



## Machines for strip edge trimming and surface treatment

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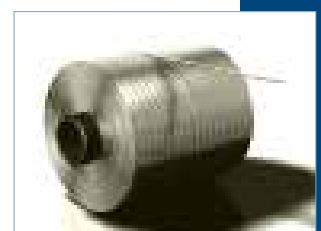
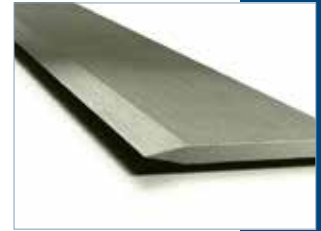
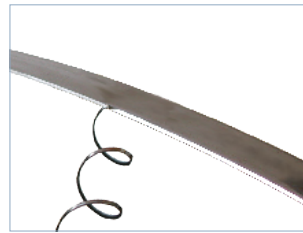
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# Production Parts

Strips for the production of:

- Tubes
- Hollow sections
- Plain bearing bushes
- Cutting rules
- Alu profil frames
- Tailored strips
- Transformator sheets
- Motor sheets
- Doctor blades
- Strippers
- Saw blades



# Industries

- Tube industry
- Pressing and stamping industry
- Automobile industry
- Steel service centers
- Electronic industry
- Packaging industry
- Rolling mills

# Applications

## Steel Service Center

The quality of the slit strip often does not meet the requirements of the finishing industry. Strip width tolerances are not adhered to and edges are not clean.

When the strip edge has to be an integral edge (e.g. for hollow profiles, curtain rails, rain gutters, shelves a.s.o.), the burr has to be removed and the strip edge has to be contoured. The specified tolerances must be achieved.

This is the reason why more and more steel service centers integrate a strip edge trimming line into their production process, being able in this way to offer a finished strip to their customers.

## Strippers, Cutting Rules, Doctor Blades

Strippers, cutting rules and doctor blades are products whose quality is determined by the condition of the strip edge.

A lot of producers integrate strip edge trimming lines to realize a perfect strip edge and to optimize the strip width tolerances.

Often the Julius strip edge trimming line is combined with a Nell strip grinding station of the series BSM. In this case the strip edge is chamfered by the Julius line and ground by the Nell line.

The slit strip is transformed into a finished product.

Strip edge trimming line of the series QUATTRO







Strip edge trimming machine of the series DUO integrated into a tube welding line

## Optimized weld seam for tubes

Slit strip is generally the base for welding of tubes. The slit strip edge is usually irregular in regards to straightness, angle, width and structure. Coatings also affect the welding process.

Mechanical edge trimming optimizes the angle of the edge, removes the burr and any cavity. This allows a superb facing to the edges for any welding process to achieve a solid and dense weld seam.

Some advantages:

- lower energy input
- higher welding speed
- less bulge
- less shaping at the inner and outer side of the weld seam
- less scrap
- smaller width add-on
- high yield
- homogeneous welding structure
- better quality of the weld seam
- better shape stability

## Saw blades

The production of saw blades with improved shape stability consists of joining a soft steel strip as support to a strip of HSS for cutting.

The condition of the strip edge of the supporting strip as well as the cutting strip determines the quality of the final product.

At this point, the modular strip edge trimming machines are used to clean the strip edge by removing the burr and machining a right angle.



Strip edge trimming line of the series QUINTO for the production of saw bands

## Plain bearing bushes

Thanks to edge trimming the strip is perfectly prepared for the production of plain bearing bushes and half bearing shells. Even at a speed of 100 m/min edge trimming reduces the costs.

The line executes five operations:

- thickness and width calibration,
- trimming of 2 chamfers at the upper and the bottom side
- oil grooving

It is possible to work from coil to coil, from slit strip packet to coil or – for long running times of the bending and punching machine – from multicoil to spool coil. Equipped with NC-technique, the line controls all operations electronically, even scrap marking with multiple axes.



CNC controlled strip edge trimming and oil grooving line for the production of plain bearing bushes and half bearing shells

# Strip Edge Trimming by Metal-Cutting

If the slit edge is the operational edge in the final product, the condition of the slit edge is inadequate for the downstream operation.

The Julius system of strip edge trimming by metal-cutting strips the burr from the strip edge. The swarfs fall into a scrap conveyer and are removed from the manufacturing line.

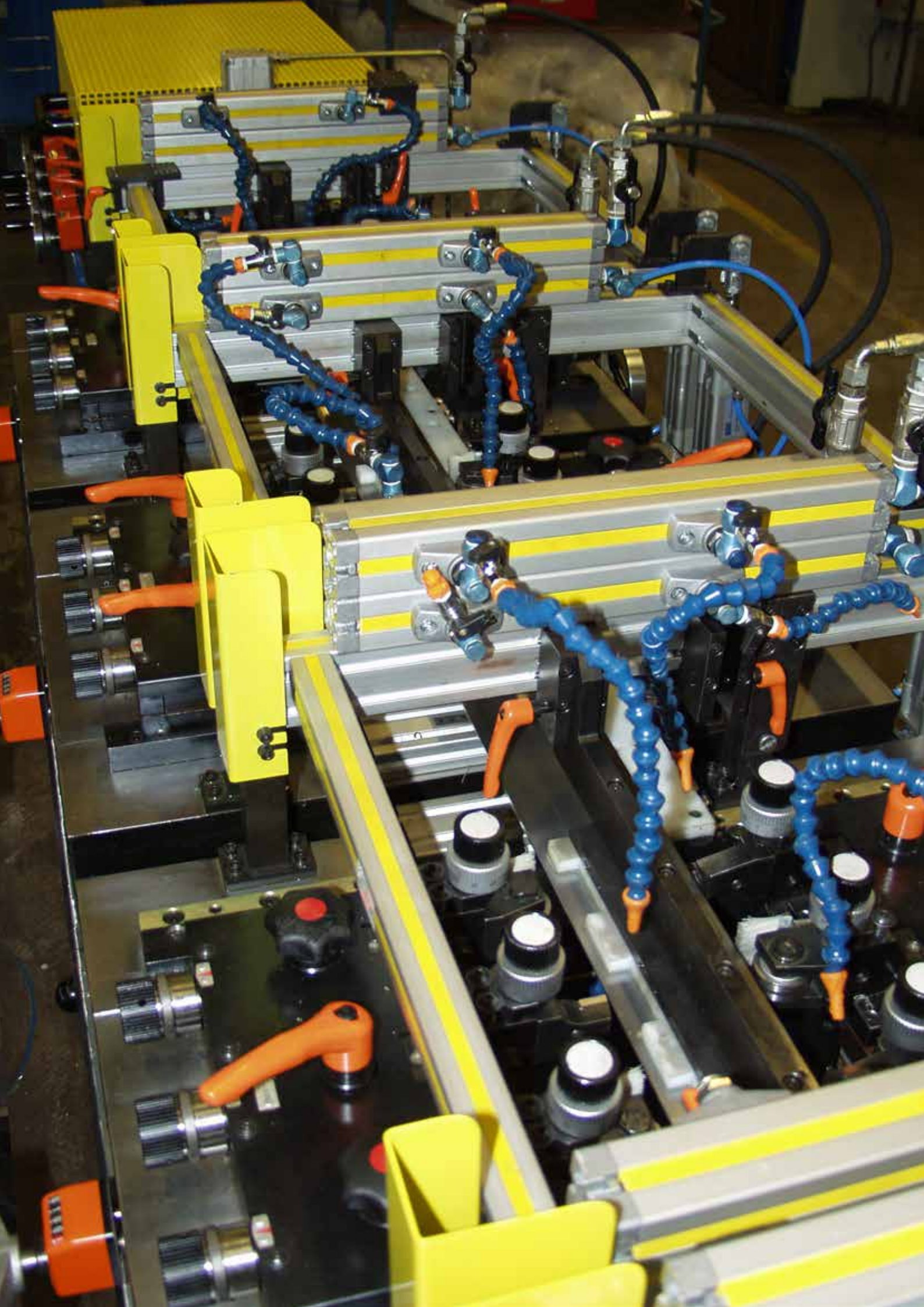


Onesided edge machining of an aluminium strip

This prevents any burr particles interfering in the processes e.g. stamping or profiling. Edging of strip by machining does not alter the material contrary to a rolling procedure. The structure of the surface is unaltered.

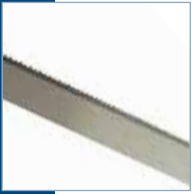
Precise tooling adjustments and intelligent tooling positioning allows production of complex bevels and contours without affecting the surface structure.







# The Modular System



The edge trimming units can be combined flexibly and expanded or retrofitted any time due to the modular concept.

In this way, a machine with one working station (UNO) can be extended to a machine with two (DUO), three (TRIO) or even more stations.

The module itself is composed in a modular method. All assemblies and components can be added and exchanged in each module.

Each module incorporates 3 positions for tool or roll holders at each side. Tools and rolls can be adjusted and exchanged in any order.

By means of a programmable automatic opening the main supports and horizontal guides are lifted hydraulically vs. pneumatically.

If the production speed is high and/or the swarf is thick higher energy is introduced into the process. A cooling and/or lubricating system will accommodate the higher strain.

The modular strip edge trimming machine can be combined with modules of strip surface treatment.

Strip edge trimming line of the series QUATTRO – here with the new protecting caps (option)







The strip edge trimming machine of the series UNO works with one tool each side. It is the smallest machine of the modular system being employed for simple deburring of the strip edge.



The strip edge trimming machine of the series DUO works with 6 tools. Often the DUO is integrated into tube production lines to optimize the weld seam.



The TRIO strip edge trimming machine works with up to 9 tools. A DUO strip edge trimming machine can be extended to a TRIO by flanging one more module.



The QUINTO strip edge trimming machine works with up to 15 tools and achieves each contour required.

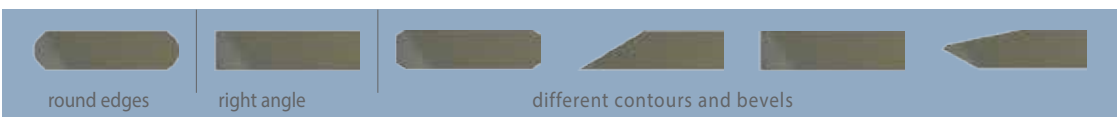
## Dimensions of the machine (W/L)\*

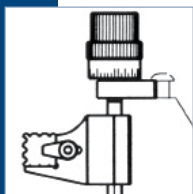
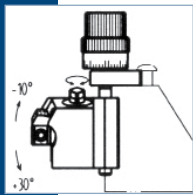
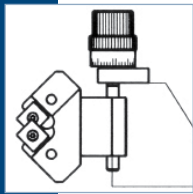
UNO:	700 mm × 760 mm	(27.56" × 29.92")
DUO:	700 mm × 1.360 mm	(27.56" × 53.54")
TRIO:	700 mm × 1.900 mm	(27.56" × 74.8")
QUATTRO:	700 mm × 2.500 mm	(27.56" × 98.43")
QUINTO:	700 mm × 3.100 mm	(27.56" × 122.1")

\* The machine width corresponds to a max. strip width of 80 mm (3.15"). The larger the strips are the wider the machine will be. The height of the machine is adapted to the strip running height.

## Technical data

- Strip width max. 1.500 mm (59.1")
- Strip thickness 0,15–8 mm (0–0.32")
- Contours: different contours (see here below)
- Speed: up to 300 m/min (1181.1"/min)
- Strip material: all kind of machinable material
- Automatic opening
- Hydraulic and pneumatic lifting
- Lubricating and cooling systems for tooling





# The Modular System

## Options

The modular system offers options to integrate further modules subsequently and covers changing demand parameters.

Julius provides the following options:

- TRI-Step system
- Rail system
- Roller cage
- Pinch rolls
- Swarf hopper / swarf removal system
- Swarf shredder
- Swarf guiding plates
- Swarf blowing system
- Cooling and lubricating system
- Measuring systems

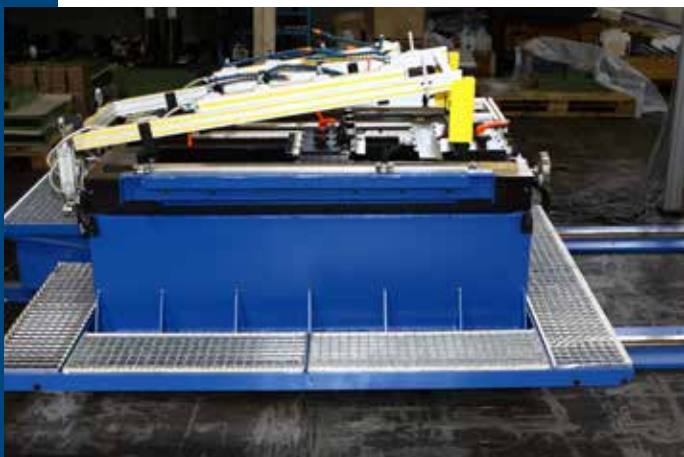


### Tool Motor Adjustment

#### TRI-Step system

The TRI-Step features a motorized adjustment of the tools on the non-operator side – and if desired also of the tools on the operator side. It can be retrofitted later.

The use of a TRI-Step system is recommended for strips with a width of over 400 mm (15.75").



### Flexible positioning of edge trimming

#### Rail system

A rail system allows the edge trimming machine to be rolled in and out a process line. This feature is used if and when the center of line of the strip changes.

This system is used for example for the production of tailored strips.



## Loop Operation

### Roller cage

A roller cage is flanged at a DUO strip edge trimming machine to support the strip when it leaves of a loop, preventing any fonding.



### Pinch rolls

When the strip machining is slight, the strip can be pulled by pinch rolls. It is necessary in case of loop operation.

The photo on the right shows a UNO strip edge trimming machine in front of a pinch roll unit.



## Swarf Removal

### Swarf hopper

A swarf hopper is integrated into a QUATTRO strip edge trimming machine.

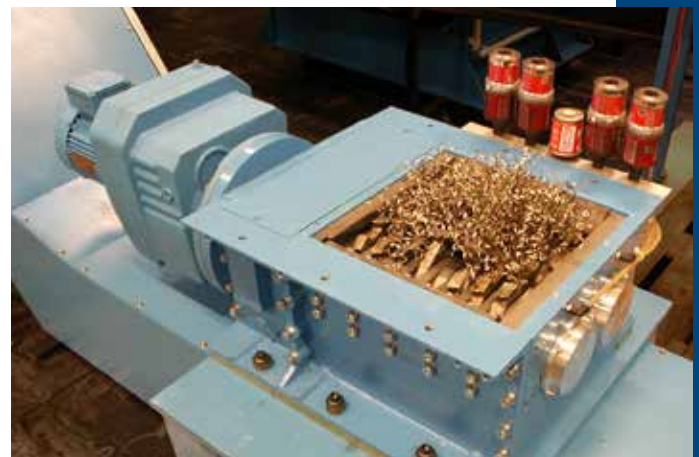
The swarfs are fed to a shredder through a swarf hopper and finally removed over a conveyer belt.



### Swarf shredder

The swarfs are fed into the shredder through a swarf hopper.

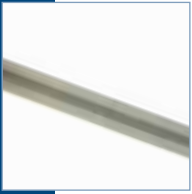
The shredder pulls in the swarf, shreds them and they fall onto a conveyer belt for removal.



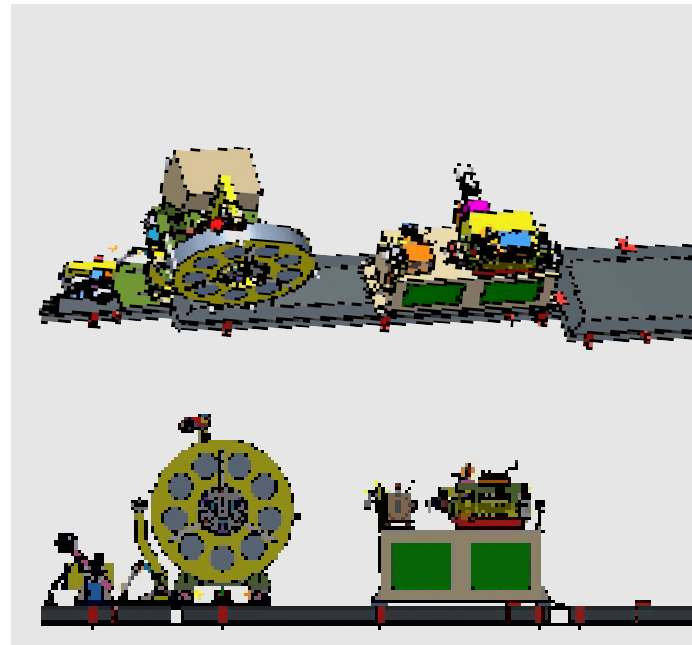


# The Modular System

## Lines



Strip edge trimming line of the series QUINTO with decoiler, flat levelling machine, brushing machine, aperture roller, vertical levelling machine, QUINTO strip edge trimming machine, strip width measurement, strip tension technique with S-bridel and dancer as well as recoiler

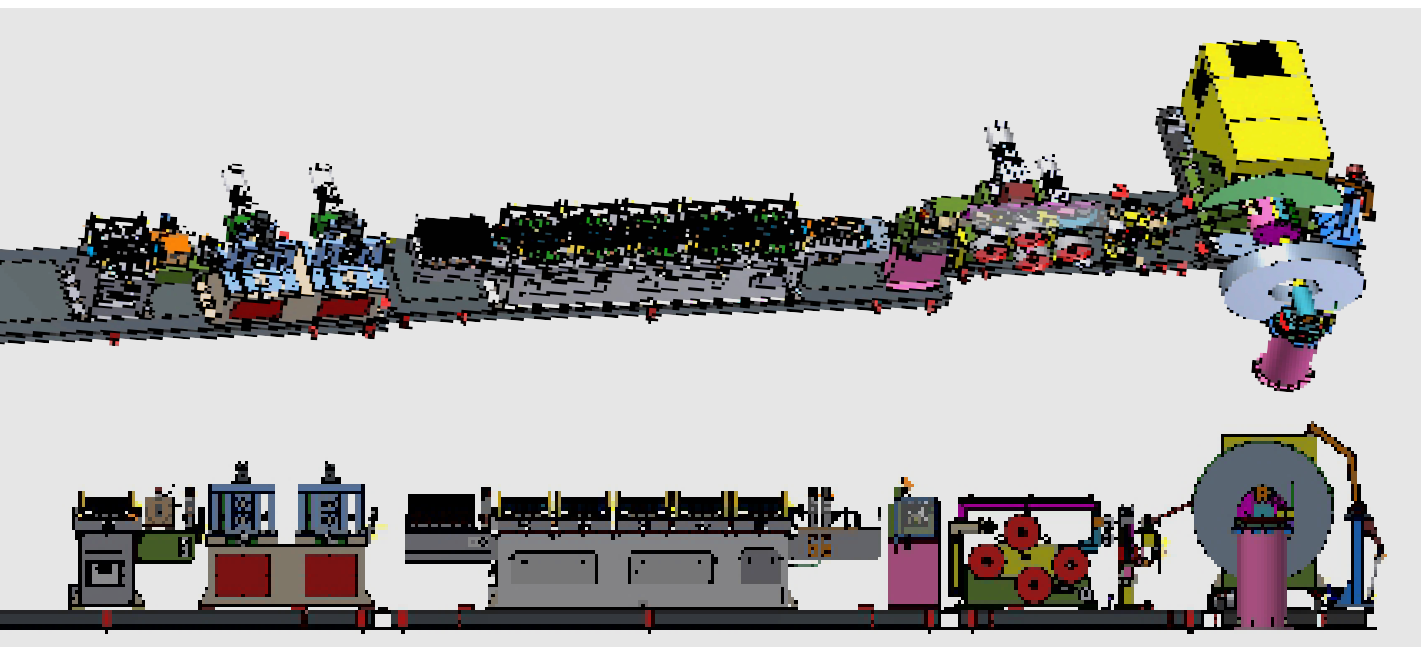


The modular concept allows different modules to be integrated into a full operational line. It facilitates other modules to be added later if and when demand changes.



Modules can be integrated into a line as follows:

- Strip edge trimming machines
- Strip surface treatment machines
- Traverse winding and multicoil systems
- Strip tension technique
- Levelling machines
- Measuring devices



Strip edge trimming line of the series QUINTO with (from left to right) decoiler with strip tension technique and multicoil system, brushing machine, flat levelling machine, UNO deburring device with brushing machine and brake, two aperture rollers, vertical levelling machine, QUINTO strip edge trimming machine, stripper, speed measurement, extended S-bridel, dancer, pneumatic guiding arm, recoiler with traverse winding system, pressing arm and turnstile



Basic line with decoiler, DUO strip edge trimming machine and recoiler



Basic line with decoiler, TRIO strip edge trimming machine, strip width measurement and recoiler



DUO strip edge trimming line with decoiler, flat levelling machine, vertical levelling machine, DUO strip edge trimming machine, strip width measurement, strip tension regulation, S-bridel and dancer and recoiler



Strip edge trimming line with vertical levelling machine, QUATTRO strip edge trimming machine, strip width measurement, strip tension system with S-bridel and dancer as well as recoiler and turnstile (not on the picture: aperture roller and flat levelling machine)

# Strip Edge Trimming

## for Heavy Duty

Large cross sections and high productivity impose heavy stresses on the machining of the edges.

The BKB compact is designed for maximum material removal at each tool, which ensures that even complex contours with wide bevels can be machined on strip with heavy cross sections or hard material.

The spacing of the tools is further apart widening the gap for easy flow of the heavy chips.



### Technical data

- Strip width: max. 1.500 mm (59.1")
- Strip thickness: 0,15–8 mm (0–0.32")
- Contours: all contours and chamfers
- Speed: up to 300 m/min (1181.1"/min)
- Strip material: all machinable materials





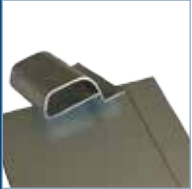
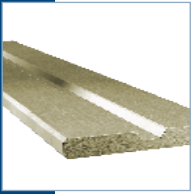
Strip edge trimming machine of the series BKB-compact with six (seven) tools

Strip edge trimming line of the series BKB-double-compact with (from left to right): multicoil, decoiler, strip entering system, two compact strip edge trimming machines with six (seven) tools each, S-bridel and dancer for strip tension reduction and recoiler (not on the picture)



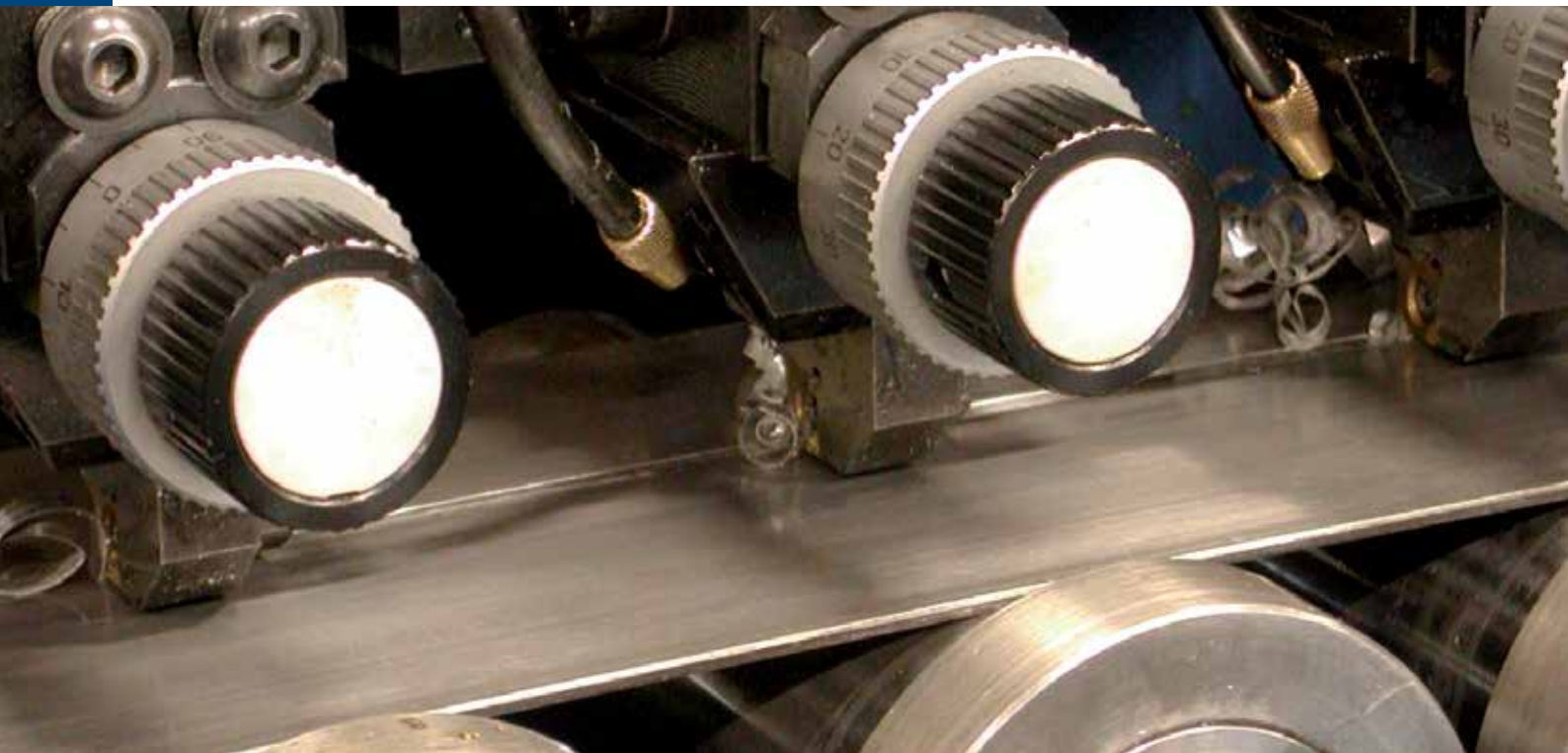
For Heavy Duty

# Strip Surface Treatment by Metal-Cutting



Some operating processes require both an edge and a surface machining before transferring the strip downstream for additional processing.

For some manufacturing processes (such as the production of hollow profiles) a narrow band of the coating layer is removed to allow the base metal to weld onto itself.



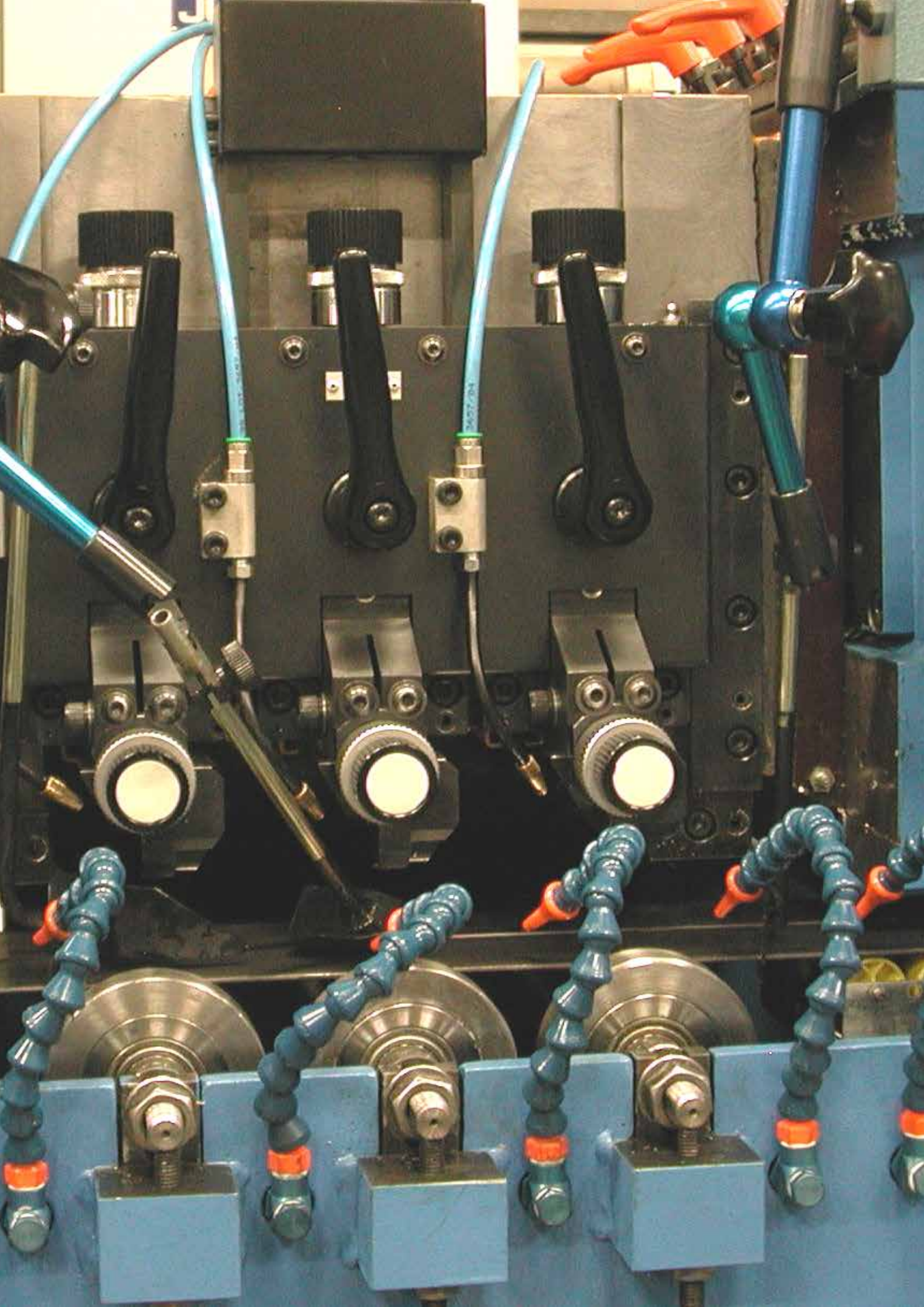
Strip surface treatment with three tools  
Picture on the right: TRI-NU oil grooving machine

This is an ideal application of the JULIUS grooving system. Scarfing single or multiple layers of the coating from the surface optimizes the welding process.

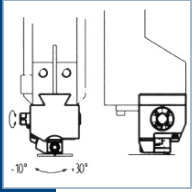
Tool positioning is adjustable horizontally, vertically and angle incline, therefore flexibly meeting any specification.

If the strip material is very hard or if a lot of material has to be removed from the top side of the strip edge, it is advisable to treat the strip edge vertically. In this case a grooving machine of the series TRI-NU is used.









# The Modular System

The Julius product range offers the modular series NU, DNU and TRI-NU as well as the groove dressing machine for the machining of the strip surface.

The machines of each series can be combined with elements of modular strip edge trimming.

Due to a compact construction method, the machines of the modular series can easily be integrated into existing lines or even retrofitted later as an extension.

## Series NU



Grooving machine of the series NU with one tool – here flanged at a TRI-NU strip edge trimming machine



Grooving machine of the series DNU U with two tools

With one tool the grooving machine of the series NU removes a layer of coating from the strip surface. The tool can be adjusted vertically and horizontally.

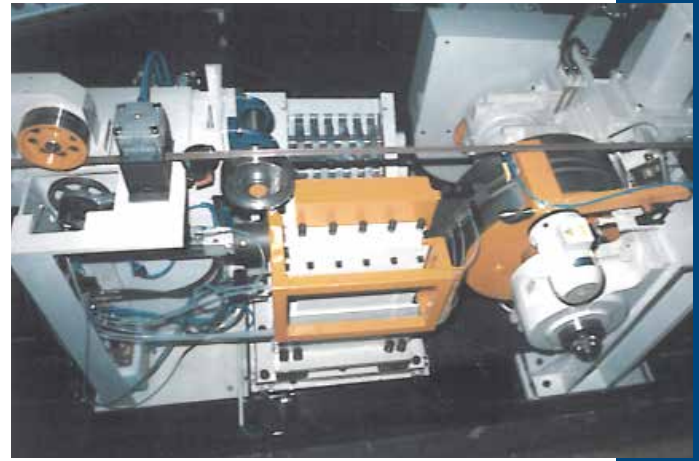
The grooving machine of the series DNU is composed of two grooving modules installed serially.

The DNU U machines two layers of coating from the bottom side of the strip. This unit is used when the groove has to be on the bottom side of the strip.

Technical data	NU
Groove width:	3 mm (0.12")
Groove depth:	0,1–0,2 mm (0–0,001")
N° of grooves:	1/machine
Speed:	100 m/min (393.7"/min)
Strip material:	all machinable material
Options:	lubrication system special tool holders swarf blow process swarf guiding system



TRI-NU grooving machine with three tools



Groove dressing machine with seven tools

## Series TRI-NU

The grooving machine TRI-NU has three tools arranged staggered or simultaneous. The flexibility of adjustments on three axes and the angle makes it possible to have any groove wider and/or deeper.

Up to three grooves can be drawn into the strip surface with a max. distance of 10 mm (0.39") (in case of three grooves) or 20 mm (0.79") (in case of two grooves).

A basic oil grooving line is composed of a decoiler, a recoiler and a TRI-NU grooving machine. The line can be completed by a flat levelling machine, a vertical levelling machine, a brushing machine and different modules of strip edge trimming.

- Max. groove width: 20 mm (0.79")
- Groove depth: 0,01–1 mm (0–0.04")
- 3 grooves/machine
- Speed: up to 100 m/min (393.7"/min)
- Strip material: all machinable material
- Options: lubrication system, special tool-holders, swarf blow process and swarf guiding systems

## Groove Dressing Machine

The groove dressing machine can accommodate up to seven tool stations for grooves up to 2.5 mm (2") deep and up to 40 mm (1.58") wide. Up to 16 grooves can be machined by using multi tooling.

- Max. groove width: 40 mm (1.58")
- Max. groove depth: 2,5 mm (2")
- Max. number of grooves/machine: 16
- Speed: up to 100 m/min (393.7"/min)
- Strip material: all machinable material
- Options: strip tension reduction for extreme strip cross sections, traverse winding and multicoil systems, flat and vertical levelling machines, strip contour thickness and width measuring systems, swarf removal systems, brushing machines



TRI-NU grooving line with decoiler, strip pull-in, two grooving machines, strip thickness measuring system and recoiler

# Multicoil, Traverse Winding, Strip Tension Technique

Thick and/or wide strips have a stable cross section and easily absorb high strip tension. Thin and/or narrow strips pose problems for recoiling or traverse winding. The strip tension can rise substantially based on prior processing steps.

Julius provides traverse winding systems for a wide range of strip widths and thicknesses as well as multicoil and strip tension regulation systems.



Traverse winding at the recoiler side: Due to a fixed spool guide a high exactitude of traversing is achieved. Picture on the right side: S-bridel, dancer and recoiler

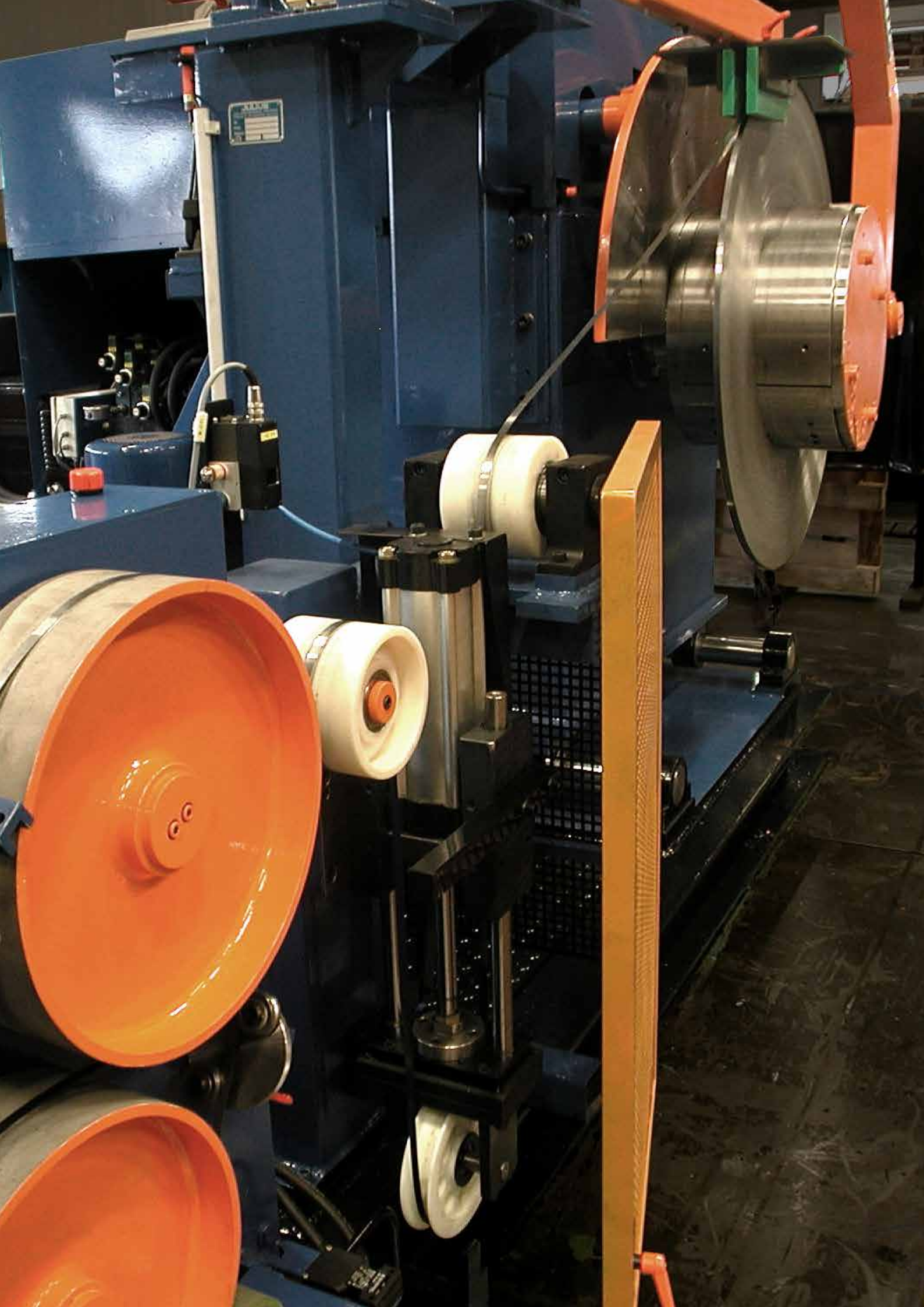
Strip regulation systems adapt the strip tension to the sensitive requirements of weak cross-sections.

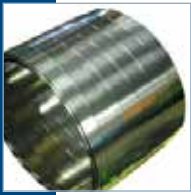
The strip tensions and mass-forces which occur in the line are disconnected by a dancer. Different S-bridel systems and auxiliary drives reduce the strip tension to a tolerable level.

In this way, a strip processing line can machine a much larger range of strip widths, thicknesses and qualities.

The effectiveness of the line is improved substantially.







# 

Julius offers traverse winding systems at the recoiler and the decoiler side. Thus, it is possible to run in three ways – either from coil to spool, or from multicoil to spool or from spool to spool.

Various traverse winding guides are proposed for different purposes.

The infinite variable spooling guide can be adjusted to different guide widths, therefore easily variable between different strip widths.

A fixed guide system is however recommended for weak cross sections.

The kinematic traverse winding guide keeps a constant distance to the coil optimizing in this way the accuracy of traverse winding.

- Spool width: 100–400 mm (3.94"–15.75") (or according to agreement)
- Spool weight: 1–2,7 t (or according to agreement)
- Strip width for spooling: 3–80 mm (0.12"–3.15")
- Strip material: all machinable material
- Fixed or variably adjustable traverse winding guides alternatively
- Strip tension regulation with S-bridel and dancer
- Two lateral guides for decoiling or with flanged adapter from cassettes
- Recoiling:
  - with and without lateral discs
  - on fixed core with and without lateral discs
  - from flanged adapter into cassettes

Traverse winding on the decoiler side: Thanks to a special strip guide and a dancer even weak strip cross-sections can be traverse wound, here from cassette with flanged adapter



Traverse rewinding of small strips with cassette and flanged adapter



Traverse rewinding of wide strips





CNC controlled strip edge trimming and oil grooving line with multicoil system

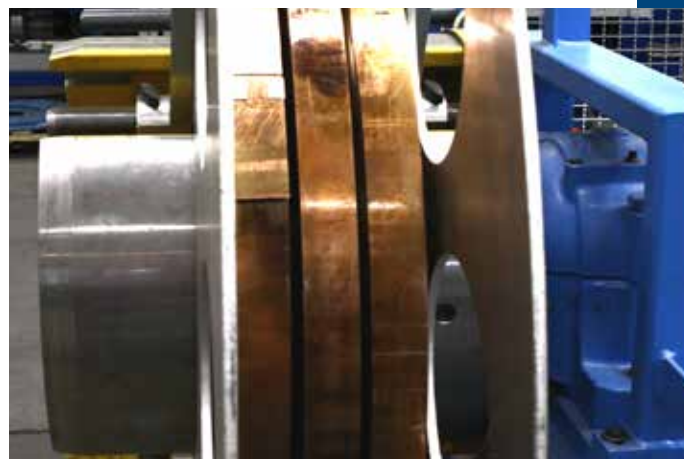
## Multicoil

With a multicoil system, several coils can be loaded and processed sequentially.

- Width of the slit strip packet: 250 mm (9.84") (or according to agreement)
- At the push of a button the slit strip packet positions coil by coil at the strip center line.
- Weight of the slit strip packet: up to 2,5 t (or according to agreement)



Turnstile



Decoiler with multicoil system



# Strip Tension Technique

Some operational treatment of the strip e. g. machining of complex contours or beveling, exerts excessive strip tension for safe recoiling of strip with weak cross sections.

If so, a S-bridel and a dancer will regulate the strip tension to a tolerable level.

Thus, even thin and small strips can be machined and subsequently traverse winded or recoiled to big diameters.

## S-bridel

The S-bridel either reduces the strip tension or elevates the traction during the recoiling process. The strip tension is reduced at  $\frac{1}{2}$  or even less.

By adding further drums, the  $F_z$  reduction or as the case may be the  $F_z$  increase is adapted correspondingly. An automatic slip control is integrated into the S-bridle.

When the job is to machine the edges of strips with weak cross sections or to traverse wind a strip, the use of the S-bridel is strongly recommended.

It is possible to machine even strips with sensitive coating as teflon for example thanks to the extended S-bridel. (see picture on the left side)

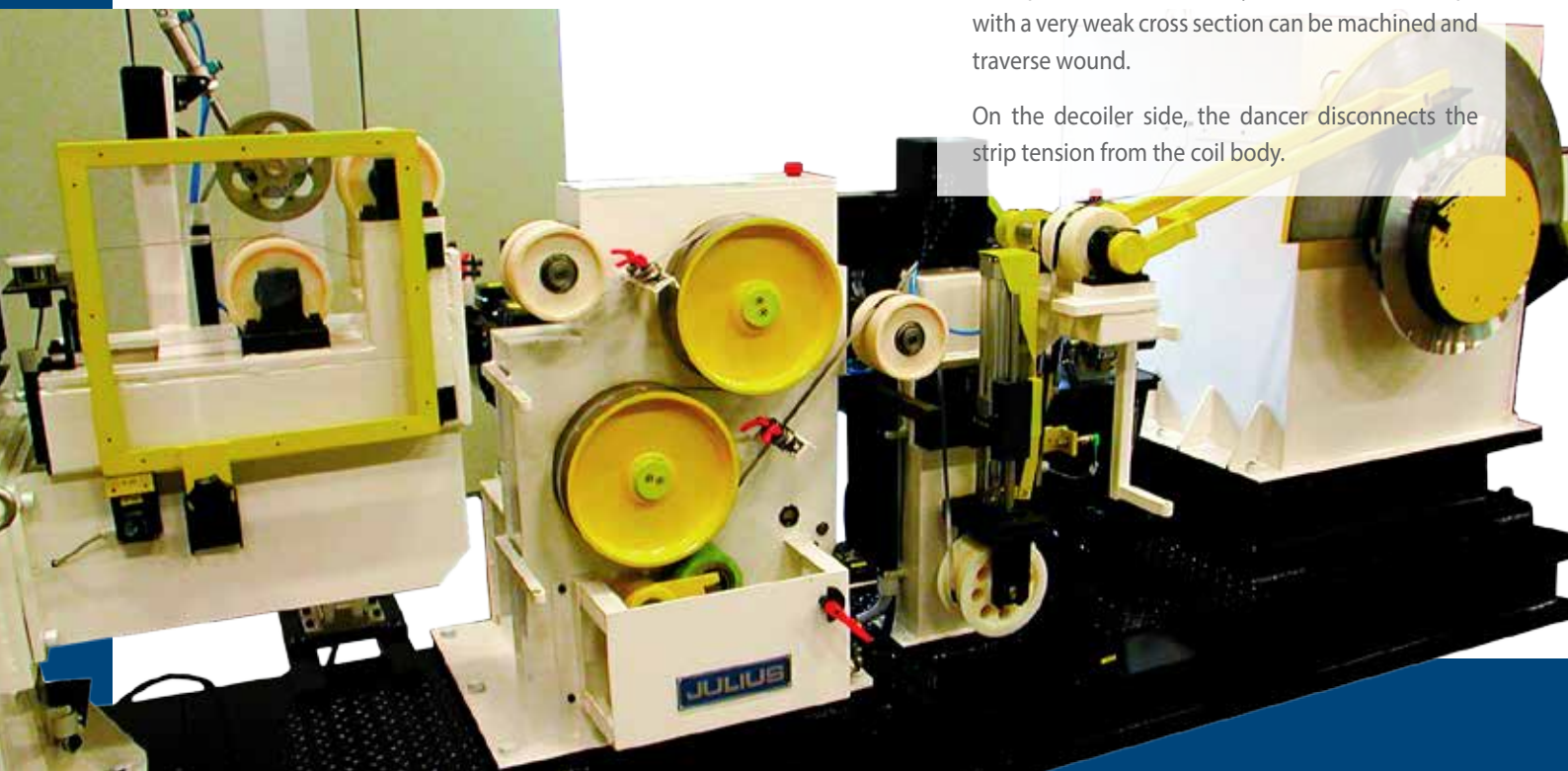


Extended S-bridel for the treatment of teflon coated strips

## Dancer

On the recoiler side, the dancer displaces the scope of strip tension reduction. By this means, even strips with a very weak cross section can be machined and traverse wound.

On the decoiler side, the dancer disconnects the strip tension from the coil body.



S-bridel and dancer at the recoiler side



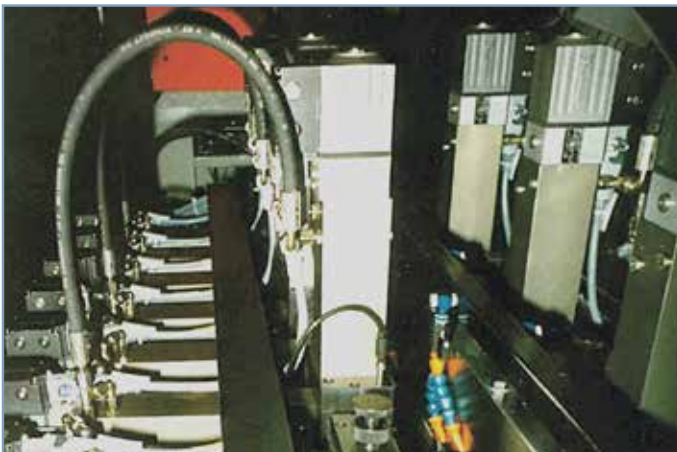
Decoiler with dancer and flat levelling machine

## Measuring Technique and CNC Technology

Julius offers strip edge and strip surface treatment by metal-cutting in a closed loop. Strip width, contour and residual wall thickness of the groove are measured and automatically restored to preset tolerance ranges.

Different measurement systems can be integrated into strip edge trimming and oil grooving lines to measure strip width and thickness, contour at the strip edge and residual wall thickness of the groove adjusting them to preset tolerances.

- Strip width and thickness measurement by laser systems
- Cameras for radii and angle condition
- Measurement systems connected to a closed loop with CNC control or installed as a monitoring system with signal alarm
- Measurement systems for the adjustment
- Automatic deviation marking



CNC controlled tools in combination with measuring technique



Strip width measurement integrated into a strip edge trimming line



# Levelling , Calibrating, Brushing

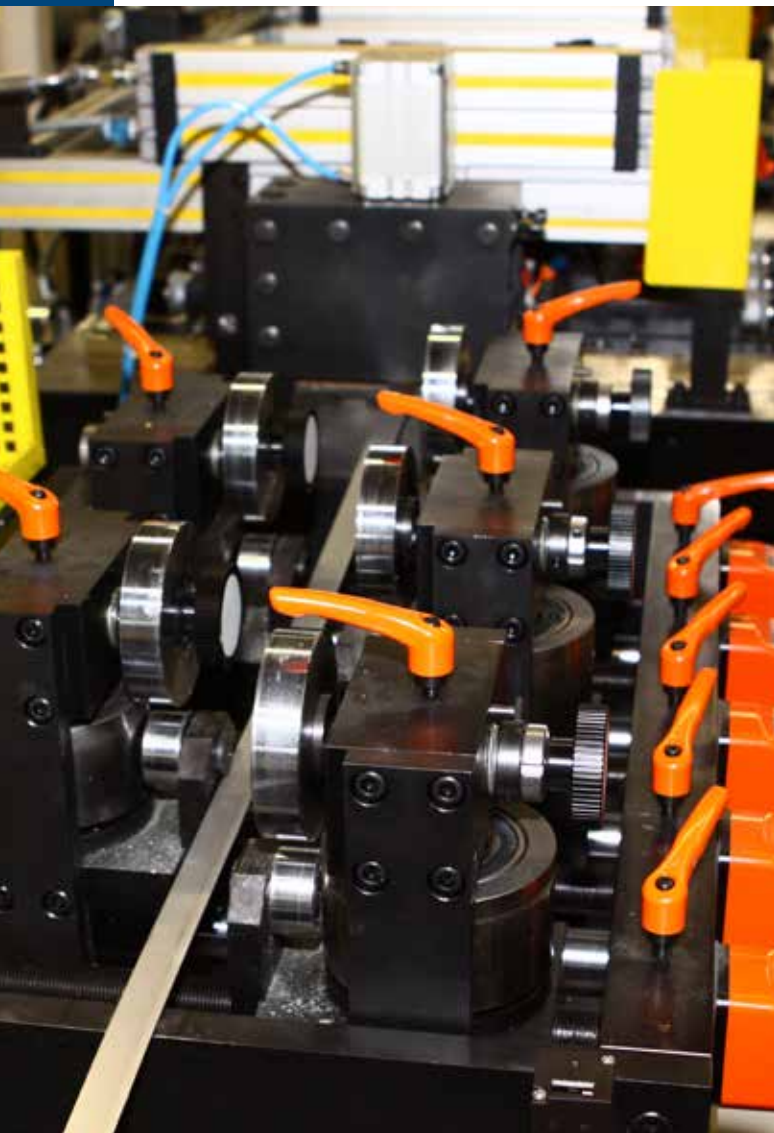
For numerous further operating processes (e.g. the machining of the edge and the surface) the strip must be flat and straight.

Bow and waviness must be adjusted to allow downstream operation to process optimally.

Julius provides different series for levelling, calibrating and cleaning metal strips.

All machines can be integrated into existing lines and be retrofitted at any time.

Vertical levelling machine of the series HDR



Flat levelling machine of the series DRAP



The vertical levelling machine of the series HDR eliminates the edge bow of strips. It is designed for narrow strips with an corresponding thickness/width ratio.

- Strip width: up to 50 mm (1.97") with a corresponding thickness/width ratio
- 5 sets of vertical levelling rolls
- 5 sets of positioning rolls



Vertical levelling machine of the series HDR

The flat levelling machine of the series DRAP is used for slight levelling of strip material. It reduces the waviness of the strip and removes the coil set.

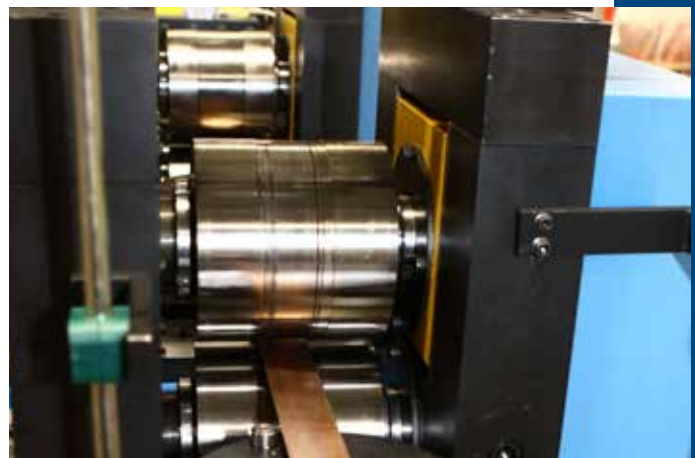
- Strip width: up to 1500 mm (59.1") as a standard
- Strip thickness: up to 6 mm (0.24")
- Levelling rolls-Ø: variable depending on the strip thickness
- Number of levelling rolls: variable
- Options: drive system, supporting rolls, pinch rolls, alligator system and wipers



Flat levelling machine type DR61 with alligator system

The aperture roller of the series FW is used to calibrate the strip thickness with an accuracy of  $\pm 0,005$  mm (0.0002").

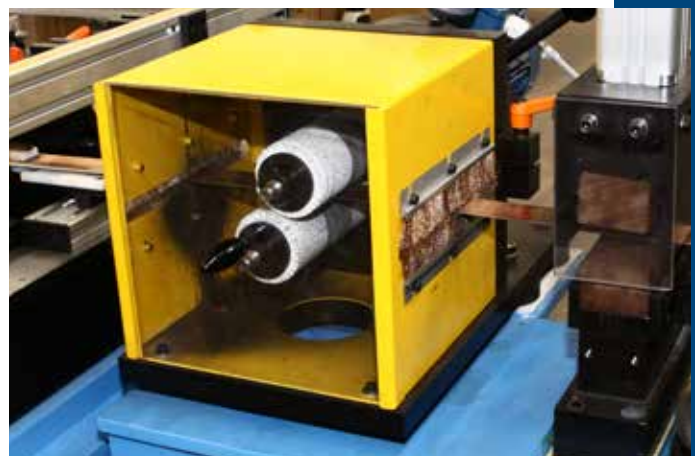
- Strip width: max. 50 mm (1.97")
- Strip thickness: max. 3 mm (0.12")
- Drive: depending on requirements



Aperture roller of the series FW

The brushing machine of the series BS removes dirt particles from the strip surface. Both brushes can be adjusted and exchanged easily.

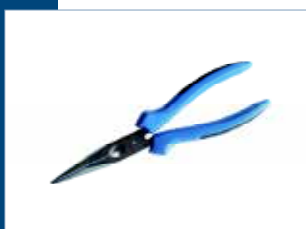
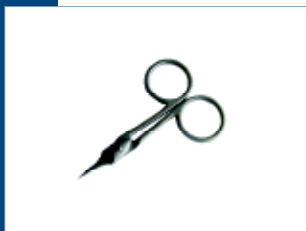
- Brush width: 70–500 mm (2.76"–19.69")
- Brush-Ø: 70–250 mm (2.76"–9.84")
- Number of brushes: 2
- Power: 0,5/0,75/1,5 kW



Brushing machine of the series BS



# Strong partners under one roof ...



The names Berger, Hauschild, Nell, Julius, Peters and Laschet stand for highest quality in the field of machining and refining metal coils and tools, e.g. household and machine blades, cutting tools, surgical instruments, cast or forged tools. Their in-house robotic capabilities provide solutions to automation and process integration tasks.

Trend-setting innovations in the fields of robotics and CNC machines for grinding and polishing tools, as well as state-of-the-art technology for strip edge trimming by metal-cutting and surface finishing, are available for coil stock and tools that demand high quality.

The first automatic grinding machines from Berger in 1957, the development of the Julius edge trimming machine in 1980, the first CNC controlled double-scallop polishing machine by Hauschild in 1987, the use of more than 300 robots for automating Berger grinding machines since 2000, as well as Nell's develop-

ment of the BSM 3000 CNC grinding machine for micro-grinding coil stock with camera control – all important milestones for the Group and key driving forces for the metalworking industry.

Thanks to a broad product line, the synergistic effects in our engineering, R&D and production departments, and a competent customer service team, the Berger Group provides complete solutions – particularly for custom requirements – all from a single source.

Heinz Berger Maschinenfabrik

Hauschild

August Nell jr.

Julius Maschinenbau

Werner Peters

LP – Laschet

... the Berger Group!



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