

## Breve presentación: Las Cifras Clave de WAFIOS

- **Fundación:** 1893.
- **Fundadores:** Ernst Wagner, Hans Ficker y Otto Schmid.
- **Sede:** Reutlingen.
- **Junta Directiva:** Dr.-Ing. Uwe-Peter Weigmann  
Dipl.-Ing. Jörg Eisele Martin Holder  
Dipl.-Ing. Martin Mayer.
- **Empleados:** 1027 en el grupo WAFIOS  
45 Desarrollo de hardware y software  
80 Diseño mecánico.
- **Facturación:** 203,4 millones de euros  
(Facturación prevista de WAFIOS Group para el 2025).
- **Cuota de exportación:** 64 % (en 2024).
- **Gama de productos:** >130 modelos de máquinas.



## 1

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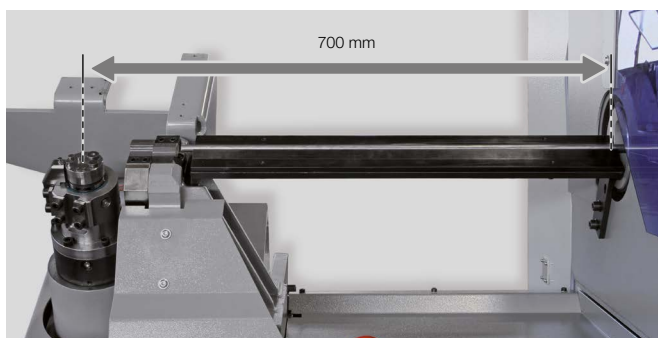
## CNC Coiling and Bending Machines for the Production of Two- and Three-Dimensional Parts made of Wire



Series  
B

# Series B

▼ Fixed bend-back clearance



▼ Feed unit including straightening unit



## Our Accomplishments for your Benefit

- Reduced machine concept cuts costs per unit
- High flexibility and safety due to reliable and proven tool concept
- Safe and simple operation due to our WAFIOS Programming System WPS 3.2 EasyWay
- Minimization of set-up times due to *iQ* software functions
- Simple handling of wire, from infeed unit up to bending head

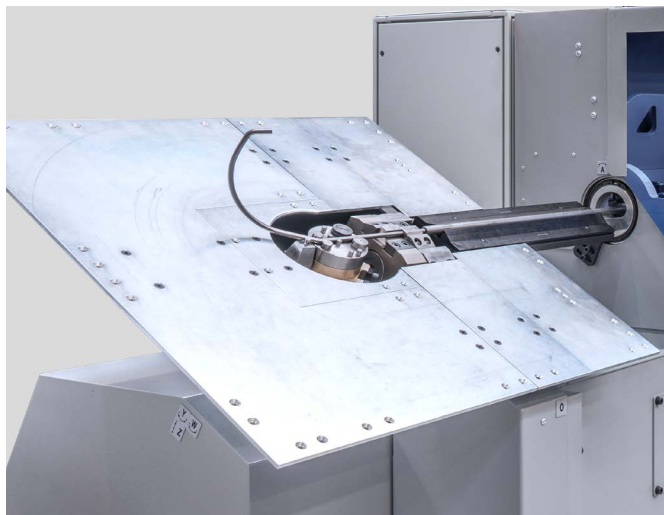
## Design Features

- 6 CNC axes (standard)
- Robust feed unit for advancing and rotating the wire, together with combination roller straightener
- Fast, cycle-time optimized, CNC-controlled cutting unit
- Versatile bending head with large bending space and flexible application possibilities by infinitely rotating bending and mandrel axis as well as large up/down strokes
- Feed and bending tools compatible with BM series as of 2003 (multi-radii and 4-pin bending tool)
- No lateral displacement of the bending head
- Combination roller straighteners cover the entire operating range of the machine
- Hand-held operating device
- Fast, PC-based CNC control
- Electr. M functions, standard
- Optical control for process monitoring (option)

## Operation

- User-friendly and fast set-up with the hand-held operating device
- Reduced set-up times due to ergonomic access to all tool positions as well as simple and fast programming of tools, material properties and bending programs with WPS 3.2 EasyWay
- *iQbend*: Automatic optimization of CNC program sequences with regard to the geometry of the bent part (option)
- *iQinspect*: Import/export of nominal data or correction data from external measuring systems to WAFIOS Programming System WPS 3.2 EasyWay

▼ Bending head



# Versatile, Flexible and Profitable – WAFIOS CNC Coiling and Bending Machines, Series B

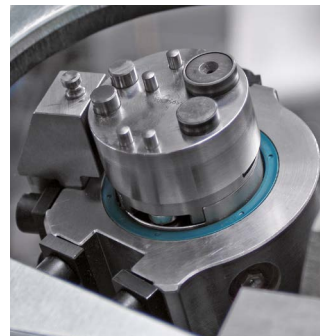
## Trend-Setting Machine Concept

The WAFIOS B Series has been designed for the production of two- and three-dimensional wire parts. It offers a new machine concept based on components and tools that have been tried and tested hundreds of times. High process safety, the possibility to employ tools of predecessor models and the familiar standard operating system WAFIOS WPS 3.2 EasyWay enable high outputs.

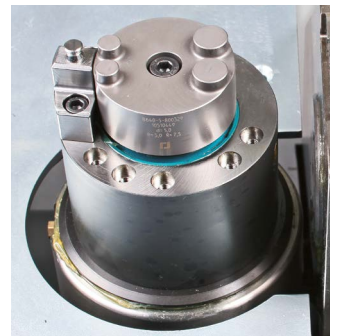
The rotation of the wire is based on a well proven concept. The stationary mounted bending head is very robust even when high bending speeds are used.

Reliable concept: Fast and precise bending and coiling operations due to high flexibility of tools.

Sophisticated safety concept, CE conformity in accordance with Machinery Directive 2006/42/EG, in connection with pay-off unit AHP / AGH / H and protective fence.



▲ Multi-radii bending tool for bending and free-form bending



▲ 4-Pin bending tool, type 5

## Quality

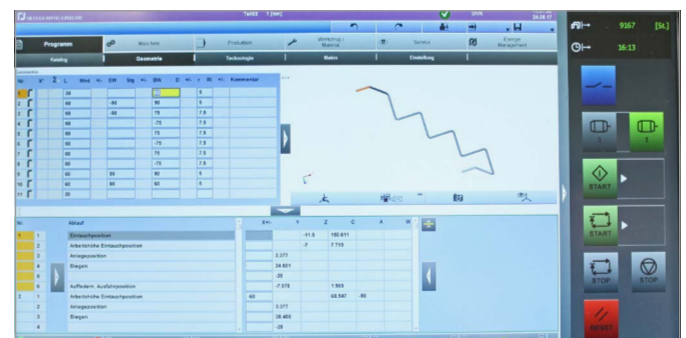
For more than 125 years, the name of WAFIOS has been synonymous with highest quality, safety standards, and technical innovations in the German machine manufacturing industry.

## Reliability

Strict quality controls, state-of-the-art production systems, and many years of experience guarantee that your investment is safe in our hands. Our global service network ensures high availability of WAFIOS machinery.

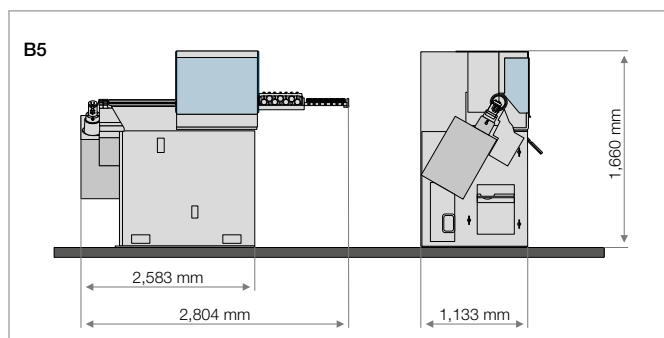
## Cost efficiency

High production output and a long service life will save money and shorten the amortization time of your investment.



▲ User-friendly WAFIOS Programming System WPS 3.2 EasyWay

Technical Data	B4	B5
Operating range, wire Ø: 600 N/mm <sup>2</sup> 1.200 N/mm <sup>2</sup> 1.900 N/mm <sup>2</sup>	3.0 – 8.0 mm 3.0 – 5.0 mm 3.0 – 4.0 mm	4.0 – 10.0 mm 4.0 – 6.0 mm 4.0 – 5.0 mm
Feed rollers	3 Pairs	4 Pairs
Rotary angle, mandrel axis	Infinite	Infinite
Rotary angle, bending axis	Infinite	Infinite
Bending head, up/down stroke	+25 mm / -120 mm	+25 mm / -120 mm
Bend-back clearance	700 mm	700 mm
Bending head positioning	+30° fix	+30° fix
Feed speed	max. 120 m/min	max. 120 m/min
Bending torque	ca. 520 Nm	ca. 1,050 Nm
Number of standard CNC axes	6 fix	6 fix



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Precision Machinery for Wire and Tube

## CNC Single-Head Bending and Coiling Machine for the Production of Two- and Three-Dimensionally Bent Parts and Frames from Wire and Profiled Materials



B 36 Performance

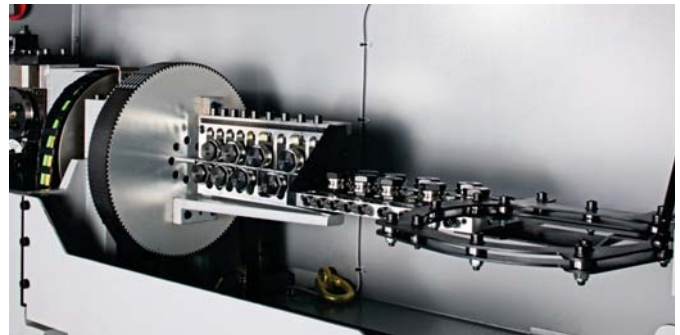


## B 36 Performance

▼ Two options for bend-back clearance (400 or 800mm)



▼ Infeed including straightening unit



### Our Accomplishments for your Benefit

- Performance machines are built on the basis of many years of WAFIOS know-how.
- Application-oriented standard equipment based on solid and reliable technology - Performance machines have been designed for the most common wire bending applications
- Defined number of options - In contrast to High-Performance machines, there is a limited number of options available
- WAFIOS WPS 3.2 EasyWay high-end programming system
- Modern operating concept based on the one used by the High-Performance machines of the B, BM and BMU series

### Design Features

- Basic machine with 5 CNC axes (standard) upgradable to a maximum of 6 axes
- Robust infeed unit for advancing and rotating the wire together with the roller straightening unit, it can be displaced manually in order to adjust the bend-back clearance
- Diverse bending tools with large bending clearance and flexible application possibilities thanks to the infinitely rotating bending and mandrel axes as well as vertical strokes
- Defined number of options, e.g. CNC-controlled support plate or guide wheel are available

### High-End Programming System

- User-friendly machine operation with WAFIOS latest WPS 3.2. EasyWay programming system with plain-text programming of lengths, angles or coordinates
- Connection to all machine components and graphic user interfaces
- Control panel carriage with a touchscreen display and hand-held operating device

▼ Control panel with new hand-held operating device



# Safe, efficient and profitable – WAFIOS B36 Performance CNC Single-Head Bending and Coiling Machine

## Performance - The New Definition of Flexibility

WAFIOS Performance Machines are characterized by optimized basic equipment and by a defined selection of options. The machines are based on decades of WAFIOS engineering know-how. All Performance machines are equipped with the high-end WAFIOS WPS 3.2 EasyWay programming system. All these features result in high outputs and high machine availability.

On the WAFIOS B 36 Performance, there are two options to adjust the distance between feed unit and bending head. Therefore, the machines feature very reliable bending and coiling parameters that enable a wide range of possible applications.

The standard equipment of the machines includes 5 CNC axes. The machines can optionally be equipped with an additional support plate (1 CNC axis). This plate can be used to produce large frame parts in the 3D bending mode. The machine design engineered by WAFIOS with rotating infeed unit and fixed bending head guarantees highest production output while maintaining outstanding quality.



▲ Standard 4-pin bending tool

## Quality

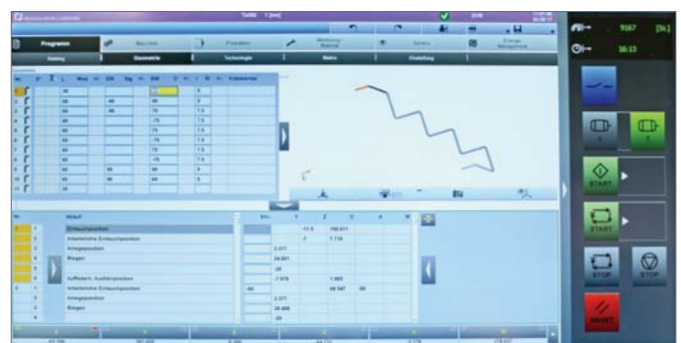
For more than 125 years, the name of WAFIOS has been synonymous with highest quality, safety standards, and technical innovations in the German machine manufacturing industry.

## Reliability

Strict quality controls, state-of-the-art production systems, and many years of experience guarantee that your investment is safe in our hands. Our global service network ensures high availability of WAFIOS machinery.

## Cost efficiency

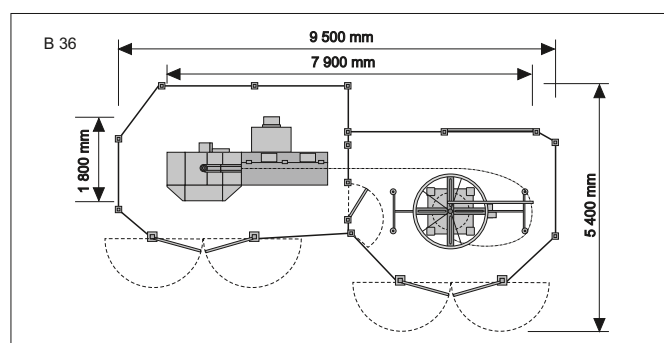
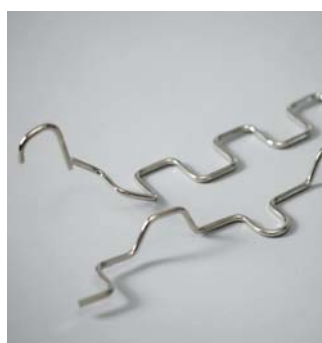
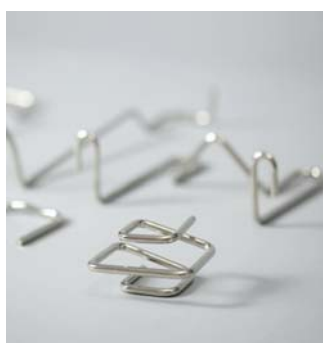
High production output and a long service life will save money and shorten the amortization time of your investment.



▲ Userfriendly WAFIOS Programming System WPS 3.2 EasyWay



Technical data	B 36
Working range wire Ø	
< 600 N/mm <sup>2</sup>	2.0 – 6.5 mm
< 1 200 N/mm <sup>2</sup>	2.0 – 4.5 mm
< 1 900 N/mm <sup>2</sup>	2.0 – 3.6 mm
Infeed rollers	2 pairs
Angle of rotation of mandrel axis	Infinite
Angle of rotation of bending axis	Infinite
Vertical stroke of bending head	+5 mm / -20 mm
Manual bend-back clearance (mm)	400/800
Orientation of bending head	+30° fixed
Stroke of CNC support plate (opt.)	+25 mm / -200 mm
Infeed speed max.	120 m/min
Bending moment	ca. 180 Nm
Number of CNC axes max.	5 (6 option)



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Precision Machinery for Wire and Tube

## HighSpeed CNC Coiling and Bending Machine for the Production of Parts and Frames from Wire and Profiled Materials



BM 36 *HighSpeed*  
BM 43 *HighSpeed*

# BM 36 *HighSpeed* BM 43 *HighSpeed*

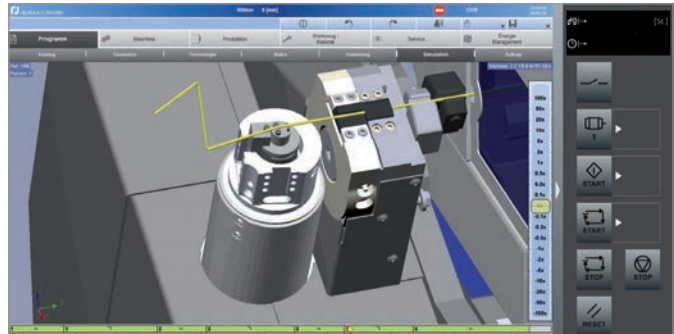
## Our Accomplishments for your Benefit

- The highly dynamic drives and the 5-year license of *iQsmartbend* of the new BM HighSpeed series guarantee highest quality of parts and economic efficiency
- The machine's innovative design and new developments increase its dynamics while maintaining its well-known reliability
- The servomotor-driven displacement of the feed unit enhances the quality of parts and offers highest degrees of geometrical freedom due to variable bend-back clearances
- The high-end control WPS 3.2 EasyWay features an intuitive user interface, it reduces set-up times to a minimum and enables an easy production of complicated parts
- The HighSpeed series offers maximum flexibility and combines the following options in one modular concept: servomotor-displaceable feed unit, rotary straightening (BM 43 HS) and displaceable cutting unit (BM 43 HS)
- The new chamfering device without extraction unit ensures an economical production of wire parts with chamfered ends

## Design Features

- Newly developed, easy to maintain and more efficient feed unit
- Enhanced cutting unit with maximum bending freedom for geometries that require bend-back clearances
- Manual adjustment of feed unit on linear guides or servomotor-displaceable feed unit as an option
- The tubular wire guide and the displaceable feed unit increase process reliability and improve the machine performance when processing wire diameters smaller than 2 mm or soft materials.
- The light-weight bending head with low inertia guarantees high process speeds

## ▼ WAFIOS Programming System WPS 3.2 EasyWay



## Control System

- User-friendly and quick set-up due to hand-held operating device with touchscreen
- WAFIOS WPS 3.2 EasyWay user interface enables the programming of lengths, angles or coordinates
- Quick programming of tools, materials and bending programs

## WAFIOS Technology: For Those Who Demand the Best! Solutions for Process Optimization (*iQs*)

- *iQwire*: Real-time simulation for calculating cycle times and for collision control (option)
- *iQwire+*: Automatic calculation of a production process free from collisions, positioning of the table axis and optimized calculation of cycle times (option)
- *iQinspect*: Import/export of nominal geometry data and correction data from external measuring system to WAFIOS programming system WPS 3 (option)
- *iQbendcontrol*: Visual camera system for measuring and regulating bending angles (option)

# Variable, Flexible and Productive – WAFIOS CNC Bending and Coiling Centers BM

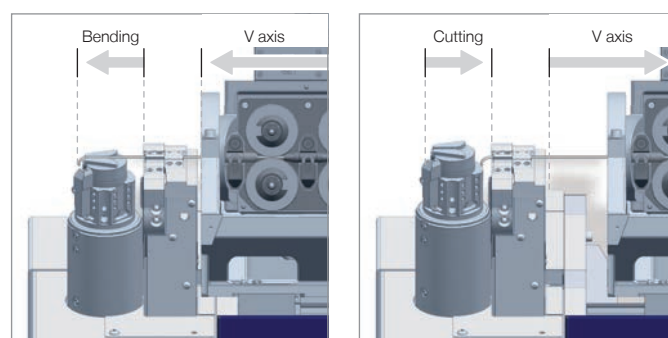
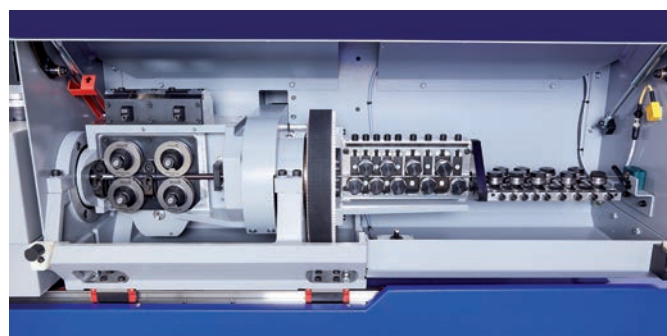
## Maximum Performance for your Parts

The BM HighSpeed series is the most efficient generation of machines for manufacturing bent wire parts of high complexity.

The HighSpeed machines, which include both highly dynamic drives and a 5-year license *iQsmartbend*, can be used to optimize unit costs across the entire range of parts. The high-end bending machine, equipped with intelligent software, optimizes all bending programs fully automatically based on its digital twin. As a result, the output of the BM 36 HS could be increased by up to 40%.

The BM series' great number of available options make it easy to customize to meet market requirements. The machine's modern and innovative design highlights the technological leadership of the new BM generation.

▼ Feed unit and straightening unit of the BM 36 HS



▲ Servomotor-driven displacement of the feed unit for highest degrees of geometrical freedom

## Quality

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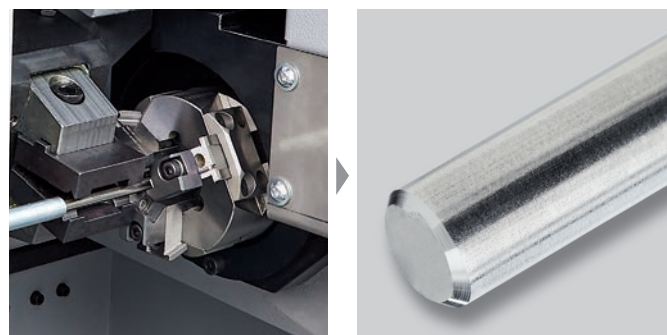
## Reliability

Strict quality controls, state-of-the-art production systems, and many years of experience guarantee that your investment is safe in our hands. Our global service network ensures high availability of WAFIOS machinery.

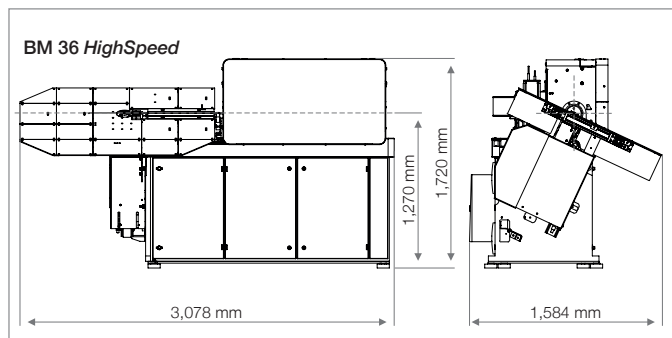
## Cost efficiency

High production output and a long service life will save money and shorten the amortization time of your investment.

▼ Chamfering device for the production of wire parts with chamfered ends



Technical Data	BM 36 <i>HighSpeed</i>	BM 43 <i>HighSpeed</i>
Wire diameter range: 600 N/mm <sup>2</sup> 1,200 N/mm <sup>2</sup> 1,900 N/mm <sup>2</sup>	2.0 – 6.5 mm 2.0 – 4.5 mm 2.0 – 3.6 mm	3.0 – 8.0 mm 3.0 – 5.0 mm 3.0 – 4.3 mm
Extension of wire range diameter (option)	From wire Ø 1.5 mm	From wire Ø 1.5 mm
Rotary angle, mandrel axis	Infinite	Infinite
Angle of rotation of bending axis	Infinite	Infinite
Bending head, up/down stroke	+10 mm / –80 mm	+18 mm / –122 mm
Bending head transverse stroke	+40 mm / –40 mm	+60 mm / –60 mm
Bend-back clearance	160 / 500 / 800 / 1,100 mm Option: Infinite adjustment via CNC axis	200 / 500 / 800 / 1100 / 1,400 mm Option: Infinite adjustment via CNC axis
Bending head positioning (option)	+30° fix	+25° fix
CNC support plate, stroke (option)	+25 mm / -200 mm	+25 mm / -235 mm
Feed speed	max. 140 m/min	max. 140 m/min
Bending moment, tool holding fixture	ca. 180 Nm	ca. 225 Nm
Number of CNC axes	7 (max. 14 as an option)	7 (max. 17 as an option)



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Precision Machinery for Wire and Tube



## CNC Bending and Coiling Machine for the Production of Two- and Three-Dimensional Parts and Frames from Wire and Profiled Materials



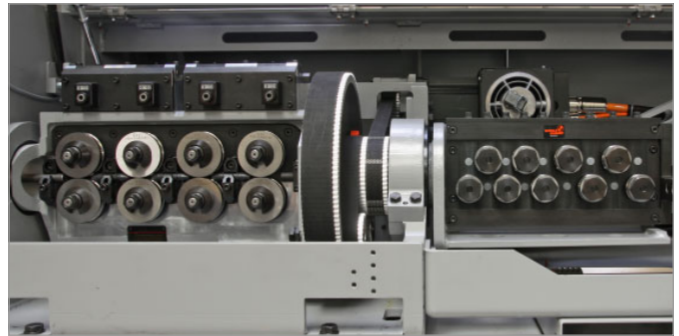
BM 50

# BM 50

▼ Bending head and Cut



▼ Feed unit including straightening unit



## Our Accomplishments for your Benefit

- **Tried and tested, successful machine structure**
- **Most of the tools from predecessor machines can be used**
- **Higher process safety thanks to adjustable bend-back clearance**
- **Consistent standard operating system**

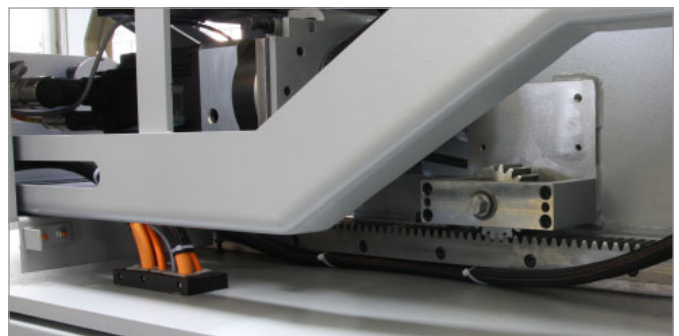
## Design Features

- Bending machine available in 3 sizes
- Basic machine with 7 CNC axes, upgradable to 8 standard CNC axes
- Robust feed unit for advancing and rotating the wire, manually displaceable together with the combination roller straightener for adjusting the bend-back clearance
- Fast CNC-controlled cutting unit with optimized cycle times
- Versatile bending head with large bending clearance and flexible application possibilities thanks to the infinitely rotating bending and mandrel axis as well as long transverse and up/down strokes
- User-friendly user interface WAFIOS WPS 3.2 EasyWay with plain-text programming of lengths, angles or coordinates, and linking of all machine components
- Control panel carriage with touchscreen display and hand-held operating device
- Fast CNC machine control, upgradable to 14 CNC axes
- Numerous add-on devices available (options)
- Combination roller straighteners cover the entire operating range of the machine
- Air-conditioned switch cabinet

## Operation

- User-friendly and fast set-up thanks to hand-held operating device with touchscreen
- Reduced set-up times due to ergonomic access to all tool positions as well as simple and fast programming of tools, material properties and bending programs with WPS 3.2 EasyWay
- **iQbend**: automatic optimization of CNC program sequences with regard to the geometry of the bent part (option)
- **iQwire**: Real-time simulation for determination of cycle times and collision control (option)
- **iQinspect**: Import/export of nominal data or correction data from external measuring system to WAFIOS Programming System WPS 3.2 EasyWay (option)

▼ Displaceable feed and straightening unit



# Versatile, Flexible and Profitable – WAFIOS CNC Coiling and Bending Machines, Series BM

## Trend-Setting Machine Concept

The WAFIOS BM series has been designed for the production of two- and three-dimensional parts and frames made of wire and profiled material. It offers a new machine concept based on components and tools that have been tried and tested hundred of times. High process safety, the possibility to employ tools of predecessor models and the familiar standard operating system WAFIOS WPS 3.2 EasyWay enable high outputs.

The rotation of the wire is based on a well proven concept. The stationary mounted bending head is very robust even when high bending speeds are used.

Reliable concept: Fast and precise bending and coiling operations due to high flexibility of tools.

Sophisticated safety concept, CE conformity in accordance with Machinery Directive 2006/42/EC, in connection with pay-off unit H / AHP and protective fence.



▲ Multi-radii bending tool for bending and free-form bending



▲ 4-Pin bending tool, type 5

## Quality

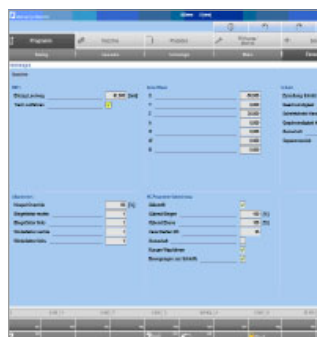
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## Reliability

Strict quality controls, state-of-the-art production systems, and many years of experience guarantee that your investment is safe in our hands. Our global service network ensures high availability of WAFIOS machinery.

## Cost efficiency

High production output and a long service life will save money and shorten the amortization time of your investment.



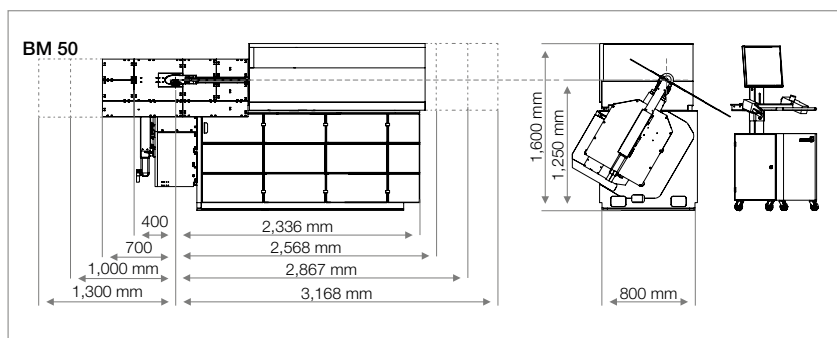
▲ iQbend in WPS 3.2 EasyWay



▲ User-friendly WAFIOS Programming System WPS 3.2 EasyWay

Technical Data	
Operating range, wire Ø:	600 N/mm <sup>2</sup> 1,200 N/mm <sup>2</sup> 1,900 N/mm <sup>2</sup>
Extension of wire range diameter	(option)
Feed rollers	
Rotary angle, mandrel axis	
Angle of rotation of bending axis	
Bending head, up/down stroke	
Bending head transverse stroke	
Bend-back clearance	
Bending head positioning	
CNC support plate, stroke	(option)
Feed speed	
Bending moment, tool holding fixture	
Number of CNC axes	

BM 50
4.0 – 10.0 mm 4.0 – 6.0 mm 4.0 – 5.0 mm
Wire from 2.0 mm diameter
4 Pairs
Infinite
Infinite
+25 mm / –120 mm
+200 mm / –100 mm
400 / 700 / 1,000 / 1,300 mm
+30° fix
+25 mm / –235 mm
max. 120 m/min
ca. 1,050 Nm
7 (8 / max. 14 as an option)

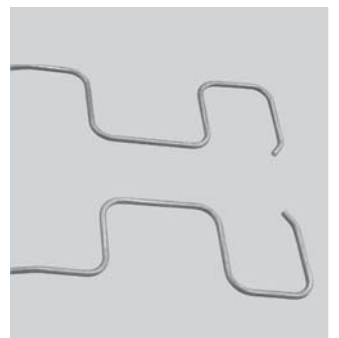


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Precision Machinery for Wire and Tube

CNC Multiple-head benders for the production of two- and three-dimensionally bent components



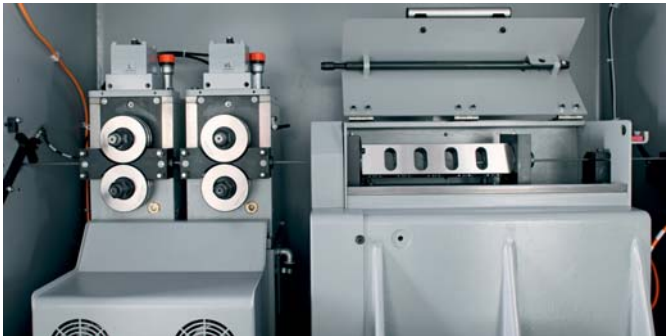
Series  
BT



# Series BT

▼ Straightening unit consisting of two pairs of feed rollers, rotary straightening unit and length measuring device

▼ Multiple-bending unit allows simultaneous bending on up to four bending heads



## Our accomplishment – Your benefit

- High output due to independently operating bending heads and new control concept WPS 3.2 EasyWay
- Highest process safety, further development of the successful and widely installed predecessor model BT 4
- High efficiency, especially when producing asymmetrical parts with many bends
- High flexibility, gripper holds part in a defined position ready for succeeding operations or integration in production sequences

## Software

- High-performance CNC machine control
- User-friendly and clear programming system WPS 3.2 EasyWay allows fast set-up and correction of geometry data and machine parameters
- Separate programming of bending units supports a rapid input of asymmetrical parts and facilitates correction
- *iQbend* - new control function for adjusting the bending sequence to the oscillation behavior of long and unstable bent parts

## Features

### Machine structure

- Completely new, patented machine concept for an output many times higher than that of conventional CNC systems
- Powerful electronical system
- Highly dynamic straightening system
- Servo-electrically controlled cutting unit
- CNC-controlled wire feed and transport system
- Highly dynamic bending head drives
- 2 (BT 3.2/5.2) - 4 (BT 3.4) independently working bending units

### Operating range

- Maximum wire length: 2,000 mm (alternatively 3000 mm at BT 3.2 + BT 5.2)
- Minimum center length is 80 - 120 mm, depending on the geometry of the bent part (alternatively, there are also shorter lengths possible)
- Very large bending space due to the positioning unit's

## Bending head

Equipped with an infinitely rotating bending and mandrel axis, allows the use of multi-radii bending tools and also the bending of closed loops. As the Z-axis movement is CNC-controlled, the output is increased and multi-stage tools can be employed. Additionally, there is the possibility to position the wire out of the bending head's center in order to be able to use bending tools type 3 and special bending tool versions.

# Powerful, safe and profitable – WAFIOS BT CNC multiple-head benders

## Precision made easy

Designed for the production of complex two- and three-dimensionally bent wire parts off the coil, the CNC multiple-head benders set the standard on the market when it comes to high output numbers.

The dynamically rotating straightening system guarantees increased precision with higher process safety.

The unique machine concept of the BT series, i.e. the special arrangement of bending heads and positioning units (advance feed) are protected by patents in many countries. Compared to conventional CNC machine concepts, the function principle of the BT 3.2 and 3.4 has increased output and precision many times.

The up to four independently operating bending heads with integrated positioning system make it easy for the operator to influence the geometry and programming of parts that must be true to gauge.



▲ Gripper with swivel arm in connection with bending tool (upper bending head)



▲ Gripper with swivel arm in connection with bending tool (lower bending head)

## Quality

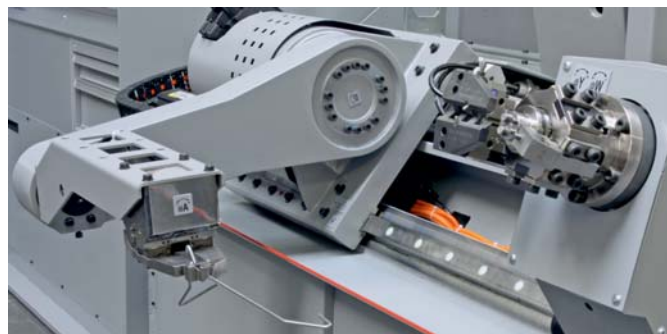
For more than 120 years, the name of WAFIOS has been synonymous with highest quality, safety standards and technical innovations in the German machine manufacturing industry.

## Reliability

Strict quality controls, state-of-the-art production facilities and many years of experience guarantee high investment security. Our world-wide service network ensures a high availability of WAFIOS machinery.

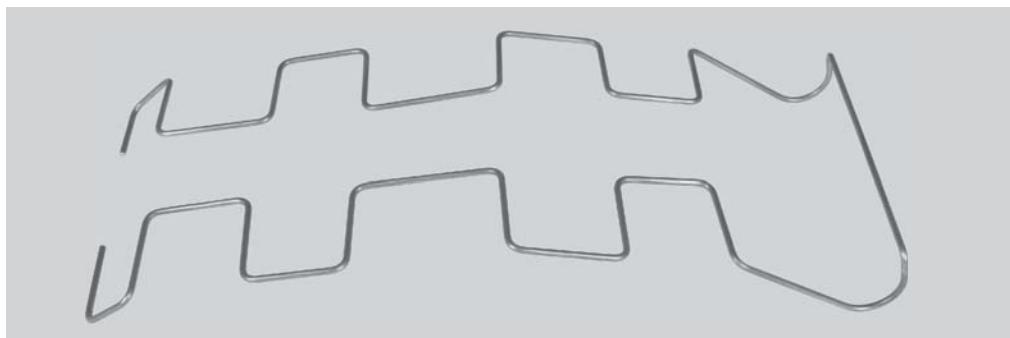
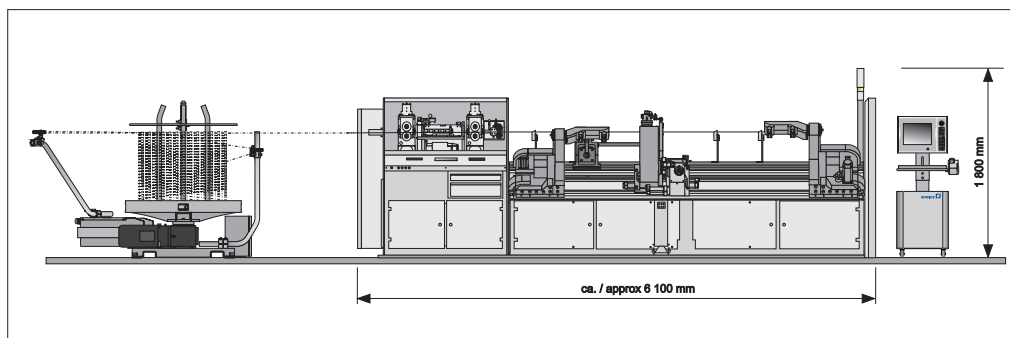
## Efficiency

High production outputs and long machine service lives save money and shorten the payback period of your investment.



▲ Bent part in deposit or pick-up position, e.g. for following operations

Technical Data	BT 3.2 / BT 3.4	BT 5.2
Wire dia. min.	2.0 mm	4.0 mm
Wire dia. max.	$< 600 \text{ N/mm}^2$ 6.5 mm $< 1200 \text{ N/mm}^2$ 4.5 mm $< 1900 \text{ N/mm}^2$ 4.0 mm (4.3 mm reinforced version)	10.0 mm 6.0 mm 5.0 mm
Feed speed max.	120 m/min	120 m/min
Rod length min. - max.	200 - 2000 mm Option: 200 - 3000 mm (BT 3.2)	200 - 2000 mm Option: 200 - 3000 mm (BT 5.2)
Distance towards center (Standard) With a special device	min. 80 - 120 mm min. 25 mm	min. 80 - 120 mm min. 35 mm
Swivel angle of swivel arm max.	180°	180°
Swivel angle of gripper	360°	360°
Programming system	WPS 3.2 EasyWay	WPS 3.2 EasyWay
Bending units	BT 3.2 = 2 BT 3.4 = 4	BT 5.2 = 2
Bending moment	ca. 250 Nm	ca. 520 Nm



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Precision Machinery for Wire and Tube

# CNC Tube Bending Machine BMZ 6 for Processing Rod-Shaped Materials

## Technical description:

The WAFIOS BMZ 6 is a unique and innovative CNC tube bending machine that has specifically been designed for the production of micro parts as they are used e.g. in medical technology for cannulas or in high-frequency technology for semi-rigid coax cables. The smallest machine of the well-known BMZ series is setting standards in terms of profitability, production speed and efficiency. Thanks to its compact design, it can be installed on site more quickly and requires much less space than larger, oversized machines.

## Our Accomplishments for your Benefit:

- Unique and compact machine design especially for miniature components such as those used in medical technology for cannulas or in high-frequency technology for coax cables
- Modularity for highly complex components by combining different bending techniques with additional operations such as winding, cutting, forming and coiling
- High operating convenience by means of 3D simulation for enabling feasibility studies and determining cycle times
- Patent-pending cutting unit to produce ready-to-use short parts from rods or coiled material

Technical data	BMZ 6
Tube Ø	0,5 - 6,35 mm
Standard lengths, recommended	500 mm / 1,500 mm with regrabbing
CNC axes, standard / max.	6 / 10
Weight	800 kg
Space required	1600 x 800 x 1350 mm
Machine control	WPS 3.2 EasyWay



**BMZ 6**

## CNC Tube Bending Machine for the Production of two- and three-dimensionally Bent Parts from Tube



BMZ 8  
BMZ 12



# BMZ 8 BMZ 12

▼ Flexible gripper system with intelligent bending tool

▼ The loading arm axis serves for automation purposes (option)



## Our Accomplishments for your Benefit

- High level of flexibility and high degree of automation
- Highest output and quality
- Value added superior and precise technology
- Perfect handling of machine due to functional design
- Configuration of machine according to customer requirements

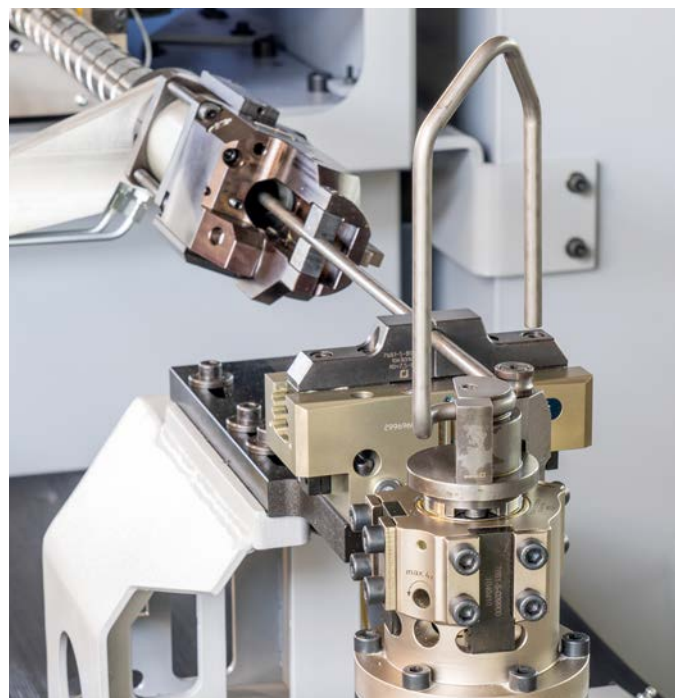
## Design Features

- Extremely high bending speeds
- Integrated loading and unloading automation (option)
- Right/left bending in one clamping
- Combined rotary-draw, roll and free-form bending
- Fully electronic machine concept, all relevant bending parameters are CNC-controlled
- Precise production of 3-dimensional bent parts by means of CNC controlled support plate (option)
- High dynamics due to state-of-the-art drive technology even for complex parts
- User-friendly machine control WAFIOS WPS 3.2 EasyWay with plain-language programming of lengths / angles or coordinates and 3D-simulation
- Numerous software packages for process optimization such as *iQsmartbend*, *iQinspect*...
- Open system for the complete networking of WAFIOS machines enables, for example, the machine-to-machine communication or, via interface the integration into the existing customer infrastructure (OPC UA)
- Equipped with hand-held operating device and 24" Multi Touch Screen
- Reduced retooling times due to simple and repeatable tool changes
- Open collet system allows the acceptance of end-treated tubes also with cap nuts

## Bending Head

The bending head has been designed for combined right/left bending procedures in one clamping. The lateral displacement of the bending head also enables the production of complicated geometries. This multi-functional bending head is able to hold all common WAFIOS tube tool systems.

▼ Bending head with tooling and part



# Versatile, Powerful and Profitable – WAFIOS CNC Tube Bending Machines

## Tube bending “State of the Art”

The BMZ series is based on a successful and reliable concept. Designed for the production of complicated bent parts from cut-to-length, end-treated and ready-to-install tubes, the WAFIOS BMZ series sets standards on the market since many years.

The graphical programming WPS 3.2 EasyWay allows geometry input by means of lengths, planes, angles or via coordinates. Alternatively, CAD files and other formats can be imported directly into the programming system. Other available additional software functions such as *iQtube* for 3D simulation of the programmed components support the machine operator even in complex tube geometries.



▲ Hand-held operating device with Touch Screen



▲ Standard bending tool combines draw and roll bending

## Quality

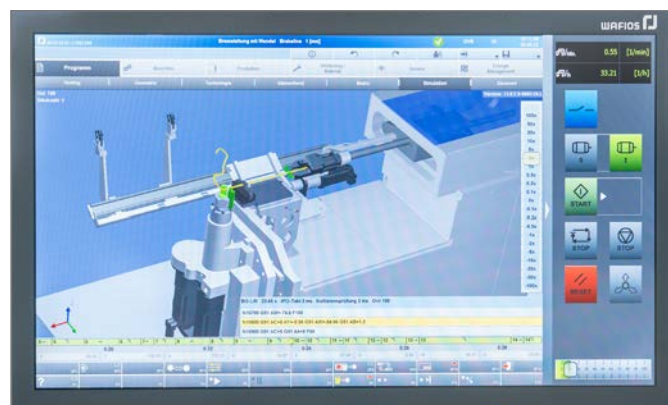
For more than 125 years the name WAFIOS has stood for the highest in terms of quality expectations, safety standards and technical innovation in German manufacturing systems engineering.

## Reliability

Strict quality controls, state-of-the-art production systems and many years of experience guarantee that your investment is in safe hands. Our global service network ensures high availability of WAFIOS machinery.

## Efficiency

High production output and a long service life will save money and shorten the amortization time of your investment.



▲ User-friendly work piece simulation thanks to WAFIOS-Programming-System WPS 3.2 EasyWay with *iQtube*

Technical Data		BMZ 8	BMZ 12
Operating range	Tube diameter, max.* Standard lengths* (recommended) From BMZ magazine	8.0 mm up to 2,000 mm 100 - 2,000 mm	12.7 mm up to 2,000 mm 100 - 2,000 mm
CNC axes	Standard/Maximum Bending head Spindle unit (without swiveling) Lateral displacement of bending head Internal mandrel unit Auxiliary gripper  Loading arm Swiveling the collet	6 / 10 3 axes 2 axes 1 axes ---- Pneumatic / 1 axes (optional) 1 axes (optional) 1 axes (optional)	7 / 10 3 axes 2 axes 1 axes 1 axes (optional) Pneumatic / 1 axes (optional) 1 axes (optional) 1 axes (optional)
Collet	Operating principle Structure Single stroke Multiple stroke	Pneumatic Open sideways 750 mm Any often	Pneumatic Open sideways 750 mm Any often
Automation	Loading from a magazine Position-oriented depositing Combination with robots	Optional Optional Optional	Standard Standard Optional
Weight		1,150 kg	1,950 kg
Space requirements (l x w x h mm)		2100 x 1250 x 2050	2150 x 1250 x 2050
Machine control		WPS 3.2 EasyWay	WPS 3.2 EasyWay

\* All specifications depend on material and bending radius, different lengths on request



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Precision Machinery for Wire and Tube

## CNC Tube Bending Machine for the Production of Two- and Three-Dimensional Parts of Tube or Solid Material



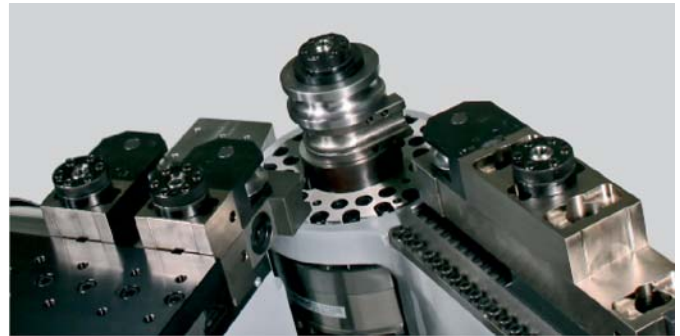
RBV 25-60  
R / RS



# RBV 25-60 R / RS

▼ Tube positioning with boost pressure function of advance feed unit

▼ New quick die change equipment for combined rotary-draw and free-form bending



## Our Accomplishments for your Benefit

- Highest precision at maximum rigidity of machine body and bending head
- Very high operating speed due to performance-optimized design of machine and drive system
- Highest energy efficiency thanks to state-of-the-art drive technology with energy recovery
- Modular machine structure that can be adjusted to a wide range of applications
- High machine availability due to durable machine design

## Control

- Reliable WAFIOS WPS 3.2 EasyWay control program
- Intuitive control concept for the creation of a bending program in short and concise steps
- Interactive graphical 3D programming of tubes
- Different user levels with authorizations
- Numerous functions for monitoring the condition of the machine
- *iQtube* for graphically simulating the bending sequence, with integrated collision monitoring and theoretical output (option)

## Design Features

- Extremely robust body and bending head design, verified by finite element method
- Free positioning of hood increases degrees of freedom for extreme bending geometries
- Right and left bending for rotary-draw and free-form bending in one clamping
- Fully electric drive concept
- Mandrel bending device is freely programmable over the entire feed length (patented)
- Tube positioning with boost pressure function (booster) of advance feed unit
- New, more rigid follow bar design with a second linear guide
- Up to 3 tool levels for each bending direction
- Higher holding torques due to the use of a gear drive for the linear movements of clamping axes

▼ Bending head





# Precise, Reliable, Versatile and Profitable – WAFIOS CNC Tube Bending Machines

## Perfect Union of Design and Functionality

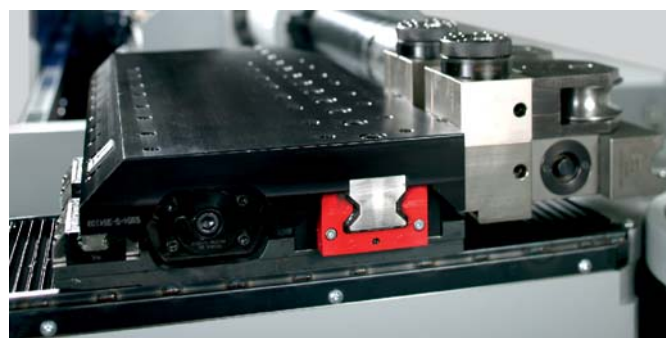
An ingenious machine concept with integrated automation. Already the standard version of the WAFIOS RBV-R Series unites different bending procedures with high flexibility in one unique machine concept - also in small-batch production.

The new ergonomic design of the machine body, in combination with the dynamic positioning unit of the bending head meets the most stringent demands with regard to:

- Accessibility, thanks to the new and patented quick die change equipment and the advance feed and mandrel carriage that were adapted to the machine design
- Maintenance, service and user friendliness
- Greater range of parts thanks to extremely high degrees of freedom

The further development of the bending head for improving the rigidity of the housing and the follow bar guide enables:

- Increased repeat accuracy
- Higher process safety
- More dynamical acceleration processes



▲ Follow bar with additional guide rail

## Quality

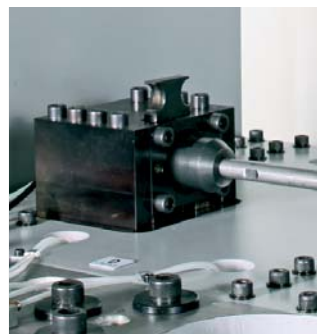
For more than 120 years the name WAFIOS has stood for the highest in terms of quality expectations, safety standards and technical innovation in German manufacturing systems engineering.

## Reliability

Strict quality controls, state-of-the-art production systems and many years of experience guarantee that your investment is in safe hands. Our global service network ensures high availability of WAFIOS machinery.

## Efficiency

High production output and a long service life will save money and shorten the amortization time of your investment.

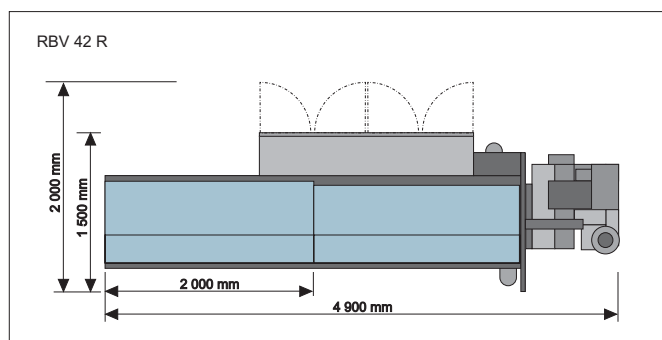


▲ Mandrel bending unit freely programmable over entire tube feed length (patent)



▲ Modern and easy-to-use programming and control software WAFIOS WPS 3.2 EasyWay

Technical Data	RBV 25 R	RBV 42 R/RS	RBV 60 R/RS
<b>Bending capacity</b> Bending torque Clamping force Boost pressure: advance feed unit	1.0 kNm 25 kN 2 kN/5 kN	4.5 kNm 30 kN / 58 kN 10 kN/20 kN	8 kNm 60 kN / 140 kN 25 kN/50 kN
<b>Bending geometry parameters</b> Max. tube diameter Feed length Max. bending radius, rotary-draw bending Max. bending radius, free-form bending (option) Max. bending arm angle	25,4 mm 2,000 / 2,960 / 4,960 mm 75 mm infinite 195°	42 mm 2,700 / 4,700 mm 130 mm infinite 190°	60.3 mm 3,000 / 4,500 mm 180 mm infinite 193°
<b>Bending procedures</b> (rotary-draw and free-form bending) Bending directions Bending levels per bending direction Tool installation height per bending direction	Left and right bending up to 3 120 mm	Left and right bending up to 3 160 mm	Left and right bending up to 3 160 mm
<b>Max. speeds</b> Advance feed Rotation Bending	2,800 mm/s 450°/s 180°/s	2,000 mm/s 450°/s 180°/s	1,700 mm/s 450°/s 180°/s
<b>Axes accuracy</b> Advance feed Rotation Bending	+/-0.05 mm +/-0.05° +/-0.05°	+/-0.05 mm +/-0.05° +/-0.05°	+/-0.05 mm +/-0.05° +/-0.05°
<b>Dimensions/weight</b> l x w x h mm Weight	4,500 x 1,400 x 1,500 2,900	4,900 x 1,500 x 1,500 4,800	5,600 x 1,900 x 1,600 5,500
<b>Connection and consumption data</b> Voltage Frequency Compressed air connection Max. compressed air consumption	400 V 50/60 Hz 6 bar 1-3 l/min	400 V 50/60 Hz 6 bar 1-3 l/min	400 V 50/60 Hz 6 bar 2-5 l/min



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Precision Machinery for Wire and Tube

CNC multiple-head tube bending machine for the production of complex, three-dimensionally bent parts



BL 10

# BL 10

▼ Bending station with transfer system



▼ Maximum flexibility with large bending space



## Our Accomplishments for your Benefit

- Broad range of parts possible, including with complex geometries thanks to the special kinematics of the tube bending machine
- Increase in output even with highly complex and unstable parts through automatic optimization of the bending processes and part transfer thanks to *iQsmartbend*
- Maximum repeat accuracy thanks to rotary-draw bending integrated in one-of-a-kind, universal, low-wear tool concept
- One-of-a-kind, innovative loading concept solves insertion problems experienced with long, unstable lines
- Reduction in unit costs due to minimized non-productive times, rapid part transfer, low-wear tool drives, space-saving machine concept, and automatic optimization of bending processes

## Control

- Convenient sequence programming thanks to WAFIOS WPS 3.2 Easyway with EasyTab
- Full HD multi-touch 24" monitor
- Sequence simulation, distribution across multiple stations
- Online interface
- *iQfunctions* – more efficiency through intelligent process control

## Design features

- Left, right, rotary-draw bending, and roll bending in up to three planes combined in one standard tool
- Low tool costs thanks to simple tool design
- State-of-the-art control technology with minimized non-productive times
- Parallel operating sequences possible
- Modular structure with 2-, 4- or 6-head transfer
- High repeat accuracy thanks to wear-free bending technology
- Line stabilization with grippers providing support in front of the bending head

▼ BL 10-6



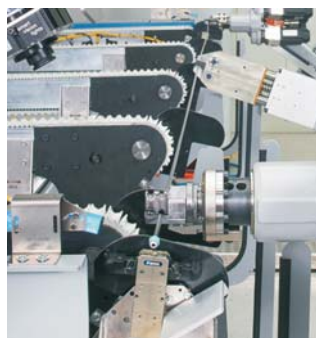
# Powerful, flexible, and efficient – a new kind of multiple-head bending machine

## One-of-a-kind bending concept

Extremely high degrees of freedom and parallel operating sequences ensure a level of productivity and output that has never been seen before on the market. The space-saving machine concept enables lines up to 6,000 mm in length to be bent to an extremely high quality and repeat accuracy thanks to stabilizing grippers that are used as a support directly in front of the head.

In the BL 10, the award-winning *iQsmartbend* control solution (optional) is also incorporated in tube bending for the first time. It is a software solution for the automatic optimization of bent parts to enhance quality and performance by calculating the ideal tool motion profiles.

Compact, slimline, and freely positionable bending heads offer extremely high degrees of freedom and combine both rotary-draw bending and roll bending in up to three planes. The combination of these methods enables bending close to screw connections or the hoses often used in brake pipes, for example.



▲ Free positioning of the bending heads



▲ High flexibility for part geometries

## Quality

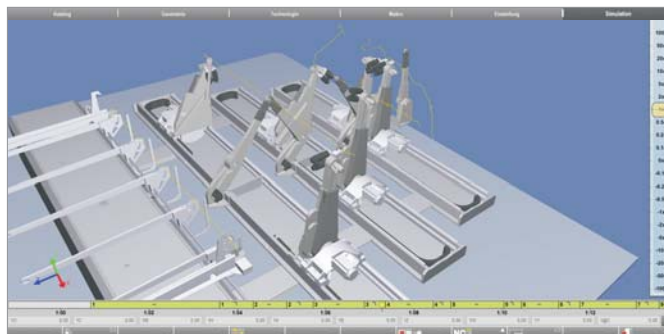
For more than 120 years the name WAFIOS has stood for the highest in terms of quality expectations, safety standards and technical innovation in German manufacturing systems engineering.

## Reliability

Strict quality controls, state-of-the-art production systems and many years of experience guarantee that your investment is in safe hands. Our global service network ensures high availability of WAFIOS machinery.

## Efficiency

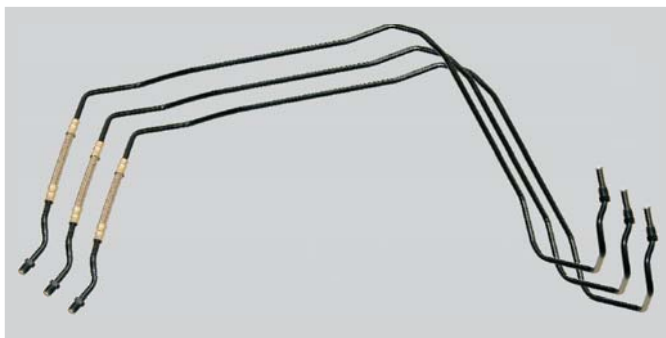
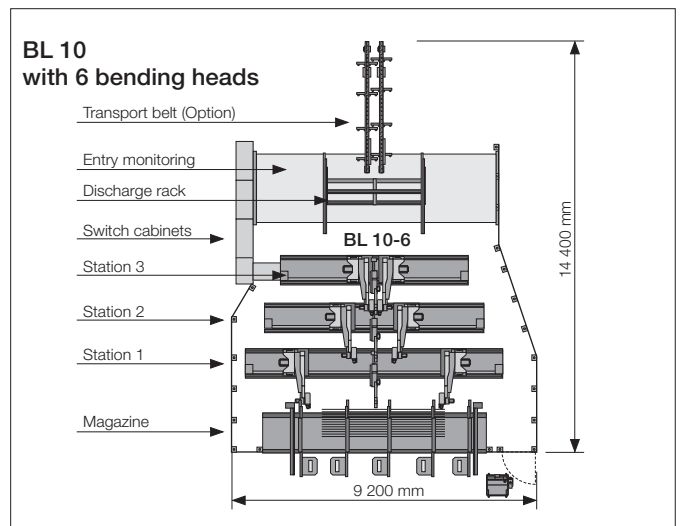
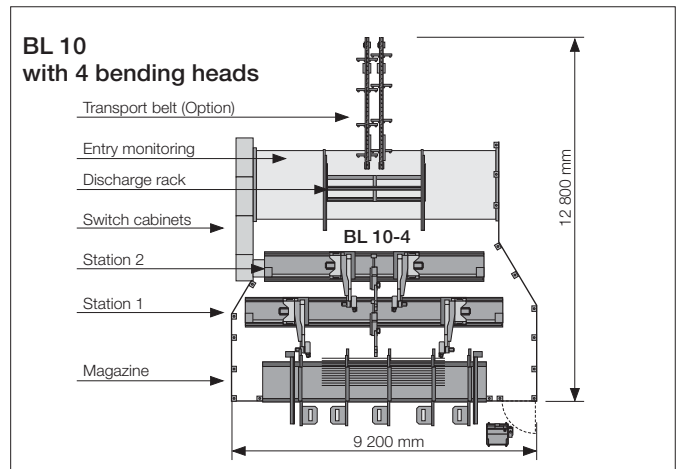
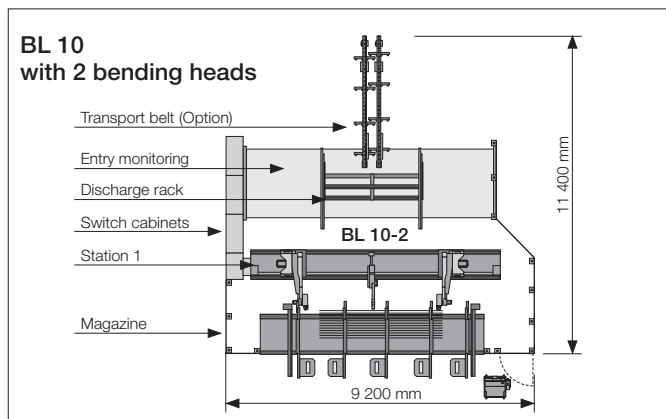
High production output and a long service life will save money and shorten the amortization time of your investment.



▲ User-friendly control with WAFIOS WPS 3.2 EasyWay



Technical data	BL 10
Tube ø: steel tensile strength up to 400 N/mm <sup>2</sup>	4.0 – 10.0 x 1.0 mm
Tube ø: aluminum tensile strength up to 270 N/mm <sup>2</sup>	4.0 – 12.7 x 1.0 mm
Tube length	up to 6 000 mm
Operating range extension	Option
<i>iQtube</i> bending simulation	Option
Length measuring device	Option
Camera system	Option
Color detection	Option
Movable auxiliary grippers	Option
Ext. programming station	Option
<i>iQinspect</i> measuring cell connection	Option
Weight (BL 10-6)	ca. 16 000 kg
Machine control	WPS 3.2 EasyWay



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Precision Machinery for Wire and Tube



## Wire Straightening and Cutting Machine for the Production of Straightened Rods Made of Round Wire



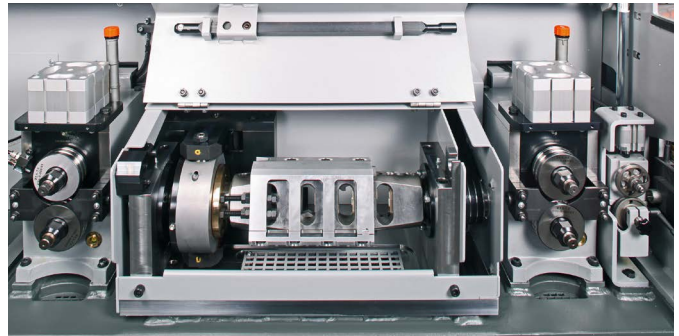
R 36

# R 36

▼ Infeed with Manually Adjustable Straightening Rotor (standard)



▼ Servo-Adjustable Straightening Rotor (option)



## Our Accomplishments for your Benefit

- More powerful while offering even more operating convenience
- Minimized set-up times
- Optimized and language-neutral operator guidance
- Several partial use of the tools of previous models
- Improved working conditions due to service instructions, electronically stored operating instructions

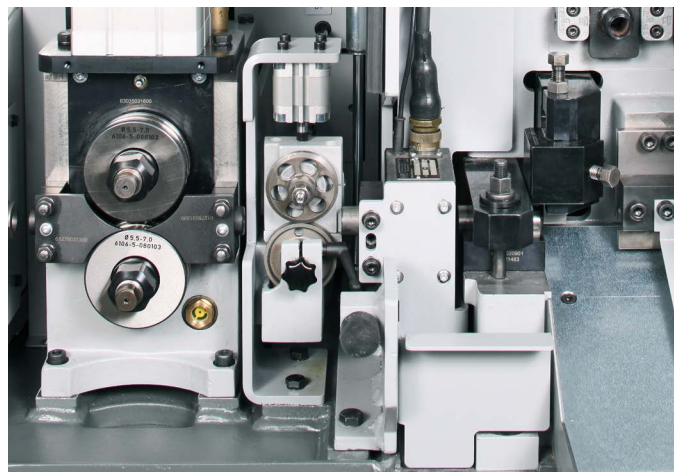
## Operation

- Reduced set-up times due to ergonomic access to all tools
- User-friendly color Touchscreen with masks e. g.  
*ROD EASY* mask: A selection of fixed wire diameter and wire type is stored. The values for the straightening ratio and the pressure of the feed rollers are applied automatically. In addition, the Operator can store their own types of wire.  
*MAINTENANCE* mask: Monitoring of maintenance intervals.

## Design Features

- New design combined with reliable technology
- Optimized feed and rotor technology
- Reduced noise emission due to the use of state-of-the-art materials
- Comfortable and language-neutral operation via SIEMENS Comfort panel
- Chamfering (option)
- Optimum protection against soiling due to encapsulation of feed modules and rotor, channel for collecting lubricants and dirt, optional extraction unit
- Room for optional test probes in combination with measuring wheel
- Creative solutions for storing tools and operating tools
- Improved results in the lower wire diameter range due to shortened distance between tension rolls and cut

▼ Length measuring device



# Quality, Reliability and Efficiency – WAFIOS Wire Straightening and Cutting Machines

## New Definition of Productivity

WAFIOS R machines have been designed for the production of straightened and cut-off rods. They provide new technical solutions for increasing your output and optimizing costs.

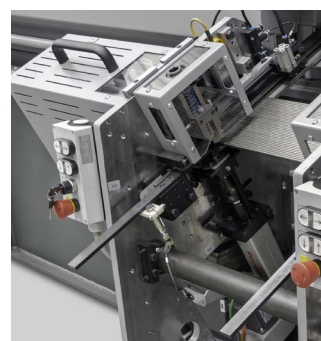
The standard equipment of these machines includes 4 drives. As an option, the machines can be fitted with an additional push roller pair and a straightening system with a larger spacing to use the machines also in the larger diameter range.

Further options are compact rotors and a freely selectable number of cuts to increase the output, spray oil device, interts for minimizing length tolerances as well as different extension versions for increasing the machines efficiency.

Moreover, tools and devices for processing profiles are also available if required.



▲ Collecting tray



▲ Chamfering EBF

## Quality

For more than 125 years, the name of WAFIOS has been synonymous with highest quality, safety standards, and technical innovations in the German machine manufacturing industry.

## Reliability

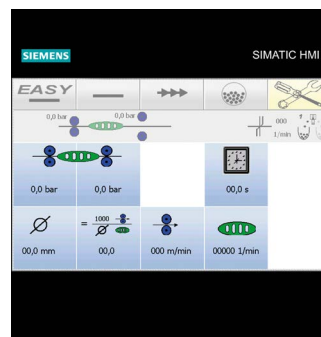
Strict quality controls, state-of-the-art production systems, and many years of experience guarantee that your investment is safe in our hands. Our global service network ensures high availability of WAFIOS machinery.

## Cost efficiency

High production output and a long service life will save money and shorten the amortization time of your investment.



▲ Graphical operator guidance



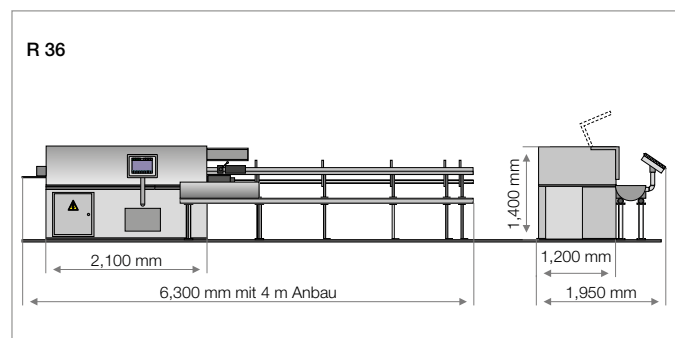
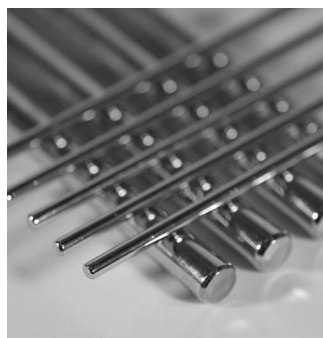
▲ Color Touchscreen

Technical Data	R 36		R 36 S			R 36***
Feed speed: [m/min]	5 – 180		5 – 180			5 – 180
Wire Ø** [mm] ■ 400 – 800 N/mm²: ■ 800 – 1,200 N/mm²: ■ 1,200 – 1,600 N/mm²:	(Standard) 1.5 – 7.0 2.0 – 6.5 2.0 – 6.0	(B-Version) 3.0 – 8.0 3.5 – 7.0 3.5 – 6.5	(1. Rotor) 1.5 – 3.5 2.0 – 3.0 —	(2. Rotor) 3.0 – 6.0 3.5 – 5.5 —	(3. Rotor) 2.0 – 5.0 2.5 – 4.5 —	2.5 – 7.0 3.0 – 6.5 3.0 – 6.0
Shortest cutting lengths with flat wire guide [mm] ■ with length measuring unit: ■ with release head: ■ with fixed stop:	100 250 25 – 250		100 — 25 – 250			100 — 25 – 250
Max. cuts per minute: ■ with fixed stop (option):	160 / 320* 276		160 / 320* 276			160 / 320* 276
Space requirement without extension (l × w × h): [mm]	2,100 × 1,200 × 1,400		2,100 × 1,200 × 1,400			2,100 × 1,200 × 1,400

\* Freely selectable number of cuts (option)

\*\* Cold-rolled reinforcing steel, measured across the ribs

\*\*\* Servo-Adjustable Straightening Rotor (option)



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Precision Machinery for Wire and Tube

# Electronic High-Speed Coiling Machine for the Production of Compression Springs

## Technical Description:

Compression spring coilers from the FUL line are the most efficient WAFIOS machines. The generation of machines with the „+“ in their name is available in two sizes: FUL 26+ and FUL 36+. Not only their standard equipment sets new standards. In addition to the high-speed option, the machines are also available in the *4speed* version. Their water-cooled drive system and an innovative wire slack concept enable maximum feed speeds of up to 600 m/min (FUL 26+).

### Our Accomplishments for your Benefit:

- Highest dynamics due to new, water-cooled drive technology, for an increased output and reduced unit costs
- Pay-off units of the AHT and AHP line with an increased load-bearing capacity and designed for wire feed speeds of up to 600 m/min, safely process wire from coils and from spools.
- The wire slack box compensates fluctuations between the wire coiling machine in start/stop operation and the pay-off unit in continuous operation. The wire enters the connected machine free from tension.
- Innovative and modern machine design with enhanced ergonomics

Technical Data	FUL 26+	FUL 36+
Wire Ø: (RM - N/mm <sup>2</sup> )	0.2–1.6 mm (WM > 4) 2,300 N/mm <sup>2</sup>	0.5–2.8 mm (WM > 4) 2,300 N/mm <sup>2</sup>
Wire Ø: (RM - N/mm <sup>2</sup> )	0.2–1.8 mm (WM > 4) 1,900 N/mm <sup>2</sup>	0.5–3.0 mm (WM > 4) 2,000 N/mm <sup>2</sup>
Wire Ø <i>4speed</i> : (RM - N/mm <sup>2</sup> )	0.5–1.6 mm (WM > 4) 2,300 N/mm <sup>2</sup>	1.0–2.8 mm (WM > 4) 2,000 N/mm <sup>2</sup>
Outer spring Ø:	45 mm	65 mm
Max. feed speed: <i>4speed</i> (Option)	240 m/min 600 m/min	220 m/min 500 m/min
<b>Pay-off</b> Max. height of spools/coiled material Min. inner dia. of coiled material Max. outer bundle Ø Bore hole Ø of wire spools Max. load-bearing capacity	AHT 2 <i>4speed</i> 400 mm 900 mm – 32–85 mm 500 kg	AHP 3 <i>4speed</i> 800 mm 300 mm 1,000/1,300* mm – 1,200/1,300* kg

\* subject to carrier plate (Ø mm)



FUL 26+  
FUL 36+

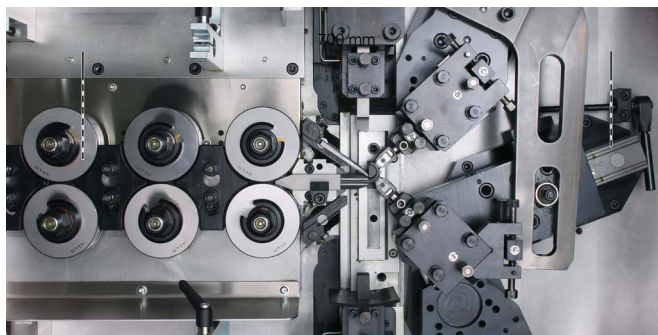
## Spring Coiling Machine for the Production of Compression Springs



Baureihe  
F



▼ Tool room F6



## Our Accomplishments for your Benefit

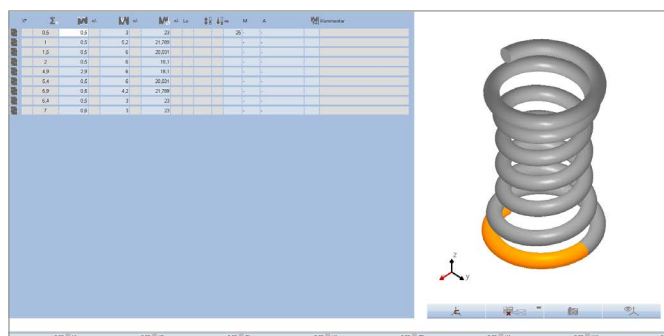
- Fully-fledged compression spring coiler even in standard version, equipped with the latest drive technology
- Performance Machine: Great compromise between high performance and attractive price
- Uses the familiar FPS 1.2 software with user-friendly interface and simplified spring input (except for F4 and F6)
- Modern machine design
- PTP coiling finger for regulating initial tension (except for F4 and F6)
- At F 12: The perfect intermediate size for the economical production of compression springs up to 1.2 mm wire diameter
- At F 18: Higher output in comparison to previous model (F2) due to increased feed speed

## Design Features

## Machine Structure

- New and cost-optimized coiling unit with rigid 2-axes coiling device
- Optional PTP coiling finger
- No optional second shape drive as motor can be easily converted from top to bottom due to innovative machine design (F08, F12, F18, F30)
- New design of the coiling pin holder similar to the F 30 with rotatable insert for the coiling pin (F 12 and F 18)
- Cost-optimized standard equipment with 4 CNC axes
- Axes for infeed, straight cut, vertically displaceable pitch device and coiling device
- High-precision roller feed unit with two or three (F 6) pairs of feed rollers

▼ Input of the spring geometry



- Manually adjustable cutting mandrel, optionally also available as pneumatic mandrel displacement device
- Optional mandrel displacement device
- Electronic handwheel for convenient and safe set-up of machine and spring (option)
- Straight cut (optional multi cut, except for F 30)
- Vertically displaceable pitch device (parallel displaceable pitch device available as option)
- Modular configuration as stand-alone solution or integrated in production line
- Reduced variety of options

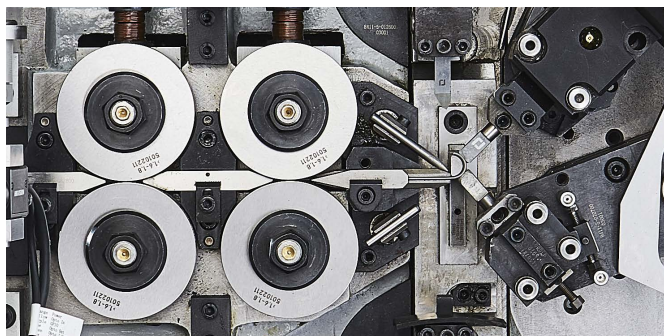
## Measuring and software technology

- Optical camera measuring system for measuring and regulating the spring length and diameter (FVS)
- Sorting device

## Software/Programming

- Industrial PC with color touchscreen / keyboard / mouse
- Multi-touch screen as control panel
- Handwheel (option)
- OPC UA Interface for exchanging data (Industry 4.0)

▼ Tool room F 30



# Versatile, Flexible and Profitable – WAFIOS CNC Spring Coiling Machines, Series F

## Trend-Setting Machine Concept

The F series has been designed for the production of high-precision compression springs of 0.12 - 7 mm wire diameter. The Performance Machine combines high output with an attractive price. It thus constitutes an economical alternative to all established compression spring coilers.

The machines of the F series are fully-fledged, fully functional and precise production facilities, even in their standard version. The modular machine design can be adjusted depending on the requirements and production range. The F machine can be upgraded or downgraded to meet the needs of the production line. Modern, optical measuring systems for measuring the spring length and diameter and a sorting device guarantee a high quality of springs.

The F 08 succeeds the FSE 15 while the F 18 is the successor machine of the F2. The gap between the two machine sizes is closed by the F 12.

Application area: All types of compression springs and extension spring strands for e.g. the automotive industry, medical goods and technical components

## Quality

Since 1893, the WAFIOS name is synonymous with outstanding quality, safety standards, and technical innovations in the German mechanical engineering industry.

## Reliability

Strict quality controls, state-of-the-art production systems, and many years of experience guarantee that your investment is safe in our hands. Our global service network ensures high availability of WAFIOS machinery.

## Cost efficiency

High production output and a long service life will save money and shorten the amortization time of your investment.



▲ Product example



▲ Sorting device



▲ User friendly WAFIOS Programming System WPS 3.2 EasyWay

Technical Data		F4	F6	F 08
Wire-Ø bei (Wm) Rm	<i>[mm]</i> <i>[N/mm<sup>2</sup>]</i>	1,5 – 4,0 mm at Rm 2.000 N/mm <sup>2</sup>	2,1 – 6,0 mm at Rm 2.000 N/mm <sup>2</sup>	0,12 – 0,6 (6) mm at Rm 2.600 N/mm <sup>2</sup>
		1,5 – 4,5 mm at Rm 1.800 N/mm <sup>2</sup>	2,1 – 7,0 mm at Rm 1.800 N/mm <sup>2</sup>	0,6 – 0,8 (4) mm at Rm 2.300 N/mm <sup>2</sup>
Spring diameter, max.:	<i>[mm]</i>	100 mm	130 mm	20 mm
Feed speed, max.:	<i>[m/min]</i>	100 m/min	100 m/min	160 m/min
Springs, max.:	<i>[Stk/min]</i>	280 Stk/min	160 Stk/min	1.500 Stk/min
Dimensions (l×w×h) mm (without pay-off unit)	<i>[mm]</i>	1.900 × 1.800 × 2.350 mm	2.300 × 2.200 × 2.450 mm	900 × 1.700 × 900 mm
Weight	<i>[kg]</i>	ca. 3.200 kg	ca. 5.400 kg	ca. 700 kg

Technical Data		F 12	F 18	F 30
Wire-Ø bei (Wm) Rm	<i>[mm]</i> <i>[N/mm<sup>2</sup>]</i>	0,2 – 1,1 (4) mm at Rm 2.500 N/mm <sup>2</sup>	0,35 – 1,6 (4) mm at Rm 2.300 N/mm <sup>2</sup>	0,7 – 2,5 (4) mm at Rm 2.000 N/mm <sup>2</sup>
		> 1,1 – 1,2 (5) mm at Rm 1800 N/mm <sup>2</sup>	> 1,6 – 1,8 (4) mm at Rm 1900 N/mm <sup>2</sup>	> 2,5 – 3,0 (6) mm at Rm 1800 N/mm <sup>2</sup>
Spring diameter, max.:	<i>[mm]</i>	30 mm	40 mm	65 mm
Feed speed, max.:	<i>[m/min]</i>	160 m/min	140 m/min	135 m/min
Springs, max.:	<i>[Stk/min]</i>	600 Stk/min	450 Stk/min	300 Stk/min
Dimensions (l×w×h) mm (without pay-off unit)	<i>[mm]</i>	900 × 1.700 × 900 mm	1.200 × 1.850 × 1.650 mm	1630 × 2.100 × 1.800 mm
Weight	<i>[kg]</i>	ca. 700 kg	ca. 1.200 kg	ca. 1.400 kg

F08 Limited operating range only with optional second pair of feed rollers (see FUL 16+ flyer)

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FUTURE FORMING TECHNOLOGY

# CNC Spring and Wire Forming System, Type FMU E For the Production of Hairpins, I-Pins and Stator Connection Assemblies from Flat Material

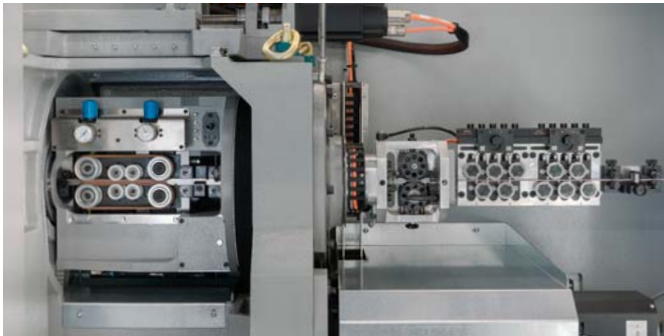


FMU E

# FMU E

▼ Newly developed feed unit:  
Belt feed, length measuring device and  
roller straightening unit for profiled material

▼ Bending tools Type 10 and Type 5 particularly for flat material



## Our Accomplishments for your Benefit

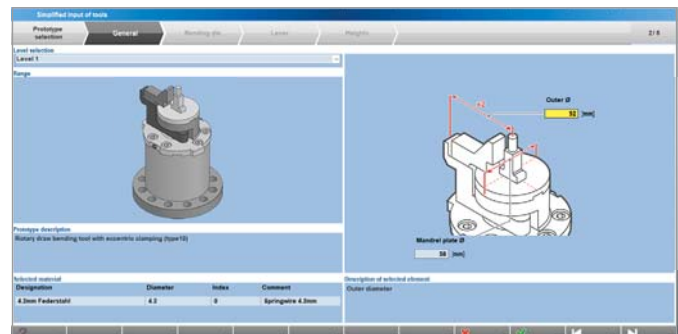
- The new FMU E series represents a unique machine concept for the production of hairpins and stator connection assemblies. It complements the successful FMU series in the electromobility sector.
- The WAFIOS tool system for hairpins combines active rotary-draw bending with the agility of conventional wire bending tools. It prevents the material from slipping and increases the quality of complicated geometries.
- The newly developed feed unit prevents deformations of the profiled material and enables - together with the tool system - the positioning of end legs.
- Our programming system WPS 3.2 EasyWay offers easy, geometrical programming and a clearly arranged overview of the materials and tools used.
- The FMU E series can be complemented by insulation stripping, burr-optimized cutting and chamfering modules.

## Design Features

- The new tool design has been developed for the specific requirements of the e-mobility industry. It allows the production of complicated geometries while ensuring highest quality.
- The integrated length measuring device monitors the infeed length and guarantees dimensionally stable geometries
- The roller straightening unit enables the processing of flat material over the entire operating range without the need to change straightening rollers
- The pay-off unit for wire spools (SPT 2) ensures the smooth unwinding of material without that the material gets damaged, even when processing insulated materials

## Operation

- Full HD multi-touch monitor (at least 21.5") for a better overview and gesture-based control
- User-friendly and quick set-up with hand-held operating device and touchscreen
- Reduced set-up times due to ergonomic access to all tool positions as well as simple and fast programming of tools, material parameters and bending programs with the WPS 3.2 EasyWay



► The guided input of tool data facilitates the set-up of bending tools



# Powerful, Flexible, and Efficient – A New Kind of CNC Spring and Wire Forming System

## Comprehensive support: From the design to large series production

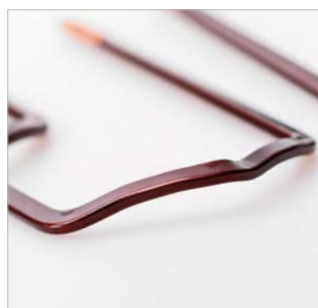
Besides the FMU E series for small series production, WAFIOS offers an indexed machinery system for the production of large series. The contract manufacture of hairpins as well as support in the construction and design of bent parts complete the range of services offered.



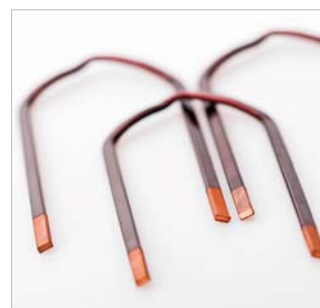
An integrated fiber laser enables clean surfaces and a good welding result.



The rotary wire advance feed is a unique development that guarantees 100% position control of the workpieces' leg positions.



The WAFIOS **Hairpin Tool System** allows the production of complex geometries and a surface-protecting handling of the insulated copper wire/flat material.



The in-process measurement and control of several geometry points enables a production free from errors.

## Quality

For more than 125 years, the name of WAFIOS has been synonymous with highest quality, safety standards, and technical innovations in the German machine manufacturing industry.

## Reliability

Strict quality controls, state-of-the-art production systems, and many years of experience guarantee that your investment is safe in our hands. Our global service network ensures high availability of WAFIOS machinery.

## Cost efficiency

High production output and a long service life will save money and shorten the amortization time of your investment.

▼ User-friendly WAFIOS Programming System WPS 3.2 EasyWay including the programming of geometries and the visualization of bent parts

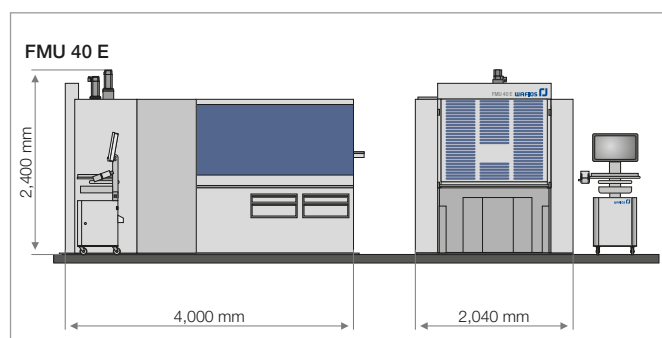
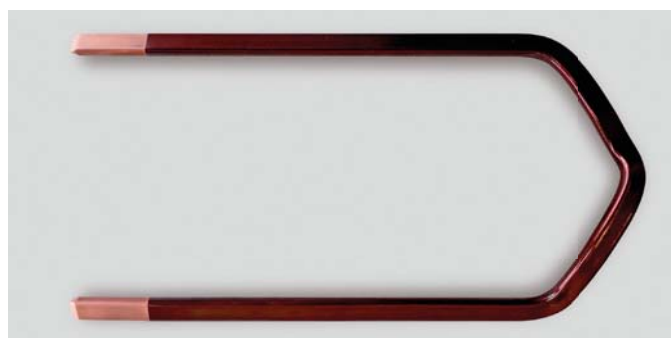




Technical Data
Tensile strength:
Cross section:
Thickness:
Width:
Bend-back clearance:
Stroke of vertical table:
Stroke of horizontal table:
Stroke of slide:
Dimensions: (w × h × l)
Weight without pay-off unit:
Upgradable to max. CNC axes

FMU 32 E
max. 400 N/mm <sup>2</sup>
max. 20.25 mm <sup>2</sup>
max. 4.5 mm
max. 8.0 mm
max. 250 mm
+70 mm / -120 mm
± 90 mm
95 mm
1,600 × 2,250 × 2,300 mm
ca. 3,600 kg
max. 24 axes

FMU 40 E
max. 400 N/mm <sup>2</sup>
max. 30.25 mm <sup>2</sup>
max. 5.5 mm
max. 10.0 mm
max. 450 mm
+55 mm / -175 mm
± 70 mm
130 mm
2,040 × 2,400 × 3,120 mm
ca. 5,900 kg
max. 24 axes



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Precision Machinery for Wire and Tube