

From CCR Aluminium Rod to CCR Copper Rod

In the mid-1950's, nonferrous metallurgy, for copper in particular, was very similar to the technology of previous centuries. Reading a temperature or the oxygen content was more "magic" than technical. Only the very old remember the ordinary tools of the time such as the Seeger's cones (little pyramids of different composition melting at different temperatures) or the evaluation of the oxygen in copper by watching to see if the upper surface of a solidified sample was flat, convex or concave!

Pure aluminium in itself has an affordable behavior when melted and poured. It is self-protected from oxidation and small impurities do not affect its properties' malleability.

On the other hand, copper is a delicate metal. Everything can affect its behavior. Some sulphur contained in the furnace fuel, the flames of the burners, hydrogen and oxygen content, surface oxides and a few ppm of several metals can make you crazy when you work with copper. In addition, the much higher melting temperature required new and different materials for tundishes, belts, spouts and casting ring to obtain a life span at least one shift long.

Mr. Ilario Properzi was a very calm but resolute man; despite the expected difficulties and the overwhelming skepticism of the copper industry experts, he was able to see the future and the far away success of his method of continuous casting with a wheel and belt machine followed by direct rod rolling with a multistand/ monoblock rolling mill for copper.

Experimenting was Ilario Properzi's passion and delight. In 1954, using what little money he had, he began experimenting on a modified casting machine Mod. 6 with an 1100 mm diameter wheel.

In October he would write to his American agent, in a mixture of Italian and English, that he was ready to show "a run upon Model 6 Machine on copper" to an American visitor. His only help at the time was a small oil fired rotary furnace, which was loaned to him for a short period of time by a manager at Pirelli on a personal basis rather than on a common interest or joint venture basis. At the end of the loan period, Pirelli, the largest cable company in Italy, decided not to pursue any collaboration.

Our inventor succeeded in finding another furnace and continued his experimentation with copper when he was not too busy supplying his Aluminium lines to customers all over the world. Tests were discouraging: one step forward, two steps back. One day he produced hundreds of meters of sound bar (sometimes the workers carried the small bar along the street in front of the building!), but the next day he produced only small pieces of black copper from the wheel.

Ilario understood that a proper furnace for the Properzi process had to be invented and started working on this project. Tired of fuels contaminated by sulphur and of unstable burners, he worked on inventing a new type of electric furnace. It was a basin similar to the ones used in the Aluminium pot lines. Cathodes were





placed on the bottom while granules of charcoal covering the cathodes worked as resistance and as an anti-oxidant.

Good idea: it was simple, not expensive and assured stable copper quality... in theory, but it never worked out; the only production was a sort of nougat, a mix of copper and coal granules.

He went back to a gas fired furnace (expensive LPG) and his experiments began to produce better results. Some cast bar was reheated and rolled producing short lengths of good rod. This success made possible a renewed effort to seek out joint ventures with copper mines or cable companies with something solid in hand, but also with something that required additional experimentation. In fact, as discovered later on, rolling of reheated bar or rolling directly in line are two different

things as the latter process requires a bar of superior quality. Copper mines were politically against the Properzi process that could jeopardize the wirebar market and the cable companies were very much linked to the mines. Everyone was one hundred percent skeptical.

Toward the end of 1957, Ilario Properzi realized that securing a partner for a joint venture was a must as there was a lot of work to do, a lot of copper, and a lot of downstream tests that he could not afford. Finally, in early 1958 an agreement was signed with Felten & Guillaume, a famous cable company in Germany. Continuus-Properzi would supply, for experimental use only, a fully working caster and one rolling mill as well as specialized personnel to run and test it in the German factory.

The machinery was delivered, installed and tested. The final outcome will be revealed in the next issue of Properzi Tech News. *by Giulio Properzi*

