

# BTU

BRIDLE - TECHNOLOGY



- PERFECT STRIP FLATNESS
- TOP-QUALITY SURFACE
- STRAIGHT-EDGE COILS
- HIGH YIELD

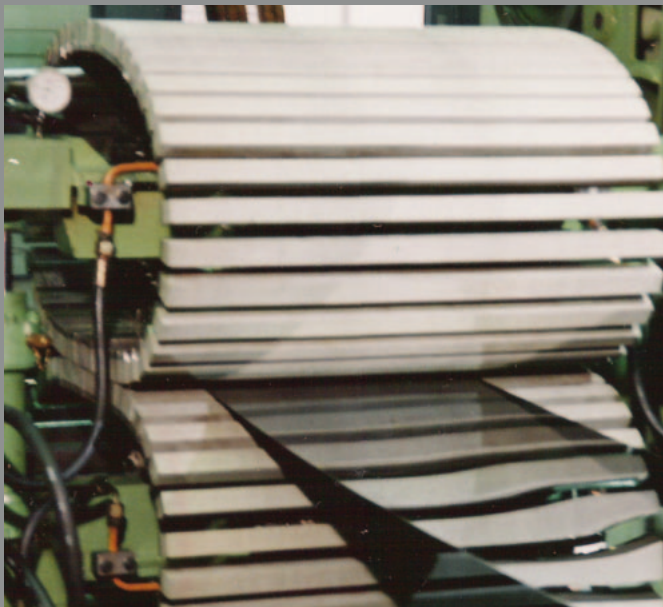
## PRECISELY CONTROLLED STRIP TENSION

**The key to success in innovative  
production processes**

# BRIDLE TECHNOLOGY

## UMLAUF-BRIDLES

### increase and decrease strip tension as required



Umlauf Bridles increase and decrease strip tension as required – at virtually any position along the production chain, from the cold rolling mill down to the finishing facilities and in service centers.

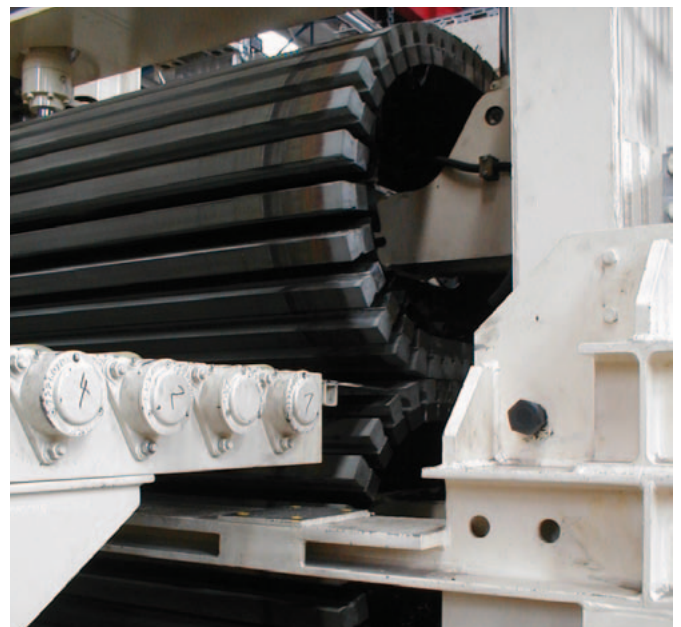
They offer numerous innovative options to produce steel or non-ferrous metals strip with unsurpassed economic efficiency. Umlauf Bridles add great value to strip manufacturing processes such as:

- paying off and recoiling
- pickling, rolling, annealing, leveling and coating
- side trimming
- slitting and cutting to length

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“ Umlauf Bridles generate tensions of several thousand kN in a strip, much more than traditional bridle roll units can. This makes Umlauf Bridles the technology of choice especially for thick and high-strength strips.”

Norbert Umlauf  
Founder of BTU Bridle Technology





„It would help us a lot, if we were able to set the strip tension more precisely at the various stages of the production chain.“ This is what we often hear people say when we visit rolling mills or service centers. Optimal strip tension is not only a key factor for the quality of the coils produced and the efficiency of the production process. What is more, Umlauf Bridles have made possible processes like continuous stretch-leveling – even without using any leveling rollers, or strip rolling with a controlled tension-pressure ratio.

### Minimal residual stresses

Umlauf Bridles apply a high tensile force to the strip, equally distributed over the complete strip width. This results in uniform tensile stress distribution across the entire width of the strip and over its thickness, and consequently in a perfectly flat strip.

### Optimal yield

Umlauf Bridles are installed very close to the processing units they interact with. For example, when an Umlauf Bridles is installed ahead of a recoiler, this has the positive effect that strip tension is actually being built up before the strip head runs into the recoiler. This significantly increases the usable coil length, in other words the yield. In certain strip processing lines this may amount to a plus of 20 meters per coil.

### Ideal strip shape

Umlauf Bridles can be rotated very precisely through their vertical axis, for example, in order to reduce strip camber or adjust the strip position during side trimming.

### Premium surface quality

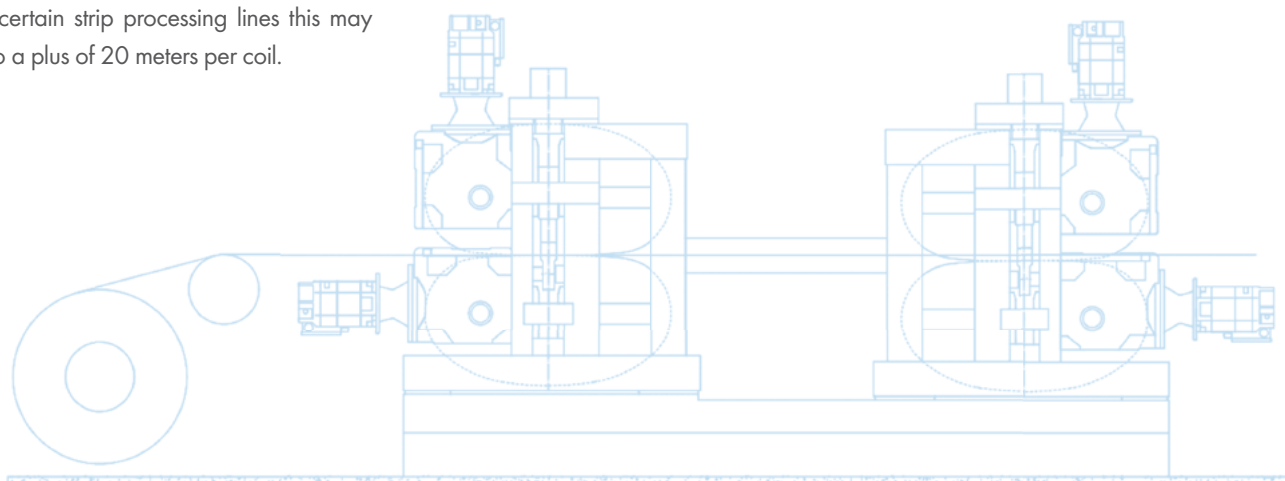
Applying the force over an area – and not concentrated in one point – avoids any local concentrations of forces or relative movements between the crawler unit and the strip surface. Thus also very delicate strip surfaces will be free of damage when they leave the processing lines.

### Perfectly wound coils

Installed ahead of a coiler, Umlauf Bridles steer the strip so as to ensure that the edges of the wound strip are perfectly aligned.

### Minimal energy requirements

Umlauf Bridles do not bend the strip in any way. Therefore, no strain energy is required. For example, lines using traditional bridle rolls would benefit from a replacement with Umlauf Bridles in the form of significant cost savings – especially, when thick-gage strip is processed. Used as braking units, Umlauf Bridles may feed electric power into the works mains.



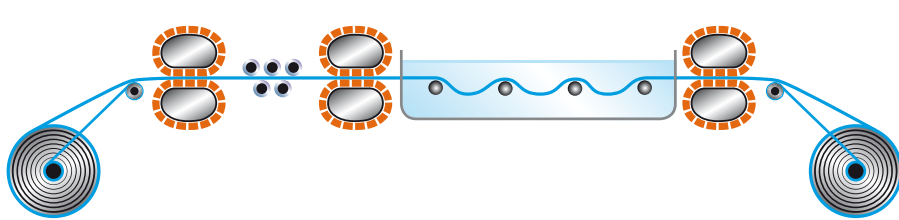


# PICKLING

## Scale breaking without conventional bridle rolls

In the run-in area of push-pull pickling lines, Umlauf Bridles may replace conventional bridle roll units. The extremely compactly designed Umlauf Bridles can generate extremely high strip tensions. This makes them highly efficient scale-breaking units. Moreover, side trimming the strip ahead of the pickling line would allow the strip to be pickled at higher speeds.

An Umlauf Bridle arranged at the exit of a push-pull or continuous pickling line pulls the strip through the pickling tank in a very controlled manner, enabling smooth recoiling with equally precisely controlled back-tension. In lines with the side trimmer arranged after the pickling tank, this provides ideal conditions for high-precision side trimming.

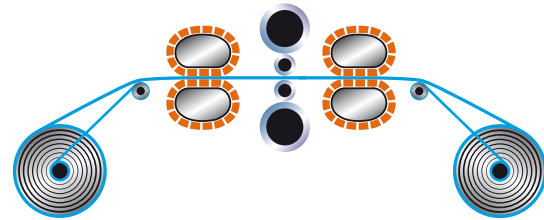


# ROLLING

## Fewer passes, maximum flexibility

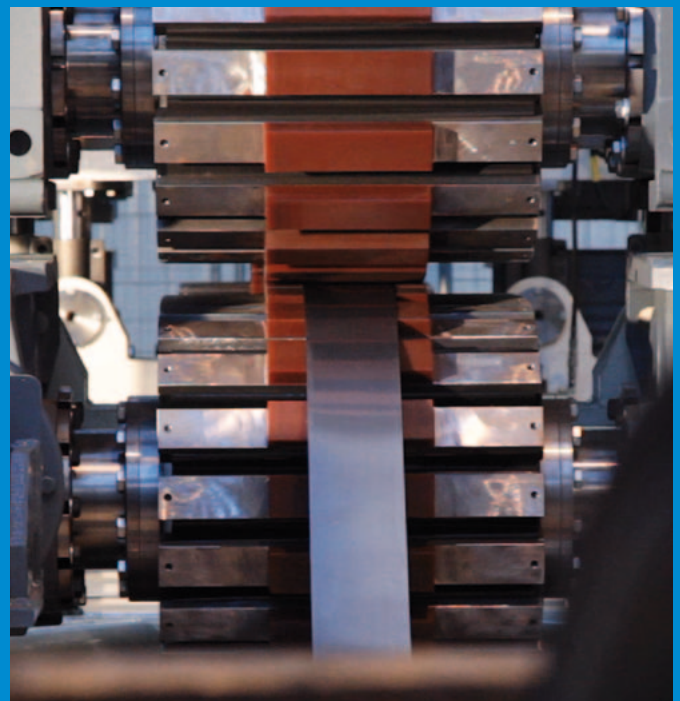
Two Umlauf Bridles – one arranged before and one after the rolling stand – are able to set virtually any strip tension required. Such arrangement allows rolling mill operators for the first time to achieve any specific pressure-tension ratio in the roll gap. This capacity makes it easier to set the required strip properties and allows rolling at higher specific contact pressure. The resulting benefits: fewer passes and fewer recoiling operations, and minimal handling.

The high tension applied uniformly across the entire width of the strip and the higher rolling force are beneficial to the flow of material in the roll gap, because residual stresses are markedly reduced. Thus, already during the rolling process, Umlauf Bridles serve as continuous stretch-levelers.



Umlauf Bridles have made a number of processes possible that used to be considered unfeasible for a long time, for example, rolling with a controlled pressure-tension ratio or continuous stretch-leveling. Also leveling several slit coils at the same time in slitting lines is something no one else can do.”

**Michael Umlauf**  
Commercial Director, BTU Bridle Technology

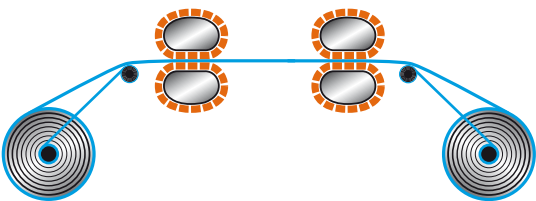
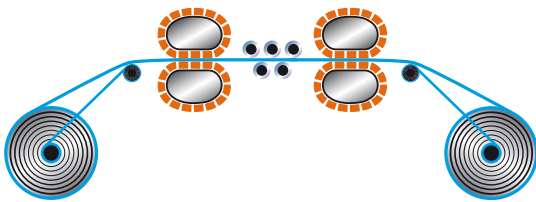


## LEVELING

### High strip tension, minimal residual stresses

With one Umlauf Bridle arranged before and one behind the leveling process, it is possible to generate – in a precisely controlled manner – strip tensions of several thousand kN in the strip. This makes it possible to also level thick-gage strips and strip made of high-strength steels and ensure that also such strips also feature minimal residual stresses when shipped to the customer.

In conventional stretch-leveling lines, the use of Umlauf Bridles provides a number of advantages versus the use of regular bridle rolls. Umlauf Bridles generate a distinctly higher and extremely uniform tension in the strip over its entire width. And they allow fewer, but larger rollers to be used in the leveler, resulting in an overall marked reduction of residual stresses and in superior strip flatness.



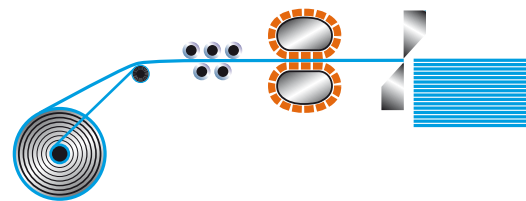
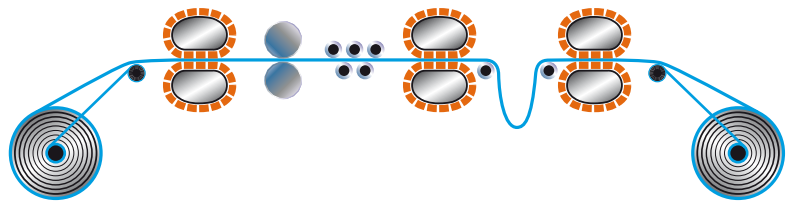
## SLITTING

### Optimal cuts, high-precision guiding of slit coil

Umlauf Bridles pull the strip carefully and extremely accurately through the slitting line. This technique achieves top-quality cuts and reduces the wear of the circular knives.

Only the Umlauf Bridle technology allows all strips of slit coils to be leveled in one simultaneous process.

An Umlauf Bridle arranged in the exit area of the slitting line acts as a braking unit, precisely controlling both the slit strip position and the tension in such a way that optimal slit coils are produced. The contact surfaces of the crawler unit do not heat up. Therefore the process can run at higher strip speeds, boosting the line's throughput.



## CONTINUOUS STRETCH-LEVELING

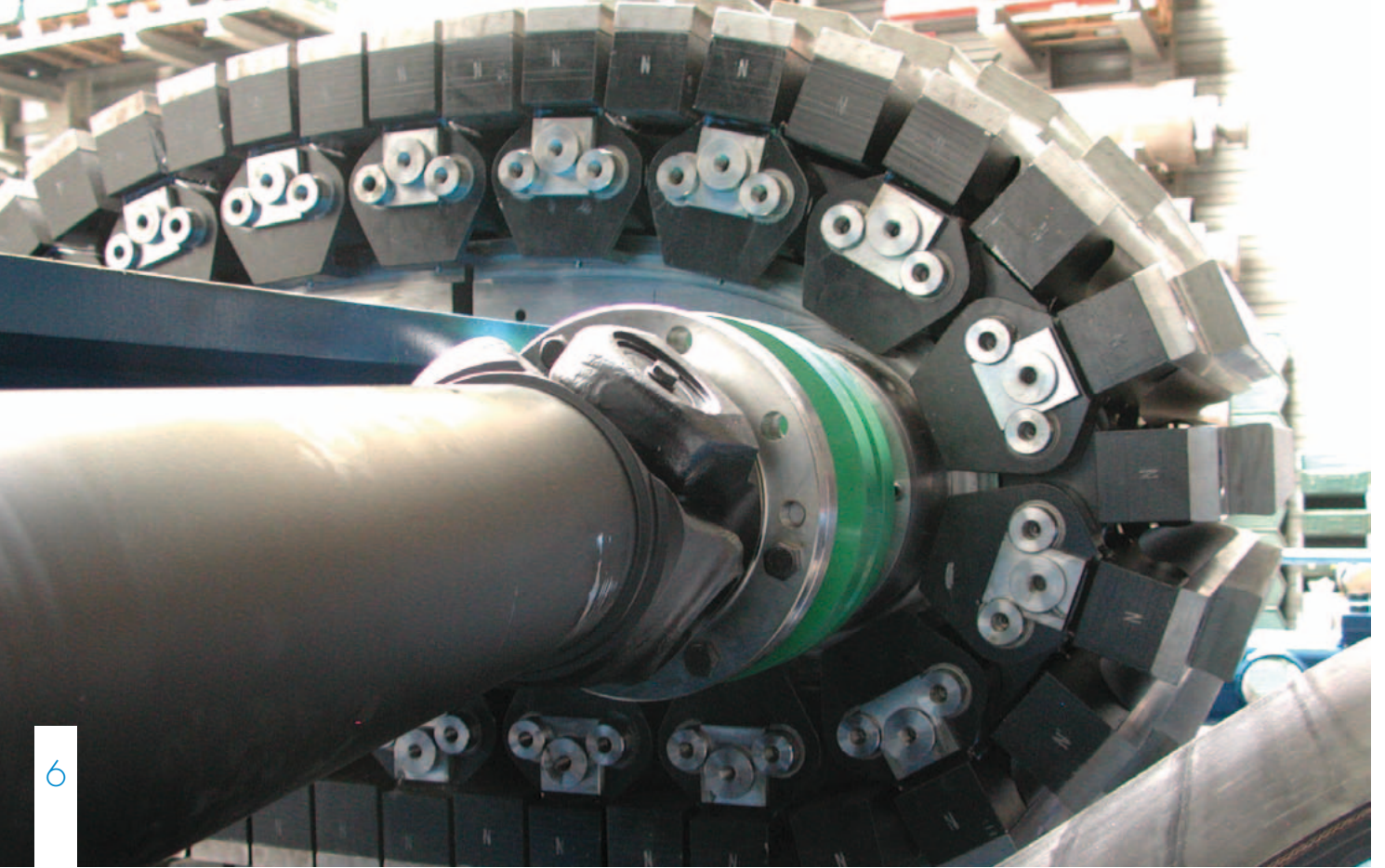
### Extremely flat strip and high throughput

Undisputedly, stretch-leveling is the most effective strip leveling method. However, stretch-levelers operate discontinuously, with a correspondingly low throughput. Unlike conventional stretch-levelers, Umlauf Bridles stretch the strip in an uninterrupted process – for the first time achieving a genuine continuous stretch-leveling process.

## CUTTING TO LENGTH

### Perfectly cut plates

An Umlauf Bridle arranged behind the leveler pulls the strip precisely and perfectly positioned through the leveler. By pulling the strip, work is relieved from the leveler's drive units. This creates capacity to use larger rollers in the leveler. Larger rollers lead to a marked reduction in residual stresses and achieve superior strip flatness. Under certain conditions, it may even be possible to do entirely without driven rollers. The Umlauf Bridle positions the strip edge perfectly perpendicular to the shear. Thus plates with exact rectangular cuts can be reliably produced.



## THE PRINCIPLE

### Always the perfect strip tension

Umlauf Bridles consist of two crawler-type units covered with an elastic coating. One unit is arranged above and one below the strip. They guide and transport the strip linearly, i.e. without any up or down-bending, through rolling stands or strip processing lines.

The crawler units generate strip tensions of several thousand kN – uniformly distributed over the entire strip width.

The linear movement of the strip facilitates threading into downstream processing units. Thus, non-productive times are minimized.

### Ideal for newly built lines and revamps

Umlauf Bridles are extremely compact. This saves valuable space when building a new line or revamping an existing one. Maintenance requirements are very low.

The controls allow the contact pressure, strip tension and strip speed to be adjusted and fine tuned in such a manner that there is always a perfect balance between the three. Parameters such as elongation of the crawler chain are continuously monitored.

Consistent use of modern design and manufacturing techniques has made the Umlauf Bridle a state-of-the-art technology characterized by low capital expenditure, low maintenance costs and high reliability. The integration of Condition Monitoring is just one example of the many features resulting from the consistent further development and sophistication of the systems.



# ONE UMLAUF BRIDLE

## Pulling or braking the strip

Single Umlauf Bridles arranged in processing lines can fulfill multiple tasks.

At a pay-off reel, a single Umlauf Bridle generates exactly the strip tension needed to have a smooth pay-off process. This is particularly important in case of thick-gage strip. The Umlauf Bridle also relieves work from the drives of downstream processing units, such as the stretch-leveler. Arranged as single units, Umlauf Bridles can be used to pull the strip through the processing units at a tension perfectly adjusted to the given pressure acting on the strip, while ensuring most accurate strip guiding.

Arranged downstream of a side trimmer, a single Umlauf Bridle pulls the strip accurately through the trimming shear unit, in the process automatically adjusting the most suitable rpm for the circular knives. Users have been reporting much higher knife lifetimes.

# TWO UMLAUF BRIDLES

## Precise strip tension control

Two Umlauf Bridle units, one arranged ahead and one after, let's say, a rolling stand or a leveler, can adjust virtually any strip tension required.

This capacity makes it possible to enhance the rolling process by adjusting a specific strip tension relative to the rolling force, to level a strip without having to use any leveling rollers and to correct the strip shape in the process.

Unlike conventional bridle roll units, Umlauf Bridles distribute the strip tension equally over the complete width of the strip. Additionally, they transport the strip linearly, without any up and down-bending.



Ahead of a recoiler, a single Umlauf Bridle adjusts the strip tension and aligns the edge of the winding strip so as to produce perfect straight-edge coils.

At the exit of strip processing lines, a single Umlauf Bridle can reduce the strip tension to zero, allowing the strip to be transported on the run-out roller table in a completely tension-free state. Thus the Umlauf Bridle creates ideal conditions for optical flatness measurements.



# BTU

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## MORE THAN 30 YEARS OF PLANT ENGINEERING EXPERIENCE

BTU was founded in 1985 by Norbert Umlauf. His invention, the Umlauf Bridle technology, is all about controlled increasing and decreasing of the tension in strips made of steel or non-ferrous metals. Special about his invention is that it is able to fine-adjust the strip tension to the specific needs of the process or application on hand.

For more than 30 years, BTU has focused on aspects of "strip tension" in all stages of strip production and processing. This has led to the implementation of solutions that would never have been feasible with traditional plant engineering approaches.

Today, more than 30 Umlauf Bridle units are in operation all over the world at leading strip producers – in rolling mills, strip processing lines and service centers.

Since 2016, also Norbert Umlauf's sons, Christian and Michael, have taken up active roles in the company management.