

EXPLORING THE RANGE OF CCR LINES FOR PRODUCING ALUMINIUM ROD

20 Technology

In order to understand the range of Aluminium CCR Lines presently offered by Continuus-Properti, one must understand how the company began and the almost 70-year journey that continues to define our mission today.

Ilario Properti was truly a genius! In 1947 he invented and patented a process that would revolutionize the distribution of electrical power throughout the world. This process was the continuous casting and rolling of nonferrous metals into wire rod.

A modern term that would be used to describe this invention is Disruptive Technology (or Disruptive Innovation). This is defined as “those technological advances that fundamentally change a market or industry, often by displacing an existing technology”. Disruptive technology can fundamentally change the rules of the game for an entire industry: either because it represents a shift in efficiency, a shift in economics, or ideally both. This is exactly what Ilario Properti did for the production of wire rod; his process displaced that of wire rod production starting from wirebars, it did it more efficiently and it fundamentally changed the wire rod industry forever!

The Properti organization, led by Giulio Properti, continues this spirit of innovation through a highly motivated and technically-oriented staff. Continuus-Properti holds more than 400 patents throughout the world; a true testament to this innovative spirit! With nearly 200 people, more than 30 of which are engineers, the organization services our customers and equipment throughout the world.

The evolution of the aluminium wire rod market has been, and continues to be, greatly influenced by the demand for electrical energy. The aggregated demand for electrical power in 1950 was 1,850 TWh, it climbed to 3,700 TWh by 1965, it reached 10,000 TWh by 1990, 13,000 TWh by 2000, and nearly 20,000 TWh by 2013. It is forecasted to surpass 30,000 TWh by 2040 and some ‘experts’ think this figure will be closer to 35,000 TWh! Thousands of kilometers of power cable will be required to transport and distribute this energy throughout the world.

Properti has manufactured and installed more than 250 Aluminium CCR Lines during our near 70-year history. As the demand for electrical energy has grown, so has the demand for wire rod needed to construct the distribution network for this energy. As a consequence, the production capacity and versatility of the Properti CCR Lines increased as well. Currently, there are more than 145 Properti Aluminium CCR Lines still in operation throughout the world.

The Casting Machines in the late 1940s and early 1950s had a production capacity of approximately one metric tph and they made use of Casting Wheels that were under one meter in diameter having a casting groove around 800 mm². Today the Properti Aluminium Casting Machines have evolved to the point where the Casting Wheels can be as large as 3.5 meters in diameter, have a casting groove that exceeds 5,400 mm² and produce 15 metric tons of aluminium per hour. Today, we offer a complete range of Aluminium Rod Lines that cater to the small independent cable maker, to the cast houses of the largest smelters, and everyone in between.

The Rolling Train has always made use of the Properti 3-roll technology. This technology facilitates a nearly perfect balance of lateral spread and longitudinal displacement of the metal during each reduction step. Properti Lines are equipped with tandem Rolling Mills; a Roughing Mill comprised of 2-roll Stands to achieve higher reductions in the initial rolling passes and a Finishing Mill comprised of the infamous 3-roll Stands to achieve excellent control of the rod geometry. As the production rates increased so did the size of the Rolling Mills.

However, the size of the Lines is not the only thing that changed over time, the lines continued to become more and

... a sea of coils ready for shipment





Large size
Casting Machine

more flexible in order to meet the ever-increasing demand for different types of power cable constructed from different alloys in order to meet specific market requirements. In addition to the typical Aluminium Conductor Steel Reinforced (ACSR) cable made from EC Grade rod, the aluminium wire rod market demanded more complex solutions for the transportation and distribution of electrical energy. This manifested itself in the development of the following types of conductors:

- >> AAAC (All Aluminium Alloy Conductor) made of electrical conductors such as 6101, 6201, 5005, 8107, 8030 and 8176
- >> ACCC (Aluminium Conductor Composite Core) made of EC Grade aluminium with low temper (H11) and using a hybrid carbon and glass fiber core
- >> Aluminium alloys using Mg and Zr commonly called TAL, XTAL, ZTAL and known as sag resistant conductors

Continuous-Properti designs, engineers and manufactures customized Aluminium CCR Lines that are capable of producing all of the above electrical alloys as well as mechanical alloys used for various applications including fasteners, welding wire, screen wire, utility wire, rivets, fence wire, screw machine stock, impact extrusion, etc. These mechanical alloys include those from the 2000, 3000, and 4000 series of aluminium alloys as well as a host of 5000 series alloys and a few 6000 series alloys destined for mechanical applications.

The individual Lines are equipped with the necessary auxiliary equipment to facilitate the production of the desired alloys. Depending upon the different alloys that need to be produced, this auxiliary equipment can include, but is not limited to, the following: Cast Bar Cooling Tunnel, Bar Straightener, Bar Milling Machine, Bar Induction Heater, Quenching System, etc.

But the evolution of Properti Lines did not stop there. The wire rod needs to be collected in a suitable package that can be efficiently transported and utilized in subsequent manufacturing operations. This package is a tight coil and it is made on an Automatic Twin Reel Coiler. The Properti Twin Reel Coiler is available in a host of configurations in order to facilitate collection of rod having drastically different physical and mechanical characteristics. The desired rod diameter can range from 9.5 mm to over 30 mm. Typically the rod is round, but some shaped rod is also produced/coiled on Properti Lines. The rod tensile requirements can be very low, as low as 80÷85 MPa, or they can be very high, over 300 MPa.

The aluminium rod market is very demanding. In order to cater to the needs of the entire market, Properti Aluminium Rod Lines are tailor-made to suit customer needs as they strive to meet more complex power cable requirements through the manufacture of the various alloys and conductors mentioned above. The Properti range of Aluminium CCR Lines are not only designed to meet these needs from a casting, rolling and coiling perspective, but also offer great flexibility to allow customers to develop new, cutting-edge alloys. Our commitment to the industry and to the customers we serve started nearly 70 years ago and continues to grow stronger with every passing year!

By G.E.M.

Finishing Mill equipped with ten 3-Roll Rolling Stand

Jumbo Coiler with Automatic Unloading System

