

# Continuus-Properzi's new look

The size of a company is not measured solely on the magnitude of its revenue but above all on its ability to evolve, to change, and to continuously improve.

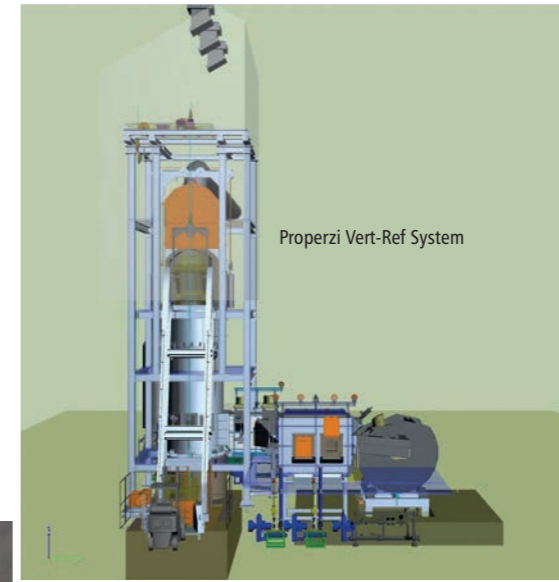
Over the years, Continuus-Properzi has expanded its product range so that it can offer its customers complete systems: from furnaces to coilers, from the new IULIUS4.0 applied technology to the new

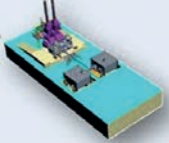


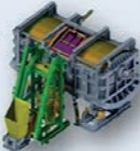
Technical Consultancy Service available in three versions. The latest Continuus-Properzi innovations have been focused on our furnace technology that is divided according to the material to be processed, starting from furnaces for copper scrap then passing to those for Aluminium.

To optimize and support this division,

the Continuus-Properzi Board of Directors decided to improve and implement its engineering expertise by dedicating a Research and Development team to the study of Properzi technology applied in the design and realization of Furnaces.

Here is a **chart** (left) showing the complete typology of Properzi furnaces that we are going to highlight



TYPOLOGIES OF PROPERZI FURNACES	
PROPERZI FURNACES FOR ALUMINIUM LINES	PROPERZI FURNACES FOR COPPER LINES
<b>VERT-MELT (VERTICAL MELTING) FURNACE SET</b> 	<b>VERT-REF (VERTICAL REFINING) FURNACES FOR COPPER SCRAP</b> 
	<b>SHAFT &amp; HOLDING FURNACES FOR COPPER CATHODES</b> 
	<b>REVERBERATORY SCRAP REFINING FURNACES FOR COPPER SCRAP</b> 



An example of Reverberatory Refining Furnace - 250 Ton



Vert-Melt Furnaces Set for AL Lines



Shaft and Holding Furnaces - Properzi CU Lines 12.5 tph

### Vert-melt furnace set for aluminium lines

Today, in the modern globalized world, large Aluminium CCR rod lines may require a Furnace Set (Melting and Holding) with production rates above 5.0 tph up to 8.0 tph and higher, and, at the same time, that provide a modest investment cost, a compact lay-out, low maintenance, and low gas consumption.

Taking advantage of 30+ years of experience with Shaft Furnaces, only Continuus-Properzi can currently offer a precise answer to this market demand that is the Vert-Melt family of furnaces.

The Vert-Melt furnace is a combination of a vertical (shaft) melting furnace with a static receiving/holding chamber.

### Main advantages

- Very high production rate
- The skip charging machine is virtually automatic
- Constant melting rate not disturbed by charging operation
- Energy efficiency is approximately 25% higher than any Reverberatory Furnace with regenerative burners
- Metal losses are more than three times less compared with a Reverberatory Furnace: 1.5% versus 5%
- Easy operability and low maintenance
- Low emissions
- Possibility of continuous production of alloys by feeding two Holding Furnaces: one for alloying practices and one to feed the casting machine
- Vert-Melt Technology does not require sophisticated and energy wasting stirring systems nor delicate maintenance and spare parts for regenerative burners and tabular alumina

The charging system is very reliable and permits loading either ingot bundles or compressed bundles of pure aluminium scrap. The charging system is equipped with the following safety devices:

- Overload protection, to prevent operation exceeding the maximum admissible charging load
- Surrounding protections properly interlocked
- A closed circuit TV and camera system which monitors the charge position

inside the Shaft

The advantage of this continuous charging system is that heat loss is minimal and the furnace walls are not subjected to any thermal shock.

### Furnace set for copper lines

The variety of the Properzi family of furnaces extends, as we have indicated above, to furnaces suitable for the completion of plants for the production of copper wire rod starting from two types of products: cathodes or scrap (with different percentages of copper), or even for plants that can process both materials.

Let's start with continuous refining from scrap.

### Continuous copper scrap refining

When scrap has Cu content  $\geq 97\%$ , an even more efficient technology has been developed. In this case the Properzi Vert-Ref technology is applied.

The vert-ref system for copper scrap recycling

The new Vert-Ref Process is an evolution of the well-known Cosmelt System supplied by Continuus-Properzi based on 20+ years of experience. The Vert-Ref Process facilitates the melting, slagging, refining and homogenization of copper scrap in a continuous or batch operation in order to obtain molten copper with a controlled content of impurities for the production of copper ingot, copper rod, or other copper products.

The Vert-Ref System consists of a special shaft furnace where a skip-hoist machine charges the scrap that is melted and starts the refining process. There are one or more refining chambers at the bottom of the shaft furnace where additives are added and some slagging is done. At the exit from the last chamber the melt has been refined but is still too high in oxygen content. The reduction operation is accomplished in the downstream holding furnace by tuyeres or porous plugs. For continuous operation a second holding furnace is needed and, in some cases, a third one may be required.

### Main advantages:

- Increased thermal efficiency
- Longer refractory life and very short downtimes
- Easier slagging and refining
- Easier fumes filtration
- Cheaper refining process with less additives

- Improved final chemistry of the molten copper

### Production range

The Vert-Ref System is very flexible and offers many possibilities taking into consideration that the downstream casters may be continuous or discontinuous, therefore dozens of configurations of the production plant are possible.

The Vert-Ref melting shaft furnace is suggested in the range 5-12 tph while the total annual production may vary from 8,000 up to 40,000 tpy and higher with different arrangements of casters for rod, billet, ingot or other products and with different quantity and size of holding/reduction furnaces installed within the system.

Always beginning from the melting of copper scrap, another typology of furnaces is the reverberatory scrap refining furnace.

### Reverberatory scrap refining furnace

Recycling of copper scrap is not only environmentally friendly, and an example of a circular economy, but provides a good opportunity for a prosperous business.

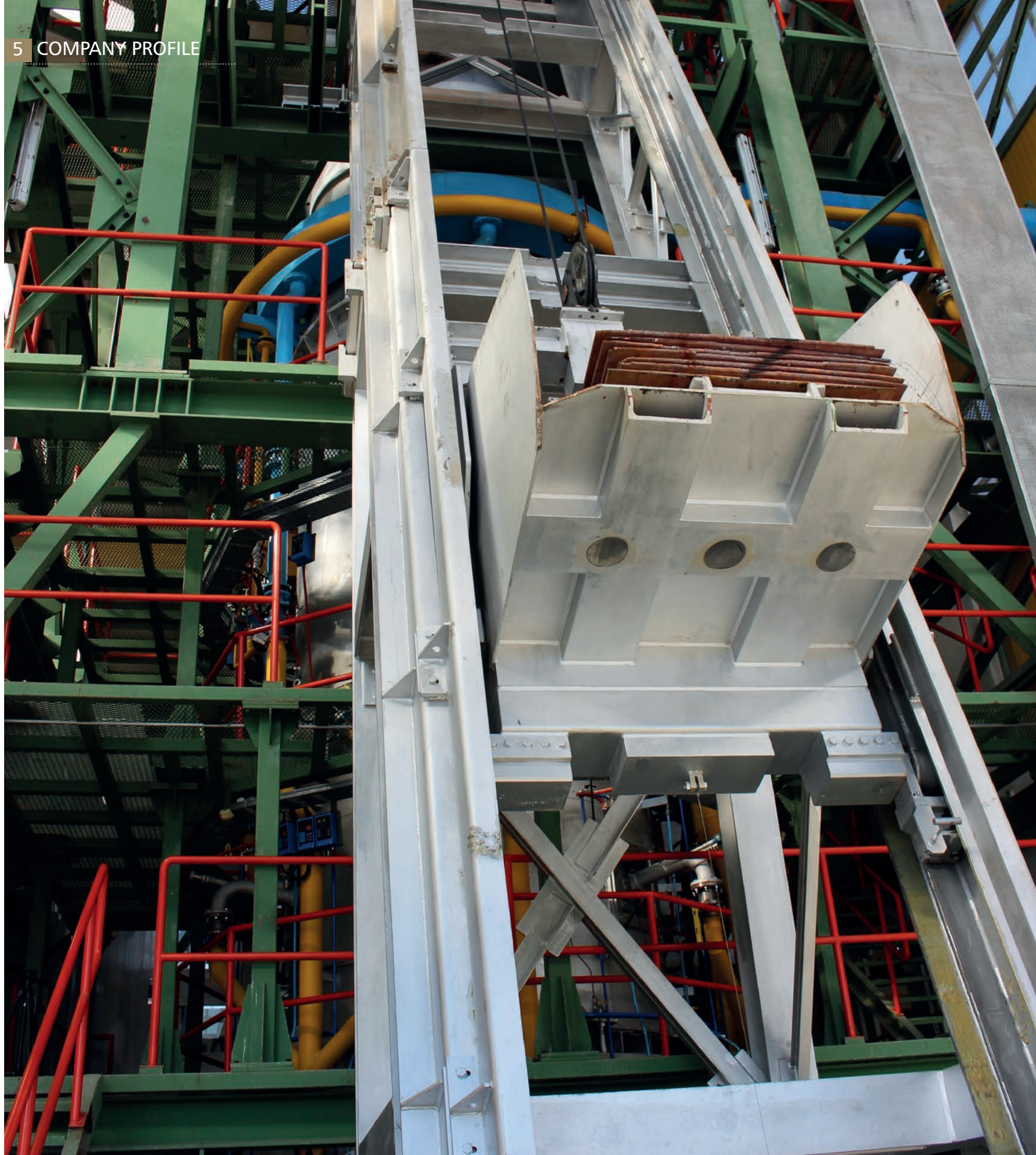
Continuus-Properzi introduced an important evolution of the old model of reverberatory furnaces that were tiltable on wheels or rollers and were developed during the second part of the 20th century for the steel and copper industries.

The general geometry of the old reverberatory furnaces was always similar except for the size and the different brands. The charging door(s) and the slagging door were on one lateral side while the pouring spout and the tuyeres were on the opposite side. The main burner(s) and the fumes exit were located on the shorter sides of the furnace opposite to one another.

Continuus-Properzi patented a new design in 2010 where, as a major difference, the charging door was located on the roof of the furnace thereby allowing a faster, simpler, and more automatic charging operation.

The loading system can be accomplished via a skip charging machine or an industrial belt conveyor. The latter system is the most advantageous for larger size furnaces allowing many tons of scrap to be charged in just one minute.

Continuus-Properzi provides Reverberatory Refining Furnaces that cover all the different sizes of Copper Casting Lines from small ones, which produce 10,000 tons per year, up to large ones producing 75,000 tons per year. The first 250-ton capacity Refining Furnace using this new roof top charging concept has been in operation in the USA since 2012 with excellent results. Top-charging 100



Cathodes Loaded Automatically

ton and 150-ton capacity Reverberatory Refining Furnaces followed.

The refining know-how developed and optimized in many installations during the last 25 years is the key to the profitable operation that Properzi can offer to Clients worldwide.

The Reverberatory Refining Furnace can be fed with 100% copper scrap with minimum 94% Cu content that could be a mix of many different kinds of copper scrap thereby saving hundreds of dollars per ton on the raw material!

This technology is designed and capable to process copper scrap into liquid metal with a controlled content of impurities. The production of this molten copper is suitable to produce FRHC (Fire Refined High Conductivity) copper rod, strip, billets, or copper ingot.

We will now move on to the furnaces designed for the production of wire rod that starts from the melting of cathodes; in this case the most suitable Properzi furnace set will be shaft + holding.

Shaft + holding for copper cathode  
Properzi has 40+ years of experience in designing such furnaces and was the first to develop the pre-mix burner system that today is adopted by all furnace producers.

#### Various size options:

##### Small output rate

- Production rate: from 5 to 10 tph
- Expected yearly output: from 25,000 to 58,000 tons

##### Medium output rate

- Production rate: from 12.5 to 20 tph
- Expected yearly output: from 61,000 to 115,000 tons

##### Large output rate

- Production rate: from 25 to 40 tph
- Expected yearly output: from 125,000 to 250,000 tons

The cathodes, and up to 15% clean copper scrap, are loaded automatically and scattered inside the shaft furnace in order to increase melting efficiency thus reducing fuel consumption and refractory wear as well.

The melting rate and the combustion quality are strictly controlled by Properzi's state-of-the-art burner combustion system, where the combustion air-to-fuel ratio of each burner guarantees consistent melting at the desired value.

The optimal combustion parameters, so maintained, facilitate optimization of flame quality, negligible dissolved hydrogen (gassy-copper), improved refractory service life, and, last but not least, fuel savings. The thermal consumption of a Properzi Shaft Furnace is the lowest in this type of application and the quality of the liquid copper, collected in the Holding Furnace, is suitable for the most severe applications and meets the most stringent standards.

Moreover, we provide the maximum flexibility in terms of design, configuration, and scope of supply, from just the technological package to a complete supply on an EPC (Engineering, Procurement, Construction) basis so that our customers can be only minimally involved with the installation of the plant. This flexibility is a distinctive characteristic of our company.

In the end, it is important to underline that any facet of Properzi technology which is utilized by our customers will always be supported by specialized after-sales service and assistance.

The advantage of having Properzi as your equipment and technology supplier/partner for the complete development and lifetime of any project is the strength of the company itself which can offer highly specialized technical consultancy services (for all Properzi users) through three different options:

**1.** E-mail Consultancy - a fast "problem solving" approach based on information exchange via e-mail. The Customer will detail the issue to [consultancy@properzi.it](mailto:consultancy@properzi.it). Properzi will deploy its dedicated and qualified engineering/process team until problem resolution.

**2.** Remote Assistance - it is a direct point-to-point connection between Properzi's control room and Customer Line PLC. To enable the Remote Assistance Service a communication module has to be installed and connected to the Internet.

**3.** Technical Audit at Customer Site - This requires dispatching Properzi's specialist(s) to site in order to assist the customer in resolving the most critical issues, those which cannot be addressed by mail and require Properzi's physical presence on the Line.

We are always a step ahead in finding continuous innovation and new solutions to make life easier and more economical for all our customers. ■