



## CUTLERY INDUSTRY

MACHINES + ROBOTIC CELLS FOR  
grinding | polishing | serrating | sharpening



CONTENT

MACHINES AND ROBOTIC CELLS

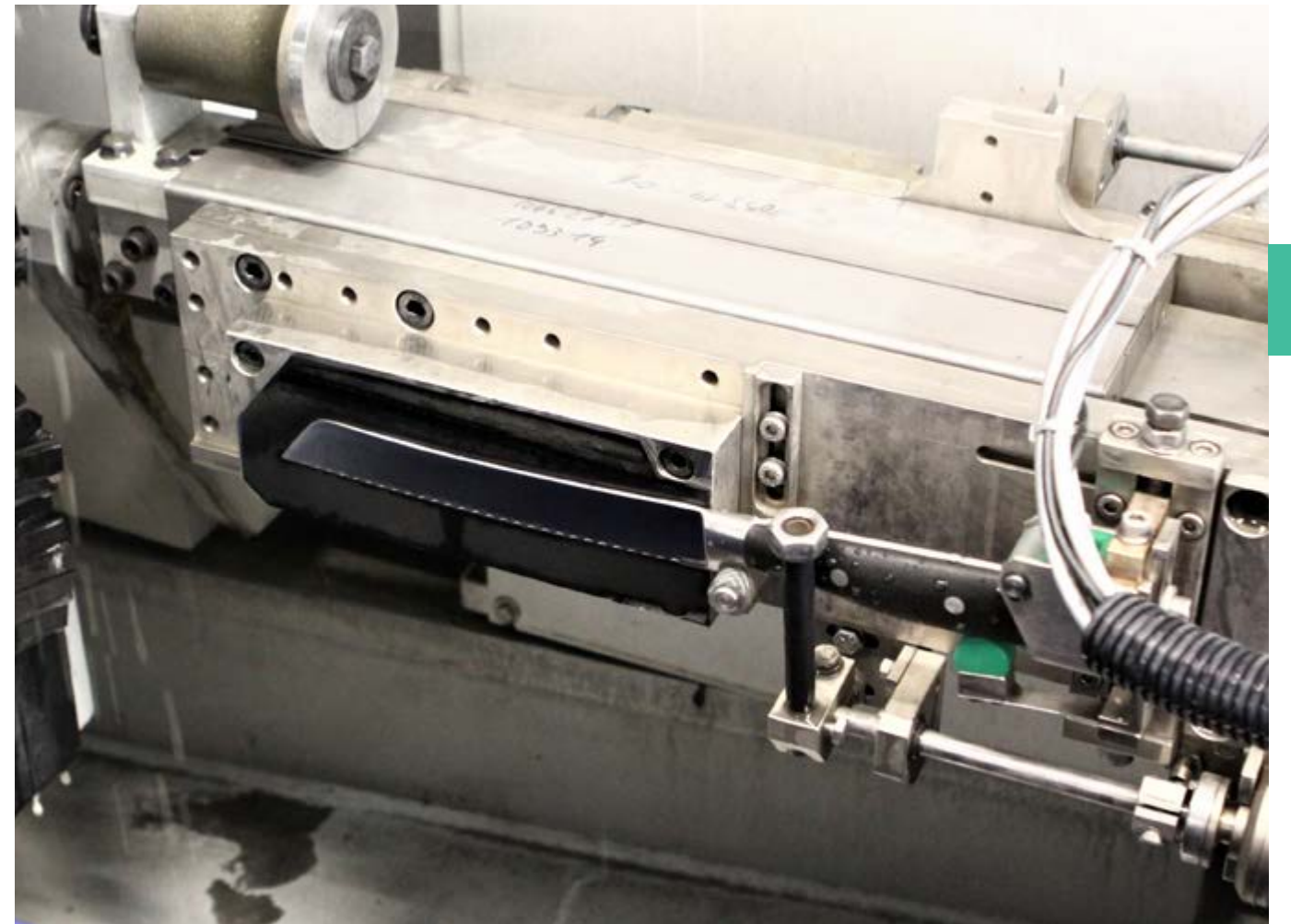
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## CUTLERY

### PROCESSING STEPS

#### GRINDING SERRATING SHARPENING

The Berger Gruppe offers CNC controlled grinding, glazing, polishing and sharpening machines as well as robot cells for processing knives, scissors, manicure instruments and similarly shaped work-pieces.



#### Knives

Processing steps:

- knife back grinding p. 52 f., p. 73
- flat grinding p. 28–31
- flat bevel grinding p. 10 ff.
- hollow grinding p. 44 f.
- glazing p. 46 ff.
- polishing p. 64 f.
- scalloped grinding p. 34 f.
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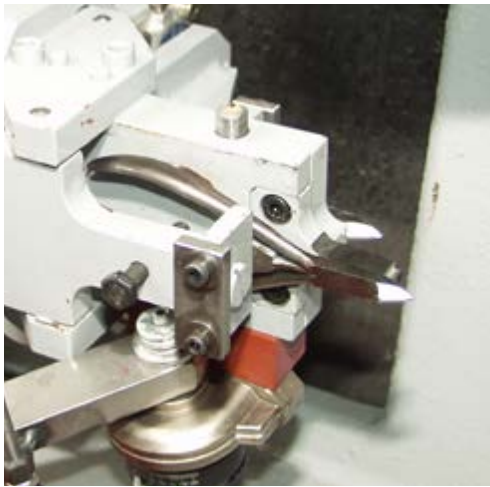
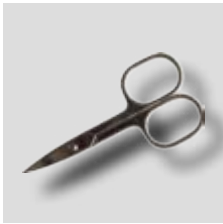
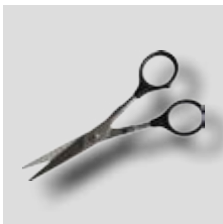
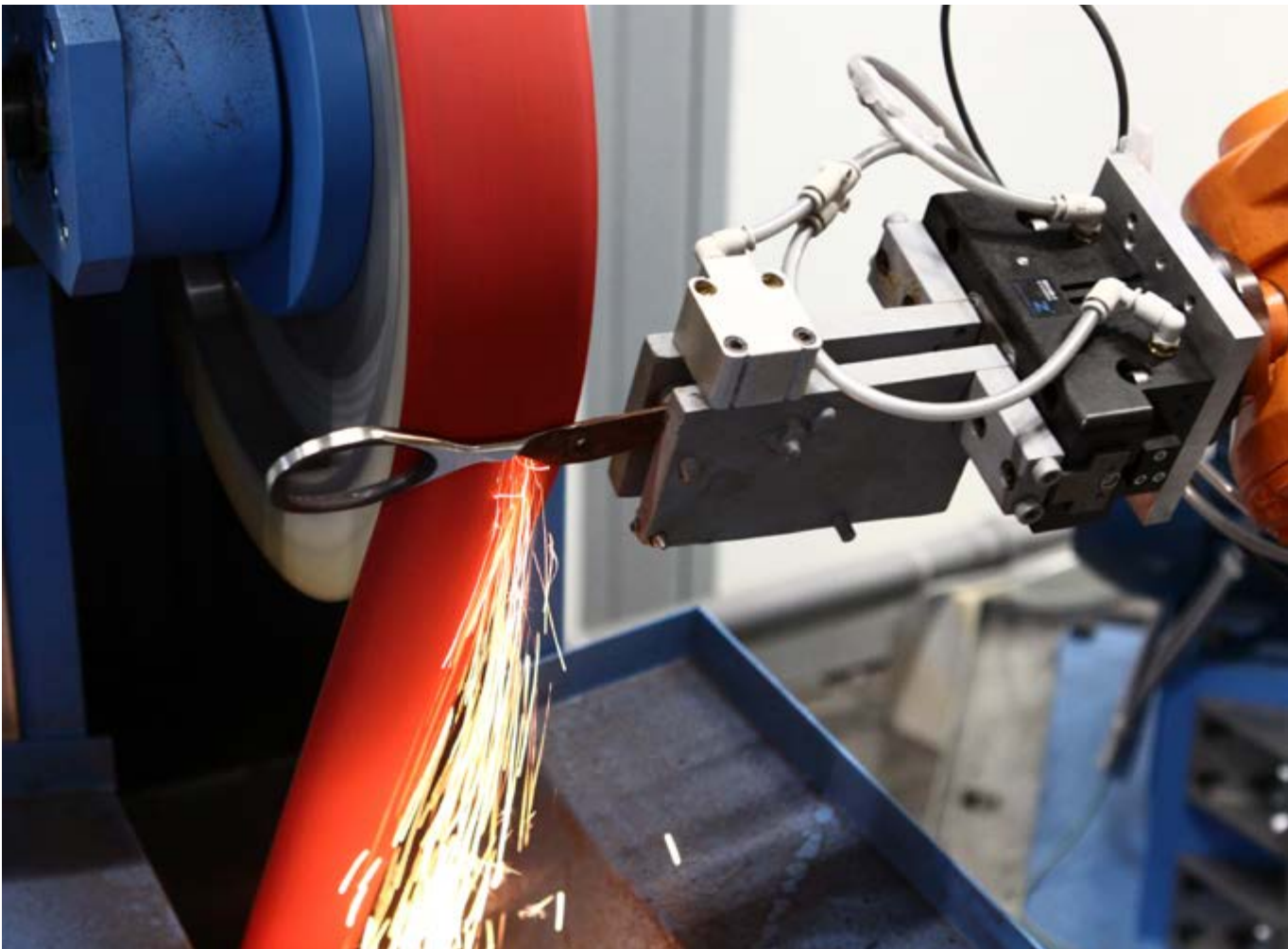
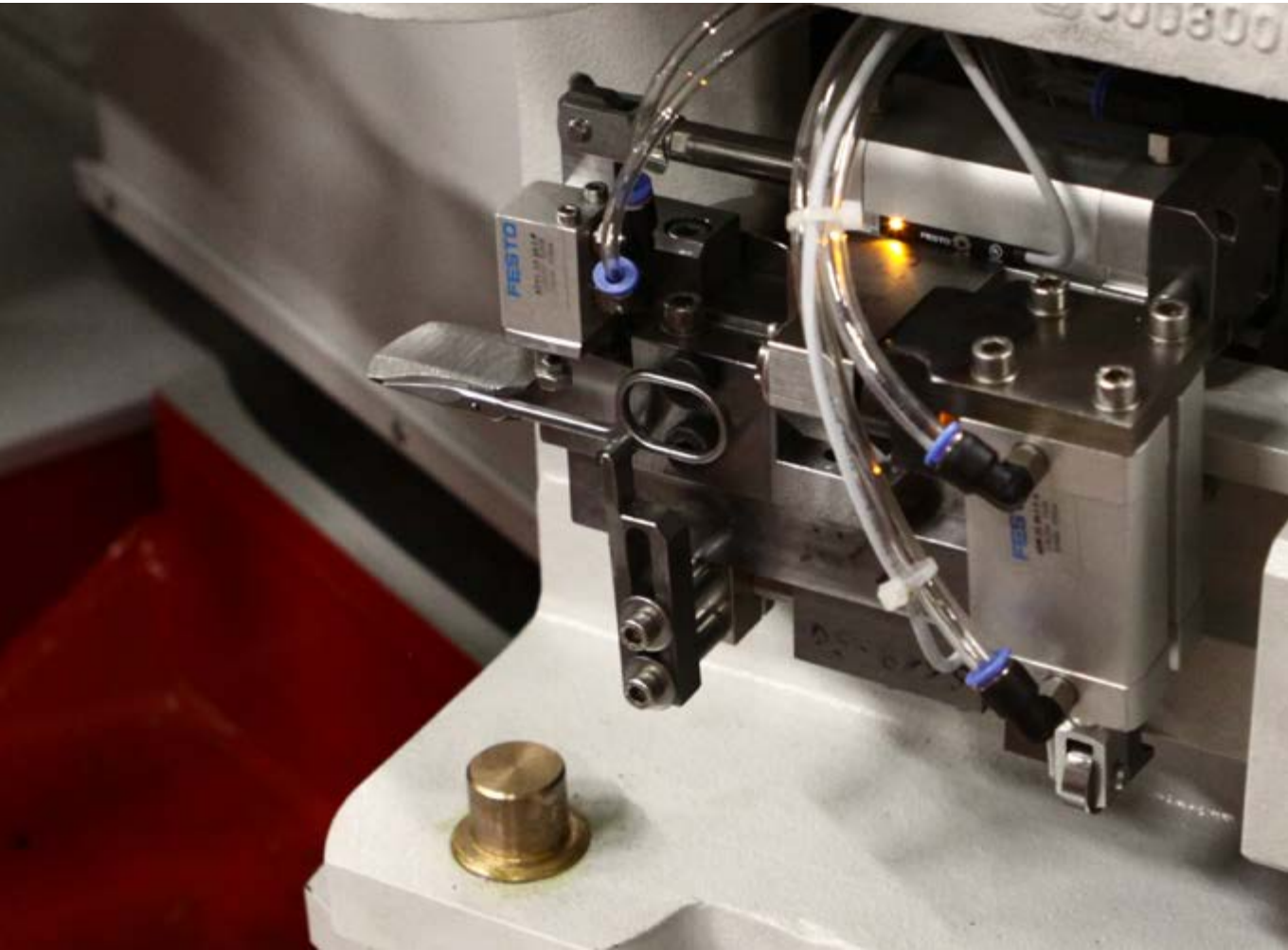


# CUTLERY PROCESSING STEPS

## Scissors

Processing steps:

- contour milling p. 86 f.
- back grinding p. 52 f., p. 78 f.
- flat grinding p. 28 f.
- flat bevel grinding p. 10 ff., p. 32 f.
- scalloped, serrated grinding p. 34 f., p. 78. f.
- outer contour p. 78 f.
- polishing p. 64 f.



## Manicure instruments

Processing steps:

- flat bevel grinding p. 14 f.
- robotic machining (nail clippers) p. 84
- robotic machining (manicure tweezers) p. 85

The following catalogues are available for the machining of related workpieces:

- surgical instruments
- tools
- technical blades
- machine knives



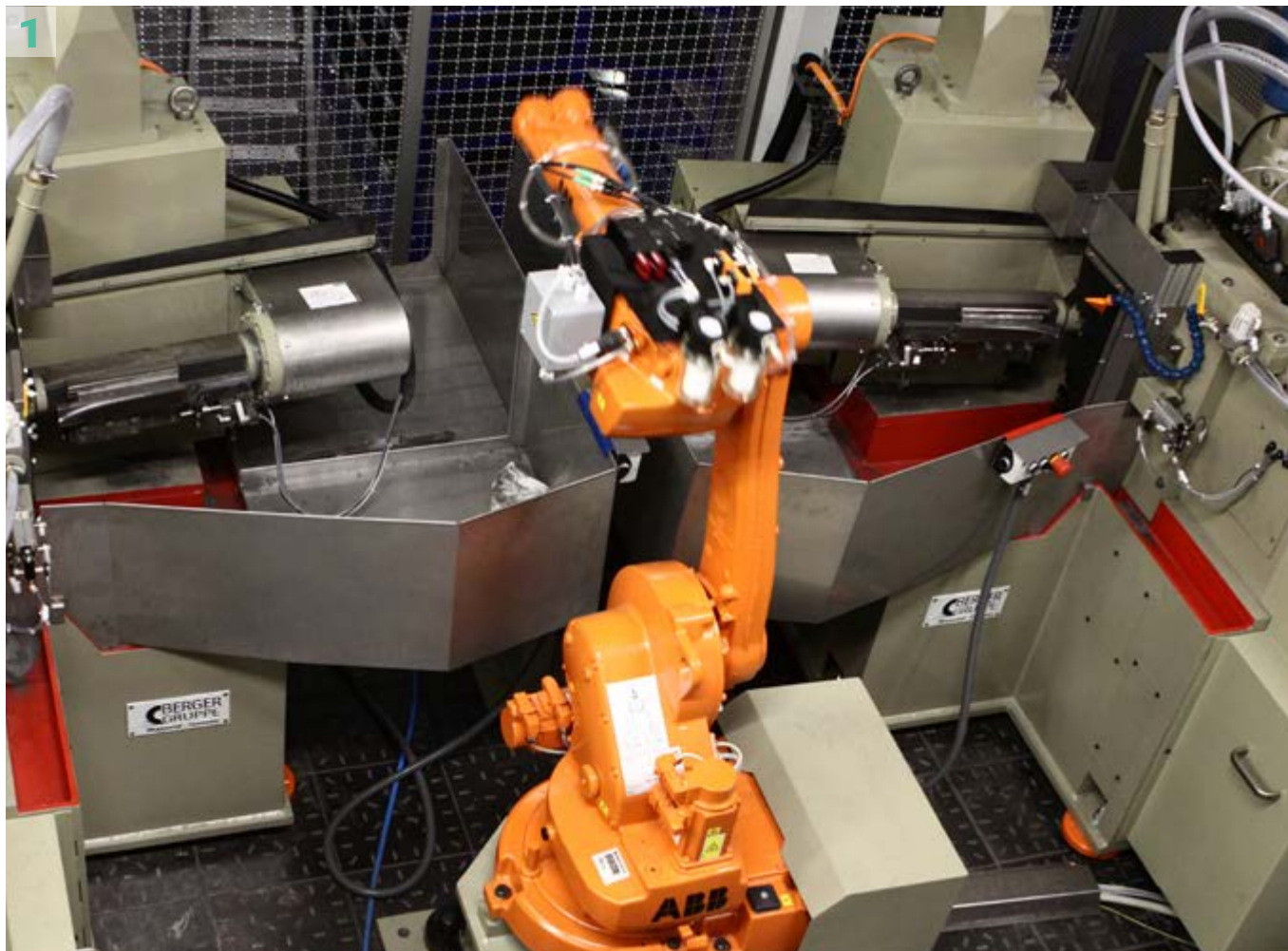
## GRINDING MACHINES

### FOR SINGLE WORKPIECES

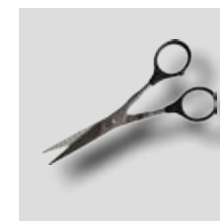
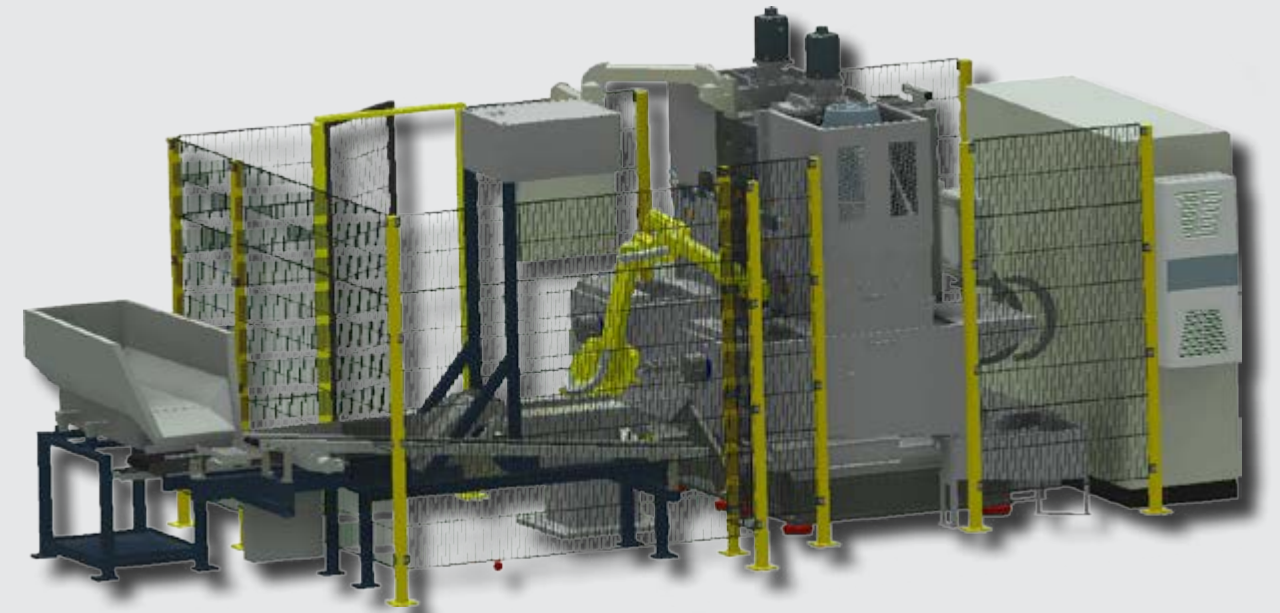
#### GRINDING SHARPENING GLAZING

Grinding with CNC technology

For the processing of cutlery, the Berger Gruppe offers CNC controlled machines for grinding, glazing, polishing, serrating and sharpening.



2



The machines are mainly used in the cutlery, machine knife, tool and surgical industries.

The following grinding machines are used:

- flat bevel grinding machines
- rotary table grinding machines
- peripheral grinding machines
- rotary index table grinding machines
- hollow grinding machines
- glazing machines
- contour grinding machines
- sharpening machines



#### Examples of use (pictures)

1. Flat grinding of knives with flat bevel grinding machine BG2/NT (picture 1)
2. Exemplary structure of a machining cell with DG/NT flat bevel grinding machine, robot loading and unloading, Berger Feeder and disordered feeding via conveyor belt (picture 2)
3. Indexing rotary table magazine for knives (picture 3)



# FLAT BEVEL GRINDING MACHINES BG

## Surface grinding

The grinding machines of the BG series process CNC controlled surfaces on knives, scissors, hand tools and related workpieces.

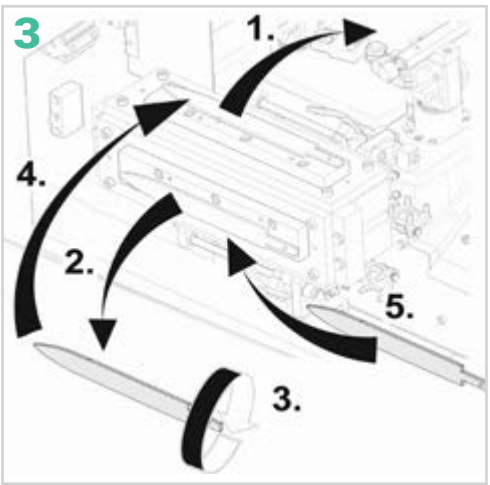
Depending on the size of the workpiece to be machined, the machines are equipped with grinding wheels with different diameters.

Different series are available depending on requirements:

- BG/NT: complex geometries
- BG/RV/NT: extremely curved workpieces
- BG/VSS/NT: knife blades with inclined bolster
- BG/ZA/NT: economic grinding of simple geometries
- BG/RH/NT: radii grinding



- digital Windows control
- measuring control integrated in CNC control with measuring probe, digital display of grinding wheel wear, determination of remaining grinding wheel service life
- grinding table in 30° inclined bed design, roller rail guide with direct path measuring system
- workpiece-dependent programming software and NC block
- AC servo motors
- automatic interval-controlled central grease lubrication with monitoring and fault indication
- prepared for the reception of clamping devices
- TeamViewer for diagnosis/remote control of CNC and PLC functions
- grinding length 150–1 000 mm (5.9"–39.4") – depending on the model
- spindle drive 6.5–45 kW (depending on the model)
- mounting flange for grinding wheel segment or grinding wheel Ø 80–710 mm (3.15"–27.95") – depending on the model



## Examples of use (pictures)

1. Grinding machine BG/NT for surface grinding of knife blades (picture 1)
2. Grinding machine BG/NT with 360° rotating workpiece carrier block for holding up to four workpiece supports for subsequent machining (picture 2)
3. Blade exchange in device using a single machine for grinding knives (picture 3)



# FLAT BEVEL GRINDING MACHINES BG/NT

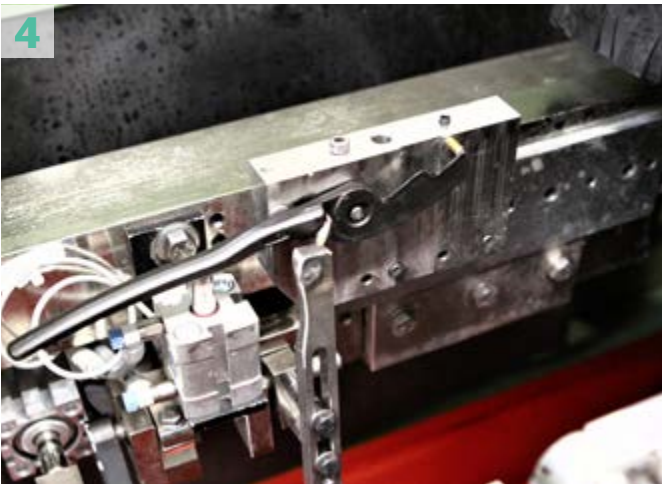
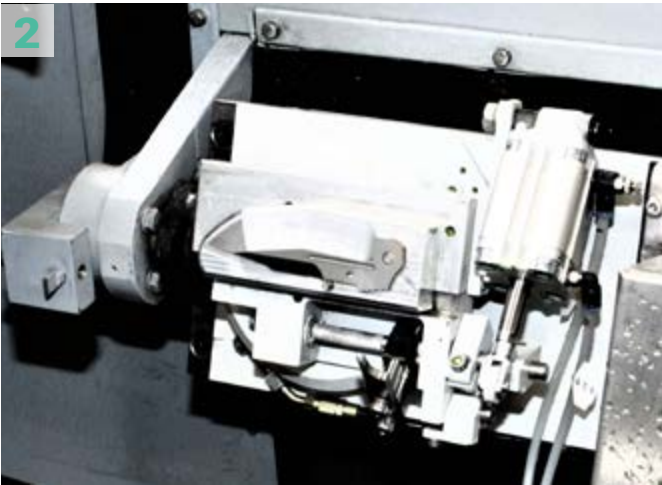
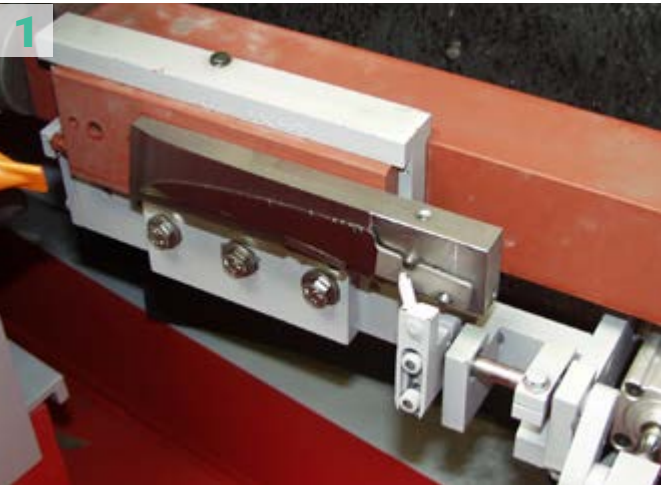
## Surface grinding of complex geometries

The BG/NT is the most widely used side surface grinding machine in the Berger Gruppe. It achieves surface grinding on workpieces with complex geometries.

Depending on the size of the workpiece, the grinding machine is equipped with grinding wheels with different diameters.

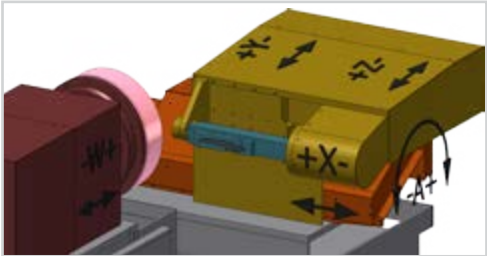
The grinding machine is equipped with four contour giving axes and one tool axis.

- horizontal grinding spindle
- Windows control with interface for robots, SPS, measuring technique and other applications
- automatic, central grease lubrication system
- four standard models with different grinding lengths up to 900 mm (35.4") and workpiece Ø 250 mm (9.84")
- grinding wheel or grinding segment Ø 80–710 mm (3.15"–27.95")
- wear-free main axis drive with linear motor – thus rapid traverses of 80 m/min (213.3 ft/min)
- precise positioning without backlash due to direct measuring system



- compact precision gear with high rigidity for controlling the flange angle
- workpiece-oriented programming and NC block
- spindle drive 6.5–45 kW
- spindle with backlash-free preloaded precision bearing, designed for peripheral speeds of up to 50 m/s (213.3 ft/s)
- grinding table with four axes:
  - X-axis = main feed axis, grinding tables driven by linear motor
  - Y- and Z-axis = linear contact pressure axes against grinding wheel
  - A-axis = tilt axis/cutting edge angle
- W-axis = infeed axis grinding wheel, infinitely variable and freely programmable
- digital axis drives on preloaded ball screw and Z-axis or precision reduction gear A-axis, digital axis drive linear motor for X-axis

## Axle arrangement BG/NT



## Examples of use (pictures)

1. BG2/NT: grinding and sharpening of flex knives (picture 1)
2. BG2/NT: grinding of sports knives (picture 2)
3. BG0/NT: grinding of pocket knife parts, machining cell with Berger Feeder and Fanuc robot (picture 3)
4. BG1/NT: grinding of cable shears (picture 4)



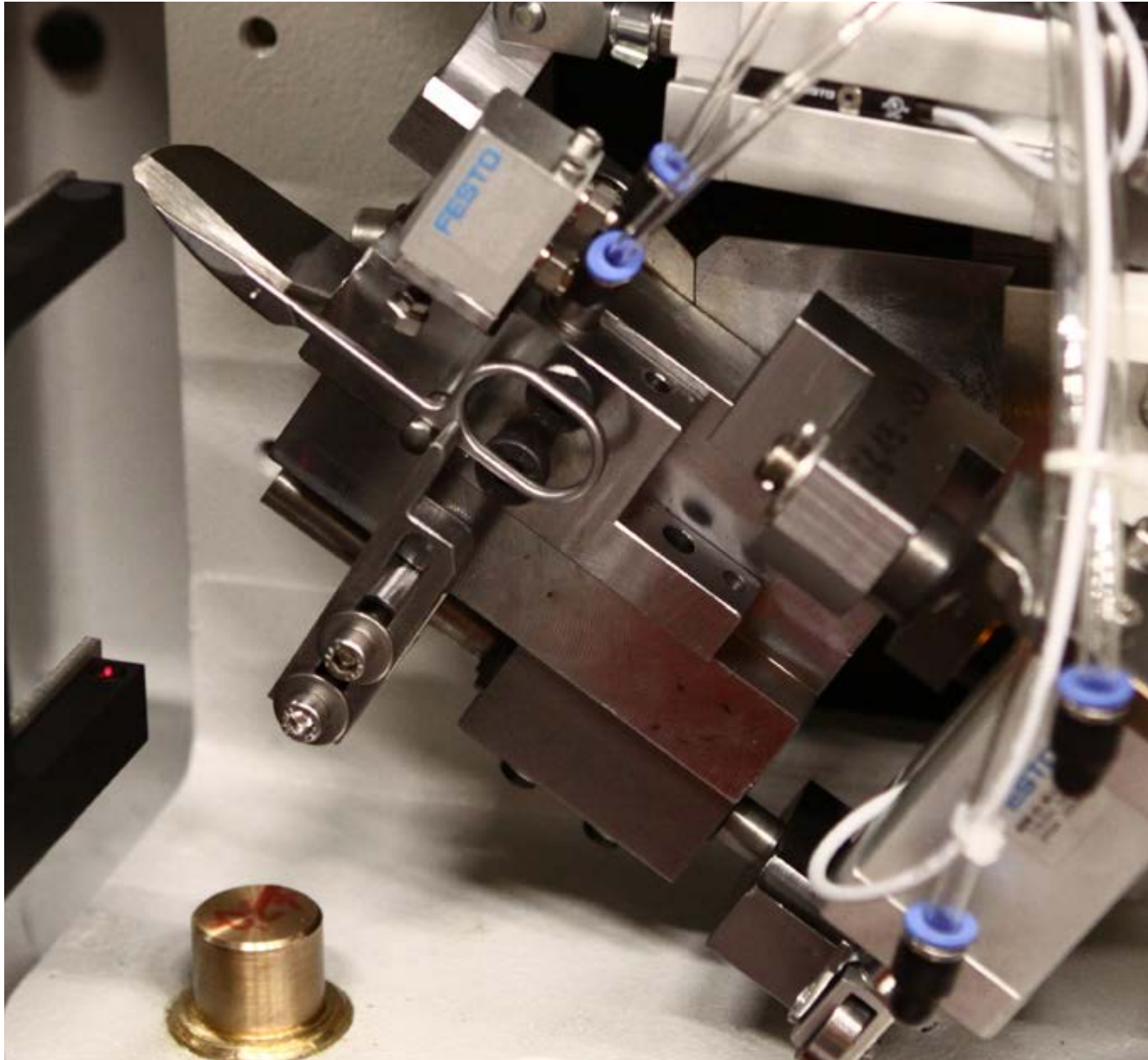
# FLAT BEVEL GRINDING MACHINES BG/RV/NT

## Grinding of extremely curved workpieces

The CNC controlled flat bevel grinding machine of the BG/RV/NT series processes strongly curved radii.

Surgical scissors, manicure scissors, pliers, hooks on garden shears and similarly shaped workpieces can be processed.

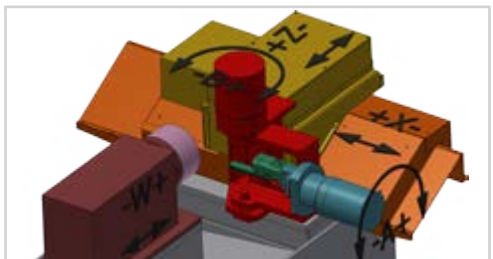
The grinding machine is equipped with four contouring axes and one tool axis.



In addition to the technical data listed on pages 12 and 13, the machine has the following technical specifications:

- precision-bearing grinding spindle, directly driven by special motor, power 6.5 kW
- grinding length up to 300 mm (11.81")
- frequency converter for stepless control of spindle speed from 2 000–6 000 rpm, power 7.5 kW
- mounting flange for grinding wheel Ø 80–200 mm (3.15"–7.87")
- grinding table with four axes:
  - X-axis = main feed axis, grinding table driven with linear motor
  - Z-axis = linear contact pressure axis against grinding wheel
  - A-axis = tilt axis/cutting edge angle
  - B-axis = axis of rotation

## Axle arrangement BG/RV/NT



- W-axis = infeed axis grinding wheel, infinitely variable and freely programmable
- digital axis drives on preloaded ball screw, Z-axis or precision reduction gear (A- and B-axis), digital axis drive, linear motor for X-axis



# FLAT BEVEL GRINDING MACHINES BG/V/NT

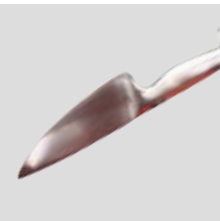
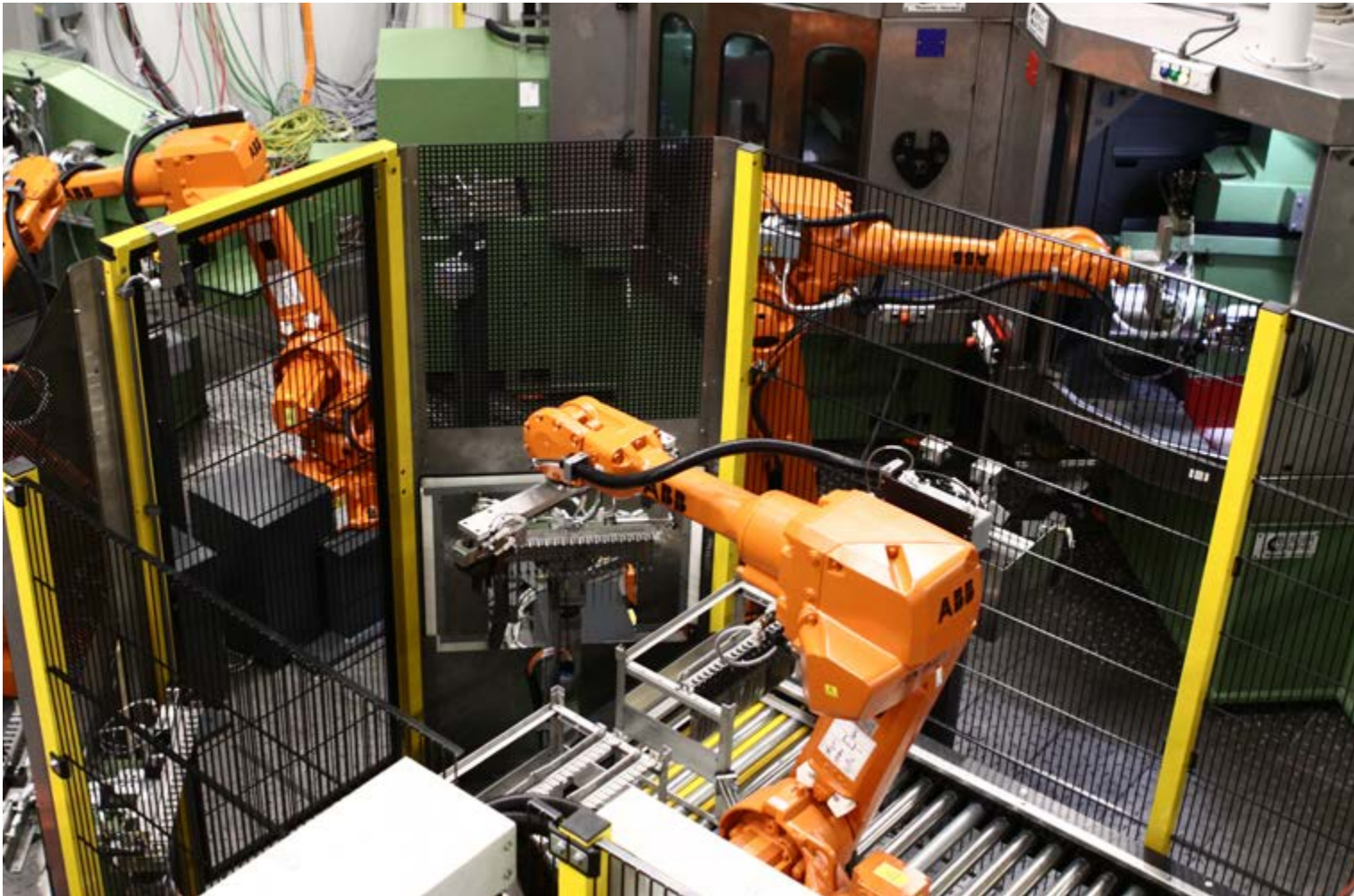
## Grinding of knife blades with inclined bolster / standard bolster

The flat bevel grinding machine of the series BG/V/NT has been specially designed for grinding knife blades with inclined bolsters.

However, it can also be used for workpieces with standard bolsters.

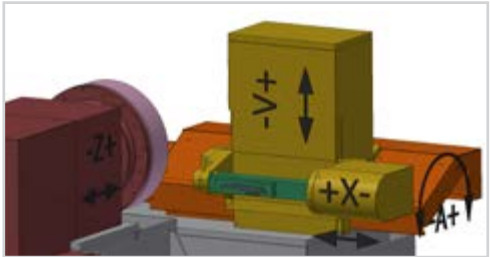
The grinding machine is equipped with four contouring axes.

- grinding length 300–640 mm (11.8"–25.2")
- reception flange for grinding wheel: Ø 450–710 mm (17.7"–27.95")
- grinding spindle drive motor 22–45 kW
- precision mounted grinding spindle, designed for circumferential speed of up to 50 m/s (213.26 ft/s)



- grinding table with three axes:
  - X-axis = main feed axis, grinding table driven with linear motor
  - V-axis = vertical axis
  - A-axis = tilt axis/cutting edge angle
- Z-axis = infeed axis grinding wheel
- digital axis drives on preloaded ball screw, Z- and V-axis or precision reduction gear (A-axis), digital axis drive, linear motor for X-axis
- additional axis arrangement with wheel axis Z- and W-axis for grinding wheel compensation. The Z-axis is used as axis for grinding the workpieces. It is used when the stroke of the wheel axis is not sufficient to grind the workpieces. Examples of this are wide knives where both the face and the cutting edge are ground in one clamping. (See also picture on page 20 and axis arrangement on page 21)

Axle arrangement BG/V/NT





# FLAT BEVEL GRINDING MACHINES BG1/ZA/NT

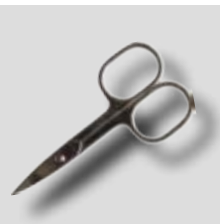
## Economic grinding of simple geometries

The CNC controlled flat bevel grinding machine of the series BG/ZA/NT is designed for economic grinding of workpieces with simple geometries. The grinding machine is equipped with three contour giving axes.

In the cutlery industry, the BG/ZA/NT is used, among other things, for grinding kebab knives or long knives.

Other applications include the grinding of garden shear parts, wood drills or straw chopper knives.

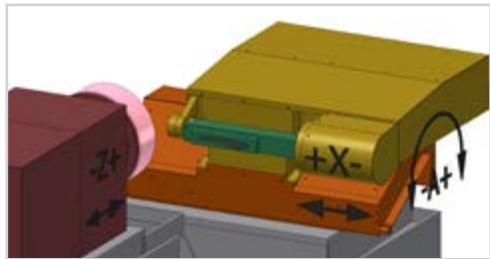
In the field of surgery, the BG1/ZA/NT is used for grinding surgical tweezers and the inside shanks (branches) of surgical scissors.



In addition to the technical data indicated at BG/NT the machine is classified by the technical specifications as follows:

- grinding length 300–640 mm (11.8"–25.2")
- reception flange for grinding wheel: Ø 80–710 mm (3.15"–27.95")
- spindle drive 6.5–45 kW
- precision mounted grinding spindle, designed for circumferential speed of up to 50 m/s (213.26 ft/s)
- grinding table with three axes:
  - X-axis = main feed axis of the grinding table, powered by a linear motor
  - Z-axis = infeed axis for grinding wheel
  - A-axis = tilt axis/grinding angle
- digital drive for the axes, preloaded ball bearing spindle, Z-axis or precision reduction gear (A-axis), digital powered X-axis with linear motor

## Axle arrangement BG/ZA/NT



## Examples of use (pictures)

1. Flat bevel grinding machine of the series BG/ZA/NT (picture 1)
2. Kebab knife grinding (picture 2)

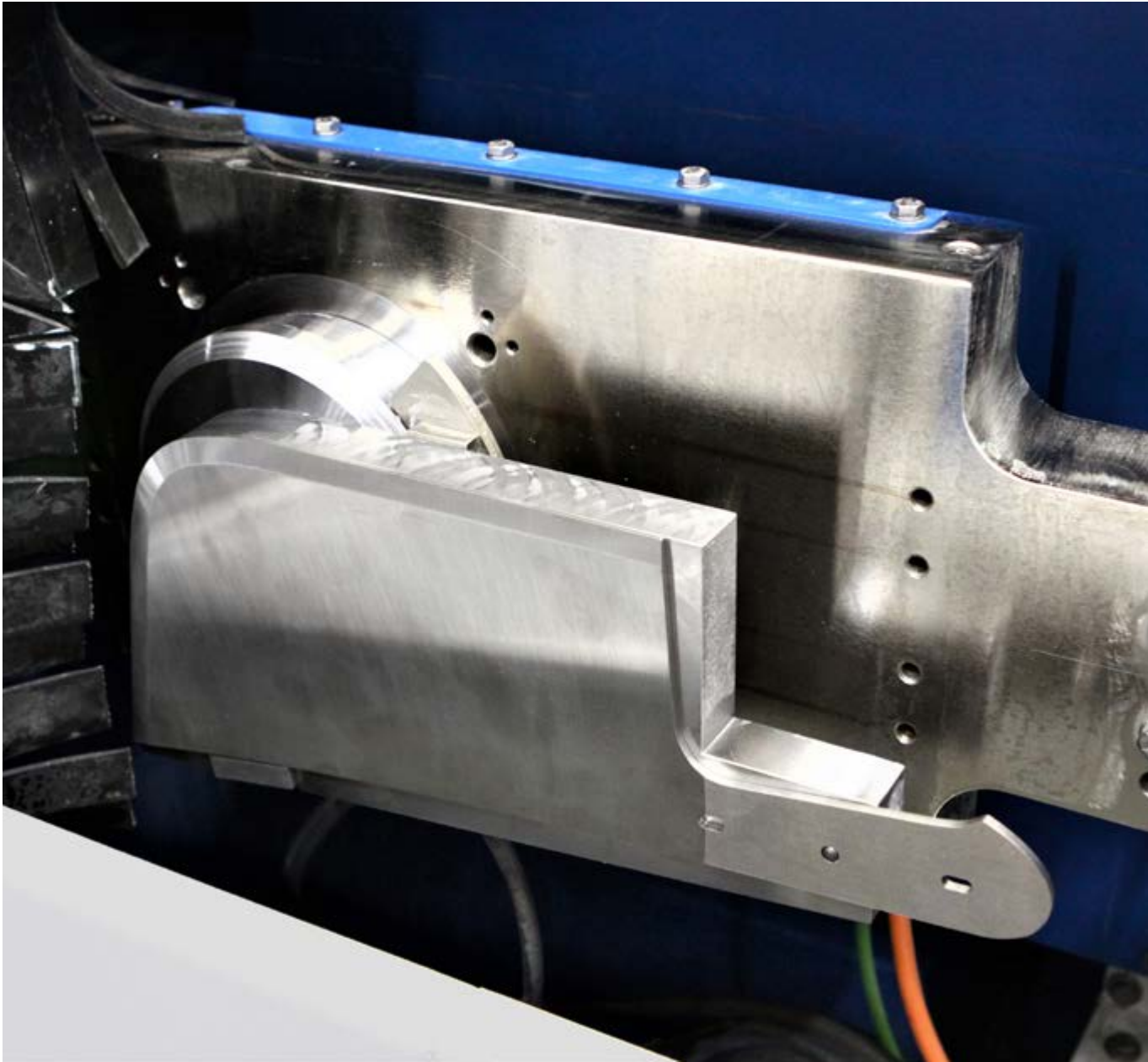


# FLAT BEVEL GRINDING MACHINES BG/VSS/V/RH/NT

## Grinding with high flexibility

The flat bevel grinding machine of the series BG/VSS/V/RH/NT treats workpieces with great flexibility combined with high rigidity thanks to the combination of stone axis (Z-axis) to compensate for grinding wheel wear and additional infeed axis (W-axis).

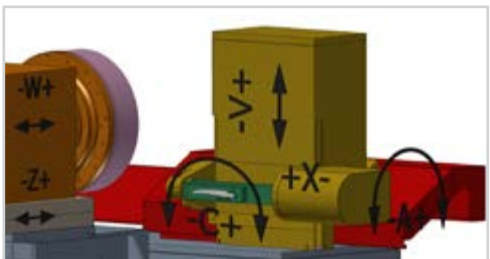
A combination with an additional vertical axis (V-axis) and a rotary axis (C-axis) is realized.



In addition to the technical data listed on pages 12 and 13, the machine has the following technical specifications:

- grinding length 300–640 mm (11.8"–25.2") (option: 1 000 mm (39.37"))
- mounting flange for grinding wheel Ø 200–710 mm (7.87"–27.95") (or segments)
- spindle drive 22–37 kW
- spindle with backlash-free preloaded precision bearing, designed for peripheral speeds of up to 50 m/s (213.26 ft/s)
- digital Windows control
- grinding machine with six CNC axes:
  - X-axis = main feed axis, grinding table driven with linear motor
  - A-axis = tilt axis/cutting edge angle
  - C-axis = horizontal rotating axis (option)
  - V-axis = vertical axis (option)

## Axle arrangement BG/VSS/V/RH/NT



- W-axis = infeed axis grinding wheel to compensate for grinding wheel wear
- Z-axis = linear pressure axis against grinding wheel
- digital axis drives on preloaded ball screw or precision reduction gear A-axis, digital axis drive linear motor for X-axis



# FLAT BEVEL GRINDING MACHINES BG/RH/NT

## Radii grinding

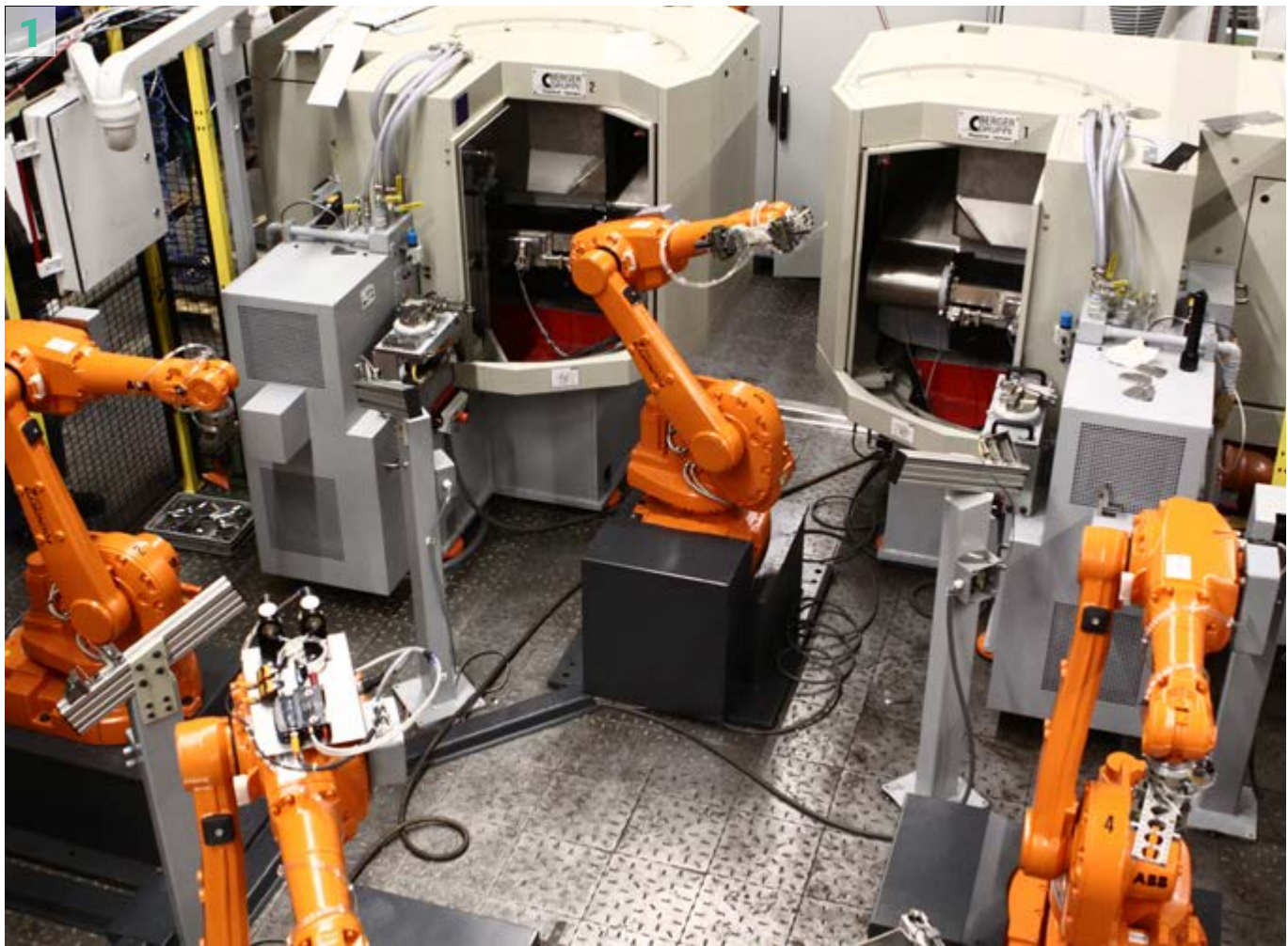
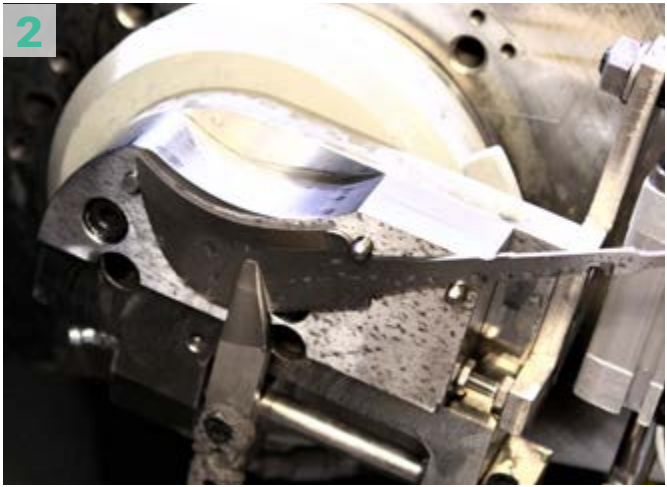
The CNC controlled flat bevel grinding machine of the BG/RH/NT series is designed for grinding curved cutting edges, e.g. on garden shears, pruning shears, hedge trimmers, axes, hand tools and circular blades.

It is equipped with up to five contouring axes and one tool axis.

The horizontal C-axis (RH) can also be used on grinding machines of the BG/V/NT, BG/VSS/NT or BG/ZA/NT series.

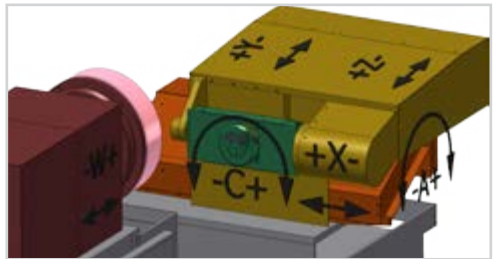
In addition to the technical data listed on pages 12 and 13, the machine has the following technical specifications:

- grinding length 300–640 mm (11.8"–25.2")
- mounting flange for grinding wheels Ø 80–710 mm (3.15"–27.95")
- spindle drive 6.5–45 kW
- spindle with backlash-free preloaded precision bearing, designed for peripheral speeds of up to 50 m/s (213.26 ft/s)



- digital axis drives on preloaded ball screw, Y- and Z-axis or precision reduction gear A- and C-axis, digital axis drive, linear motor for X-axis
- grinding table with five axes:
  - X-axis = main feed axis, grinding table driven with linear motor
  - Y- and Z-axis = linear pressure axis against grinding wheel
  - A-axis = tilt axis/cutting edge angle
  - C-axis = horizontal rotating axis
- W-axis = infeed axis grinding wheel, infinitely variable and freely programmable or with support axis for anvil knives and additional hollow grinding

## Axle arrangement BG/RH/NT



## Examples of use (pictures)

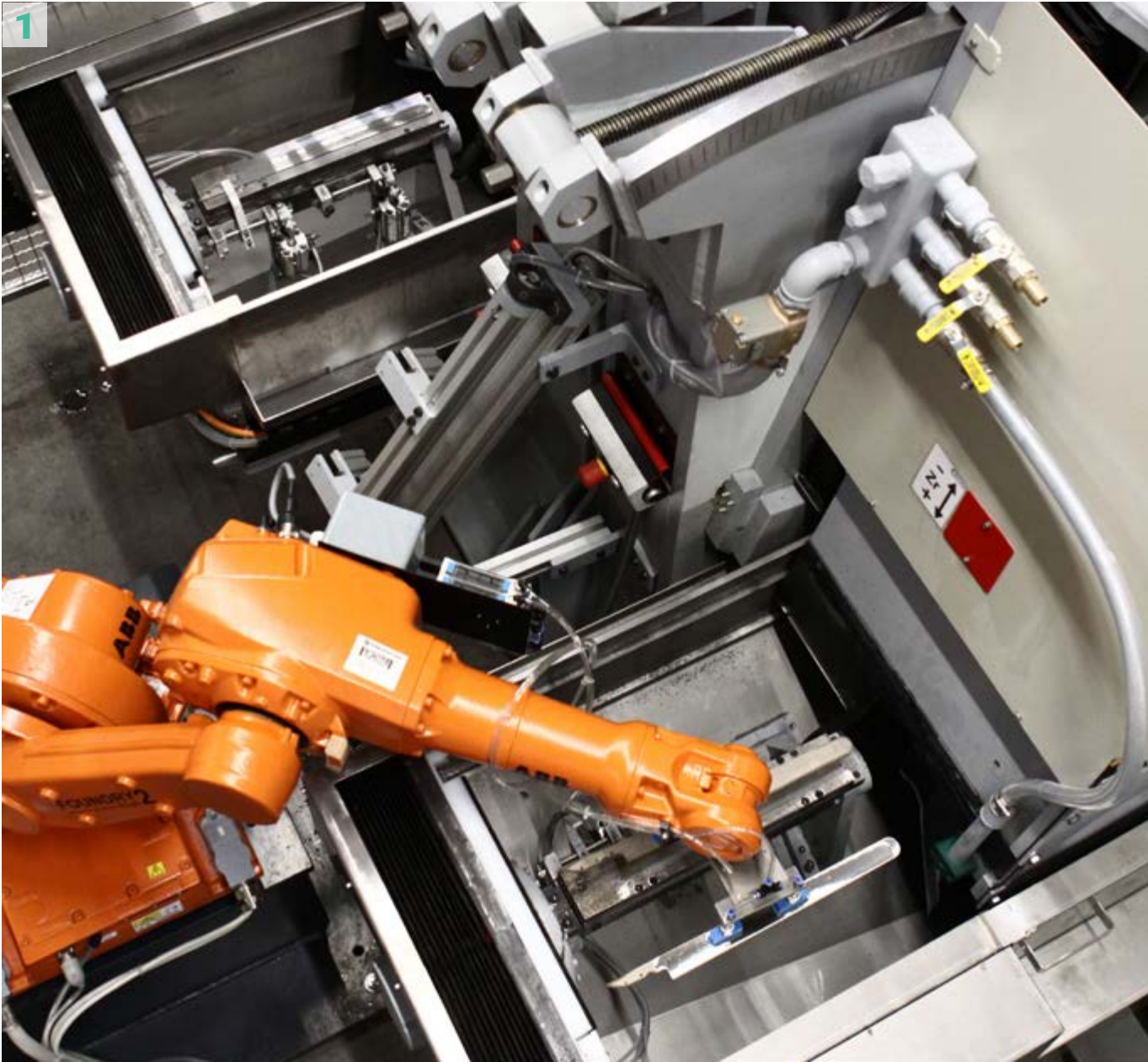
1. Processing cell for sports knives with BG1/RH/NT, two belt grinding stations BSS10, a polishing station P3, two double-storey magazine systems (see also p. 72 f.) and drying station (picture 1)
2. Grinding of sports knives (picture 2)
3. Circular blades 360°, arc-grinding (picture 3)
4. Machining of sports knives (picture 4)
5. Sports knives with orientation of the grinding grooves perpendicular to the contour (picture 5)



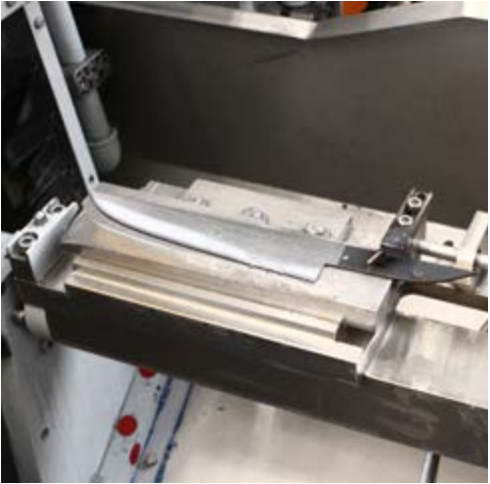
# FLAT BEVEL GRINDING MACHINES DG/NT

Surface grinding in the smallest space

The CNC grinding machine with three or four axes and a vertical grinding spindle is designed for grinding surfaces, e. g. on knives, scissors, hand tools and related workpieces.



- 30 % less space required compared to horizontal arrangement of the grinding spindle
- good stability due to solid welded construction of the machine body
- avoidance of vibrations during machining by filling the machine body with mineral casting
- Windows control with interface for robots, PLC, measuring technique and others applications
- wear-free main axis drive with linear motor – thus rapid traverses of 80 m/min (262.47 ft/s)
- precise positioning without backlash due to direct measuring system
- compact precision gear with high rigidity for controlling the flange angle
- designed as single and double machine by using two separate machine bodies



## Examples of use (pictures)

1. Grinding of knives with max. grinding length of 450 mm (17.7") with DG2, loading and unloading via robot (picture 1)
2. DG1 with Berger Feeder, Fanuc robot grinding of pocket knife parts (picture 2)

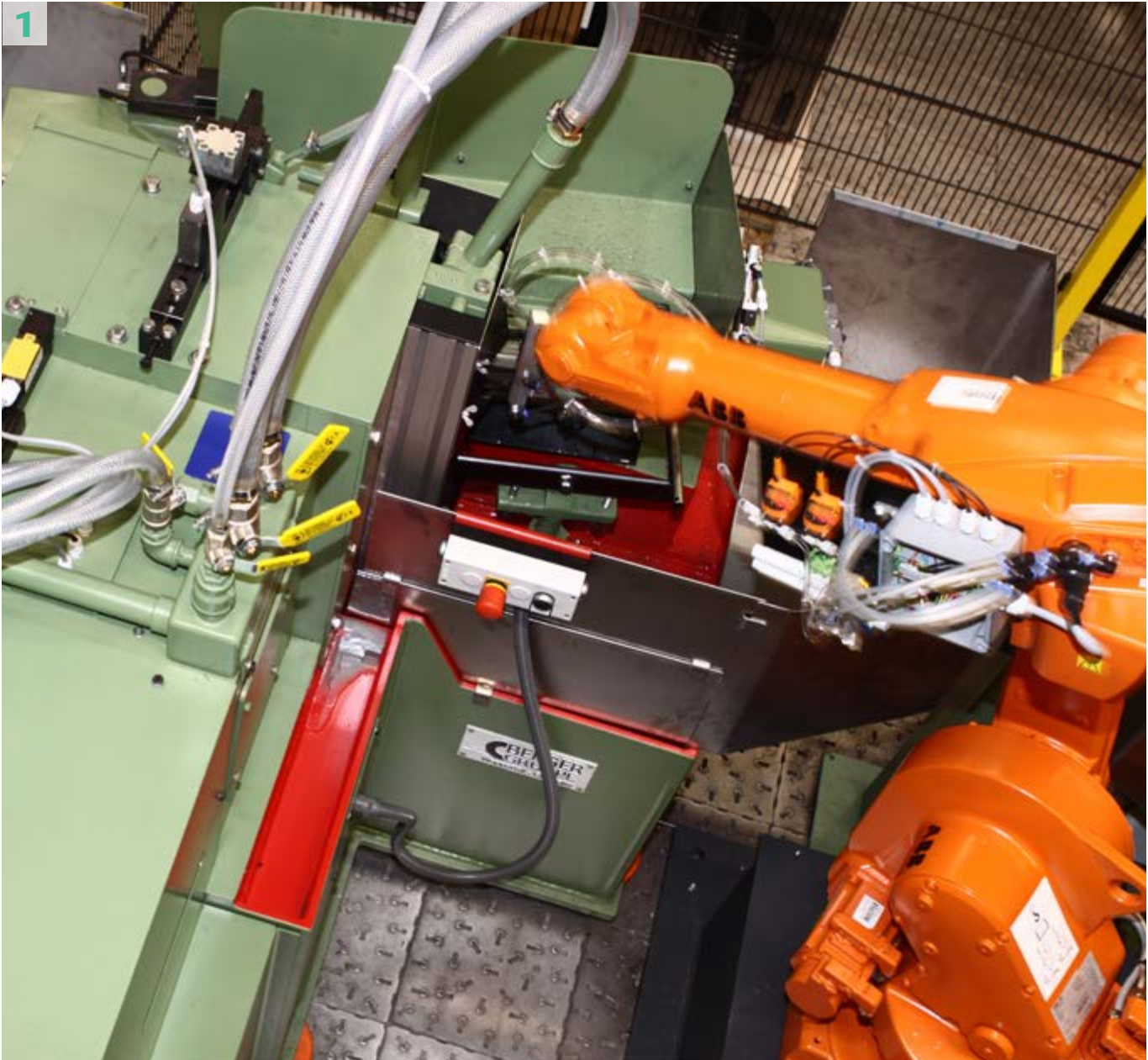


# FLAT BEVEL GRINDING MACHINES

## AS/H

### Surface and bevel grinding

The flat bevel grinding machine with hydraulically driven grinding table is designed for the machining of knives, mechanical knives, scissors, hand and gardening tools and similar workpieces.



### AS1/H

- grinding length up to 255 mm (10.04")
- grinding wheel Ø up to 350 mm (13.78")
- drive 5.5 kW (7,5 PS) – 15 kW (20 PS)
- designed for grinding table, pocket, kitchen, sports and hunting knives, secateurs and different hand tools such as axes, screwdrivers, chisels and pliers

### AS1/2/H

- grinding length up to 255 mm (10.04")
- grinding wheel Ø up to 450 mm (17.72")
- drive 5.5 kW (7,5 PS) – 15 kW (20 PS)
- designed for grinding table, pocket, kitchen, sports and hunting knives, secateurs and different hand tools such as axes, screwdrivers, chisels and pliers

### AS2/H

- grinding length up to 415 mm (16.34")
- grinding wheel Ø up to 500 mm (19.69")
- drive 7.5 kW (10 PS) – 18 kW (25 PS)
- designed for grinding big professional knives, hedge trimmers, axes and similar workpieces

### AS2/3/H

- grinding length up to 415 mm (16.34")
- grinding wheel Ø up to 700 mm (27.56")
- drive 15 kW (30 PS) – 30 kW (40 PS)
- designed for grinding heavy and wide workpieces with high material removal, e. g. cleavers, axes or mechanical knives

### Examples of use (pictures)

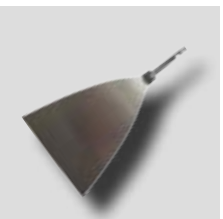
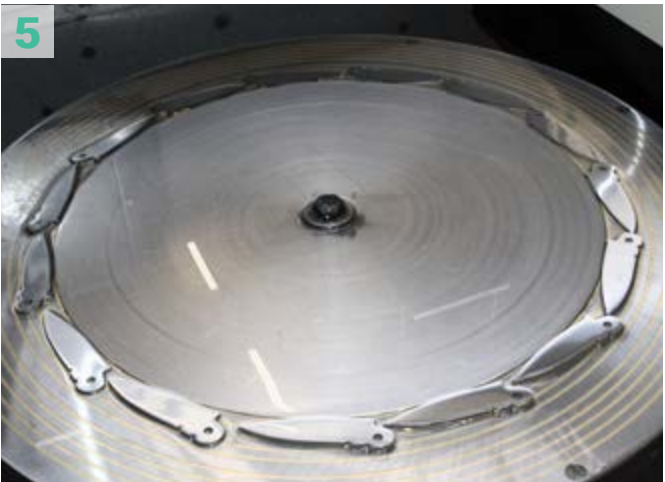
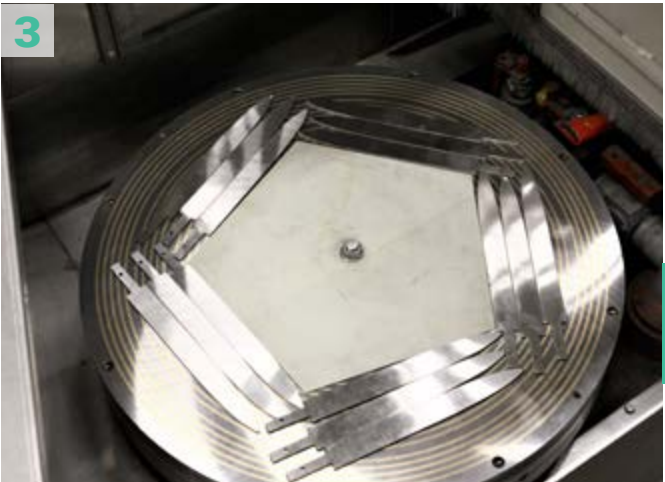
1. Flat bevel grinding machine AS/1/2 with robotic loading (picture 1)
2. Grinding machine AS2/H with extended stroke of 560 mm (picture 2)



# ROTARY TABLE GRINDING MACHINES DRG

## Flat grinding

The two-axe CNC double rotary table grinding machine works with high productivity and is designed for machining flat or tapered surfaces on a variety of workpieces, such as table knives, wood chisels, insides of shears, spatulas or connecting rods.



- nominal dimension of the workpieces on the rotary table adjustable with up to four independent measurement controls
- electromagnets with interchangeable pole plates
- mechanical, hydraulic or pneumatic clamping
- rotary table Ø 500–800 mm (19.69"–31.5")

## Examples of use (pictures)

1. Rotary table grinding machine DRG1
2. Grinding the inside of scissors with an additional shoulder (picture 2)
3. Flat grinding of professional knives (picture 3)
4. Flat grinding of spatulas (picture 4)
5. Grinding of sports knives (picture 5)

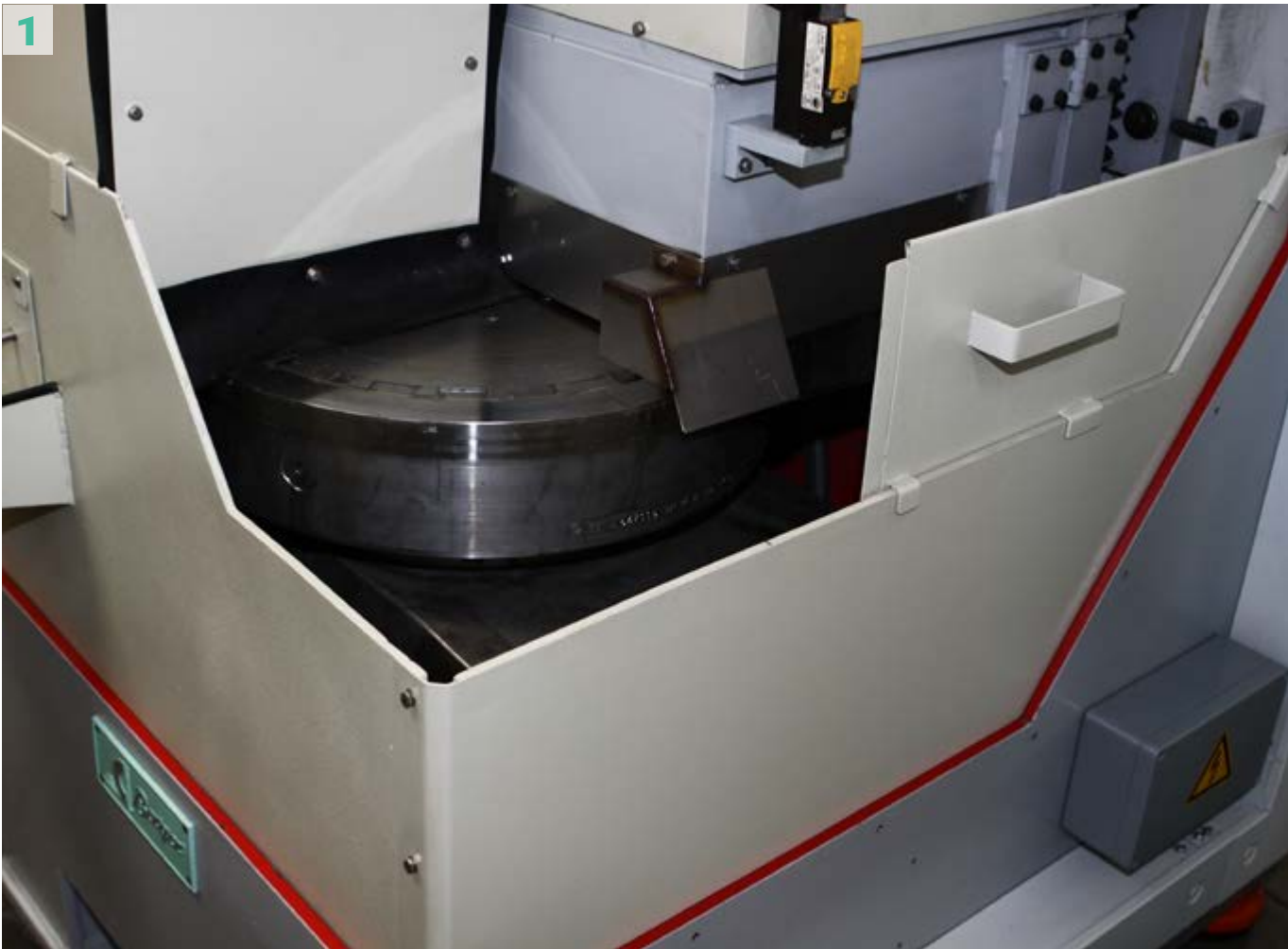


# ROTARY TABLE GRINDING MACHINES RTS

## Flat grinding

The grinding machine with vertically adjustable spindle is designed for economical surface and bevel grinding, e. g. on machine knives, pocket knife parts or hand tools in a continuous process.

Basically, a distinction is made between three different sizes depending on grinding wheel diameter, table diameter and spindle drive.



- vertically adjustable grinding spindle
- grinding wheel motor 7.5–15 kW (10–20 PS)
- grinding wheel or grinding segment Ø 350–420 mm (13.78"–16.54")
- mechanical device plates or electromagnetic pole plates with Ø 470–700 mm (18.5"–27.56")
- rotary table speed infinitely variable from 0.25–2 rpm
- automatic grinding wheel wear compensation via measurement control
- manual, horizontal adjustment of the grinding spindle position
- high productivity of up to 2 500 parts/h with automatic loading

## Examples of use (pictures)

1. Rotary table grinding machine RTS2 for flat grinding of machine knives for the textile industry, probes with direct measuring system also for interrupted grinding (picture 1)
2. Rotary table grinding machine RTS1 for grinding pocket knife parts (picture 2)

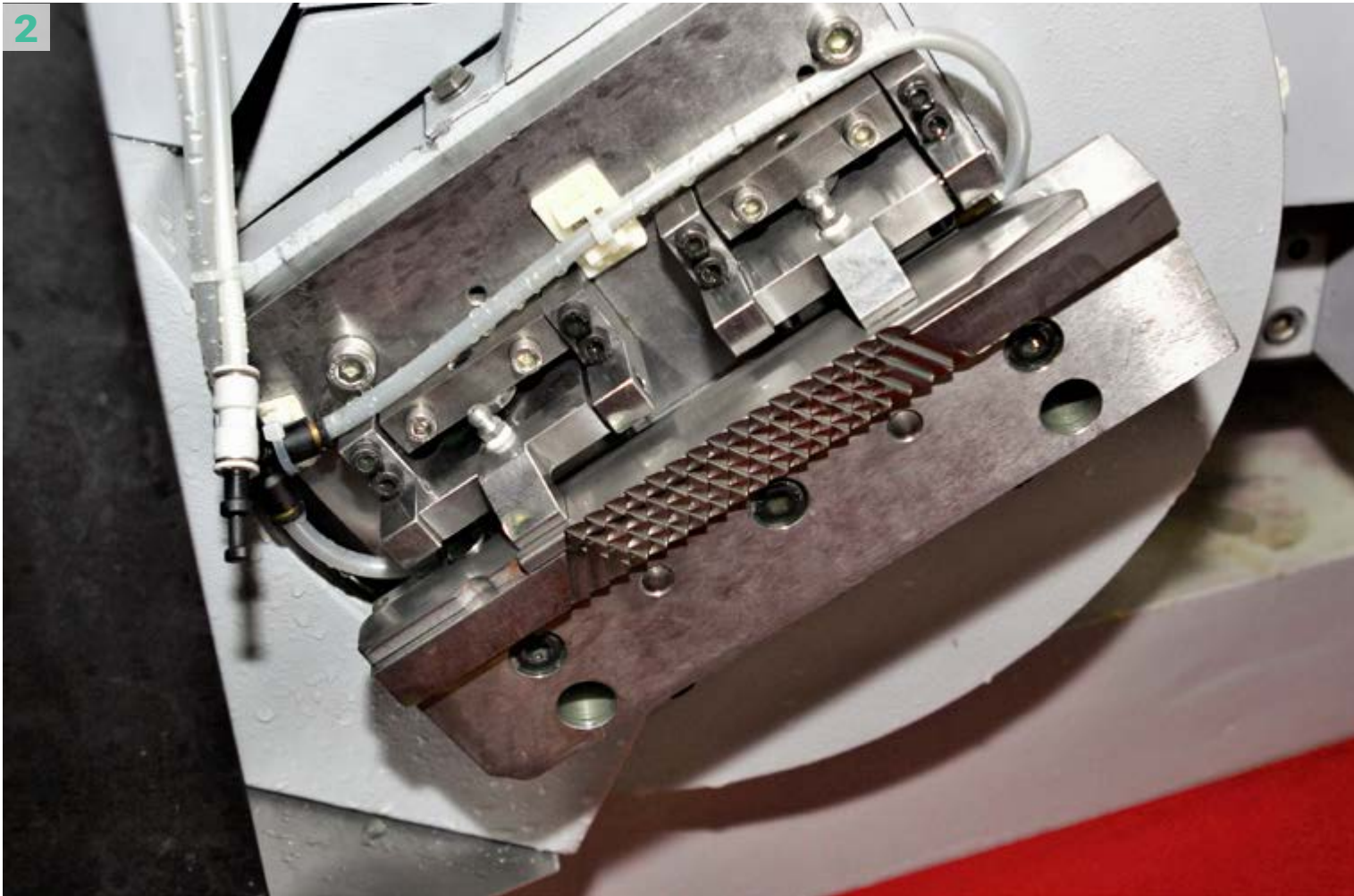
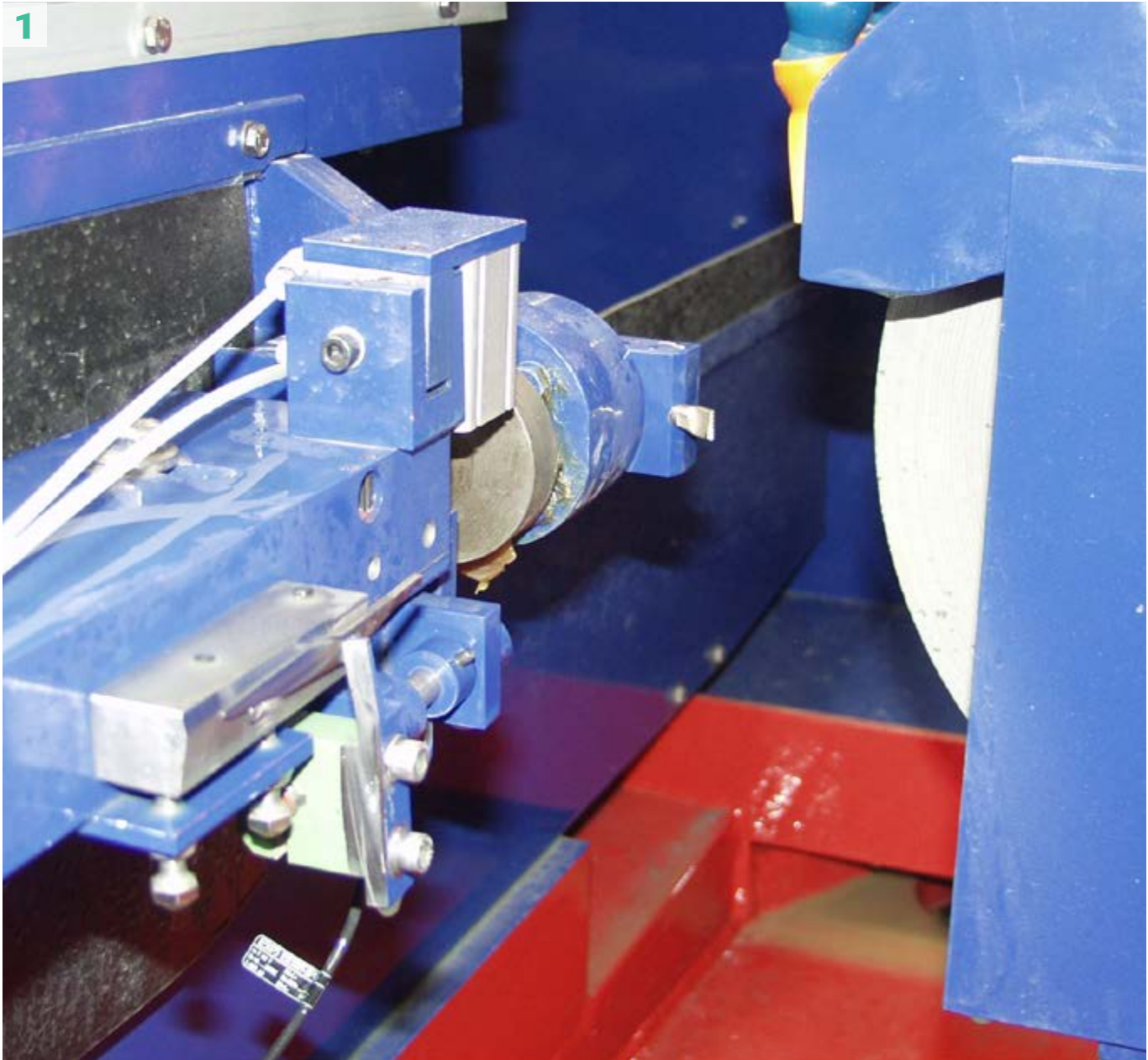


# PERIPHERAL GRINDING MACHINES PB/PB/NT

## Surface grinding

The CNC controlled peripheral grinding machine is equipped with a three- to five-axis grinding table and is designed for grinding the crowned outside and hollow inside of scissors.

- grinding stroke up to 350 mm (13.78") or 490 mm (19.29")
- 11–18 kW, up to 5 000 rpm
- peripheral grinding wheel with Ø 200–400 mm (7.87"–15.75") – depending on application



- three- to five-axis CNC grinding machine
- automatic robot loading with e.g. ABB, Mitsubishi or Kuka
- dresser of the grinding wheel with diamond-coated dressing roller or diamond fleece

## Examples of use (pictures)

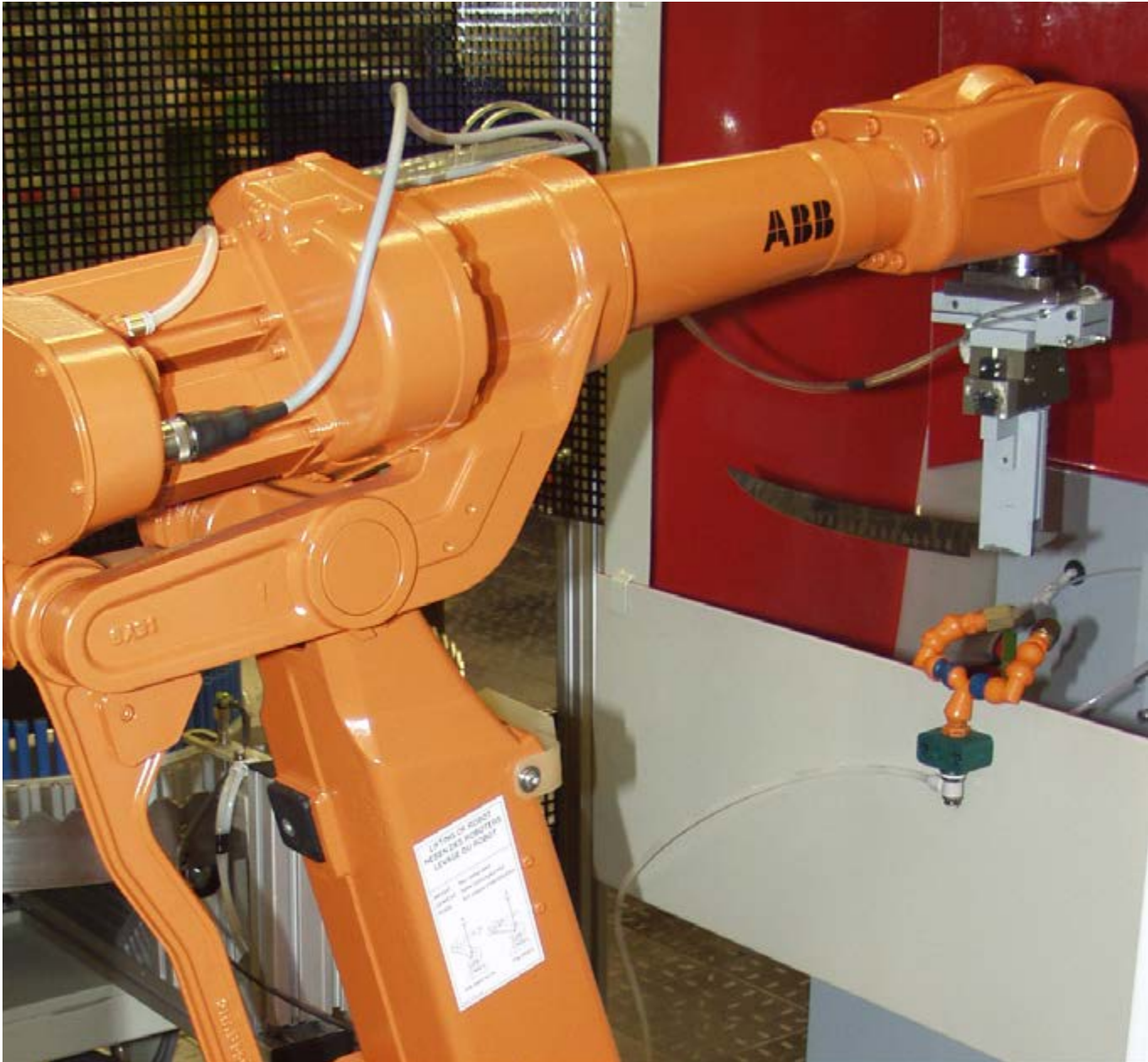
1. Convex grinding of outer and inner sides of hair scissors (picture 1)
2. Cross serration in the back of bayonets (picture 2)
3. Grinding the convex outer surface of scissors (picture 3)
4. Grinding the hollow side in the recess with 150 mm (5.9") hollow radius (picture 4)



# PERIPHERAL GRINDING MACHINES WSM

## Scalloped and serrated grinding

The CNC peripheral grinding machine with up to three axes is designed for infeed grinding of teeth on knives (e.g. bread or steak knives), scissors, machine knives or comparable workpieces.



- simple, direct programming via input of workpiece data/parameters
- CNC control with display for operation/programming
- horizontal traverse of the grinding wheel via servo motor and preloaded ball screw
- max. standard machining length 360 mm (14.17") – other lengths as option
- simple, direct programming via the input of parameters/workpiece data
- interval-controlled dressing of the grinding wheel via diamond-coated profile roller, dressing roller made of tool steel or programmable single grain diamond
- programmable movement of the workpiece on a straight grinding wheel (e.g. for steak knives) using a six-axle robot
- automatic compensation of the travels after each dressing cycle as well as adaptation to preset circumferential speed via frequency converter integrated in the control
- vertical workpiece movement to the grinding wheel possible

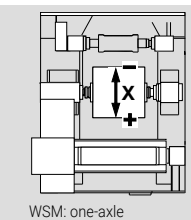
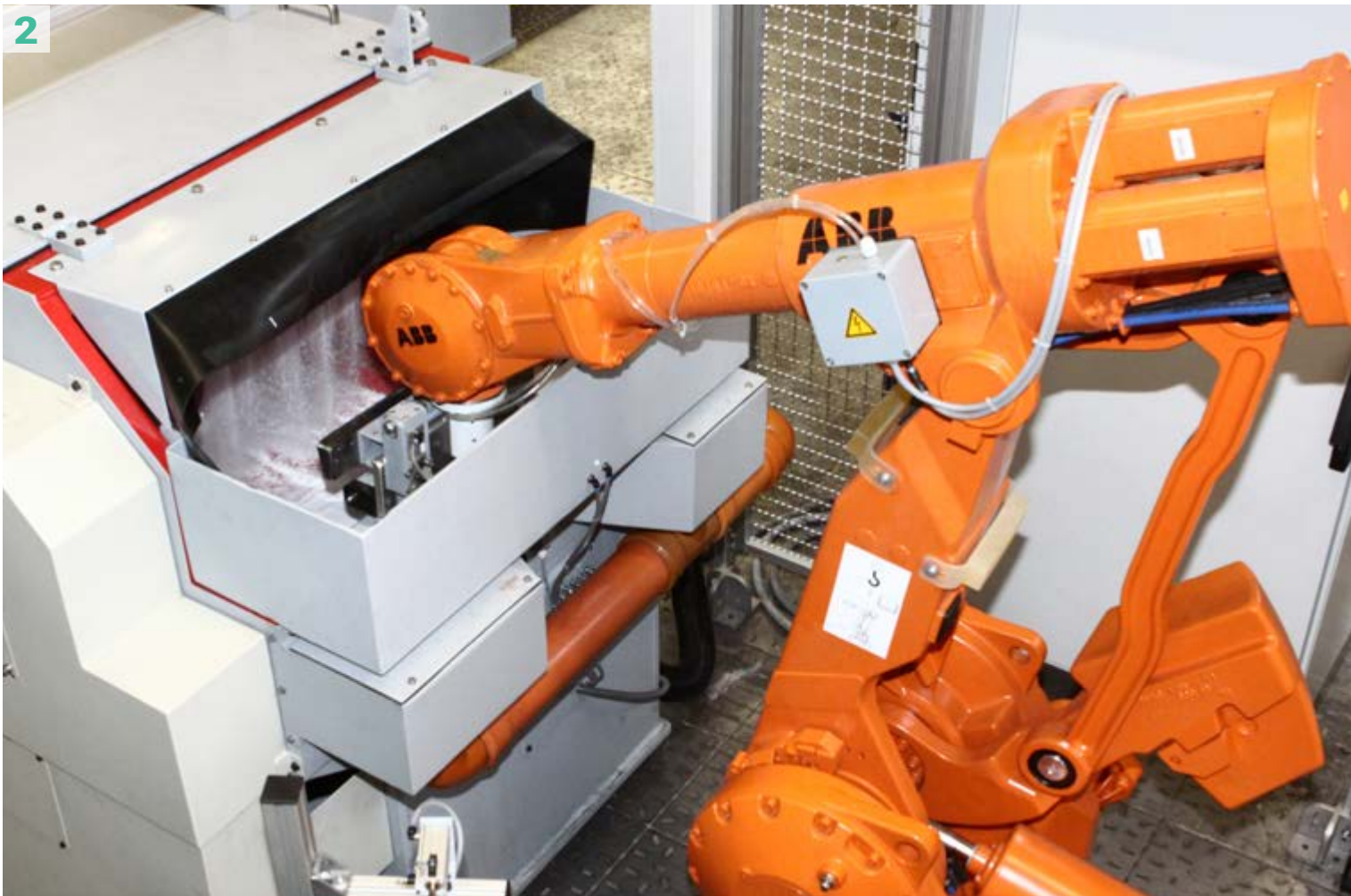


# PERIPHERAL GRINDING MACHINES

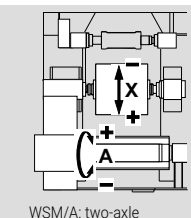
## WSM – SERIES

### WSM

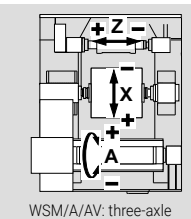
- uniaxial CNC grinding machine
- receiving the workpieces in pneumatic clamping and swivelling device
- dressing of the grinding wheel via diamond-coated profile roller, dressing roller made of tool steel



WSM: one-axis



WSM/A: two-axis



WSM/A/AV: three-axis

### WSM/Robot

- uniaxial CNC grinding machine
- movement of workpiece against straight grinding wheel with six-axis robot

### WSM/A

- two-axis CNC grinding machine
- A-axis 360° rotary for simultaneous grinding and loading/unloading of workpieces
- scaling down of nonproductive time to 1 s
- dressing of the grinding wheel by diamond coated shape roll made of tool-steel

### WSM/A/AV

- three-axis CNC grinding machine
- A-axis block 360° rotatable
- programmable dressing of grinding wheel by displaceable dresser (Z-axis) with rotating or fixed tool



### Examples of use (pictures)

1. WSM/A: Granton edge grinding (picture 1)
2. WSM/Robot: Programming interface for robot machining (picture 2)
3. WSM/A/AV: A-axis 360° rotatable (picture 3)

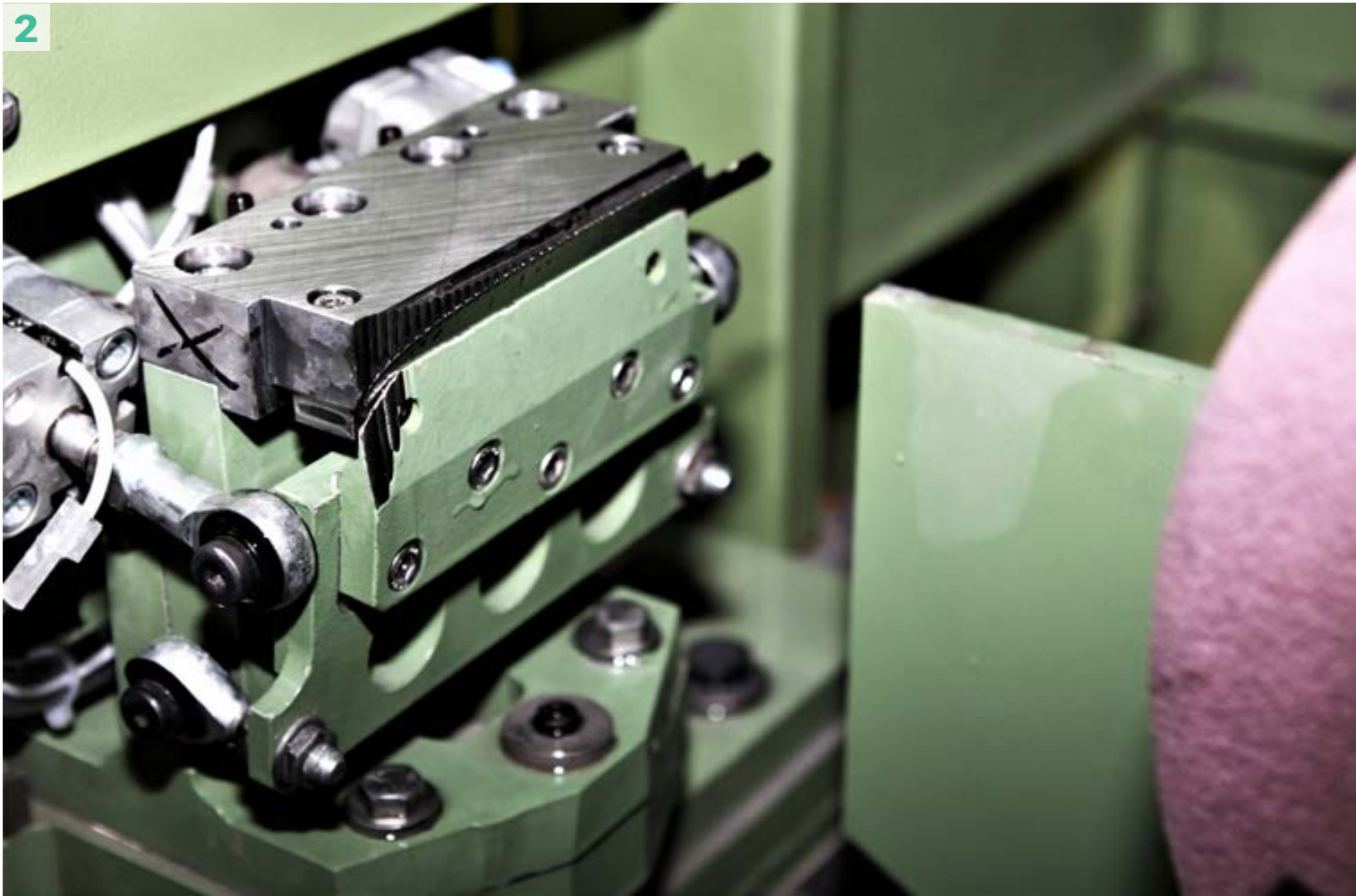
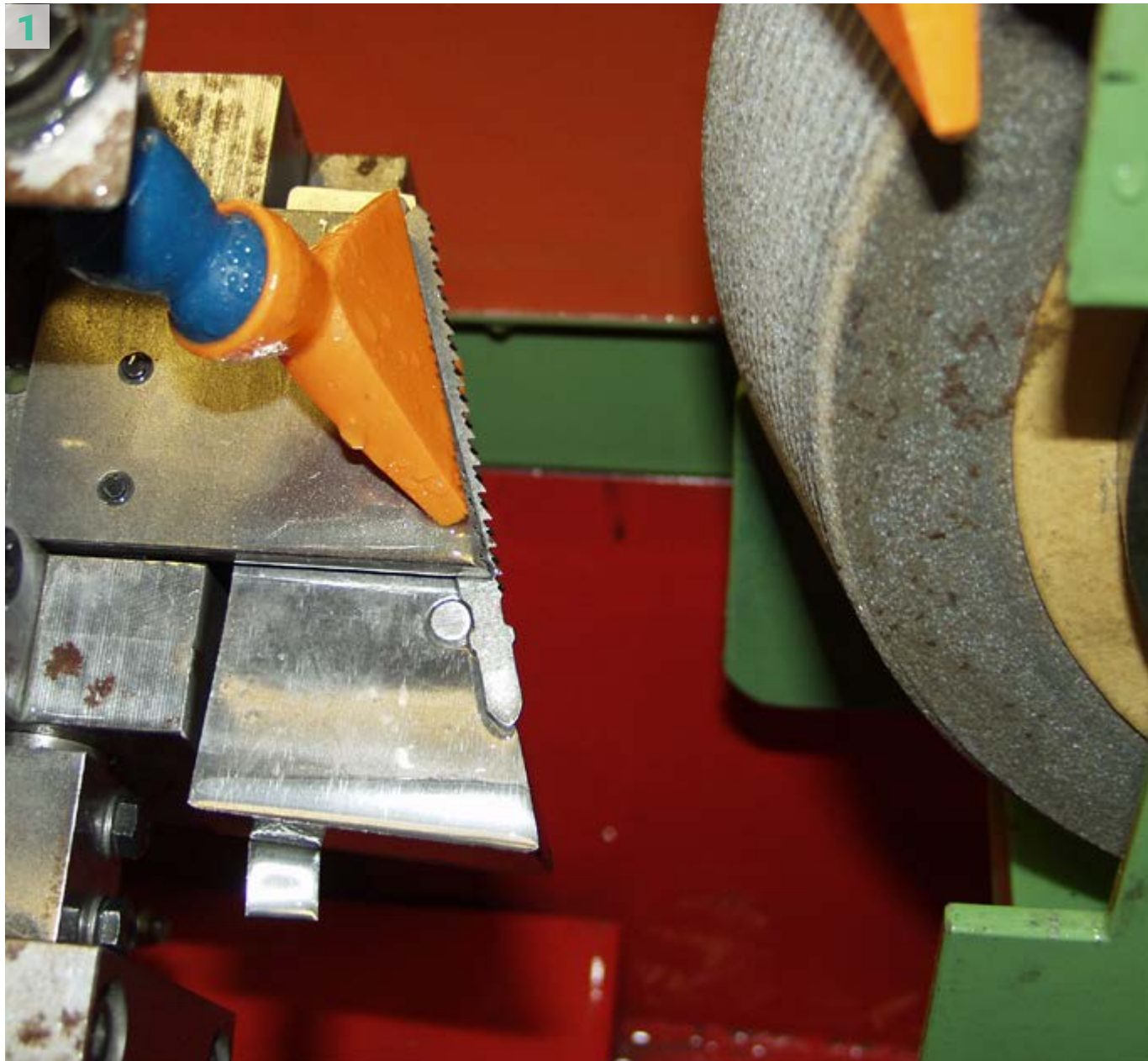


# PERIPHERAL GRINDING MACHINES WS

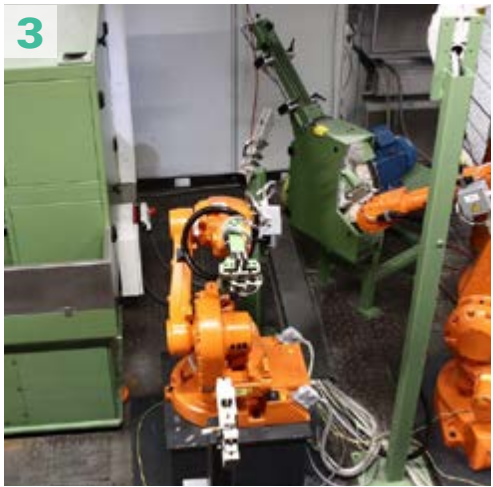
## Serrated grinding, plunge grinding and through-feed grinding

The CNC peripheral grinding machine achieves with up to three axes a plunge grinding for the serration of knives, surgical blades, scissors or similar workpieces.

- CNC controlled with display of all operating information / programming of up to three axes
- horizontal wheel motion by AC servomotor driven by preloaded precision ball screw
- grinding width up to 100 mm (3.94")



- simple workpiece oriented programming with entry of dimensions / parameters
- dressing of the grinding wheel with diamond coated dressing roll, tool steel crush roll or programmable single point diamond
- automatic compensation of workpiece plunge travel after each dressing cycle and maintenance of selected rotational wheel speed (by frequency variation)
- programmable moving at a straight grinding wheel
- composition of the grinding wheel at cross table for plunge grinding and through-feed grinding (WS6)
- cross tooth grinding of saws in connection with a vertical and a pivot axis for saws with a length of up to 650 mm (25.6") during indexing operation



## Examples of use (pictures)

1. Serrated grinding and cross toothing of jigsaws, additional vertical and swivel axis (picture 1)
2. Machining of knife blades (picture 2)
3. Additional robot for subsequent polishing of the cutting edge (picture 3)



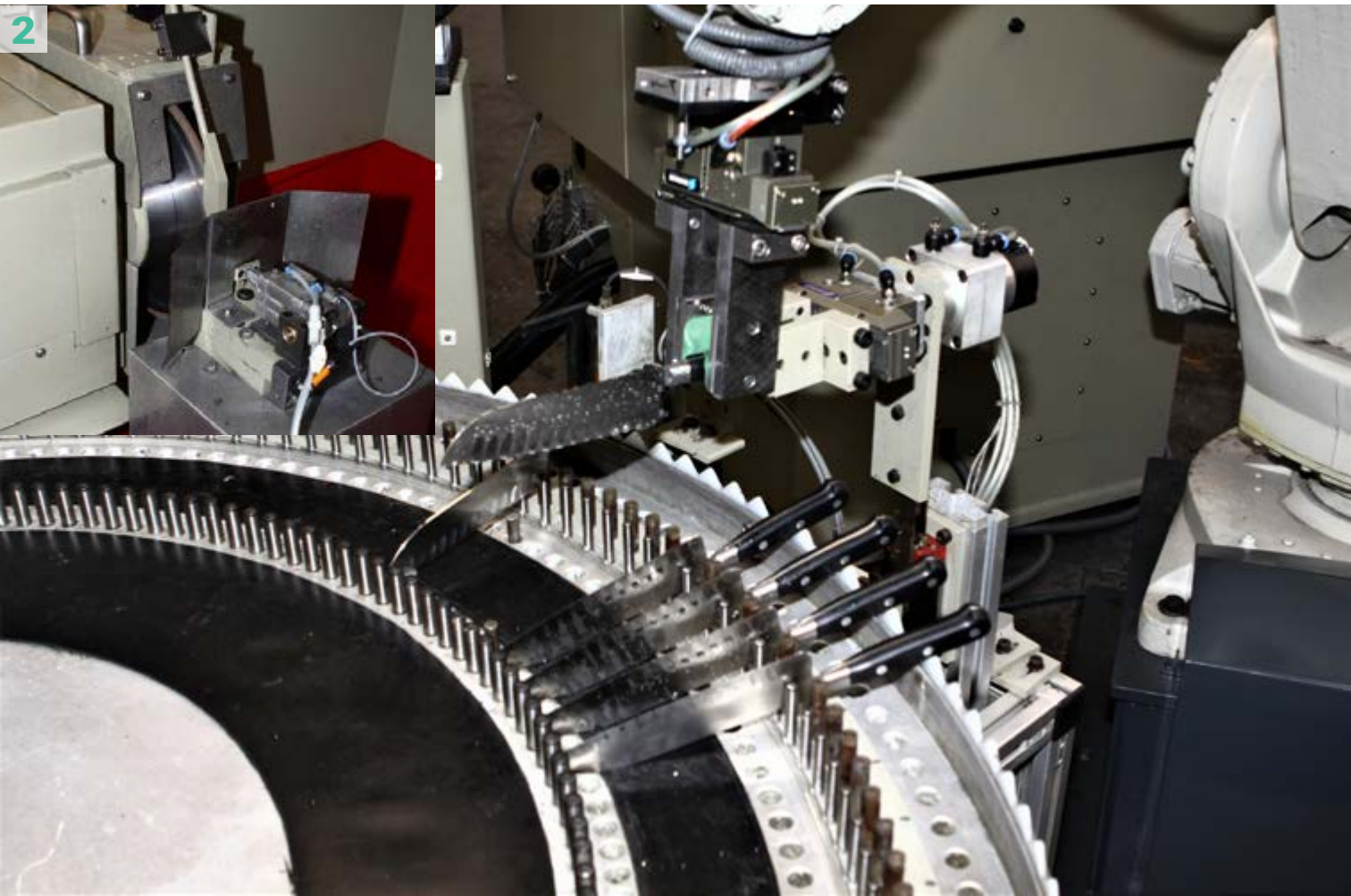
# PERIPHERAL GRINDING MACHINES KS

## Hollow edge grinding of knife blades

The peripheral grinding machines KS achieve a hollow edge grinding of knife blades.

Often the machine is combined with a robotic system RSP or a peripheral grinding machine of the series WSM or WS.

The machine is conceived for grinding knives with a cutting edge of up to 350 mm (13.78") length.



- grinding spindle driven by special motor of 7.5 kW
- grinding wheel Ø 300 mm (11.81") x width according to design of hollow edge
- additional vertical axis possible
- frequency inverter for continuous adjustment of the spindle up to 60 m/s (196.9 ft/s)
- dressing of CBN disc with diamond coated profile (Ø 80 mm (3.15")) – without profile roll
- dressing wheel drive 1.5 kW/2 800 rpm
- movement controlled by robot control
- pneumatically activated clamping device for hollow edge / scalloped grinding
- prepared for wet grinding



## Examples of use (pictures)

1. Hollow edge grinding of knife blades with peripheral grinding machine of the series KS (picture 1)
2. Robot loading and unloading (picture 2)
3. KS version with additional vertical axis for additional blade geometry (third workpiece picture at the left) (picture 3)



# ROTARY INDEX TABLE GRINDING MACHINES RST

## Serrated grinding

The rotary index table grinding machines RST is available in various configurations and is designed for grinding steak knives, jigsaws or blades with serration.

- corresponding grinding stations assigned to a precision rotary table
- processing with grinding and polishing stations in through-feed grinding with spiral wheels
- automatic loading and unloading systems can be integrated



## Examples of use: steak knives



- three uniaxial grinding stations of the WSL series for peripheral grinding
- cutting edge angle by means of workpiece support
- feeding via stack magazine
- workpiece separation
- workpiece feeding via pick-and-place unit
- turning device 180°
- precision rotary table
- dropping
- capacity approx. 550–600 knives/h

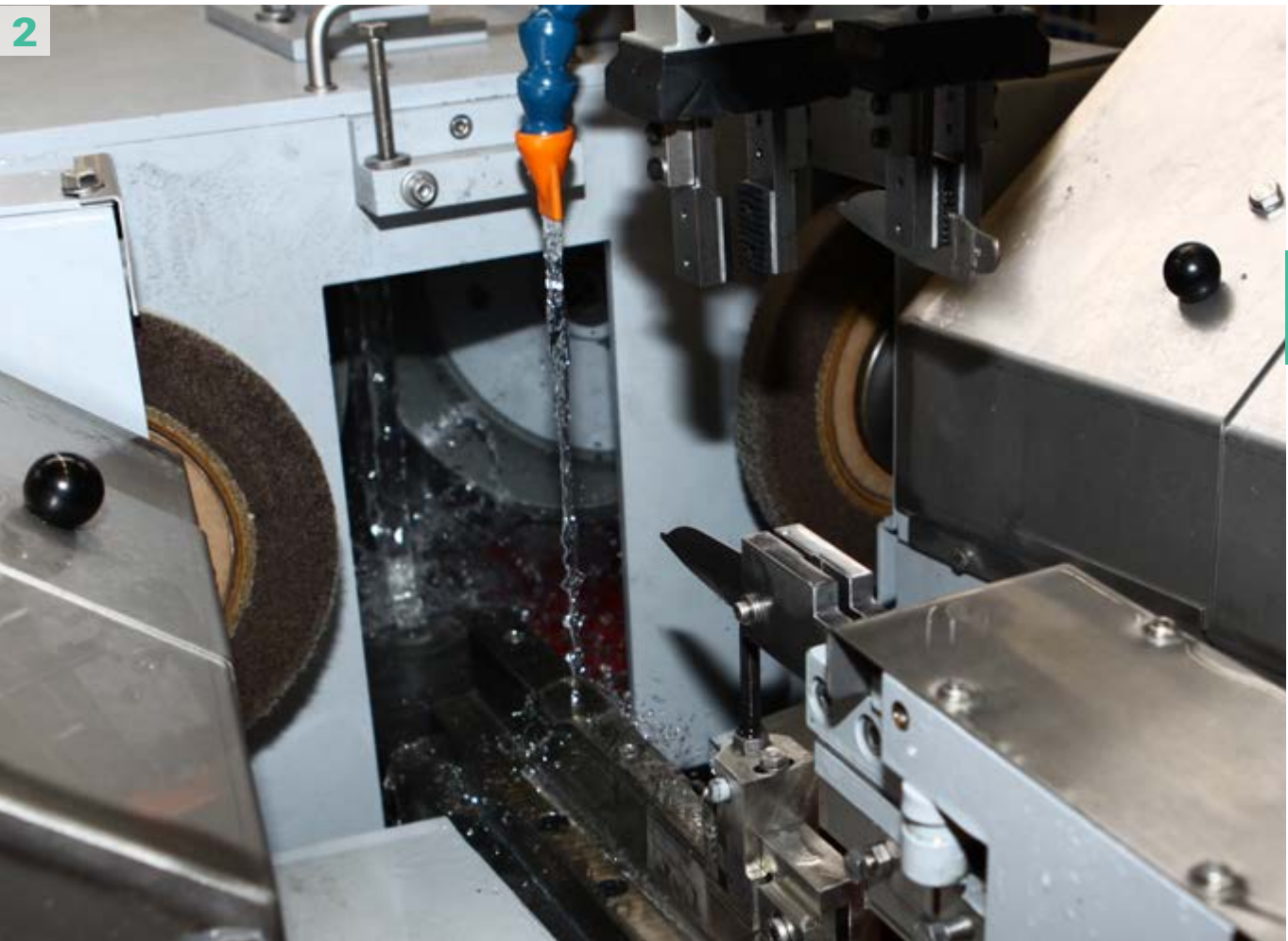


# HOLLOW GRINDING MACHINES HG/NT

## Hollow grinding

The CNC grinding machine with four axes is designed for double-sided hollow grinding of kitchen and steak knives, hunting and sports knives, pocket knives as well as hand tools like e. g. saw blades.

- grinding with two cup wheels, each wheel at an angle of 45° to the blade
- thereby a consistent hollow bevel shape over the entire wheel life
- dimension of the grinding wheel depending on blank thickness, bevel width and thickness



- programming with contour probe installed on the grinding machine
- grinding wheel outside Ø 80 mm, 125 mm, 175 mm, 200 mm or 220 mm (3.15", 4.92", 6.89", 7.87" or 8.66")
- motors completely enclosed and equipped with high-quality moisture protection insulation
- two digital measurement controls integrated into the CNC control to supervise the wear of the grinding wheels
- integration of a CNC controlled scotch brite station in order to polish the piece in the same clamping
- individual wear measurement of both grinding wheels and adjustment after each grinding process via CNC adjustment axes
- automatic central grease lubrication system
- digital four-axe Windows controllers (X-, Y-, and the two spindle axes)
- grinding length up to 430 mm (16.93")
- sensor programming, probing of contour shape and direct generating of necessary program data
- grinding wheels activated by special motors with precision mounted spindles



## Examples of use (pictures)

1. Hollow grinding of hunting knives (picture 1)
2. HG2 with integrated scotch brite station, clamping for one-sided hollow grinding (picture 2)
3. Hollow grinding on kitchen knives with automatic loading and unloading (picture 3)



# GLAZING MACHINES PLM2/E/H

## Mechanical glazing of knife blades

The hydraulic glazing machine is designed for the mechanical glazing of ground knife blades.



- main motor of 5.5 kW/7 HP for spindle drive
- frequency converter for stepless adjustment of the spindle speed
- equipped for set-up wheels with Ø 530 mm (20.87")
- compensation of the wear of the set-up wheel manually by hand wheel
- manual adjustment of the clamp feed -10° and +10° via scale
- pneumatically driven contact pressure device, manually adjustable via pressure control valve

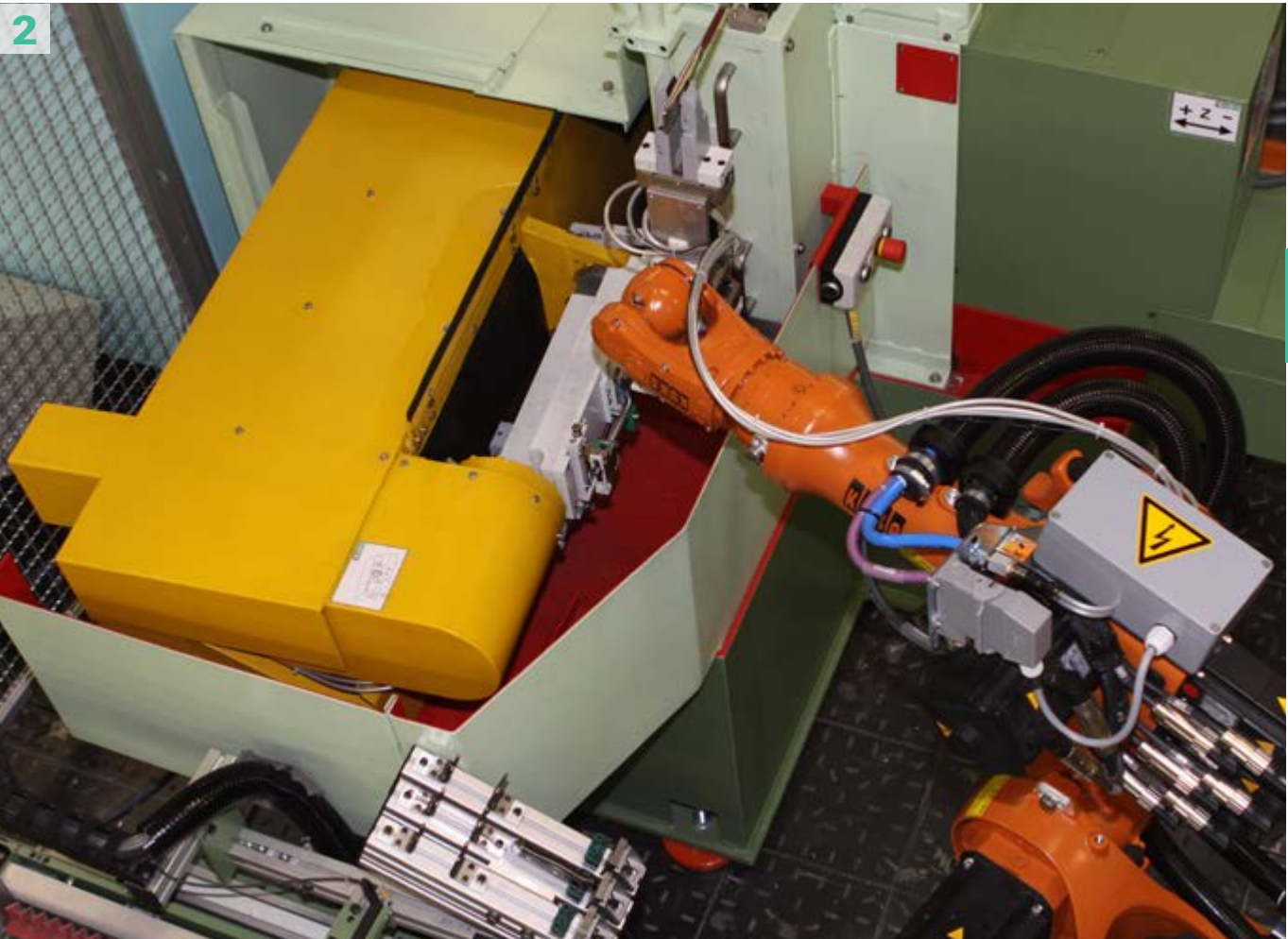
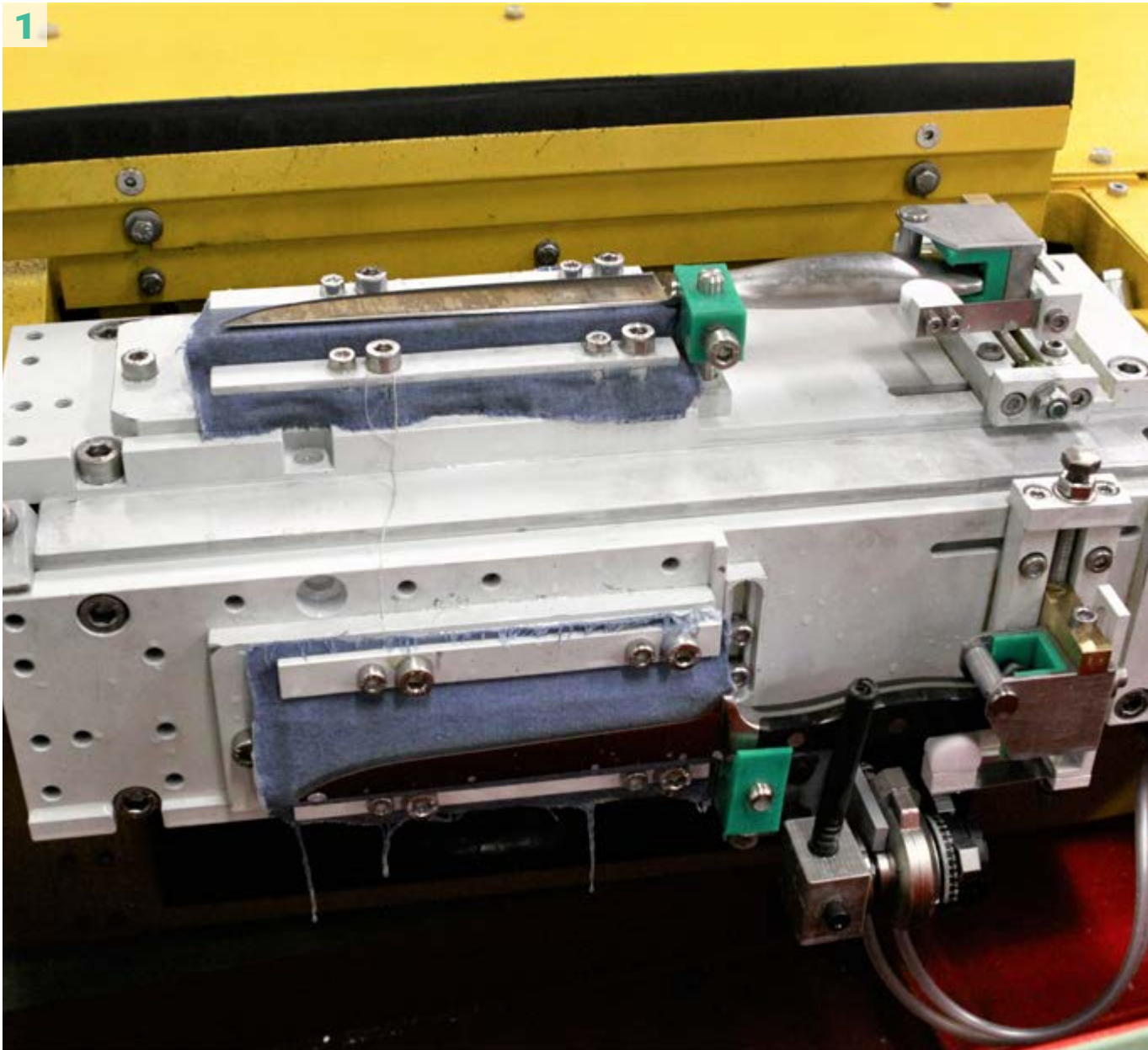


# GLAZING MACHINES PLM/NT

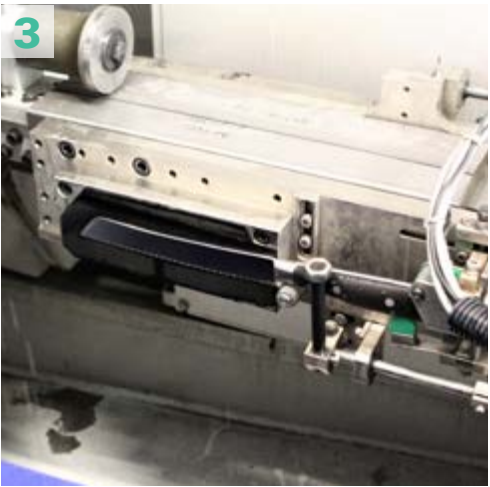
## CNC controlled glazing of knife blades

The CNC controlled glazing machine works with three axes and is designed for finishing ground knife blades.

- short set-up and changeover times
- high quality and repeat accuracy
- economical processing of very small series



- machining length max. 480 mm (18.9")
- simple, direct programming with input of workpiece data/parameters
- designed for set-up wheels with Ø 530 mm (20.87") or 795 mm (31.3")
- automatic paste feed for fat glazing or set up for wet glazing
- workpiece data transfer from CNC controlled grinding machine BG/NT
- machining of several surfaces in one clamping
- dressing to profile the wheel



## Examples of use (pictures)

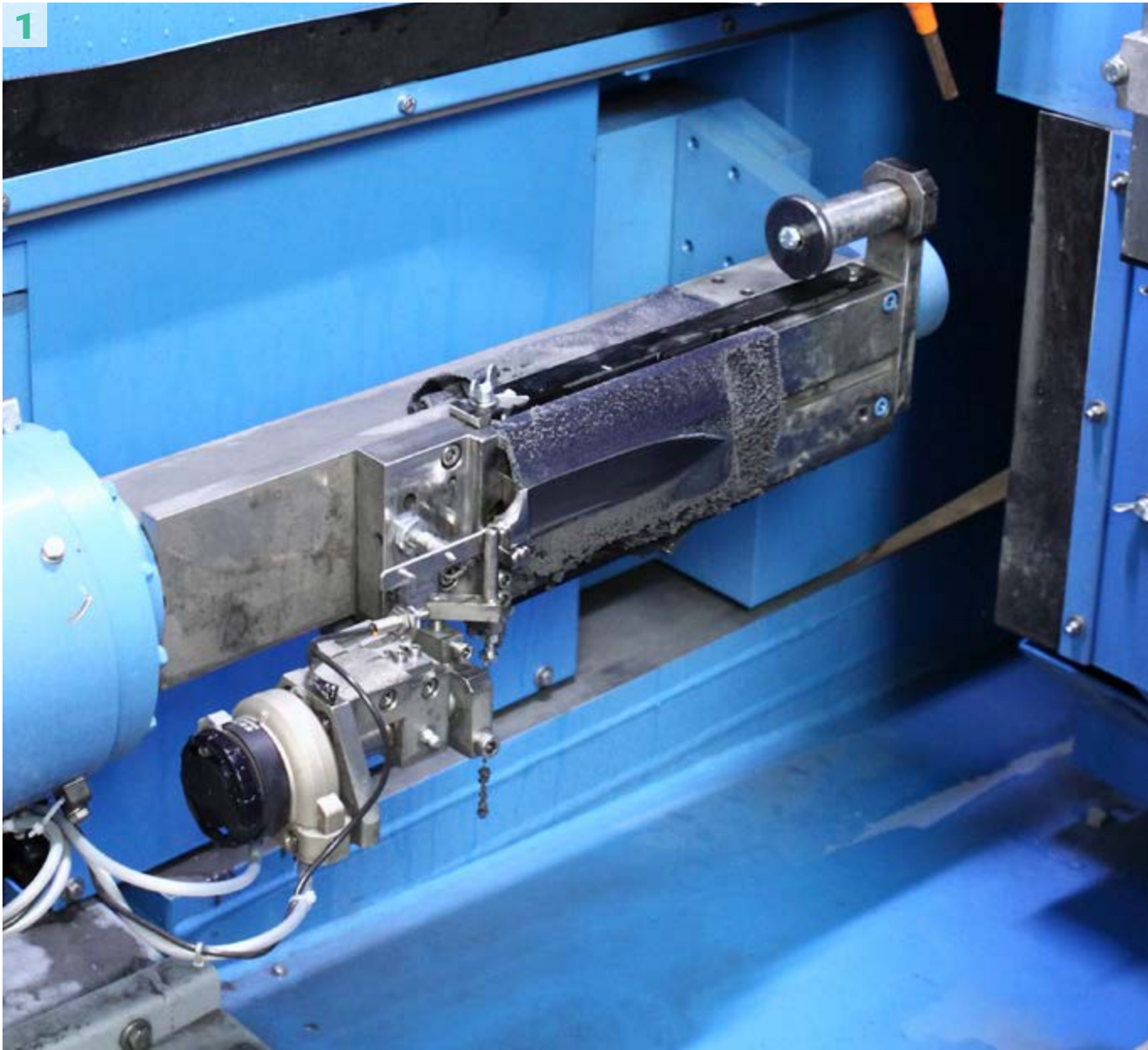
1. Workpiece carrier block 180° for different workpieces, which are called up in a programmable manner (model A and model B) (picture 1)
2. PLM2/NT with robot loading and unloading (picture 2)
3. Shaping of kitchen knives with dressing device for profiling the disc (picture 3)



# GLAZING MACHINES PLM2/V/NT

Glazing of knife blades with inclined bolster

CNC the PLM2/V/NT series glazing machines can be equipped with an additional vertical axis and are thus optimized for glazing knife blades with inclined bolster.



## Examples of use (pictures)

- 1. Glazing machine of the PLM2/V/NT series with additional V-axis for machining a inclined bolster (picture 1)
- 2. PLM2/V/NT series grinding grinding machine and BG3/V/NT series flat bevel grinding machine with full enclosure (picture 2)
- 3. Glazing machine PLM2/V/NT combined with a flat bevel grinding machine of the series BG3/V/NT (picture 3)





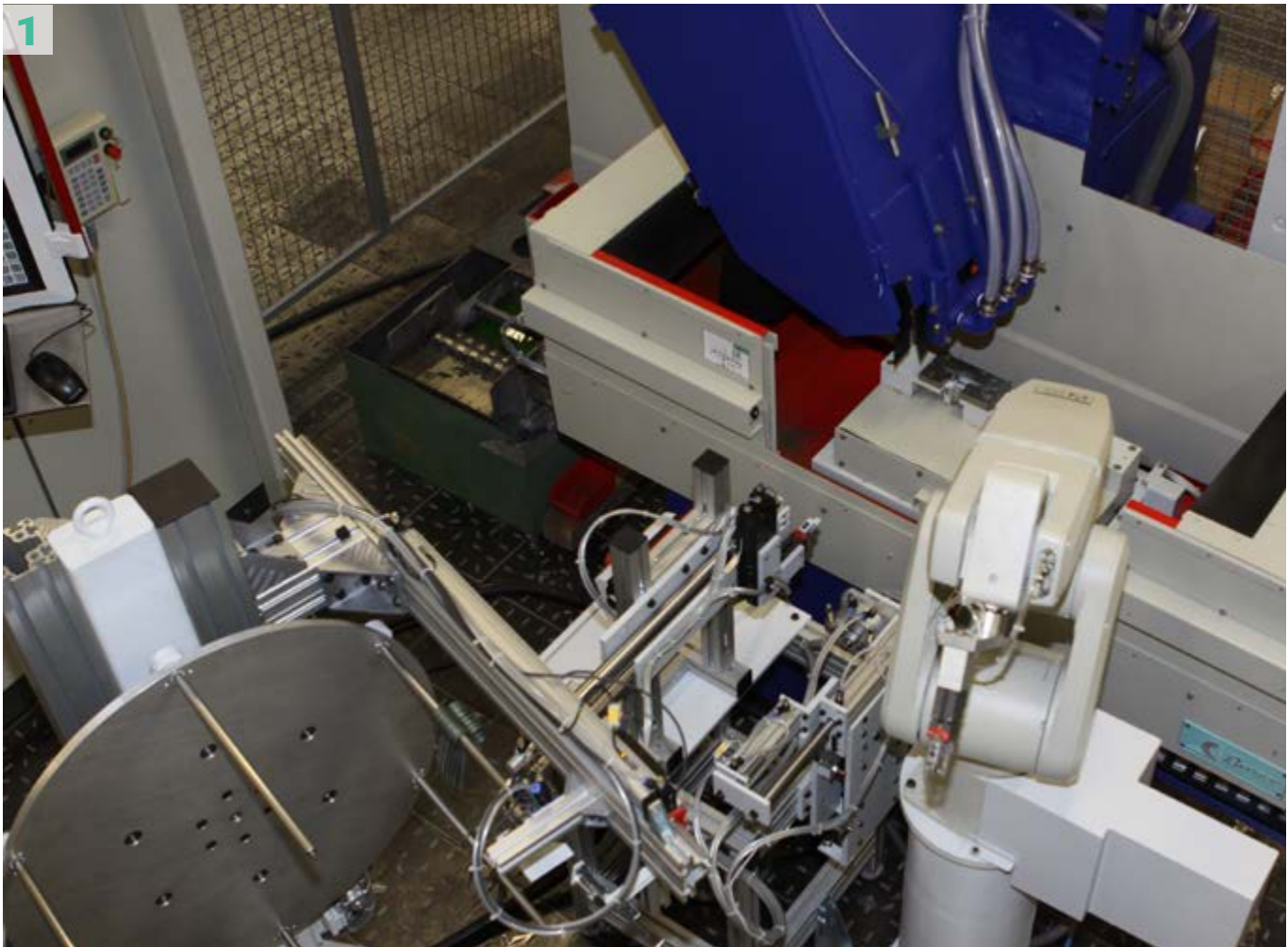
# CONTOUR GRINDING MACHINES

## CG

### Contour grinding

The CNC belt or stone grinding machine works with two axes and is designed for contour processing of tweezers, knives, scissors, hand tools and comparable workpieces.

- wet belt grinding machine with belts width of 3 500 mm × 200 mm (137.79" × 7.87")
- 15 kW, up to 4 000 rpm
- contact roller support in two versions: Ø 80–200 mm (3.15"–7.87") or 30–100 mm (1.18"–3.94") with additional counter bearing
- grinding stroke up to 550 mm (21.65")
- grinding width 180 mm (7.09")
- automatic magazine recognition for subsequent processing of different workpieces
- interval-controlled, automatic grease central lubrication
- automatic oscillation of the grinding belt
- adjustable hinge arm 0–45°
- sensor programming by scanning the contour and direct export of the recorded dimensions to the programming interface
- use of raw or finished parts
- remote maintenance, diagnosis and error correction via TeamViewer



### Examples of use (pictures)



1. Grinding machine CG1 with drum magazine and turning station for processing scissors (picture 1)



2. Contour grinding machine CG2 with magazine for scissors, double row for upper and lower side in succession (picture 2)

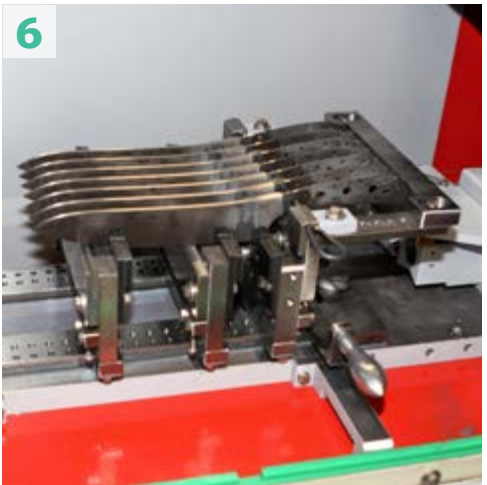


3. Magazine for kebab knives (picture 3)

4. Magazine for scissors, use of small contact rollers for smaller radii (picture 4)

5. Integration of provided magazine (picture 5)

6. Magazine for forged knives with spacer (picture 6)



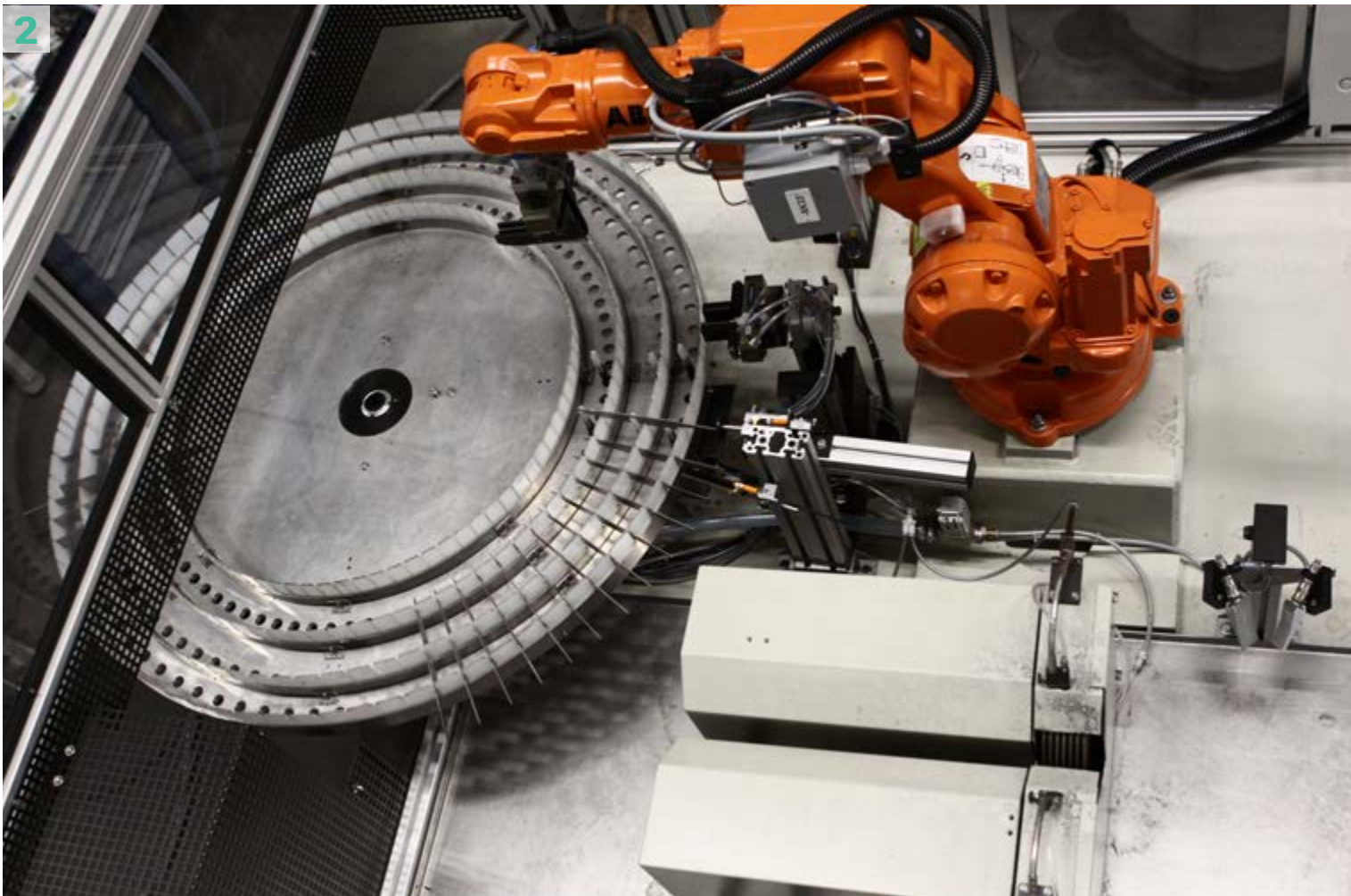


# SHARPENING MACHINES SM

## Sharpening of knife blades

The CNC sharpening machine with up to three axes is designed for sharpening blades and mounted knives.

- two servomotors to activate coated CBN-spiral wheels with a Ø 200 mm (7.87")
- digitally synchronized servospindle
- mechanical adjustment of the cutting angle 20°–50°
- designed for manual treatment or in combination with a robot



## Examples of use (pictures)



1. Hollow grinding machine of the series HG/NT in combination with a sharpening machine SM: grinding and sharpening in one production cell (picture 1)
2. Automatic sharpening machine SM with six-axle robot, spiral sharpening machine, indexing rotary magazine and laser measuring system for checking the position of the blade and program setting (picture 2)
3. Sharpening machine SM with two coated CBN-spiral wheels (picture 3)



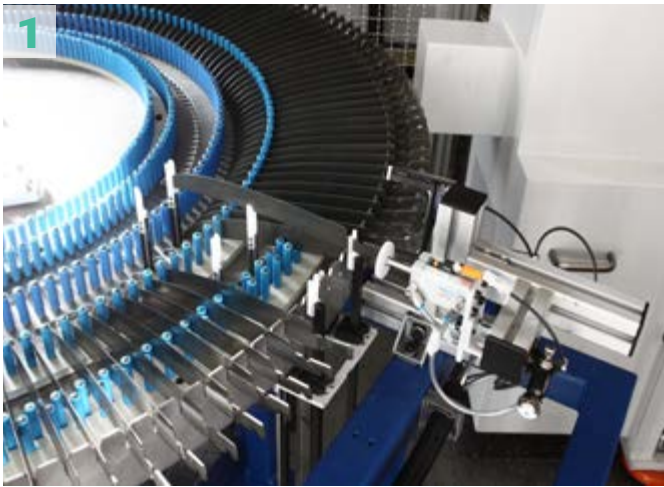


# ACCESSORIES FOR GRINDING MACHINES AND ROBOTIC CELLS

## Magazine systems

The design of the loading/unloading magazine depends on various requirements:

- required magazine capacity (e. g. one hour or one complete shift)
- shape of the workpiece (forged, conical, or flat)
- variety of workpiece shapes/dimensions, that should be processed
- integration in the preceding stage of production (e. g. stamping) or subsequent processing (e. g. polishing, glazing)
- in which way the pieces are orientated (e. g. disordered in a glide grinding line)



## Examples of use (pictures)

1. Rotary table magazine (picture 1)
2. Sliding magazine 30° inclined position with deposit on conveyor belt (picture 2)
3. Bar magazine for scissors (picture 3)
4. Berger Feeder with bunker (picture 4)
5. Loading from Schäfer box (picture 5)
6. RoMag for the integration of automated guided vehicle (picture 6)
7. Magazine cassettes on conveyor belt (picture 7)





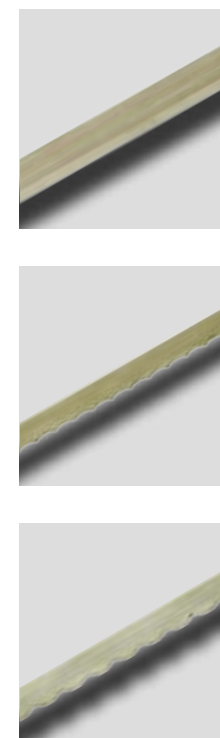
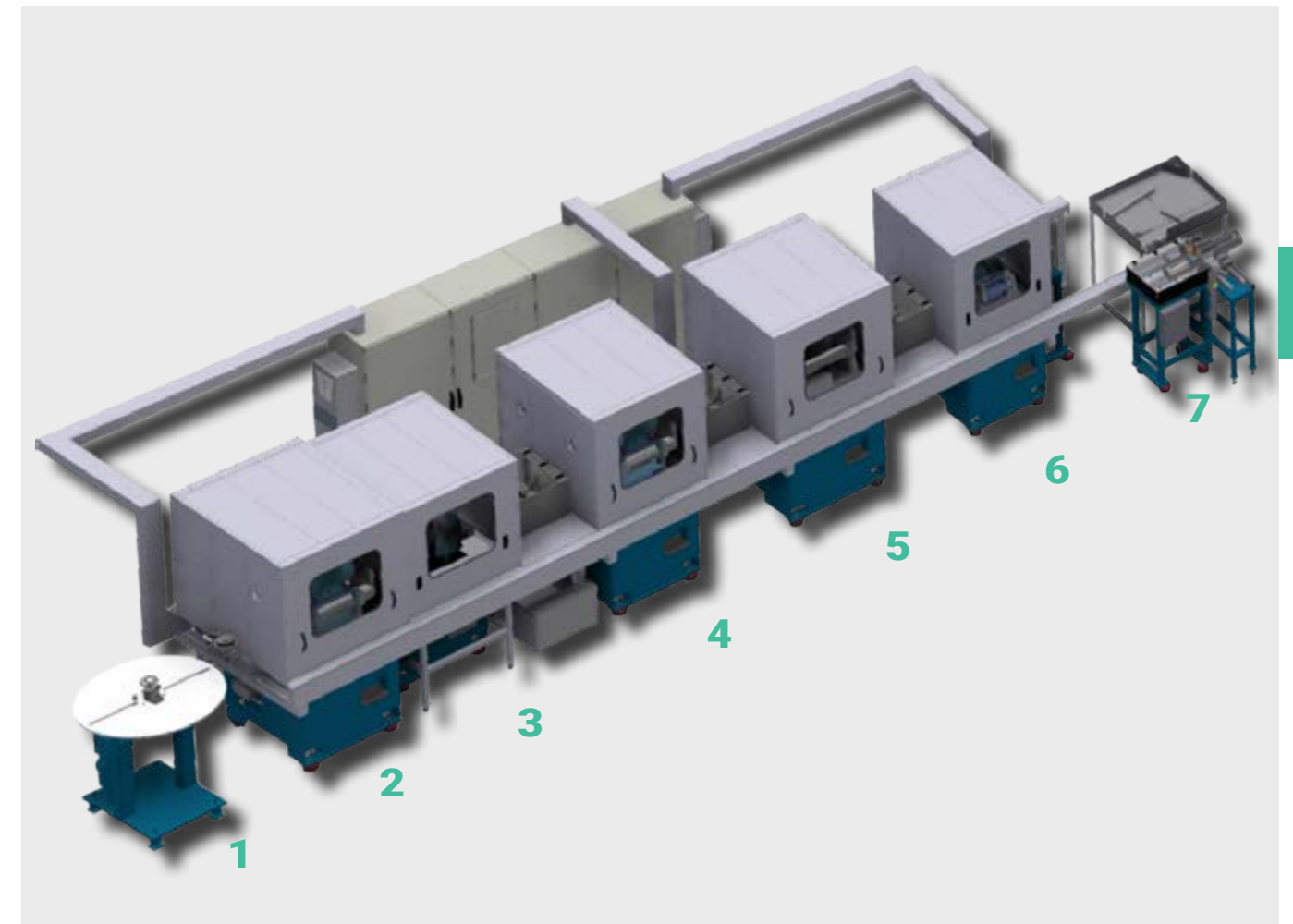
## GRINDING MACHINES

### FOR STEEL STRIPS

#### STRAIGHT FINISH GRINDING SCALLOPED GRINDING SERRATED GRINDING

Precision grinding machines for fine grinding of steel strips

It is worked either from coil to coil or from coil into a breaker. The strip material is processed as slit strip or chamfered at the edge with strip edge trimming machines.



The processing machines are equipped with tools, e. g. grinding stones, on one or two sides. The angle range can be adjusted between 0° and 35° by motor, depending on the task and design of the processing station.

The infeed takes place at the set angle so that the cutting edge angle on the strip remains constant even with a decreasing grinding stone diameter.

The grinding wheel wear is compensated by a guide carriage with precision guides, ball screws and an AC servo motor. The infeed values can be determined by means of camera or laser measuring technology.

The use of different tools allows grinding, honing and polishing of strips.

#### Example of use

1. Spool plate
2. Steel strip grinding machine BSM3000/E/L
3. Steel strip grinding machine BSM3000/E/R
4. Steel strip grinding machine BSM3000/D
5. Steel strip grinding machine BSM1500/TT
6. Steel strip deburring and polishing machine BSM3000/P
7. Loop control with breaker and magazine



# STEEL STRIP GRINDING MACHINES

## BSM3000

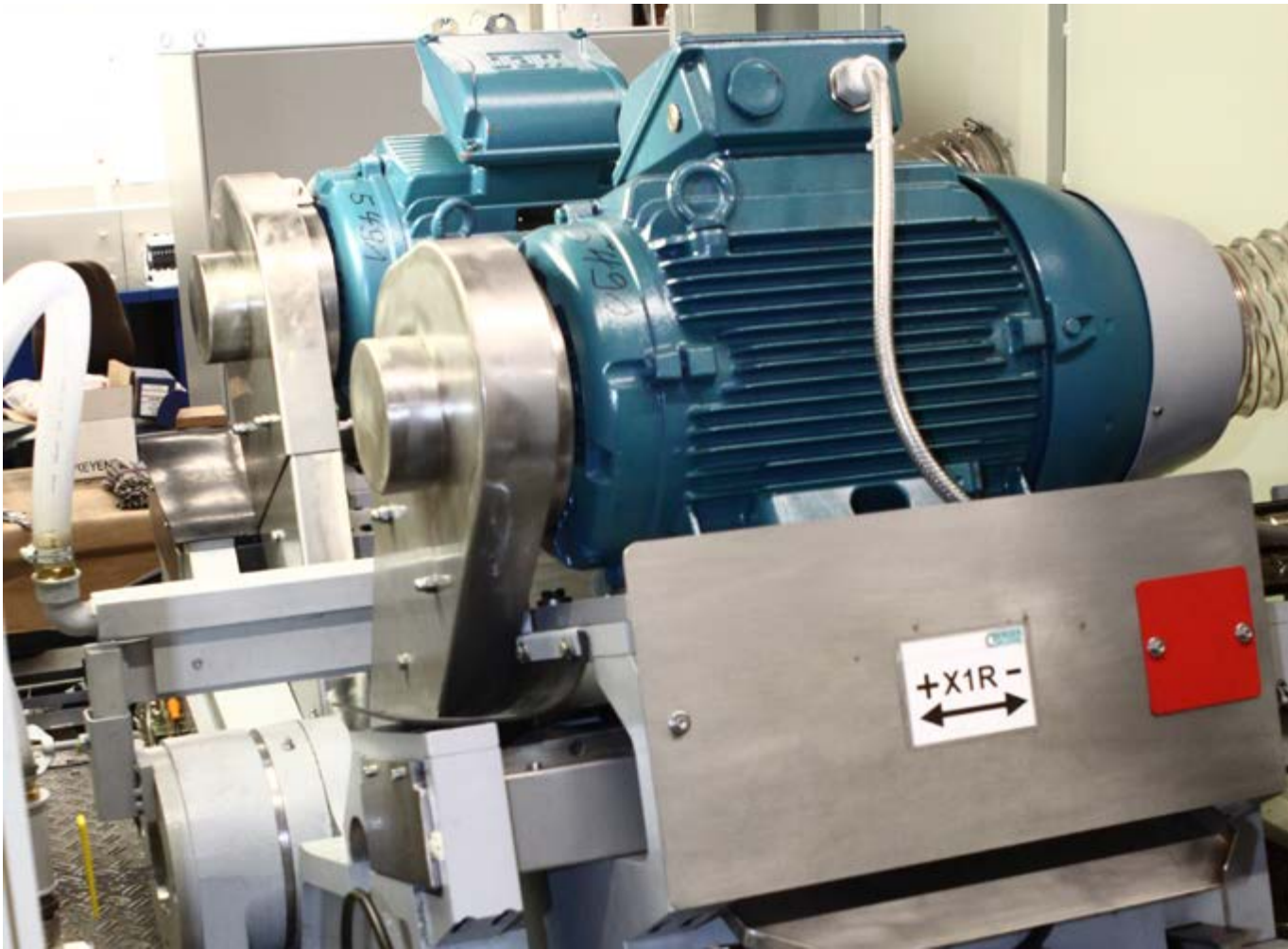
### Straight finish grinding Continuous grinding

The modular steel strip grinding station of the BSM3000 series can be designed differently depending on the application:

- One-sided grinding station BSM3000/E
- Double-sided grinding station BSM3000/D
- Double-sided polishing station BSM3000/DP

The one-sided grinding station BSM3000/E is designed for the machining of pencil sharpener blades, curette bands, machine blades and similarly shaped workpieces on one side.

The double-sided grinding station BSM3000/D processes technical blades, doctor blades, surgical blades and similarly shaped workpieces on both sides.



- main motor: 15 kW or 2 x 15 kW
- frequency converter: 18.5 kW for programmable, constant peripheral velocity
- peripheral velocity: 30–50 m/s (98.43–164.04 ft/s)
- motorized angle adjustment: 0–35° with butterfly wings
- grinding wheel Ø: max. 300 mm (11.81")
- wheel/grinding width: max. 300 mm (11.81")
- bilateral precision spindle bearing
- cutting speed: max. 50 m/s (164.04 ft/s)
- central lubrication
- configured for wet machining with grinding emulsion
- guideways are solid carbide or with carbide inserts
- various dressing systems available for grinding wheel profiles



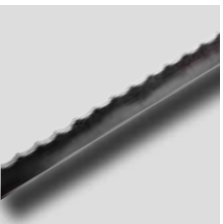
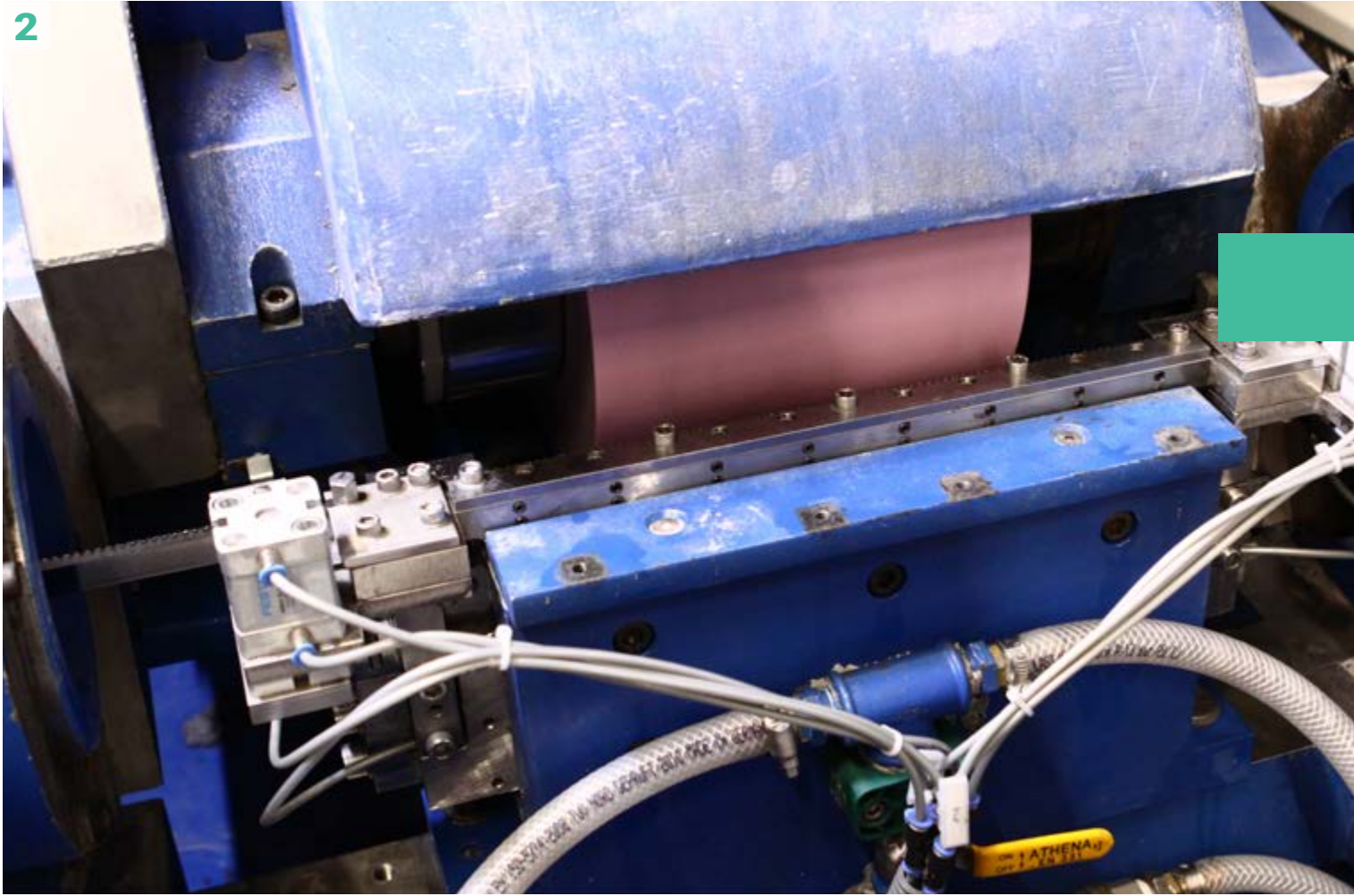
# STEEL STRIP GRINDING MACHINES BSM3000/2E/1D/1D/P

**Straight finish grinding, scalloped and serrated grinding of kitchen knives**

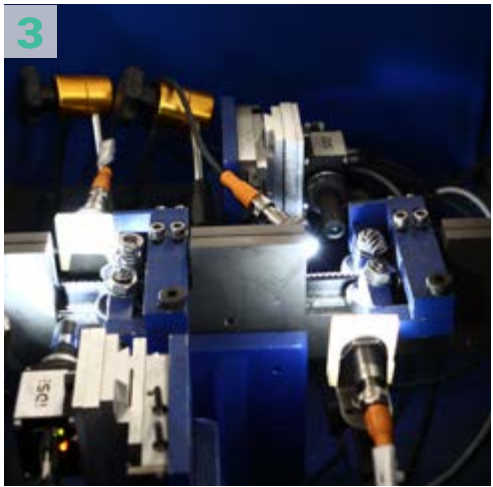
The grinding station of the BSM3000/2E/1D/1D/P series achieves straight finish grinding, scalloped grinding and serrated grinding on kitchen knives.

The plant consists of the following stations:

- two steel strip grinding stations BSM3015/E
- strip grinding station BSM3000/D
- strip grinding station BSM3000/D/P
- de- und recoiler
- camera measuring system with two cameras
- laser measuring system



- main drive: 15 kW
- frequency converter: 18 kW (for programmable peripheral speed)
- motor angle adjustment: 0°– 35°
- grinding wheel Ø: 300 mm (11.81")
- grinding wheel width: 10–300 mm (0.39"– 11.81")
- cutting speed: max. 40 m/s (131.23 ft/s)
- central lubrication
- design for wet machining with grinding emulsion
- mounting of guides with carbide inserts



## Examples of use (pictures)

1. Steel strip grinding line with four processing stations (picture 1)
2. Scalloped grinding of steel strip for the manufacture of kitchen knives (picture 2)
3. Camera measuring station (picture 3)



## POLISHING MACHINES

FOR SINGLE WORKPIECES



## POLISHING WITH CNC TECHNOLOGY

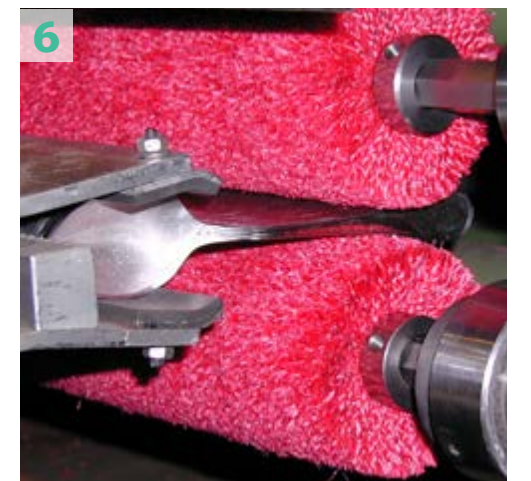
The Berger Gruppe offers double shaft polishing machines for rough and final polishing workpieces on both sides.



- PLC control for setting the machine (paths, distance, speed etc.)
- working width: 1 000 mm (39.37")
- infinitely variable speed controlled polishing roller drives
- polishing paste shot control
- automatic correction of polishing roller wear
- load-dependent corrected roller contact pressure
- integration of 360° swivel tools for the machining of rotary workpieces

### Examples of use (pictures)

1. Double shaft polishing machine of the PS1000 series (picture 1)
2. Rough and final polishing of professional knife blades (picture 2)
3. Handle processing 360° (picture 3)



4. Rough and final polishing of silverware bowls (picture 4)
5. Rough and final polishing of scissors (picture 5)
6. Polishing of the outer edge of silverware (picture 6)



# DOUBLE SHAFT POLISHING MACHINES DWP/PS1000

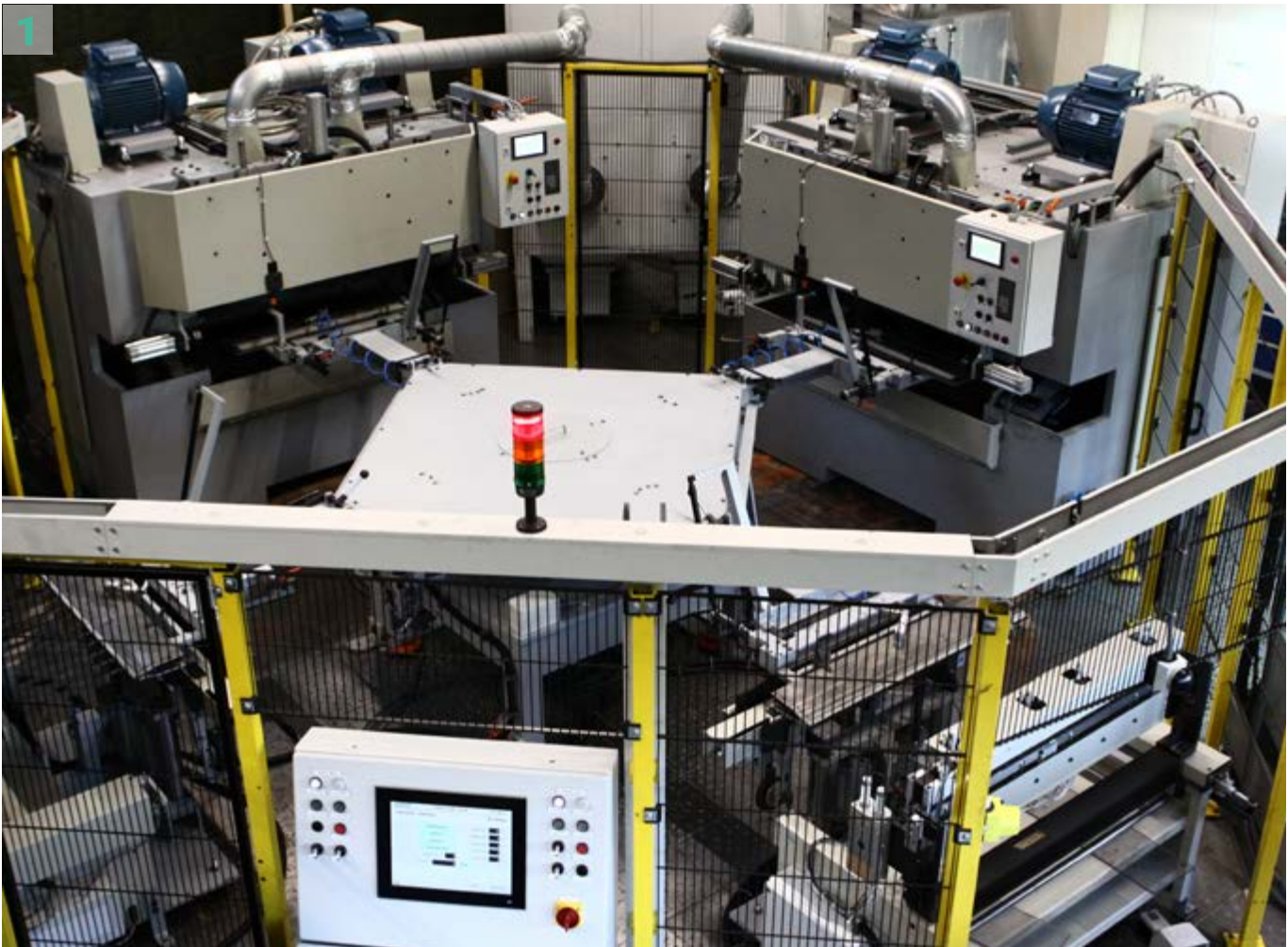
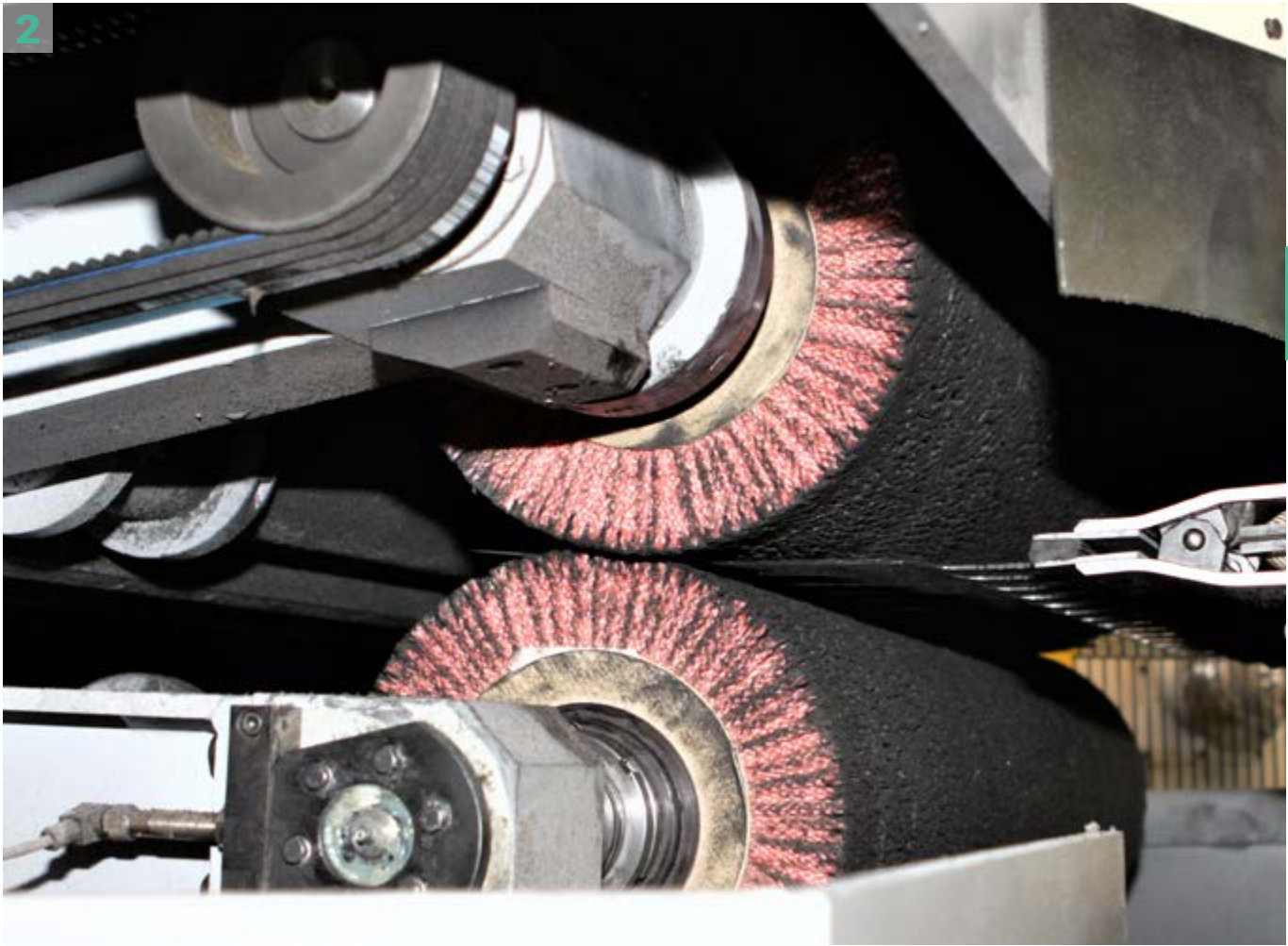
## Rough and final polishing of professional knives

A processing cell with four processing stations, a rotary table as well as a loading and unloading station was put together for the rough and final polishing of professional knives.

The rotary table is equipped with four rotary collets.

The CNC controlled double shaft polishing machine of the PS series is equipped with a control system in which all process parameters are programmed in a user-friendly way and stored depending on the workpiece.

Thanks to a short changeover time of a few minutes, the machine can also produce small series.



- infinitely variable speed controlled polishing roller drives
- polishing paste shot control
- automatic correction of polishing roller wear
- load-dependent corrected roller contact pressure
- acquisition and output of production data on integrated or external printer or directly to the work preparation
- demonstration programs
- working width: 1 000 mm (39.37")
- trimming of the working shafts: 55–230 mm (2.172–9.06")
- long stroke (upper/lower shaft): 0–300 mm (0–11.81") each
- cross stroke (upper/lower shaft): 0–60 mm (0–2.36") each
- width across flats of the hexagonal working shafts to accommodate the polishing wheels: 12–32 mm (0.47"–1.26")
- polishing roller drive upper/lower shaft each: 11–15 kW
- movement of the long and cross stroke axes: hydraulic



## Examples of use (pictures)

1. Processing cell for polishing professional knives with four double shaft polishing stations and one rotary table (picture 1)
2. Rough and final polishing of professional knives (picture 2)
3. Loading and unloading station (picture 3)



# DOUBLE SHAFT POLISHING MACHINES PC

**Rough and final polishing of knife blades with a length of up to 650 mm (25.59")**

The CNC controlled double shaft polishing machine of the series PC is designed for rough and final polishing of knife blades up to a length of 650 mm (25.59").

Due to the innovative conception of automation it is possible to run in continuous process or to use separate fixtures.



- working width of 1 000 mm (39.37")
- movement of the polishing machine CNC controlled
- continuous feeding of the workpieces
- use of polishing wheels with Ø up to 300 mm (11.81")
- integration of a linear chain conveyor containing five clamping tongs

## Examples of use (pictures)

1. Rough and final polishing of knife blades (picture 1)
2. CNC controlled double shaft polishing machine of the PC1000 series (picture 2)
3. Loading with tensioning frame (picture 3)





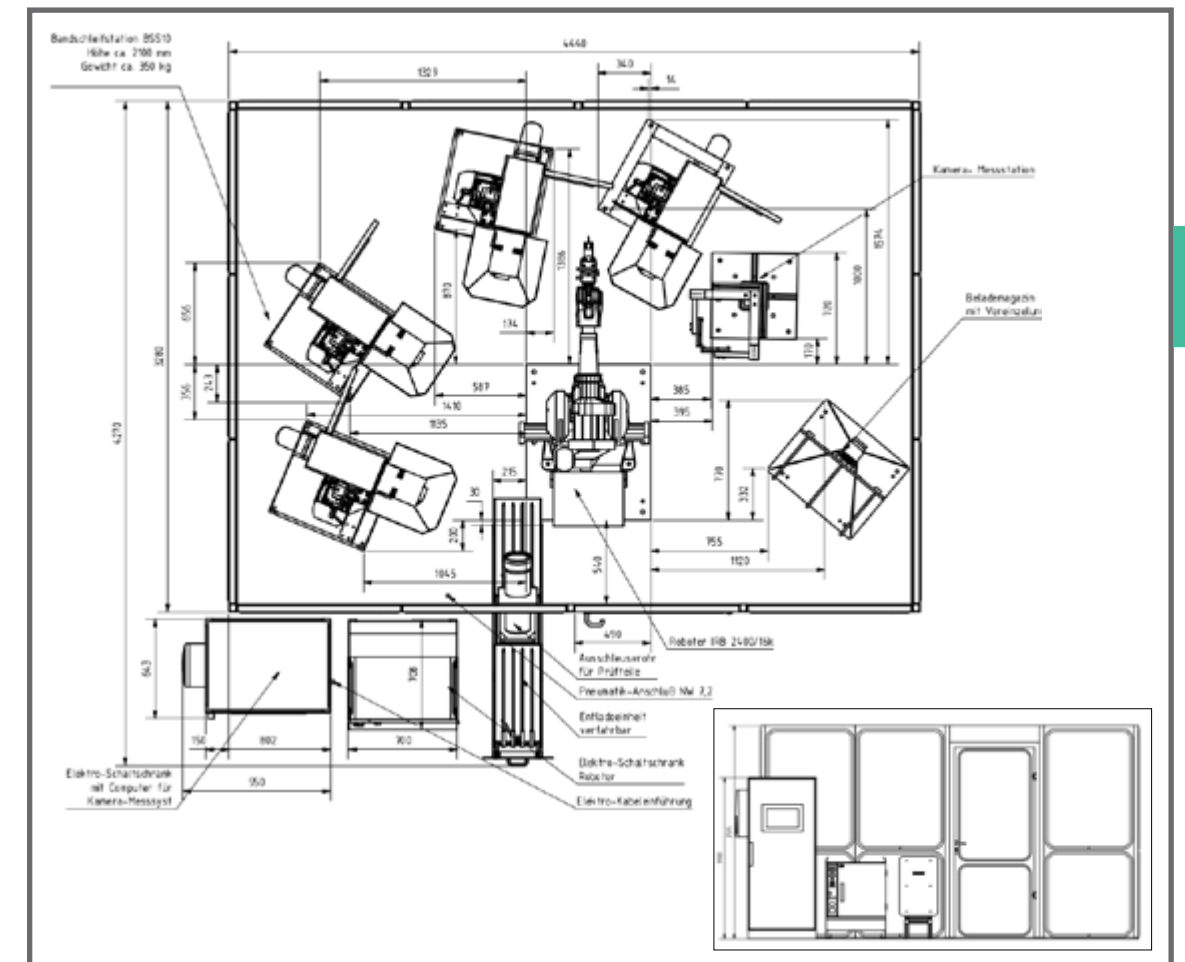
## ROBOTIC

### GRINDING AND POLISHING SYSTEMS

#### GRINDING AND POLISHING WITH ROBOTIC TECHNIQUE

The Berger Gruppe offers solutions for robotic processing of workpieces of various sizes and geometries.

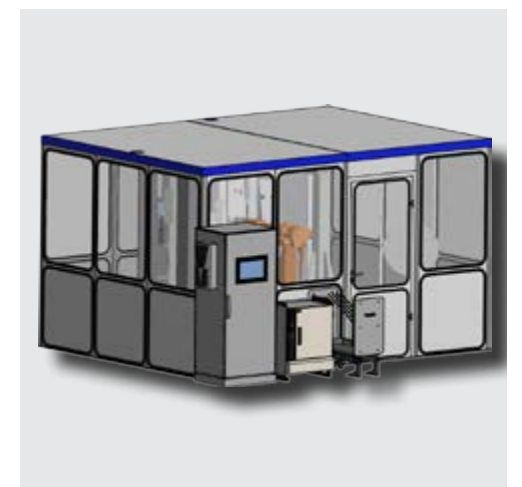
The focus is on partly standardized robot cells with different conceptual approaches.



Depending on the nature of the workpiece, the robot cell is equipped with different processing stations. Either the workpiece or the tool can be guided by the robot.

If the tool is guided by the robot, the workpiece can be aligned via CNC axes, so that all-round machining is possible without additional changeover time.

- robot grinding and polishing stations either integrated into existing production lines or set up as separate cells
- standard interfaces to all common robot manufacturers such as ABB, KUKA, Stäubli and Fanuc
- programming using the touch-in method or with a CAD/CAM interface
- integration of measuring systems for compensation of workpiece tolerances in position and dimension
- different processing stations with different tools (e.g. grinding belts, grinding stones, polishing wheels) available



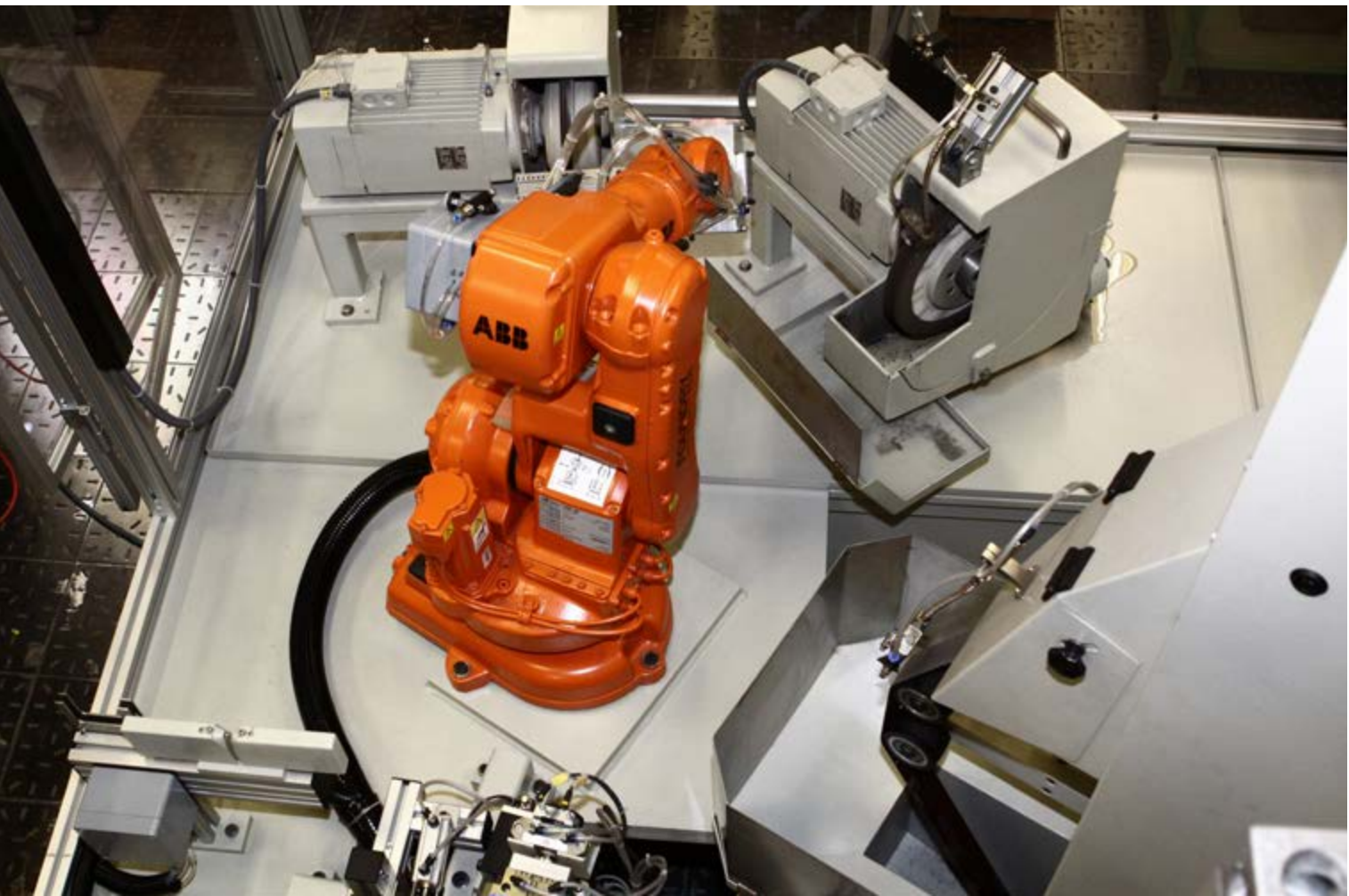
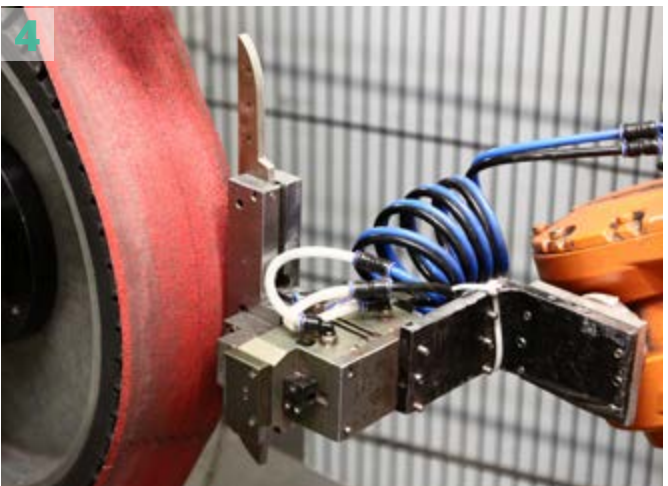
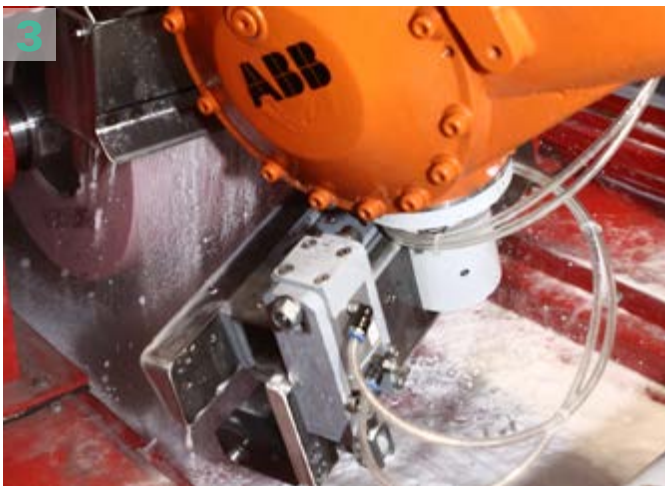


# ROBOT CELLS WITH ROBOT-GUIDED WORKPIECE

## Sharpening of knife blades

With this universally applicable concept, cutting edges on knives and blades are sharpened and polished.

- design optimization of the gripper: robot gripper to pick up the knife in the back and on the handle
- sharpening optionally with belt grinding or stone grinding station
- polishing of the cutting edge using a single-sided polishing station, e.g. in combination with a leather disc
- measuring of the workpieces
- contour programming optimized for sharpening and polishing of knives



## Serrating of knife blades



The robot station presented here is designed for serrating knife blades. The robot cell is equipped with a belt grinding station and a stacking magazine.

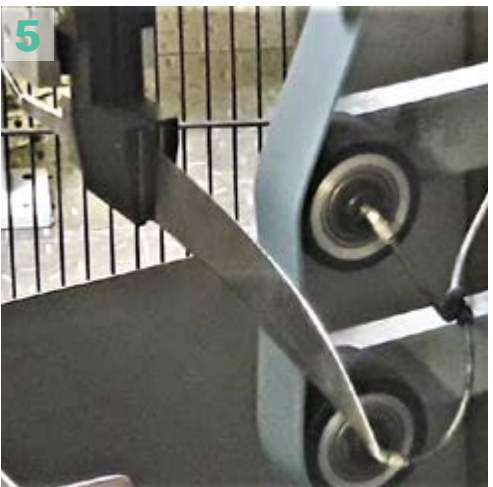


With the help of robots – in this case an IRB140F and IRB4400/69kg from ABB – the table knife blade is rolled on a straight, profiled toothed grinding wheel.



The contour of the blade is programmable based on the workpiece. (pictures 1 and 2).

A robot of the IRB4400/60 KG series and a straight-profiled grinding wheel are used to process workpieces with a maximum width of 360 mm (14.17") (picture 3).



## Back grinding of knife blades

The RSP/2B/1M robotic grinding station is designed for grinding (picture 4) and scotching (picture 5) of knife backs.



# ROBOT CELLS WITH ROBOT-GUIDED WORKPIECE

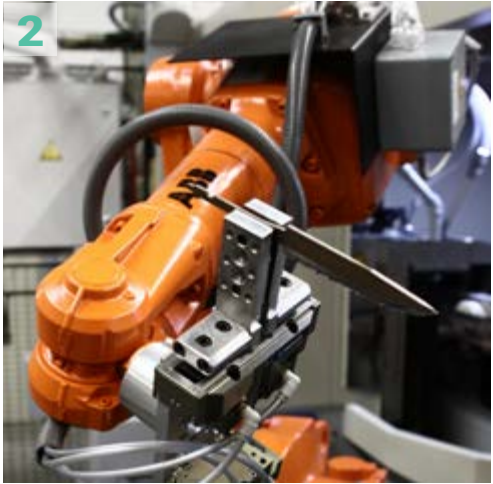
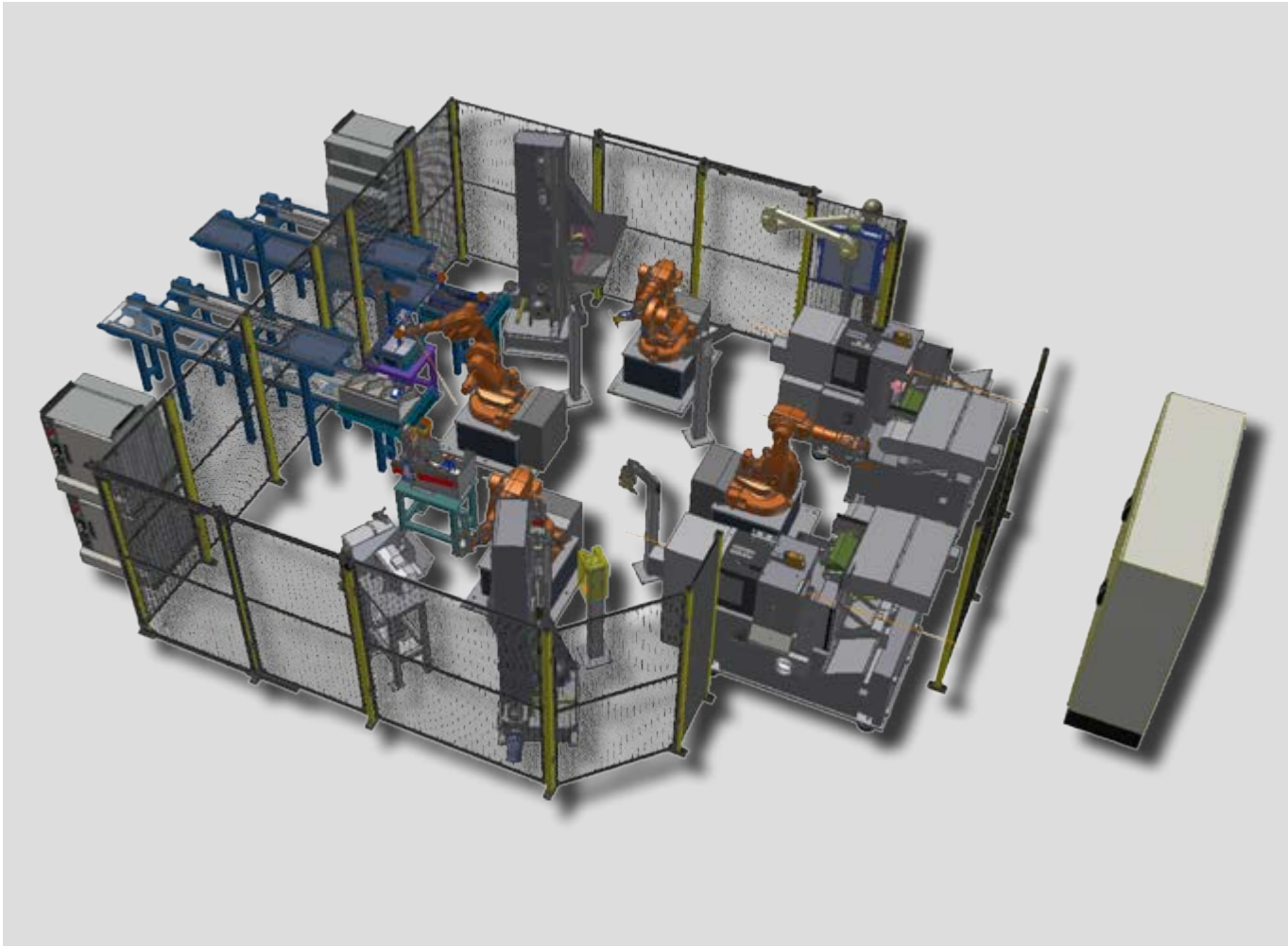
## Grinding and sharpening of sports and kitchen knives

The processing cell presented here carries out the following processing steps on kitchen and sports knives:

- back grinding
- flat bevel grinding
- radii grinding
- sharpening

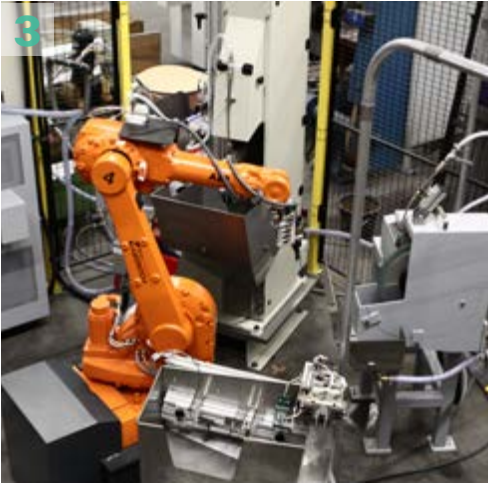
The processing cell is equipped with:

- flat bevel grinding machine BG1/RH/NT
- two belt grinding stations BSS10
- polishing station P3
- four robots IRB 1600 (ABB)
- two double-level magazine systems for supply and removal of magazine cassettes
- drying station



## Examples of use (pictures)

1. Processing cell for flat bevel grinding, back grinding and sharpening of sports and kitchen knives (picture 1)
2. Back grinding of knives (picture 2)



3. Sharpening of knives with belt grinding station BSS10 (picture 3)



# ROBOT CELLS WITH ROBOT-GUIDED WORKPIECE

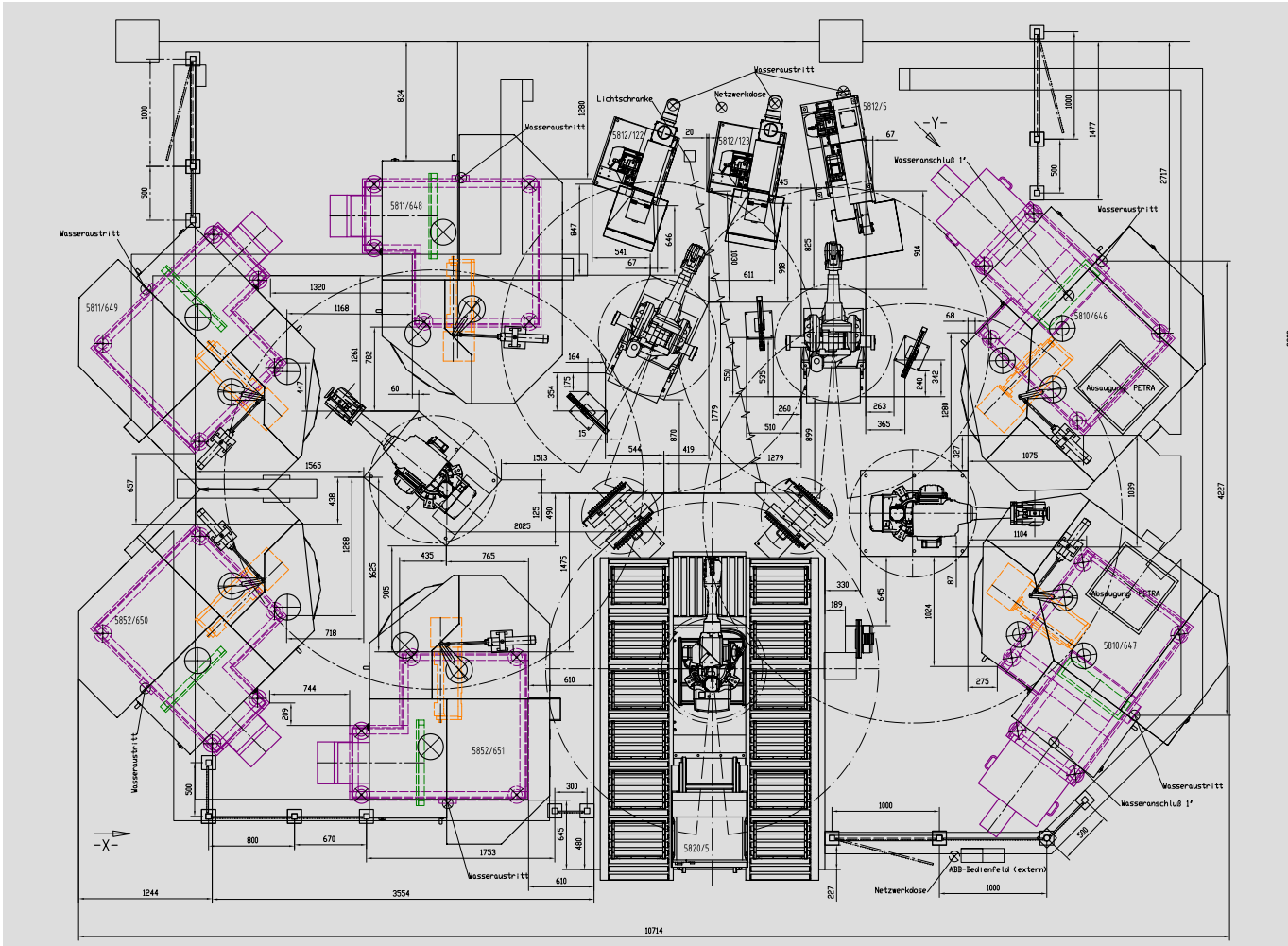
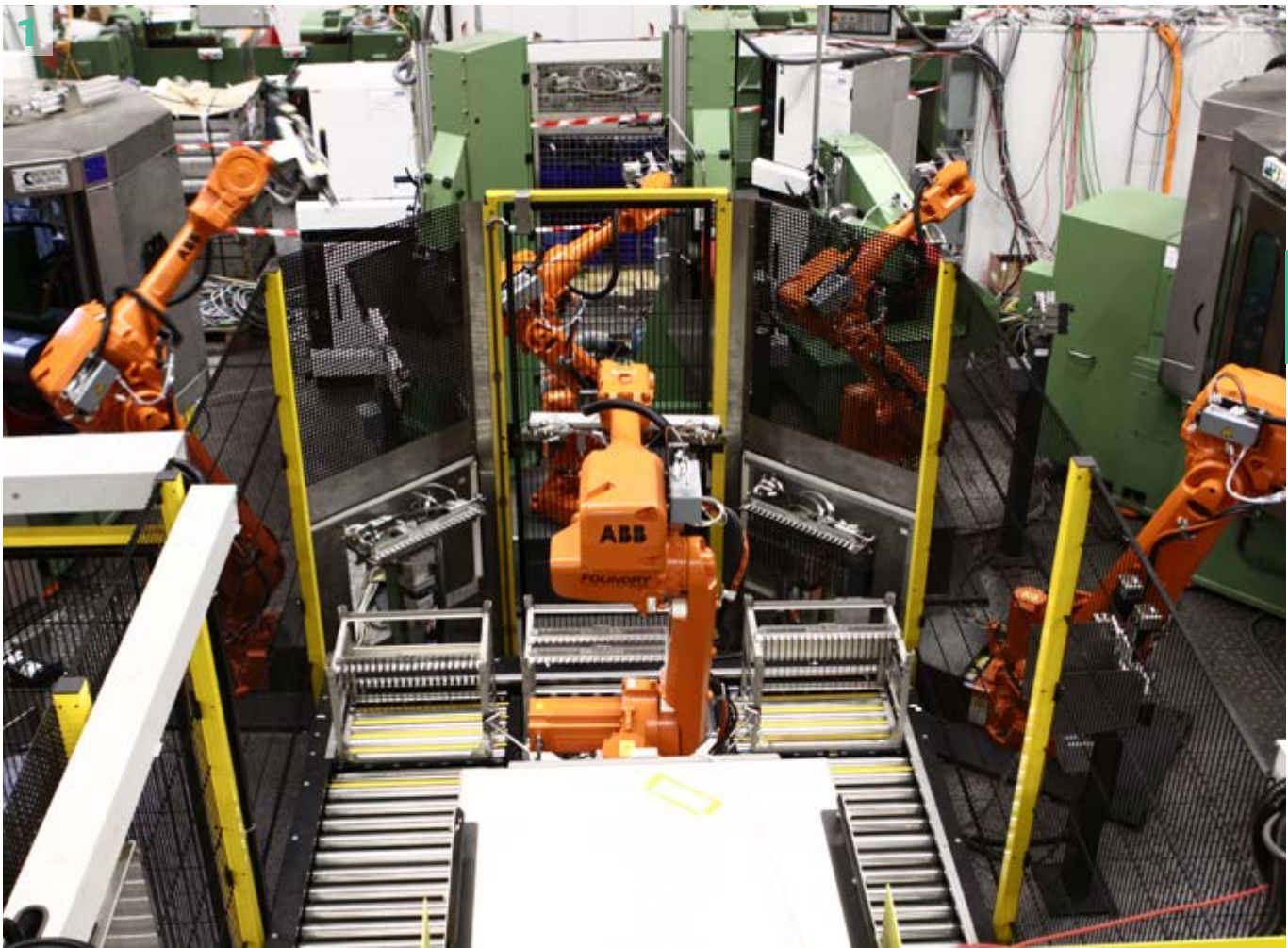
## Back processing, grinding and glazing of knives

The machining cell presented here carries out the following machining steps on knives with or without bolster:

- back grinding
- flat bevel grinding
- glazing

The processing cell is equipped with:

- flat bevel grinding machine of the series BG3/2/V/NT2/AV with full enclosure
- glazing machine of the PLM2/V/NT series with full enclosure
- two belt grinding stations BSS21 and BSS10 for back processing
- two robots IRB 4600/60kg (ABB)
- two robots IRB 2600/20kg (ABB)
- magazine/feeding system RoMag1



## Examples of use (pictures)

1. Processing cell for grinding, glazing and back grinding of knives (picture 1)
2. Flat bevel grinding machine BG3/2/V/AV/NT (picture 2)
3. Glazing machine PLM2/V/NT (picture 3)



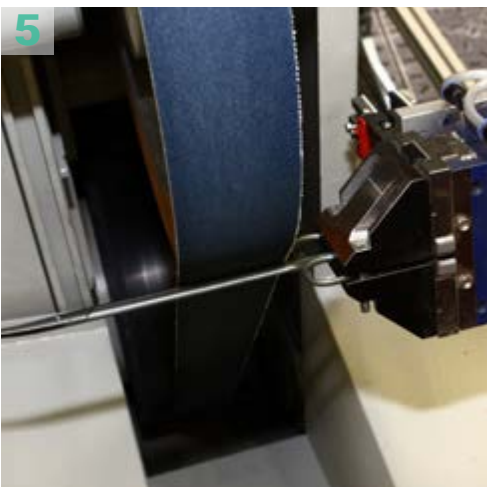
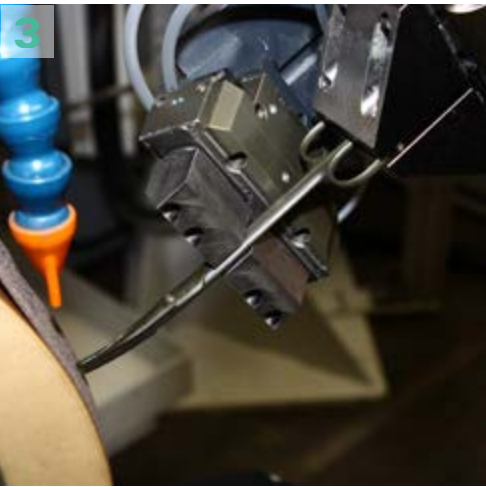
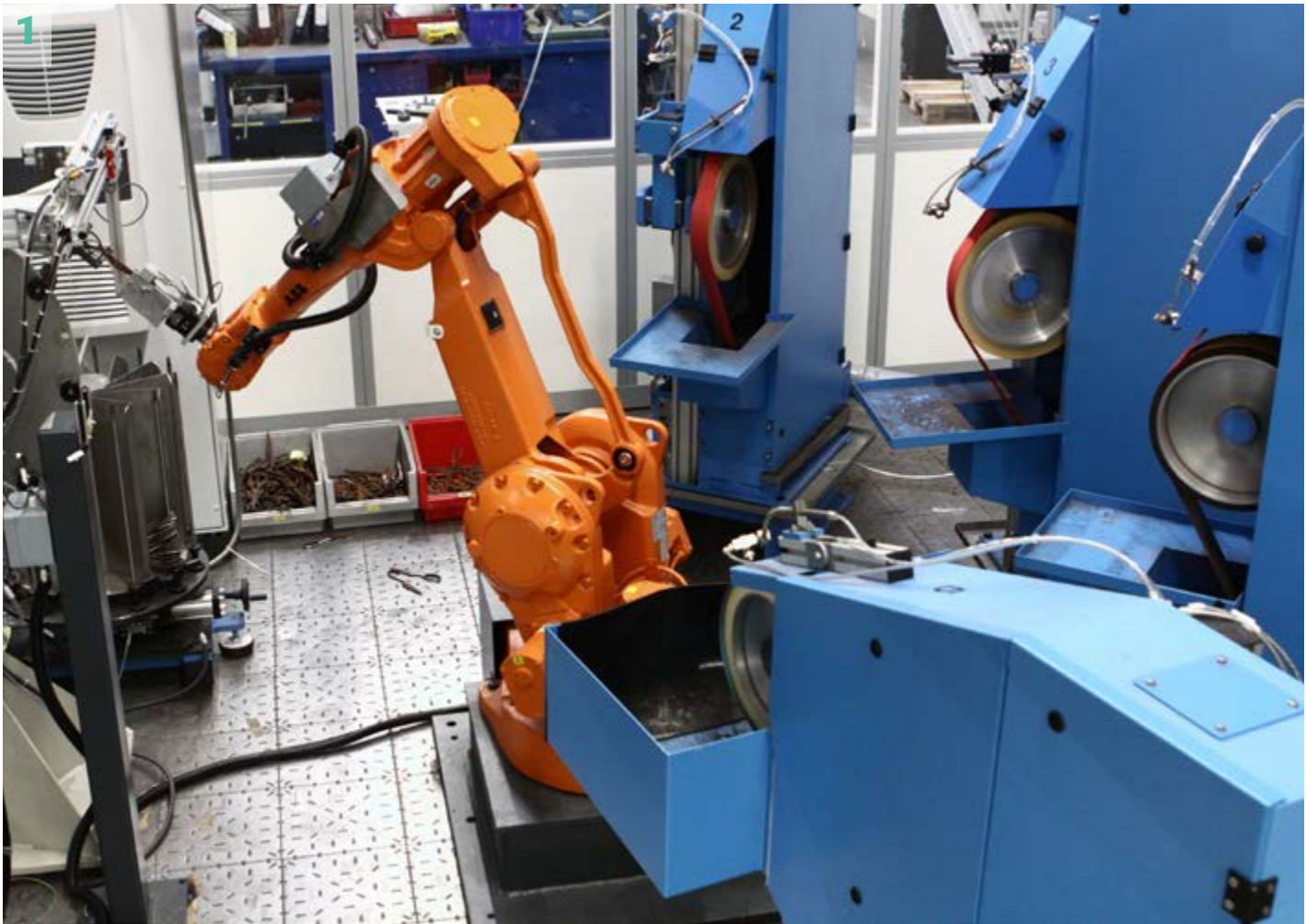
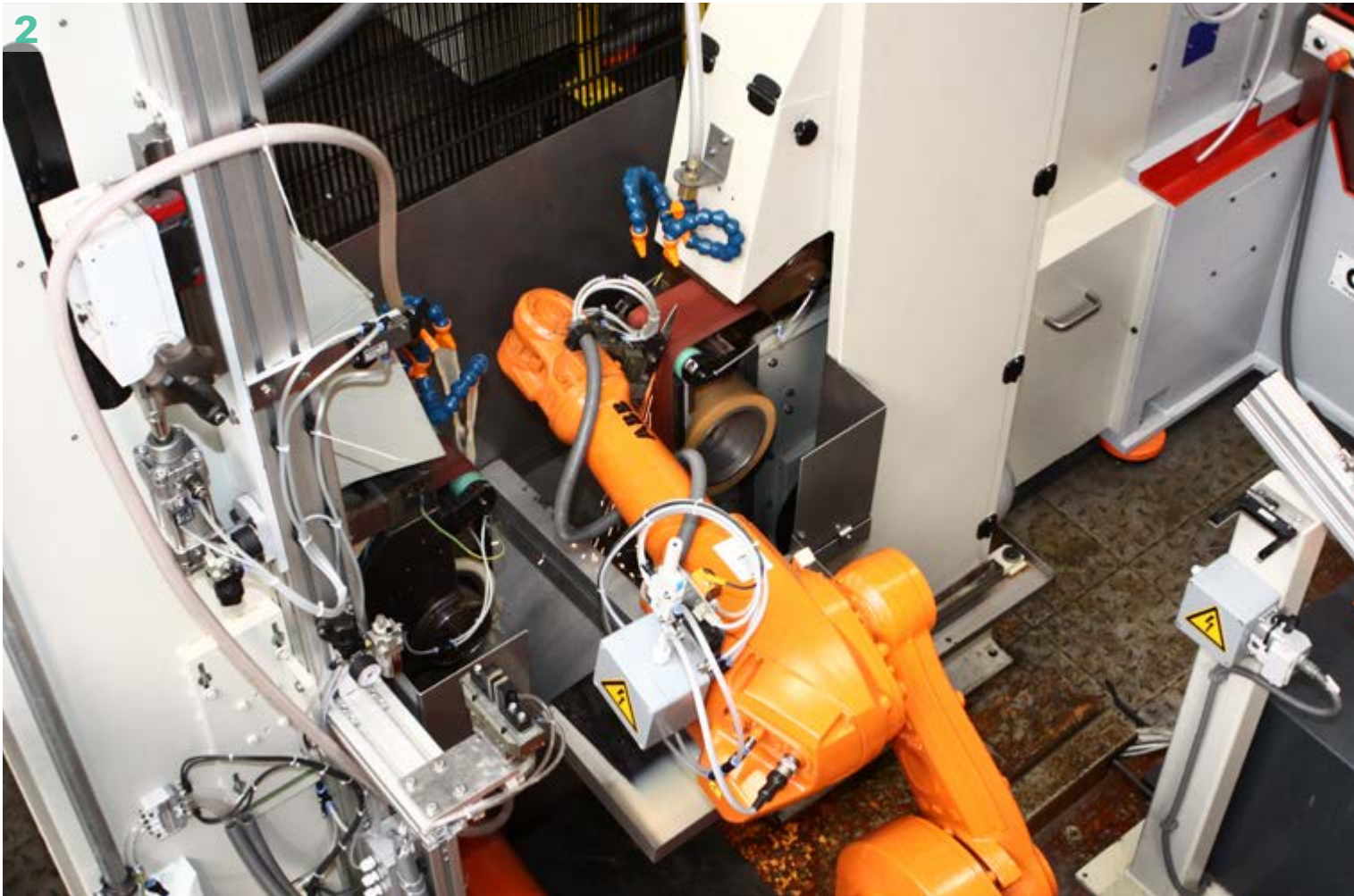
# ROBOT CELLS WITH ROBOT-GUIDED WORKPIECE

## Processing of scissors

The robotic grinding stations can be used to process hair scissors, garden shears, nail scissors, surgical scissors and similarly shaped workpieces.

Depending on the shape of the workpiece and the type of processing, the robot cell is configured with appropriate stations such as:

- belt grinding stations
- indexing rotary table magazines
- camera measuring systems



## Examples of use (pictures)

1. Grinding of scissors with four belt grinding stations (picture 1)
2. Back grinding of scissors (picture 2)
3. Grinding of mounted scissors (picture 3)
4. Grinding the outer edge with high material removal (picture 4)
5. Grinding and contour machining of scissors (picture 5)



# ROBOT CELLS WITH ROBOT-GUIDED WORKPIECE

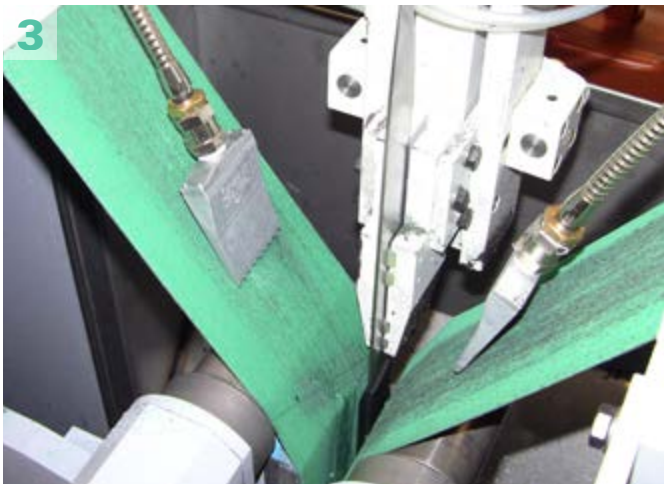
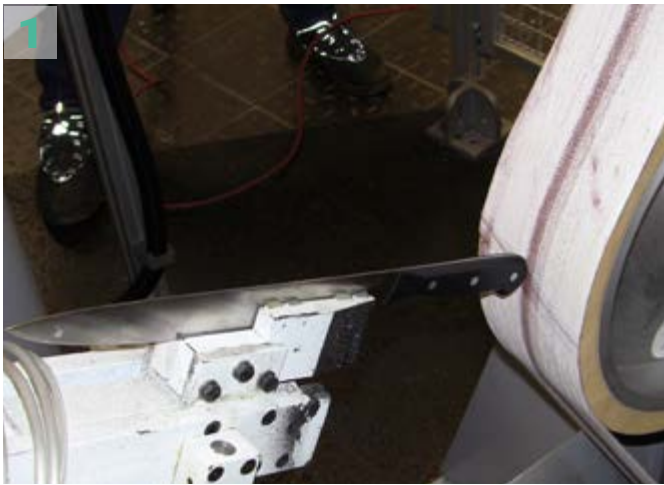
## Grinding of knife handles

With a specially configured robotic cell, a surface grinding of knife handles can be achieved.

- surface grinding of knife handles on both sides by two opposite belt grinding stations
- stations connected to each other by a special attachment for surface grinding on both sides
- grinding of handles by profiled wheel

## Examples of use (pictures)

- 1. + 2.** Belt grinding station for contour grinding on knife handles (pictures 1 and 2)
- 3.** Two opposing belt grinding stations for flat grinding of knife handles (picture 3)
- 4.** Indexing rotary table magazine including adjustable stops for holding approx. 160 workpieces (picture 4)



## Polishing of knife handles

Single-sided polishing stations are used for polishing knife handles.

Depending on the model, equipment with a polishing wheel in widths of 100 mm (3.94") or 300 mm (11.81") is recommended.

The polishing paste can be supplied in liquid or solid form.

The robot station shown here (picture above) is equipped with:

- three polishing stations of the P1 series
- indexing rotary table with adjustable stops for holding approx. 160 workpieces

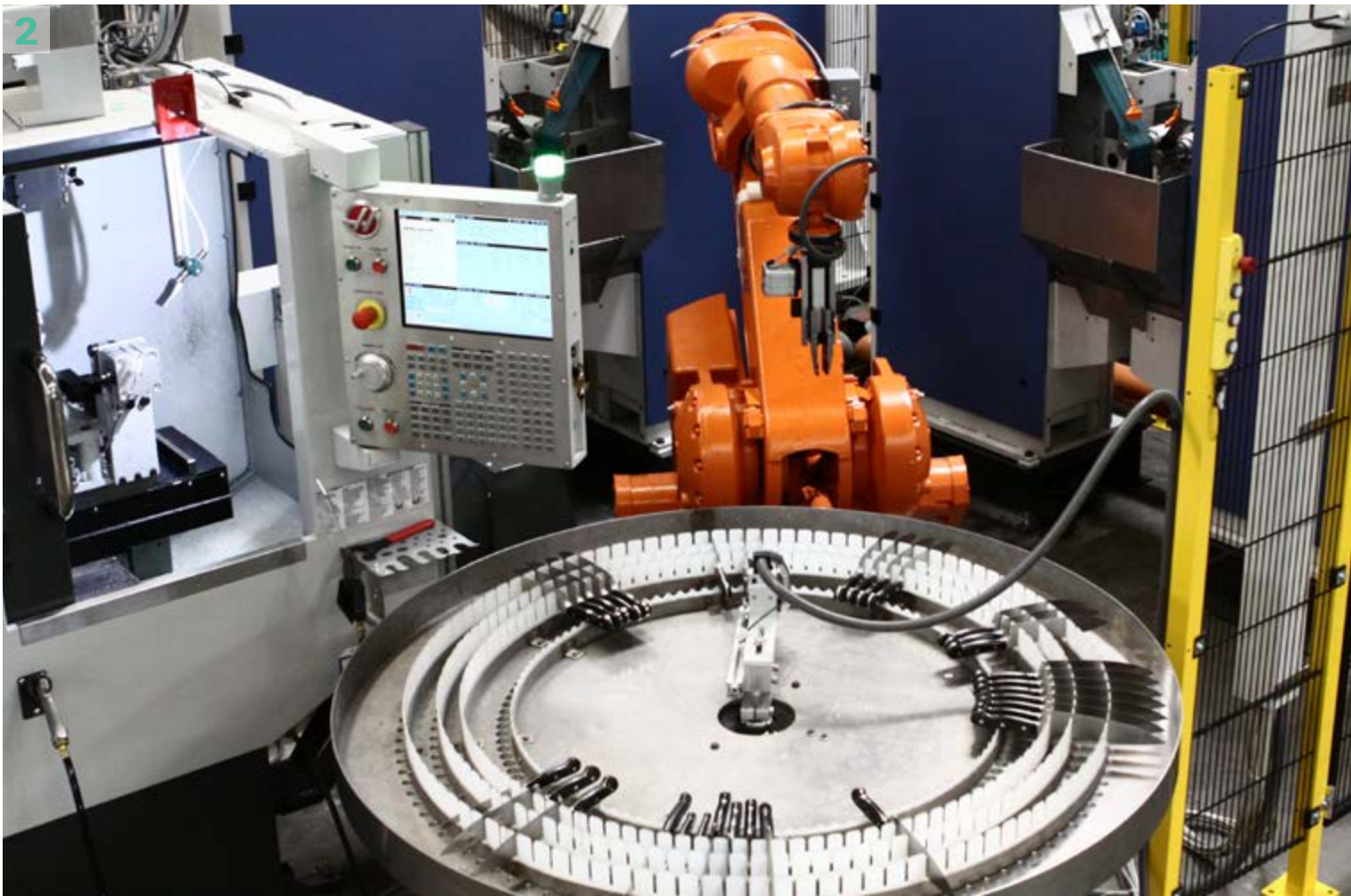




# ROBOT CELLS WITH ROBOT-GUIDED WORKPIECE

## Milling and flat grinding of knife handles

The milling of the handle results in a precisely repeatable contour for further grinding and polishing operations.



Robot grinding and milling system designed for milling the handle and flat grinding of the stainless steel rivets consisting of:

- belt grinding station BSS10
- two belt grinding stations BSS14 for pre-grinding
- two belt grinding station BSS14 for fine grinding
- milling station
- two laser measuring stations
- indexing rotary table

### Examples of use (pictures)

1. Clamping in milling station (picture 1)
2. Robotic processing cell RSP/5B/1F/2L with milling station and belt grinding stations for all-around milling and flat grinding of knife handles (picture 2)
3. Two opposite belt grinding stations for flat grinding of stainless steel rivets for knife handles (picture 3)
4. Milling station (picture 4)



# ROBOT CELLS WITH ROBOT-GUIDED WORKPIECE

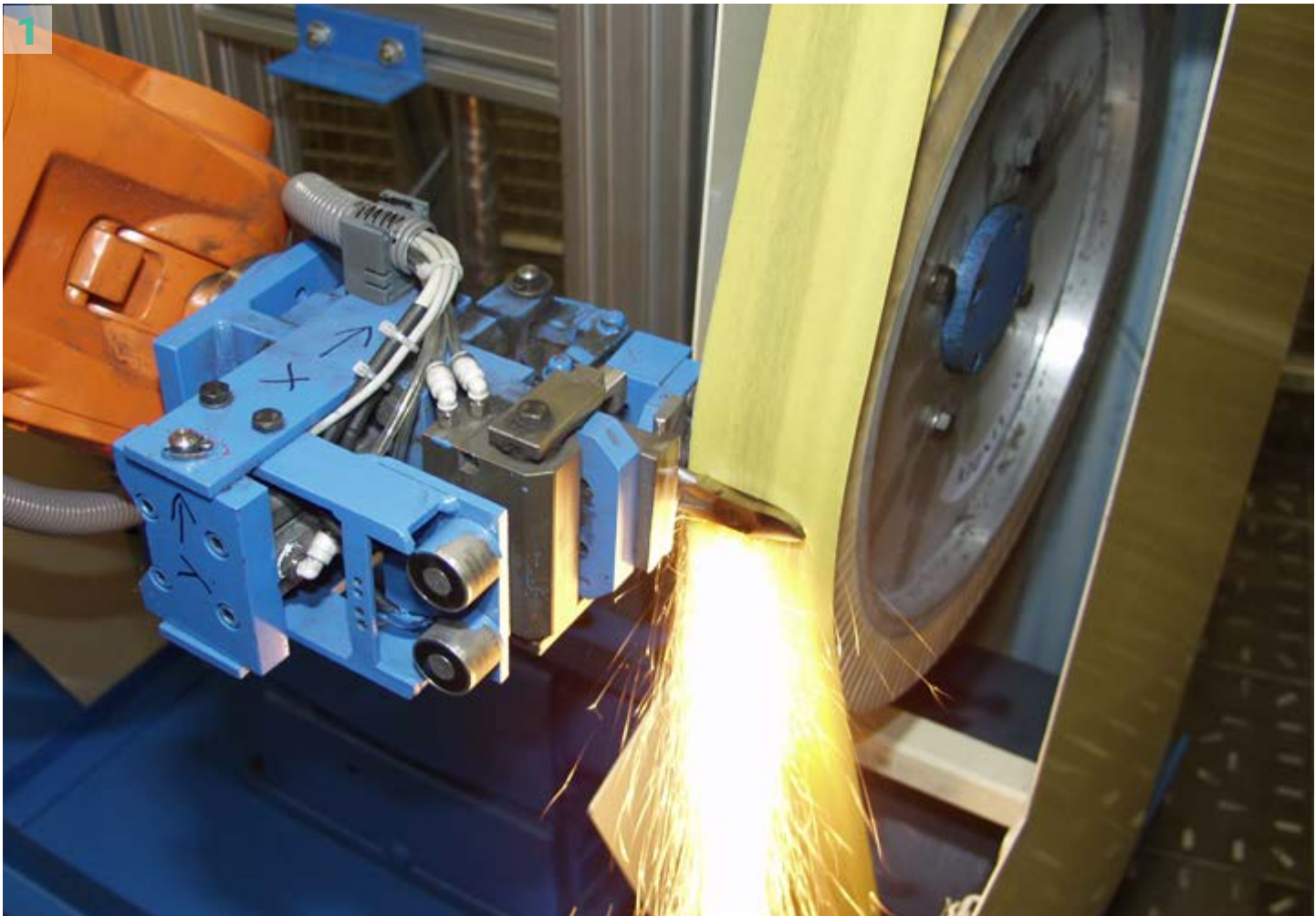
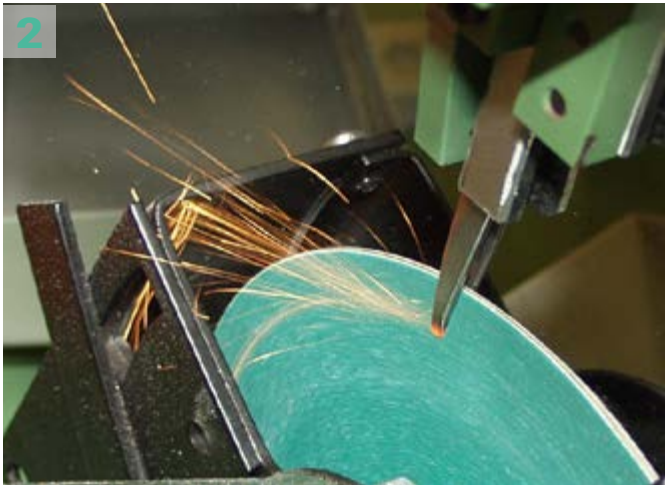
## Grinding of nail clippers

Robot grinding stations of the RSP series can be used for processing nail clippers and similarly shaped workpieces.

The configuration of the robot cell depends on the workpiece and the desired processing.

The robot cell shown here consists of:

- four belt grinding stations of the BSS10 series
- indexing chain magazine for conical material (loading capacity 2 000 mm (78.74"))



## Grinding and sharpening of manicure tweezers

By means of a special configuration, manicure instruments such as nail scissors or tweezers can be sharpened and ground in the robot cell.

The robot cell shown here consists of:

- two belt grinding stations
- sharpening station
- laser measuring station
- Rotating bar magazine for tweezers with position detection via bearings

## Examples of use (pictures)

1. Grinding of nail clippers with belt grinding station (picture 1)
2. Sharpening of manicure tweezers (picture 2)
3. Grinding of the tip of manicure tweezers (picture 3)
4. Robotic grinding station RSP/4B/1K/1L with indexing chain magazin for conical workpieces, here nail clippers (picture 4)
5. Robotic grinding station RSP/2B/1S/1L with rotating bar magazine for tweezers (picture 5)



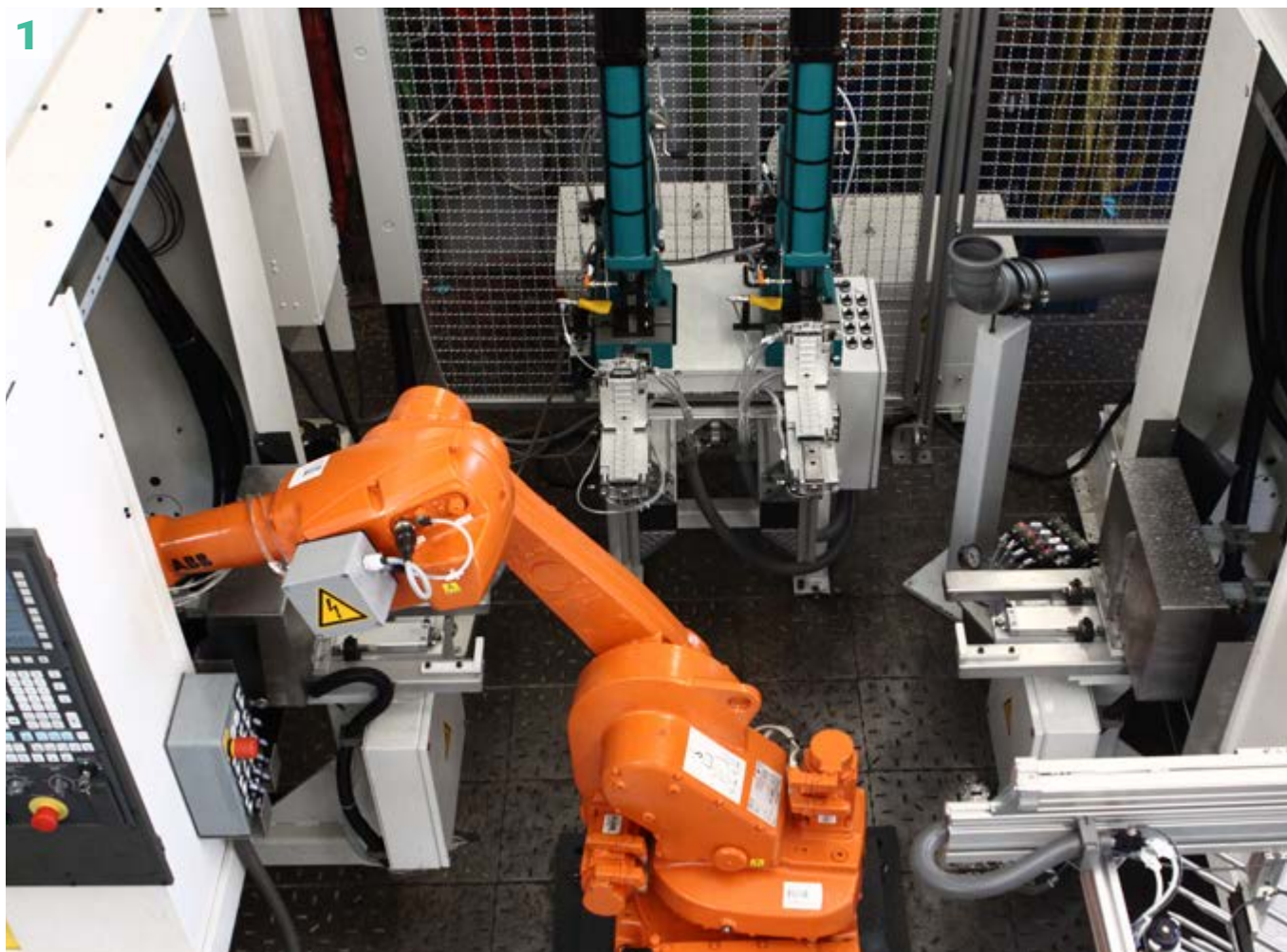
## ROBOTIC

### PROCESS TECHNOLOGY / AUTOMATION

#### INTEGRATION AND AUTOMATION OF MILLING CENTERS

##### Integration of production processes

Various production processes can be integrated into a robot cell, such as build-up welding, bending presses, drilling/countersinking, hardening systems, painting systems and packaging machines.



##### Centering, drilling, milling

- preparation of the workpieces for subsequent grinding
- fixture construction and development

##### Examples of use (pictures)

1. Automation of milling center and press for bending of scissors (picture 1)
2. Special device for CNC milling centers for centering, drilling, thread cutting and milling (picture 2)



## MEASURING TECHNIQUE

### Measurement control BEM

A measuring system type BEM can be integrated into a Berger grinding machine with automatic stone feed.

- probes in different versions e. g. AE Acoustic Emission or with diamond

- detection of the grinding wheel position for automated compensation of grinding wheel wear

The illustration below shows the measuring control type BEM in combination with a dressing device for knives with bolster.



### Camera/laser measuring technique for sharpening processes

Measurement programming for measuring the ground blade consisting of

- measurement of the twist in the gripper
- measurement of the distortion in X-direction (from the handle to the tip)
- measuring the course of the cutting edge (top view)
- further solutions customer- or user-specific



ACQUISITION AND  
EVALUATION OF  
MACHINE DATA

Berger Machine Interface 4.0

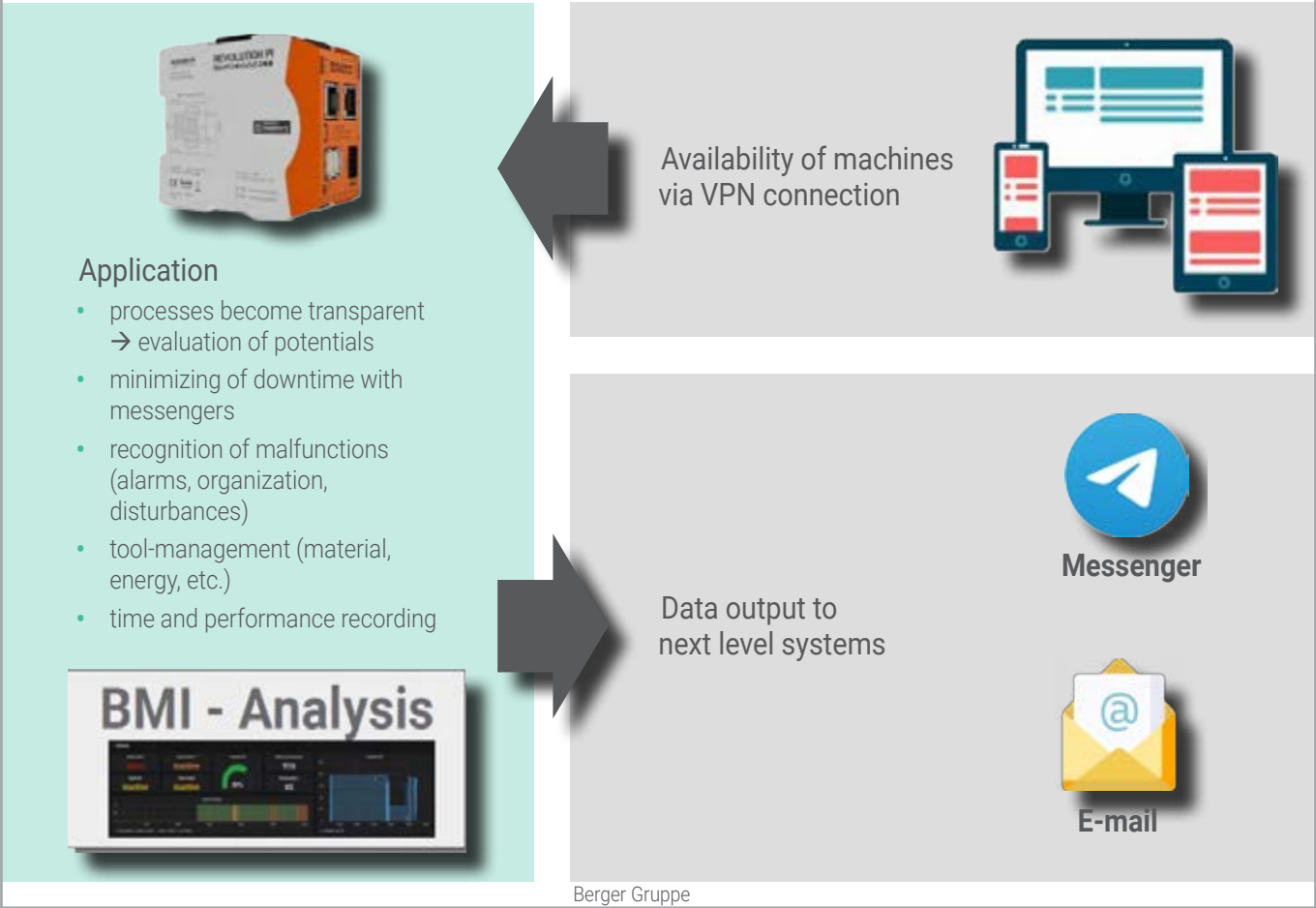
Berger Machine Interface 4.0 (BMI4.0), in conjunction with KEBA/Andronic and Windows 10, enables bus-based acquisition of sensor signals on a machine and evaluation of the machine data.

Definition of universal protocol

(1. Definition of a universal protocol on 20/02/2019, use with KEBA/Andronic/Siemens control)  
Example of a universal protocol. The parameters can be compiled as required.

Variable	Type	Unit	Comment
General information			
Alarm active	BOOL		0=no alarm, 1=alarm activated
Machine ready/autorun	BOOL		NC activated, green button
Rob1 Automatic/Autorun Rob1	BOOL		
Rob2 Automatic/Autorun Rob2	BOOL		
Rob1 Alarm	BOOL		
Rob2 Alarm	BOOL		
Feed rate (feed potentiometer position)	INT	(%)	0...100% of potentiometer position
Total piece counter	INT32		Total piece counter (not resettable)
Piece counter1 resettable	INT		Piece counter 1 (resettable)
Piece counter2 resettable	INT		Piece counter 2 (resettable)
Target batch counter	INT		
Actual batch counter	INT		
Machine-specific/channel-specific			
Current program	STRING (24)		
Grinding activated	BOOL		0=inactive, 1=grinding activated
Measuring activated	BOOL		0= inactive, 1=grinding activated
Dressing activated	BOOL		0= inactive, 1=grinding activated
Grinding time	REAL	sec	
Loading time	REAL	sec	
Cycle time	REAL	sec	Grinding time + loading time

REVPI AND SIEMENS IOT SERVER

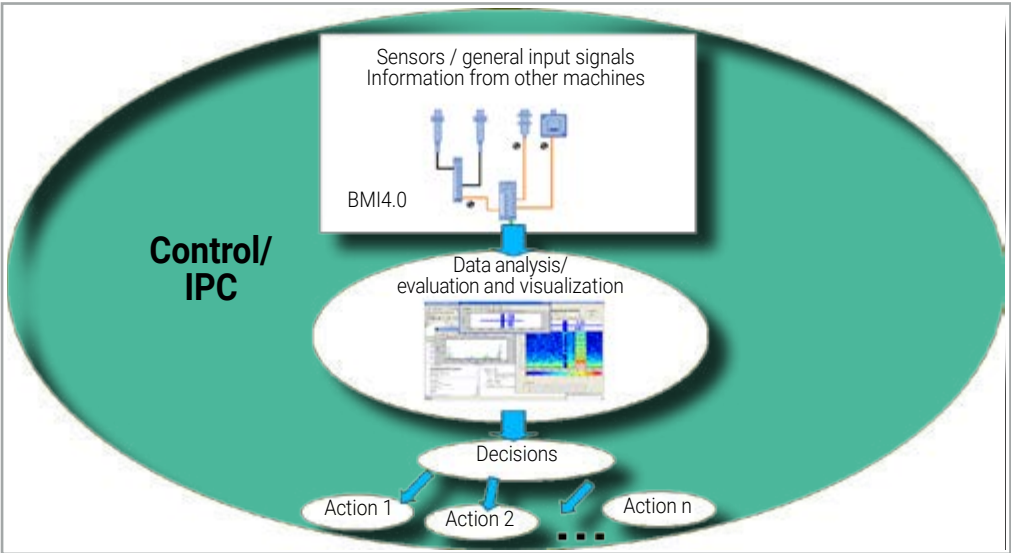


Functions of BMI4.0

- universal bus-based acquisition of sensor signals on a machine such as coolant temperatures, motor load, AE signals for spindle monitoring, air pressure and quantity
- data reduction and visualization with evaluation software
- networking with IOT or company network
- programming of interfaces for individual connection to existing PDA or ERP systems with OPC server

Advantages of BMI4.0

- prerequisite for intelligent resource management (IRP)
- prerequisite for preventive maintenance and real-time monitoring of the machine park
- acquisition of process data for process optimization and detection of process dependencies
- optimization of downtimes and set-up times, thus optimal capacity planning





# DIGITAL PRODUCTION

## REMOTE MAINTENANCE WITH DATA SECURITY

### Solution for remote desktop connection without external cloud

The remote desktop solutions provide data security for connections. The connection is made from the customer's router to the Berger Gruppe's own company server. This means that the customer does not need to open the firewall for external dial-in.

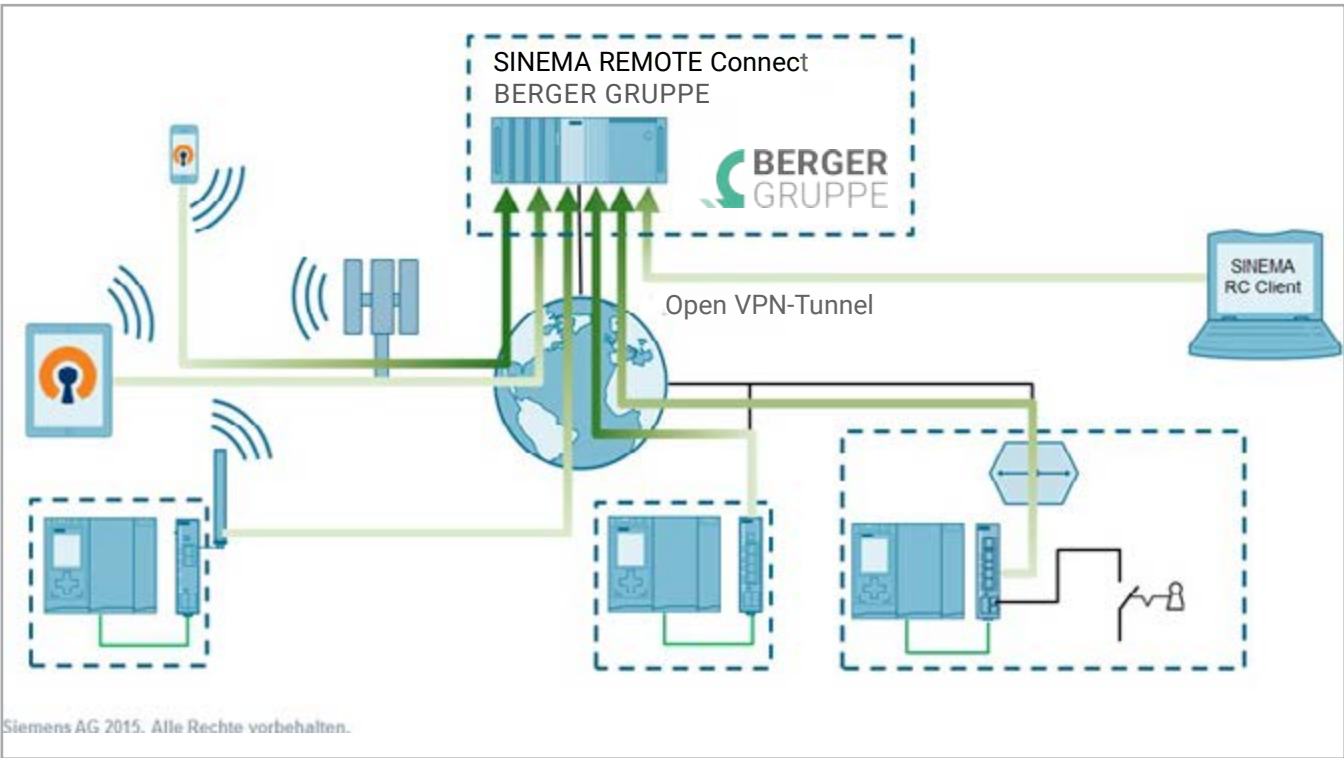
The system is independent of cloud solutions or external partners, which ensures high data security. The dial-up of the routers happens automatically or on request of the customer. The plants do not need to be constantly connected to the Internet or the server.

By using a router, different parts of the plant can be made accessible for remote access. Machines manufactured in series can be easily connected via remote access, even if they have identical IP addresses.

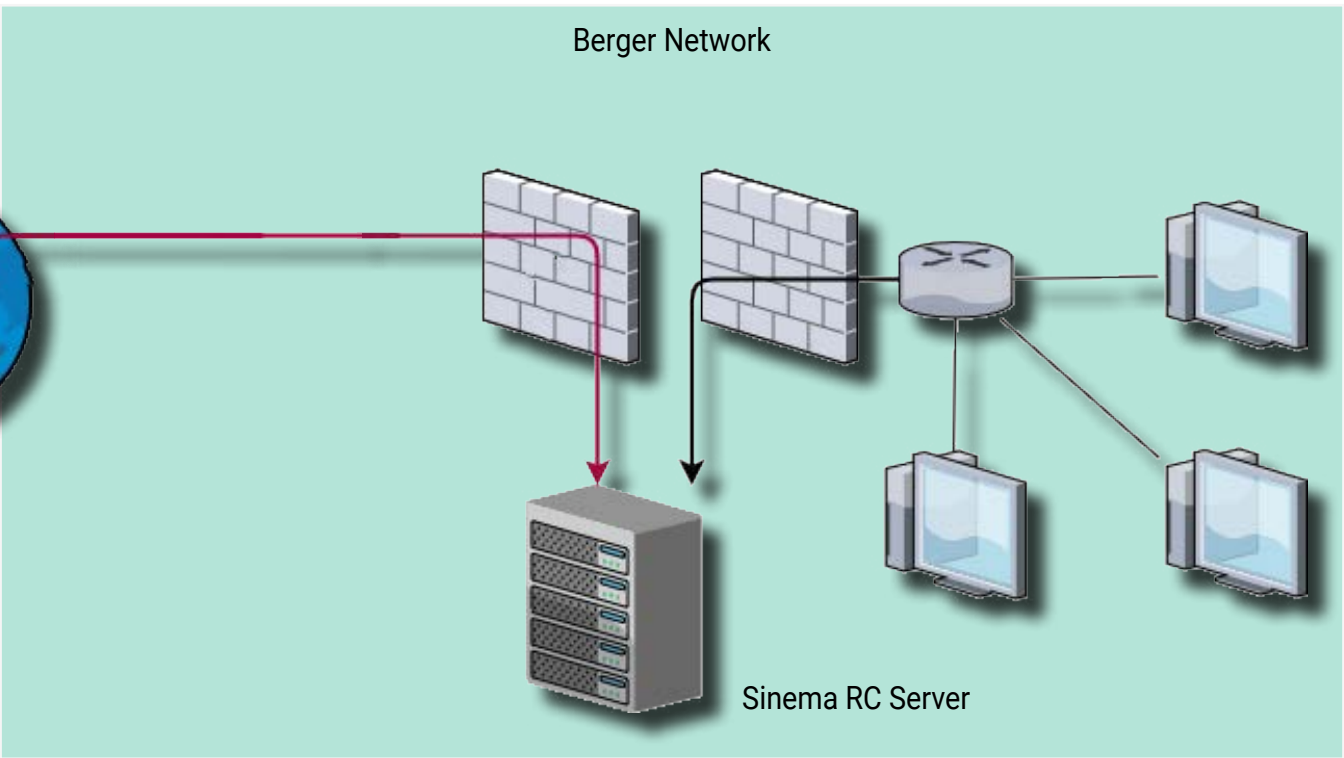
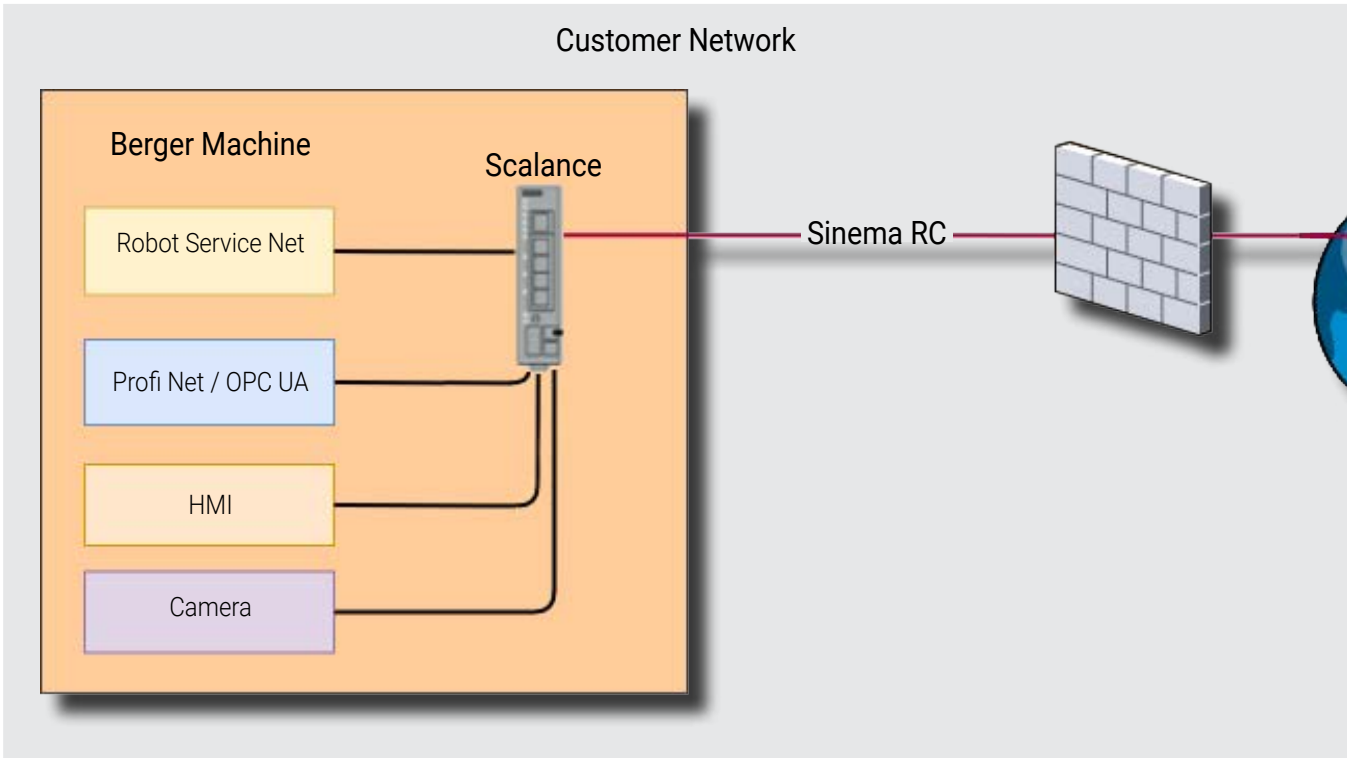
The "Sinema RC" system from SIEMENS provides long-term support for security updates.

### Sinema Remote Connect

- easy remote access for remote service and maintenance
- dial-up of the router can be switched on/off or automatically
- uncomplicated firewall configuration – no active connection setup from the Internet
- connection of multiple subnets: robot, camera, CNC machine, ...
- internet connection via mobile or network connection possible
- management of tunnel connections (VPN) between service technicians, headquarters and plants



- consistently secure data transfer through encrypted connections with OpenVPN and IPsec
- access restriction through multifactor-authentication and support of current encryption methods
- certificate management with automatic fallback function
- user/customer management through separate user groups
- access by customers to their own machines possible
- logging of connections
- integration in machines with ProfiBUS possible
- retrofitting of the control with Remote Connect possible, even after delivery
- long-term support for security updates





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# REQUEST FOR QUOTATION

## QUESTIONNAIRE FOR TECHNICAL DATA



Company	_____
Contact	_____
E-Mail	_____
Phone/Fax	_____

WORKPIECE	Workpiece		
	Lot size		
PROCESSING	Batch size		
	Number of types		
MACHINE	Sample		
	Drawing		
PROCESSING	Contour milling	Polishing	
	Back grinding	Scalloped grinding	
MACHINE	Flat grinding	Serrated grinding	
	Flat bevel grinding	Bolster Machining	
PROCESSING	Hollow grinding	Handle Machining	
	Glazing	Sharpening	
MACHINE	Automatic loading/unloading	central	decentralized
	Autonomy, capacity magazine		
MACHINE	Coolant system		
	Flow Control for coolant supply		
MACHINE	Magnet valve for coolant flow start/stop		
	Chiller for coolant system		
MACHINE	Coolant tank	single-shell	double-shell
	Exhausting device		
MACHINE	Connection	central	decentralized
	Full enclosure		
MACHINE	Safety fence		
	Tension		
MACHINE	Preferences control	Andron	Bosch
	Preferences robot	ABB	KUKA
MACHINE	Starting up	customer's site	
	Transport		
MACHINE	Guarantee extension		