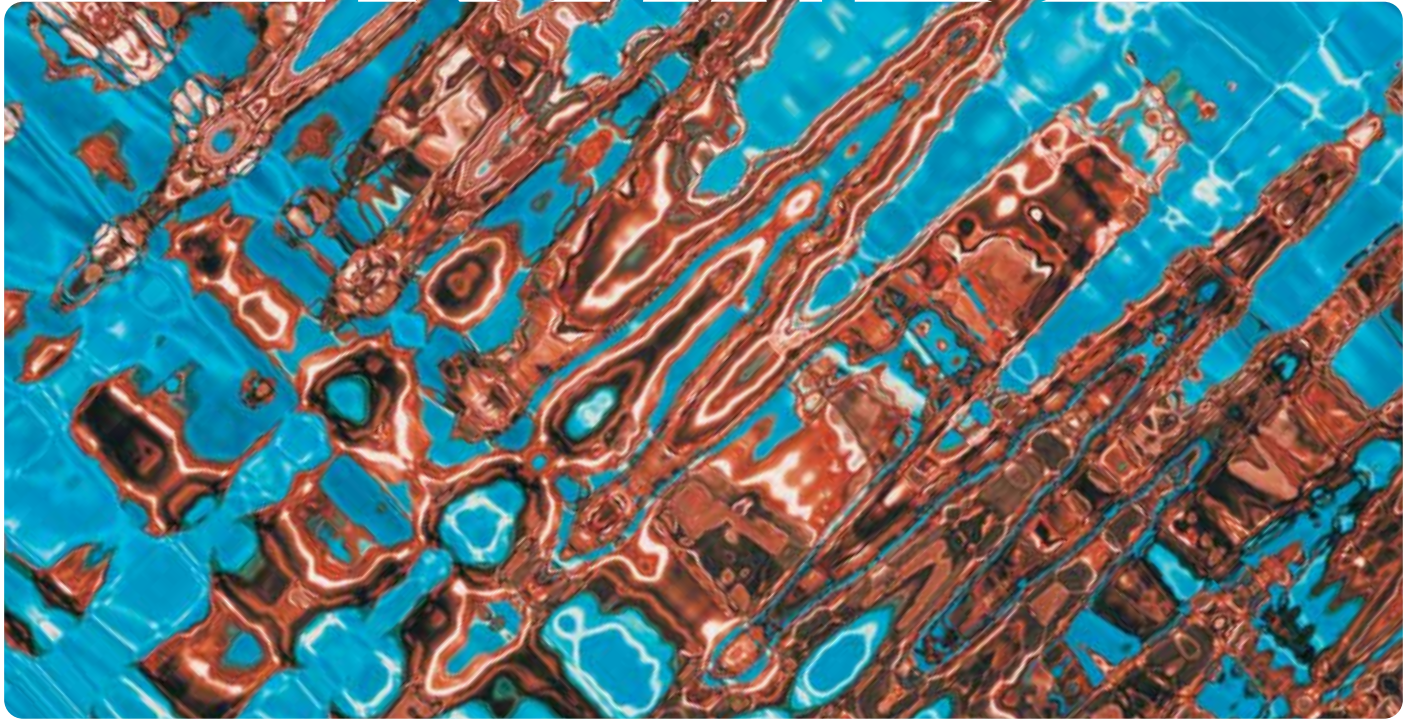


OUTOKUMPU



As a globally renowned and trusted supplier of metallurgical plants, Outokumpu Technology offers you the revolutionary HydroCopper™ process, an unparalleled means of producing high-quality copper directly from concentrate. In addition, HydroCopper™ also facilitates the cost-effective recovery of copper metal from a wide variety of concentrates.

HydroCopper™ **– ground-breaking technology**

stainless | copper | **technology**

A revolutionary new era for copper production



The Outokumpu factor

The Outokumpu HydroCopper™ concept offers mining and concentrator plants a revolutionary opportunity to obtain a more enriched end product and save time and money in production. By applying our technological expertise, you will enhance the performance of your plants and products. This competitive edge we give you is what we call the Outokumpu factor.

Outokumpu is an international metals and technology group operating in more than 40 countries. As part of the group, Outokumpu Technology offers solutions for metals and minerals processing industries.

As one of the world's leading developers and suppliers of technology, we design and deliver plants, processes and equipment in addition to providing engineering, project management and support through our global service network.

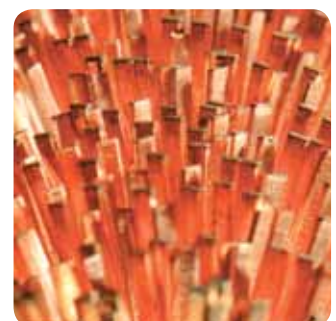
Ground-breaking technology

Building on its long, industry-leading expertise and extensive research work, Outokumpu has launched a major new innovation for copper production in the shape of hydrometallurgical copper recovery from sulphide concentrate.

The HydroCopper™ process is a cost-effective method for producing

high-quality copper directly from concentrate. In comparison with conventional copper production methods, HydroCopper™ provides an astonishing opportunity for producing directly cast copper products without smelting. The recovery rate for copper, silver and gold meets even the most exacting of requirements.

HydroCopper™ is not merely a production process; it is a total concept and complete solution that answers all your needs.



Making your business more profitable

Your needs are our driving force

As your partner, Outokumpu Technology converts your needs into solutions which add value to your business.

The most highly educated, experienced and skilled professionals work in our engineering, operations and business teams and are focussed on HydroCopper™ process development and implementation. We have the best available research and development facilities, which enable us to offer the most modern and reliable technologies – designed to meet your requirements.

Economical superiority and logistical strength

HydroCopper™ gives you an economical means of copper production: low investment and operating costs are obvious advantages of this advanced technology.

HydroCopper™ allows for a short processing time and minimized storage periods, generating significant operational cost savings. The expense of time and money in transportation from concentrator to smelter is also reduced.

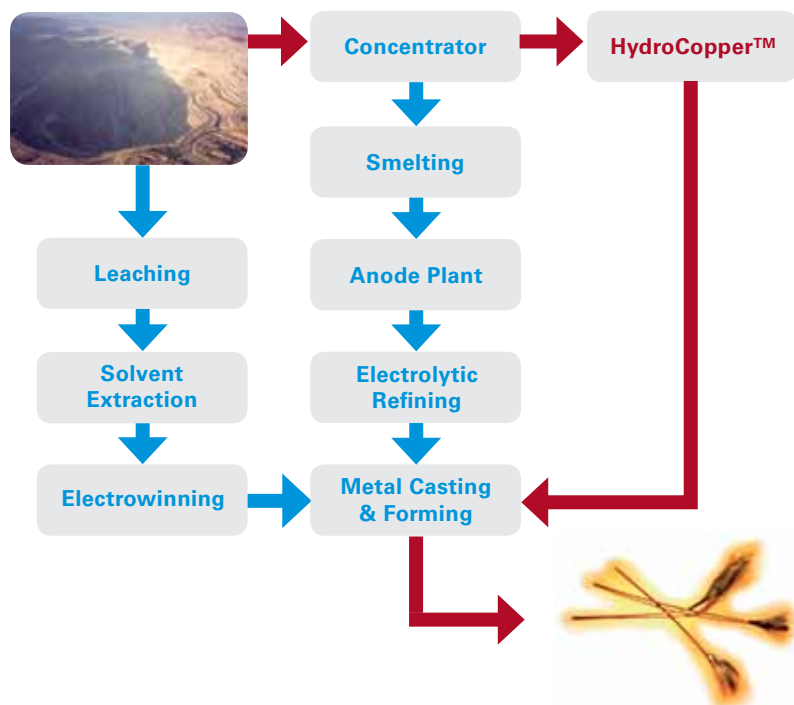
Locating a HydroCopper™ plant close to a concentrator offers further savings as there are no freight costs for secondary materials such as gangue, and you need only transport value-added metals such as copper, gold, silver and other products.

Save time with HydroCopper™

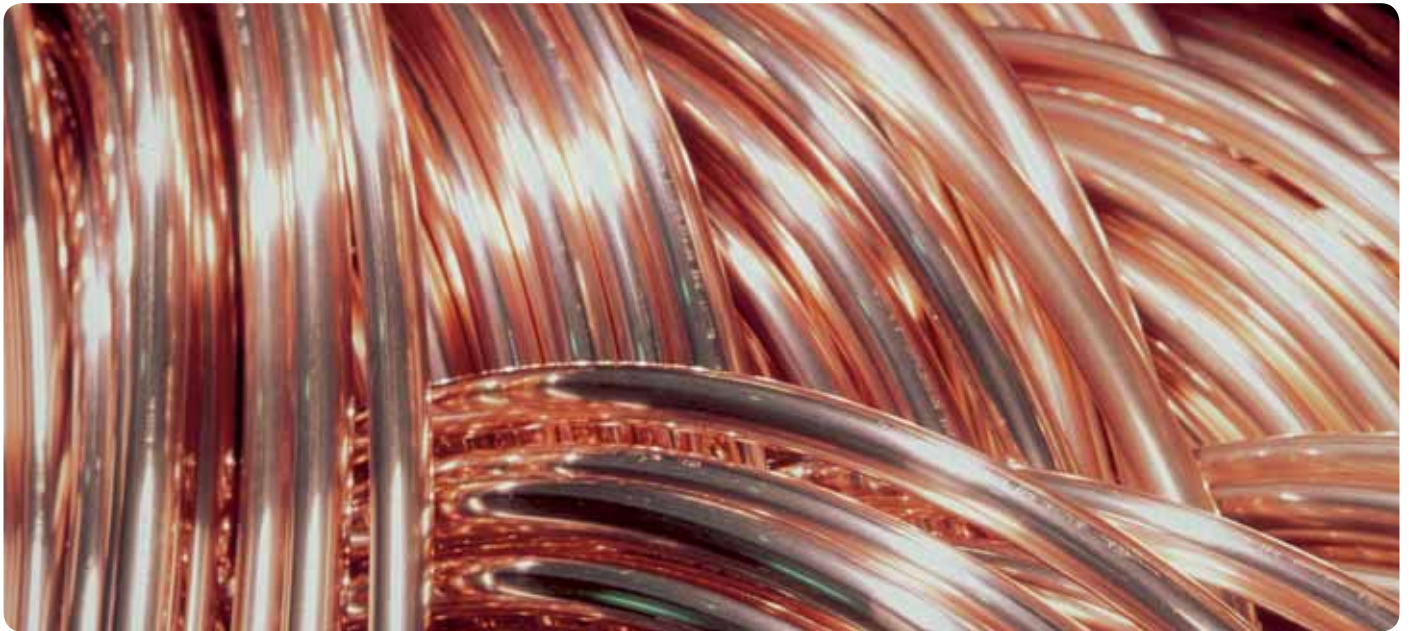
Your concentrate is enriched to copper within a matter of days and reduced transportation time allows you to sell the copper, and realize profits, months faster than was possible with old methods. As a direct result, working capital is substantially reduced and our innovative, cost-effective process provides you with the opportunity to minimize loss of interest.

HydroCopper™ enhances your business:

- Savings in freight costs and in working capital are significant
- The chloride-based leaching process is viable for most concentrates
- The revolutionary copper production method will enable on-site Independent Copper Production (ICP)



Redefining the rules of the game



New rules in the mining industry

HydroCopper™ is a simple way to begin copper production on-site, close to the concentrator.

With HydroCopper™, even small-scale production plants can be economically viable. Processing low-grade and metallurgically difficult ore bodies also becomes feasible through the low-cost integrated process chain.

HydroCopper™ will make many mining areas viable even during periods when the price of copper is low. The premium price of a cast copper product is considerably higher than for LME A+ cathode quality.

Choosing our HydroCopper™ technology enables you to operate your business more effectively.

A process that fits your capacity

The HydroCopper™ process allows economical copper metal production in the capacity range of 20,000 to 200,000 tons per year. The end product of the process is high-quality copper of LME A+ purity, which can be cast in any form required.

The HydroCopper™ process enables the use of low-grade concentrates and makes it possible to achieve better copper recovery for the concentrator and allows a lower cut-off grade. This means higher production and a longer lifetime for your mine. The process is very robust; it tolerates a variety of impurities and is viable for a multitude of copper concentrates including those bearing low copper values and it is appropriate for diverse copper contents.



High-quality copper directly from concentrate

Demonstration plant to ensure suitability

The HydroCopper™ concept is based on long-term process research and development in one of the world's leading metallurgical laboratories, Outokumpu Research Center in Pori, Finland. Our research center has first-class laboratory resources and around 200 top scientists specialized in metallurgical research.

Outokumpu has designed set up a HydroCopper™ demonstration plant next to the research center, where all the process phases and equipment have been rigorously tested.

The HydroCopper™ demonstration plant has facilities for making demonstration runs using your concentrates, ensuring their suitability for the process. The production capacity is set at one metric ton of copper rod per day.

The demonstration plant uses small industrial-scale equipment instead of laboratory-scale equipment, ensuring its results are comparable with commercial production plants. It consists of all the essential unit processes needed in a full-scale production plant and is capable of processing most kinds of copper concentrates and even high-grade ore.



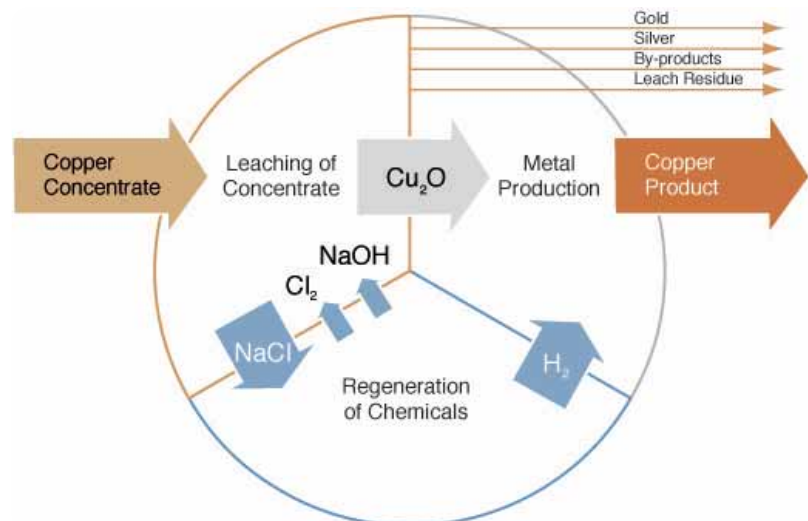
Sophisticated process

The HydroCopper™ concept is a new hydrometallurgical method in which a sulphide copper concentrate is leached in an oxidizing chlorine environment. The dissolved copper is recovered and further reduced to metallic copper to be cast in any form required.

The utilization of chlorine solutions is advantageous due to the aggressiveness in leaching and the stability of the cuprous ion. This offers a stable production environment

and therefore the HydroCopper™ plant is designed for a high-degree of automation.

We have carefully considered environmental issues in the development of the process. Chemicals used in the process are regenerated in chlor-alkali electrolysis and circulated back to the process. The process is also designed with closed water circulation and efficient handling of process off-gases.



User-friendly process taken to a new level



HydroCopper™ is a compact, simple method that eliminates complex smelting and electrorefining processes. Instead, the process utilizes chlor-alkali electrolysis and progressive solutions to enable a high degree of automation and higher yields. This facilitates the transformation from conventional copper production into an advanced, clean chemical process.

Environmentally sound process

Innovative HydroCopper™ is an environmentally sound process with a superior eco-balance compared to traditional methods.

There is no need for long gangue transportation when transporting products instead of concentrate. Residues are handled flexibly; leaching residues are hematite or goethite and elemental sulphur.

As your reliable partner, we offer:

- Industry expertise
- Advanced innovations and proven technologies
- Business solutions
- Total project implementation
- Extensive plant services
- Sustainable value

Our technology controls and optimizes water balance and energy consumption thereby reducing environmental loads and expenditure.

Demand the best



Outokumpu Tornio plant.

Operational reliability

Outokumpu is uniquely positioned to serve process industries with the latest developments in the harmonizing of operating and maintenance practices. Our Reliability Expert System, Re-X, consists of process and maintenance-related services and software components.

Re-X is now available in conjunctions with HydroCopper™. It allows management of the process environment as a whole, keeping it beneficial for the production process.

Outokumpu excellence at your service

The HydroCopper™ process is now available for you. We look forward to a fruitful, profitable collaboration to start a new era in the copper industry.

We offer you a secure and stable partnership with one of the world's

leading metals and technology companies. In addition to our cutting-edge technologies, we provide life-cycle plant services to you. We also have resources and connections to support you with financial arrangements, product trading and off-take.

Our after-sales services cover training, maintenance and operation services, consulting and auditing as well as spare-part management. Our goal is to supply you with the most effective solution to ensure you obtain the best results possible.

HydroCopper™ demonstration plant in Pori, Finland.



Outokumpu is a dynamic metals and technology group. Focusing on our core competences, that is, extensive knowledge of metals and metals processing, we aim to be leaders in all of our key businesses: stainless steel, copper and technology. Customers in a wide range of industries use our metals, metal products, technology and services worldwide.

**OUTO
KUMPU**

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