



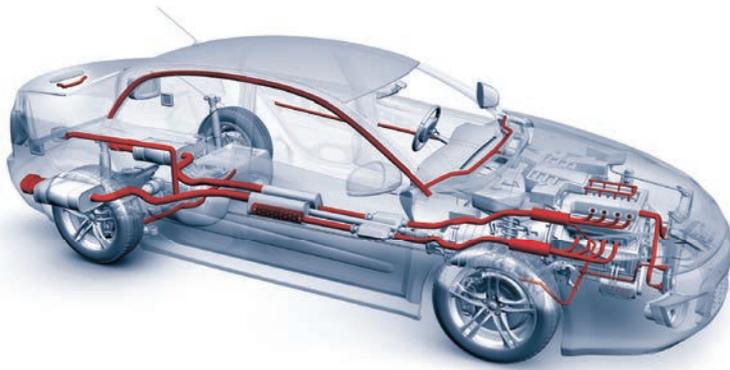
# High Performance

Machines for Serial and  
Large-scale Mass Production

**polwelt**

Bending to perfection.





## Innovative and Efficient

The manufacturing industry faces major challenges around the world and across economic. Manufacturing processes not only need to be faster, cheaper and more flexible today, but also accommodate the current mega-trends, such as sustainability, resource management and customization. Stricter legal regulations demand a more careful use of resources and protection of the environment. Designers in the aviation and aeronautics, car manufacturing, air conditioning and hydraulic piping sectors are thus being forced to develop component parts which are overall more compact, lighter weight and at the same time heavy duty. Intelligent bending concepts capable of machining even high-strength steels and special materials accurately and economically are required to meet these needs.

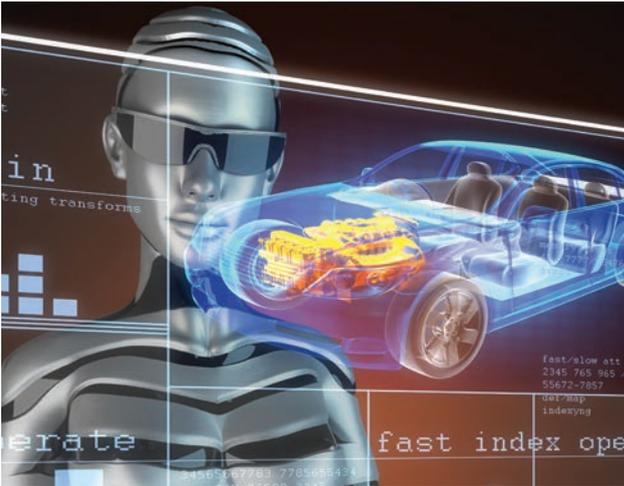
Current environmental regulations and rising energy prices are forcing companies to improve their overall production processes. To achieve this, innovative technologies are required that reduce energy consumption intelligently and thus cut costs. Processes also have to be designed to use resources more conservatively in future to improve efficiency and ensure that all output is of the highest quality.

### **Time is money**

At the same time, as the saying goes: time is money. What needs to be done is to guarantee high availability in state-of-the-art mass production by shortening cycle times and still maintaining quality. Minimized manufacturing cycles, setting-up and down times as well as a high level of utilization can only be guaranteed by outstanding service and intelligent systems that can be integrated in existing production environments.

### **We are setting new standards**

To respond to these current trends in an appropriate manner, a maximum of technical progress and innovation is needed. This starts with the efficient production of semi-finished products. And this is precisely where the bending solutions from Schwarze-Robitec come in. We have an in-depth knowledge of the current industry demands our customers face. To create new standards for tube processing tomorrow, we have invested great effort in research and development. With our industry experience and our technical expertise we offer you the right solution for long-term success.



## Satisfying Industry Demands with Expertise

Industry's ultimate aim is to make processes more efficient in terms of time and more economical and to improve quality and throughput at the same time. Consequently, for large batches industry relies on consistent process chains. The intelligent networking of all of production shortens manufacturing cycles and lowers manufacturing and production costs. Production capacities can only be raised with state-of-the-art tube bending machines. Combined with online maintenance systems that are deployed during actual production, modern systems minimize idle times. Optimized setting-up times also contribute effectively to economic and flexible production with fast and easy tool changing.

Sustainability, environmental protection as well as high prices for energy and raw materials demand a change in the

### Always available

The high cost pressures faced by modern industry and the need for efficient production chains require the use of systems and machines with high availability. But the systems also have to be integrated in existing production chains. Our machines are some of the most affordable worldwide in regard to total cost of ownership (TCO).

They provide the means to perform all steps from manufacturing to inspection of the components parts fully automatically and fully integrated. With a long period of use of 10-15 years they have proven reliable for decades in three-shift continuous operation. They regularly attain a high availability and thus also meet all requirements of the automotive industry.

existing production processes. To be able to meet the legal requirements to reduce fuel consumption, the automotive industry is increasingly relying on lightweight construction. The high-strength materials and thin-walled tubing required for these applications make high demands of tube bending machines. Among other standards, they also have to meet strict requirements in regard to surface quality similar to those in the aviation and aeronautics industry.

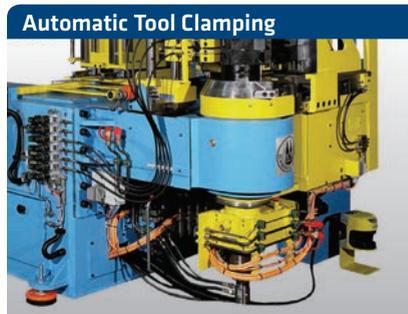
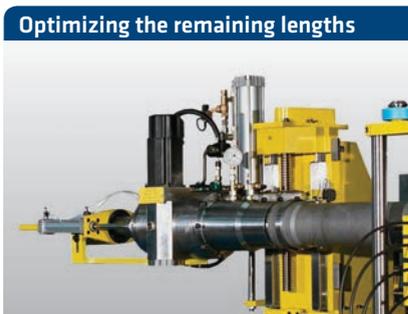
### Resource-saving and energy-efficient production

The efficient use of energy also needs to be considered. One practical solution, for example, consists of control drive mechanisms that put the machine into no-load operation during idling. Intelligent electric drives also help save energy. These drive mechanisms ensure that power is only used when mechanical power is needed. At the same time, innovative drive technologies make the machines very efficient.

More sustainable manufacturing processes can only be based on technologies that replace previous systems with innovative methods and processes. During conventional production, for example, elaborate cleaning of the piping systems produces environmental pollutants. State-of-the-art bending concepts are needed for these applications with high-tech micro-lubrication systems that prevent lubricant residue. Only the most modern machines are capable of forming applications that save both on resources and materials.

### Our answer: knowledge of the industry and innovation

As longstanding development partners, we are well-acquainted with the challenges currently facing a wide range of industries. We work closely with our customers and develop the right solutions for even the most sophisticated production tasks. We look forward to your particular challenge.



# Optimally Adapted to Your Requirements

## Our extras

Our CNC machines are available in a wide range of variants: single stack, multi stack, as fully automatic or also with a left-and-right bending function. The configurable modular machine and accessories program also offers maximum flexibility. A tube bending machine designed precisely for your specific production requirements makes a major contribution to maximizing productivity and contributes decisively to your competitiveness.

It is our aim to find the best possible solution together with our customers. That's why none of the systems we produce and sell are „off the rack“. Instead, we start every new project with a comprehensive consultation. This is how we find the truly best bending solution for your task together with you.

## Your Optional Extras

These are just some of the examples of the wide range of accessories available from Schwarze-Robitec.

### Height-adjustable pressure dies

Efficient at every level. Our multiple-radius bending tool is even more efficient and cost-effective when used with one of our own developments: height-adjustable pressure dies. The dies are moved to the required bending plane. Instead of a multilevel pressure, all that is needed is a single groove pressure die.

### Mandrel bar protection

Perfect protection. The mandrel bar safety device prevents axial overloading which can be caused by a damaged tube or an incorrect tool setting.

### Optimizing the remaining lengths in boost systems

Resource-saving production. Using this jig, a bend is added in the wiper die using a centering sleeve. This reduces the remaining lengths of tubing to a minimum.

### Rapid Clamping System „Quick Tool Unlock“

The rapid clamping system “Quick Tool Unlock” allows quick change of the bending formers without tools and therefore reduces set-up time noticeably. It is comprised of a tie bar support which is opened by a clamping lever that can be swiveled away from the bending former. In interaction with the automatic tool clamping, the bending former can be removed without any difficulty.

### Individual safety concepts

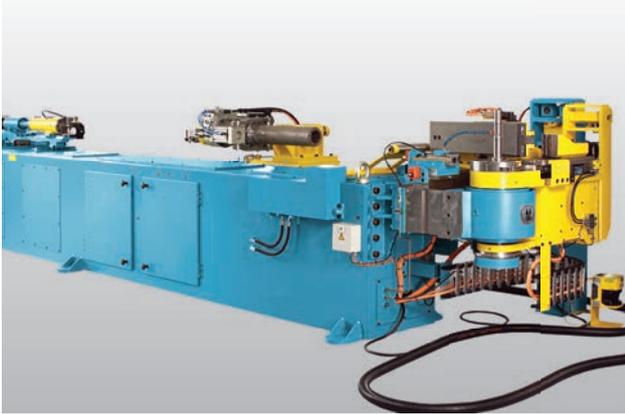
Get good results safely. Protective fencing, laser barriers and laser scanners all protect the machine: our safety concepts give you and your operators the greatest safety at work.

### Network and peripherals connections

Intelligently networked. Our machines can be connected to production peripherals and company networks in many different ways – depending on the desired degree of automation.



## CNC 60



### For any application: single stack CNC machines

Excellent operating efficiency and precision: typical of the CNC tube and profile cold bending machines with PC-CNC control for any application. These all-rounders bend tubing and profiles fast and efficiently. They are thus ideally suited for manufacturing in a wide range of pipe manufacturing segments and industries.

### Drive systems – for any application

Expertise in drive systems. We offer CNC machines in different versions: hydraulic, electric, part-electric and as hybrids – optimally adapted to your requirements.

## CNC 100 MR



### Versatile: multi stack CNC machines

Equipped for a wide range of tasks. For the production of different radii, bend-in-bend systems and piping systems such as manifolds and exhaust pipes, our multi stack CNC machines equipped with several clamp jaws are the ideal solution. The powerful mandrel bending machines of the CNC MR series are equipped with multiple-bending tools. The multilevel technology when combined with customizable tools ensures that forming tubes with very short intermediate lengths between the individual bends is easy and accurate. This technology is capable of bending, for example, exhaust pipes with a bending radius of 1xD even without straight intermediate lengths between two bends.

## Technical data

Illustrations may include optional equipment. Special versions by request. Subject to technical modification. Further optional equipment is available on request.

		CNC 18	CNC 25	CNC 40	CNC 60	CNC 80/60 CNC 80/60 MR	CNC 80	CNC 100/80 CNC 100/80 MR	CNC 100	CNC 130
<b>Max. Ø tube x wall thickness</b>										
▶ Tensile strength: 450 N/mm <sup>2</sup>	mm	18 x 2	25 x 2	40 x 2	60 x 3	70 x 3,5	80 x 2,5	100 x 2,5	114,3 x 3	130 x 3
▶ Tensile strength: 750 N/mm <sup>2</sup>	mm	15 x 1,5	20 x 1,5	32 x 1,5	55 x 2	65 x 2	75 x 2	90 x 2	100 x 2	120 x 2
<b>Max. section modulus</b>	cm <sup>3</sup>	0,4	0,8	2,2	7,3	11,6	11,9	18,2	28,4	37,1
<b>Max. centerline bending radius (CLR)</b>	single stack	75	75	150	200	200	290	290	350	450
	multi stack	60+15	60+15	125+25	160+40	160+40	240+50	240+50	285+65	350+100
<b>Min. centerline bending radius (CLR)</b>	mm	10	10	10	20	30	30	50	50	50
<b>Tube length (basic machine)</b>	mm	2,000	2,000	2,000	2,000	2,000	2,000	3,000	3,000	3,000
<b>Max. bending angle</b>										
▶ forward, steplessly adjustable	RPM	100	100	45	24	22	22	75	75	6
▶ return, constant	RPM	100	100	45	24	22	22	75	75	6
<b>Power requirement</b>	kW	11	15	22	30	45	45	50	50	40
<b>Bending direction</b>		Clockwise – on request counter clockwise								
<b>Weight of machine approx.</b>	kg	1,000	1,650	3,000	5,500	7,000	7,200	11,000	11,500	13,500



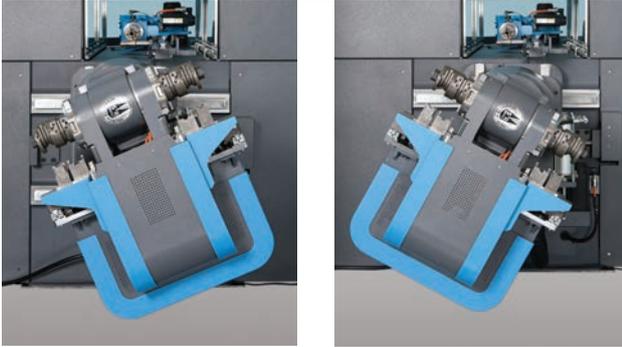
## CNC Rotary and CNC Twin



### In one step: clockwise and counter clockwise

In every direction: The CNC Rotary and CNC Twin series machines for any bending application need only one step for bending both in a clockwise as well as a counter clockwise direction. Even the most complex tube geometries are possible.

### Rotating bending head of the CNC Rotary bending machine



## CNC machines as automatic bending cells



### Fully-automatic manufacturing

All of our CNC machines can be expanded to a fully automated bending cell. The range of additional functions extends from automatic pipe feed to insertion and removal systems to an integrated production line, consisting of a bending machine, tube separation and sorting, end finishing machine and 100% inspection for high output. Anything is possible. We are also available to assist any of your other partners.

### Optional Extras (excerpt)

- Mandrel bar safety device with electrical monitoring
- Automatic mandrel bar lubrication unit
- Automatic central block lubrication
- Wiper die holder
- Wiper die lubrication
- Vertical height-adjustable pressure dies multi stack axis
- SpringMatic measuring system for springback compensation
- Programmable clamping cartridges
- Optimization of remaining lengths for boost system
- Bus interface for connecting a wide range of robot types
- Expansion option to fully-automatic machine

CNC 160   CNC 160 MR	CNC 18 Twin	CNC 25 Twin	CNC 40 Twin	CNC 60 Twin	CNC 40 Rotary	CNC 60 Rotary
160 x 3,5	18 x 2	25 x 2	40 x 2	60 x 3	40 x 2	60 x 3
160 x 2	15 x 1,5	20 x 1,5	32 x 1,5	55 x 2	32 x 1,5	55 x 2
65,9	0,4	0,8	2,2	7,3	2,2	7,3
500	75	75	150	200	150	200
400+100	60+15	60+15	125+25	160+40	125+25	160+40
50	10	10	10	20	10	20
3,000	2,000	2,000	2,000	2,000	2,000	2,000
4	100	100	35	24	35	24
4	100	100	35	24	35	24
40	11	15	22	30	25	30
Clockwise & Counter Clockwise						
15,000	1,000	1,650	3,000	5,500	3,200	3,200

# Equipped for Every Task



## Bending tools for the highest quality

Regardless of whether you want to bend different radii or tubing – our machines are versatile and can be equipped with the precise tool for your bending order. The especially sturdy tools easily process ultra-high-strength materials. We use only first-class materials and sophisticated manufacturing processes for our specially hardened tools. The result: a high degree of resistance to wear as well as dimensional stability that guarantees that you get a precise, long-lasting and first-class production solution of the highest standard.

Bending tools for excellent quality. Our designers develop and manufacture all tools together with you to meet your specific requirements. If a tool needs replacing after long loading, rapid replacement is guaranteed. Within the shortest possible time, your new tools are manufactured and delivered to you based on the stored data.

Constant spare parts availability and in-house production of individual components without delay also guarantee the necessary operational reliability of your entire production.



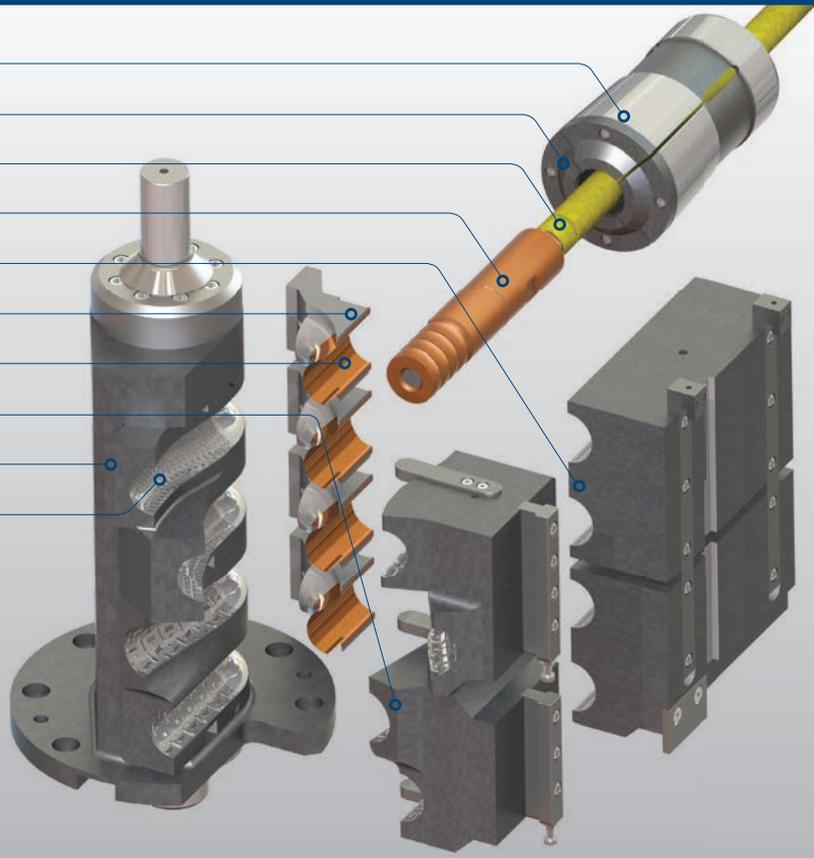
Multi-radius Bending Tool

## Automatic, fast, and intelligent

The multi-radius bending tool makes production processes especially fast. Product parameters can easily be stored in the system, documented and reproduced at any time with the highest precision.

## Bending tool

- 1 Collet
- 2 Collet Insert
- 3 Mandrel Rod
- 4 Ball Mandrel
- 5 Pressure die
- 6 Wiper Die Cassette
- 7 Wiper Die Insert
- 8 Outer Clamp Jaw
- 9 Bend Former
- 10 Inner Clamp Jaw



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