

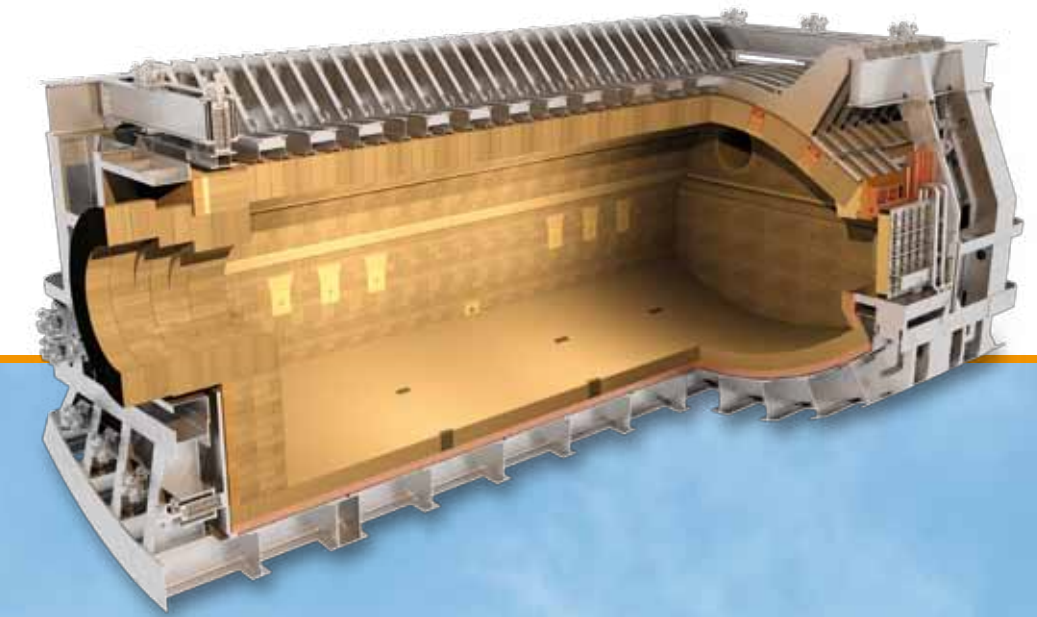
Cooling Technology



Your Partner for Cooling Technologies

Getting more for less

Optimized processes increase productivity and decrease costs



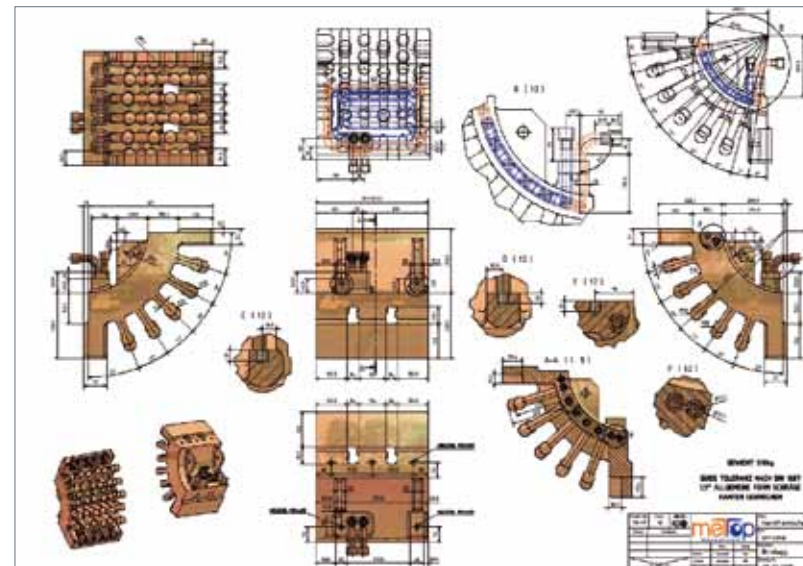
METTOP FIS provides comprehensive solutions, enabling the maximum benefits from cooling to be attained, through the correct integration into the refractory lining. When installing cooling elements, the surrounding brickwork and the general furnace situation always have to be considered. Possible lining modifications not only comprise the refractory engineering, but also the refractory material selection (e.g., AlCr).

Modern lining designs require new technologies to reduce operational costs and increase the furnace availability. Cooling element technology, which has been gradually introduced over the years, provides considerable benefits in different furnace lining areas.

Our main goal is an optimized furnace lifetime – optimum cooling element operation is a prerequisite for achieving this.

Cooling Engineering

- > Basic engineering
- > Specific engineering for implementation in existing smelters
- > CFD calculations for water flow rate and heat balance
- > Complete engineering and cooling system manufacture
- > Installation



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Ionic Liquid Cooling Technology ILTEC



Safe cooling technology – no water - no explosions – no corrosion – no hydration

METTOP FIS has developed and patented a new cooling technology (ILTEC) using ionic liquids (ILs) as the cooling medium instead of water. This technology enables the main disadvantage in today's cooling systems to be overcome: Namely the cooling medium water and its strong cooling effect.

ILTEC enables higher cooling element temperatures to be used and does not cause explosions. To provide the optimum IL for cooling purposes, we closely collaborate with proionic, Austria, who has expert knowledge and long-standing experience in IL development and production.

ILs are organic salts with a wide liquidus range and melting points typically below 100 °C. By varying the cations and anions, a wide range of ILs with different properties (e.g., melting point, viscosity, and solubility) becomes possible. As ILs allow higher cooling medium temperatures, hydration during furnace heat up and dew point corrosion can be avoided. The main advantage is that ILs do not lead to explosions if they come in contact with liquid metal, as in the case of a leakage. This is not only an important cost factor regarding furnace repair and associated standstill times, but also an essential safety improvement.

Advantages

- > No explosions in the case of leakage
- > Higher cooling medium temperatures
- > No hydration
- > No dew point corrosion problems
- > New possibilities for cooling applications (e.g., below bath level)



METTOP FIS provides complete ILTEC systems, namely the cooling element, cooling medium (ISIS), and cooling circuit design, as well as complete hardware delivery of all system components. The IL is circulated in a closed cooling circuit, which is specially designed with regard to the IL properties and the specific cooling application.

Various ILs are available:

- > ISIS_A – “advanced” cooling medium temperatures up to 250 °C
- > ISIS_B – “basic”, cooling medium temperatures up to 150 °C
- > ISIS_C – “cool”, low ambient temperatures

ILTEC opens up totally new cooling possibilities in metallurgical furnaces, namely using cooling elements in areas where water cooling is not feasible or too dangerous. Some examples for interesting applications in metallurgical furnaces are TSL lance tips, tap holes, furnace mouths, and electrode cooling.

Our main goal is customer satisfaction – therefore, METTOP FIS uses a mobile test stand for initial onsite ILTEC tests. This test stand can be easily transported to the customer's site. The big advantage is that the customer can test ILTEC directly in the specific application.

ILTEC

- > Ionic liquids instead of water
- > Complete system
- > Closed circuit
- > Adjustable cooling medium
- > Safe operation



CFM Cooling Elements



Efficient heat transfer – adjustable cooling – prolonged refractory lifetime – modular elements

METTOP FIS provides different types of cooling elements, which are customer-tailored for the specific application. Our main focus is the Composite Furnace Module (CFM) cooling technology, where we have a collaboration with and license from the University of Melbourne, Australia.

The CFMs can be used as a local solution in highly stressed furnace areas, but also for larger furnace sections for complete furnace walls. Further cooling benefits are enabled by using CFM cooling elements with our patented ionic liquid cooling technology (ILTEC).

The CFMs consist of a specially shaped copper cooling element with cast-in cooling medium channels (Cu or Monel pipes) and cast refractory material. The finger-shape of the copper element provides good contact between the copper and refractory, resulting in efficient and homogeneous heat transfer. A very uniform hot face temperature is achieved and hence good refractory protection, resulting in prolonged refractory lifetime and furnace campaigns.

A wide range of heat removal levels can be achieved by using different CFM designs resulting in an optimized heat balance.

CFM

- > Homogeneous hot face temperature
- > Special design enables good copper cooling element/refractory contact
- > Effective and adjustable cooling
- > Extended refractory lifetime and furnace campaigns

