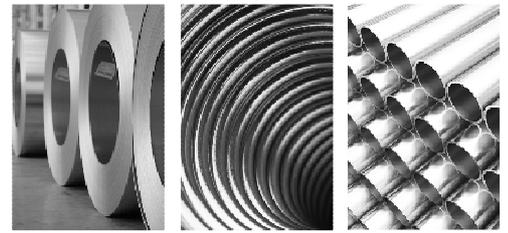


Continuous-Copperplating Device



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





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 autocatalytic 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.

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.

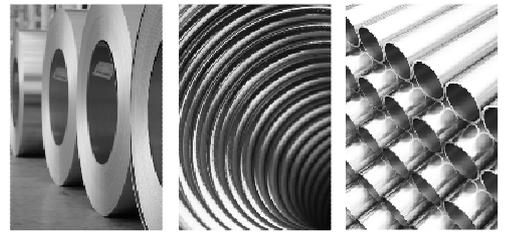
Properties of the copper layer

In its crystalline form the electrolytically deposited copper layer is denser, more homogenous and less porous than the auto-catalytically 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.



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.



STAKU-Continuous Copperplating Device

Complete device for welding wire production

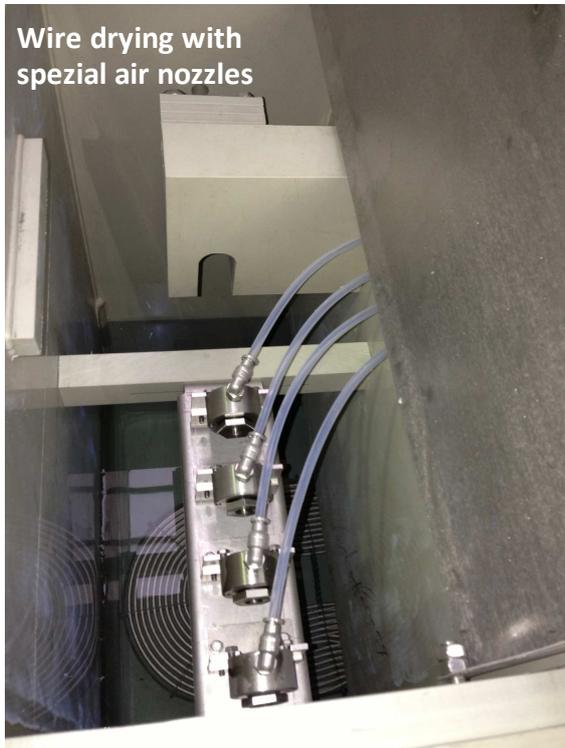
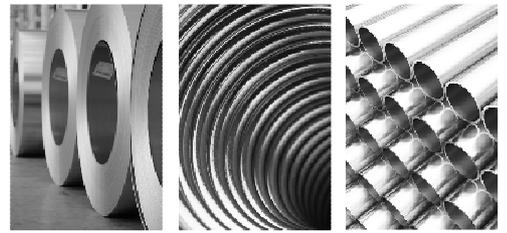
The complete device is manufactured from polypropylene PP and is delivered completely wired with integrated electric control system and ready for operation.

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

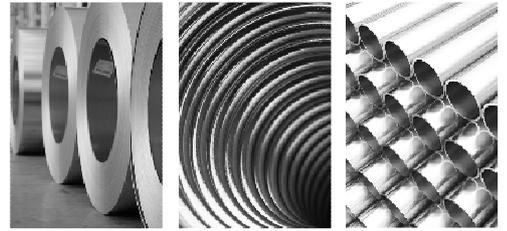
To avoid bath entrainments, the wire is blow-dried by nozzles with compressed air.





Detail views





STAKU- High pressure spray cleaning

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



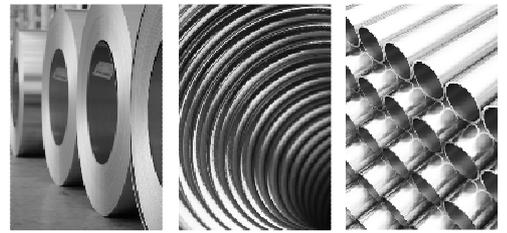
View at the spray nozzles of the
high pressure cleaning device



Additional equipment for The STAKU-Continuous Copperplating Device

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.



eclean - Continuous electrolytic degreasing device
for welding wire 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.

Process sequence:

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