

# Metso

Metso's Outotec®

## Kaldo L Furnace



Metso  
**PLUS**

# Kaldo L Furnace

Kaldo L Furnace is a flexible solution for smelting and converting various primary and secondary raw materials with the highest environmental performance and operational flexibility.

## Kaldo L Furnace

Metso's Outotec® Kaldo L Furnace - which is the 4th generation Top Blown Rotary Converter - utilizes the vast experience from previous TBRCs in the steel and the nonferrous industries. Kaldo L is a heavy-duty furnace with smooth movement, and is designed to achieve maximum efficiency for melting and processing of several different materials. The technology is supported from processes and equipment in symbiosis. The system is a part of Metso's Metso Plus portfolio, which highlights offerings that contribute to a more sustainable environment.

Metso's Outotec Kaldo L Furnace is a flexible solution for smelting and converting various primary and secondary raw materials such as concentrates, copper scrap, e-waste, and precious metals anode slimes. It is equipped with advanced charging and off-gas systems, thus allowing a very compact plant layout and operational flexibility.

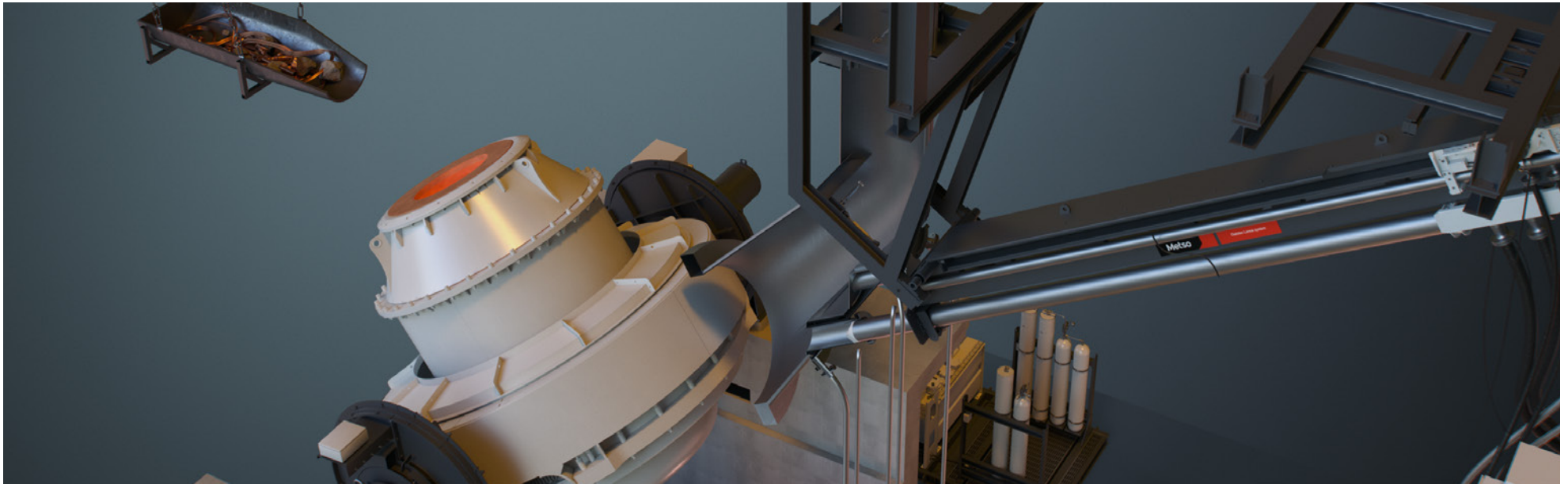
The process with smelting, reducing, and converting can be performed in a single vessel.

The system is fully encapsulated by a furnace casing, thus facilitating ventilation of the whole section, including the ladle car below the furnace. Stray emissions are prevented, resulting in a safe working environment.

An advanced hydraulic system allows smooth and safe control of any movement. The heating and converting processes are performed by introducing water-cooled lances mounted in lance wagons with a hydraulic drive. A Multi-Purpose Utility Lance can also be introduced for temperature control and refractory wear measurement. The cooling system is equipped with a safety system to prevent water leakages into the vessel. In case of a system malfunction, an internal energy accumulator will automatically move lances out from the vessel and allow a tilting of the vessel to empty the melt into ladles. Material is introduced to the vessel by one of several systems, depending on the process. Process control from the operator panel and control room with an advisor system is possible to assist the operator.

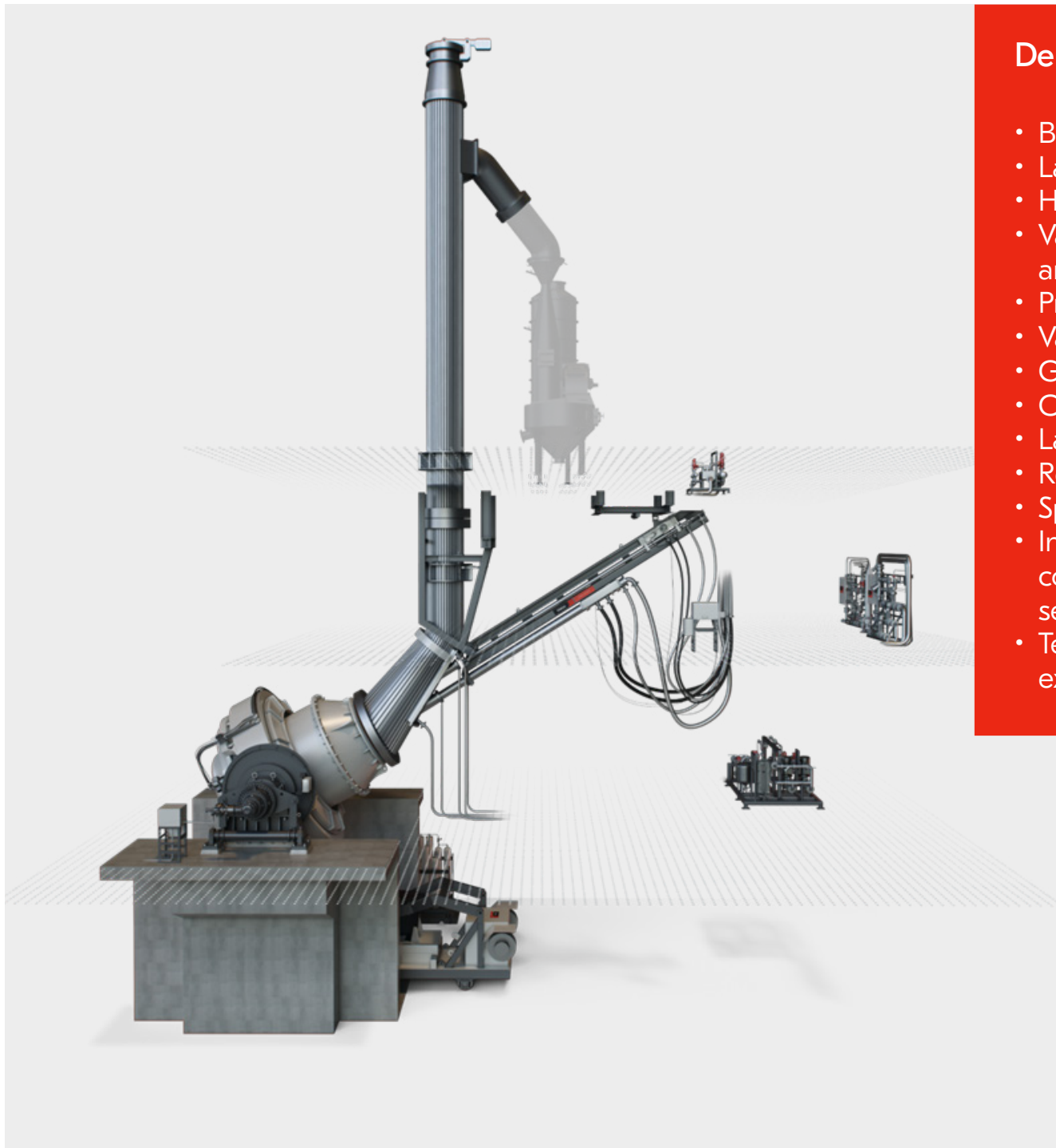
Metso's Outotec Kaldo has been successfully used in the precious metals, copper, and lead processing industries for decades and represents the best available TBRC technology for this purpose. Metso has continuously developed the Kaldo Furnace since the 1970s and has substantial references globally. A Pilot plant TBRC Kaldo L is available for tests where customers can verify and validate materials and processes before making important decisions.





## Main features

- Technology and equipment optimized for the need, allowing processing of various primary and secondary raw materials
- Trunnion ring with slewing bearing for flexible use, less wear onto critical items and a quick and easy replacement of the vessel
- Advanced hydraulic system for smooth and safe control including emergency system for movement of lances and tilting of the vessel in any malfunction
- Process control system with a modern interface for equipment and plant control
- Plant solutions or stand alone equipment for Global business
- Lance system with up to 3 lances and supporting valve racks
  - NG burner lance, water cooled. Auto ignition and flame monitoring
  - High Efficiency Super Sonic Converter Lance with oxygen enriched air, water cooled
  - Utility lance
- Process calculation supported by HSC-Sim
- IPRs for Equipment and Technology



## Delivery scope

- Batch furnace, 0.2m<sup>3</sup> to 20m<sup>3</sup>
- Lance system for varying capacities
- Hydraulic power unit
- Valve racks for cooling, NG burner and converter system
- Process control systems
- Various charging systems
- Gas uptake
- Casing
- Ladle train
- Refractories
- Spare packages
- Installation supervision, commissioning, and lifecycle services
- Technology packages with experienced knowhow



# Kaldo process

This versatile technology can be used for smelting and converting various primary and secondary raw materials such as concentrates, copper scrap, anode slimes, and e-waste. The process utilizes a top-blown rotary converter. Metso's Outotec Kaldo L Furnace is equipped with advanced charging and off-gas systems for a very compact plant layout and high operational flexibility.

## Operation

The batch process starts with the charging of material to the furnace. Depending on the process and raw materials to be charged, this is achieved in different ways. Smelting and converting are performed by introducing water-cooled burner and converting lance.

When the processing is finished, the furnace is tilted to pour the slag and alloy to ladles located on a ladle transfer car below the furnace. The process is very compact and fully encapsulated, making it possible to ventilate the whole section to the bag filter and prevent stray emissions. Metso's Outotec process for PM Kaldo is a well-established solution and has substantial references globally.

## Specifications

- Very flexible top-blown rotary converter technology for processing a variety of materials
- Commonly used for treating copper anode slimes and other materials containing precious metals
- Burner fuel type can be selected according to customer requirements
- Technology supported by HSC-Sim
- Technology packages with experienced know-how
- Pilot plant TBRC Kaldo L is available for verification and validation of process development

## Benefits

- Produces a high recovery of valuable metals
- Lowers operating and maintenance costs
- Offers high process flexibility
- Versatile and efficient operations
- Allows a compact plant layout

Product range

# Technical data

## Kaldo L Furnace

Kaldo m <sup>3</sup>	Trunnion, frame capacity m <sup>3</sup>	Rotation speed rpm	Tilting rpm	Overhead crane capacity, min ton	Est. overhead crane, min lifting height -> hook m	Estimated burner MW	Converter Nm <sup>3</sup> /h***
0.8*	0.2 - 0.8	0 - 20	0 - 0.6	25	5.6	1.5	<840
2.0*	0.9 - 2.0	0 - 20	0 - 0.6	45	7.0	2.0	<2,000
3.2*/**	2.1 - 3.2	0 - 16	0 - 0.6	55	7.8	3.0	<3,360
5.1*/**	3.3 - 5.1	0 - 16	0 - 0.6	75	8.8	5.0	<5,360
8.0*/**	5.2 - 8.0	0 - 12	0 - 0.6	100	9.9	7.0	<8,400
11**	11.0	0 - 12	0 - 0.6	120	10.7	10.0	<11,550
13.0**	13.0	0 - 12	0 - 0.6	130	11.2	11.0	<12,600
16.0**	16.0	0 - 12	0 - 0.6	150	11.9	12.0	<16,800
20.0**	20.0	0 - 12	0 - 0.6	165	12.6	13.0	<21,000

\*) A sizes in smelting, alternative capacity on request

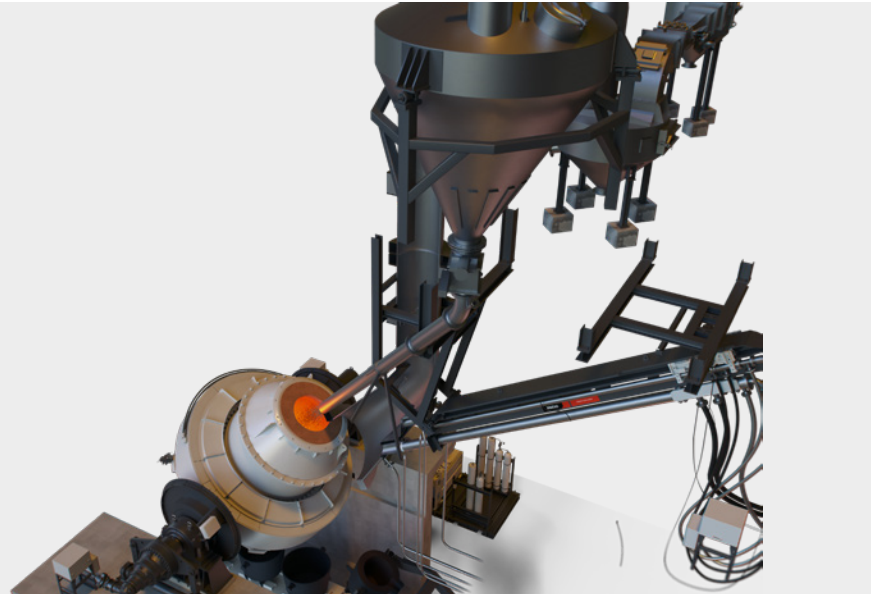
\*\*\*) A sizes E-waste, alternative capacity on request

\*\*\*) Oxygen enriched <35%

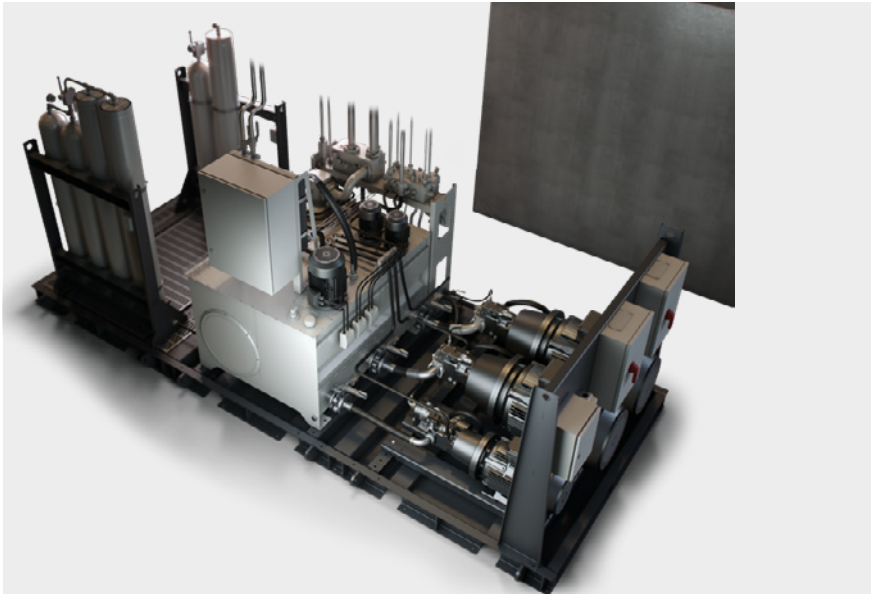
\*\*\*\*) 3 positions lifting arrangement with angle 60°



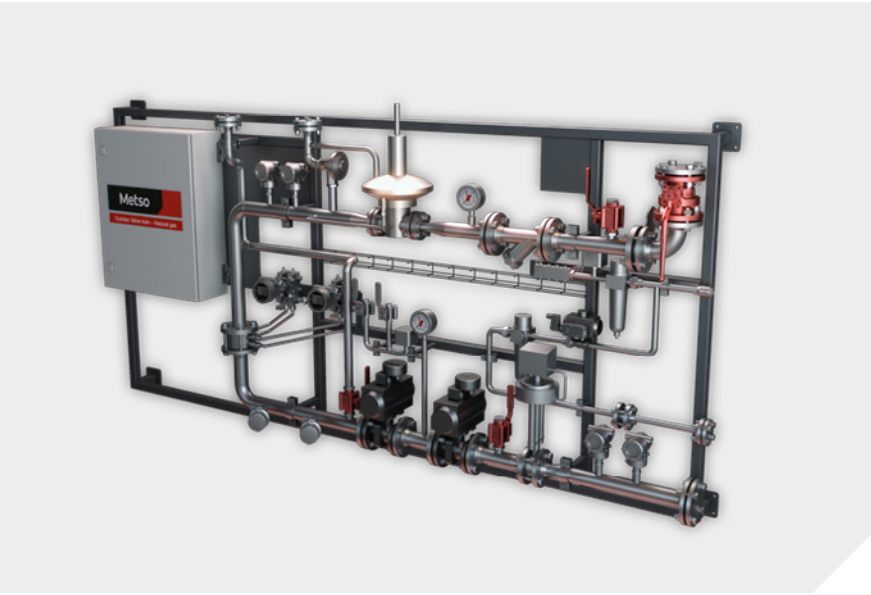
Vessel design with tapping hole



Material charging by use of BIN



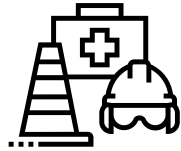
Hydraulic power unit



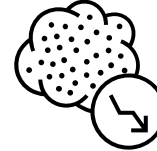
Natural gas valve train



Flexible technology and optimized equipment



Outstanding occupational safety and health



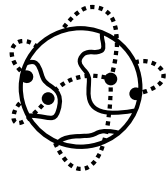
Excellent gas capturability



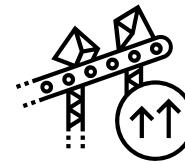
High recovery of metals



Efficient handling and short process time



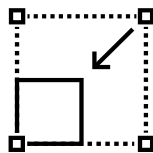
Substantial references globally



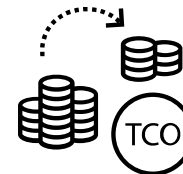
High throughput in one furnace



Long equipment lifetime



Compact equipment



Low total cost of ownership





# Why Metso?

1. Complete, optimized process solutions for a diverse range of feed materials based on decades of technical expertise.
2. Fully automated smelting solutions enable safe, stable operations leading to high recovery and availability.
3. Minimized investment risk due to proven technology.
4. Successful reference projects delivered for customers globally.
5. Proven environmental compliance.
6. Technology delivery backed by pilot testing, process guarantees, and advisory services enables fast ramp-up to design capacity.
7. Optimized total cost of ownership.

Metso is a frontrunner in sustainable technologies, end-to-end solutions and services for the aggregates, minerals processing and metals refining industries globally. We improve our customers' energy and water efficiency, increase their productivity, and reduce environmental risks with our product and service expertise. We are the **partner for positive change**.

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