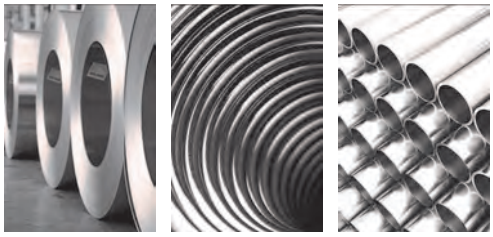

# STAKU Anlagenbau GmbH

Patented processes for surface pre-treatment and finishing

## Our offer of complete continuous surface treatment lines and devices for wire and strip


**STAKU Anlagenbau GmbH**
Bahnhofstraße 33–35
35423 Lich

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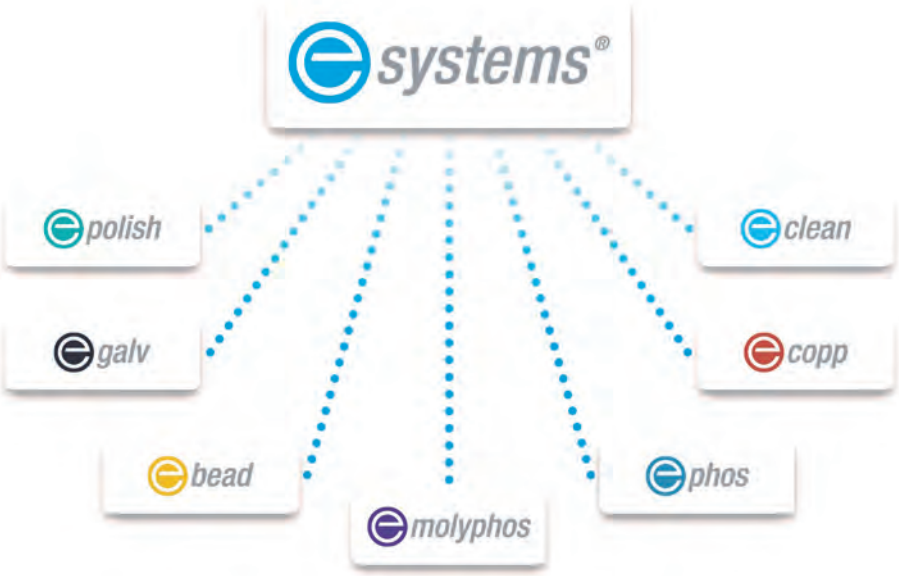
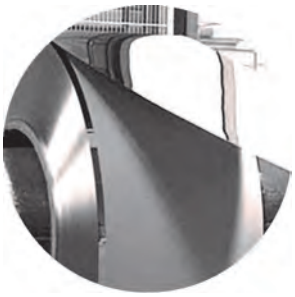
# STAKU Anlagenbau GmbH

Patented processes for surface pre-treatment and finishing




Wire treatment lines



Strip treatment lines

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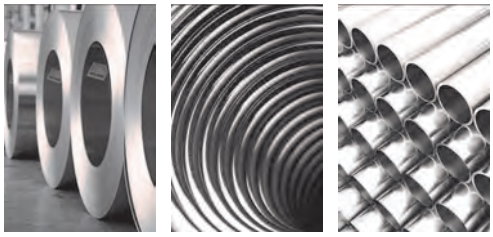

# Wire treatment devices

The perfect surface for your wire

with our devices and

our patented e-systems surface treatment

Cleaning lines

e clean

ultraclean

Phosphating lines

e phos

e molyphos

Copperplating lines

e copp

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# Wire cleaning lines

## Electrolytic cleaning processes for single-wire lines and high metering rates

- for removal of wire rod scale with $H_2SO_4$
- for removal of drawing agents and stearates

## Electrolytic and chemical continuous plickling devices as a part of lead patenting and galvanizing lines

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## Process description:

Precondition for the further processing or a subsequent coating you need a very clean wire surface. That means that the lubricants and stearates from the previous drawing process have to be removed from the wire surface.
The usual degreasing processes which work with high temperatures and / or with with support of ultrasonic sound often are to slow in their response time to be applied within fast operating processes.

STAKU solved this problem by developing the **e-clean process**. This process enables the surface cleaning within seconds by applying very high current density at changing polarization.
During the electrolytic cleaning continuous current flows to any spot of the metal surface and generates small hydrogen an dioxygen blisters according to polarization.

The pollutant particles are blast away from the surface by the emerging gas pressure and result thereby in a precision cleaning of the surface. Consequently electrolysis is especially suitable in cases you need very clean surfaces.

**Benefits:**

**+ only a fraction of the usual treatment period necessary**
**+ far better cleaning results**
**+ lower production costs**

Wire surface with and without cleaning

Multi-wire device

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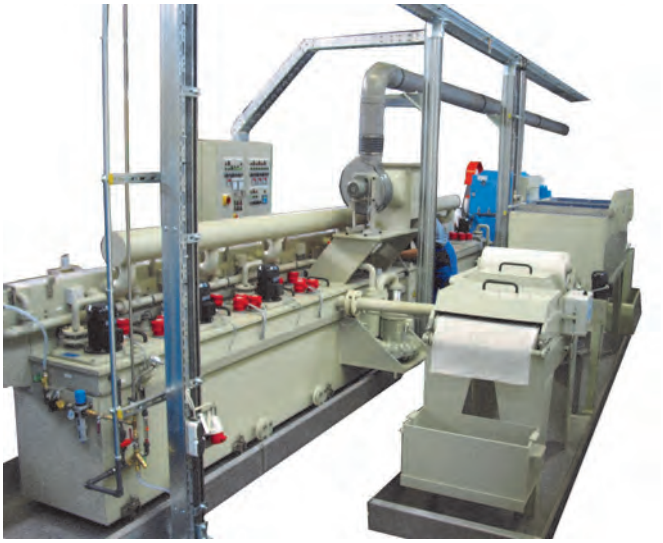
# Electrolytic continuous degreasing devices up to 12 m/s

- within reel-2-reel-processes:



- with subsequent drawing process:

Multi-wire degreasing device in front of the annealing furnace, 24 strands

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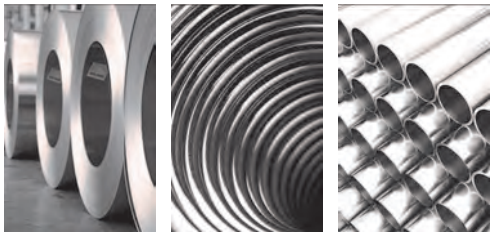

Electrolytic continuous pickling device for annealed non-ferrous wires

with polishing drawing

Electrolytic continuous pickling device for wire rod up to 60 m/min

with finishing treatment

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# Electrolytic and chemical continuous pickling devices as a part of lead patenting and galvanizing lines

Flood tank with guide bars

Pickling device with flux bath with opened hood

Continuous pickling device „closed type“, 40 strands

Electrolytic pickling device

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# Chemical continuous pickling devices with HCl

# as a part of lead patenting and galvanizing lines

Continuous pickling device, 10 strands

Hight adjustable wire deflation

Exhaust air scrubber with exhaust fan

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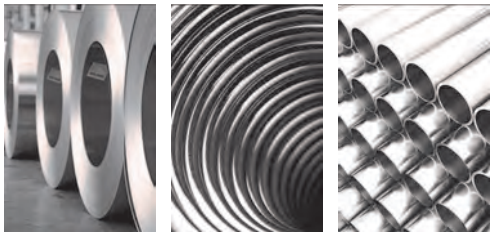

## Complete inline devices for single-wire- or multi-wire-treatment

### Application areas:

e phos®

- a coating for the drawing of cold heading and steel wires
- as well as the forming of cold heading products

e molyphos®

- a coating for alloy made of stainless steel and titanium material subsequent drawing processes or cold and warm forming
- additionally suitable for coating of draw peeled surfaces

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STAKU Anlagenbau GmbH

e systems®

e phos®

e molyphos®

Compared to the conventional phosphating process the STAKU e-phos process offers essential advantages in its inline devices, such as very short treatment periods, lower consumption of chemicals and lower operating temperature. .

This allows reduction of operating costs and a considerable increase of productivity at the same time. The STAKU devices with its contemporary state of the technology work more efficient and do not need waste water disposal due to their processes and control technology.

In this system process control and the dosage of chemicals is fully automatic.

The use of electrolytic deposit avoids the occurrence of sludge caused by the traditional chemical reaction, thus the periodic cleaning of the device and proper disposal of the routine sludge are no longer required.
You only need the metal components zinc and calcium, metering is usually carried out automatically by the electrical control system of the device. By co-current flow the coating of the surface happens simultaneously at many places of the surface. Thereby you accomplish in a very short time very evenly spread homogeneous layers. The combination of calcium and zinc forms very smooth, velvety mixed crystals. The coating dries quickly and offers because of the zinc part a good protection against corrosion. The layer thickness can be regulated easily by current rating and dwell period.


Process control

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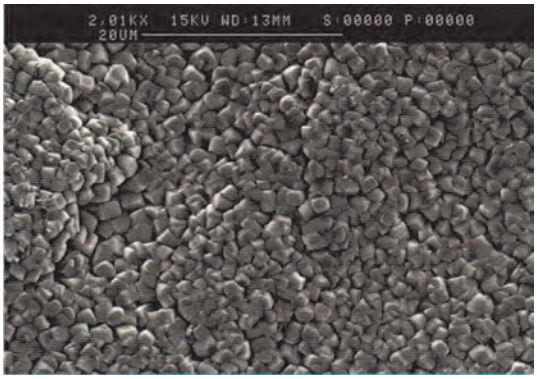
# Zinc-calcium phosphating

## Fine-crystalline zinc-calcium phosphating systems have an excellent track record as carriers of lubricants


Zinc phosphating layer structure
(magnification 1000x)




Zinc-calcium phosphating layer structure
(magnification 2000x)

### Differences to conventional zinc phosphating:

- **Coating composition**
  With zinc phosphating the coating contains
  **hopeite $Zn_3(PO_4)_2 * 4\ H_2O$**
  With zinc calcium phosphating it contains
  **schlozite $Zn_2Ca(PO_4)_2 * 2H_2O$**
- **Layer strucutre (see REM pictures)**

### Advantages:

- **Phosphate layers with an ultra-fine crystalline structure, less shear and better adhesion for forming**
- **Greater resistance to heat during forming**
- **Reduced reaction with reactivesoap, for instance in the production of „fifgree“ profiles, connecting elements, etc.**

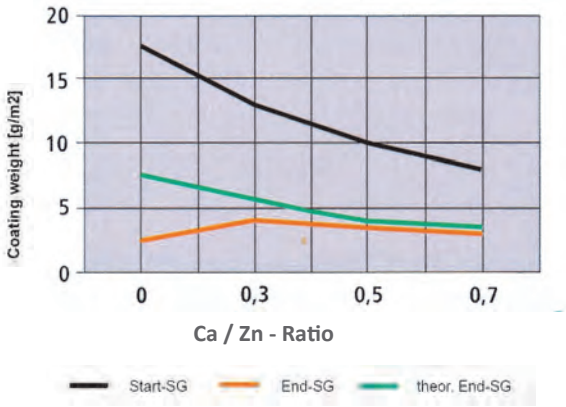
### Application specific advantages:

- **Reduced coating weight without impact on performance**
  Reduced consumption of phosphating chemicals
  - Less phosphate sludge
- **Improved compactability of phosphate sludge**
  - Significantly higher solids content
  - Prolonged bath cleaning intervals

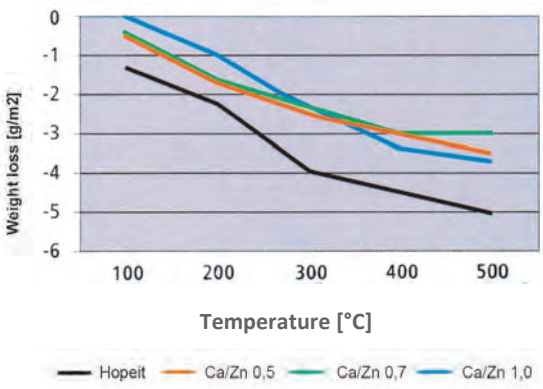
### Higher temperature resistance

| Heating 30 minutes | from crystalline | to crystalline | Weight loss |
|---|---|---|---|
| 120 – 130 °C | $Zn_3(PO_4)_2 \cdot 4\ H_2O$ | $Zn_3(PO_4)_2 \cdot 2\ H_2O$ | 8,0 % |
| 200 – 210 °C | $Zn_3(PO_4)_2 \cdot 2\ H_2O$ | $Zn_3(PO_4)_2 \cdot H_2O$ | 4,0 % |
| 280 – 290 °C | $Zn_3(PO_4)_2 \cdot H_2O$ | $Zn_3(PO_4)_2$ | 4,5 % |
| 165 °C | $Zn_2Ca(PO_4)_2 \cdot 2\ H_2O$ | $Zn_2Ca(PO_4)_2 \cdot H_2O$ | 4,5 % |
| 413 °C | $Zn_2Ca(PO_4)_2 \cdot H_2O$ | $Zn_2Ca(PO_4)_2$ | 4,8 % |

### Improved adhesion during forming




### Temperature resistance

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e systems® e molyphos®



# e molyphos - the smart coating

**A revolutionary new lubrication layer for the wire drawing as well as the warm and cold forming of alloy made of stainless steel and titanium material by applying an electrolytic process.**

Further, draw peeled wires have no more surface defects and deliver a homogenous metal structure which will be perfect for the coating with E-molyphos.
Together, this perfectly prepared material is resulting in a unique wire quality.

E-molyphos is the new standard by which all others will be measured by.
E-molyphos replaces expensive conventional high performance oils and graphite lubricant.

The central issue at warm and cold forming of chemically highly resistant material is the creation of perfect tribological conditions between the friction partners. A chemical coating in the way of the usual conversion coating is almost impossible due to the inherent surfaces of the material.
The electrolytic process can do the job.

When analyzing the requirements of the whole system and the environment it will result in the following profile:

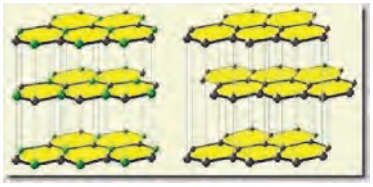
- Resistance of forming pressure > >300 kN
- Low friction coefficient µ even at elevated temperatures above 500°C
- High adhesion between lubricant and material surface
- High environmental compatibility (Green Coating), resource-conservative
- Avoiding waste materials and low energy consumption
- Short exposure time at phase to phase inline processes

**E-molyphos is a lubrication system which matches all named requirements by electrolytic coating in one single bath. In this process a highly performing solid lubricant is deposited within a matrix of components which also contribute to the lubrication.**

E-molyphos is the consequent improvement of the e-phos process developed by STAKU and which is meanwhile successfully working in numerous applications worldwide.

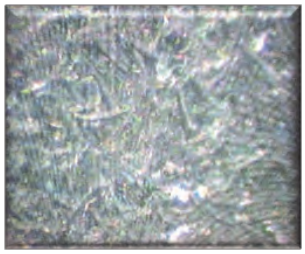
**Benefits of this electrolytic process in comparison to the conventional phosphating:**

- Temperature of the bath only 45°C instead of 80°C
- Virtually no sludge generation
- 33% less percentage of zinc due to replacement by calcium
- 40% less chemical consumption due to dense and microcrystalline
- layer
- Three seconds of coating time in comparison to seven minutes at the conventional process
- No toxic activation chemicals needed by using DC in the electrolytic process
- High bonding force avoids shearing-off at the forming
- No generation of spent acid, the application of drag-out rinse reduces waste water about 40%
- No final treatment with soap, lime or similar necessary
- Lowest operation costs



The pictures of the microscope representation show the different layer construction of the different processes.

Conventional



e phos

e molyphos

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e systems®

e phos®

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## e-phos line
## for the production of cold heading wire

**TECHNICAL DATA**

**Number of strands:**
**1 pc**

**Wire diameter:**
**9,0 –37,0 mm Ø**

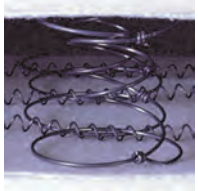
**Wire Speed:**
**0,6-1,2 m/sec.**

**Wire material:**
**Cold heading wire**

**Wire pre-treatment:**
**Electrolytic with $H_2SO_4$**

**Phosphating:**
**Zinc-Calcium-Phosphate**

## e-phos Linie
## for the drawing of spring wire

**TECHNICAL DATA**

**Number of strands:**
**1 pc**

**Wire diameter:**
**5,5–8,0 mm Ø**

**Wire speed:**
**max. 2,0 m/sec.**

**Wire material:**
**Steel wire**

**Wire pre-treatment:**
**Electrolytic with $H_2SO_4$**

**Phosphating:**
**Zinc-Calcium-Phosphate**

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## e-phos Line
## for the wire drawing

**TECHNICAL DATA**

**Number of strands:**
**2 pc**

**Wire diameter:**
**5,5 – 14,0 mm Ø**

**Wire speed:**
**1,0-2,0 m/sec.**

**Wire material:**
**Low alloyed wire**

**Wire pre-treatment:**
**Electrolytic with $H_2SO_4$**

**Phosphating:**
**Zinc-Calcium-Phosphate**

## e-phos Line
## within a lead patenting line for steel wire

**TECHNICAL DATA**

**Number of strands:**
**24 pc**

**Wire diameter:**
**2,5 – 6,0 mm Ø**

**Wire material:**
**max. 26 m/min.**

**Drahtqualität:**
**Patented steel wire**

**Wire pre-treatment:**
**Electrolytic with $H_2SO_4$**

**Phosphating:**
**Zinc-Calcium-Phosphate**

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## e-phos Line
## for the production of prestressing steel wire


**TECHNICAL DATA**

**Number of strands:**
**1 pc**

**Wire diameter:**
**8 - 15 mm Ø**

**Wire speed:**
**1,0 - 2,0 m / sec.**

**Wire material:**
**Prestressing steel wire**

**Wire pre-treatment:**
**Electrolytic with $H_2SO_4$**

**Phosphating:**
**Zinc-Calcium-Phosphate**

## e-phos Line
## as a part of a rough drawing line for saw wire



**TECHNICAL DATA**

**Number of strands:**
**1-pc**

**Wire diameter:**
**5,5 mm Ø**

**Wire speed:**
**2,0 - 2,8 m / sec.**

**Wire material:**
**Steel wire C80 - C 90**

**Wire pre-treatment:**
**Electrolytic with $H_2SO_4$**

**Phosphating:**
**Zinc-Calcium-Phosphate**

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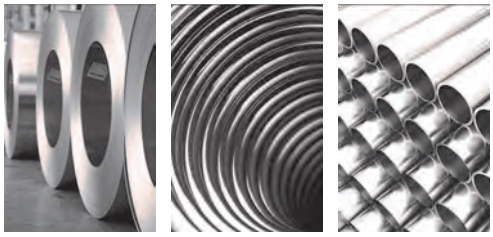

# Continuous-Copperplating Device

**for wet and dry drawing lines up to 30 m/sec.**
**with electrolytic pretreatment**
**welding wire from 0,8 mm up to 5,0 mm diameter**
**CO2, Sub Arc, Flux Cored, Stainless Steel**

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# The STAKU - Copperplating Process

## Description of Process

In autocatalytic copperplating, copper is deposited on the surface of the wire by the exchange of copper ions for iron ions. In the technology of galvanisation, this exchange process is known as “cementation”. The overall process is an example of a so-called Redox process in which the deposition of the copper takes place as a reduction reaction and iron is dissolved by oxidation. During the deposition of copper an equivalent quantity of iron ions enter into the solution. These ions have to diffuse through the increasing copper layer, leaving behind a fine pored copper surface. As a result of the constantly increasing concentration of iron ions the copper plating bath becomes unusable. Beyond a certain iron concentration it has to be discarded.

In the Ecopp process, the copper ions dissolved in an acid bath are deposited onto the surface of the wire by means of an external electrical source. This is also a Redox process. In contrast to autocatlytic copper plating, however, only electrons (from the electrical source) are attracted. An exchange of material, copper for iron, which dissolves iron from the wire does not take place.

In order to maintain a constant concentration of copper ions, copper, in the form of pellets, is dissolved in anode baskets. During the dissolving of the pellets almost the equivalent quantity of copper goes into solution as was previously deposited on the wire.

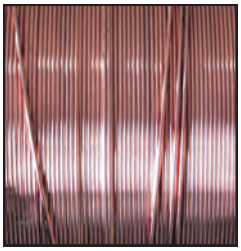
Therefore, only copper has to be supplied as a raw material; the bath does not have to be replaced and disposed of.

The anode baskets are arranged in such a way in the copper plating bath that the operator can top up the baskets with new copper pellets after opening the cover of the bath. As a result it is not necessary to stop the process.

The anode baskets themselves are manufactured from high quality titanium alloy.

## Properties of the copper layer

In its crystalline form the electrolytically deposited copper layer is denser, more homogenous and less porous than the autocatalytically deposited copper layer. The explanation for this is that no iron ions have to pass through the copper layer and the direct voltage current ensures an even deposition of copper ions along the surface of the wire.Comparative measurements of autocatalytic and electrolytic deposited copper layers produce Ra- values of 0.2µ and 0.1µ in surface roughness. Therefore it is to be expected that the much smoother Ecopp-surface will have substantially fewer problems during the feeding of wire through the hoses of the welding machine.

## Controlling the thickness of the layer

The deposition of the copper is determined solely by means of the DC connection. For this reason, an electrical connection between the copper plating plant and the wire drawing machine is required. Control is achieved by the wire drawing machine delivering an analogue signal of its speed of 0 – 10 V. This is evaluated by the PLC of the copper plating plant for the appropriate control of the rectifier. In this way we ensure a uniform layer of copper, independent of the speed of the wire. The installation has a potentiometer which adjusts the output of the rectifier depending the diameter of the wire and the desired thickness of the layer. In the event of a plant shut down, the rectifier is automatically regulated down by means of a ramp and subsequently switched off.

## Economic-ecological considerations

If one compares the traditional autocatalytic copper plating process with the electrolytic process, important advantages in the electrolytic process are identified. As a result of constantly rising prices for metals and precious metals like copper, the careful utilisation of these raw materials becomes ever more important as a considerable savings potential exists in this area. Thus, in disposing of a used bath of copper sulphate, the concentration of unused copper is still around 30g/l, which is equivalent to 30 Kg of copper in a 1000l bath. This copper, along with the acid and the dissolved iron is neutralised and ultimately disposed of, which entails enormous costs.

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# STAKU-Continuous Copperplating Device

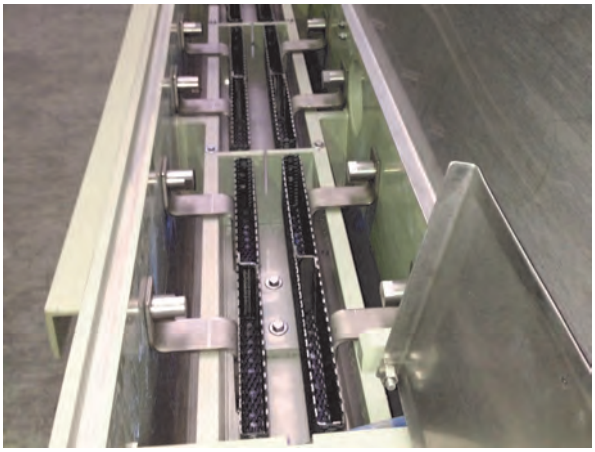
## Complete device for welding wire production

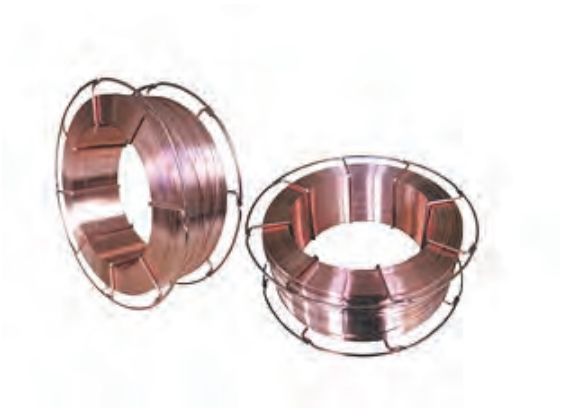
The complete device is manufactured from polypropylene PP and is delivered completelywired with integrated electric control system and ready for operation.

The treatment steps of the wire after the drawing process are:

⇒ pretreatment with high pressure cleaning device
⇒ electrolytic pickling and activating with sulphuric acid at max. 50 °C
⇒ chemical or electrolytic copperplating at 30-40 °C
⇒ spray rinsing and
⇒ wire drying by nozzles

To avoid bath entrainments, the wire is blow-dried by nozzles with compressed air.





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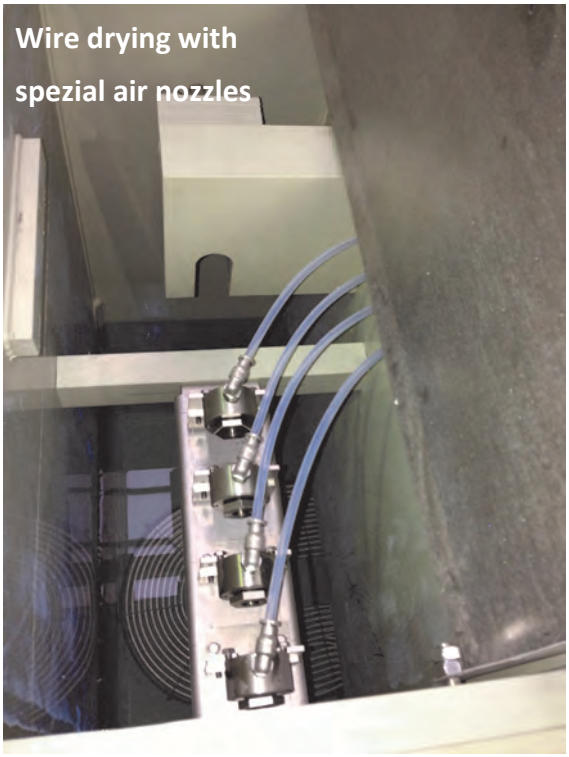
Wire drying with
spezial air nozzles

Detail views


Exhausting fan with drop separator

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# STAKU cleaning devices for welding wire producers

## STAKU-High pressure cleaning device

**Additional equipment for the STAKU-copperplating device**

for mechanical descaled wire rod, for pre-drawn wire and before copperplating

If the wire rod is descaled by using mechanical systems, known from experience, the wire surface after the drawing process is polluted with residues of stearate.

In this case, a hot water high pressure cleaning before entering the copperplating device is advisable.

View at the spray nozzles of the high pressure cleaning device

## e clean - Electrolytic continuous degreasing device for welding wire up to 15 m/sec.

If you need welding wire with a very clean and bare surface, we can provide the e-clean-continuous wire cleaning device. The device consists of following treatment sections:

- electrolytic continuous degreasing according to the mid-point conductor process
- 3-fold cascade rinse
- double ring-nozzle for wire stripping for compressed air connection

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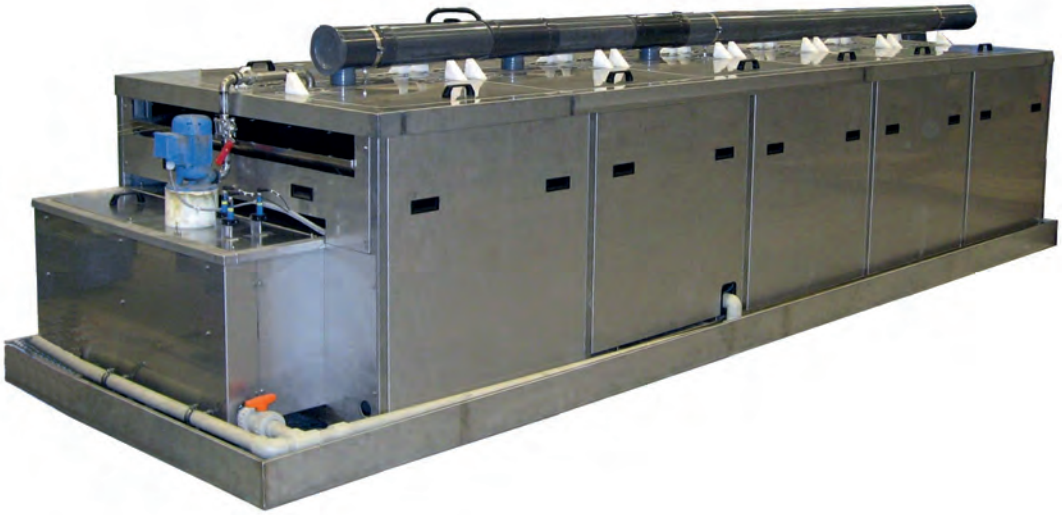
## Ultra*clean* - Continuous cleaning devices for wire with ultrasound

Areas of Application

With chrome/nickel alloys and for non-ferrous metals in particular, cleaning that is gentle to the product is crucial and desirable. For this purpose, especially, it is advisable to carry out surface cleaning using ultrasound, since this process does not attack the basic material.
This procedure allows you in particular to remove stearates and rolling and drawing oils from the surface with processing times of about 1 second.
Before carrying out heat treatment, in particular, it is possible to achieve extremely high levels of cleanliness at a relatively low speed and in a tight space using ultrasonic degreasing systems.



Tecnical data:

| | |
|---|---|
| Model: | Open frame, standalone unit,<br>hat rail generator,<br>19“ housing, modul generator |
| Capacity: | 80 W bis 3000 Watt |
| Mains connection: | 230/240 V—50 Hz, sowie 380 Volt,<br>3 Ph, N, PE |

Ultrasound frequency: 25, 30, 40, 50, 75, 250, 500 Khz, 1 Mhz

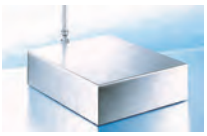
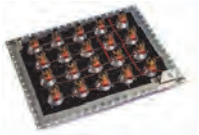
You can use our transducers to adapt the ultrasonic frequency and sound power perfectly to the material that you want to clean.


Technical data:

| | |
|---|---|
| Model: | Submersible transducer, transducer plate, rod transducer |
| Capacity: | 80 W bis 3000 Watt |

Ultrasound frequency: 25, 30, 40, 50, 75, 250, 500 Khz, 1 Mhz



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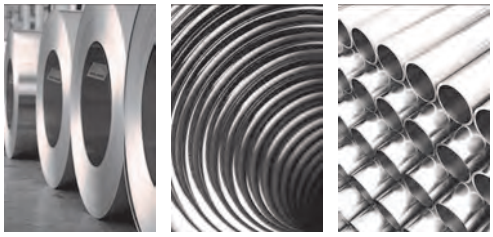

# Strip treatment lines

**for cold-rolled strip**

made of steel and non-ferrous metals

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e systems®



1. Cleaning lines

e clean

2. Electropolishing lines

e polish

3. Tinning lines

4. Galvanizing lines

e galv

5. Phosphating lines

e phos

6. Abrasive strip brushing lines

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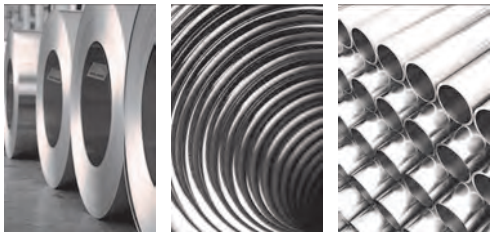

# Continuous cleaning of cold-rolled strip surfaces

## 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 anod. | 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 A/dm² anod. | 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

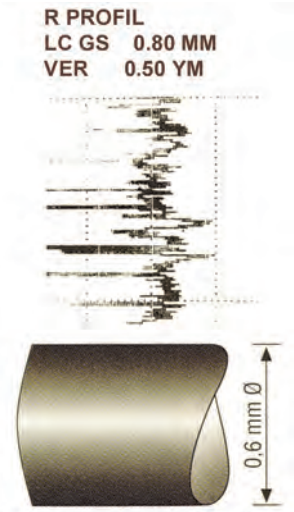
## e-clean - Electrolytic degreasing

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.

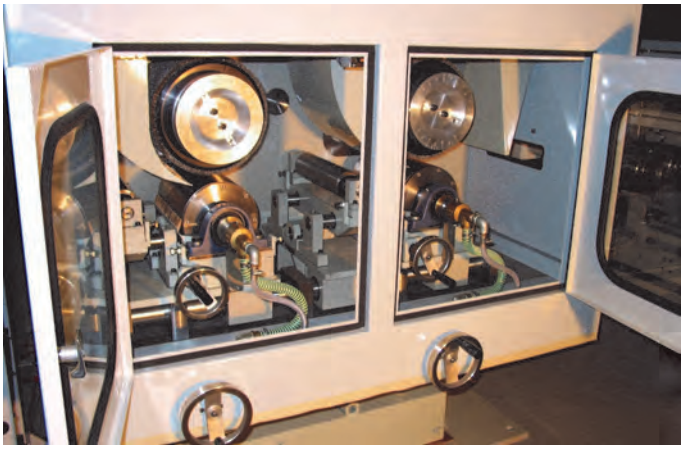
Degreasing chamber with plate electrodes and power supply line.

## 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. Cleaning 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. Cleaning lines

**TECHNICAL DATA:**

Strip material:
Copper and copper alloys

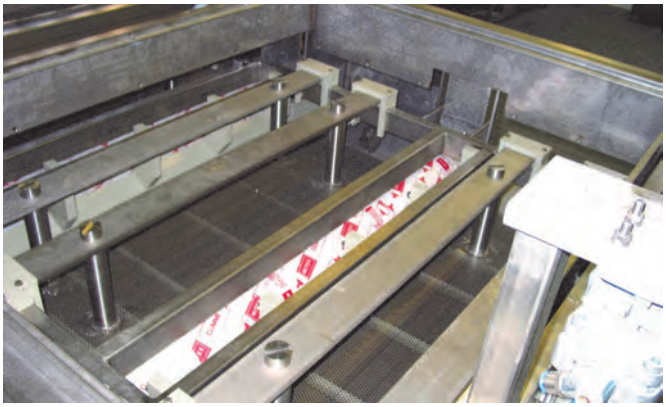
Strip width:
800 - 1280 mm

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

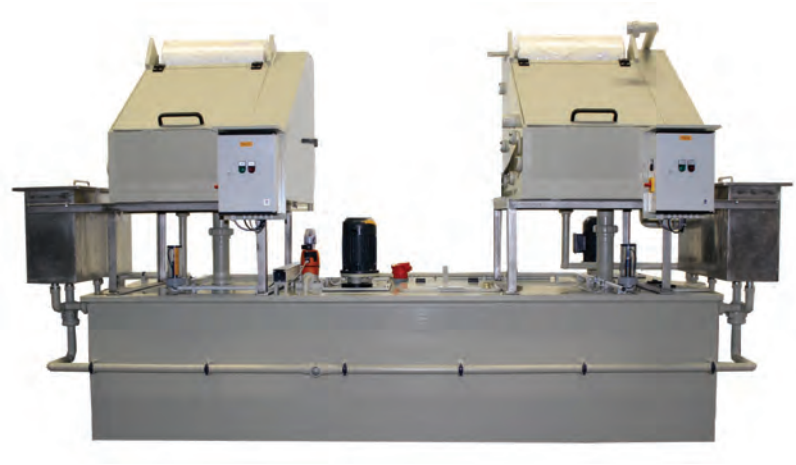
## Continuous preparation of the degreasing agent

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.

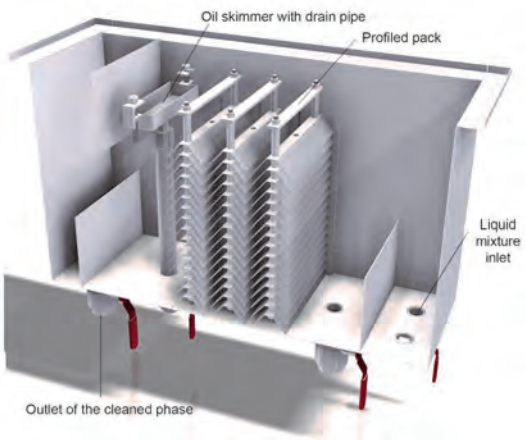
Disk belt filtration system SBF

Interior view of the disk belt filter

Receiver tank of the preparation loop



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




Interior view of the phase separator

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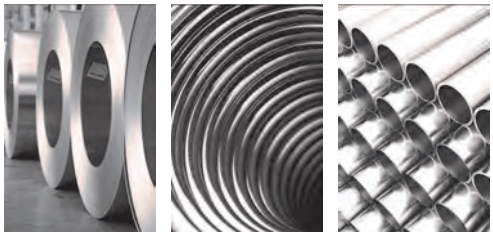
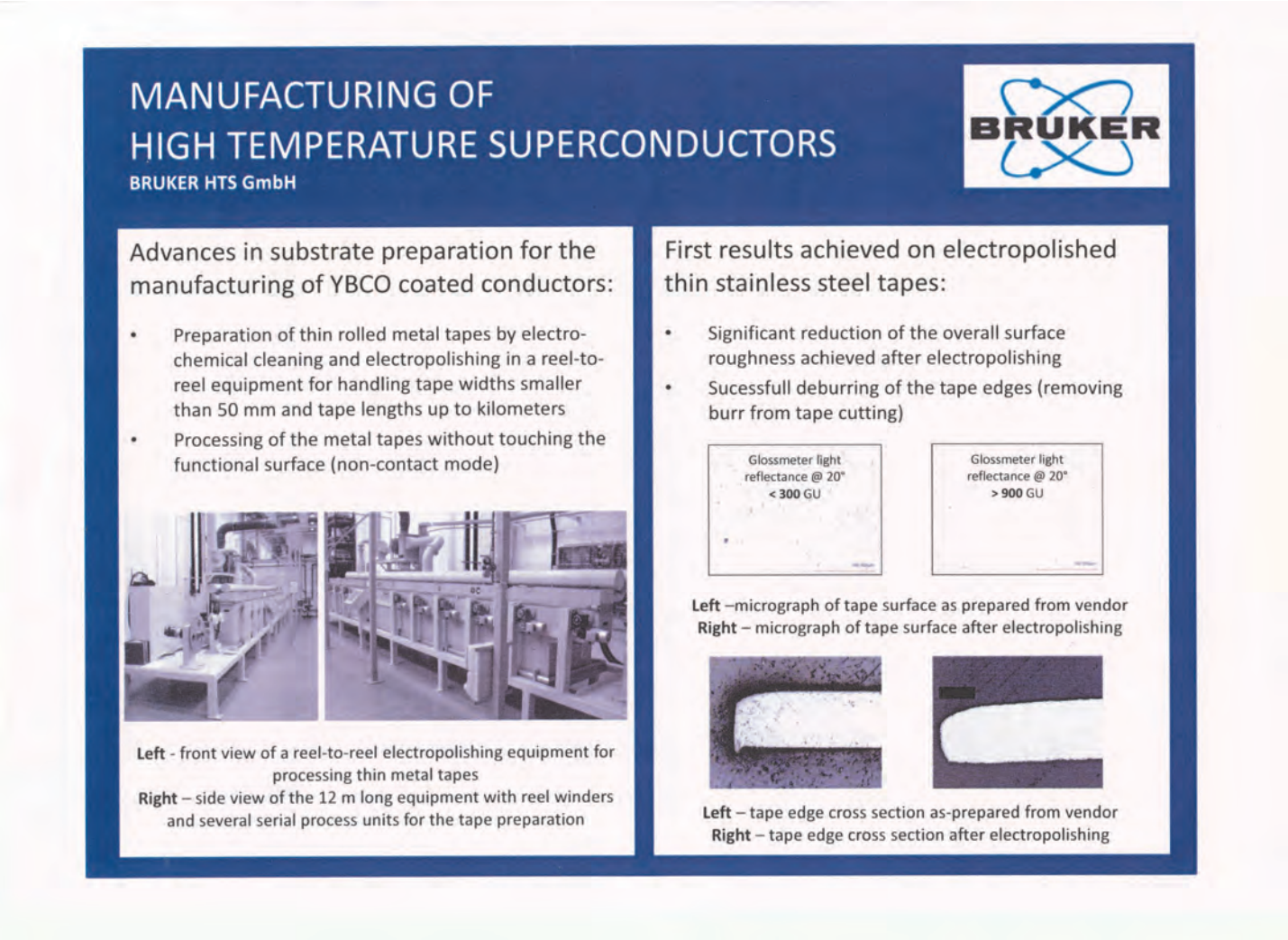


## 2. Electropolishing lines




**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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## 3. 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
- Strip tinning

## 4. 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
- Strip galvanizing

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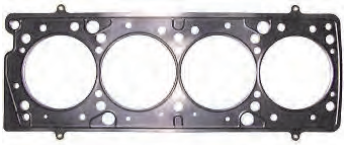
# 5. Phosphating lines

**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<br>- 3-fold cascade spray rinsing<br>- electrolytic activation<br>- 2-fold cascade spray rinsing<br>- electrolytic phosphating<br>- 3-fold cascade spray rinsing<br>- Bandtrocknung über Abquetschung |



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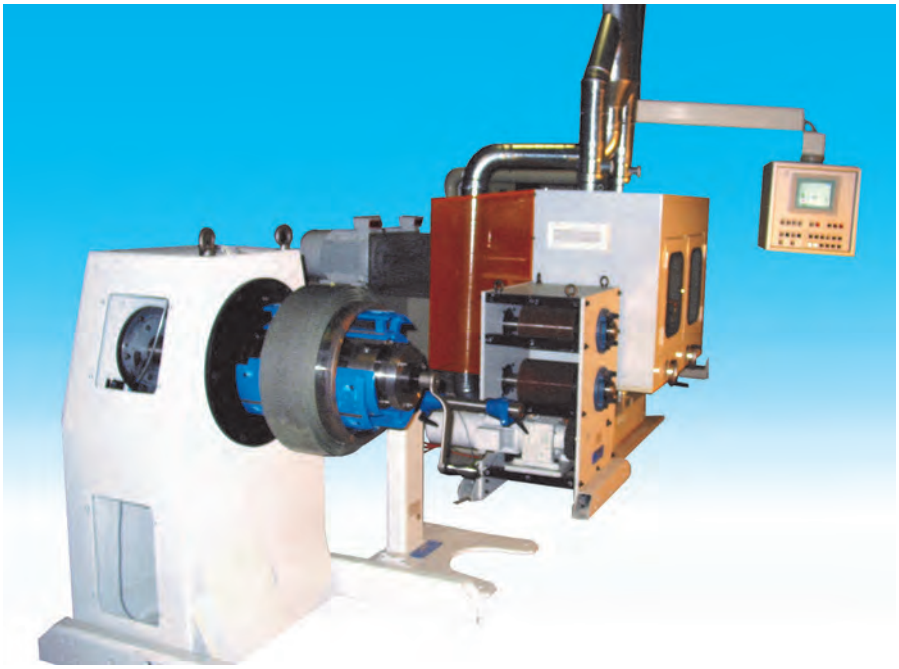
# 6. Abrasive strip brushing lines



**TECHNICAL DATA:**

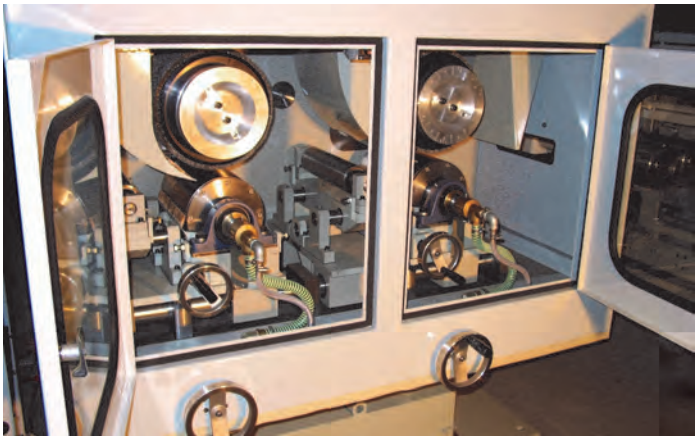
Strip material:
Copper, nickel, aluminum

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



Interior view of the brushing machine

Back view with sight at the brush gear

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**Environmental Protection**

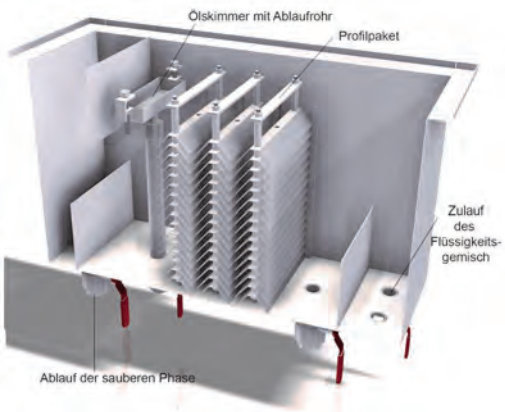


# Accessories for STAKU-surface treatment lines

## Waste water treatment

Disk belt filter type SBF

Interior view of the disk belt filter




Interior view of the phase separator

Plant for a wire drawing mill and screw factory:
- Neutralization
- Cr-reduction
- $SO_4$-precipitation
- Sedimentation
- Filtration
- Capacity 25 m³/h

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

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# Accessories for STAKU-surface treatment lines

## Cleaning of polluted exaust air

Exhaust air scrubber of a pickling line


Packed wash tower working on counterstream principle


Horizontal separator for NOx gases with drop separator and spray nozzle system completely with PP-immersion pump.

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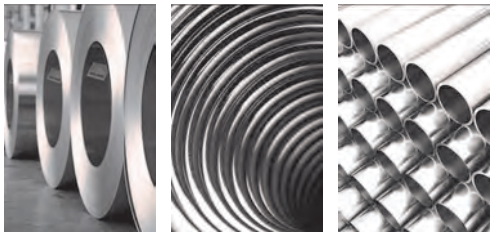

# STAKU Anlagenbau GmbH

## Patented processes for surface pre-treatment and finishing

Our competence is based on decades of experience in developing galvanic processes for pre-treatment and refinement of metallic semiproducts.

Our specialist staff in the laboratory is working permanently on the improvement of existing processes as well as the development of new processes for optimal solutions, which are realized in our engineering department. Finally in our workshops STAKU builds complete production devices.

## STAKU is looking for strong partners

As a system provider STAKU works intensively to develop and offer complete treatment lines and new galvanic coating systems in the field of alloy deposit and is accordingly looking for qualified, powerful and innovative partners to cooperate with on the specific projects.


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