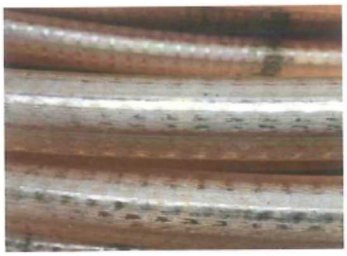
Casting challenges the drawing technology

The variety of new materials and alloys in the wire industry increases. With casting wire suppliers are able to react on varying customer's demands flexibly without being forced to modify the complete production process. Additionally, it gives them the opportunity to extend their own added value.

Casting involves that the surfaces created partially show a quite significant inhomogeneity. Due to this as well as the resulting inclusions in the edge areas of the wire the drawability of alloys created by casting is reduced. Also the drawability to fine wire is considerably decreased later on due to such surface characteristics. One option to increase the drawability is to remove the surface areas containing errors by shaving the wire. Wire produced in such a way shows a very high surface quality. By constant improvement of the machines, always new fields for this technology and its applications can be found. This also applies for the production of shaped wire, such as high-tensile trolley wire. Kieselstein International is a leading manufacturer of plants for the production of such wire. Trolley wire, which usually is copper alloy, is mainly produced by casting. Therefore, the surface containing errors affects the drawability considerably. Also the processability for example in the production of cables is reduced due to insufficient surface quality.



Detail casted wire, here copper-magnesium-alloy. Photos: Kieselstein

In the course of a project with a customer it was possible to solve these problems; on the one hand to reach a high homogeneity of the wire and to improve its drawability to fine wire, and on the other hand to achieve more flexibility of the drawing equipment. By combining shaving as a chip-removing process for eliminating the negative cast skin with a multi-step drawing for the production of shaped wire the producer can react flexibly on customer's demands. The plant shown in pictures 3 and 4 has some specific characteristics that take account of both applications.

At first the soft cast skin is drawn in several steps. The increased tensile strength serves the improvement of the cutting properties for the shaving process. Therefore, the shaving unit may be positioned quite flexibly within the plant. The result is wire that is free from surface defects. Afterwards this wire can be drawn to a diameter of 8mm which is typical for wire rod. The inlet material used has a diameter of 20mm. Alternatively, on larger size plants, wire with a diameter of up to 40mm can be drawn and shaved. The wire processed in this way can be drawn down to 0.15mm later on. Such wire is for example used for the production of cables. Shaving can be done "wet" with emulsion, "dry" or with "minimum lubrication" by using an appropriate cutting oil. The choice of the right technology depends on the wire material. For the tool, carbide or tool steel which is coated for higher wear resistance are used. For very high production quantities of a certain diameter PCD-tools haven proven. In advance a feasibili-

Chip removal by shaving.

Plant for drawing and shaving of casted wire.

Drawing block with integrated shaving unit.

ty study can be carried out in order to find out which tool is appropriate. Alternatively, trolley wire for the railway industry can be drawn on this plant. It has all the prerequisites necessary for the production of such wire. This includes a drawing die holder adjustable in five axis as well as the so called deflection ring, which allows to accumulate shaped wire on the drawing capstan without any damages to the wire surface. At the end of the process the wire is spooled layerwise. The installed spooling machine which is designed for wooden spools as well as for steel spools.

Drawing plant for the production of trolley wire.

Very low error rate

It shows a high flexibility at a very low error rate. By detection of the flange position an optimal layer-by-layer spooling can be realized and the right spool is identified by the plant automatically. In addition to the standard SPS control system the plant has further features for preventative maintenance, such as remote access, operator guided documentation and maintenance by monitoring the time requirements. The plant concept that has proven in various applications in the wire industry, may be transferred to other applications, such as the production of aluminum wire. Also brass alloys are processed by casting at first. During the "wire" show a standalone plant for shaving of brass wire as a preparation for a multi-step drawing was presented.

Shaving in this case serves the purpose of removing oxides and similar negative surface characteristics. In combination with induction annealing technology for heat treatment and the process integration included handling times and internal processing times can be reduced or eliminated completely. The plant concept created increases the availability with higher flexibility of the production at the same time and opens the customer a wide range of applications for copper alloys produced by casting.

Kieselstein International GmbH
Erzbergerstrasse 3
09116 Chemnitz/Germany
Contact person Mr. Jens Kieselstein
Phone: +49 371 9104-100
info@kieselstein.com
www.kieselstein.com