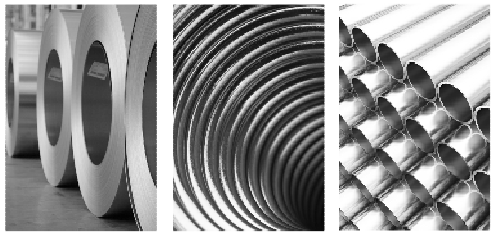

Strip treatment lines

for cold-rolled strip

made of steel and non-ferrous metals

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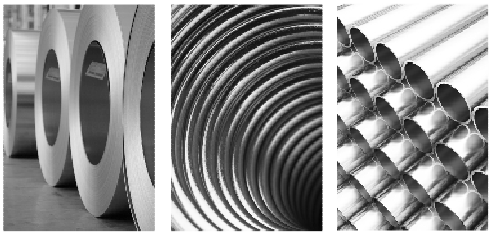
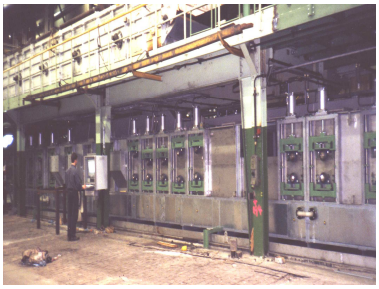
e systems®

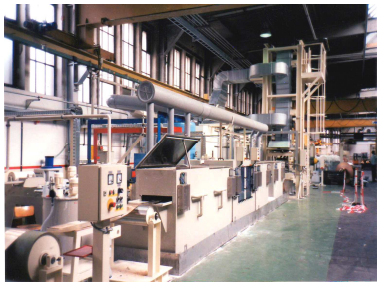




1. Pre-treatment lines

e clean

e polish



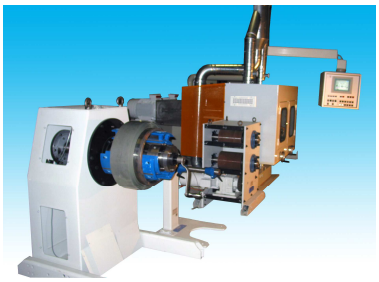
2. Tinning lines

3. Galvanizing lines

e galv

4. Phosphating lines

e phos



5. Abrasive strip brushing lines

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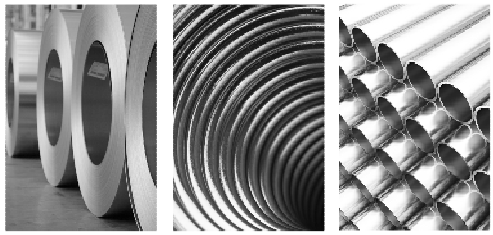

Continuous cleaning of cold-rolled strip surfaces

Cleaning task

In the semi-manufactured product industry for strip materials, strips – amongst other items – are manufactured in cold-rolling procedures. This normally applies for all types of metal such as steel, copper and alloys and also including aluminium.
In order to be able to fulfil the high level of requirements placed upon the lubrication and the cooling during the rolling process, it is often the case that so called cooling lubricant is used. This lubricant is in the form of rolling oil or roiling oil emulsions.
Chemists refer to this as hydrocarbon compounds in liquid form.
In addition to this, oil emulsions are also created with the help of surface-active agents that could cause foaming problem in the cleaning systems.
Due to the high mechanical pressures between the strip and rolling surfaces, a thin metal abrasion or flitter of the raw material develops. This will then remain on the surface area of the strip.
Therefore both of the problem areas are defined with regards to the cleaning of the surface areas. In doing so the respective cleaning system or a combination from the various systems is to be selected depending on the analysis of the dirt rate.

When both tables are analysed, the following becomes apparent:

1. Carbon remains can be most effectively removed via the usage of a combined removal procedure of brush and electrolytic degreasing from the surface area.

2. The removal of metal abrasion is most successful when u sing a combination of brush and electrolytic processing. This is to be carried out to a lower extent.

In addition to this, the cleaning of non-ferrous alloys is made more difficult due to the presence of zinc and/or tin. This is due to the fact that there is an increase of the adhesive strength between the dirt and the strip surface.

TABLE 1
Shows the analysis of the carbon values before and after the cleaning process in mg C/m²

Process	mg C/m²		
	Average	Minimum	Maximum
Base dirt	37,7	24,2	47,9
Individual Process			
Dipping	3,3	2,8	4,0
Brushing	2,2	1,5	2,9
Spraying	3,1	2,7	3,6
Electrolysis 10 A/dm² anod.	2,9	2,5	3,3
Electrolysis 10 A/dm² cath.	1,6	0,7	2,0
Electrolysis 15 A/dm² anod.	4,0	3,0	4,3
Electrolysis 15 A/dm² cath.	1,6	0,6	2,5
Combined Processes			
Spraying + Brushing	1,7	1,2	2,1
Brushing + Electrolysis 10 A/dm² anod.	1,4	1,2	1,8
Brushing + Electrolysis 10 A/dm² cath.	0,6	0,3	0,9

TABLE 2
Shows the analysis of the copper abrasion before and after the cleaning process in mg M/m²

Process	mg M/m²		
	Average	Minimum	Maximum
Base dirt	20,0	17,4	23,9
Individual Process			
Dipping	16,8	15,4	18,1
Brushing	15,5	13,3	17,7
Spraying	13,3	12,2	14,4
Electrolysis 10 A/dm²	11,5	11,1	12,0
Electrolysis 10 A/dm² cath.	13,4	12,9	13,7
Combined Processes			
Spraying + Brushing	13,3	13,2	13,5
Brushing + Electrolysis	10,5	11,3	11,6
Brushing + Electrolysis 10 A/dm² cath.	9,8	9,9	11,7

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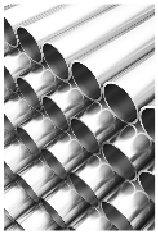
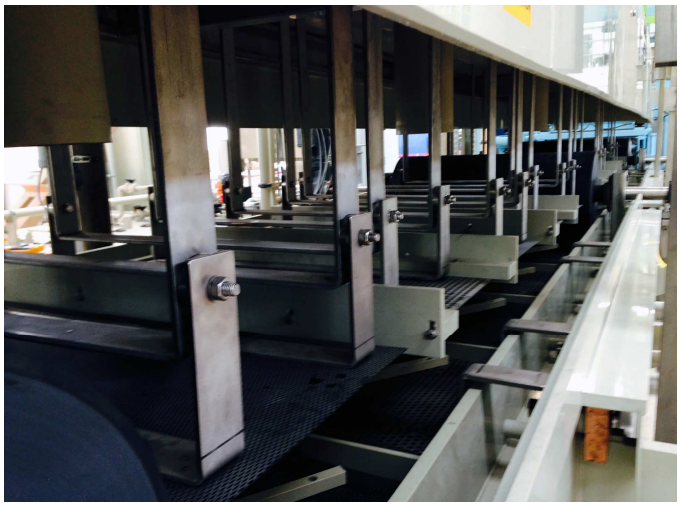


Description of cleaning systems and processes

e-clean - Electrolytic degreasing

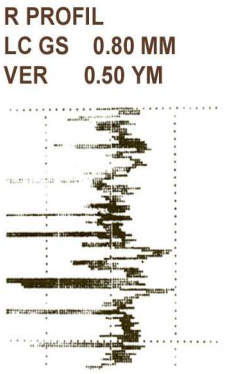
When carrying out the electrolytic degreasing, DC current flows onto each area of the metal surface area. Small hydrogen and oxygen bubbles will form, depending on the polarisation of the area. The dirt particles are correctly blasted from the surface area via the gas pressure that forms. This is the equivalent of ***precision cleaning***.
Therefore the electrolysis is primarily intended for used in application where extremely clean strip surface areas are required, for example layers with tin or roll cladding processes.
A further advantage of electrolysis is that the cleaning process is carried out ***with no contact being made***. This is extremely advantageous when cleaning foils as this means that no damage can be caused.

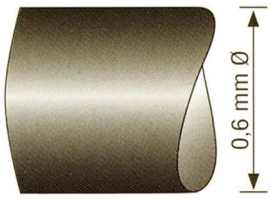


Degreasing chamber with plate electrodes and power supply line.

Mechanical degreasing with washing brushes

Degreasing by using washing brushes is primarily intended as a ***pre-degreasing*** process where a large amount of the dirt particles are removed from the surface area. The following illustration clearly displays that the brush cleaning method is not intended as a precision cleaning process.
The strip surface area – which has been enlarged here 40 times – optically appears to be completely flat. However the harshness picture clearly displays mountains and valleys. Even a fine brush hair that only measures 0.6mm in diameter cannot remove the dirt particle residue from the indentations found on the strip surface area.





Spiegelglatte Bandoberfläche u. Bürstenhaar - 40fach vergrößert

Interior view of the brush machine

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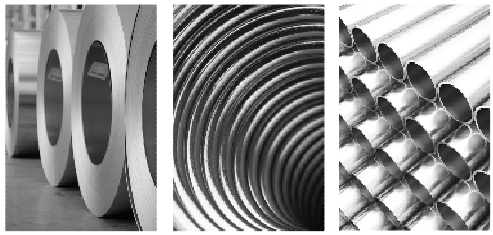

1. Pre-treatment lines

TECHNICAL DATA :

Strip material:
Steel, stainless steel, aluminum

Strip width:
800 mm max.

Strip thickness:
0,1 - 1,0 mm steel/stainless steel
0,2 - 1,5 mm aluminum

Line speed:
20 - 80 m / min.

Treatment cycle:
- electrolytic strip degreasing
- 3-fold cascade spray rinsing
- strip drying by double squeezing

Receiver tank with heating circuit and electrolyte preparation

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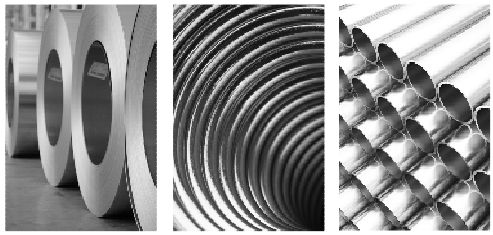

1. Pre-treatment lines

TECHNICAL DATA :

Strip material:
Copper and copper alloys

Strip width:
800 - 1280 mm

Strip thickness:
0,5 - 8,0 mm

Line speed:
bis 110 m / min.

Treatment cycle:
- electrolytic strip degreasing

Elecrolyte overflow chamber with electrodes and strip supporting roller

View at the lift frame of the electrodes with current supply

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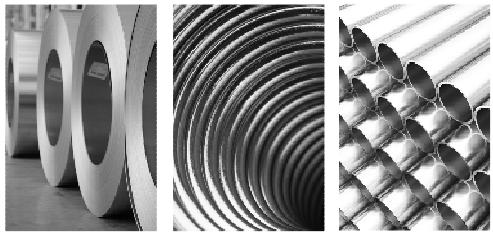


Accessories for degreasing lines

Continuous preparation of the degreasing agent

It is necessary to continually prepare the degreaser in order to be able to maintain the cleaning performance of the degreaser at a constant level. This process takes place in a preparation loop that has been specifically developed for this procedure and comprises a disk belt filter and phase separator.

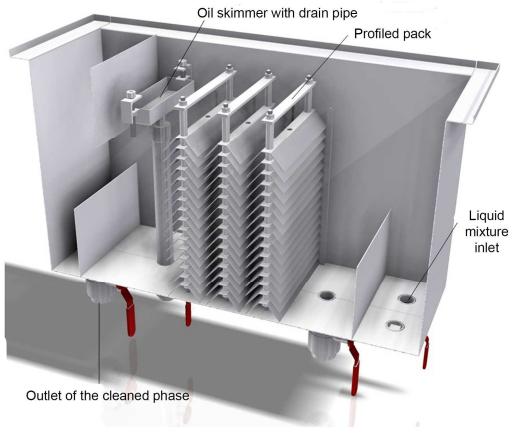
However, the degreaser must allow to carry out a preparation, but the majority of chemical degreasers don't that. They contain emulsifying substances such as surface-active agents and phosphates that make a phase separation impossible,

Therefore **STAKU** only uses products which allow the preparation.

Disk belt filtration system SBF

Interior view of the disk belt filter

Preparation loop for the degreasing agent with
Disk belt filter and phase separator



Interior view of the phase separator

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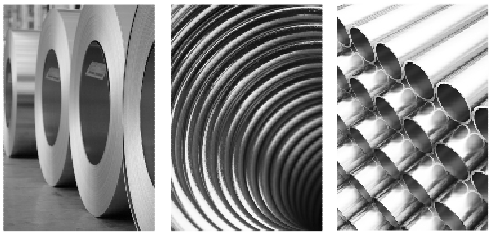
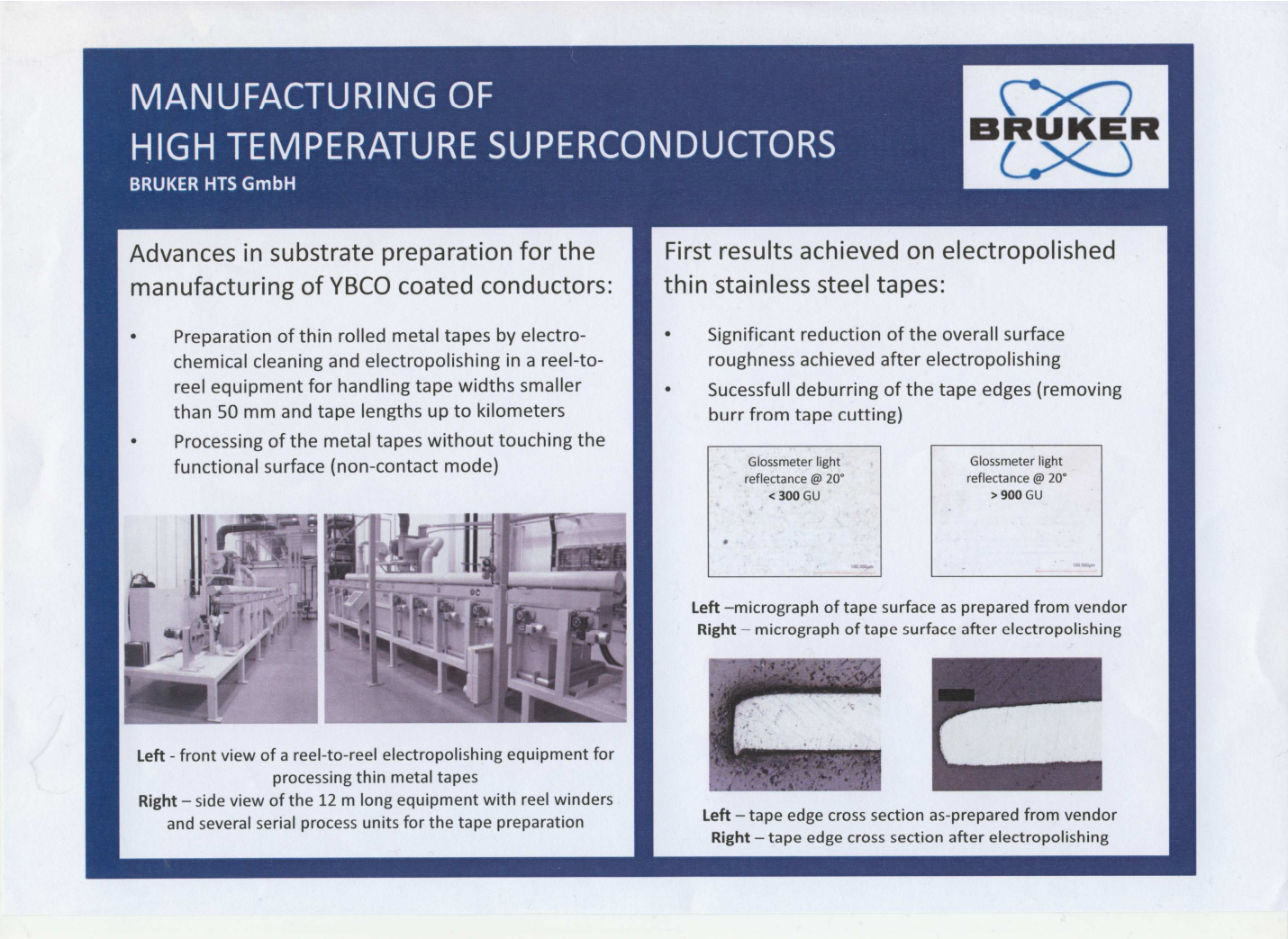


1. Pre-treatment lines



TECHNICAL DATA :

Bandmaterial:	Stainless steel 1.4854ZA
Strip material:	4/12/50 mm
Strip thickness:	0,05 –0,15 mm
Line speed:	0,5 - 1,0 m/min
Treatment cycle:	electropolished strip degreasing

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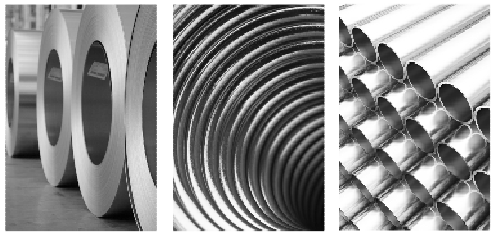
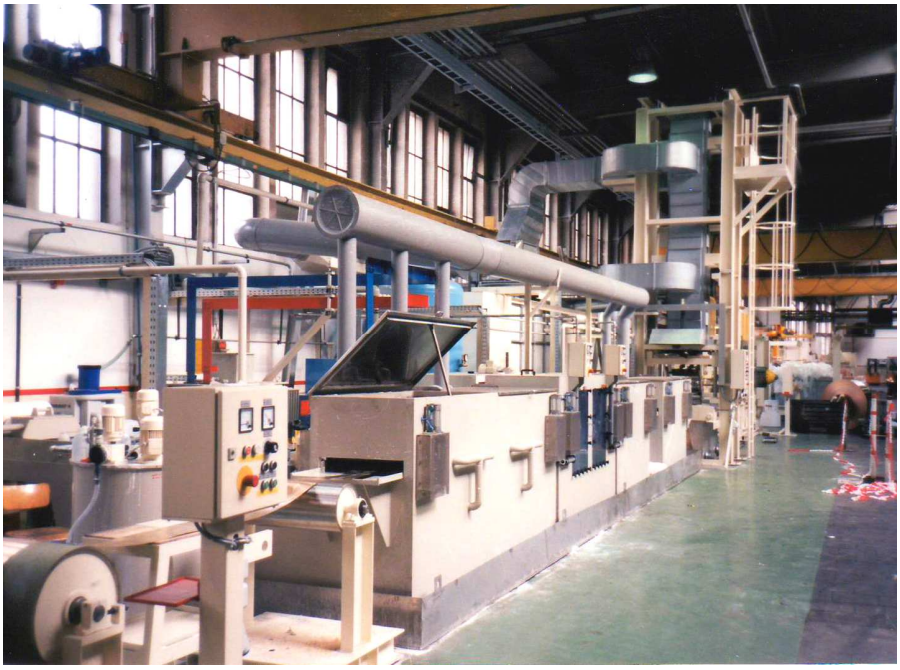


2. Tinning lines



TECHNICAL DATA :

Strip material:
Copper and copper alloy

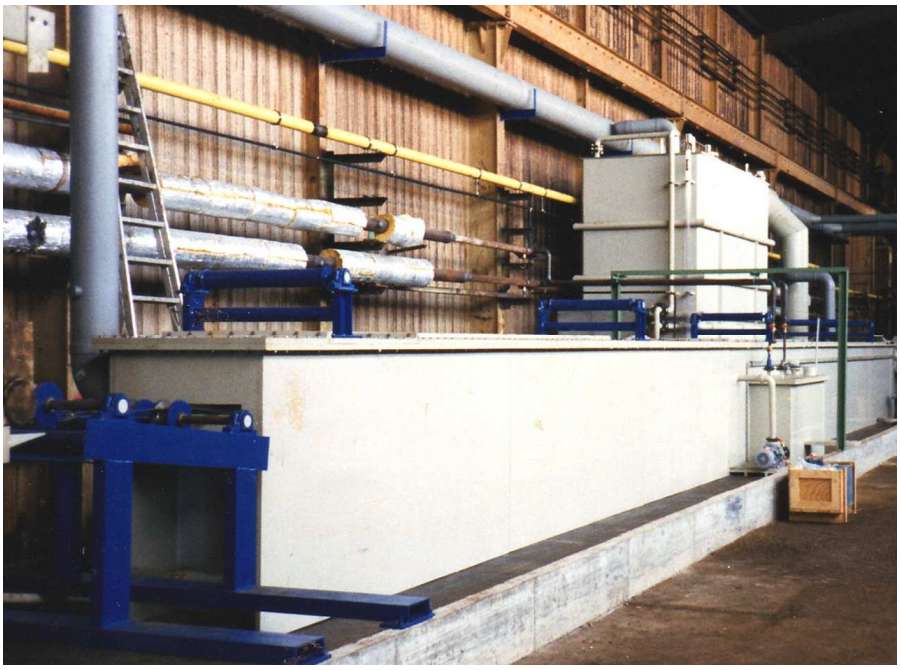
Strip width:
max. 400 mm

Strip thickness:
0,15 - 1,0 mm

Line speed:
bis 80 m / min.

Treatment cycle:
- electrolytic strip degreasing
- Bürstentfettung
-2-fold cascade spray rinsing
- Passivation
- Flux bath with filtration

3. Galvanizing lines



TECHNICAL DATA :

Strip material:
Steel strip - 5 pc

Strip width:
15 - 60 mm

Strip thickness:
20 - 40 mm

Line speed:
bis 15 m / min.

Treatment cycle:
- electrolytic strip degreasing
- HCl - Spray pickling
-3-fold cascade spray rinsing
- Flux bath

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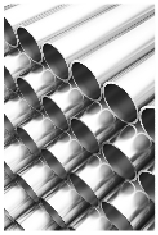

4. Phosphating lines

TECHNICAL DATA :

Strip material:	Stell, stainless steel
Strip width:	710 mm max.
Strip thickness:	0,2 - 1,5 mm
Line speed:	20 - 80 m / min.
Treatment cycle:	- electrolytic strip degreasing - 3-fold cascade spray rinsing - electrolytic activation - 2-fold cascade spray rinsing - electrolytic phosphating - 3-fold cascade spray rinsing

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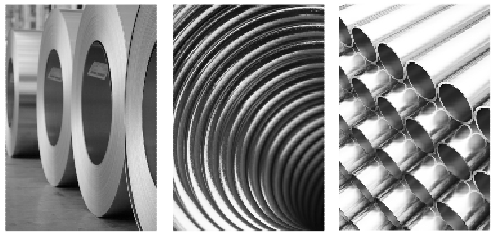
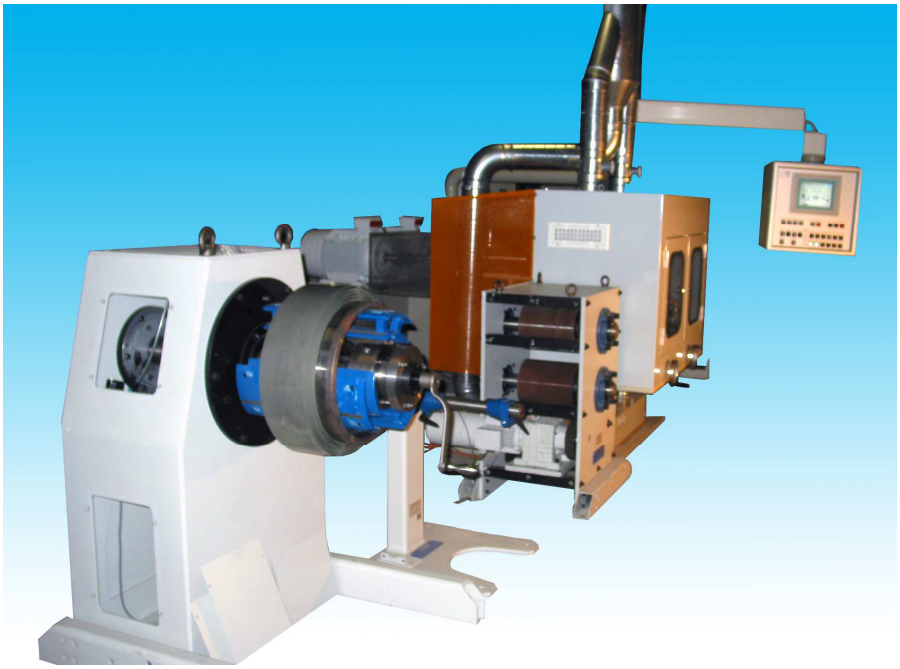


5. Abrasive strip brushing lines



TECHNICAL DATA :

Strip material:
Copper, nickel, aluminum

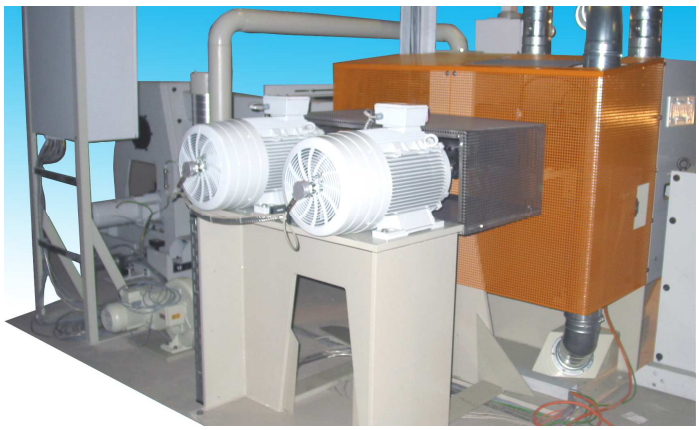
Strip width:
130 - 250 mm

Strip thickness:
0,1 - 0,5 mm

Line speed:
max. 20 m / min.

Line speed:
- mechanical surface activation by Brushing treatment
- Strip tinning

Interior view of the brushing machine



Back view with sight at the brush gear

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