

Yesterday, Today and Tomorrow

PROPERZI

ETP & FRHC Copper World



NOTE

The equipment displayed in this magazine has been photographed without protection for editing purposes.

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First Edition - 2026

Rooted in Continuity, Focused on the Future

(Where Roots Become the Future)



We live in a fast-paced world: markets, technologies, decisions. It is a complex, often unstable time, which requires companies not only to evolve, but also to persevere, adapt, and above all, **believe deeply in their identity.**

This is how Continuum-Properzi has grown: through decades of industrial, social, and technological change, without ever losing its center of gravity. Today, in 2026, we are a global company with a human dimension, a multinational capable of competing in the world while maintaining the spirit, cohesion, and responsibility of a large industrial family.

Strong roots do not simply preserve a legacy: it **interprets, renews, and projects it into the future.** Honoring our roots does not mean standing still; it means building on solid foundations that allow us to push further. From here comes our ability to look ahead, to expand our business horizons, and to face new markets and challenges with vision and determination.

The future of Continuum-Properzi speaks the language of young people: **new skills,** new perspectives, new energy integrated with the experience, methods and industrial culture built over time. We believe in the value of intergenerational exchange, teamwork, and innovation driven by diverse perspectives and ideas. Because innovation is never a solitary act: it is always the result of **deep collaboration.**

In a world that demands speed, we respond with **reliability.** In a complex environment, we choose continuity. Our technological solutions are designed to last, to operate like a perfectly engineered system, and above all to support our customers over time as partners, not merely suppliers.

Behind every plant, every patent and every successful project, there are people. People who share goals, responsibilities, challenges and achievements. People who understand that shared values and strong foundation are not limit, but strengths capable of creating trust, stability and a true sense of belonging. And it is precisely this cohesion, tested by complexity, that becomes our truest and most enduring root.

Continuum-Properzi looks to the future with realism and ambition, strengthened by a past that is not nostalgia, but **foundation.**

Because today, longevity means one thing above all: **staying united, looking ahead, and believing in the value of people.**

Chiara Properzi



FROM INNOVATION TO INNOVATION



Yesterday, Today, Tomorrow

"It's no secret that copper wire and cable makers are chasing around to come up with cost-cutting method that would give them an edge in the highly competitive fields... It's a tool that will provide a means to a manufacturer to operate in the black in a highly competitive market". It is a very banal and uninteresting incipit talking about Continuous Casting of Redraw Copper!

But it changes color and significance if you know that it is from Eng. Ilario Properzi's interview in American Metal Market on May 16, 1963, just one month before the first ever continuous copper rod was produced by a brand new Properzi System in the USA. It was the beginning of a new era thanks to Ilario Properzi and his genius!

Since then, dozens of prominent people and companies have contributed to the development and optimization of ETP copper rod production plants up to the current astonishing production rates (50 tph and more) and drawability (0.10 - 0.05 mm diameters and smaller processed by high speed multiwire drawing machines!).

We are proud of our founder, the inventor of the CCR process for non-ferrous rod, we added his name to Continuous, now Continuous-Properzi Co. We are equally confident of the inventiveness and strong

leadership shown by Giulio Properzi, our President, and in the commitment and capabilities of the entire Continuous-Properzi team.

Step by step, our Company, despite some unfair competition and fake gossip, has developed into a real EPC supplier that has accumulated the longest worldwide experience and relevant know-how regarding complete ETP or FRHC Lines, from furnaces to coilers, for the copper rod and wire industry.

Our commitment is to continue and surpass the 75+ years of success of our company based on the continuous attentiveness to our Customers and to the future requirements of the global market.

Our latest innovation is the Microrolling® Mill process Self-Annealed copper wire, a promising revolution of the drawing shop. The new Pro-Form rotary extrusion system completes the picture.

As a true Engineering company, we feel confident in providing full packages from finished foundations to plant in operation.

Always looking forward and always a step ahead is our mantra toward our centenary anniversary!



Mordica Memorial Award
Bestowed Upon
Engineer Ilario Properzi
in 1973



President's Award
Bestowed Upon
Engineer Giulio Properzi
in 2004

Eng. Ilario
Properzi
During
One of
His Study
Sessions



Eng. Giulio
Properzi
in a Photo
Shoot
for Our
Magazine





QUALITY IS OUR GOAL AND SAFETY IS FIRST



A Typical
Properzi
CCR Copper
Rod Line



A Typical
Properzi
Rolling
Mill



A Copper
Coil
Produced,
Using
Properzi
Technology

It is commonly known that the increasing and increasing quality of the rod from continuous casting & rolling Lines allows multiwire drawing down to very fine diameters of 0.10 mm – 0.05 mm at speed near 30 meters per second. But what is possible is not automatically reached!

Under such operating conditions, it is not only necessary for rod producers to provide high quality wire rod but, far more importantly, the quality of the ETP rod must be easily measureable and consistently repeatable.

The efficiency of a Plant, in terms of rod quality and transformation costs, is the critical point for a rod producer in any part of the world! For new installation the following "factors of success" are mandatory.

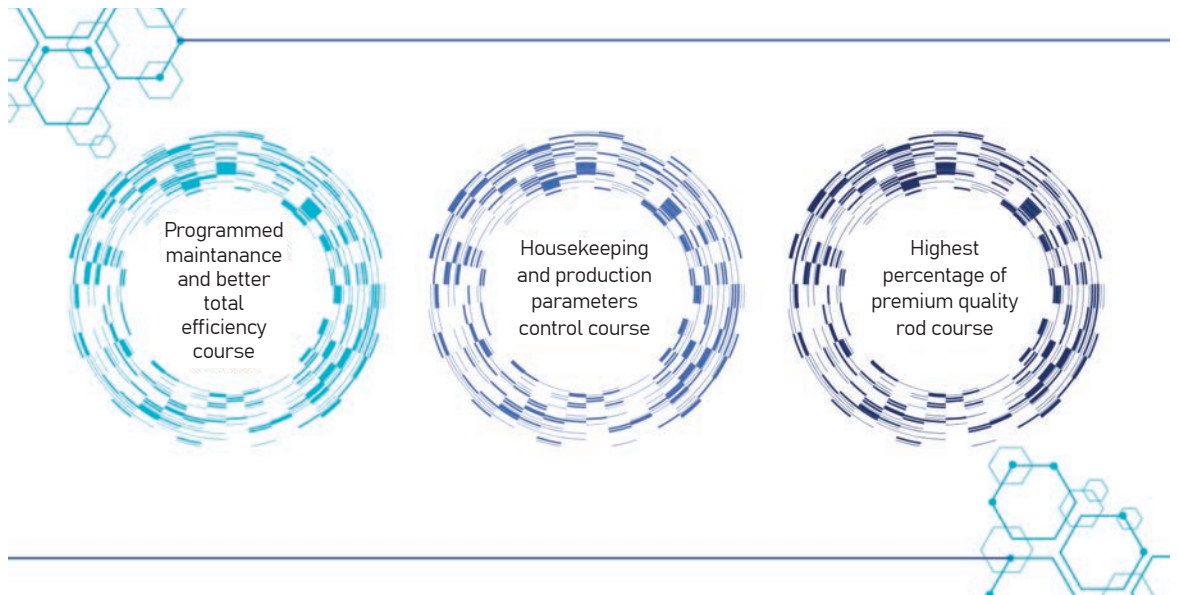
- The first class Properzi Line from furnaces to coiler
- The applicable package of modern GMPs (Good Manufacturing Practices)
- On-site assistance, as well as support from our Technical Office, based on know-how and expertise collected over the last 60 years
- A skilled, well-trained and motivated Operational Team

To repair the obsolescence of those Systems (Plant + GMP + Team) commissioned years ago, when the rod requirements were far less severe, our Excellency Group can provide all the support necessary to attain the quality standards that are a "must" today with a reasonable and justifiable investment.

In parallel, "while posing no danger to the Owner's balance sheet", we can supply dedicated retrofit kits to update those older machines which have become obsolete. It is not the major things but the little details which make the difference; like we always say, "the devil is in the details!".

Our experts can suggest how to modernize the Line and also transfer the "Total Quality" and "Zero Defects" approach following the methods that the Automotive Industry – the most demanding industry – has identified, implemented and improved upon year after year.

Quality Road Map



Several courses are available in our QUALITY ROAD MAP (QRM), for example:

- Programmed maintenance and better total efficiency course
- Housekeeping and production parameters control course
- Highest percentage of premium quality rod course

Quality is the combination of good machinery and good manufacturing practices.

We are making the European Norm for Safety and Total Quality Policy familiar around the world. They are known as ISO 45001:2018 or ISO 9001:2015, respectively.

Just to give a general idea, QRM implemented together with some important customers, has increased their old Properzi lines performances as follows:

- OEE: +5% and even above
- Average drawability: from ≥ 0.2 mm down to ≥ 0.1 mm
- Rate of rejected rod by the drawing shops: reduced up to 5 times

...with the above improvement the old lines continue to operate with a consistent economic return.

Occupational Health and Safety Management System - ISO 45001:2018

bsi. 

Certificate of Registration

QUALITY MANAGEMENT SYSTEM - ISO 9001:2015

This is to certify that: **Continuus-Properzi S.p.A.**
Sede legale
Via Cosimo del Fante, 10
Milano (MI)
20122
Italy

Holds Certificate No: **FM 33637**
and operates a Quality Management System which complies with the requirements of ISO 9001:2015 for the following scope:

Design, sales, manufacture, supervision of installation and start-up of continuous melting, refining, casting, rolling, drawing, extrusion, coiling and stranding plants and machines for metals shaped as ingots, rods, wires, strips and profiles, as well as completely engineered production plants.
Activities are related to IAF Sector 18.

For and on behalf of BSI: 
David Fardel, Country Manager, Assurance - Continental Europe

Original Registration Date: 1996-03-07
Latest Revision Date: 2024-07-08

Effective Date: 2024-10-02
Expiry Date: 2027-10-01

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 ...making excellence a habit.

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bsi. 

Certificate of Registration

OCCUPATIONAL HEALTH & SAFETY MANAGEMENT SYSTEM - ISO 45001:2018

This is to certify that: **Continuus-Properzi S.p.A.**
Sede operativa
Via Emilia Km 310
Sordio (LO)
26858
Italy

Holds Certificate No: **OHS 586148**
and operates an Occupational Health and Safety Management System which complies with the requirements of ISO 45001:2018 for the following scope:

Design, sales, manufacture, supervision of installation and start-up of continuous melting, refining, casting, rolling, drawing, extrusion, coiling and stranding plants and machines for metals shaped as ingots, rods, wires, strips and profiles, as well as completely engineered production plants.
Previously certified to BS OHSAS 18001:2007 since 2012-12-04
Activities are related to IAF Sector 18.

For and on behalf of BSI: 
David Fardel, Country Manager, Assurance - Continental Europe

Original Registration Date: 2021-08-09
Latest Revision Date: 2024-07-08

Effective Date: 2024-08-09
Expiry Date: 2027-08-08

Page: 1 of 2

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Quality Management System - ISO 9001:2015



CU GREEN WIRE AND PROPERZI CU REFINING TECHNOLOGY

Copper (Cu), with its unique properties, is central for economic growth, quality of life and sustainability. However, the base-metal producing sector, as well as the downstream processes, is under growing public pressure with respect to energy and water requirements and needs to meet several challenges, including increased demand and lower ore grades, and increased demand of electrical energy which generally requires greater use of resources.

In this article we will emphasize and illustrate Continuous-Properzi's significant contribution to reducing the CO₂ emission in the Copper Chain with recycled and green copper through the Properzi Refining Technology, detailed in the following paragraphs, and the production of the Cu Green Wire through Properzi's disruptive SAM (Self-Annealing Microrolling®) technology.

Properzi Cu Refining Technology:
savings up to 7,000 Kg CO_{2-eq} per ton of
FRHC copper rod products processing
100% copper scrap.

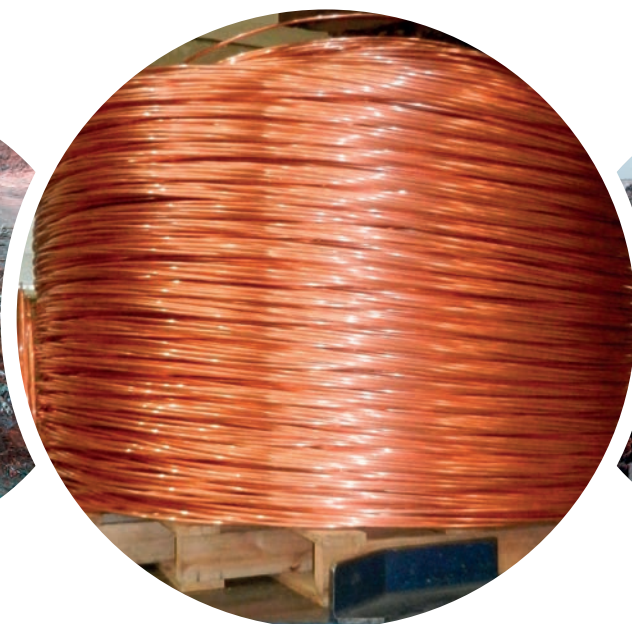
The future challenges of the sector, in order to maintain its competitiveness, minimize carbon and water footprint, and achieve sustainable growth, include aspects related to exploitation and access of new resources, trade, research and innovation activities, and the reduction of energy and water requirements.

The decreasing ore grades result in environmental concerns such as large waste/metal ratio and higher use of resources with respect to the use of energy, explosives, and water.

The metal producing sector is, on the one hand, under growing public pressure, while on the other hand it needs to overcome several burdens such as, for example, increased demand for metals and the treatment of lower ore grades.

The most reputable publications on the Carbon footprint of Cu production from primary sources calculates values of CO₂ equivalent to produce 1 ton of Cu up to 8.5 t CO_{2-eq/t} Cu in certain geographical regions, according to the required metallurgical production process. This value is consistent with what was retrieved from the various literature sources.

High-quality
Copper Coil
Obtained from
Scrap, Using
Properzi
Technology



Copper can be 100% recovered from the majority of its end-products and returned to the production process without loss of quality during recycling. The production of secondary Cu is based on the direct melt of "new scrap" (waste resulting from either metals discarded in semis fabrication or generated during the initial manufacturing process) and/or the recycling of "old scrap" (obsolete end-of-life products or structures). Old scrap is often contaminated to a certain degree, depending mainly on its origin and the efficiency of its collection systems. Scrap metal recycling involves a number of steps such as recovery, sorting, brokering, baling, shearing and smelting.

In the following paragraphs we will provide more information on the types of copper scrap that can be refined thanks to the Properzi Refining Know-How and the wide range of furnaces and performances we can achieve. Here we focus our attention only on the reduction of the $\text{CO}_{2\text{-eq}}$ made possible with our technology in obtaining refined secondary Cu that is internationally identified as FRHC (Fire Refined High Conductivity).

The main processes used for obtaining secondary Cu are disassembly, sorting (according to different levels of purity), transportation, chopping, melting, and refining to remove the necessary quantities of impurities to reach the desired characteristics. The Properzi Refining Technology allows to melt and refine selected Cu scrap (old, new or a mix of them) with a production ranging from 0.2 to 0.3 t $\text{CO}_{2\text{-eq}}/\text{t}$ Cu. According to the available literature the average values for the upstream processes, mainly for Cu scrap transportation/preparation, vary from 0.25 to 0.35 t $\text{CO}_{2\text{-eq}}/\text{t}$ Cu.

The data indicates that the variation depends on the quality of the source material, the metallurgical process used and the quality of copper scrap.

According to our studies, we obtained results similar to the ones published by Giurco and Petrie in their work titled "Strategies for reducing the carbon footprint of copper: New technologies, more recycling or demand management?" issued by Minerals Engineering. We calculated that the Carbon Footprint to obtain 1 t of Cu from an ore (0.45% Cu) can reach 7.65t $\text{CO}_{2\text{-eq}}$; however, when Cu was obtained from a mix of 25% 1st quality scrap (>99% Cu), 37.5% of 2nd quality scrap (>96% Cu), and 37.5% of low quality scrap (>94% Cu) the Carbon Footprint was estimated to be reduced to 0.65 t $\text{CO}_{2\text{-eq}}$.

An important industrial partnership agreement has been signed with a French company, a world leader in electrification. Continuous Properzi, world's leading supplier of complete ETP (Electrolytic Tough Pitch) and FRHC (Fire Refined High Conductivity) wire rod plants. The goal has been to produce wire rod from recycled copper through a state-of-the-art refining system that processes up to 100 percent of copper scrap, optimizing water and energy consumption.

Properzi
Casting
Machine in
Operation



Example of
Properzi Shaft
and Holding
Furnaces



According to this data the production of FRHC Cu products from secondary Cu, that can replace with almost identical characteristics Cu products starting from primary Cu, thanks to the **Properzi refining technology**, can reduce the Carbon Footprint by as much as **7,000 Kg CO_{2-eq} per ton of FRHC copper rod products processing 100% copper scrap (old and/or new)**.

In addition to the Refining Process, it is important to mention our revolutionary Self-Annealing Microrolling technology that facilitates a 50% energy savings. Even if the value of CO_{2-eq} per ton is much lower compared to the one indicated for the refining process, its amount is important considering the millions of tons of copper rod processed into wire.

The production of Cu wire from 8 mm ETP rod has occurred for almost 50 years through the traditional breakdown drawing machines equipped with an inline electric annealer. During this period of time the breakdown drawing machines have been subjected to several improvements both in mechanics and automation.

However, the basic concept design still requires that the wire under process is cooled in each capstan before passing through the various dies so that the wire can then be subsequently heated and quenched by the annealing process in order to obtain soft wire. The fundamental limitations, strictly from the environmental point of view, of this consolidated process can be summarized by saying a high consumption of electric energy, in the range of 90÷110 kWh/t, is necessary for the recrystallization of the Cu wire through the annealer.

With the aim of resolving the problems listed above, Continuus-Properzi has designed, patented, manufactured, and tested a revolutionary system based on the well proven Microrolling® mill as described here forth in the following paragraphs.

The concept design of Properzi's new Process is based on the use of the rolling power to increase the temperature of the wire while being rolled so that it exits at a temperature which is above the recrystallization temperature. The costly power usage for the re-heating in the annealer is totally avoided.

Cu Green Wire: savings up to 50% of electrical energy per ton of 1.8-2.6 mm wire starting from 8 mm rod.



Details of
a Properzi
Rolling Mill

Furthermore, the electric power requested for the rolling operations at such temperature, needs considerably less power compared with the power needed by a breakdown drawing machine.

This Properzi SAM Cu Microrolling® system is a revolutionary piece of equipment and, among all the other advantages that we will be glad to explain to you, is environmentally friendly with energy savings compared to traditional rod-breakdown operations of up to 50% (in the range of 90÷110 kWh/t) while creating virtually no copper dust during the process. These two characteristics allow a savings of CO_{2-eq} and, considering the millions of tons of copper rod processed in the traditionally breakdown machine, the potential reduction of installed power plants of hundreds GigaWatt.

Conclusion

If you have the chance to visit our headquarters, we are sure that you will immediately understand Continuus-Properti's commitment to be not only an inventor of new technologies that has changed the traditional industrial practices in the Non- Ferrous sector, but also our strong commitment to the environment and sustainability that is an integral part of our Company. This is evident at our headquarters with 20,000 square meters of greenery and hundreds of trees which existed when the company relocated to its current location; now these same trees are more than 70 years old.

The Nature of our Company is to increase the efficiency of our equipment, to reduce the consumption of utilities and to reduce waste by inventing new technological solutions for recycling copper scrap . As explained above it is possible to convert 100% low quality copper scrap directly into high quality copper rod. We have spent tremendous effort in the realization of these goals and we continue to work to improve upon the significant results already reached.

We summarized these results here below:

- Properzi Cu Refining Technology : savings up to 7,000 Kg CO_{2-eq} per ton of FRHC copper rod products processing 100% copper scrap
- Cu Green Wire: savings up to 50% of electrical energy per ton of 1.8- 2.6mm wire produced starting from 8 mm rod

The goal of the global community is to make the Copper Chain “greener” and Continuus-Properti continues to make a significant contribution in this field.



The Lebanon Cedar,
Planted by Our
Founder Ilario Properzi
Over 70 Years Ago
and Moved (Saved), to
Make Space for a New
Shed

We are pleased to announce that Continuus-Properti has been selected by an Indian Group, as best technological and commercial partner, for the supply of a giant Properzi ETP TOP Copper Rod Line for their new copper complex. We are more than happy and proud to announce this strategic sale of a brand new Properzi CCR Line designed to produce up to 250,000 tons of ETP copper rod per year and even more, with our mission to make this CCR Line as the most efficient, easiest to operate, and highest quality in the sector.



CONTINUOUS-PROPERZI CCR ETP & FRHC COPPER LINES

CCR COPPER ETP

(Electrolytic Tough Pitch)

ROD LINES

SMALL OUTPUT RATE

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

MEDIUM OUTPUT RATE

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

LARGE OUTPUT RATE

- Production rate: from 25 tph to 50 tph
- Expected yearly output: from 125,000 t to 310,000 t

Parameter	Reference	Value
Chemical composition	Cu+Ag %	>99.95
Oxygen	Ppm	150 ÷ 250
Elongation	A ₂₀₀ %	42 ÷ 46
Tensile strength	Kg/mm ²	22 ÷ 24
Conductivity	IACS %	101.0 ÷ 102.0
Twist test to failure	No	54 ÷ 60
Best drawability	mm	0.05
POPS test – surface oxides	Ångstrom	100 – 200
Re-crystallization temperature	°C	180

CCR COPPER FRHC

(Fire-Refined High-Conductivity)

ROD LINES

There are three types of Continuous-Propenzi process for the production of FRHC copper:

No. 1

Batch Process with maximum refining

Copper scrap mix ≥93%

Expected yearly output: from 12,000 t to 90,000 t

No. 2

Continuous Process with limited refining

Copper scrap ≥97%

Expected yearly output: from 25,000 t to 100,000 t

No. 3

Batch Process with limited refining

Copper scrap mix ≥96%

Expected yearly output: from 12,000 t to 24,000 t

No. 1 PROCESS

Is based on one reverberatory furnace usually feeding a rod line or a slab caster during approximately one shift per day (1st – 2nd – 3rd Class).

No. 2 PROCESS

Is based on a vertical (shaft) furnace and two holding refining furnaces feeding a rod line 24 hour/day (1st – 2nd Class).

No. 3 PROCESS

Is based on a reverberatory furnace usually feeding an ingot line during approximately one shift per day. Ingots are then diluted with cathodes in a shaft furnace for ETP rod production (1st – 2nd Class).

Parameter	Reference	Value
Chemical composition	Cu+Ag %	>99.90
Oxygen	Ppm	150 ÷ 250
Elongation	A ₂₀₀ %	38 ÷ 43
Tensile strength	Kg/mm ²	22.8 ÷ 23.5
Conductivity	IACS %	100.5 ÷ 101.3
Twist test to failure	No	43 ÷ 50
Best drawability	mm	0.25
POPS test – surface oxides	Ångstrom	100 – 200
Re-crystallization temperature	°C	280

No. 1 PROCESS

1st CLASS



CU > 99%

No. 2 PROCESS

2nd CLASS



CU > 96%

No. 3 PROCESS

3rd CLASS



CU > 93%

THE PROPERZI COPPER INGOT



A Winning Alternative to Open Top Casting System

Recycling of copper scrap is one of the best example of circular economy. Melting, refining and casting the desired final product according to Properzi know-how, accumulated during 30+ year of experience, allows great energy saving and avoid additional spoiling of the mines.

Copper products produced from the mines requires 2.5 times the energy used when starting from scrap and creates 750 times (!) the SO₂ Pollution.

Copper scrap availability is constantly increasing. The so-called "new scrap" is a percentage of the total production of new products that is increasing year by year and the "old scrap" (30-50 years old) from dismantled wire, cable, tubes and so on, is also increasing through the years.

Properzi's technology to produce ingots, which we will now describe, fits perfectly into this specific context.

The old open top system looks simple and economical but several drawbacks are hidden until the production starts. The intermittent pouring, mould by mould, is imprecise and subject to spout clogging; the thickness of the ingot is not stable and can create stacking problems; the ingot may present holes and cracks in the upper surface causing water explosions; the iron moulds have a very limited life while the copper moulds are very expensive; the number of moulds required is nearly 200.

The Properzi wheel and belt casting machine has a totally automatic continuous pouring system and produces a sound bar that is cut into 20-25 kg ingots having a very precise geometry. The only mould required, the casting ring, can last for years.

Several Properzi ingot lines are in production with casting rate ranging from 20 to 25 tph and a business plan returned of the investment in less than 2-3 years.

Properzi
Copper
Ingots,
Obtained
from
Recycled
Scrap





CCR COPPER LINES FURNACES

The history of Properzi and copper began sometime during the 1950s when Eng. Ilario Properzi started experimenting with the application of the continuous casting and direct rolling technology for the production of copper rod; this was a natural progression from the already successful continuous casting and direct rolling of aluminium rod.

The experience of Continuus-Properzi in the specific production of ETP (Electrolytic Tough Pitch) copper rod started in 1962, when Eng. Ilario Properzi sold the first copper rod mill, and continues today with the most modern and efficient Shaft Furnaces for melting cathodes and clean scrap.

Shaft + Holding (CATHODES)

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 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 standards.

The cathodes and clean scrap are loaded automatically and scattered inside the Furnace to increase melting

efficiency thus reducing fuel consumption and reducing 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 air-to-fuel combustion ratio of each burner guarantees consistent melting at the desired value, regardless of the set firing rate and, far more importantly, regardless of any backpressures arising from the natural shifting of the charge.

These optimal combustion parameters, so maintained, enable optimal flame quality, negligible dissolved hydrogen (gassy-copper), improved refractory service life and, last but not least, increased fuel savings.

The thermal consumption of Properzi Shaft Furnaces 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 standards.

The Shaft Furnace can be combined with one of Properzi's refining furnaces described below, allowing our customers to work, in campaign, not only with copper cathodes/clean scrap but also with higher impurity copper scrap.

Maximum flexibility in terms of design, configuration and scope of supply, from the basic technological package to a complete scope of supply on an EPC (Engineering, Procurement, Construction) basis to limit our customers' involvement with plant installation, is also a distinctive characteristic of our Company.

The Holding Furnace, offers the following main advantages:

- Controls the desired molten metal temperature and oxygen level
- Tilting allows to increase or decrease the liquid metal volume contained inside
- Special pouring design prevents the floating slag from exiting the Furnace, thereby allowing clean copper to the casting operation
- Hydraulically operated door on the upper furnace head-wall, allows access for skimming and poling should this become necessary
- The burner air-to-gas-ratio is automatically controlled by the PLC to maintain the pre-set values, which is monitored by the dedicated CO analyzer system
- A special shutter, located on the exhauster, allows pressure adjustment inside the furnace thereby preventing unwanted oxidation and overheating



Example of Shaft and Holding Furnaces for the Production of Copper Rod from Cathodes

Reverberatory-Refining (SCRAP)

Continuus-Properti 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 up to 90,000 tons per year.

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.

Continuus-Properti patented a new design in 2010, introducing an important evolution of the old 20th Century model of Reverberatory Furnaces.

As a major difference, the charging door is now located on the roof of the Furnace thereby allowing a faster, simpler, and more automatic operation. The loading system can be accomplished via a skip charging machine or an industrial belt conveyor. The second system is the most advantageous for big size furnaces allowing many tons of scrap to be charged in just one minute.

The Reverberatory Furnace can be fed with 100% copper scrap with minimum 93% Cu that could be a mix of many kinds of copper scrap thereby saving hundreds of dollars per ton on the raw material!

The refining know-how developed and optimized in several installations during the last 40 years is the key to the profitable operation that Properti can offer to Client worldwide!



Properti
Refining
Furnace



The Holding Furnace, offers the following main advantages:

- Easier charging system
- Improved total thermal efficiency and refractory life
- Faster charging phase
- Higher range of loadable scrap
- Less fumes

Vert-Ref (SCRAP)

The Vert-Ref Process is the evolution of the many Refining systems supplied by Continuus-Properti.

The raw material utilized in the Vert-Ref process can be 100% copper scrap with a copper content higher than 97% coming from scraping of electrical installations, copper piping, boilers, chips and other industrial waste. The copper scrap requires a continuous refining treatment to reduce the metallic impurities.

The new 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 melting shaft is suggested in the range 5-15 tph while the total annual production may vary from 25,000 up to 100,000 tpy and more with different arrangements of casters for rod, billet, ingot or other products and different number and sizes of the holding/reduction furnaces installed.

The raw material can consist of a wide range of copper scrap mixtures such as:

- Special and first-class scrap (Berry): this material consists of clean, un-tinned and unalloyed copper wire and cable
- Kanal or birch: this type of scrap consists of unalloyed copper wire having a minimum copper content of 96%
- Granular copper (clove): chopped wire without insulation with minimum copper content of 99%
- A mixture of scrap and primary copper with a balanced copper content of 97%

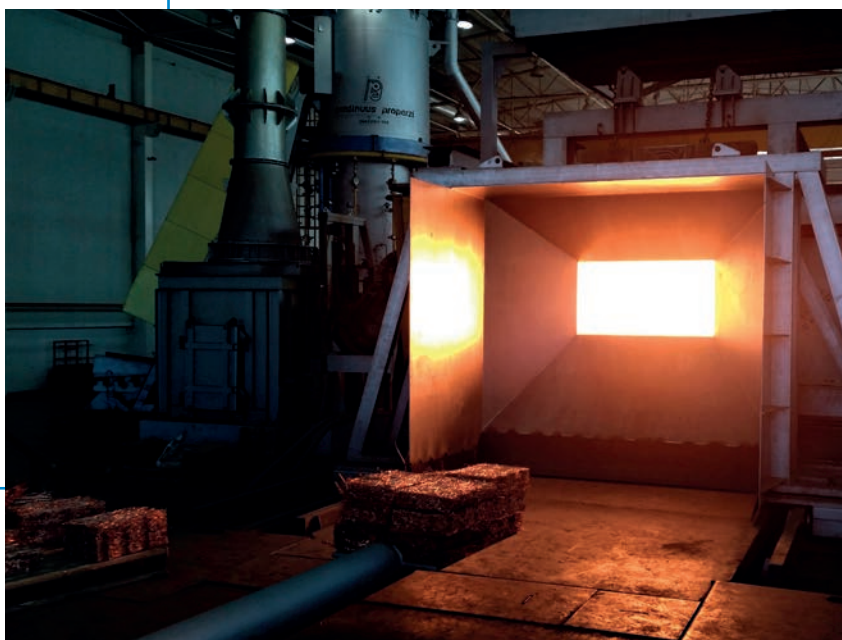
The refined copper can be continuously cast, rolled or extruded to produce FRHC (Fire Refined High Conductivity) copper rod or ingot, strip, billet and other copper products.

The Process is much more environmentally friendly and less expensive in terms of energy consumption compared to the traditional batch fire refining or electrolytic process (scrap – anodes production – electrolytic process – cathodes production).

PROPERZI proprietary know-how enables our customers to control the mixing of the charge for best economical and technical results throughout the refining process to obtain high quality FRHC copper products.

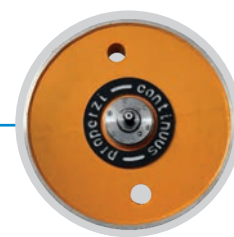
The Vert-Ref furnace, offers the following main advantages:

- Increased thermal efficiency
- Longer refractory life and very short downtimes
- Easier slagging and refining
- Cheaper refining process with less additives
- Improved final chemistry of the molten copper
- Based on 40+ years of experience



Side-load
Reverberatory
Refining
Furnace

FURNACES AND EXHAUST CONTROL AS COMPULSORY TWINS



Today environmental consciousness and stringent regulations are widespread throughout the world. But until recently, suppliers of furnaces and suppliers of complete systems for exhaust filtration and pollutants control have been on two divergent paths that would only occasionally cross.

Industrial processes typically generate and exhaust fumes. Systems in place to protect the environment are more or less well known, yet each process has its idiosyncrasies and advantages.

Over the last several decades, Continuu-Properti – as a supplier of technology for the refining of copper scrap and of aluminium melting furnaces – was faced with having to choose the best supplier of fumes filtration systems.

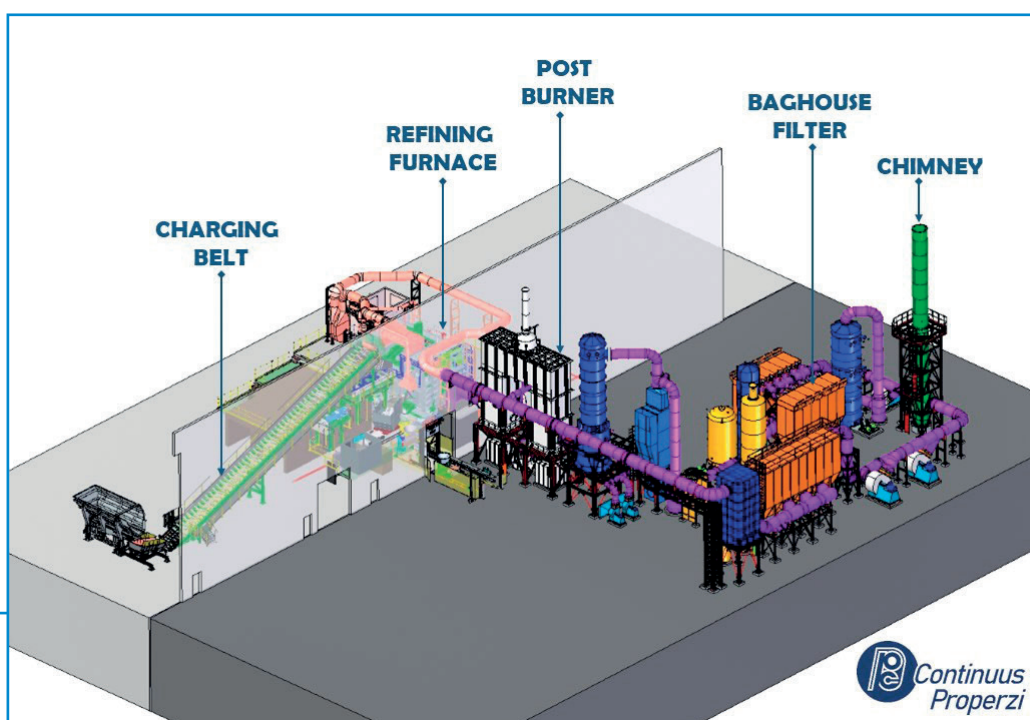
Particularly, Continuu-Properti has been developing a special technique for the refining of copper scrap in both tilting reverberatory furnaces and in vertical continuous melting and refining furnaces. At this time, dozens of these systems have been installed.

Our systems safeguard our customer's profitability while meeting the requirements and potentials of a circular economy

The range of possibilities is vast.

Reverberatory tilting furnaces have been developed to refine a mix of copper scrap having a medium copper content > 94% and even lower. Production per day can range from 40 ton up to a maximum of 300 ton. For larger furnaces, a new charging system was developed and patented in many countries. For cleaner scrap, with a minimum copper content of 97%, it is possible to use a continuous vertical furnace; different sizes have been sold and installed from 5 tph up to 20 tph targeting the remarkable production of 100.000 tpy. These furnaces are suitable to produce downstream rod or ingot, billet or slab.

The exhaust volume, at the furnace outlet flange, ranges between 3000 and 12500Nm³/h and the contained pollutants can vary due to the non-constant quality of the initial scrap. It must also be noted that while



Technical Drawing of Fumes Treatment System



During
Installation
of a Fumes
Treatment
System

the reverberatory furnaces work in a batch mode with different emission during the 24-hour cycle, the vertical melter produces a constant emission at a lower temperature throughout its operation.

This results in two very different approaches when designing an optimized fume treatment system. It must be emphasized that the fume filtration system is not a minor entity as it involves a considerable CAPEX and tremendous responsibility on behalf of the User.

In the past, the Buyer was mainly focused on the selection of the best furnace(s) for the project; volumes from 10.000 tpy up to 70 + 100.000 tpy are typically requested by market participants. Then attention was diverted towards the control of emissions; and thus began the relationship between the three players: the new investor, the fumes specialist, and Continuous-Properti.

Buyers were engaging local suppliers of fumes treatment equipment. Often these suppliers lacked experience in the refining of copper scrap. Therefore, their fumes treatment equipment lacked the flexibility to handle the specific requirements posed by the daily variations in copper scrap since it is not a commodity. Unfortunately, this resulted in buyers not always achieving effective and efficient investment goals.

This is the reason why Giulio Properti decided to initiate a joint venture – called Exus Company – with an experienced Italian specialist to provide the customers of Continuous-Properti a one-stop-shop/supplier of complete Refining and Fume Filtration Systems. Having knowledge of every

detail of the copper scrap refining process is what determines the best consultant to place in charge of an optimized exhaust treatment system. Today Continuous-Properti's strategy is to propose not only a furnace or a set of furnaces but a complete package including: furnaces, exhaust control and the casting line, meaning a Properti rod Line or a Properti ingot Line, but also equipment in partnership with other companies to produce billet and/or granules.

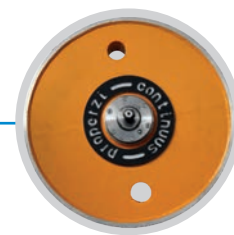
Through Exus, a new subsidiary of the Continuous-Properti Group, we are prepared to meet the market's demands for a complete project supplier.

To summarize, a typical Exus system may include: the post combustion chamber (where fumes are kept at a specific temperature for a specific amount of time while appropriately mixed with Oxygen to address issues of VOCs, dioxin, and furans), followed by the quencher (with optional air cooler or waste heat boiler), a fumes purification dry section (for Dioxins, furans and acids removal), and lastly a bag house filter (that collects powders and fumes and directs them to an exhaust fan before being expelled by the chimney).

Exus does not cater to just copper scrap refining furnaces but can also supply fumes treatment systems for aluminium furnaces as well as other general nonferrous production applications.

The first system supplied by Exus is currently being installed for an important copper scrap recycling project in the USA.

LATEST UPDATES ON IULIUS 4.0



The Properzi Program Supporting the Transition of Users' Facilities to Digital Factories

Continuu-Properzi has always been investing in innovations to provide increases in quality and improvements for significantly responding to the end user's needs.

In recent years in the Industry 4.0 field, we developed IULIUS 4.0, a specific package of Automation and Information-Technology features to support and facilitate the transition of our end users' factories into digital factories, with the goal to achieve much higher performances in fields like quality, consistency, OEE, savings, and reactivity to new market challenges.

The package has been designed for the particular industry sector of non-ferrous metals producers, as it addresses the specificities inherent of the Properzi technology/equipment, and the ones of their end users (i.e. rod producers, welding wire producers, ingot casters, etc.). This complies exactly with the purpose of providing a complete set of functionalities, fully integrated and ready-to-use, which greatly ease the non-ferrous metals producers' journey in the digital transition of their facilities.

The **IULIUS 4.0** program currently consists of functionalities divided in two major sets:

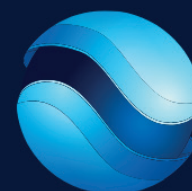
- The **IULIUS 4.0 Ready**: the most basilar and necessary functionalities. They are included as a part of our standard scope in the supply of all new Lines, and consist of:
 - a. wireless visibility of plant's data through the automation LAN
 - b. access to HMIs from on-site mobiles
 - c. Remote Technical Assistance via Internet
- The **IULIUS 4.0 Advanced**: the next, more advanced functionalities. They are supplied upon request, and this is occurring more and more frequently as the market realizes the benefits Industry 4.0 can provide, and include:
 - d. SCADA System
 - e. SCADA pages on end user's mobiles
 - f. KPIs for the end user's Managers, with new graphics and searching functionalities
 - g. database for the end user's IT system
 - h. new interface with the MES system of the end user

The above IULIUS 4.0 advanced package is now enriched and has become even more performant thanks to the addition of two new very effective features:

NEW ENHANCED GRAPHICS AND SEARCHING FUNCTIONALITIES for the KPI dashboard pages

This update consists of completely redesigned KPI dashboard pages enhanced with a brand new graphical aspect. The pages now provide more agile and optimized views, due to the ability of automatically scaling the elements shown therein according to the screen size of the mobile devices used.

Furthermore, these pages have been enhanced with powerful query and filtering functions, which, in addition to making searches easier and faster for locating the data of interest, also allow you to make meaningful comparisons between different production periods, castings, shifts, types of product, etc.



IULIUS 4.0
TECHNOLOGY

CONTINUUS-PROPERZI

NEW INTERFACE with the end user's MES SYSTEM

This function consists of a new interface, made with a set of ready-to-use data that IULIUS 4.0 instantaneously exchanges with the MES, Manufacturing Execution System, program running in the end user's IT.

The main task of the MES is planning, improving, and optimizing production in the entire facility, including that pertaining to the Properzi Line. The data exchanges between IULIUS 4.0 and MES through this interface are of specific interest for the end users to digitally integrate, more quickly and with much less effort, the Properzi Line with their logistics system or with the supply chain of their factory, and/or with other lines present in the same production site.

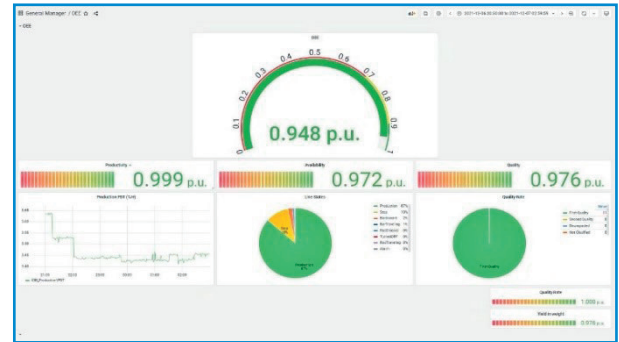
The concerned data exchanges, mainly include production plans, order plans, order status, pending/processed orders, etc. Through these exchanges, production planning, tuning and control by the factory managers, in combination with the KPIs, email alerts, and reports computed by the IULIUS 4.0 system, become much easier, more flexible, and performant.

Regarding implementation, the exchanges are made through an effective but simple and largely diffused protocol, which greatly shortens the work on the end user side. Furthermore, the interface makes use of several stored data, through additional database tables, which keep track and provide information upon request of the exchanges done between MES system and IULIUS 4.0.

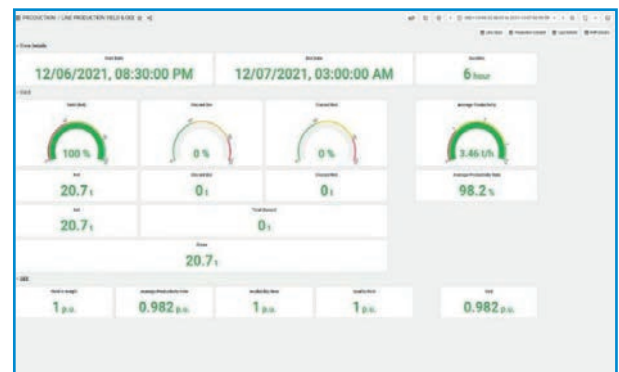
Naturally, the above is a standardized solution that is ready-to-use by the end users. But if required, it can always be customized to comply with particular needs.

With the addition of these two new features above, the IULIUS 4.0 package now offers a fully effective and complete set of capabilities that can ease the transition of your factory into a digital factory. The use of this package has several advantages:

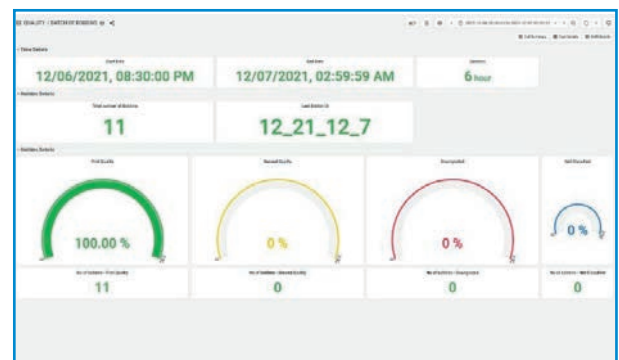
- Specifically designed for the non-ferrous metal market served by the Properzi Lines
- Equipped with ready-made IT functions already integrated with the concerned automation functions
- Captures and records all of the data essential to the concerned process, making them available on ready-made KPIs dashboards on the managers mobile devices
- Automatically generates emails containing alerts and reports
- Shares data with your MES system through a ready-to-use set of databases and interfaces



Dashboard Page for the Line Manager



Dashboard Page for the Production Manager



Quality Dashboard Page on Mobile Device

All of this drastically reduces your implementation costs and times, alleviates the job of your managers in ensuring everything is operating smoothly, and in cascade fashion produces benefits on various performance aspects such as: product quality on a more consistent basis, increased Overall Equipment Efficiency, easier and more timely identification of corrective actions, better yield, more timely decisions, etc.

TECHNICAL CONSULTANCY



The Milestone in the Operation of a Plant

The successful operation of large scale plants is focused on the highest possible availability and efficiency of the equipment, combined with the constant stability of the quality of the products.

In the increasingly demanding and competitive markets, with frequent new products and technical requirements being the norm, the maintaining and up-dating of the existing equipment is of paramount importance.

This task is not simple nor straightforward due to the complexity of modern plants and increasing quality demands. At the same time, other factors, including the quick obsolescence of the components, changing market or local conditions, and the excessive turnover of personnel, increase the risk of inefficiency and quality degradation which can result in economic loss.

Supplying a new plant for the production of non-ferrous commodities is not only Properzi's core business, but an act of responsibility and commitment where first-class equipment must be accompanied by first-class After Sales Service during the complete operational lifetime of the equipment. This commitment begins from the start-up and commissioning and continues throughout the entire lifetime of the plant with our Total Quality Policy based on ISO 9001:2015. The quality of the product is a combination of good machinery, good manufacturing and maintenance practices, and a well-trained crew.

To support Properzi's Customers, Continuus-Properzi is now offering a new "Technical Consultancy" service delivered by our team of experienced and highly-skilled specialists.

The areas of consultancy cover a multitude of production topics:

- Training and best practices for production and maintenance: through audits and dedicated courses, the newly hired customer's personnel is trained, while the existing team members are updated
- Programming of scheduled maintenance using modern line diagnostics and audits
- Control and optimisation of key production parameters
- Troubleshooting of the machinery and the production process
- Audits for modernisation, upgrades, and improvement
- Programming of spare parts supply: the extended operative lifetime of equipment depends on an up-to-date spare parts supply and is essential for a well-maintained plant. We guide the Customer, especially during the first two to three years of operation, in scheduling and managing the spare parts inventory as a function of the scheduled production. The result is diminished risk of facing urgencies and interruptions of production.

Remote
After Sales
Technical
Consultancy



The Technical Consultancy is performed through three main channels, permitting a very efficient approach that is well balanced with the Customer's needs and requirements, as well as with the complexity of the topic.

These three channels are:

- **E-mail Troubleshooting/Consultancy**
- **Remote Assistance Service**
- **On-site Assistance**



Remote Electrical &
Automation Technical
Consultancy

E-Mail Troubleshooting/Consultancy:

It is a fast "problem solving" approach based on information exchange via e-mail (consultancy@properzi.it). The Customer sends an e-mail to the dedicated Properzi address describing in detail the issue, clarifying in which specific cases it occurs, and adding any meaningful additional information or pictures. Properzi will deploy its dedicated and qualified engineering/process team until problem resolution.

Remote Assistance Service:

In case of need, Properzi software and process specialists can provide their support operating on the Customer PLC from the remote control room located in Properzi's premises.

To enable this Service, a communication module has to be installed on the Customer's PLC and connected to the Internet. All new Lines are delivered equipped with a Remote Assistance Module and CCTV circuits, while most of the existing Lines can be easily upgraded.

On-Site Assistance:

Properzi's specialist/s visit the Customer site to give support in resolving the most critical issues or any other Customer requests which cannot be addressed remotely.

Once the intervention is completed, a detailed report will be transmitted to the Customer which will include the reasons for the issue, any recommendations to prevent future issues, and all possible areas of improvement.

Advantages obtained with Properzi services:

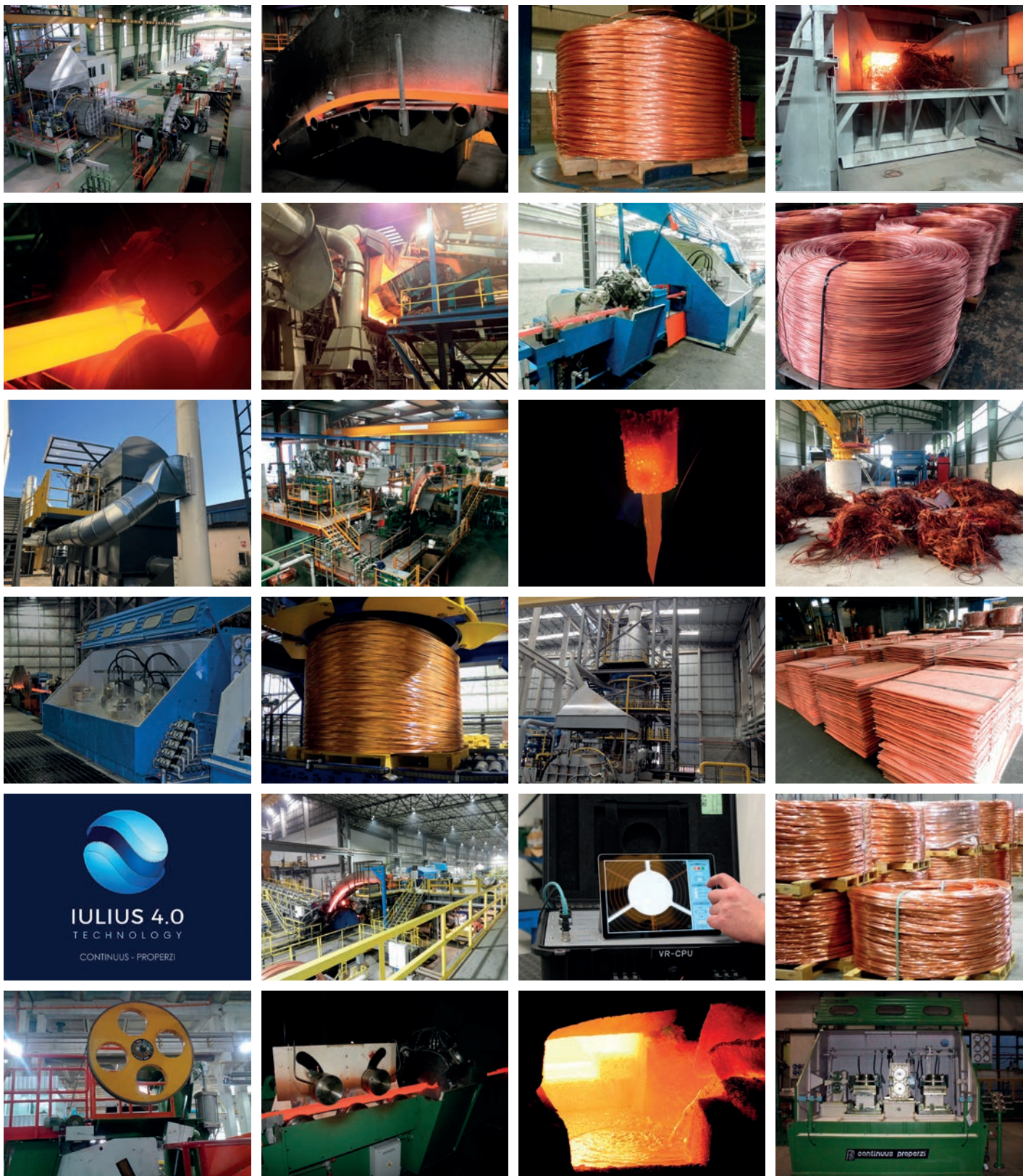
Exploiting the opportunity given by the new Technical Consultancy service, Properzi's Customers can obtain:

- Fast troubleshooting and relevant remedies
- Continuous operator(s) training
- Opportunity for improvement and modernisation
- Quality improvement
- Total efficiency improvement
- Consistent economic savings

With the Technical Consultancy service, Properzi is taking the continuous support of our Customers to a higher level.

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