compensation of longitudinal displacements – an optional function which ensures absolute accuracy of the cutting machine in the longitudinal direction. During installation, the machine is measured by a laser interferometer and the measured values are used for calibration of the positioning system. The measurement can be applied upon request in case of cutting of long parts with very high demand on accuracy.
Accuracy of the cutting technology is enhanced by eliminating beam deviations that occur naturally when the torch is in a tilted position in relation to the material and cause an unwanted difference of the cut angle from the theoretically programmed slope 11.

ABC – Adaptive bevel compensation – is an advanced feature of iMSNC for compensation of such beam deviations. ABC enables implementation of databases of compensation angles and other values for various cutting technologies (e.g. Hypertherm´s True Bevel™ technology). The compensation values can also be adjusted directly by the machine operator 12.

And finally, to ensure precise following of the material surface during plasma bevel cutting with the torch positioned always in the correct cutting height, MicroStep developed a smart height control system:

STHC – Self-teaching height control – a combination of 3D motion control, self-teaching algorithms and adaptive height control according to the plasma arc voltage. STHC ensures positioning of torch in the correct height at any angle (e.g. during cutting of variable bevels).

All the described functions greatly contribute to improvement of accuracy of the bevel cutting process. Our more than 700 beveling tool stations and 350 ACTG systems supplied in the field and first of all the excellent bevel cutting results achieved on MicroStep machines tell the story by themselves.



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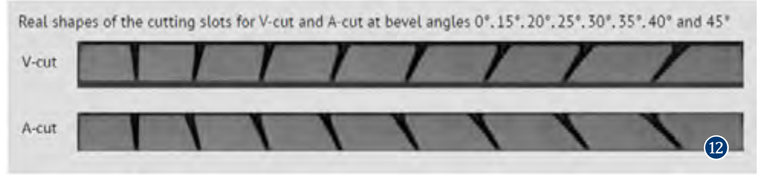

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Additional Beveling Process

ABP: Additional weld preparation with gantry-type CNC cutting machines – an efficient alternative to robots

Robots are widely regarded as irreplaceable when it comes to weld preparation and bevel cutting on already cut parts. MicroStep has brought an alternative to the market, which has seriously shaken the robots' position in this regard. This innovative technology is called ABP – Additional Beveling Process and it allows very precise subsequent beveling with gantry-type CNC cutting machines.

Subsequent weld preparation is a standard procedure for cut parts in many areas of the metalworking industry. Manufacturers of machinery and materials for power plants, turbines, pumps, mining equipment equipment and others often work with very large steel thicknesses, so the parts cannot be immediately cut with bevels – either due to technology limitations or because it would mean a significant waste of material.

Alternative to conventional processes

In case of big material thicknesses, bevel preparation on parts has traditionally been a two-stage process. First, the desired contour is cut on a conventional cutting machine with a straight tool, e.g. by plasma or oxyfuel. Then, the cut part will be taken out and moved to another workplace, where it will be processed by a robot, which will add bevels to the contour in preparation for a subsequent welding process.
"The initial question we asked ourselves was why you should require a robot for the subsequent weld preparation in the first place," explains Alexander Varga, development chief and co-founder of MicroStep. "Our cutting machines have all the means for achieving highly precise bevel cuts."

Based on MicroStep's long-term experiences in bevel cutting and process control, the company developed a technology involving laser scanning of parts along with software tools that enable programming of additional bevels on parts. The process was named ABP – Additional Beveling Process. ABP proves to be superior to the standard two-stage process in terms of efficiency as well as quality. And it comes with only a fraction of the investment cost that would be needed for a robotic workstation.

ABP: Laser scanner opens up new possibilities

In order to enable a MicroStep machine to use the additional beveling function, the machine has to be equipped with one of MicroStep's bevel cutting tool stations and an additional scanner unit. The unit can be attached to the bevel bead or mounted on a separate tool station – depending on the particular machine configuration and desired application.

The process then unfolds as follows: First, a 2D drawing of the pre-cut part is imported into MicroStep's CAM software AsperWin®. The machine operator defines the required bevels in AsperWin's user-friendly interface. The system then generates a cutting program for additional beveling. To find the exact position of the part on the cutting table, the machine will use the ABP scanner. During the scanning process, the real contour of the part is compared with its ideal shape from the drawing and if slight differences are detected (a real part is hardly ever completely accurate), the system will align the cutting program with the real shape to achieve the most accurate cutting result possible. After the starting point of cutting is verified, the cutting process begins. The system can make V, Y, X and K bevel cuts (whereby for K and X cuts the part needs to be turned and scanned again after the first cutting round is completed). Obviously, the technology allows to scan and process parts made with completely different technologies – for example, thick parts cut with oxyfuel can be subsequently beveled by plasma, or parts pre-cut with plasma can be cut with ABP by fiber laser. Thanks to MicroStep's unified concept of bevel cutting equipment and its easy setup via the patented ACTG® technology, the ABP process is fast, reliable and easily applicable to all cutting technologies – plasma, laser, oxyfuel as well as waterjet. (More details on ABP with oxyfuel technology can be found on p. 19.)

New process provides significant advantages

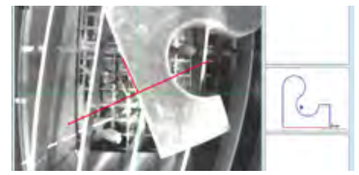
Compared to additional processing of pre-cut parts with a robot, ABP technology offers several clear advantages: the complete process (2D cutting and additional beveling) can be done with the same machine – this saves space in production and, above all, the time that is otherwise spent with part manipulation. In addition, the cost of adding a laser scanner to a MicroStep cutting machine is significantly lower than the investment in a separate, dedicated robotic workplace. On the other hand, cutting results that can be achieved on a gantry-type machine are more precise due to the generally higher rigidity of the cutting machine.

EXTRA

ABP for stainless steel and aluminium

ABP with plasma can be used for not only mild steel parts but also for stainless steel or aluminium. As an example, the 15 mm thick stainless steel part pictured above was beveled in a 130 A plasma cutting process.
"The dross is easy to remove. The technology provides impressive results. Especially with stainless steel, it saves a lot of material and also handling costs," says Alexander Varga, development chief of MicroStep. "For bigger thicknesses, the material savings achievable thanks to ABP are very attractive."

ABP scanner determining the exact position of a part placed on a random spot on the cutting table.



During the scanning process, the real contour of the part is compared with its ideal shape (drawing).

With rotator from MicroStep, V-, Y-, and (under certain conditions) also X- and K-cuts can be produced additionally on already pre-cut parts.

Thanks to high rigidity of the cutting machine, the cutting results are finer and more precise than with a robot.

Close-up view of a cut part with added bevels.

ABP
Video presentation:

www.microstep.eu/video

“All expectations fulfilled!“

stürmsfs AG, one of the most modern steel and metal processing job shops in Europe, invested in a complex MG machine

stürmsfs AG is considered one of the leading job shops in Switzerland and one of the most modern across Europe. This steel and metal business is well prepared to take care of all jobs, both complex and short-term. For this reason, the company has invested heavily in recent years, into digital systems, automation, and cutting edge technology. Since July 2017, this includes also the MG plasma cutting machine from MicroStep. stürmsfs relies on this multifunctional cutter for 3D processing of sheet metal with a plasma rotator, 2D plasma torch and drilling spindle.

Nestled between the hilly Appenzellerland and Lake Constance, Goldach is regarded as one of the most attractive regions in Switzerland. Amidst this picturesque scenery is one of the most modern steel and metal processing job shops in Europe that helps make the Goldach region one of the most efficient providers of complete steel and metal solutions on the Swiss market. 40 thousand tons of metal and steel wait at different locations, including fully automatic high shelf warehouses, ready to be cut, processed and delivered every day.

A total of six facilities in Switzerland, Austria and Slovakia employ around 260 employees responsible for production of customized components. Small locksmiths, steel construction builders, large manufacturing plants, all depend on the stürmsfs AG’s high-quality products and their on-time delivery ensured by their own truck fleet. “It is the diversity that makes our company so important that we are considered the most established steel and metal dealer in Switzerland. We are competent in many areas like machining and thermal cutting. We are also known for a high degree of automation. We function as a detached workbench of the customer.” Marcel Meier, Head of Procurement & Corporate Development, explains.

Large orders on a short notice

Automation of the whole production cycle – from placing of the order and manufacturing to delivery – is one of the company’s many strengths. Just to give an example, the major customers have individual access to stürmsfs´ system in order to achieve fastest results possible. “We are absolutely flexible in production,” says Meier who sees the increasing number of short-term orders as the major challenge for the entire job cutting industry. “You know what is going to be cut this week but often you have no idea what the week after that will be like. The contractor has to be prepared to cut large orders on a short notice.” Automated processes and increased digitalization of production should be a big help in this regard. The core of the company’s success is still the “know-how” of its employees coupled with the machinery which leaves room for flexibility that in turn enables the necessary speed while maintaining required quality.

Wanted: Technologically advanced plasma cutting system with bevel cutting and drilling

As a part of a large-scale production optimization project, the company decided to build a new hall for thermal cutting. Their now five-year-old plasma cutting machine was to be supplemented with a second one in order not to affect the current plasma cutting orders. After an extensive analysis of the market as well as the technical possibilities and considering their particular needs, stürmsfs finally decided in favor of a plasma cutting machine MG from MicroStep. “We were convinced by the whole package. From the start we had an impression that the bevel head we are getting is state-of-the-art.” says Marcel Meier looking back at the purchase decision at the end of 2016. In addition, performance of the drilling unit has also proven to be most convincing. “This is where MicroStep is far ahead compared to other CNC machine producers.”

Since July 2017 the machine has been in use for two shifts per day and when it is necessary, a third, night, shift is added. The job shop has bought a plasma cutting system enabling both 2D and 3D plasma cutting, drilling, tapping and countersinking.

“The machine is two to three times as productive as its predecessor.”

Since July 2017 the machine has been in use for two shifts per day and when it is necessary, a third, night, shift is added. The job shop has bought a plasma cutting system enabling both 2D and 3D plasma cutting, drilling, tapping and countersinking. The working area of 21 x 3,5 m, divided into two cutting zones, allows processing of large-format plates in parallel operations – while in one zone the material is being cut, the other one is safe for unloading of cut parts and loading of new material. The job shop is usually cutting plates between 5 and 35 mm thick. Both the drilling spindle and the plasma rotator with infinite rotation are being used quite often. The decision has proven to be the right one also for the plate production manager Markus Egger: “We are very satisfied with the machine. Especially when it comes to drilling, it is two to three times more productive than its predecessor. We have a great advantage, we are able to cut threads, we are able to countersink. Both accuracy and quality of bevels are very high.”

Switching to MicroStep technology worked “very well”

The switch to MicroStep was accompanied by the change to the SigmaNEST CAD/CAM software made by an American nesting specialist. Marcel Meier is satisfied: “We have taken some risks because we had to change both the machine and the nesting software provider at the same time. And the whole change with MicroStep worked out very well,” says the head of Projects and Corporate Development who played a major role in the investment decisions.

This project has left behind many happy faces among the responsible people from stürmsfs AG. “The system is very productive and reliable – it has met all our expectations,” says Marcel Meier. “Our operators appreciate that they can actively influence the cutting result.”

Markus Egger
Head of Sheet Metal Division
stürmsfs AG

stürmsfs

“We are very satisfied with the machine! The accuracy and also the bevels are of a very high quality.“

stürmsfs
Video presentation:

www.microstep.eu/video

A good experience

Metallbau Striegel have decided for a waterjet-plasma cutting combination with a pipe processing option

Maschinen- und Metallbau Striegel GmbH from southern Germany supplies its customers from many different industries with a wide variety of products. In order to fulfill all the orders on time, the managing director Joachim Striegel has decided to invest into a combined CNC waterjet-plasma cutting machine from MicroStep.

Kenzingen, 30 kilometers north of Freiburg is often called “Pearl in Breisgau“. More than 10,000 inhabitants and many visitors like to stroll through its historic old town and it is also the place where employees of Maschinen- und Metallbau Striegel GmbH go about their work with great passion and skill. In 1991, Joachim Striegel founded the company because he always wanted to stand on his own feet as he revealed during the interview. Striegel’s customers appreciate the results of cutting and joining steel and stainless steel as well as their production of complete assemblies. “If someone needs quick help, then they come to us,” says Managing Director and founder Joachim Striegel.

The requirements are as diverse as the customers: pharmaceutical industry, food and beverage industry, tunnel technology or heavy engineering. The expectations Joachim Striegel and his team have to meet are very high. The company has corresponding demands on its machines. About ten years ago they started to use waterjet cutting.

Later on, Striegel invested into a plasma cutting machine from MicroStep. However, over time, the solution with two cutting machines utilizing different technologies

proved to be no longer adequate because operation and loading took too much time and limited the production. And so, Striegel considered several offers for new equipment and eventually decided to invest into a combined CNC waterjet-plasma cutting machine from MicroStep. “I made that decision because I had good experience with MicroStep.”

The AquaCut 6001.30WWrkP from MicroStep is equipped with a waterjet rotator for cutting bevels up to 45°, a second straight waterjet head and a plasma cutting head for underwater cutting. It also has a pipe cutting channel. With a large work area of 6,000 x 3,000 mm the machine can bevel cut and mark plates and pipes of various sizes.

The machine runs seven days a week from 7 am to 11 pm. Mr. Striegel is satisfied: “The new machine is exactly like I imagined it.”

Waterjet
Video presentation:

www.microstep.eu/video

Partnership with mountain conquerors expanded

Cutting with CNC machines, welding with robots: this is only possible with the highest precision in bevel cutting and, according to Doppelmayr, that is a unique feature of MicroStep

The Doppelmayr/Garaventa Group climbs to the highest and most remote corners of the earth, transporting skiers, vacationers or daily commuters. For 17 years, the market leaders in cable car construction and MicroStep have maintained a close partnership. In the hunt for steady improvements, their reliable production line has been recently completely renewed. Thus, Doppelmayr increased its flexibility in cutting, its precision and the production speed.

A turquoise shimmering sea, glittering sandy beaches, palm-covered islands - the sight that Vietnam vacationers have been enjoying for a few months on a ride on the longest cable way in the world is peerless. 7,899.9 meters connect the two holiday islands Phú Quốc and Hòn Thơm in the south of the country and, at the highest point, the cable car takes visitors to 164 meters. This is just one example of Doppelmayr/Garaventa Group's projects. The company's history is characterized by innovations, records and superlatives. Adjectives such as "longest", "greatest", "highest" and more adorn the headlines of richly illustrated articles in newspapers and magazines. Cable ways open up remote corners of the globe at lofty heights and connect people with cities and nature through innovative transport solutions. In 95 countries on six continents, several thousand cable car installations are in use every day. It is no coincidence that the company has been the market and technology leader for more than half a century. "Foresight, trend recognition, innovation. These are the strengths that Doppelmayr's customers can rely on. We have been working together well with many of them for decades. This enables us to set milestones again and again," says Walter Eberle, explaining the strengths of the group. He works as a deputy production manager in production planning at Doppelmayr's headquarters in Austrian Wolfurt on Bodensee Lake.

Exciting projects can only be implemented with modern technologies

There are always new and exciting projects on Eberle's desk. The market demands ever shorter delivery times for increasingly individualized solutions. "As a market and technology leader, it is of course our goal to always maintain the highest technological level. To achieve this, it is necessary to keep relying on new technologies in production," says Mr. Eberle.
The Doppelmayr/Garaventa group has experienced another such success in the recent past. During the last two years, their entire cutting department has been fundamentally modernized. The global group relied on MicroStep's solutions – as has been the case for more than 15 years now. At the turn of the millennium, Doppelmayr was looking for a suitable job cutting provider but was unable to find one that could make the up to 5,000 parts they needed daily. "So, we had to search for a supplier of cutting equipment and, fortunately, ended up at MicroStep," Mr. Eberle looks back. The decision was easy to make: Doppelmayr wanted a single supplier for software, controls, drilling and cutting machines. MicroStep was the only company to offer such complete solution. And so, the 60-meter-long production line did almost two decades of good work – until came the time to modernize it. The main requirement was to increase the precision of bevel cutting so that no problems would occur during subsequent automated robot welding. In addition, the new purchases should provide more flexibility, productivity and efficiency. "Our cutting process needs to be very accurate because we then weld about two thirds of the components with robots. That's why we need a tolerance of maximum ±0.5 mm here. This is a very, very high requirement for this thermal process," emphasizes Walter Eberle.

For the company Doppelmayr MicroStep installed a powerful drilling machine of the DRM series 1 and two plasma and oxyfuel cutting machines of the MG series with two gantries 2 + 3 each. The two MG machines are each equipped with a CCD camera 4 for maximum precision when cutting pre-drilled parts.

Leading technology, good experience and service proximity all speak for MicroStep

With that in mind, the decision-making group of Mr. Eberle and other production managers searched extensively on the market, visited trade fairs and took a close look at technology demonstrations. In the end, the decision fell again on the world's market leader in automated plasma cutting. "There were several criteria that were crucial. We have had good experience together for fifteen years, the service proximity of MicroStep in Bad Wörishofen was also an advantage and in terms of bevel cutting quality, MicroStep has a unique selling point when it comes to complying with the required tolerances."

In mid-2016, the production line was gradually renewed. Implemented were: a drilling unit with a gantry and automatic tool changer 1 and two cutting machines with a total of four gantries. Three cutting gantries 2 + 3 are each equipped with a plasma rotator, a 2D plasma cutting head and two oxyfuel cutting heads. The fourth cutting gantry has four cutting heads for parallel oxyfuel cutting 5. "It worked the way it was supposed to from day one," says Mr. Eberle. The three identical cutting gantries bring more flexibility. Doppelmayr has cut about 13,000 tons of sheet metal every year in the recent past. According to Mr. Eberles's estimate, 18,000 tonnes in a three-shift operation are now possible. "We will cut more in the future. When we build more products, we need the capacity in order to cover the ever increasing number of production peaks. This is the first step in production and we must not fall behind. So we still have a good reserve for the future," says Mr. Eberle.

Special solution saves manipulation time and increases precision

Each of the two cutting machines was also equipped with a CCD camera 4. This determines the exact position of holes already drilled into the plate, on which the nested cutting plan is then automatically aligned. As a result, the material can be precisely cut in exactly the correct relation to the already drilled holes. "Because all of these technologies are available to us on one production line, we save on a lot of time-consuming material handling that is without added value," explains Mr. Eberle.

The entire production line has been completed by commissioning of the last machine in December 2017. Ever since, it has been running in a multi-shift operation from day one. It was a worthwhile step for Doppelmayr/Garaventa Group. Walter Eberle is convinced of this – after more than 15 years of cooperation. "It distinguishes the company, shows that it seeks progress and does not rest on the deserved success and continues to look for what can be improved."

Walter Eberle
Production Planning
Doppelmayr Seilbahnen GmbH

"We have had a good experience together for fifteen years. When it comes to bevel cutting quality, MicroStep has a unique selling point in complying with the tolerances required for robot welding."

One of the four cutting gantries at Doppelmayr is equipped with four oxyfuel cutting heads for cutting of big material thicknesses. The more than 60-meter-long production line runs in three shifts at the headquarters of the company in Wolfurt (Austria) near the Bodensee Lake.

Doppelmayr
Video presentation:

www.microstep.eu/video

Beveling and drilling are crucial

The job shop Prinzing invested into a plasma and oxyfuel combination with a handful of complementary technologies

The combined plasma and oxyfuel cutting solution at MAP Prinzing Brennschneidtechnik GmbH enables bevel cutting with plasma, 2D oxyfuel cutting, drilling, tapping and marking on two gantries. At the request of the company, a tool magazine for 16 tools was added.

In order to renew its machine park and to become faster and more flexible in production, the Baden-Württemberg based company MAP Prinzing Brennschneidtechnik GmbH was looking for new cutting machinery. The job cutting business found their solution at MicroStep – and invested into a complex CombiCut machine. This multi-functional system enables bevel cutting with plasma, 2D oxyfuel cutting, drilling, tapping, countersinking and marking with a powerful combination of two gantries.

About 50 kilometers east of Stuttgart in Germany lies the Baden-Württemberg municipality of Gingen an der Fils. Here, a modern job cutting company is operating their production facility. Small-sized locksmiths as well as large steel construction companies rely on the products of MAP Prinzing Brennschneidtechnik GmbH. Thanks to decades of experience, the contractor produces parts from small batches of 1 up to 500 pieces. All this with innovative machines that make Prinzing Brennschneidtechnik ready to handle even the most urgent orders. These are usually handled with a two-shift operation and, if necessary, a third shift may be added on short notice.

The most common tasks for this sheet metal service include production of custom parts using plasma and oxyfuel cutting technologies. On average, 300 tons of raw material are processed every month. Prinzing Brennschneidtechnik has recently invested into a multi-functional cutting system which offers a multitude of processing options. After an extensive search for the right cutting solution, Hans Prinzing's management has decided to purchase a combined plasma and oxyfuel machine with supplemental drilling technology. "We looked at the entire market and also attended several technology demonstrations. All the technology combinations were known beforehand. The decisive factor for MicroStep was the bevel cutting equipment and the drilling unit. The drill was the most powerful among all competitors," Hans Prinzing looks back.

And so, in order to achieve maximum flexibility in production, the company Prinzing opted for a special solution which integrates two gantries in one cutting machine over a table sized 24,000 x 3,000 mm. The first gantry is equipped with a plasma rotator for bevel cutting and two straight oxyfuel cutting heads for parallel cutting of thicker materials. The drilling spindle enables drilling of holes up to 40 mm in diameter and tapping up to M33. At the request of the company, a fully automatic tool magazine for 16 tools has been added to facilitate the wide range of jobs to be done on the machine.

The second gantry also contains a drilling unit for drilling up to 40 mm, tapping up to M33 and countersinking. In addition, there are another three 2D oxyfuel cutting heads and a punch marker. "There were no problems with the commissioning even though our existing table was integrated together with our suction system. We are satisfied with the performance, the drilling works great," concludes Mr. Prinzing.

Hans Prinzing
Managing Director
Prinzing Brennschneidtechnik GmbH & Co. KG

MAP Prinzing Brennschneidtechnik GmbH

"The decisive factor for MicroStep was the bevel cutting head and the drilling unit. MicroStep's drill was the most powerful among all competitors. We are satisfied with the performance."

Additional beveling with oxyfuel

The leading Spanish earthmoving equipment manufacturer Solintal "turns projects into reality"

Over 50 years ago, a small repair business called Talleres Alcobendas has been founded, specializing in mouldboards, tiltrotators and other agricultural tools. Over time, the workshop continued to grow and became Solintal, a leading company in design, manufacture and supply of comprehensive solutions and tools for earthmoving and mining machinery as well as other industrial equipment. Recently, the company has invested in cutting-edge technology from MicroStep.

Today, Solintal is known for its high degree of specialization, excellent quality of its products and recognized aftersales services. With facilities covering over 16 000 m2, the company has in recent years become known for being a modern business with a philosophy based on innovation, constant improvement of services and personal approach towards its customers.
Over the past few years the company has undergone a series of changes with the management starting a process of overall modernization of the company. Although the manufacturing side was less affected by abrupt changes since the production means and equipment were being continuously upgraded, the recent need for enhancement of manufacturing capabilities resulted in a purchase of two machines from MicroStep: a plasma bevel cutting machine MasterCut with a work area of 12,000 x 3,000 mm with a 300 A plasma source Hypertherm XPR300™ and an oxyfuel bevel cutting machine CombiCut.
Being a renowned innovator with more than 18 years of experience in development of bevel cutting equipment, MicroStep emerges as a supplier of choice for many when talking about bevel cutting. Since the introduction of its first rotary plasma bevel heads in the early 2000s, customer-driven research and subsequent improvements of this technology led to a continuous increase in sales of MicroStep's beveling tool stations. That, in turn, brought the company invaluable experience with long-term maintenance of these systems and related issues. The knowledge obtained thanks to ever-growing demands of its customers resulted in numerous enhancements of not only the mechanical design of bevel heads; it also contributed to overall stabilization of the bevel cutting process.

The approach of overcoming drawbacks and limitations systematically resulted in solutions that are universal, applicable to various cutting technologies and to various bevel head designs. Beveling with plasma has been gradually supplemented by other technologies – waterjet, oxyfuel and laser. Besides standard types of bevel heads, MicroStep has also been working on development of special rotary heads with pantographic arms for cutting of 3D shapes such as pipes, profiles, domes and beams as well as on a simpler design – the Plasma bevel head – that was delivered with Solintal's MasterCut. Apart from development of the heads' mechanical design, great focus was also put on developing methods for compensation of physical limitations of cutting technologies and processes to ensure higher accuracy, enhance functionality and maintain long-term stability. The results are advanced techniques such as Auto-calibration of Tool Geometry (ACTG®) for fast and easy calibration of geometry of the bevel tool, Adaptive Bevel Compensation (ABC) for adjustment of bevel angles on cut parts or Self-teaching Height Control (STHC) for control of cutting height based on arc voltage for variable bevels with plasma. Another great technology is ABP – Additional Beveling Process for cutting bevels on already cut parts.

In 2018 MicroStep has launched the next generation of infinite rotator with several enhancements – one that is especially attractive is the increase of the maximum tilt angle to 65°. The latest innovation is integration of an oxyfuel torch into the rotator – a technology that exposes a whole new application area.

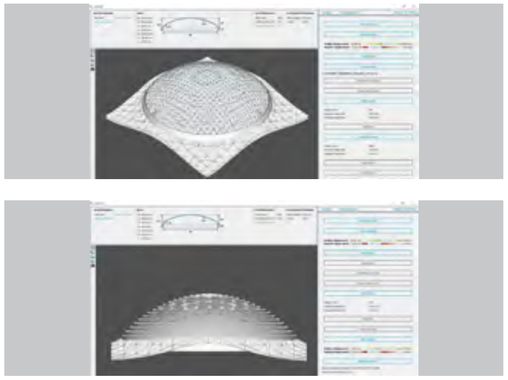
Additional beveling with oxyfuel – just 45 minutes instead of 6 hours for a part to be finished

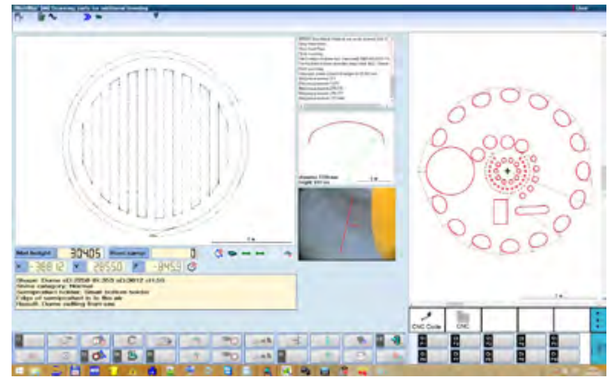
Solintal was initially looking for a double- or triple-torch solution. For their jobs, e.g. 45° Y-bevels on parts 160 mm thick, oxyfuel was naturally the technology of choice. However, the geometry of a triple torch – especially the tangential offset between torches – imposes limitations on possibilities to cut different contour shapes. Distorted inner bevels and a rather significant waste of material when beveling thick materials are the most obvious drawbacks. At the time, MicroStep had the technology of the oxyfuel rotator almost developed, and presented it to the customer. The proposal was accepted.
Apart from the possibility to cut direct bevels with oxyfuel in a broad thickness range, the biggest innovation is the use of ABP. A laser scanner scans the shape of a part which was previously cut with a straight oxyfuel head and moved to a free place on the cutting table. Based on the part's real shape and exact location, MicroStep's ABP offers the possibility to add bevels to the contours. Besides excellent cut quality, smooth surface and accurate contours, this technique saves a great amount of material. Furthermore, the movement capabilities of a rotator enable cutting of a great variety of contour shapes – as a consequence, for parts that previously took 6 hours to finish, Solintal now need just 45 minutes. Another great advantage that ensures high output accuracy is the possibility of auto-calibration of the oxyfuel rotator in exactly the same way as plasma or laser – with MicroStep's ACTG® technology.

For the jobs at Solintal (e.g. 45° Y-bevels on parts 160 mm thick) oxyfuel was naturally the technology of choice. The movement capabilities of rotator allow to cut a great variety of contour shapes. A high output accuracy is ensured by the possibility of auto-calibration of the oxyfuel rotator – thanks to MicroStep's patented ACTG® technology.

Dome cutting expert

mScan: Unique technology sets standards in high-precision processing of dished ends for less rework





Thanks to the mScan technology, the 3D scan of a dome enables to determine production-related deviations from the ideal contour that then could be compensated for accordingly during cutting.

Production of pressure vessels and boilers counts among the major industrial applications where cutting of 3D objects comprises an essential part of the production process. The obvious requirement is to make this process fast, simple to setup and, most importantly, with an accurate result that won´t need further mechanical or even manual processing. Typical cutting tasks in this regard are cutting of openings in a dished end of a vessel for welding of inlet pipes, slicing of a dished end or trimming of the edges of a dished end with preparation for its welding to the vessel body. The cross-sections of the cut edges must meet the requirements of the subsequent welding process – in other words, depending on the wall thickness of the cut object, the V-, X- or K-cuts with constant or variable bevels need to be produced with the prescribed accuracy, possibly in a fully automatic process.

For such tasks MicroStep has developed a special beveling tool station that enables tilting of tool up to 120° while having a big enough stroke to reach across the whole dome surface. Furthermore, MicroStep has newly introduced an advanced 3D laser scanning process and a corresponding point cloud mapping software – mScan – that enables a CNC cutting machine to measure the true shape of a 3D object, e.g. a dome, and use this measurement for adjustment of the subsequent cutting process so that contours and openings are cut in the needed positions on the surface with a very high precision – compliant with the production requirement.

Needless to say, implementation of such 3D scanning technology greatly contributes to increasing of the accuracy of the dome cutting process, as the real dimension of a dome can lay within – at least – allowed tolerances which in fact means that the real and ideal shapes of domes sometimes differ by several centimeters. Conventional methods of positioning corrections via control of plasma arc voltage are thus not applicable in case of 3D cutting. Implementation of a scanner on the other hand makes it possible to create a model of the actual dome surface within the coordinate system of the cutting machine and to subsequently use this model to analyze the shape of the dome, identify its center and define the exact toolpath above the surface. How does it work?

During the scanning process, the iMSNC control system receives data from the scanner and pairs it with positions of all motion axes of the machine in each moment. The measured positions are further adjusted by applying displacement corrections of particular axes positions (based on the exact measurement of machine kinematics by a laser interferometer) as well as the calibration data of the bevel head and 3D scanner itself (obtained via MicroStep´s patented auto-calibration technology ACTG).

Alexander Varga, Ph.D.
Head of R&D
MicroStep

"With mScan technology, we can achieve unprecedented precision in dome cutting."

High quality results and big time savings by processing domes with many openings and welding preparations.

As a result, the control system has information about the exact position of the scanned object with respect to the cutting tool and thus enables exact scanning of this object within the coordinate system of the particular cutting machine. The scanner then uses mScan to create a detailed surface representation (3D model) of the object from point cloud while fully describing its parameters including its deviations from ideal shape.

MicroStep´s 3D CAM software mCAM is then used to map the generated cutting path (meaning the ideal cutting path created for the ideal shape of the object based on its STEP model) onto the real scanned object. Subsequently, a new cutting plan is generated to fit exactly the true shape of the scanned object. All the described automatic processes are conveniently displayed for the operator in the form of 3D visualizations on the control system screen. Depending on the dome size, this whole process, which is carried out prior to the actual cutting, takes from 2 to 10 minutes.

Of course, there are cases where it isn´t necessary to perform the whole process and thus the time is significantly decreased. In case the customer needs to measure just the dimensions of dome, it is enough to scan a "cross" projected over the top of dome – this way, also the exact position of the dome top is determined, which may be important for the next production steps. The top of dome can be marked with a marking head or directly with a plasma torch, depending on the particular configuration of the machine. Also, if the cutting plan involves just a part of the dome surface, e.g. the spherical top part that is usually quite flat, it is not necessary to scan the whole dome extensively. In case of cutting into the more flat top part the height control during cutting can be based on plasma arc voltage which is a standard function of any MicroStep plasma cutting machine.

All processes and 3D scanning functions are handled by the machine operator or easily accessed via a company network. Additionally, mScan provides an analysis of shape geometry – a comparison of the true and ideal shapes of the scanned object which in itself is a powerful tool for verification of production output in production of 3D objects, e.g. domes.
Thanks to the modular structure of MicroStep machines in terms of machine dimensions, types and locations of cutting zones and configurations of tool stations, a particular machine can be designed according to exact requirements of a customer´s production. A single gantry with a bevel tool station, 3D scanner and marker can be used for cutting of domes as well as flat sheets – an example is the DRM machine for Slawinski GmbH in Germany with a flat-bed cutting of sheets on the area of 14 x 6 m and dome cutting in the range of Ø 500 – 5,500 mm with a dome height up to 1,200 mm (for further information please have a look to page 21).

Maximum precision in dome cutting is made possible by MicroStep's mScan technology. In the process, a laser scanner integrated into the portal determines the 3D surface geometry of the workpiece in advance.

EXTRA: MicroStep mCAM – CAM solution for cutting of 3D parts

Modern industrial factories, which greatly focus on efficiency, automation and computerization of production processes, have been increasingly relying on CAD design software, which allows 3D modelling of parts and construction assemblies. The option of easy and comfortable 3D modelling has naturally also brought requests for CNC machines programming based on these models – 3D CAM software.

MicroStep has been designing and producing complex cutting solutions for almost three decades. In addition to development of machines and their control systems, the company has also been focusing on development of its own software tools for creation of cutting plans: the CAM software package AsperWin® for cutting of plates, which included also parametric libraries for creation of cutting plans for 3D shapes – pipes, profiles, domes and pipe elbows. Years of experience with 3D cutting of various materials resulted in development of another tool – a 3D CAM software launched under the name mCAM.

mCAM is designed for advanced 3D production with plasma, oxyfuel, waterjet and laser technologies. The program can process 3D models created by common CAD software and offers automatic nesting of parts and automatic generation of CNC programs including visualizations and simulations. A straightforward user interface enables easy, efficient and accurate processing of parts, as well as easy implementation of special technological operations (e.g. marking of text or contours, or drilling). The entire cutting process can be conveniently simulated in 3D, which allows the operator to check details of cutting paths, positioning of pipe supports and to monitor the overall motion control on the contour – its speed, dynamic change of the kerf width and machine movements in particular axes.

mCAM has been developed for easy generation of CNC programs for all types of cutting machines, with multiple options for cutting automation. The program uses boundary representation models in order to recognize 3D models and is able to process 2D and 3D formats commonly used in industrial production:

- 3D CAD models – in STEP, IGES, DSTV, XML and IFC
- 2D shapes wrapped around/projected on parametrized solid
- Models created directly in mCAM using an integrated modeler
- existing CNC code (generated out of MicroStep's SolidSel/PipeSel libraries)

The software enables import of 3D assemblies where each assembly element is recognized as a separate part. Afterwards the parts are sorted according to their shapes, sizes and materials. The entire cutting plan preparation, from loading of the parts to adjustments and nesting consist only of a few easy steps.

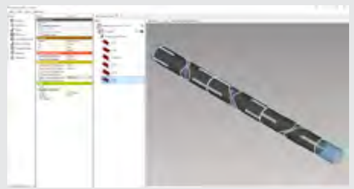
mCAM uses in-depth shape analysis for correct recognition of complex cuts and weld preparations (V-, Y-, X-, K-cuts) that simplifies the subsequent work with parameters and properties of cutting paths, contours and individual parts. Complex features and functionalities (such as automatic detection of cutting paths, dynamic 3D compensation of kerf width according to the used tool, insertion of micro-joints, different lead-in and lead-out shapes and 2D/3D cutting simulation), combined with an intuitive graphical interface, make this program highly efficient and well organized.

A variety of supported part shapes

Shape recognition is based on detection of 3D surface geometry according to known geometrical parameters and properties of various supported shapes. The latest version supports detection of these 3D shapes: flat plates, circular pipes and segments, hollow sections, elliptical, torispherical and semi-elliptical domes, cones, arched, dished, flat and inverted domes, sphere-caps, extruded and bent U- and L-beams and H- and I-beams with parallel and non-parallel flanges.

Simulation and graphical visualization of CNC programs

The software's main output is a CNC code – a cutting program for a MicroStep cutting machine or, with the help of a post-processor, even for third-party machines. The basic CNC code is standardized to DIN/ISO 66025 while also containing special control instructions for various types of rotators and automation tools. mCAM also contains a cutting simulator which enables visual inspection of the generated CNC programs. The simulator can display progress curves of machine and tool movements in great detail, speed and performance controls and dynamic kerf compensation. It shows the workpiece that was defined before the program generation, the cutting tool, all cutting paths and detection points on the surface as well as useful charts, which can help reveal possible unwanted movements.



Processing time greatly reduced

Brewing equipment specialists GEA accelerate their production with a combined plate and dome cutting machine

When it comes to the products of GEA Production Kitzingen GmbH, the highest possible precision is a fundamental requirement. That is what the customers expect of the containers and equipment of the major food processing industry supplier. High quality production requires experience, precise work and modern machine solutions. Based on advice from MicroStep, the professionals decided to procure a plasma cutting machine of the MG series for 3D processing of sheets and domes. The Head of Production in Kitzingen, Eduard Sauter, considers this "a huge benefit. I recommend MicroStep at our other sites that have a similar portfolio."

The containers and appliances that GEA Production Kitzingen builds for their customers are real giants, manufactured with the highest precision and cutting-edge technology. The products they make for the processing industry can be up to 70 tons heavy, up to 13 meters in diameter and 17 meters in length. Very high standards on surface roughness as well as high accuracies and tight tolerances are required so that the custom-made products may be installed and used as intended.

The international GEA Group is one of the largest providers of equipment for the food processing industry. Kitzingen produces containers and equipment for food, pharmaceutical and chemical industries. "We make possible what the customer wants," says Eduard Sauter.

Accurate advice from MicroStep following a rigorous analysis of the production and portfolio

These customers are always demanding faster and faster delivery times by maintaining the same quality standards. In order to achieve this, the GEA Group is always on the lookout for new technology that offers process reliability and, if possible, has some added value in terms of quality and production speed. For these reasons, 2015 was the time to replace their plasma cutting machine. Mr. Sauter preferred a laser cutting machine but also gave plasma technology another chance. MicroStep took a close look at their production times and the production itself. "We had the MicroStep specialists visit the production and evaluate which technology would bring the most benefits."

And so, the decision was made to go with the all-rounder of the MG series supporting 3D cutting of plates and domes. A comparable laser solution wasn't available on the market and the advantages of MicroStep's plasma rotator and the ability to trim bottoms of domes with bevels were the main decision factors. The plasma technology fits perfectly with the requirements. GEA produces small series of products and mainly cuts materials with thicknesses between 3 and 15 mm but in exceptional cases has to cut through 90 mm.

The machine has been operating in production since June 2017. It processes plates on a working area 12,000 x 3,500 mm large and domes up to 3,500 mm in diameter. The experience the company's specialist has had so far is positive: "The way the machine works gives me an impression that it is rock solid. I recommend MicroStep at our other GEA facilities which have similar product portfolio."

Above all stands out the innovative mScan software from MictoStep designed for processing of domes and other 3D objects. Now, the company with seat in Franconia, Germany has no problem to keep up with the required tolerances. Additionally, a lot of the hard, manual work that had to be done by people before, such as cutting of the dome bottoms, welding edge preparation etc., is now done by the machine.

GEA Production Kitzingen opted for a multi-functional MG machine that allows to process metal sheets as well as dished ends.

The typical processing time for a complex container bottom with many connection parts (as an example see photo above) was about one and a half weeks – today, if required, GEA can produce within one day.

Eduard Sauter
Head of Production
GEA Production Kitzingen GmbH

"The machine is a great benefit. I recommend MicroStep at our other GEA facilities which have a similar product portfolio."

Substantial time saving

The Hungarian pressure vessels manufacturer Faddikorr benefits from state-of-the-art dome cutting process

Faddikorr opted for two CNC cutting machines from MicroStep: fiber laser machine MSF with a straight tool station, with work area 6,000 x 2,000 mm (**below**), and a sturdy 3D plasma cutter DRM equipped with a pantographic plasma rotator capable of tilting up to 120° designed solely for cutting of domes up to Ø 3,500 mm (**on top**).

Located in the far south of Hungary, Faddikorr has been manufacturing top quality stainless steel tanks, pressure vessels and other equipment for food industry for more than 20 years now. In the beginning, there were only 4 people, but today "The Faddi Family" consists of more than 90 highly qualified and committed employees. What gives Faddikorr the edge over its competitors is the ability to meet all the special requirements of their clients while still attaining the highest quality possible.

When it comes to pressure vessels, the most difficult and tedious task has always been tank ends and their machining. Cutting all the required openings into a tank end used to take a very long time, between half and one and a half day depending on the number and sizes of holes necessary for the specific pressure vessel. The purchase of a CNC plasma cutting machine from MicroStep has been a radical change in this matter. Cutting, which used to take a few skilled workers a day, now takes one hour and all the work can be done by a single machine operator. This was the main reason for purchase of the plasma dome cutting machine according to the owner of Faddikorr, Mr. János Faddi: "We decided to buy the machine in order to reduce the cost of human labor. The drawing and cutting of a tank end used to take sometimes more than a day. Thanks to the new machine, this time has been significantly reduced."

With high quality in mind, Faddikorr opted for two CNC cutters from MicroStep: a fiber laser machine MSF with a straight tool station with a work area of 6,000 x 2,000 mm, and a sturdy 3D plasma cutter DRM equipped with a pantographic plasma rotator capable of tilting up to 120° and with a Z-axis stroke of 1,500 mm, designed solely for cutting of domes up to Ø 3,500 mm. The integrated 3D scanner scans the dome's surface to adjust the cutting program according to real dome dimensions.

In other words, local deformations of dome surface or an incorrectly placed, tilted dome are no longer a problem. Advanced cutting requirements such as various welding preparations – V-, A-, Y-, X- or K-cuts –are easy to handle thanks to the machine's flexibility, its user-friendly interface and the easy way of working with 3D solid models in MicroStep's 3D CAM software mCAM. For simpler tasks, like pipe-dome intersections, the machine also offers simple macros with functionalities like welding preparation generation or marking generation. The accuracy and long-term stability of 3D cutting is achieved thanks to MicroStep's ACTG® system (Auto-calibration of tool geometry), which is able to calibrate the entire system within 5 minutes, making the former man-assisted, hours-long, manual geometry setup process basically obsolete.

"We produce our own conical tank ends out of sheet metal. The best way to cut openings in these is to do it before the sheets are bent into the cone shape. However, many times we do not know where the holes are going to be until the very last moment. Our MicroStep DRM dome cutting machine gives us the option to cut the openings into already formed tank ends, making our work much easier."

János Faddi
Owner, General Manager
Faddikorr Kft

"The DRM plasma cutter from MicroStep gives us the option to cut openings into already formed tank ends, making our work much easier."

New system replaces two machines

Domes from Slawinski are in demand all over Europe – the company uses MicroStep's technology to cut them

When designing the plasma cutting machine, the focus was on the precise and flexible processing of domes. A special dome cutting table supports domes from 500 mm up to 5,500 mm in diameter.

The laser scanner can reach the entire dome surface. The measured data are compared with the ideal dimensions on which the cutting plan is based and deviations are automatically compensated for during the cutting process.

The pantograph plasma rotator with a tilt up to 120° enables weld edge preparation also on the bottom edge of a dome.

As a specialist for container bottoms and specialized pressure-vessel parts, Slawinski & Co. GmbH has been providing tailor-made solutions for a wide variety of customers for more than 100 years. The products of the family-owned company are used by small enterprises and global corporations alike. Slawinski relies on state-of-the-art machine solutions. The company counts on a MicroStep plasma cutting machine with an extraordinary configuration for 2D and 3D cutting to process their plates and domes.

Flexibility, innovation and the highest standards are in demand when customers ask for solutions from Slawinski & Co. GmbH from Siegen in the north west of Germany. The tailor-made container bottoms and specialized pressure-vessel parts are known to manufacturers of pressure vessels and containers throughout Europe and beyond because of their quality. The fourth generation of the approximately 130 employees use their experience and state-of-the-art technology to create customized products. The range of end products is large, each one a unique piece. Circles are cut out of metal plates and, after dishing, flanging, spinning, edge- and surface-processing, turned into container heads and bottoms, arched floors and much more. "We supply important components for construction of pressure vessels for power plants, tanks for chemical industry and high-pressure containers. There, the quality has to fit exactly," explains technical director Rainer Jurreit.

Demand for openings in domes could not be met to satisfaction

Despite the high quality of production, company's specialists were looking for new and better ways of meeting the transforming demands of customers. "Demands for openings in domes have been growing and we have not been able to satisfy it," says managing director Konstantin Slawinski. "We've been searching for 10 years, looking at many manufacturers and technologies, including robots. However, due to the dimensions of the domes, they could not meet our vision," says Konstantin Slawinski. After all, the company produces domes with diameters of up to 5,400 mm.

At EuroBlech 2014 in Hanover, the company came across MicroStep. "There, we were looking for a machine for dome cutting, we wanted to cut radial holes. With our machine, we could not cut what we envisioned. That's when we noticed MicroStep, which we did not even know before," says Alexander Fries, Head of Production Planning responsible for preliminary selection of technology. Managing Director Konstantin Slawinski adds: "We have seen that it works. For the first time in our ten-year search we had a feeling that there is someone who wants to sell something they actually master."

MicroStep has developed an innovative system for flexible and precise processing of metal plates and domes with exceptional dimensions. The DRM series, a multi-functional plasma cutting machine for the toughest jobs, has been expanded to include custom technologies for the container bottom specialist. A special dome cutting table can process domes from 500 mm to 5,500 mm in diameter The pantograph plasma rotator, with a tilt up to 120°, enables weld edge preparation also on the bottom edge of a dome. Plate cutting is possible with the same gantry on a work area of 14,000 x 6,000 mm, replacing the original plate cutting machine.

New standard for precision of contours and bevels on domes

A brand new feature on the Slawinski machine was the mScan technology for measuring of the true surface shape of a particular dome. Following a 3D laser scanning process to scan the dome entirely, advanced algorithms are used to adjust the movement of cutting tool according to the real shape of a dome and compensate so for the measured deviations from its ideal shape. "Based on our ABP technology, we developed the mScan technology specifically for dome processing and our engineers and programmers adapted it to the needs of Slawinski. This technology sets new standards for precision of contours and bevels cut on domes," says MicroStep's co-founder and Head of Research & Development Alexander Varga, Ph.D.

Konstantin Slawinski is very satisfied with the solution: "Cutting of both plates and domes is the optimal solution for our limited space. This system replaces two machines."

Konstantin Slawinski
Managing Director
Slawinski & Co. GmbH

"For the first time in our ten-year search, we had a feeling that there is someone who wants to sell something they actually master."

3D solutions for steel constructions

Versatile options for beam and pipe processing: Automatic cutting machines for structural steel jobs

The calibration system ACTG® enables durable high-precision results – also with the pantograph. This specialized 3D cutting head with tilting ability of 120° moves around the profile both in the longitudinal and transverse directions.

Apart from standard flat-bed machines, MicroStep offers an exceptional variety of equipment for processing of 3D rotary objects and structural steel sections of various shapes. The rotary objects include differently sized circular, square and rectangular hollow sections (diameters of circular sections reach from Ø 30 mm up to Ø 2,000 mm), conical pipes, torispherical or elliptical domes and elbows.

Standard configuration of a MicroStep machine in sheet and pipe cutting execution consists of a cutting table for sheets and an extracted channel for pipe positioning that is placed along the longitudinal side of table.

Pipes are clamped in a rotary pipe cutting device located at one end of the channel. The cutting process involves a combination of movements: the gantry with tool stations – straight or bevel – and the pipe cutting device are synchronized for a precise positioning of the pipe towards the cutting tool. In addition, special adapters for clamping of polygonal profiles or elbows can be attached to pipe cutting device. For cutting of domes, a dome cutting area can be located behind or in front of the cutting table. A single cutting tool is used to process all different shapes of material.

For applications in the structural steel industry MicroStep developed a product line of specialized machines for cutting of structural steel sections as well as single-purpose machines for automated cutting and drilling of flanged parts. These machines can be supplied in various executions depending on types and sizes of processed material or the requirements for automation of material input and/or part output, and alternatively connected to a production line in the customer´s facility.

For cutting of hollow structures of circular and rectangular cross-sections MicroStep supplies the cutting machines PipeCut and CPCut.

Both systems are of a modular execution, which means that they are configured for particular requirements of customer's production.

PipeCut machines can have a working length of 3 m, 6 m or 12 m and can process pipes with diameter ranges Ø 50 mm to Ø 800 mm. The maximum wall thickness is 50 mm for plasma cutting and up to 100 mm for oxyfuel. CPCut machines can process also large-sized pipes with diameters of up to Ø 2,000 mm.

MicroStep spol. s r.o.

Alexander Varga, Ph.D.
Head of R&D
MicroStep

"Our portfolio includes multi-functional systems that can process sheet metal, tubes and beams as well as single pipe or profile processing solutions."

For cutting of open profile sections, such as I, H, U or L profiles, MicroStep introduced a concept with a 3D kinematic system that is positioning the cutting torch above the surface of a steady profile – this machine line is supplied under the name ProfileCut. During the cutting process, the cut profile is motionless while a specialized 3D cutting head with tilting ability of 120° moves around the profile both in the longitudinal and transverse directions.

Possibility to equipe ProfileCut machines with cutting zones for hollow profiles or sheet metal

Furthermore, the abilities of ProfileCut can be enhanced by adding a drilling/tapping/countersinking tool station with automatic tool exchange for plate drilling up to Ø 40 mm or by various marking tool stations. The precision of cutting and positioning of the tool above the actual profile is achieved by an advanced system of 3D scanning of profile shape with laser line scanner, followed by automatic adjustment of cutting program as well as adjustment of machine movements according to the true shape of material.

In addition to cutting of open profiles, ProfileCut machines can be equipped also with other cutting zones, e.g. for processing of hollow profiles (cutting by means of a pipe positioner like on a PipeCut machine) or a cutting table for sheet cutting like on a standard flat-bed machine – all by using the same gantry and tool stations. This concept makes the ProfileCut one of the most versatile cutting solutions for steel constructions on the market. For requirements of automation of the cutting process with automatic loading and unloading of material – no matter if sheets, hollow sections or open profiles – MicroStep offers enhanced versions of its machines with input and output conveyors in which the material is inserted into the working area on a roller track by special gripper arms.

Such automated lines equipped with automatic measurement of the thickness and dimensions of material offer further possibilities of automation in interconnection with information systems or production management applications like MicroStep´s MPM.

MicroStep has developed a variety of solutions for high-precision 3D processing of tubes, profiles and beams – including fully automated material handling.

"We no longer need to outsource"

Bevel cutting of beams, pipes and plates: Innergy Heavy Industries chose versatility and reliable service

INNERGY is a multinational company specializing in eco-friendly energy solutions thinking not only about the needs of the customer, but also about the needs of our planet. When it was founded 50 years ago, the company has specialized in design and manufacture of thermal oil boilers. However, over the time the world has changed and Innergy had to change with it. Today, its portfolio contains biomass generation and cogeneration plants, boilers or systems for use of residual heat.

Today the company has three separate divisions (Innergy Heavy Industries, Innergy Electric and Innergy Engineering), three international headquarters (Spain, Chile and Japan) and has worked on more than 6,500 projects on 5 continents.

Innergy opted for ProfileCut from MicroStep with working area of 12 x 4.5 meters for cutting of flat metal sheets. The machine is equipped with a pipe positioner and supporting rollers for cutting of pipes with diameter up to 700 mm and profile cutting zone for cutting of H, U and L profiles up to 12 m long and 600 mm wide. The pantograph rotator is capable of tilting up to +/- 90° which makes the profile cutting feasible. All this supported by the XPR300® plasma source from Hypertherm. Mr. David Moldes, Chief Strategy and Corporate Development Officer, shared the decision making insights in a short interview:

Since 2017 you use a sheet and pipe cutting machine. Why did you decide for ProfileCut from MicroStep?

David Moldes: "Acquisition of new equipment in Innergy follows strict rules since we need equipment which meets high quality standards characteristic for our company. We aim to continue providing our customers with state-of-the-art industrial boilers and other products and with this in mind, we decided for ProfileCut from MicroStep. During the selection process we didn't only take the machine's features into account. The important factor was also the good references MicroStep has on the market."

How has the machine helped your manufacturing process?

David Moldes: "Having the machine has helped us mainly in two areas. First of all, by reducing manufacturing times and at the same time by improving the quality of our heater products. In addition, thanks to the incorporation of ProfileCut we no longer have to outsource the parts cutting. That gives us both speed and self-sufficiency."

“The machine runs very well“

The French company Mecasem relies on MicroStep’s technology for sheet and pipe processing

The Mecasem Group is primarily focused on precision in material testing and measuring equipment calibration. However, one branch of the company is also an engineering company supplying heating and air conditioning products. In order to increase speed and flexibility in its production, the company invested in a special plate and pipe cutting machine from MicroStep. The decisive factor that prompted Mecasem to approach the leader in automated plasma cutting was MicroStep’s innovative technology.

On the German-French border, in the midst of romantic vineyard landscapes, lies the city of Ostwald. This is the place where Mecasem Group offers its services. Founded in 1980, the group is a leading industrial laboratory specializing in materials testing and gauge calibration. At its HQs, Mecasem also produces components for heating and air-conditioning technology. “For example, we manufacture pressure vessels and oil separators for customers in France,” explains the production manager Pierre Ruble. The company operates eight branches in France and one in Germany.

In June 2014, an extraordinary machine went into operation, MicroStep’s CNC plasma cutter CombiCut 12001.15Prk + CH2000P. The system, designed for robust and multi-functional use as well as parallel cutting, has been tailored to the needs of the company while integrating also components from another MicroStep machine series – the pipe & beam cutting machine ProfileCut. Thanks to this crossover, the machine does not only process plates within the work area of cutting table 3,000 x 1,500 mm, but is also able to handle big pipes up to Ø 1,000 mm and 12 m long with automatic pipe clamping. MicroStep’s plasma rotator ACTG® feature enables bevel cutting up to 50° on both plates and pipes. “We used to buy pipes from a supplier. The problem was that it was very inflexible – deliveries took too long,” says Pierre Ruble.

The new machine is in operation at least eight hours per day with two operators taking turns. Around 4,000 pipes were cut during the first year. “There’s probably going to be more. But we will still have some capacity left,” emphasizes the production manager. 90 to 95 percent of the pipes and sheet metal processed by the machine are from mild steel and a small percentage is stainless steel.

Before the new machine was put into operation and Mecasem was able to handle in-house orders in a flexible and fast fashion, Mr. Ruble and Mecasem’s CEO Marc Meyer were intensely searching the market. “We have received four offers including a robotic system,” says Pierre Ruble, looking back. After weighing all parameters, the choice was made to go for the world market leader in automated plasma cutting. “We were convinced by the combined pipe and plate cutting machine. Others had that too but we liked MicroStep the most.” Feelings after more than a year of operation are still very positive. “Support from MicroStep is good and fast. We are satisfied with the machine, it is running very well.”

Market leader trusts MicroStep

Pipe cutting machine for the Chinese Gree Group: the world’s largest manufacturer of air conditioning solutions

When it comes to air conditioning, Gree Electric Appliances Inc. is the world’s number one. In their production, the company relies on machinery from MicroStep.

The HQ of Gree is located in the vibrant city of Zhuhai; here the company develops and manufactures air conditioning units with a turnover of more than 13 billion euros per year. Air conditioning solutions from Gree find their application in many housing and industrial facilities worldwide, from single family homes up to large prestigious projects such as the site of the final match of the 2010 Football World Cup, the National Stadium in South Africa (Soccer City) in Johannesburg. Projects like these require a high degree of precision when manufacturing components. Big construction projects in particular require very long pipes to be cut with utmost accuracy.

In 2016, Gree went on to look for a cutting solution that would suit their needs. During the search, the company focused on a CNC system for long pipes that would offer the possibility of cutting holes with bevels on the edges in preparation for the subsequent welding processes. Within the same year, the decision fell on a PipeCut machine from MicroStep configured for cutting pipes with the maximum length of 12 meters and maximum diameter of 610 mm. The machine is equipped with MicroStep’s industry-proven plasma rotator that enables easy and precise bevel cutting of pipes up to 45° with edge preparation for welding. Furthermore, in accordance with Gree’s requirement for a combined machine that could process pipes as well as domes, the design of the machine for the air conditioning expert has been tailored to include a 1,400 x 1,400 mm large cutting table for 3D processing of dished ends.

Top left + right: Gree’s combined pipe & dome cutting machine PipeCut allows to cut pipes up to Ø 610 mm and a length of 12 m as well as domes up to Ø 1,200 mm. **Bottom left:** Gree Electric Appliances Inc. was chosen to participate on prestigious projects such as the National Stadium (Soccer City) in South Africa’s Johannesburg.

The flexible beam guide of a fiber laser system not only allows building large-scale machines several tens of meters long, it also allows a much simpler construction of bevel cutting heads, easier integration of additional technologies such as drilling, tapping, marking, additional beveling (ABP) as well as addition of equipment for cutting of pipes and profiles.

The fiber laser experience

MSF product line offers multi-functionality and versatility

Thanks to the use of optical fiber for laser beam transmission, great possibilities emerge in the field of laser cutting. The flexible beam guide not only allows building large-scale machines several tens of meters long, it also allows a much simpler construction of bevel cutting heads, easier integration of additional technologies such as drilling, tapping, marking, additional beveling (ABP) as well as addition of equipment for cutting of pipes and profiles. Solid-state fiber lasers have paved the way towards installation of multi-functional CNC cutting centers similar to those already widely used in the plasma field.

Over the last decade MicroStep gradually developed its fiber laser product line as a modular design that allows creation of customized systems, reaching from simple machines to complex cutting centers with different work area sizes and possibilities of material flow automation. The aim is to deliver machines that meet particular production requirements of a variety of end users. Equipped with state-of-the-art laser sources and cutting heads, efficient fume extraction and safety cabins that prevent exposure to laser radiation, these machines are delivered as turnkey solutions with a variety of functions.

Plug & Produce: The compact design allows easy transport and quick set-up

The compact basic version – MSF Compact – is delivered in three standard sizes with work areas of 1 x 2 m, 1.25 x 2.5 m and 1.5 x 3 m. Designed as a plug-and-play solution for smaller workshops, MSF Compact machines are equipped with laser sources up to 4kW and a single cutting grate that is pulled out to the front of the cabin for convenient loading of workpieces and unloading of cut parts – with a maximum load of material up to thickness 15 mm. The compact design allows easy transport and quick set-up that makes the machine an ideal solution for accurate and reliable 2D cutting of parts with fine contours and detailed cut-outs.
The standard version – MicroStep´s high-precision all-rounder MSF – can be delivered in various sizes from 3 x 1.5 m to 12 x 3 m. It is equipped with an automatic shuttle table with two cutting grates that enable simultaneous operations of cutting and loading/unloading. Waste collection and disposal is facilitated by a belt conveyor and a waste container integrated in the cutting table. The machines are equipped by default with automatic lubrication system that shortens and simplifies their maintenance process.

Control of cutting height is provided by a capacitive sensor inside the cutting head

MSF machines can have cutting heads for straight or bevel cutting, with a maximum bevel angle 45°. Control of cutting height is in both cases provided by a capacitive sensor inside the cutting head that automatically measures the distance between the cutting tool and cut material. For proper function of the measuring system, it is necessary to keep the cutting nozzle undamaged and clean: for this purpose, a combined LU3K station is integrated in the beginning of cutting table. Besides optical check of the nozzle status by a built-in camera, the station also automates the processes of nozzle cleaning and calibration of the capacitive height sensor. Additionally, for bevel cutting heads the calibration is carried out automatically for the whole range of tilt angles.

The laser bevel head comes with the industry-leading auto-calibration system ACTG

Same like for other beveling technologies from MicroStep, also the laser bevel head comes with the industry-leading auto-calibration system ACTG, ensuring that potential mechanical inaccuracies which may occur in the mechanical setup of bevel head during long-term use will be accurately compensated by counter-movements of the machine. ACTG greatly contributes to the long-term stability and efficiency of bevel cutting process.

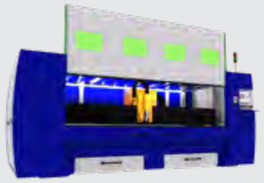
Optionally, MSF machines can be enhanced with supplementary zones for cutting of round tubes and hollow profiles of different cross-sections. There are several options: pipes up to Ø 200 mm, Ø 300 mm (in special cases even up to Ø 500 mm) and hollow sections with the same values as circumscribing circles respectively. Pipe cutting zone of MSF is placed inside the cabin along the X axis while material handling is conveniently ensured by a sliding side panel of the safety cabin. In addition to pipe cutting with manual loading, MSF can be also equipped with a fully automatic pipe cutting system that allows cutting of pipes and hollow profiles up to Ø 200 mm, with a transversal loading conveyor on the input, automatic feeding of the pipes into the cutting area by a moveable chuck, and a transversal output conveyor for small parts as well as a collecting tray for bigger parts on the output. The pipe cutting function is offered as well as a stand-alone pipe cutting machine MSF Pipe, both in manual and automatic configurations.

For large-scale cutting tasks MicroStep launched the flagship series MSF Max

For large-scale cutting tasks MicroStep recently launched the flagship series MSF Max that can be delivered up to an overall table dimension 50 x 6 m. This powerful machine is with fixed cutting table and a moveable cabin that covers the active cutting zone. Cutting of part up to a length of 20 m is possible. This machine allows for one or two beveling tool stations, drilling tool station with automatic tool exchange (up to Ø 30 mm).

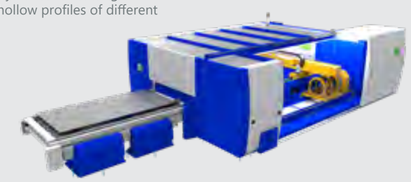
The modular design of MSF product line provides a wide range of configuration options. Customers get the possibility to configure their laser system exactly according to their needs and to integrate it most effectively into their production workflow. Thanks to the modularity, various levels of automation of material flow are possible – an automatic loading system for sheet metal MSLoad, a storage tower or an automatic cut part sorting system MSSort being the valued options.

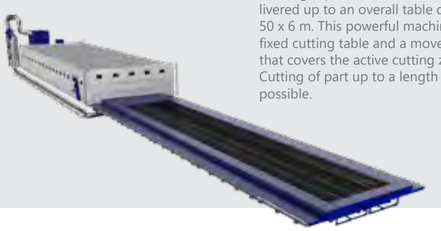
EXTRA: Overview of MicroStep's laser product series



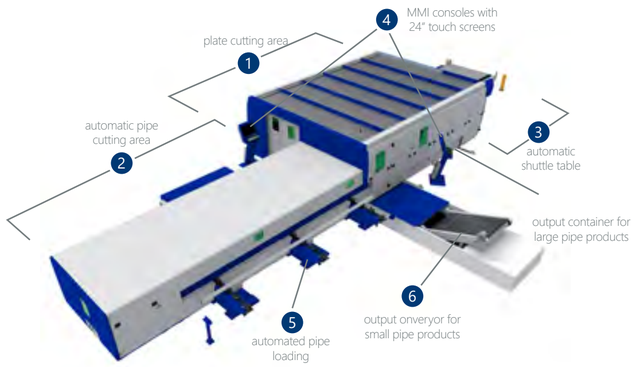
The compact basic version – **MSF Compact** – is delivered in three standard sizes with work areas of 1 x 2 m, 1.25 x 2.5 m and 1.5 x 3 m. Designed as a plug-and-play solution for smaller workshops.

MicroStep´s high-precision all-rounder **MSF** can be delivered in various sizes from 3 x 1.5 m to 12 x 3 m. MSF machines can have cutting heads for straight or bevel cutting, with a maximum bevel angle 45°. Optionally, MSF machines can be enhanced with supplementary zones for cutting of round tubes and hollow profiles of different cross-sections.





The flagship series **MSF Max** can be delivered up to an overall table dimension 50 x 6 m. This powerful machine is with fixed cutting table and a moveable cabin that covers the active cutting zone. Cutting of part up to a length of 20 m is possible.



Above left: The laser bevel head comes with the auto-calibration system ACTG, ensuring that potential mechanical inaccuracies will be compensated by counter-movements of the machine.

Above right: The machine version MSF Pipe is designed exclusively for processing of pipes and rectangular profiles.

Left: The automatic sheet loading system MSload, a storage tower or the part sorting system MSSort are valued options for the MSF series.

EXTRA: Bevel cutting and processing of tubes and profiles

MSF machines can have cutting heads for straight or bevel cutting, with a maximum bevel angle 45°. Optionally, the machines can be enhanced with supplementary zones for cutting of round tubes and hollow profiles of different cross-sections.

Successful launch of MSF Max at the traditional French cruise ship builder

Laser flagship with bevel cutting solution debuted with style in Chantiers de l'Atlantique

Chantiers de l'Atlantique shipyards (until recently STX France), located on the coast of the Atlantic, have had a long tradition in cruise ship construction, many of them being the largest at their time. More recently the company has expanded its focus also to the offshore renewable energy constructions.

Up to 150 years ago, Saint-Nazaire was just a simple harbor village on shore of the Atlantic Ocean. Its strategic location near the mouth of the river Loire has proven vital with the arrival of the industrial revolution. In 1861 John Scott from the Scottish shipyard in Greenock has been appointed to establish a new shipyard and to supervise the construction of the very first ship Impératrice Eugénie, which was delivered only three years later in 1864.
Since then, shipyards in Saint-Nazaire have been undertaking colossal projects that often require the latest achievements of science in order to be feasible. With this context it is no surprise that, over the years, this small French town has become the birthplace of some of the largest ships of their times. Just this year in March, Symphony of the Seas, the largest cruise ship ever built, has left the port of Saint-Nazaire for its maiden voyage.
Today the shipyards have more than 2,700 employees and more than 500 subcontractors bringing another 5,000 workers on the site every day.
Working in a shipyard can be a very demanding and exhausting job, even for a soulless machine without human needs and cravings. If you are building the world's largest cruise ship you will most likely need big parts, which need to be cut out with great accuracy, and you have to cut a whole lot of them. "We cut about 1,600 meters of material every day," says Project Manager Silvère Destrem.
After some consideration, Chantiers de l'Atlantique opted to invest into a large-scale fiber laser cutter, the MSF Max. It is a 50 m long machine with two 21,000 x 3,500 mm large cutting zones. The work area consists of suction tables sunk into the ground of the production hall to allow easy access onto the grates during loading and unloading. The suction table is divided into electronically controlled zones with pneumatical opening of flaps that ensure high suction efficiency and allow customized setting of zone opening times.

"The idea was to improve our workshop with a modern and efficient machine"

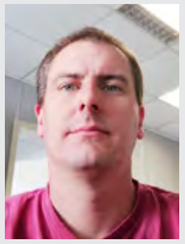
The older CNC laser machine at the shipyard was a CO_2 type. Even though CO_2 lasers have certain advantages, such as the ability to cut different materials and deliver smoother cut surface especially in bigger thicknesses, they are less efficient and require regular maintenance of the laser beam path, with the setup and alignment of the mirrors in the beam path limiting the maximum length of the machine setup. For larger-scale applications, the CO_2 laser source needs to travel with the gantry while maintaining beam path geometry at a required precision. That brings several design and production challenges – the more complicated the system, the more demanding it is in terms of maintenance and the higher is the probability of downtimes. "The idea was to improve our workshop with a modern and efficient machine," explains Mr. Destrem. Fiber laser technology eliminates several of CO_2's setbacks.
Its efficiency is much higher and the optical fiber that guides the laser beam is not limited by length and requires almost no maintenance. "An easy-to-use-and-maintain concept was an important criterion in our decision process."
The machine is equipped with a 3D bevel cutting head with an 8 kW laser source that allows Chantiers de l'Atlantique to make weld edge preparation on parts up to 20 meters long and up to 16 mm thick with bevel angles ranging up to 45°. The system is easy to use and maintain: accuracy and long-term stability of the machine's geometry that is essential for accurate bevel cutting is ensured by MicroStep´s patented auto-calibration system ACTG®. All the operator needs to do is to swap the cutting nozzle with a calibration jig and initiate the automatic calibration process – if any inaccuracies are detected, the machine will automatically adjust its movements to compensate for the measured mechanical deviations.

After a few months in production the feelings are positive.

Because of the large machine size in this particular case, the ACTG calibration station is placed in a combined technological station that is mounted directly on the gantry and is ejected during the calibration process. The station also contains other equipment – a pad for calibration of the capacitive height sensor inside the laser head, as well as a nozzle cleaning system consisting of a camera and a wiping brush. In addition, high absolute accuracy of the machine (approx. 0.2 mm at room temperature) has been ensured by a positioning tolerance compensation feature, based on precise initial machine measurement with a laser tracker device.
After a few months in production the feelings are positive. "The quality of the cut pieces is better than with our old machine. The efficiency has increased. We have the opportunity to make the production evolve towards new products," concludes Mr. Destrem.

The machine is equipped with a bevel cutting head with 8 kW laser source that allows Chantiers de l'Atlantique to make weld edge preparation on parts up to 20 m long with thicknesses up to 16 mm and bevel angles up to 45°.

MSF Max
Video presentation:
www.microstep.eu/video



CHANTIERS DE L'ATLANTIQUE

"The quality of the cut pieces is better than with our old machine. The efficiency has increased. We have the opportunity to make the production evolve to new products."

Silvère Destrem
Project Manager
Chantiers de l'Atlantique

Above: Chantiers de l'Atlantique opted to invest into a large-scale fiber laser cutter MSF Max. It is a 50 m long machine with two 21,000 x 3,500 mm cutting zones.

Left: Accuracy and long-term stability of the machine is ensured by MicroStep's patented auto-calibration system (ACTG®). The ACTG station has been integrated together with a calibration pad for the capacitive height sensor and a nozzle cleaning system in a combined technological station that is placed under the gantry and ejected in case of calibration.

Below: Just this year in March, Symphony of the Seas, the largest cruise ship ever built, has left the port of Saint-Nazaire for its maiden voyage.

CNC cutting systems for large-scale applications

MicroStep partners with global welding automation expert Pemamek for advanced shipyard projects

As a manufacturer known for innovations and customer-driven R&D projects, MicroStep has a rich history of supplying the shipbuilding and offshore industries with emerging cutting-edge technologies. Over almost two decades the company has supplied numerous machines to well-established names in the industry such as STX, Damen, Vard/Fincantieri, Royal IHC, Lürssen, Meyer, Keppel and many more, a majority of which were combined plasma bevel cutting machines for automated welding preparation and sheet marking. Several shipyard enterprises became our global partners and enthusiastic cooperators in development of new solutions that make their production more reliable, safer and efficient in the long run. Among equipment and automation solutions developed for the demanding shipyard environment were: automatic plate alignment via laser sensor, management of working zones of cutting machine with an interface for an external automatic crane for automatic loading/unloading of material, barcode and QR code marking, Machine Production Management (MPM) software suite and also our well-known ACTG® system for auto-calibration of beveling tool stations.

But it wasn't until 2014 that MicroStep was able to participate in the shipbuilding's premium cutting application – automated panel lines. Thanks to the partnership with the globally operating Finnish welding and production automation provider Pemamek, whole new application horizons have opened up for MicroStep.

Cutting of large-scale welded panels

One of the prominent manufacturing application areas in shipbuilding is production of large-scale panels with welded stiffening structures that are used to build decks and bulkheads of a ship. In modern shipyards, these panels are produced by used fully automated and robotized high-tech flat panel lines consisting of several gantries that provide the technologies for welding of single sheets to make a panel and subsequent cutting and marking processes, positioning and welding of stiffening beams and finalizing of the panel structures. Panel lines can be integrated directly into the yard's design- and manufacturing-data systems. Modern panel lines produce high-quality prefabricated components and subassemblies that allow for high-speed welding, even utilization of hybrid laser welding processes.

MicroStep was chosen to deliver the cutting part of panel lines – a robust DRM-PL gantry with effective cutting widths as big as 24 m. Apart from the sheer machine size that implies high-end design and manufacturing coupled a powerful drive-motion system, the peculiarity in this case is in the technology: the thickness of the panel as well as its surface levels can vary as the single plates comprising the panel are of different thickness. Besides the usual cutting heads (plasma or oxyfuel rotators) which enable bevel cutting of V-, X-, Y- and K-cuts, DRM-PL machines are equipped with a blasting or grinding unit and a marking tool. Blasting head is used to clean the primer from certain areas on the workpiece where, subsequently, stiffening beams are welded.

The blasting head has an integrated plasma marker to mark synchronization lines for future positioning of the stiffeners. Finally, an inkjet marker is used to print descriptions and technological marks.

Advanced features for precise panel processing

Panel cutting machines need to have several special features. For example, the starting point of cutting has to be set in relation to the position of welds on the panel since the finished product has exactly defined weld positions. Therefore, the machines are equipped with a linear laser scanner to identify of welds in any direction. Another feature is the simultaneous blasting/grinding and plasma marking with the plasma marking torch, which can rotate automatically around the blasting head to enable marking in different directions.

Plates of varying thicknesses, which make up the panels, and the welds between them require complex control of the plasma cutting process. Metal plates of different thicknesses require different cutting parameters such as cutting speed and current. The borders between different sheet thicknesses are linear with surface inclinations ranging from 1:4 to 1:3 so the parameter change is not sudden but linearly interpolated. The most complicated issue with these machines is cutting height control. The classic height control according to measured arc voltage is not enough in this case. If the border is on the top side of the panel, the cutting height is controlled in a robotic mode according to the defined shape of the weld. After a transition to a new thickness, new parameters first need to be measured by the control system and only then the height control according to arc voltage can be turned on again. Furthermore, when crossing welds, the height control needs to be deactivated so that the cut contour is not deformed.

MicroStep's panel cutting machines are capable of cutting large-scale parts with dimensions up to 24 x 24 m, inkjet marking, plasma marking as well as primer removal via sandblasting or grinding technologies.

Irving gears up with MicroStep

Shipyard invested in a 16 m wide gantry with bevel technology

Irving Shipbuilding Inc. (ISI) has built one of the most powerful combinations of shipbuilding, ship repair and fabrication expertise in Canada and the eastern seaboard of North America in more than fifty years. The company has built over 80 % of Canada's current fleet, and its Halifax Shipyard has been at the forefront of Canadian shipbuilding for more than 125 years. Today, the company also relies on technology from MicroStep.

ISI consists nowadays of five shipbuilding, repair and fabrication facilities – all committed to the company values of integrity, customer service and pride. Together, they make up Eastern Canada's most extensive array of docks, slipways, steel fabrication shops, outfit and machine shops and blasting and painting facilities.

In 2011, the historic National Shipbuilding Procurement Strategy (NSPS) was undertaken by the Canadian Government, seeking to identify two shipbuilding Centers of Excellence for the country for the next 30 years. Irving Shipbuilding was extremely proud to have been selected by the Canadian Government to build the Royal Canadian Navy's new combat fleet, a program that comprises 21 vessels and $25 billion over a period of 30 years.

Canada's chosen shipbuilder

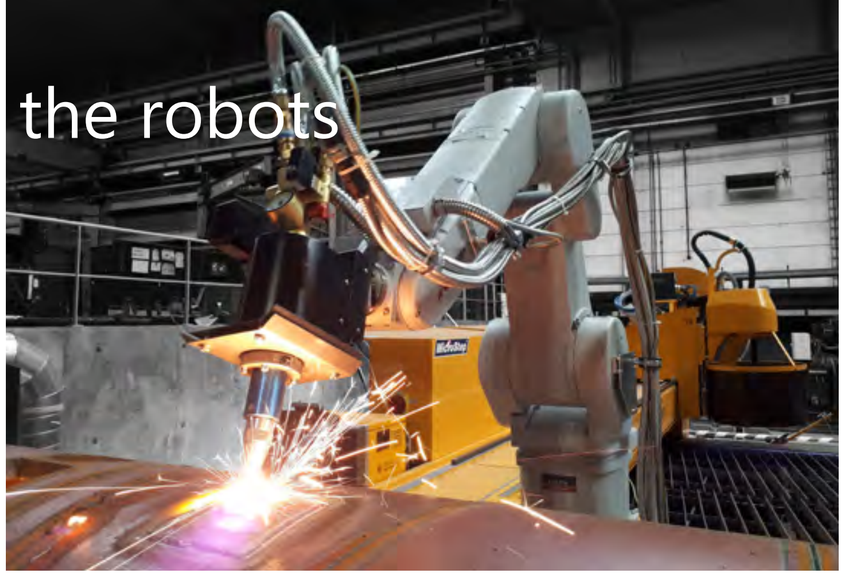
As Canada's chosen shipbuilder, Irving Shipbuilding Inc. is working with the Royal Canadian Navy on the next class of Canadian Surface Combatant (CSC) and Arctic and Offshore Patrol Ship (AOPS) vessels under the National Shipbuilding Strategy (NSS). The long-term promise of stability granted by the NSS led the shipbuilder to invest in its Halifax Shipyard to build North America's most modern and largest specialized shipbuilding facility.

As Canada's chosen shipbuilder, Irving Shipbuilding Inc. is working with the Royal Canadian Navy.

One part of this giant investment included the purchase of a cutting-edge panel line from the Finnish global welding and production automation provider Pemamek Oy. MicroStep has been a part of this project and supplied the plasma cutting part of the line: the 16-meter wide gantry is equipped with a plasma rotator for CNC bevel cutting up to 50° and with additional heads for sandblasting (primer removal), plasma marking and inkjet marking.

Here come the robots

A broad portfolio: From robotic workplaces to robots for cutting of 3D shapes



MicroStep's continuous activity in the area of robotic applications has resulted over the years in a comprehensive product line of components for robotic working cells – different types of workpiece positioners, gantry-type and cross-beam motion systems and standardized modular welding cells have been part of the portfolio for many years. Robots have been used for manipulation, welding, cutting or routing as part of a work sequence in production lines or as standalone cells.

Furthermore, apart from designing robotic and semi-robotic workplaces to automate various production processes, MicroStep's engineers have been increasingly intrigued by the vast movement possibilities of robotic arms and their potential to be utilized as carriers of cutting tools on gantry-based CNC cutting machines – especially in the field of structural steel applications such as cutting of beams or domes. This area is being gradually developed.

Integration of robots: Apart from mechanical challenges the main job is to be done by control system developers

Apart from mechanical challenges with integration of robotic arms into CNC cutting machines, the main job is to be done by control system developers. Robotic arm brings a whole different type of kinematics, a few more driven axes and requirements for controlling the cutting technology. Besides the robot itself, the machine can contain also other, standard, tool stations with various straight/bevel cutting, drilling or marking technologies. In order to achieve seamless switching between cutting heads, the control of the robot has to be integrated into the control system of the CNC machine responsible for all the mechanical modules of the system. Even though robotic arm manufacturers supply their products with genuine control systems, their implementation may present several obstacles, such as incompatibility of the communication interface, too low refresh rate of the desired effector position, insufficient feedback speed or issues of coordination with other movement axes of the machine. So here's the trick: to ensure desired operating properties, MicroStep has developed its own control modules for robots within the iMSNC control system, which cooperate flawlessly with the rest of the system. The solution takes into account mechanical tolerances of the individual robot joints as well as its movement specifics arising from the robot's construction.

Solutions with robots

MicroStep's projects with robots so far include turnkey applications such as welding of frames of tower cranes, ATVs and snowmobiles, welding of high voltage capacitors, transformer tanks and conveyor rollers as well as milling of plastics, luting, relocation of aluminium casting molds, a test cell for a partial simulation of a production line, automated cutting of ceramic tanks, cutting of coupons from hot-rolled steel and others.

Robotic pipe cutting

More flexibility for the Jan De Nul Group: An innovative combination of plasma plate cutting and oxyfuel cutting of pipes by a robot

A robotic arm on a gantry-type CNC plasma and oxyfuel cutting machine capable of cutting both flat plates and pipes with the same gantry? Even if it's not the first of its kind in the lands of Benelux and beyond, it is still an exceptional and highly innovative combination of high-quality cutting technology. For MicroStep, this newly developed solution has proven to be an eminent success.

There are companies that everybody has heard of, even the people who don't follow the Belgian industry sector. This is often due to an article in the newspaper or a report on the TV about a success story which illustrates the strength of Belgian companies abroad. You may remember the name Jan De Nul from the mega dredging project in Dubai or the new Suez Canal in Egypt. However, Jan De Nul Group is more than just a dredging company. They have four main areas of interest: dredging and marine works, offshore services, civil works and, finally, environmental works. The JDN Group has grown into a global player by continuous investment into these four activities. In 2015 the group took over the foundation expert Soetaert NV in order to strengthen its expertise in hydraulic engineering and foundation building.

Unburdening its customers: Everything from design up to execution is being taken care of

A success strategy is supported by many pillars but one of the most important ones is "unburdening the customer". In the past, work was based mainly on following the customer's specifications; today, customers are looking rather for a complete solution to their problem. The multidisciplinary teams of Jan De Nul Group follow the integrated approach – everything from design to execution is being taken care of with their own people and equipment. Some projects even include maintenance and financing. A customer always gets a creative and innovative solution tailored to their own specific needs. This endeavor is supported by a large design and engineering department which serves all four areas of interest.

Continuous investment into new technology and equipment

An equally important part of the strategy is continuous investment into new technology and equipment. Let's illustrate this by looking at JDN's own fleet. It consists of more than 85 ships, 47 of which were built between 2007 and 2013. Bigger isn't always necessarily better but for large-scale international projects that became JDN's specialty, it is an asset that cannot be underestimated. The group works with world's largest trailing suction dredgers, the sister ships Cristóbal Colón and Leiv Eiriksson with hopper capacity of 46 000 m3 and depth range up to 155 m, as well as the subsea rock installation vessels Simon Stevin and Joseph Plateau which are the most powerful vessels of their kind.

"We think that we can make complex parts best by ourselves."

More remarkably, Jan de Nul is one of the few dredger companies that design their vessels and equipment themselves. There are good reasons for this. "First of all you have better control over the delivery times and there is also the quality factor. We produce many complex parts of unusual shapes and that requires a great deal of know-how. We think we can make these complex parts best by ourselves. Furthermore, this knowledge you want to keep in your own house and not outsource," says Jose Pycke, Workshops Manager for Jan De Nul Group. 70 operators work in the production department. It is divided into a material preparation area, welding workshop and machining workshop equipped for processing of very large parts. The largest vertical lathe can handle parts with a diameter up to 5,5 meters.

The complete cutting solution from MicroStep

"Our old oxyfuel cutting machine was still functional, but we couldn't do weld seam preparation with it. We had to do the bevels manually with a hand torch or an angle grinder, and that took a lot of time. The machine from MicroStep solved this problem," says Mr. Pycke.

"Furthermore, materials thicker than 25 mm had to be cut with oxyfuel technology which was much slower."
MicroStep delivered the complete cutting solution: with a 12 x 3 m cutting area for plates up to 150 mm thick and a zone for cutting pipes with a robot situated along the outer side of the machine guidelines, the machine is capable of processing tubes up to Ø 2000 mm and wall thickness 80 mm. The challenge here was to ensure cutting and positioning of pipes in the entire required range of diameters (Ø 100 – 2000 mm) and thicknesses and, at the same time, to propose a technical solution that would allow the most convenient manipulation of pipes while requiring minimal construction interventions in the production hall. The final solution was an oxyfuel torch on a robotic arm, as this provides high movement flexibility and isn't limited by the height of the gantry. This way it was possible to place the pipe cutting tracks and supporting rollers on the floor level without the need to "sink it" underground. For compensation of possible deviations of the pipe shape, a laser scanner integrated in the torch holder is used to scan the surface of the pipe in the place of the cut will be. If any deviations are detected, the cutting program is automatically adjusted. The use of a scanner in combination with a sophisticated robot movement control (compensating for the existing inaccuracies of the robot's construction) and the dedicated 3D CAM software mCAM achieves accurate openings and contours of different shapes. The pipe cutting zone is equipped with a safety light barrier which turns on together with the robot to ensure operational safety.
"First of all, the plasma/oxyfuel cutting machine with the integrated robot has resulted in considerable time savings because all the weld preparation is now done automatically and in one step, which also increases quality. As to the pipe cutting, not only has our reach been increased, but we can also cut any shape. In terms of flexibility, we have improved significantly," José Pycke concludes.

MicroStep delivered the complete cutting solution: with a 12 x 3 m large cutting area for plates up to 150 mm thick and a zone for cutting pipes with a robot situated along the outer side of the machine guides, the machine is capable of processing tubes up to Ø 2000 mm and wall thickness 80 mm.

Jose Pycke
Workshops Manager
Jan De Nul Group

Jan De Nul GROUP

"The plasma/oxyfuel cutting machine with integrated robot has resulted in considerable time saving because all the weld preparation is now done automatically and in one step which also increases quality."

Operation 24/7: The automated cutting line (left) at ZMJ is controlled from a central control room (above). A total of eight CNC plasma cutting machines from MicroStep are automatically loaded and unloaded by a Demag process crane.

40 percent production increase

MicroStep and Terex have supplied an automated production line for the Chinese mining equipment manufacturer ZMJ

MicroStep and Terex MHPS GmbH (manufacturer of Demag industrial cranes) in a pioneering tandem: in close cooperation, the companies developed a material handling system for automated sheet metal processing for China's leading coal mining equipment manufacturer Zhengzhou Coal Mining Machinery Group. In total, eight MicroStep plasma cutting machines are being fed with plates by an automated Demag process crane from Terex. As a result, immense efficiency gains are achieved in the production process.

The Chinese mining industry is booming and so is the mining equipment sector. The Zhengzhou Coal Mining Machinery Group is one of the market leaders both for stationary equipment for roof and long-wall supports as well as for mobile machinery that operates in mines. At its plant in Zhengzhou, the capital of Henan province, the company is running a production line for automated plate processing consisting of several double-gantry MicroStep cutting machines and a Demag process crane, which is responsible for storage and retrieval of the plates as well as the feeding of the cutting systems in a 24/7 operation. At the heart of the system is the production management software MPM from MicroStep, which controls the entire production process.

The investment has paid off for ZMJ: Every day, the cutting line is able to process up to 155 metal plates in three-shift operation, with one production cycle now taking only one to two hours, compared with the four to eight hours previously. The intralogistics system implemented for this solution also ensures that the machinery is utilized to a consistently high level. The impressive result of this pilot installation: production in the entire plant has been increased by 40% with a monthly machine output of 12,000 t.

General trend towards automation

This project reflects the current trends in the field of industrial mass production. Increasingly, solutions with central production management and a high degree of automation are in demand. The goals are: the highest possible efficiency, optimization of the production process and, of course, reduction of risks and costs. The whole production should be fast, smooth and transparent. In addition to material flow and material processing, the system should also be interconnected with the central warehouse, order management system and the customer's ERP system.

The automatic line installed at ZMJ consists of eight CombiCut gantries with cutting areas of 28 x 3 m, each equipped with two high-definition plasma sources and an inkjet marker. In addition, there is an automated overhead crane (9 t x 16.5 m), an input wagon with a load capacity of 15 t and two output conveyors for collecting the cut parts and removal of waste material. The entire line is fully automated via MicroStep's Machine Production Management (MPM) software, with integrated software modules from Demag for crane management and material handling. The crane is moving on a 120 m long track in the height of almost 13 m. In the beginning of the process, the crane transports one of the plates (up to 12 m long and 40 mm thick) by means of strong magnet spreaders onto a free machine or into one of two buffer zones assigned to each of the eight CombiCut machines. After the cutting process, the crane moves the cut plate onto an output conveyor belt. Here, the plates leave the automated area and proceed to be sorted out manually.

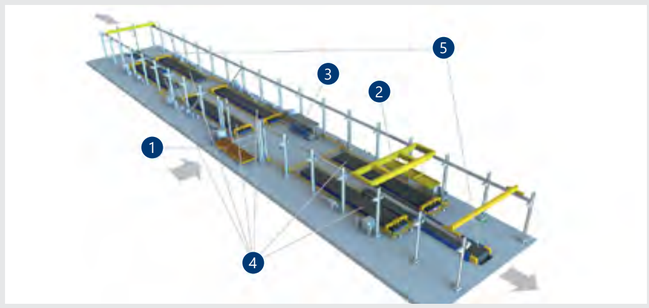
An area measuring 120 x 18 m was fenced off within the production facility for the storage and processing of plates. Here, the customer not only benefits from a better organized flow of material, but also from improved safety at the workplace: a dedicated access concept prevents any personnel from entering the individual processing areas when they are automatically approached by the crane. When routine maintenance work is performed on one of the cutting systems, the automatic crane by-passes the danger zone in order to protect the personnel.

ZMJ
Video presentation:

www.microstep.eu/video

EXTRA: Management of the entire production process via MicroStep's MPM software

The entire production is controlled by MicroStep's production management software MPM, with integrated control software of the crane (WMS) and conveyors. Through MPM, every production step is coordinated and run automatically. Therefore, no active intervention from the operating personnel is required. The parts to be cut are automatically nested by MicroStep's proprietary CAM software AsperWin® (nesting = material-saving distribution of parts on the plate by nesting algorithms in order to utilize the material to the maximum via minimizing waste), and after nesting, the corresponding cutting plan is generated for a particular plate from the stock. Generated cutting plans are then distributed to the individual CNC plasma cutting machines through MPM's MCP module. The crane automatically supplies available cutting machines with plates, based on information received from the material loader and iMSNC® control systems of the particular machines. The position and orientation of the plates on the cutting tables is measured automatically by a laser sensor. Also, the cutting process is carried out fully automatically. After cutting, the cut parts and residual waste are moved by the magnetic crane to either of the two output conveyors. In this case, machine operators are serving only as supervisors and service technicians, for example to replace worn consumables.



1 Material input (wagon)
2 Automatic crane
3 Control room
4 CNC cutting machines
5 Output conveyors

EXTRA: Machine Production Management (MPM): Automating the production process on cutting machines

Machine Production Management (MPM) software suite provides computer-aided process planning (CAPP) features for automation of the workflow on CNC machine(s) or production lines. It is an integrated system of order processing, nesting, stock management, machine operation planning and evalution which interconnects pre-production data, control systems of CNC machines and MicroStep's automatic nesting software AsperWin®. It helps to reduce work-in-progress, to save material, and to eliminate operator errors.

A substantial part of MicroStep's product portfolio is focused is on high-end customers with large production facilities, who put emphasis on efficiency and a high level of automation. Complying with these requirements, MicroStep offers an in-house developed CAPP application called MPM (Machine Production Management), which is an integration platform for different areas of the business – material storage, order management, creation of cutting plans, and CNC machines operators, allowing automation of information flow among them.

MPM software is primarily aimed at facilitating efficient machine use. Used to its full potential, the machine's interface offers the operator a cutting plan together with the location of the specific material (plate, pipe...) in the warehouse. Operator's task is to place the material in the working zone of the machine, synchronize the coordinate system with the semi-product's spatial orientation (which can be automated by finding of the material edge by a laser sensor), install the required consumables and start the cutting process. All necessary parameters are selected automatically, based on the information contained within the cutting plan. When using an integrated loading system, the machine also loads the semi-product into the cutting area and can also facilitate the unloading of finished parts.

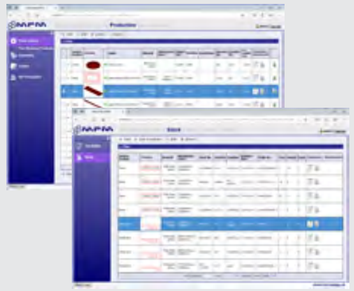
Although designed for MicroStep machines with AsperWin® CAM and iMSNC® control systems, MPM also offers possibilities of cooperation with third party machines. Naturally, the production data can be shared with customer's ERP system (e.g. SAP, AXAPTA). For effective production planning, the system provides weight analysis of particular orders along with weight reports of actual stock resources.

The primary target group for MPM application are businesses with multiple cutting machines, e.g. job shops or large steel processors in various industries (shipyards and offshore, energy, agricultural, automotive and others). One of the main benefits of this system is the automated task allocation for multiple machines based on priorities and technology availability.

The system offers a unique feature of providing feedback to the database after cutting: if specific parts have been cut incorrectly, the operator can identify them directly on the control screen. These parts are automatically returned to the order database and assigned the highest priority in the next nesting so that the order is completed as soon as possible. Processing status of each order or part can be monitored in the database in real time. This feedback feature is unique to MPM; it is not present in comparable systems on the market and is possible only due to the integration of the control software iMSNC® with the CAM software AsperWin® or mCAM, all in-house developed by MicroStep.

Integration with material loading systems

MPM features also a direct link to automated material loaders. The machine compares the cutting plans with the inventory of the warehouse and determines what is going to be cut. Based on the information received, it requests the needed types and amounts of material from the storage. A warehouse operator brings the material to the machine where it is loaded to the loading position and the rest of the process is fully automated: The loader loads the sheet into the machine. The machine can then check whether it is the required material by using a built-in thickness sensor or by scanning a barcode or QR code printed on the material. After the cutting process is complete, the machine sends information about what was cut to the MCP module (Management of Cutting Plans) and information about what kind and amount of material was used is forwarded to the storage database.
MPM and loaders are universal systems that can be configured to suit the specific manufacturing process exactly according to the customer's needs.



Example: Danish producer benefits from MPM

Real-life example: Two MG plasma cutting machines for Danish metalworker Multicut also represent an innovative solution for automatic loading and unloading. Each of the 21 m long machines is divided into two separate cutting zones. Cutting is always done in one zone while the other zone is used for unloading of cut pieces and subsequent loading of new material – subsequently, the zones switch. The active cutting zone is always secured by the system that guarantees maximum work safety. The machines identify the material by themselves, using a built-in QR code scanner.

MPM is a comprehensive system of automation of the production cycle on cutting machines. Along with MicroStep machines, it has been already deployed in more than thirty businesses in Europe, Asia and South Africa.

Machine series | The right machine for every cutting task

Plasma Oxyfuel

MG

MG is MicroStep's top-class CNC cutting machine suitable for long-term industrial use while meeting highest requirements on precision, performance and ease of operation. MG machines are suitable for a variety of applications such as bevel cutting with plasma and oxyfuel, additional beveling process (ABP), pipe, profile and dome cutting, drilling and marking.

Plasma Oxyfuel Drilling

DRM

DRM is a heavy-duty CNC cutting machine designed for a wide range of dome, plate and pipe cutting applications. Its robust gantry allows a vibration-free operation of heavy equipment such as automatic oxyfuel triple torches or a 120° rotator with Z-axis stroke 1,500 mm for cutting of dished ends. DRM can be delivered also as a high-performance drilling machine with special drilling table.

Plasma Oxyfuel

MasterCut

MasterCut is a versatile high-precision CNC cutting machine which can be applied throughout the industry reaching from small workshops to big factories. The standard version with rails in the X direction can be enhanced to a variety of high-precision plasma cutting applications including pipe, profile or elbow cutting and marking.

Plasma Oxyfuel

MasterCut Compact

MasterCut Compact is a dynamic, high-precision CNC cutting machine suitable for a variety of plasma and oxyfuel cutting jobs. Thanks to its sophisticated design it smoothly delivers latest features of plasma technology for a decent price – true contours, small holes, sharp corners. An optional bevel cutting tool station allows to perform a great portion of common bevel cutting jobs.

Drilling Plasma Oxyfuel

DS

DS is designed for high-efficiency drilling and cutting with the possibility of automatic plate feeding and automatic part sorting on output. The plate processing line is dedicated to heavy-duty structural steel applications such as high-precision fittings, gussets and endplates. The machine is designed for a high level of automation within the factory workflow.

Plasma Oxyfuel

CPCut & PipeCut

MicroStep's pipe and profile cutting solutions are designed for processing of a great range of pipe diameters and lengths. The machines' modular design enables a wide range of pipe-based applications including trimming, cutting of various openings for multiple pipe and profile intersections or connections, weld edge preparation as well as pipe marking.

Plasma Oxyfuel

ProfileCut

ProfileCut is a machine dedicated for production of steel structures. Besides optional pipe and plate cutting zones, ProfileCut's main cutting area is dedicated to processing of structural beams such as I, H, U or L. To enable precise division as well as cut-outs in required spots on the beam, the machine is equipped with a laser scanner for measuring of the true shapes of beams.

Oxyfuel Plasma

CombiCut

This robust, high-precision CNC machine is designed especially for multiple-shift high-performance plasma and oxyfuel cutting. It allows cutting of steel up to 300 mm thick, bevel cutting with a pair of oxyfuel triple torches or rotators, parallel cutting with up to 8 torches, drilling up to Ø 40 mm, inkjet, micro-percussion or laser marking, as well as pipe and dome processing.

Laser

MSF Compact

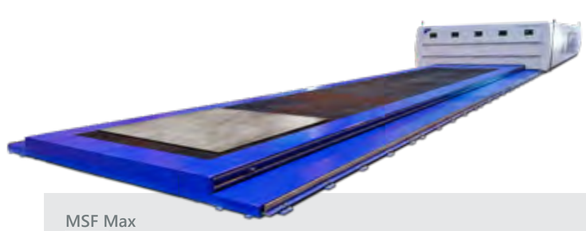
MSF Compact combines precise 2D laser cutting with a compact design. Available in work area sizes of 1,000 x 2,000 mm, 1,250 x 2,500 mm and 1,500 x 3,000 mm, this highly precise machine is particularly attractive thanks to its small footprint. A manually extractable cutting table enables easy and straightforward loading.

Laser

MSF

MSF is a powerful fiber laser cutting machine designed for the production of highly accurate parts at high cutting speeds, with surprisingly low maintenance and operational costs. The machine is equipped with an automatic shuttle table up to the size of 12 x 3 m. The optional equipment includes pipe and profile cutting, and drilling, tapping and countersinking.

Laser Plasma



MSF Max

MSF Max is a fiber laser cutting machine designed for precise processing – including efficient bevel cutting – of large-sized components. The machine offers an extensive production versatility, including 2D cutting, bevel cutting up to 45°, drilling up to Ø 30 mm, tapping up to M20, countersinking and marking.

Waterjet Plasma

AquaCut

AquaCut is a versatile waterjet cutting machine designed for processing of a wide variety of materials including those that cannot be subject to thermal or mechanical stresses. The machine can be equipped with a 5-axis waterjet rotator, as well as combined with plasma cutting, pipe and profile cutting or tapping. Further features include ABP technology and taper compensation (ABC).

Accessories | The right tool for every ta sk

2D cutting

Plasma

Plasma tool station incl. anti-collision protec- tion, laser pointer, arc-voltage THC and full support of plasma marking.

Laser

Laser tool station for fiber laser 2D cutting.

Oxyfuel | G-Multi

Oxyfuel tool station with manual tilting possibility up to ±45°. Fully automatic gas console with preset parameters ensures stable quality of cuts and best efficiency. Multi-tool version enables stripe cutting with stripe width ≥ 70 mm.

Waterjet | W-Multi

Waterjet tool station for cutting of all types of materials. Multi-tool version can carry up to 4 water jets on a single Z lifter.

3D cutting

Plasma rotator

5-axis rotary bevel head with endless rotation enables plasma bevel cutting of plates, pipes, profiles and domes up to 52°. The innovative ITH torch holder includes sensors for torch displacement detection, IHS and auto-calibration.

Plasma 3D rotator

3D rotator with a tilt range up to 120° and Z-axis stroke up to 1,500 mm enables cutting of 3D shapes such as open profiles I, H, U or L and domes.

Plasma bevel

Plasma bevel cutting head with a tilting ability up to 50° allows to perform a great portion of common bevel cutting jobs.

Laser bevel

Laser bevel cutting head with tilting ability up to 45° for fiber laser cutting of various types of materials.

Oxyfuel triple torch

Oxyfuel triple torch with fully automatic gas console enables bevel cutting of V-, X-, Y- and K-cuts with 3 oxy torches within bevel range 20° – 50°. Tilting angle and span of torches can be set manually or automatically.

Oxyfuel rotator

5-axis rotary bevel head with endless rotation enables oxyfuel bevel cutting of plates, pipes and profiles up to 65°. The innovative ITH torch holder includes sensors for torch displacement detection, IHS and auto-calibration.

Waterjet rotator

5-axis rotary bevel head for waterjet en- ables bevel cutting of all types of materials up to 45°. Adaptive taper compensation (ABC) and periodic height sensing (PHS) are included by default.

Automation & Calibration

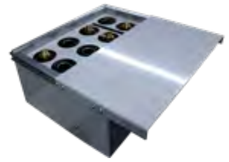
ACTG | ACDB

ACTG station provides auto-calibration of tool geometry for automatic compensation of mechanical inaccuracy of the cutting tool as well as calibration of ABP scanner and automatic measurement of drill tools.

Nozzle calibration

A combined station for automatic cali- bration of capacitive height sensor in the laser cutting head, brush cleaning of laser nozzle and a camera to check the status of nozzle orifice.

Nozzle changer



Automatic nozzle changer with a magazine for 8 nozzles provides the func- tion of automatic exchange of nozzles in the laser cutting head.

Drilling

Drilling & tapping

MicroStep supplies a variety of drilling and tapping tool stations – from small drilling heads for soft sandwich materials to big drilling and tapping units with internal cooling of tools and various automatic tool changer options.

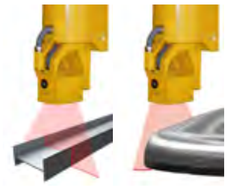
Positioning

Pipe & profile

Pipe cutting device is dedicated for clamp- ing and turning of pipes and profiles. To- gether with a straight or bevel tool station and dedicated CAM software it offers the full range of pipe cutting applications.

Scanning

3D scanner

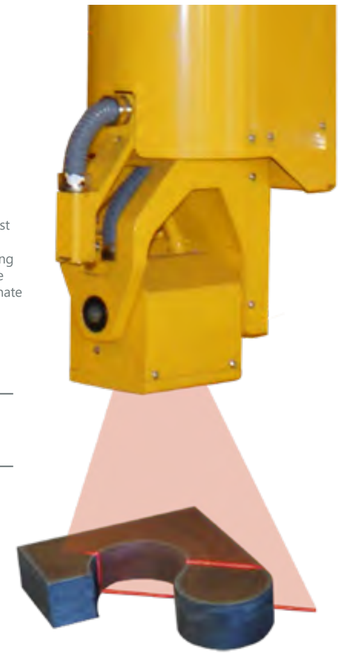


Laser scanner with a rotation and tilting ability allows to create detailed surface representations of scanned objects – e.g. profiles and domes. In combination with mScan technology it allows to adjust cut- ting plans according to true shape of 3D objects.

CCD camera | Automatic plate alignment

CCD camera can be used for:
a) scanning of the shape of template or rest plate for conversion into DXF
b) scanning of holes on plate for positioning
A laser sensor is used for scanning of plate edges for auto-alignment with the coordinate system.

ABP - Additional beveling process



Laser scanner dedicated for scanning of both the contour and position of a straight pre-cut part in ABP feature – additional cutting of bevels for weld edge prepa- ration. ABP technology is available for plasma, laser, oxyfuel and waterjet cutting technologies.

Marking

Inkjet

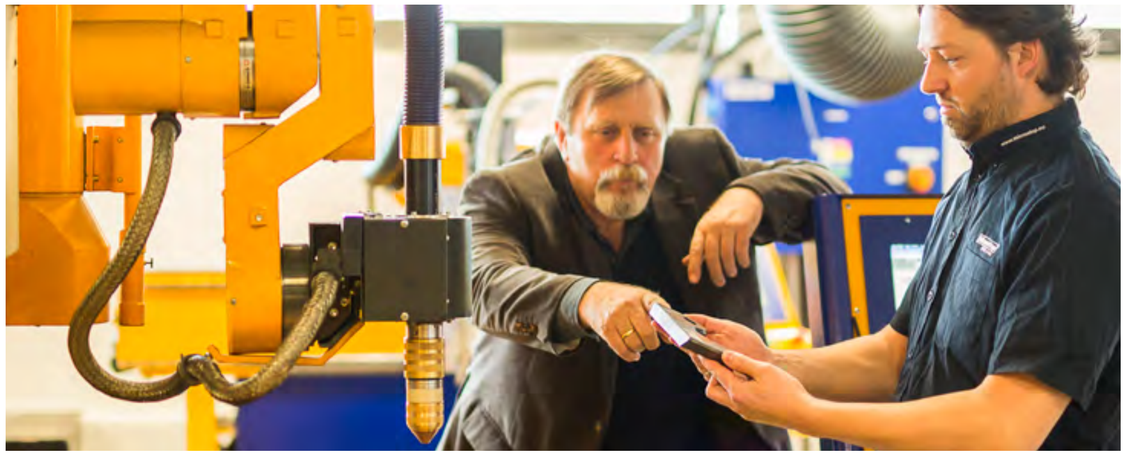
1, 7, 16 or 32-nozzle inkjet writer provides multipurpose waterproof marking in indus- trial environment. It can write lines, char- acters, barcodes or 2D matrix codes. The marking speed reaches a notable 20 m/min.

MicroPunch

MicroPunch marking unit is designed for micro-percussion marking of plates, pipes or profiles with differently machined surfaces.

Laser marker

Laser marker allows to mark text, barcodes, 2D matrix codes and bitmap images with fiber laser.



Invest in innovation and production

Dr. Alexander Varga, co-founder and MicroStep's R&D chief about the beginnings, a fruitful run and goals

Nowadays, it is said that worldwide industry has to move away from simple assembly and production towards higher added value, development and innovations. Your company did just this in its beginnings, you were focusing on the development of special applications and the production came about later. What products and services do you offer at the present?

Dr. Alexander Varga: Focus on our own development has been determined by the professional past of MicroStep's founders. MicroStep was founded in 1991 by 10 researchers and teachers from the Department of Automation and Regulation, Faculty of Electrical Engineering and Information Technology of the Slovak University of Technology in Bratislava. Our goal was to continue working within our expertise which was accurate digital servo systems and microprocessor controlled technology. We wanted to produce in-house developed control systems for applications which require accurate positioning control. Slowly, we worked our way to CNC plasma cutting machines and gradually we expanded our portfolio with other cutting technologies – oxyfuel, waterjet and laser. Time has shown us that with sophisticated products, it is possible to succeed even on a global scale. Over the years we have developed quite large portfolio of products for CNC cutting and offer both complex high-end and simpler low-end applications. Our machines are conceived in a way which allows different cutting technologies and additional technologies like drilling, tapping, countersinking, marking etc. to be installed on a single machine. The traditional flat-bed cutting machines can be extended with equipment for cutting of pipes and profiles of different diameters, or different 3D objects (e.g. tank ends for pressure vessels). Our high-end machine types have a modular construction and the actual size as well as the technology setup are made according to customer's needs. Smallest machines come with working area of 3 x 1.5 m and the biggest ones are 50 x 10 m large, and even large sized gantries providing effective working widths of more than 20 m. Our machines are fitted with high quality linear guidelines from THK, Bosch Rexroth and HIWIN, servo motors and controllers from Panasonic, pneumatic accessories from Festo etc. These top quality parts assure long term reliability of our machines. We have made a name for ourselves mainly thanks to the technological level of our solutions. The cutting technologies are constantly developing mostly in terms of cut quality, accuracy, cutting speed and maximum cut thickness. As these parameters improved, the thermal cutting started to push conventional machining technologies out of many production areas. If the part is cut with high accuracy, it doesn't have to undergo any further machining. High quality plasma, fiber laser, waterjet and CNC machines can cut parts with beveled edges ready for subsequent welding. Machines with drilling heads allow drilling, tapping and countersinking. Parts can be also marked by different technologies (laser, plasma, inkjet, micro-percussion). We can clearly see it is not only about the cutting but about complex part preparation and such machines are basically complex production centers. If we add systems for automatic loading/unloading and sorting of the cut parts, it is an automated production cell. This is exactly the kind of product we deliver. We also provide service for our machines; each is equipped with remote diagnostic software.

> "MicroStep doesn't deliver only machines; we deliver a complete workplace."
>
> **Alexander Varga, Ph.D.**
> *Head of R&D*
> *MicroStep*

MicroStep is a producer and supplier of CNC machines for cutting by plasma, laser, oxyfuel and waterjet. What are the latest trends and requirements of your customers in this area? Which technologies appear to be the most perspective?

Dr. Alexander Varga: Each of the mentioned technologies has its place and I don't believe one will be pushing the other out, even though application areas of for example plasma and laser do overlap a little. Over the last 20 years, the plasma technology has gone through huge development. Today, it is possible to cut metals up to 50 mm thick and still maintain high quality. We equip our machines with plasma sources from Hypertherm (USA) and Kjellberg (DE). Both of these companies represent the top in their field. However, when cutting thin materials with fine details, plasma will never reach quality of laser cutting. Laser cutting too has been going through period of rapid development. CO_2 lasers have been swiftly replaced by solid-state fiber lasers which transfer the laser beam into the cutting head via optical fiber. That enables simpler construction of large-scale laser cutting machines without the need to place the laser source directly on the machine gantry. This technology is suitable for cutting materials up to 25 mm thick. For our laser machines we use IPG (USA) laser sources.

Waterjet cutting on the other hand is most suitable in cases when thermal cutting isn't an option or when required materials can't be cut by other technologies (rubber, plastic, etc.). These machines are equipped with high pressure pumps from Hypertherm (USA), KMT (USA) and BFT (AT).
The oxyfuel cutting technology is dominating in the field of very thick materials usually cutting metals up to 300 mm thick.
These days, the cutting technology itself is not the primary concern for our customers anymore. More and more they want automation solutions with automatic loading, unloading, sorting of the cut parts, fully automated production cells connected to higher level of production management which fit into the recent global trends known as IoT and Industry 4.0.

Apart from development and manufacturing of new products you also develop your own software with specialized modules for particular machining applications and thanks to that you are able to offer a wide portfolio of products and services to your customers. What is it that makes MicroStep different from its competitors? What do you consider to be strengths of your company?

Dr. Alexander Varga: Software products are an integral part of our systems. MicroStep doesn't deliver only machines; we deliver a complete workplace which includes the cutting machine and software for creation of NC code. The software nests the parts in a way which leaves minimal amounts of waste, adds lead-ins, lead-outs, defines cutting priorities etc. In case the unit is equipped also with automatic loading and unloading, the software is responsible for the entire process. We develop all of the software ourselves. Naturally, there are customers who create their cutting plans using software from a different producer, but we are able to adapt also in this case. Thanks to the entire system being in our hands, we are able to offer solutions our competition can't. A great example of that is a special machine for a customer from Belgium. Apart from standard plasma cutting head there is a robot functioning as another cutting head for cutting pipes up to Ø 2,000 mm (see page 37). The main strength of MicroStep is a strong, experienced and capable development team which allows us to create tailor-made machines. Many of our competitors can't do that and our customers greatly appreciate this fact.

Your success is highlighted by the fact that you managed to succeed abroad where you have representation in many countries. Where in the world do you operate and in what markets do you have the strongest presence?

Dr. Alexander Varga: We are currently being represented by more than 40 dealers active in 55 countries worldwide. These companies aren't responsible only for the sales but also for the service and maintenance. The most significant is our representation in Germany by our subsidiary MicroStep Europa GmbH, which sells approximately 30 % of our yearly production in Germany, Austria and Switzerland. European market is the one where we have the strongest presence and are able to sell the most complex solutions. We also have strong representation in Russia and China and are currently starting business activities in USA, Canada and Australia.

With the slogan "Your Partner for Cutting and Automation" you offer a wide portfolio ranging from small solutions for schools or workshops to customized automated production lines for steel centers, shipyards or the automotive industry. Could you name some of your most prominent customers? Are there any unique projects you managed to realize recently?

> "Every customer is important to us and we approach his machine order responsibly. "
>
> **Alexander Varga, Ph.D.**
> *Head of R&D*
> *MicroStep*

Dr. Alexander Varga: Every single customer is important to us and we approach his machine order responsibly. Important category of customers who need heavy-duty machines are shipyards. We have delivered several solutions for this segment recently. One of those is a large-scale CNC fiber laser cutter 50 m long and 3.5 m wide for Chantiers de l'Atlantique (until recently STX France - see page 28). The machine powered by an 8 kW solid-state fiber laser source and equipped with a bevel head. Other significant solutions are plasma cutting machines delivered to Irving Shipbuilding shipyard in Canada, Vard Tulcea shipyard in Romania, German Naval Yards in Germany with others on the way. These machines are a part of lines for production of large-scale panels used for shipbuilding delivered by Finnish company Pemamek with MicroStep being a subcontractor. Working areas of these machines range up to 24 x 24 m. Apart from bevel cutting with plasma they are equipped with inkjet marking and plasma marking/blasting solutions that prepare places where stiffeners will be subsequently welded. Our customers are renowned companies like ThyssenKrupp, Bosch, Doppelmayr, Viessmann, Lürssen and others.

The history of MicroStep in its nearly three decades is a story of success. Where do you think has been the starting point for this fruitful run and what is in your opinion the long-term trend and prognosis for the future?

Dr. Alexander Varga: The beginning of our evolution from a small university-based start-up to a worldwide company happened 1997 in Essen, Germany. At this time, we managed to get ourselves – together with other companies from Slovakia – and with one of our simplest machines – into an exhibition stand at the internationally recognized Welding & Cutting fair. There we made first contacts with potential customers and also with potential dealers. Gradually the number of produced machines increased and these machines needed to be serviced and so naturally, a subsidiary company was founded in Germany (MicroStep Europa GmbH) responsible for sales and service. Later others were founded. The first one mentioned is the most established and sells more than 60 machines every year. Here lays the basis of our business success story. Today we produce approximately 180 CNC machines while 95% of the production is sold abroad. During the existence of MicroStep, we have sold over 2,500 machines into 55 countries worldwide.
We have the development and administration center in Bratislava (SK), production facility in Partizánske (SK) and production facility in Hriňová (SK).

Where did you invest most recently and what projects are you planning for the future?

Dr. Alexander Varga: Apart from investments into development and innovation of our entire portfolio, our investment activity is focused on the production infrastructure. In 2011 our administration and development center in Bratislava was finished and it was followed by renovation of production facilities in Partizánske and Hriňová. In 2017 we built a new assembly hall in Partizánske. Now we are planning to further expand the production halls in Hriňová. We are also continually expanding the equipment of our factories. We are currently in the process of implementing an advanced project management system.

What are your other goals and plans for the future?

Dr. Alexander Varga: Our main goal is to strengthen our position among the top producers of energy-beam cutting machines. It is a long-term continuous process of building up a good production base, good development teams, steady product improvement and a qualified dealer network.

Dr. Alexander Varga attending the finals of EY World Entrepreneur of the Year™ in Monte Carlo in 2015. Together with Eva Stejskalova he was national winner of the EY Entrepreneur of the Year™ prize awarded by the renowned consulting company EY for their achievements with MicroStep.

The MicroStep Group

State-of-the-art solutions for processing of plates, pipes, profiles, beams and domes

Activities of companies associated in MicroStep Group range from development, production and sales of CNC cutting machines to supplying of control systems and software products for power industry, rubber industry, automotive industry and mechanical engineering companies. The parent company MicroStep, spol. s r.o. was established in 1991 by members of the Department of Automation and Regulation, Faculty of Electrical Engineering and Information Technology, Slovak University of Technology in Bratislava, Slovakia with the aim to develop and deliver microprocessor-based control technology to various branches of industry. Over the years, the company has become one of the leading suppliers of cutting equipment that supplied more than 2,500 cutting machines worldwide in cooperation with strong channel partners spread over 54 countries.

Today, MicroStep is offering the full range of contemporary cutting technologies – plasma, laser, oxyfuel, waterjet – along with a great variety of supplemental equipment and software for drilling, tapping, countersinking, marking, process synchronization, automated material handling and robotic solutions. As a producer of not only the machines themselves but also of control systems and CAM software, the company delivers solutions that fit custom demands and are future-proof with respect to machine extensions in size and additional technologies. Moreover, MicroStep's machines can process different types of materials including plates, pipes, profiles, beams, domes or elbows while implementing advanced automation processes. All of MicroStep's machines are controlled by iMSNC®, a multi-tasking PC-based control system developed and produced in-house.
The focus of the company are hi-tech machines that accommodate industry's latest trends –fully automatic workplaces that combine different cutting/drilling/marking technologies in connection with automatic loading and unloading systems, following the demands for higher level of machinery automation and interconnection of control systems, CAM software and ERP systems.

Core values of MicroStep – customer-oriented and fair approach, continuous innovation and profound expertise – are rooted deeply in the company's culture

As a technology and equipment innovator, the company keeps introducing new solutions to the market on a regular basis and holds several patents. In line with its long-term effort to establish automated CNC bevel cutting as a common production technology for preparation of weld edges on different types of materials, MicroStep's patented technology ACTG® – a system that reduces the setup time of a bevel head from hours to a couple of minutes – has already been delivered with more than 400 systems and is proving its relevance in daily operations worldwide.

Rapid growth of MicroStep over the years resulted in founding of several domestic and international subsidiaries, most notable of which are MicroStep Europa GmbH in Germany, MicroStep USA, MicroStep Canada and MicroStep China. Together with subsidiaries, the company has a total of over 500 employees, out of which more than 10 % are working in the field of integrated development of mechanical and electronic nodes of CNC machines and control systems software.
The company operates two production sites in Slovakia in the towns of Partizánske and Hriňová. In addition to its own R&D base, MicroStep works closely with departments of the Slovak University of Technology in Bratislava and the Institute of Materials & Machine Mechanics of the Slovak Academy of Sciences on utilization of latest achievements in design and control of machinery. Thanks to its innovation driven production, MicroStep has become a valued partner for industry´s leading manufacturers: Hypertherm, Kjellberg, IPG, HIGHYAG, Precitec, KMT, BFT, GCE, Harris in the field of cutting technology; Bosch Rexroth, THK, HIWIN in the field of linear motion components; Festo, Asco Joucomatic in the field of pneumatic components; Donaldson and Teka in the field of filtration systems, Panasonic in the field of motor controls and ABB, Fanuc and Mitsubishi in the field of robotics.

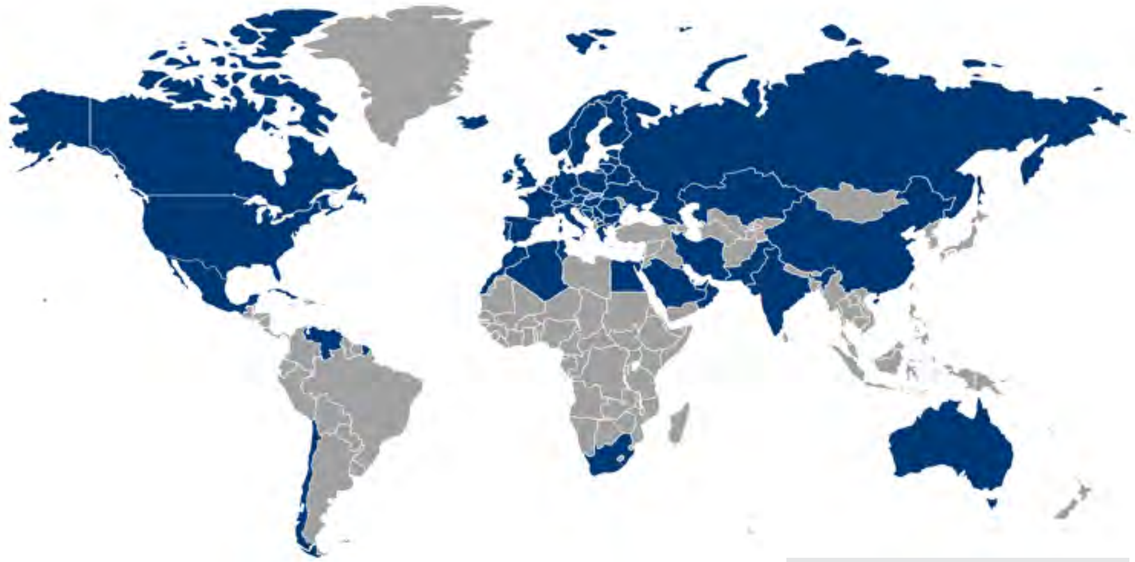
Multi-functional CNC cutting machines

PLASMA – LASER – OXYFUEL – WATERJET – DRILLING – TAPPING – COUNTERSINKING – MARKING

- Processing of plates, pipes, profiles, beams and domes
- Combinations of technologies on one machine
- A wide range of accessories
- Material handling & material flow automation
- CAPP applications for production management
- 2D & 3D CAM software
- Robotic solutions

The MicroStep World

Present in more than 50 countries worldwide



MicroStep | Your Partner for Cutting and Automation

Through a network of authorized representatives, MicroStep is present in 54 countries. More than 90% of our production is destined for export. Apart from our home market – Slovakia – and almost all European countries, MicroStep cutting machines also operate in the USA, Canada, China, Russia, South Africa, the Middle East, India and Australia. In the field of plasma cutting, the company belongs among the world's largest producers.

Contact the MicroStep representative in your area to discover the variety of MicroStep's products and features!

Our customers | Strong partnerships at a global level

The technology of MicroStep and our long-term experience in the cutting and automation fields have helped us to build a user base spread across many different industries, from schools and small workshops to big multinational enterprises. The know-how of our employees helped realize more than 2,500 cutting machines worldwide. We appreciate the trust of each of our customers, among others:

MicroStep spol. s r.o.

Alex Makuch
Managing Director
MicroStep

"Our success would not be possible without strong partnerships with our suppliers and, most importantly, without the profound commercial and technical abilities of our sales partners. Together we make it happen."

MicroStep®

Your Partner for Cutting and Automation

Complex & Multi-functional

There is hardly any other CNC system with such a variety of technologies provided by a single machine for such a variety of materials: sheets, pipes, profiles, beams as well as domes. MicroStep is offering such versatile and efficient solutions by nature.

See the cut sample above – bevel cutting of contours and openings, drilling, tapping, countersinking, punch marking and contour marking, all delivered in a fully automatic mode by our multi-functional plasma all-rounder MG.

And such versatility can be experienced in laser, oxyfuel and waterjet fields as well. For example, our modular fiber laser system MSF provides bevel cutting of plates and pipes along with drilling, tapping, countersinking, marking and automatic material handling options.

Contact the MicroStep representative in your area!

For more information visit:
www.microstep.eu/dealers

Product Catalog

Information on all MicroStep cutting systems can be found in our current product catalog.

MicroStep®

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