

# Joint ISCRAM-CHINA and GI4DM 2008 Conference

## Recent development in Submerged Arc Smelting Technology

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### ABSTRACT

The Submerged Arc Furnace (SAF) technology is continuously evolving toward the goal of safer, cleaner and more effective operations. Tenova Pyromet is supplying the industry with furnaces for ferroalloy smelting, base metal refining, slag cleaning, and waste product treatments.

The latest developments in furnace technology have been used in recent projects executed by Tenova Pyromet. Among these is our sidewall cooling system, such as our SAFECOOL™ ultra-safe sidewall copper cooling system at Bus Valera in France, and our MAXICOOL™ high intensity sidewall copper cooling system for a slag smelting furnace at Elkem Solar in Norway, as well as for the first ever ISACONVERT™ furnace in Zambia (under construction). The Elkem Solar furnace cooling system makes use of a high temperature oil based heat transfer fluid. All Tenova Pyromet's sidewall copper cooling systems are designed to maintain a stable slag freeze lining, resulting in an increased furnace campaign life.

Standard SAF's, semi closed (up to 48MVA) and closed (up to 66MVA), technology designed by Tenova Pyromet include accurate fully automated raw material feed systems, raw material pre-heating, both Pyromet and Tagliaferri electrode systems, refractory freeze linings and control system, wet scrubber or baghouse gas cleaning systems, gas cooling in trombone coolers, spray chamber or forced draught coolers as well as sophisticated safety and environmentally compliant designs.

Tenova Pyromet is busy with significant R&D activities, some in cooperation with other technology providers. The newest technology includes a new generation Multiple Preheater for SAF's jointly developed with Outotec.

A new generation SAF controller has also been developed.

A furnace lining management system uses temperatures measured at various points in the furnace lining to create a 3-dimensional model of the isotherms in the furnace lining. This provides a useful tool for the furnace operator to evaluate the condition of the lining. The operator can use the system to identify areas of high wear and take corrective action if required.

Tenova Pyromet is currently undergoing evaluation of technologies to further improve the furnace operability and reduce costs and emissions. Especially with regard to the ferroalloy industry the biggest challenge ahead is to be capable to contribute to the Greenhouse gas emission reduction.

**Keywords**

Submerged Arc Furnaces, Ferroalloy, Base Metal, waste recovery, energy efficiency, safety, environment, sidewall copper cooling.

**REFERENCES**