By combining ultrasonic and/or high pressure cleaning with blasting the surface with superheated steam, in certain applications the performance of aqueous cleaning systems can be further optimized with regard to the surface purity to be achieved. Thanks to compact, aerodynamically optimized jet nozzles in the process zone, systems with small dimensions can be realized. The steam generated in an electric steam generator can be additionally heated to temperatures of 200 to 250 °C and then flows with a pressure of 6 bar and a temperature of 150 to 200 °C from the radiation nozzles on the wire or profile surface. Oily residual contaminants are reliably removed by the high temperature and kinetic energy of the steam jet. At the same time, the dry, superheated steam with its high heat transfer ensures rapid drying of water-wetted surfaces.

For example, when cleaning copper flat wire for photovoltaic (PV-Ribbon) after rolling, residual carbon contents of less than 0.002 mg/cm² at a line speed of up to 1000 m/min, could be achieved by a perfectly to the process matched combination of ultrasound, high pressure and steam.

For the drying of wire, strand and small tubes GEO developed a stainless steel air wipe, which guaranties optimal drying with low air consumption even at high process speed and rough handling. A surface is dried by an airstream, which is lead through a helical teflon body inside the nozzle. The airstream is accelerated, pushed into rotation and blown against the material running direction. This causes an enormous shear impulse on the interface between the profile surface and the water. It exceeds the interfacial energy of the adhering fluid. Alternative methods are clearly outclassed.

The stainless steel body of the nozzle is resistant to aggressive agents, unlike the usual plastic jets. It features protective ceramic inserts for bare wire applications and can be completely dismantled. Worn or broken pieces can be replaced. The compact design fits easily into compact process lines. The air wipe model AW-C is available in seven sizes for wire diameters from 0.5 to 17 mm. Special designs e.g. with stainless steel insert and special forms made of plastic material complement the range of GEO’s air wipes.

For the drying of strips, profiles and pipes custom designs are available upon request.
For more than two decades GEO- Reinigungstechnik GmbH (GEO) has specialized in continuous cleaning equipment for wire, cable strip and tube. Whether in classical wire drawing, in high-speed applications, the manufacture of medical products, solar cell flat wire (PV-Ribbon), superconductors (HTS), precision stamped parts or high performance magnetic materials, GEO components and systems are used in a multitude of production and finishing stages. The increasing high quality demands on the cleaning processes are realized with proven GEO components.

**CLEANING SYSTEMS**

Powerful ultrasonic transducers, high pressure nozzles and steam nozzles, integrated into space saving in-line equipment including fluid management, guarantee outstanding results in non-contact and residue-free aqueous cleaning, both in single- and multiple wire lines.

Mechanical systems with brushes or textile materials and mechanically-supported washing, either separately or in any combination, complement the options for optimizing surface quality.

Tailored to the individual requirements the cleaning systems can be combined with state-of-the-art systems for continuous bath monitoring, take-up and pay-off units and much more.

**SINGLE LINE APPLICATIONS**

In single line applications for the continuous cleaning of wire, tube and band-shaped profiles varying in size from a couple of micrometers up to 30 millimeter OD GEO's powerful ultrasonic tube reactor is the centerpiece of the system.

Compact Tube reactors are unmatched in terms of ultrasound, power density and variability. The method is based on the effect of cavitation, concentrated in a tube flooded with cleaning liquid. Inside the pipe of the tube reactor, the small amount of cleaning fluid is exposed to a high-intensive ultrasonic field creating cavitation. The concentration across the entire tube cross-section and the distinctive focus zone inside the tube causes an intensive sonication which effectively removes soap, grease, oil, emulsions or particulate contaminants inline. In-line pickling processes are supported as well.

**MULTI-WIRE APPLICATIONS**

Ultrasonic submersible transducers are the first choice for the cleaning in multi-wire applications. In case of just a few, close together guided lines GEO’s tube reactor can be used alternatively. Due to its slim design a parallel arrangement of several units is also possible.

**FEATURES:**
- High-Performance Ultrasonic Unit(s)
- High Pressure Nozzle(s)
- Efficient & Economical Air Wipes
- Insulated & Heated Tanks
- Stainless Steel Frame & Housing
- All Wetted Components made of Stainless Steel 316 Ti

**OPTIONS:**
- Steam Generator
- Extraction & Demister Unit
- Oil Separator

**HIGH-PERFORMANCE CLEANING SYSTEMS**

Cleaning with high pressure is particularly suitable at moderate line speeds and light surface dirt. Moreover, the method represents a space-saving and cost-effective systems engineering.

The core of GEO’s high pressure cleaning systems constitutes a compact high pressure nozzle especially designed for wire and tube applications. The nozzle type HDD ejects hot water via equal-spaced tapered bores at high speed onto the surface of the wire against the direction motion of the material. The resulting pressure creates high pressure forces on the surface, effectively removing soap, grease, oil and emulsion residues inline. Special additives that dissolve the surface tension or adhesion increase the effectiveness of the process.

Similar to our high performance ultrasonic equipment, the material to be purified passes through different sections. The ready-to-operate systems are usually equipped with heated tanks and bag filters.

The system performance can be modified by the number and type of nozzles and additional features like the pre-soaking bath, steam nozzles and air wipes.

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