

WIRE DRAWING: EVOLUTION AND COMPARISON BETWEEN VERTICAL AND HORIZONTAL AXIS DRAWING MACHINE



Vertical axis drawing machine
Logos 2.0 Evolution

Technology 11

The wire drawing process is, in concept, quite simple. The wire is prepared by shrinking one end of it – either by hammering, filing, rolling or swaging it – so that it will fit through a conical die; then the wire is pulled through the die that has an exit section smaller than that of its entrance. As the wire is pulled through the die, its volume remains the same, so as the diameter decreases, the length increases. A wire drawing machine basically consists of a driven capstan pulling the wire through a die, thereby facilitating the drawing process. A wire drawing die is remarkable in its simplicity and effectiveness as it gives the metal a dense structure, and a hard and smooth surface. It is also an automatic testing machine detecting flaws in the metals in terms of breakage. All these functions are performed simultaneously only by virtue of the lubricants, the coatings and the force pulling the material through the die.

Over the years there has been a consistent evolution in wire-drawing machines and drawing processes, aimed at increasing productivity rates and wire quality.

Some of these improvements – the most important ones – are listed below:

- >> Drawing capstans cooled by internal water
- >> New engineering materials for machinery and dies
- >> Use of programmable logic control (PLC)
- >> Use of sensor arms to adjust the speed of the capstan according to the effective wire speed
- >> Application of more stringent international safety rules to ensure a safe operation of the machine

Modern Wire drawing machines may be classified in two separate broad groups:

- >> Single Block Drawing Machines: generally used for sizing operations
- >> Continuous Multi-pass Drawing Machines: this type of machine allows multiple reductions that would not be possible with single block machines

We would like to focus on the state-of-the-art multi-pass drawing machine for steel wire, which is the non-slip multi-pass drawing machine regulated by sensor arms, in the following configurations:

- >> Vertical Axis Drawing Machine – Logos 2.0 Evolution
- >> Horizontal Axis Drawing Machine – Megalogos

Both machine models may be supplied in a range of capstan sizes varying from 500 mm up to 1200 mm (1270 mm in the case of the Megalogos) depending on the specific customer's needs.

Basically, the two machine configurations share the following characteristics:

- >> The most modern design and construction technologies, maximizing overall performance and efficiency while minimizing the maintenance costs
- >> A pre-aligned modular frame, to facilitate the machine's installation at the customer's site
- >> A machine design studied to facilitate maintenance operations

- >> Drawing Capstans made of induction-heated forged steel yielding hardness up to 62 HRC for an increased working life
- >> Direct air cooling system
- >> Easy cleaning of the capstan/die box area
- >> High sensitivity speed control through a sensor arm on each capstan
- >> Refilling of soap boxes is possible while the machine is in operation
- >> Machine design is specifically studied to ensure the highest safety of the operator

Nonetheless, some basic differences remain and permit a better customization of the machine to each specific customer's needs and preferences.

Here are the specific features of the vertical axis Logos 2.0 Evolution:

- >> High efficiency narrow gap cooling system
- >> High efficiency transmission system utilizing a combination of gear box, belts and pulleys facilitating very low energy losses and minimum required maintenance

The characteristics of the horizontal axis Megalogos are:

- >> Ergonomic design facilitating the string-up operation, especially for larger wire diameters, and permitting easier maintenance as most of the operation can be handled easily from the back side of the machine without having to crawl under the machine, as is sometimes necessary for vertical axis machines
- >> High-efficiency sprayers cooling system: this cooling system comes from our vast experience in casting lines and, by means of a set of sprayers, provides a constant water temperature along the entire capstan surface, hence granting high heat removal capacity
- >> Transmission through epicyclical gearboxes and mechanical coupling, resulting in a high-efficiency and low-maintenance system

We are able to provide drawing machine configurations tailored to each customer's specific needs and preferences.

by *Gabriele Muscamera*

Horizontal axis
drawing machine
Megalogos

