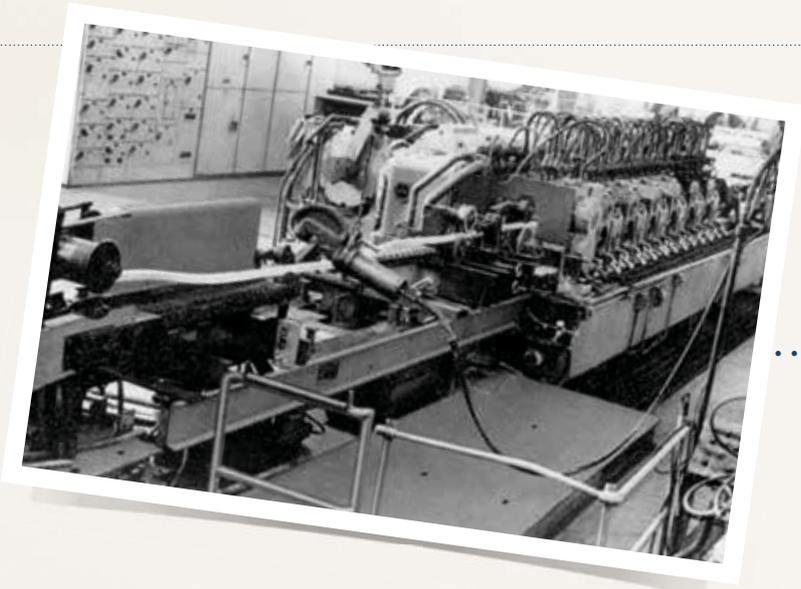


CHAPTER 4

## COPPER SCRAP: AN OLD CHALLENGE... AND AN OPPORTUNITY OF TODAY

24



Properzi Rolling Mill installed in Nassau in 1965



Copper scrap – the bank of energy

Today only a fraction of all continuous copper wire rod produced and consumed worldwide does not come from cathodes. It can come from an up-cast system, from a wheel and belt caster, from a two-belt caster and then rolled or drawn by different mills but always the raw material is copper cathode. The fraction we are talking about is the so-called Fire Refined High Conductivity rod obtained from 100% copper scrap.

It is interesting to remember that in the pioneering era of continuous rod produced by the Properzi System during the late fifties/early sixties the raw material was almost exclusively copper scrap.

At that time copper producers used and preferred to melt their own cathodes to make wirebars for the market instead of selling the cathodes to others.

This made the early days of the Properzi System very difficult. Even if the scrap was a good mix of bright copper from the drawing shop and old wires, the melting and refining technology was really ancient and the means to control the chemistry of the molten copper was either very rudimentary or nonexistent.

Melting furnaces were static and fired by oil contaminated with sulphur! Scrap was refined bringing the oxygen content of the melt up to a range of 8,000 to 10,000 ppm without measuring the ppm but only by observing the manner in which a sample solidified and the color of the cracked sample!

Reduction of the oxygen content was done submerging an entire, fresh tree into the melt until another copper sample

seemed good enough. Even the powerful Bell System – the US telephone monopoly – when using their Properzi System at Western Electric in Nassau (1965) had to send samples of the melt and pieces of rod to an external laboratory in order to check the copper chemistry by spectrographic method while rod/wire pictures were taken using a powerful microscope. Results were available to the plant only after a couple of days or more.

Despite the above, the Properzi System was created and successfully delivered to the copper wire industry: a miracle! copper producers liberated the cathode market and ETP continuous rod became the winning commodity. Many years later – during the mid-eighties – a Spanish company asked if we could supply one CCR line to cast and roll copper rod from scrap. The answer was ‘certainly we can’, having already done this twenty years ago.

But words are difficult to believe and we had to arrange a test to demonstrate our claims.

During that period we had a very good relationship with a company in Turkey who operated one of our copper plants with a shaft furnace, a holding furnace and the Properzi CCR line. Since the holding furnace had a 20 plus ton capacity, we shipped a truck full of copper scrap to Turkey and were able to melt, refine and make some rod.

Adding to this test our written warranty that it could be done, we succeeded in selling the line to La Farga Lacambra near Barcelona – a company that, at the time, was in a financial



3-D view of the new patented refining furnace



View of one modern CCR Line producing FRHC rod

situation similar to "Chapter 11". The entire project was totally successful and progressively La Farga increased their business, their technology, and their products, eventually becoming one of the largest participants of the copper industry in Europe. Licensing La Farga's production know-how, Continuus-Properti has sold several dozen copper rod lines producing rod from scrap over the past 20 plus years and now this technology is well known in certain areas of the world where the metal commodity industry has been bullish during recent years.

The FRHC rod of today, is an economic commodity that reduces the exploitation of the planet, resurrecting copper scrap of first, second and third quality, which saves much considerable energy in comparison with to ETP rod and can comply with ASTM-B49 and EN1976 standards.

It is produced in a batch process meaning that each day, usually 300 days per year, the furnace is charged, melted and refined in about 17-18 hours and then transformed into 8 mm rod – but also into larger diameters up to 23 mm – by a Properti CCR line.

However, it is difficult to continue to manufacture the same products, produce the same machinery or sell the same technology for a period of time spanning 20 years or more. We are of the opinion that a plant built in the 1980s cannot be an optimal showroom as it does not accurately portray the modern refining furnaces we recently developed and the latest designs of the Properti CCR lines. La Farga also has a different vision about their future so the two companies are now

independently exploring the market. Although collaboration between the two companies might continue but on a case-by-case basis.

We have now developed and realized our ideas on how a system to produce FRHC rod should be configured:

- >> The furnace must have our patented system for charging scrap from the roof and not from the side.
- >> The charging of scrap into the furnace must be done with a conveyor belt or a skip hoist machine, and not by wheeled front loaders, for a faster and less energy intensive result, thereby keeping this phase near to a seven hour period.
- >> The slagging operation must be facilitated by a dedicated device and should not be totally manual.
- >> The CCR line must be powerful enough to empty the furnace in a maximum of seven hours providing the opportunity for a refining phase that can be up to ten hours long.

In other words our current system of recycling copper scrap into FRHC rod is more energy efficient, more users' and environmentally friendly, and dedicated to refining with less stress for the operators. In summary, it is more profitable.

*by Giulio Properti*