STRIP PROCESSING MACHINES

BY METAL-CUTTING

deburring | chamfering | oil grooving

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SCOPE OF APPLICATION

FOR STRIP EDGING

DOCTOR BLADES, TUBES AND SAW BLADES

Steel service centers

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, or shelves, 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.

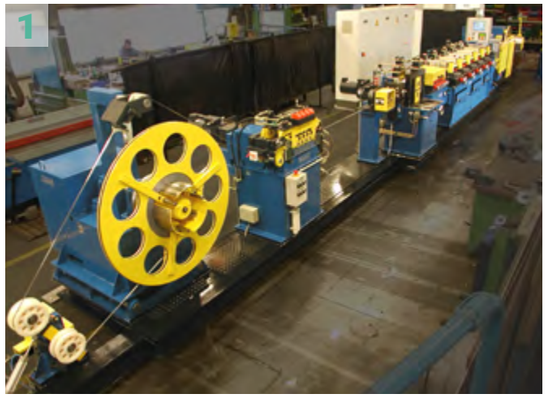
Strippers, cutting rules, doctor blades

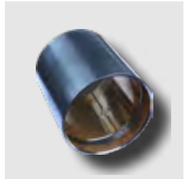
Strippers, cutting rules and doctor blades are products whose quality is determined by the condition of the strip edge.

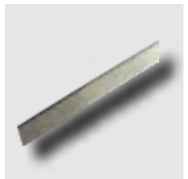
A lot of producers integrate strip edge trimming lines to realize a perfect strip edge and to optimize the strip width tolerances.

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.







Plain bearing bushes

Cost reduction is already achieved at 100 m/min by edge processing on the running strip. Five operations are carried out: Thickness and width calibration, streaking of two angled chamfers each at the top and bottom, drawing of oil grooves

It can be moved from coil to coil, from slit strip package to individual coil or - for long running times of the automatic punching and bending machine - from multi-coil to coil. Equipped with NC technology, the system electronically monitors all operations including multi-axis good/bad marking (picture 2).

Saw blades

The quality of the strip edge on the carrier strip as well as on the cutting strip is decisive for the quality of the end product. Here, modular strip edge processing systems are used, which remove the burr from the strip edge by cutting and process a right angle (picture 4).

Examples of use (pictures)

1. Strip edge trimming line for steel service centers (picture 1)
2. Strip edge trimming line for the production of plain bearing bushes (picture 2)
3. Strip edge trimming machine of the series DUO integrated into a tube welding line (picture 3)
4. Strip edge trimming line for the production of saw blades (picture 4)

SCOPE OF APPLICATION

FOR STRIP EDGING

OPTIMIZATION OF TUBE WELD SEAM

General aspects

The basic strip material is usually longitudinally split strip (slit strip). Only <35% of the edges are really cleanly cut, the larger portion is broken off and is not clean, i.e. irregular in terms of straightness, angle and structure, and coatings may interfere with welding.

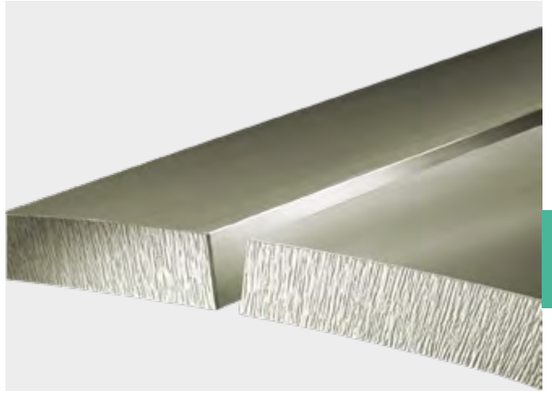
Round profiling

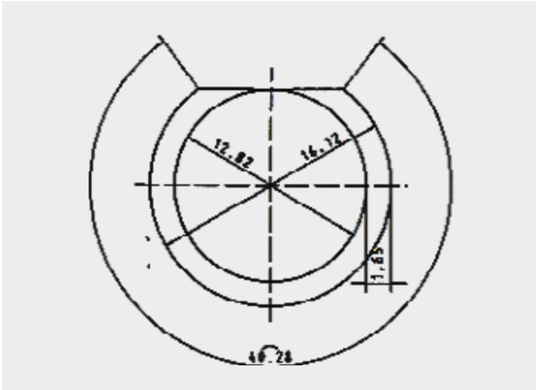
The thicker the wall thickness and the smaller the tube diameter, the greater the V-angle at which the round pipe edges meet. The cross section to be welded that collides with each other becomes smaller and smaller and thus the area to be liquefied necessarily larger.

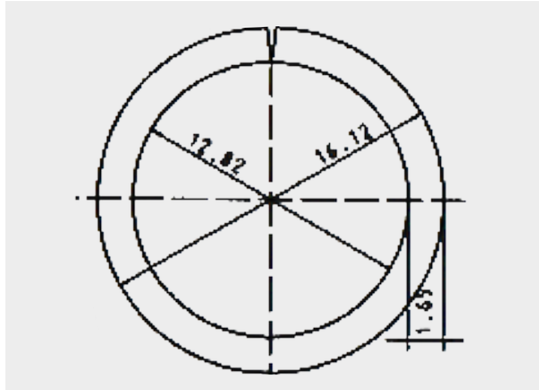
As a result, the upsetting zone and the upsetting force occurring immediately after welding become larger. This results in ever greater weld seam elevations, which have to be planed off at the top and inside surface in a very time-consuming process.

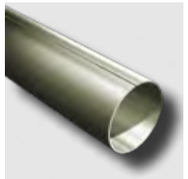
Welding methods

The welding methods commonly used up to now, such as TIG/MIG/high frequency/induction etc. can cope with the problem, but with the disadvantages mentioned above. The energy input must also be correspondingly large and/or the welding speed must be adjusted downwards accordingly.









Modern welding processes, such as laser welding, which is the only way to weld special materials today, require higher edge and contour qualities, otherwise they become uneconomical, e.g. due to high reject rates.

Advantages of strip edge trimming

The strip edges become evenly clean and straight and also have their inner structure on the surface.

The edges are machined at an adjustable angle so that the V-angle for welding is reduced and coatings on the strip edge are removed.

The colliding cross section of the edges is maximized, so that a smaller volume of material has to be liquefied.

- less energy consumption or higher welding speed
- less upsetting and thus less weld seam superelevation
- less surface and inner surface planing
- minimized reject rate
- material savings, because less strip width addition is required due to less upsetting
- more homogeneous weld structure = quality improvement
- use of special welding processes (e.g. laser) possible
- better form quality due to lower upsetting forces
- more constant strip width by narrowing the width tolerance
- greater constancy of upsetting and thus of weld seam superelevation
- covering-free edges

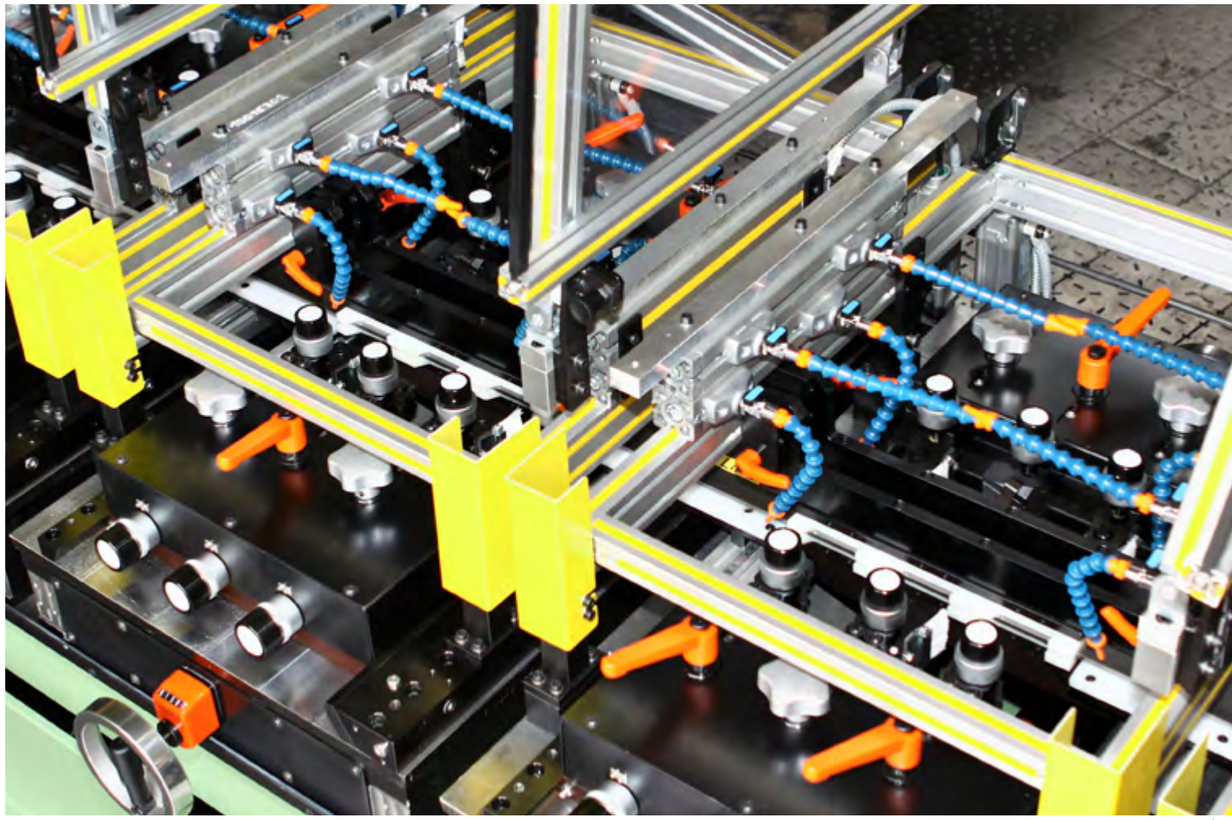
STRIP EDGING

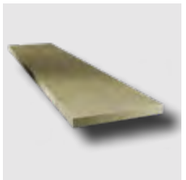
BY METAL-CUTTING

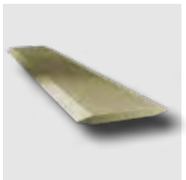
FROM CUTTING EDGE TO FUNCTIONAL EDGE

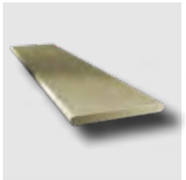
Strip processing by metal-cutting

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









When machining strip edges with the JULIUS system, the burr can be removed from the strip edge.

This means that no burrs can come off during further work processes such as punching or profiling.

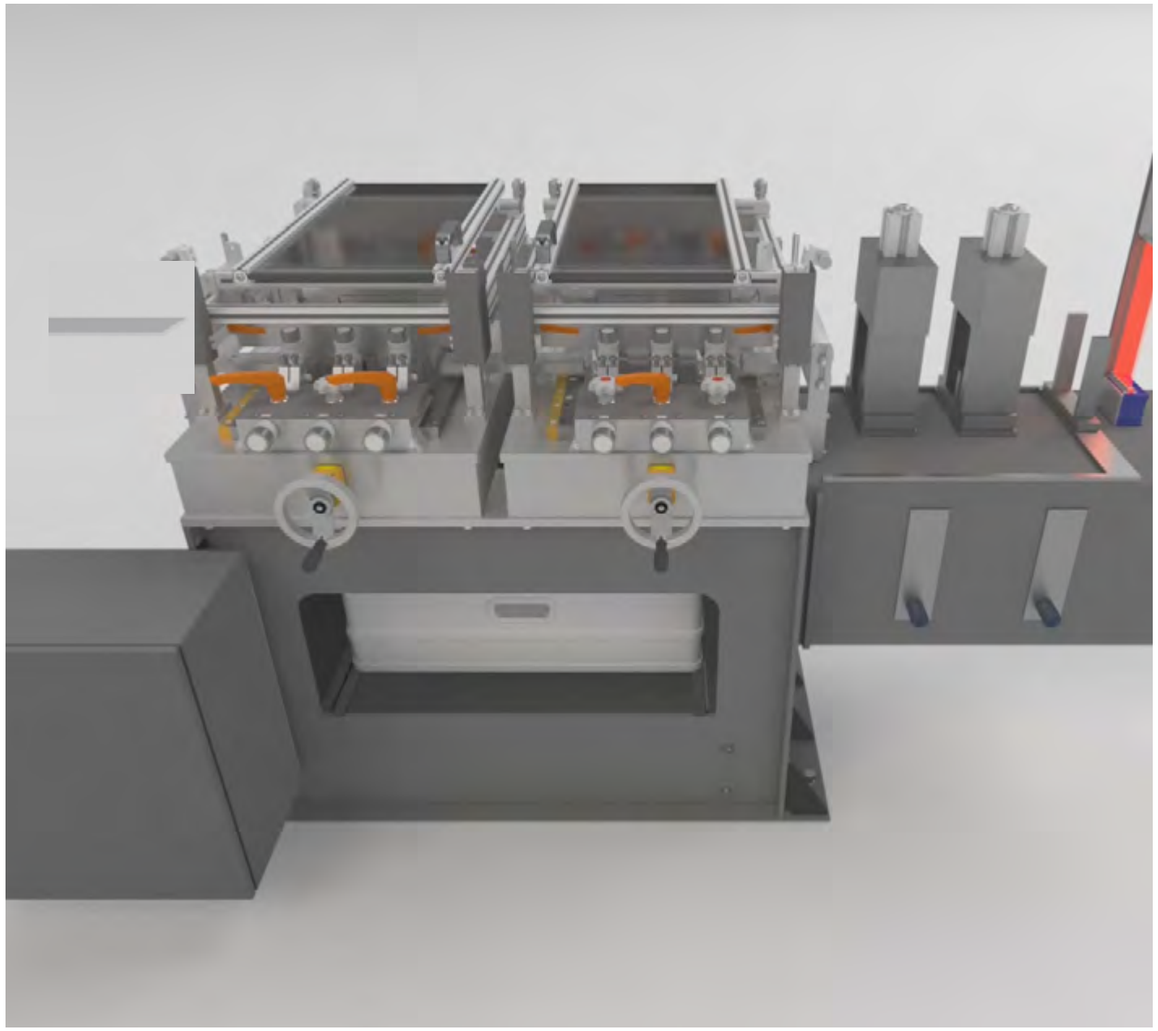
In contrast to rolling, the material is not changed during strip edge trimming by metal-cutting. The structure of the material surface is retained.

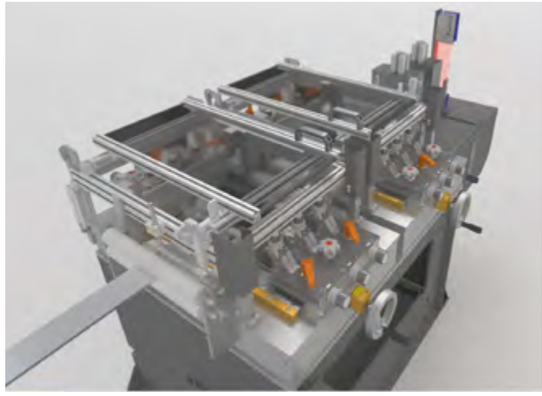
Through precise adjustment of the tools and a well thought-out system of broaching arrangement, even complex chamfers and contours are machined to the strip edge without affecting the surface structure.

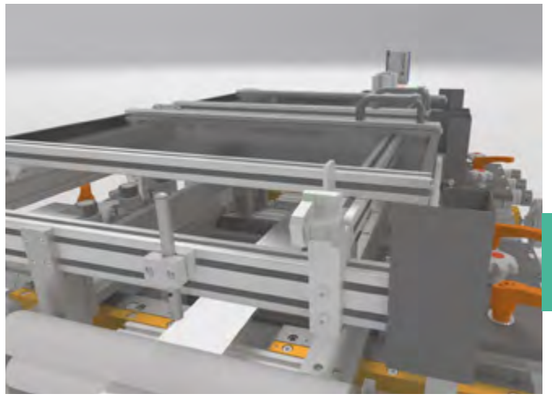
The cut edge becomes a functional edge!

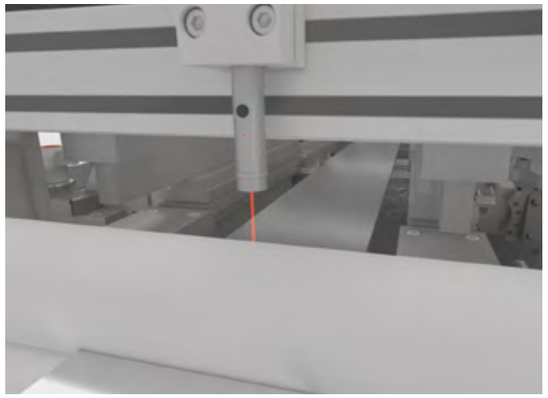
STRIP EDGE TRIMMING BY METAL-CUTTING

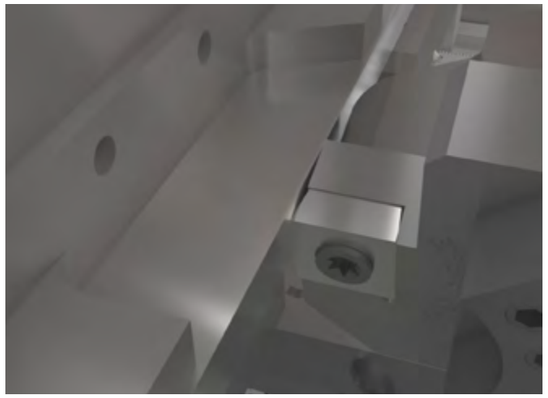
The strip edge trimming process ensures that the edges of the strips are uniformly clean, straight and true to size. They also retain their inner structure on the surface.

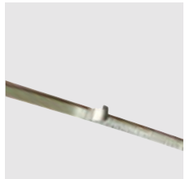












The strip is pulled through the edge processing machine with the aid of winders and unwinders or driving rollers.

The centering of the rollers is reset to 0 with a reset ruler at the inlet and outlet of the machine. The tool slides are adjusted hydraulically.

The edges are machined at an adjustable angle so that coatings can be removed and special contours can be achieved. For certain applications, the tools can be re-ajusted during the process.

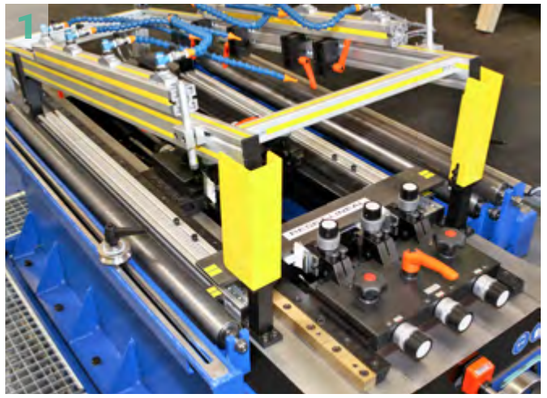
The swarf produced is removed by scrap conveyor systems.

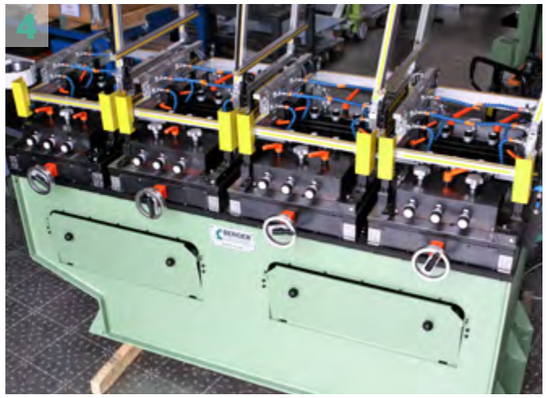
The strip width is measured at the output of the machine.

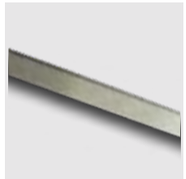
STRIP EDGE TRIMMING
THE MODULAR SYSTEM

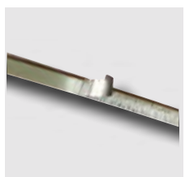
The edge trimming units can be combined flexibly – e.g. with moduls of strip surface treatment – and expanded or retrofitted any time due to the modular concept. A machine with one working station (UNO) can be extended to a machine with two (DUO) or more stations.

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.

- strip width max. 2.000 mm (78.74")
- strip thickness 0,1–8 mm (0.0039–0.32")
- contours: different contours
- speed: up to 300 m/min (984 ft/min)
- strip material: all kind of machinable material
- automatic opening
- hydraulic and pneumatic lifting
- lubricating and cooling systems for tooling

Dimensions of the machines (W/L)[1]

UNO:	700 mm × 760 mm	(27.6" × 29.9")
DUO:	700 mm × 1.360 mm	(27.6" × 53.5")
TRIO:	700 mm × 1.900 mm	(27.6" × 77.2")
QUATTRO:	700 mm × 2.500 mm	(27.6" × 98.4")
QUINTO:	700 mm × 3.100 mm	(27.6" × 122")

Examples of use (pictures)

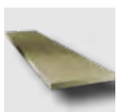
1. UNO: one working station (picture 1)
2. DUO: two working stations (picture 2)
3. TRIO: three working stations (picture 3)
4. QUATTRO: four working stations (picture 4)
5. QUINTO: five working stations (picture p. 12)

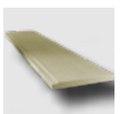
1 The machine width corresponds to a max. strip width of 80 mm (3.15"). The larger the strips are the wider the machine will be. The height of the machine is adapted to the strip running height.

deburring

different bevels and contours

round edges


90°


coating-free edges

THE MODULAR SYSTEM – OPTIONS

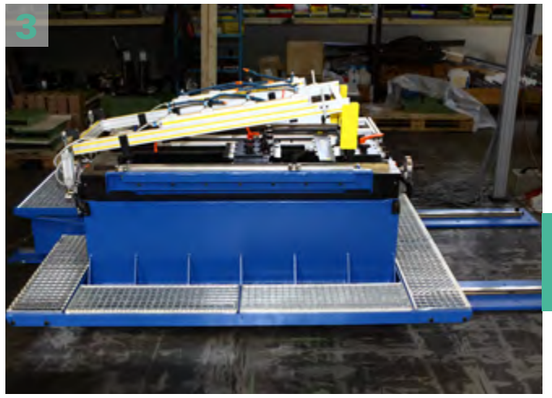
Due to the modular system, modules can be integrated subsequently.

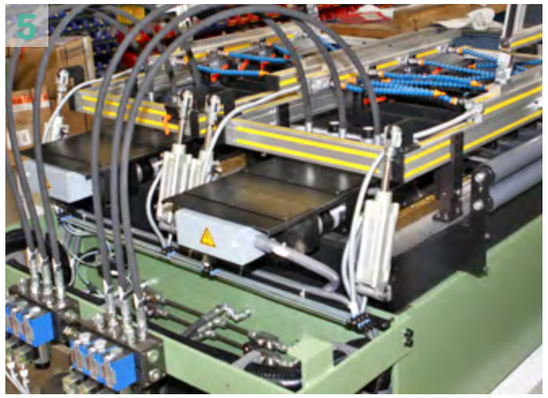
Options are available as follows:

- TRI-Step system
- rail system
- roller cage
- pinch rolls
- swarf funnel / swarf removal system
- swarf shredder
- swarf guiding plates
- swarf blowing system
- cooling and lubricating system
- measuring systems

Examples of use (pictures)

1. Strip edging line with swarf removal by swarf conveyor belt and swarf funnel integrated into a strip edging machine (picture 1)
2. DUO strip edging machine with roller cage for loop operation (picture 2)
3. Rail system for sliding the processing machine into and out of the production line (picture 3)
4. UNO strip edging machine with pinch rolls (picture 4)
5. DUO strip edging machine with TRISTEP system for motor adjustment of the backward tools (picture 5)





Loop operation

A roller cage is flanged to the strip edge trimming machine, which supports the strip when it comes out of the loop. This protects the tape from bending.

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

Swarf removal

A swarf funnel can be integrated into a strip edge trimming machine.

The swarfs are fed into the shredder through a swarf funnel. The shredder pulls in the swarf, shreds them and they fall onto a conveyer belt for removal.

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.

Motor tool adjustment

The TRI-Step system 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").

THE MODULAR SYSTEM – LINES

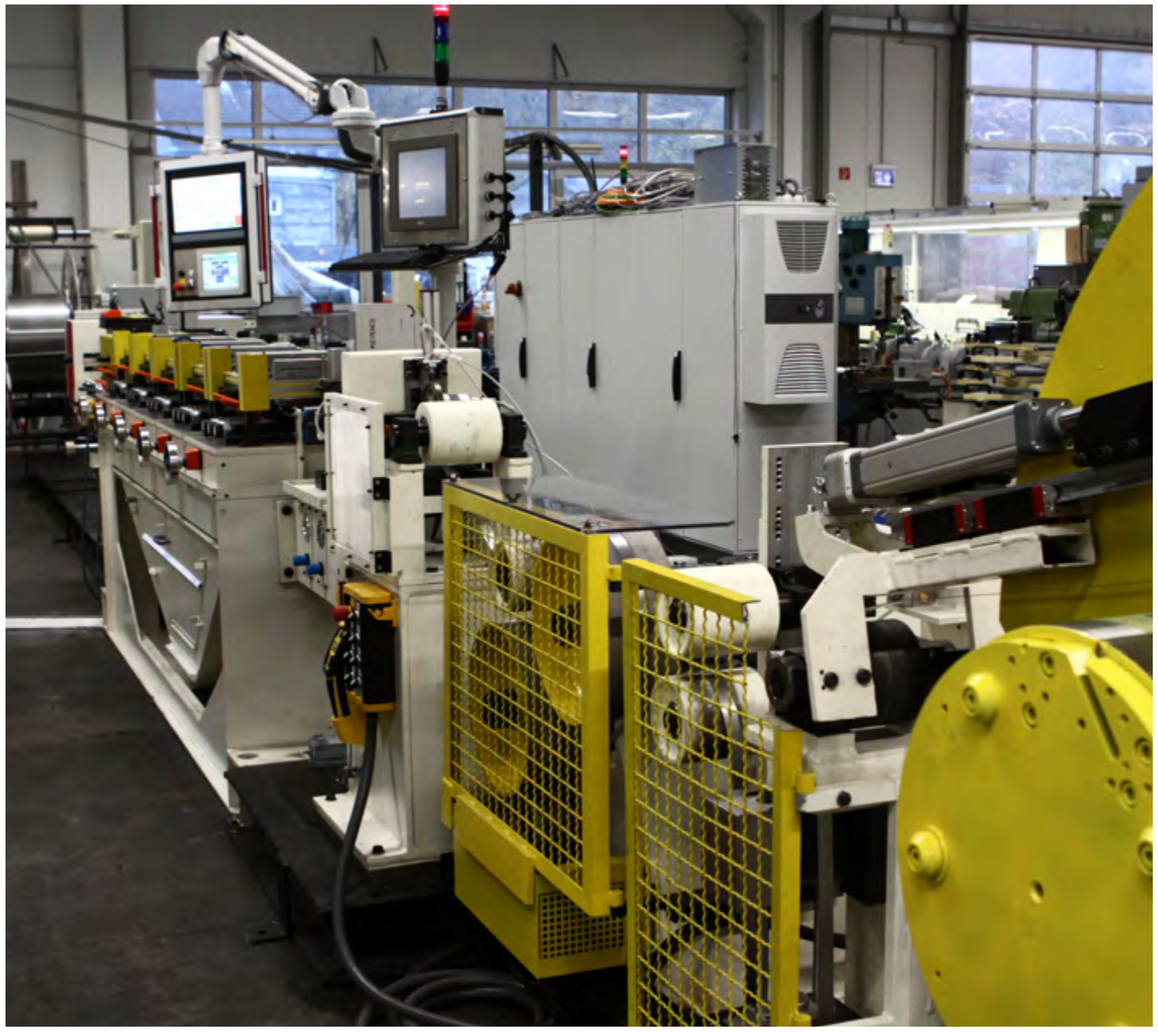
Modular strip edging

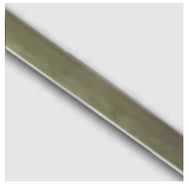
The modular concept allows different modules to be integrated into a full operational line.

It facilitates other modules to be added later if and when demand changes.

The following modules can be integrated into a strip processing line:

- strip edge trimming machines
- strip surface treatment machines
- traverse winding and multi-coil systems
- strip tension technique
- levelling machines
- measuring devices





Example of a modular strip edge trimming line (drawing here above) with (f. l. t. r.):

- decoiler with strip tension technique and multi-coil system
- brushing machine
- flat levelling machine
- UNO deburring device with brushing machine and disk brake
- two calibrating rolls
- vertical levelling machine
- QUINTO strip edge trimming machine
- stripper
- speed measurement
- S-block and dancer
- pneumatical guiding arm
- recoiler with traverse winding system
- pressing arm and turnstile

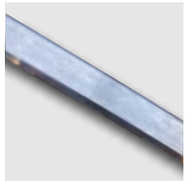
STRIP EDGING BY METAL-CUTTING FOR HEAVY-DUTY APPLICATIONS

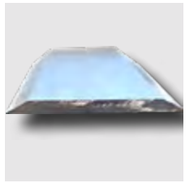
With large swarf removal cross-sections and high performance, the stress during machining of the strip edges is very high.

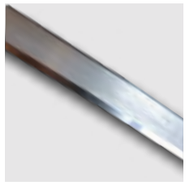
For this case, the Berger Group has developed the strip edge trimming machines of the BHR/S series.

They are designed for processing under high loads with high material removal.

While maintaining the most precise tolerance values, they can also work a complex contour with wide chamfers on thick and/or hard strips.







A new concept of support arrangement has optimized the swarf removal. It is now possible to work with a thick swarf and eliminate a maximum of material in one pass.

The arrangement of the hydraulic clamping in the guide rails on both sides and the use of additional cylinders have increased the capacity so that the machine can work vibration-free even under high loads.

- strip width: max. 2.000 mm (78.74")
- strip thickness: 0,15–8 mm (0.0059"–0.32")
- contours: all contours/chamfers
- speed: up to 300 m/min (984 ft/min)
- strip material: all machinable materials

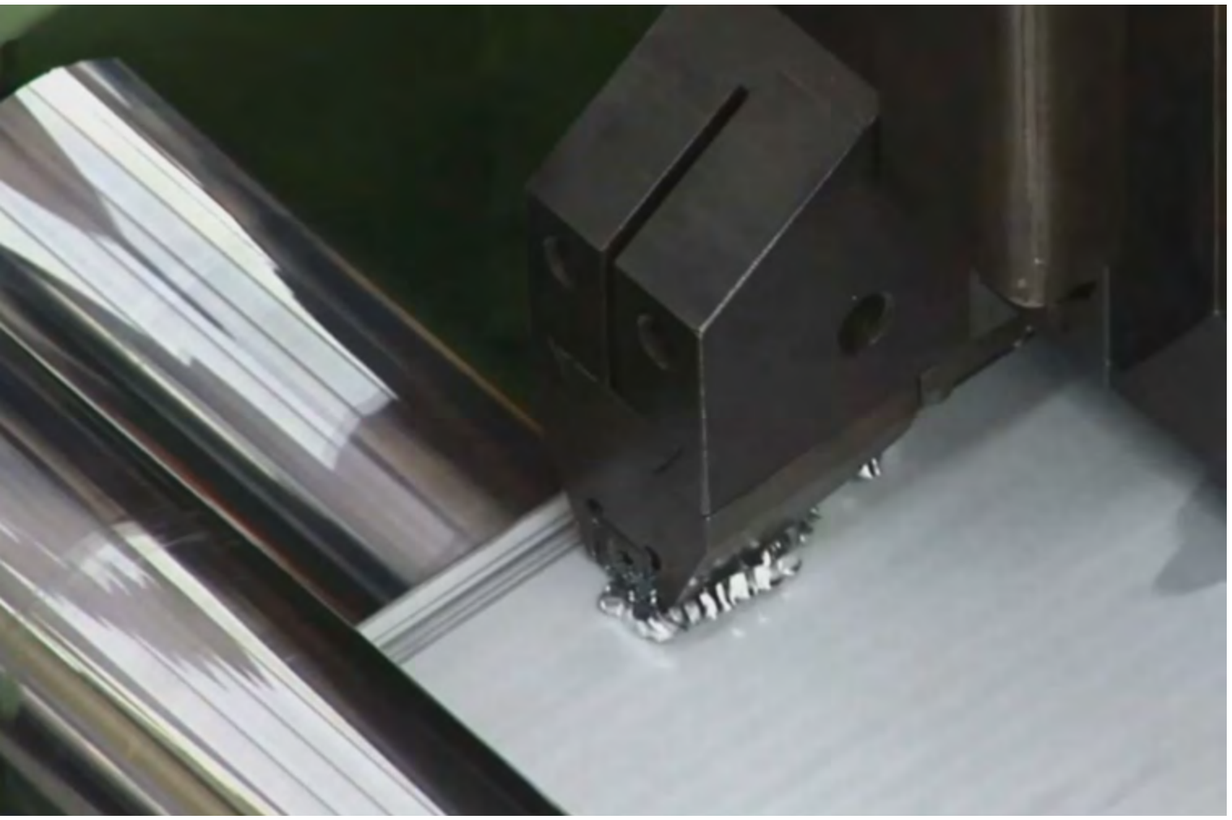
STRIP SURFACE MACHINING

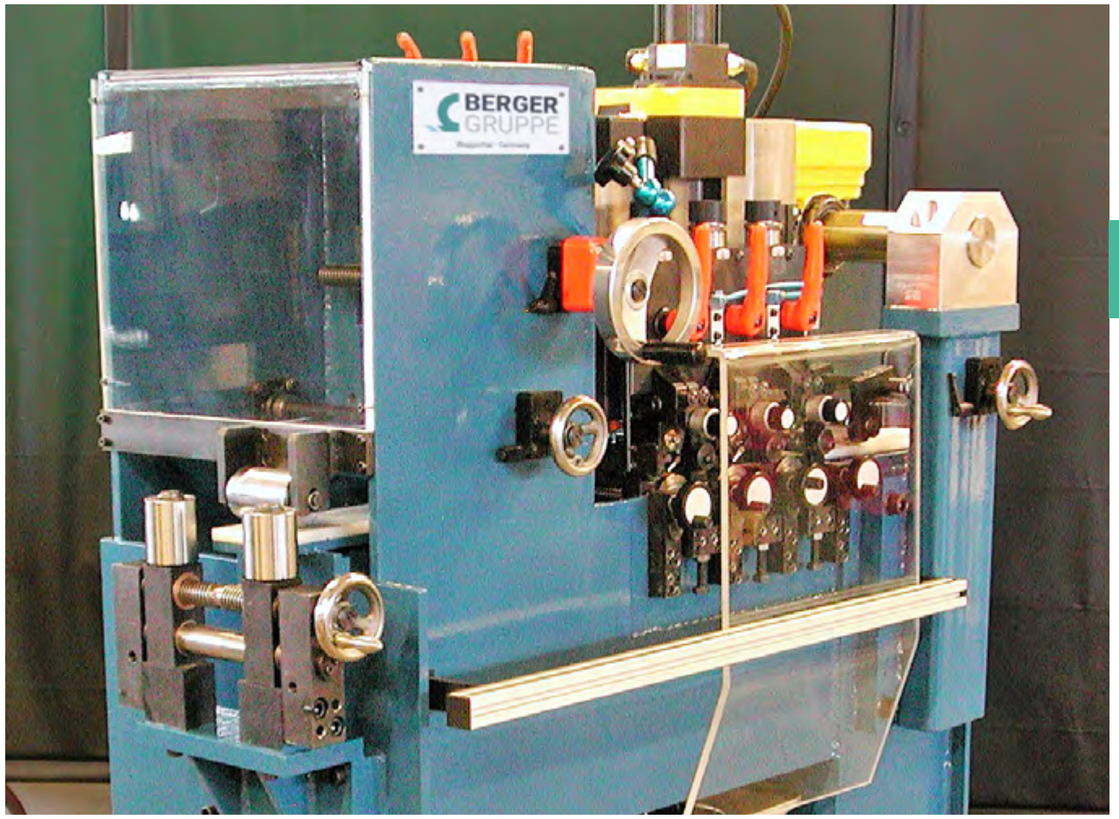
BY METAL-CUTTING

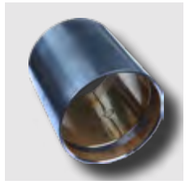
OIL GROOVING OF STRIP SURFACES

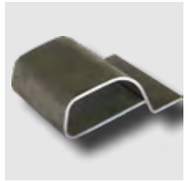
Metal-cutting machining

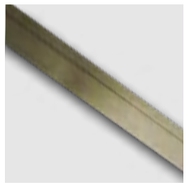
Some operating processes require both an edge and a surface machining before transferring the strip down-stream for additional processing.











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.

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.

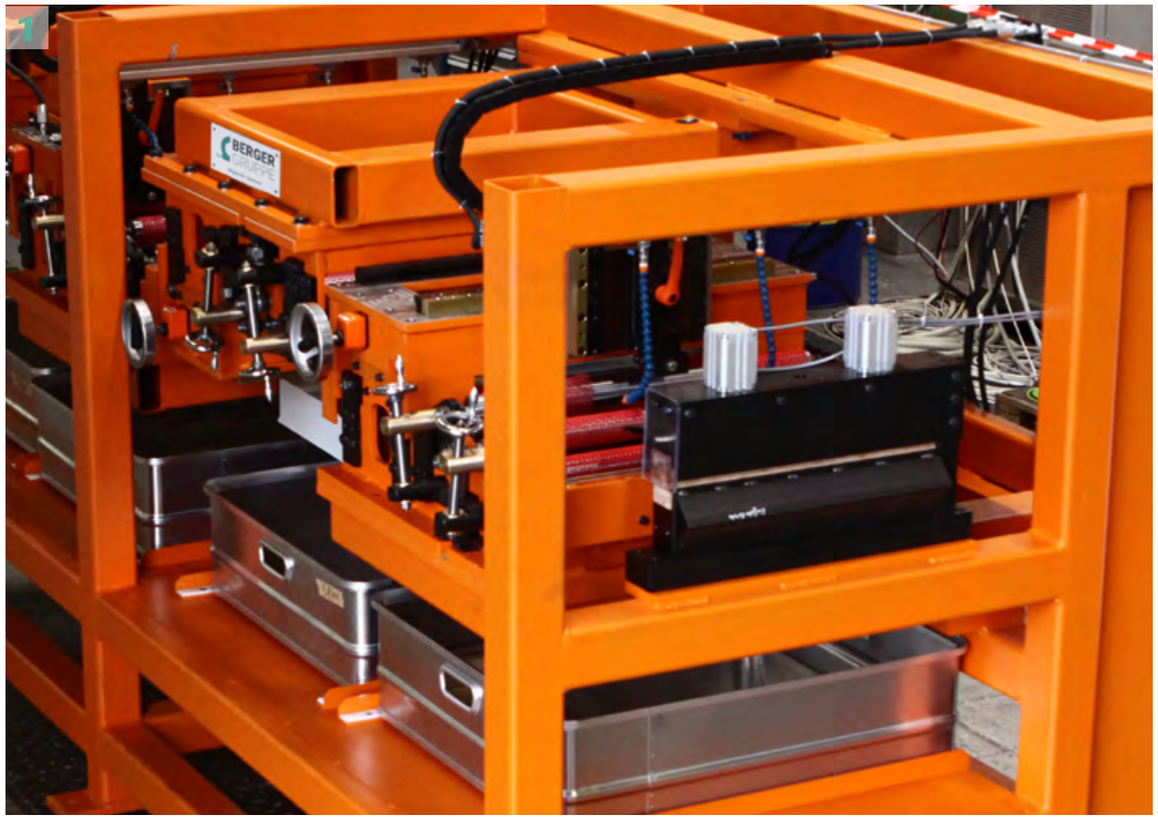
If the strip material is very hard or if a lot of material has to be removed from the top side of the strip edge, it is advisable to treat the strip edge vertically. In this case a grooving machine of the series TRINU is used.

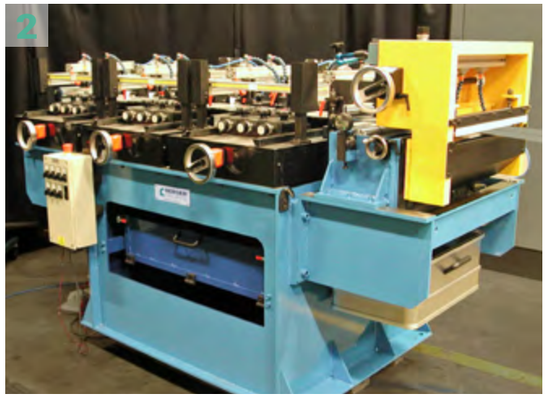
STRIP SURFACE MACHINING
THE MODULAR SYSTEM

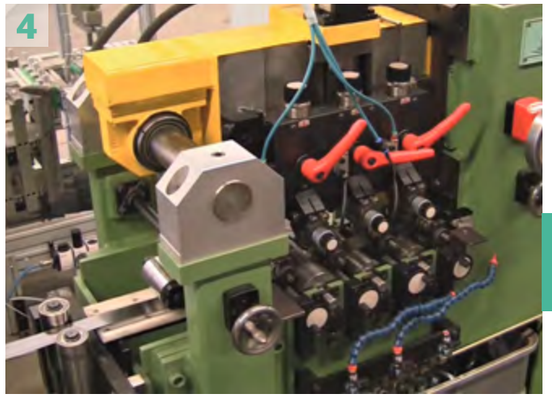
The Berger Gruppe offers various modular series for machining the strip surface. Thanks to the modular design, the machines can be combined with modules for strip edge processing and/or integrated into existing lines – even retrospectively.

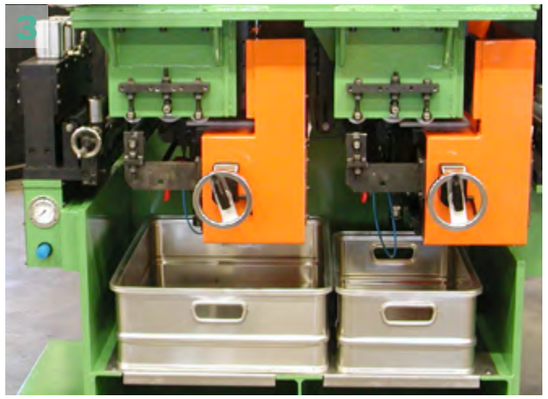
Examples of use (pictures)

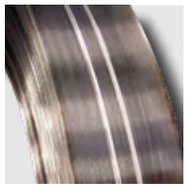
1. DNU/DNU/U/S grooving machine for the heavy-duty applications. The grooving machine consists of g. The grooving machine consists of a total of four work stations, with two stations processing the strip from above and two from below. (picture 1).
2. NU grooving machine flanged at a strip edge trimming machine of the series TRIO (picture 2)
3. DNU/U grooving machine for the machining from below with two tools (picture 3)
4. TRINU grooving machine for strip machining with three tools (picture 4)
5. Strip grooving line with TRINU two grooving machines (picture 5)

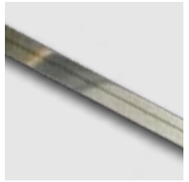












Series NU

The grooving machine of the NU series uses one tool to remove a layer of coating from the strip surface. The tool is vertically and horizontally adjustable.

Depending on requirements, the grooving machine can be configured so that the strip is machined from below (NU/U series).

The modular design of the NU series allows the grooving machine to be extended from one to two workstations (DNU series).

The NU/S series has been designed for heavy-duty machining with high material removal.

- groove width: 3 mm (0.12") with NU
  12 mm (0.47") with NU/S
- groove depth: 0,1–0,2 mm (0.004"–0.008")
- N° of grooves: 1/machine
- speed: up to 300 m (984 ft)/min
- strip material: all machinable material
- options: lubrication system, special tool holders, swarf blow process, swarf guiding system

Series TRINU

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. In a strip processing line, the grooving machine can be combined with strip edge trimming modules.

- max. groove width: 20 mm (0.79")
- groove depth: 0,01–1 mm (0–0.04")
- 3 grooves/machine
- speed: up to 300 m/min (984 ft/min)
- strip material: all machinable material
- options: lubrication system, special tool-holders, swarf blow process, swarf guiding systems

WINDING TECHNIQUE

FOR STRIP PROCESSING LINES

MULTI-COIL
TRAVERSE WINDING
STRIP TENSION TECHNIQUE

In combination with strip edge trimming, the Berger Group offers winding systems for a wide range of strip widths and thicknesses as well as multi-coil and strip tension systems.

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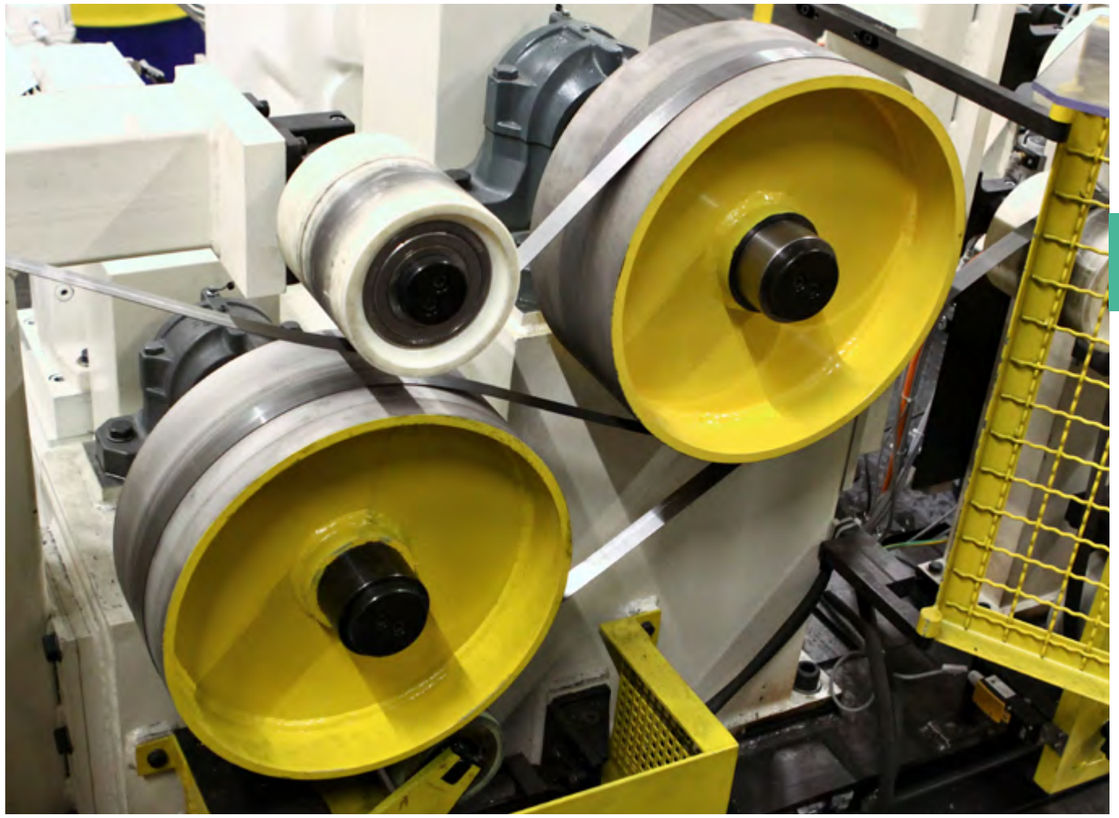


Thick and/or wide strips have a stable cross section and easily absorb high strip tension.

Thin and/or narrow strips pose problems for recoiling or traverse winding. The strip tension can rise substantially based on prior processing steps.

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-block 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.

TRAVERSE WINDING SYSTEMS FOR STRIP PROCESSING LINES

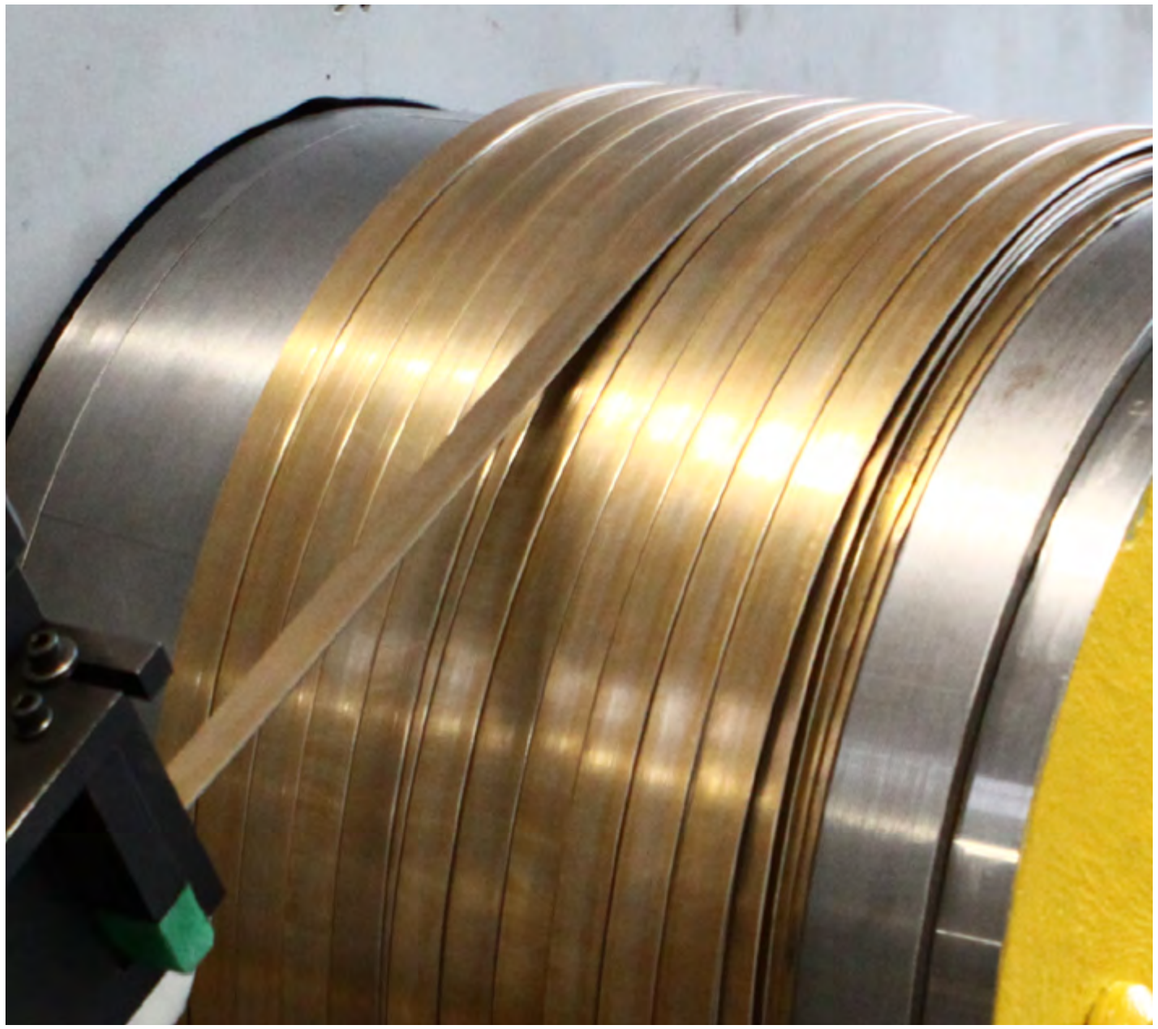
Traverse winding at re- and decoiler

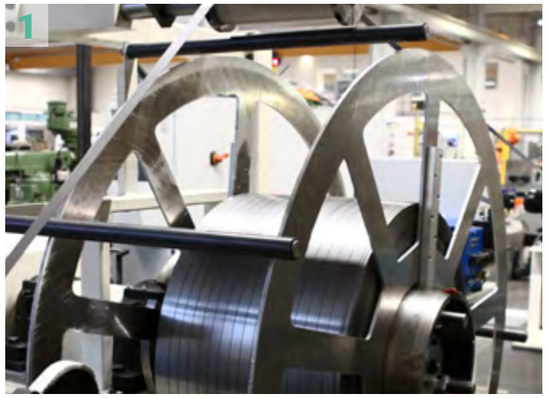
The Berger Gruppe offers traverse winding systems at the recoiler and the decoiler side. Thus, it is possible to run in three ways:

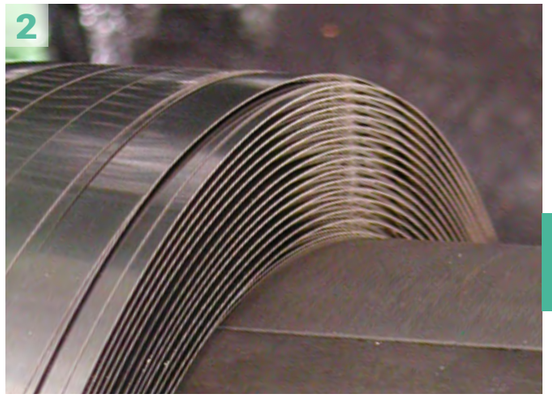
- from coil to spool
- from multi-coil to spool
- from spool to spool

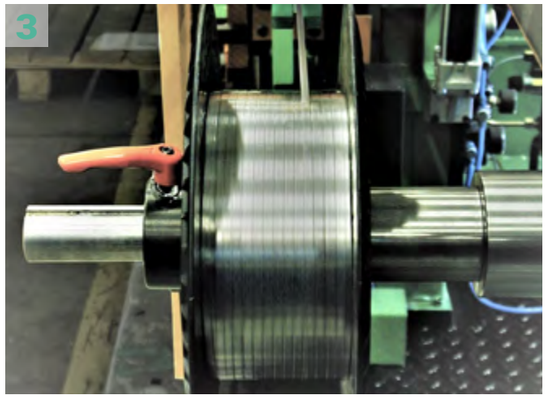
The infinite variable spooling guide can be adjusted to different guide widths, therefore easily variable between different strip widths.

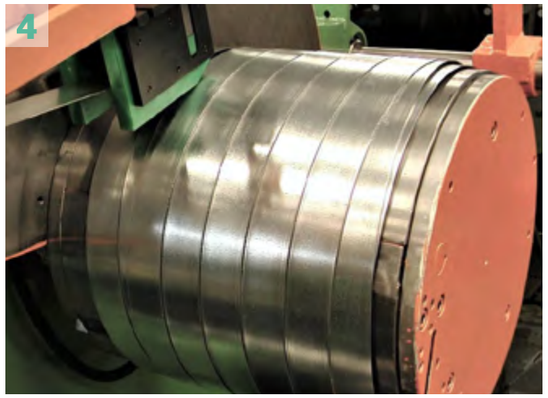
A fixed guide system is however recommended for weak cross sections. The kinematic traverse winding guide keeps a constant distance to the coil optimizing in this way the accuracy of traverse winding.

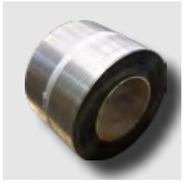


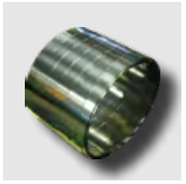












- spool width: 100–400 mm (3.94"–15.75") (or according to agreement)
- spool weight: 1–2,7 t (or according to agreement)
- strip width for spooling: 3–80 mm (0.12"–3.15")
- strip material: all machinable material
- fixed or variably adjustable traverse winding guides alternatively
- strip tension regulation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

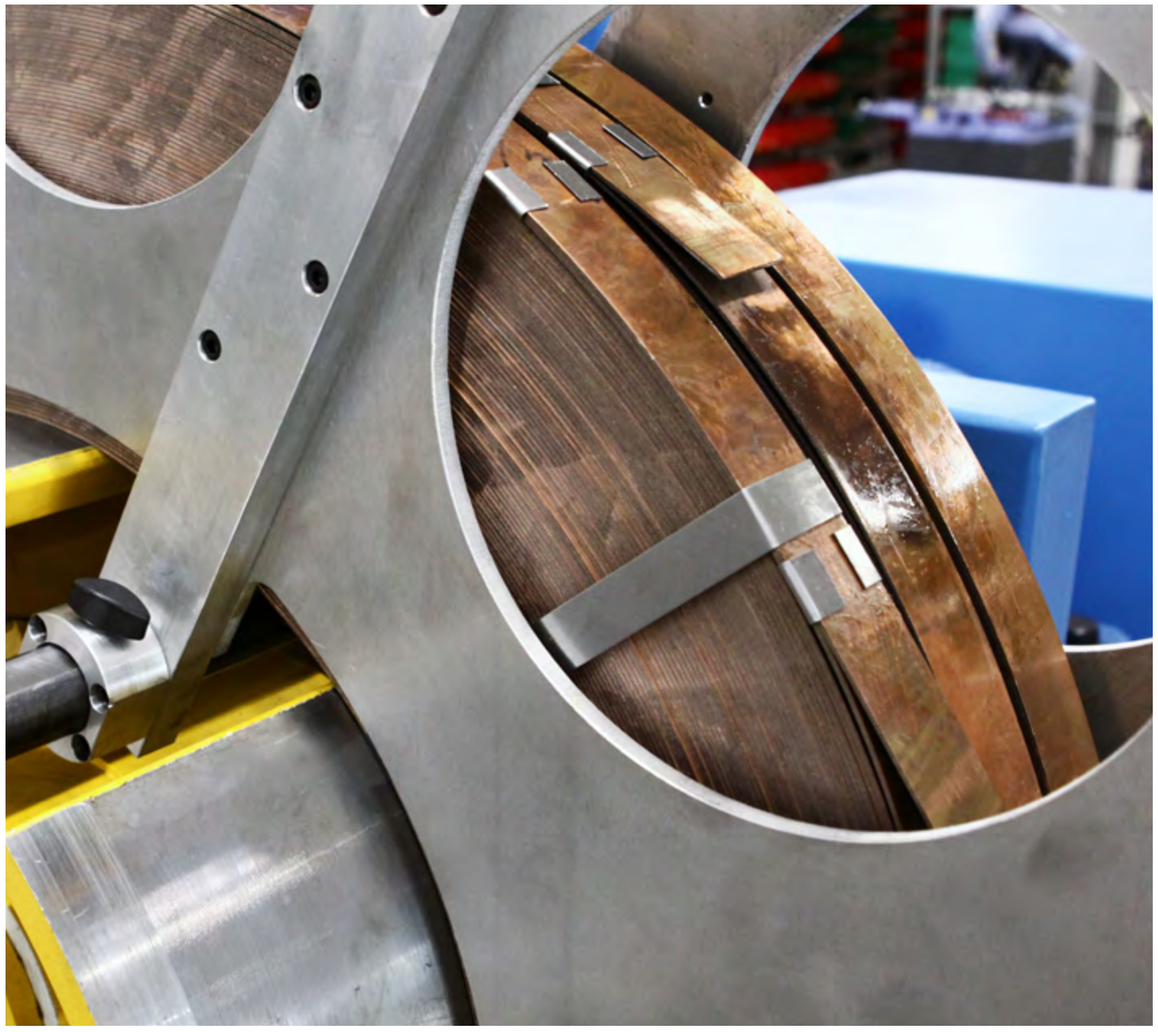
Examples of use (pictures)

1. Decoiling of metal strips with weak cross-sections via specially developed strip guide, strip tension layer dancer and side discs (picture 1)
2. Side quality and traverse accuracy during spooling (picture 2)
3. Traverse winding of narrow strips with cassette and flange adapter (picture 3)
4. Traverse winding of wide strips (picture 4)

MULTI-COIL
FOR STRIP PROCESSING LINES

The Berger Gruppe offers a big range of de- and recoilers for strip processing lines. The coilers can be equipped with a traverse winding and a multi-coil system.

With a multi-coil system, several coils can be loaded and processed one after another.



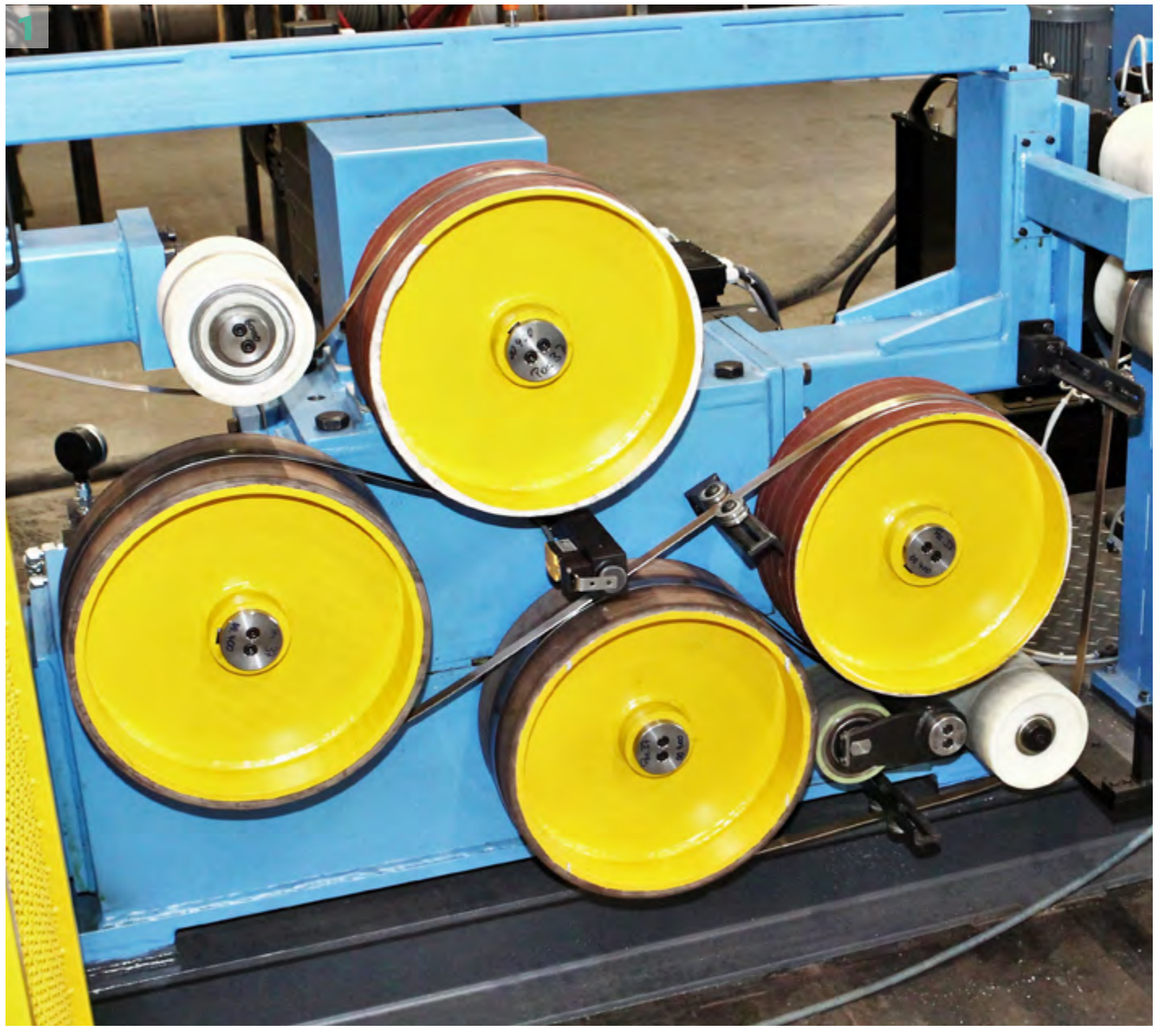
- width of the slit strip packet: 250 mm (9.84") (or according to agreement)
- slit strip packet positioned coil by coil at the strip center line at the push of a button
- weight of the slit strip packet: up to 2,5 t (or according to agreement)

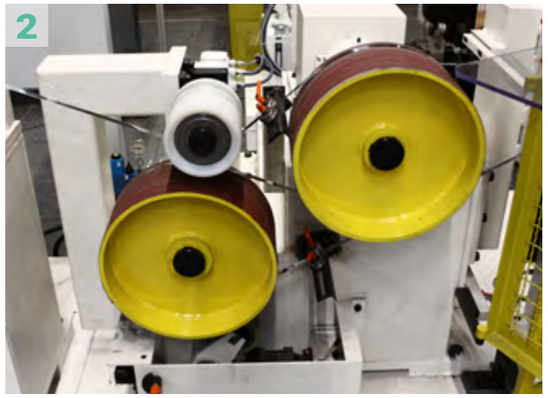
STRIP TENSION TECHNIQUE FOR STRIP PROCESSING LINES

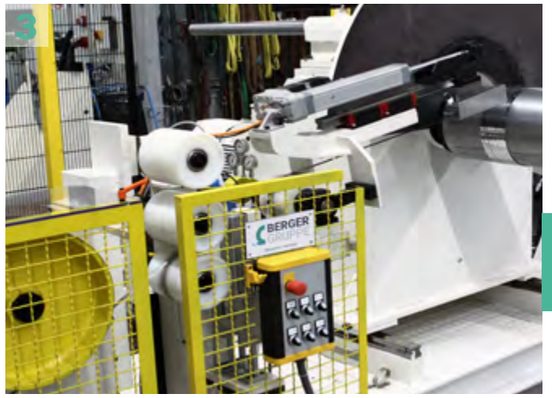
Some operational treatment of the strip – for example machining of complex contours or beveling, exerts excessive strip tension for save recoiling of strip with weak cross sections.

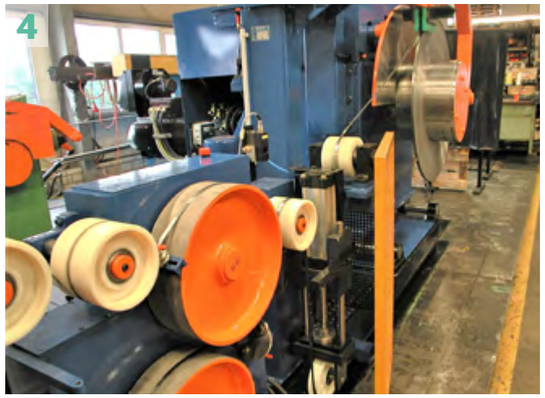
If so, a S-block and a dancer will regulate the strip tension to a tolerable level.

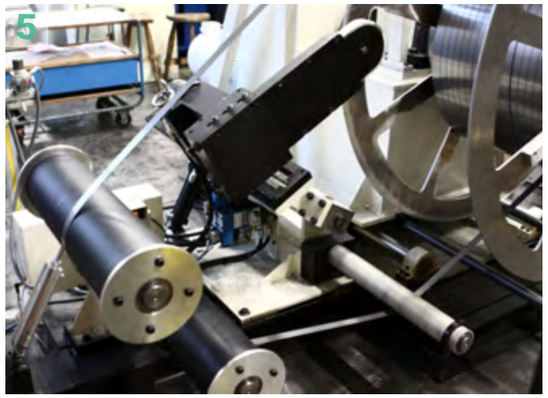
Thus, even thin and small strips can be machined and subsequently traverse winded or recoiled to big diameters.











S-block

The S-block serves as a strip tension reducer or intensifier when the strip tension must be reduced or the tensile forces must be increased. The strip tension is reduced to 1/5 and more.

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-block.

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-block is strongly recommended.

It is possible to machine even strips with sensitive coating as Teflon for example thanks to the extended S-block.

Strip tension dancer

The strip tension dancer shifts the area of strip tension reduction at the recoiler side. This means that even very small strip cross-sections can be machined and traverse wound.

The strip tension layer dancer decouples the strip tension from the coil-mass at the decoiler side.

Examples of use (pictures)

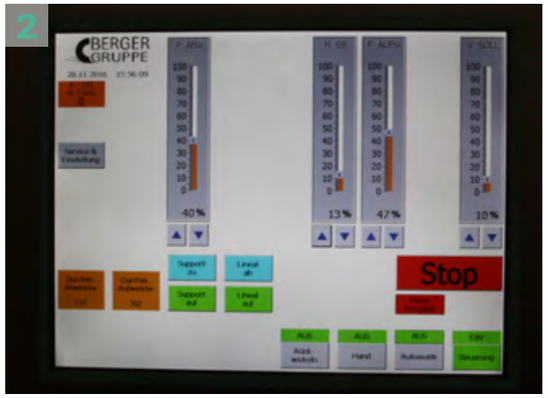
1. Extended S-block for machining strips with sensitive coatings (picture 1)
2. Strip tension reduction or increase by S-block (picture 2)
3. Strip tension dancer at the recoiler side (picture 3)
4. Recoiling of small and thin strips with S-block and strip tension dancer (picture 4)
5. Strip tension dancer reducing the strip tension at the recoiler side (picture 5)

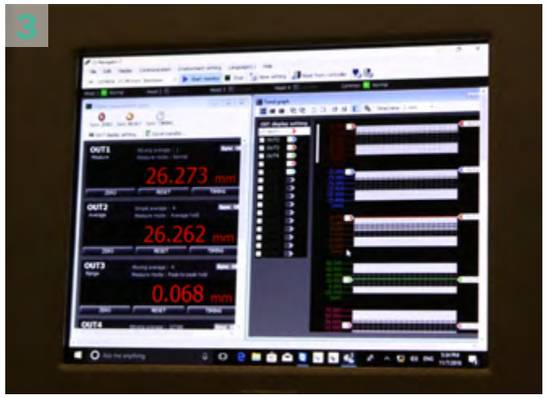
MEASURING TECHNIQUE

FOR STRIP WIDTH, THICKNESS AND CONTOUR

MEASURING TECHNIQUE CNC TECHNOLOGY

The Berger Gruppe offers the machining of the strip edge and strip surface in a closed control loop. The strip width, contour and residual wall thickness of the groove are measured and automatically corrected to the specified tolerance values.





Various measuring systems can be integrated to measure the strip width and thickness, the contour at the strip edge and the residual wall thickness of the groove and to correct them to specified tolerance values.

- strip width and thickness measurement via laser systems
- radii and angle detection via camera systems
- measurement systems connected to a closed loop with CNC control or installed as a monitoring system with signal alarm
- measuring systems for the setup
- automatic error marking

Examples of use (pictures)

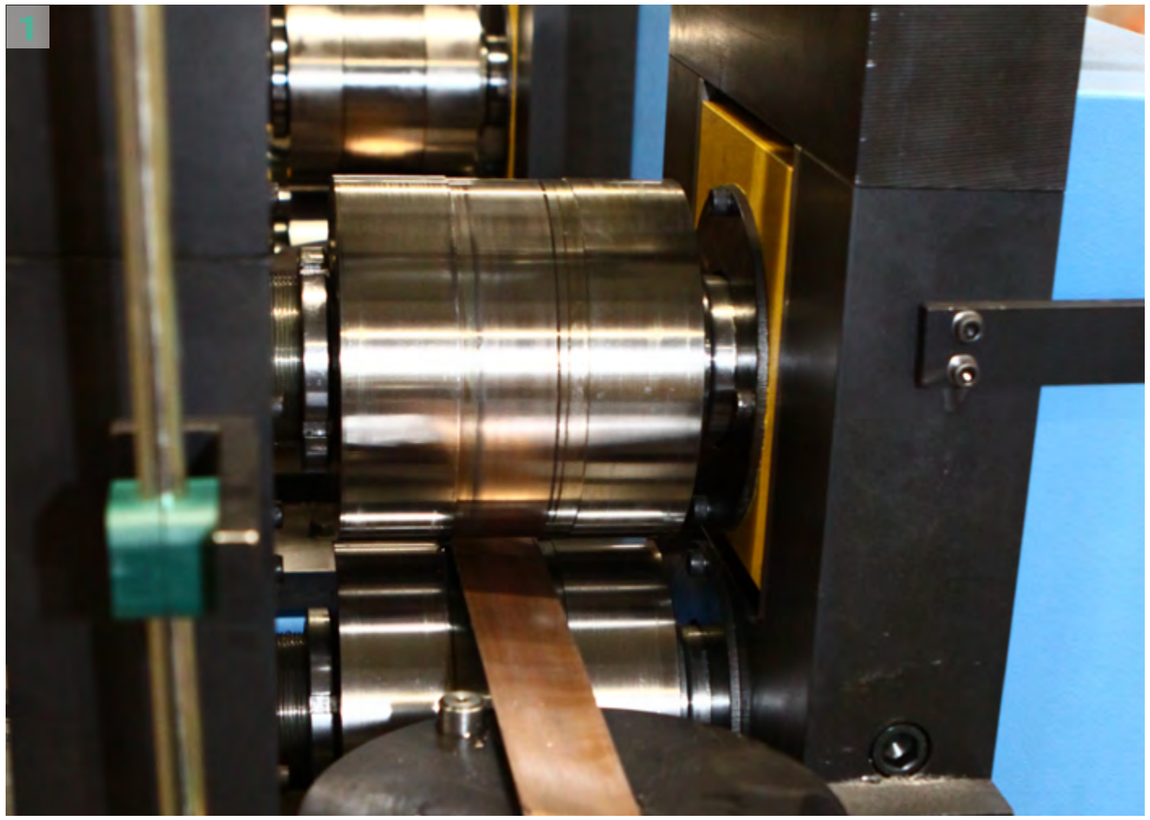
1. Measurement of the traverse accuracy during spooling (pictures 1)
2. Speed adjustment during processing with S-block (picture 2)
3. Strip width measurement (picture 3)
4. Strip width measurement, integrated in a strip edge trimming line (picture 4)

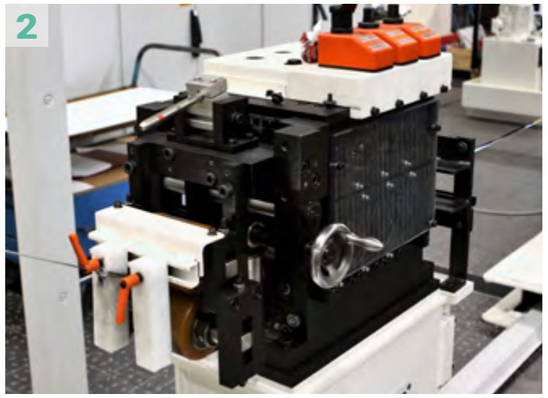
LEVELLING TECHNIQUE

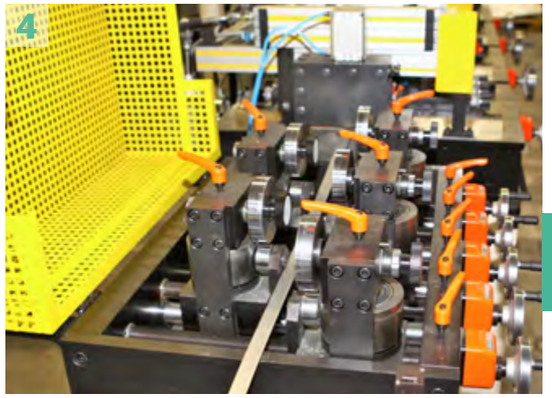
FOR STRIP PROCESSING LINES

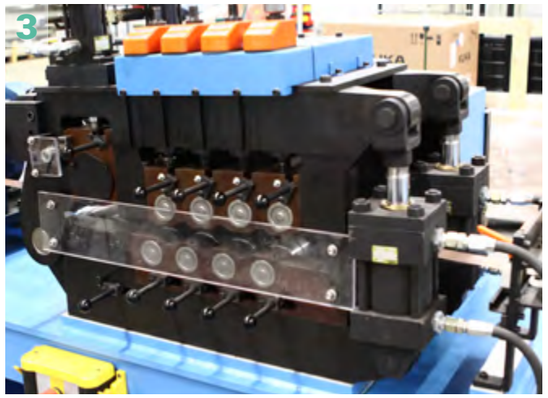
CALIBRATING
FLAT LEVELLING
VERTICAL LEVELLING

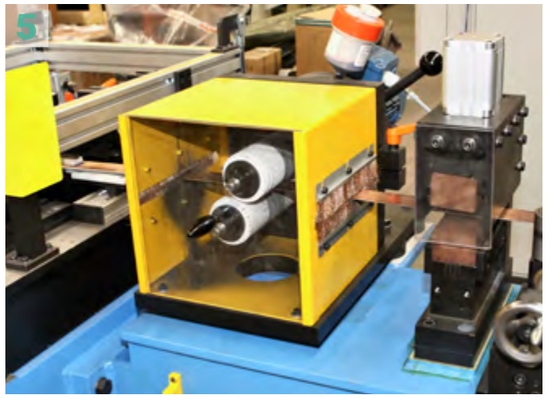
For numerous further operating processes, e.g. the machining of the edge and the surface, the strip must be flat and straight. Bow and waviness must be adjusted to allow downstream operation to process optimally.











Calibrating

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

- strip width: max. 50 mm (1.97")
- strip thickness: max. 3 mm (0.12")

Flat levelling

The flat levelling machine of the series DRAP 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")
- number and Ø of levelling rolls: variable
- options: drive system, supporting rolls, pinch rolls, alligator system and wipers

Vertical levelling

The vertical levelling machine of the series HDR eliminates the edge bow of strips. It is designed for narrow strips with a 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

Brushing

The brushing machine of the series BS removes dirt particles from the strip surface.

- 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

Examples of use (pictures)

1. FW double calibrating rolls (picture 1)
2. DRAP flat levelling machine (picture 2)
3. DRAP with alligator opening (picture 3)
4. HDR vertical levelling machine (picture 4)
5. BS brushing machine integrated into a strip processing line (picture 5)

REQUEST FOR QUOTATION

QUESTIONNAIRE FOR TECHNICAL DATA

Company	_____
Contact	_____
E-Mail	_____
Tel./Fax	_____

Please send a quotation for:

	MACHINES	PAGE
☐	STRIP EDGE TRIMMING MACHINE (to be integrated into an existing line) Strip width Strip thickness Strip material Required contour Decoiling speed Tensile strength	6–11
☐	STRIP EDGE TRIMMING LINE Strip width Strip thickness Strip material Required contour Required decoiling speed Inside coil diameter Outside coil diameter Tensile strength	12–13
☐	STRIP SURFACE MACHINING BY METAL-CUTTING Strip width Strip thickness Strip material Number of grooves required Width of the groove (s) Tensile strength	16–19

Please send the questionnaire to sales@bergergruppe.de.

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