

# Symposium "100 years of SAF" – SMS Demag AG

Report by Bernd Friedrich, Tim Georgi

One hundred years ago, in the year 1906, the first Submerged Arc Furnace (SAF) of the company SMS Demag AG started running. On the occasion of the anniversary of the company sector "Submerged Arc Furnaces" and the establishing of the SAF-technology particularly successful in recent years, from May 11<sup>th</sup> to 13<sup>th</sup>, 2006 SMS Demag invited well-known representatives from the circle of SAF-users as well as university research partners to the symposium "100 years of SAF" at its head office in Düsseldorf. It was attended by more than 80 associative partners from Germany, Finland, South Africa, India, New Caledonia and Australia. Subsequent to the symposium, a factory visit at Norddeutsche Affinerie AG in Hamburg was offered to interested participants.

The symposium was chaired in turn by Dr. Degel, Dr. Kempken and Mr. Lembgen of SMS Demag. Both days were divided into five sessions. Thursday's sessions presented the focus of the work of SMS Demag, while in both Friday's sessions the industrial representatives described their experiences. Session 1 was an introduction into the technology and metallurgy of SAF, presenting e.g. an overview of the highlights of the centennial history of the SAF at SMS Demag. A survey of the market perspectives and developments as well as of today's applications was given in Session 2. Here the emphasis was on the production of ferroalloys, such as ferrochromium and ferronickel, for which a strong increase in demand and production is expected for the next years.

Session 3 dealt with the technological innovations and trends in the field of SAF. A system for the furnace wall cooling developed by SMS Demag was presented, consisting of copper cooling elements inserted directly behind the lining and cooled by water conduits abutted from outside. Thus, the cooling water cannot come into contact with the melt. At sufficient heat dissipation through the furnace wall an intrinsic slag protection layer develops at the interior wall of the furnace protecting the lining. Since this avoids constant direct contact with the aggressive liquid slag, a longer durability of the lining can be achieved. With this cooling system an upgrade of an existing furnace from e.g. 50 MW to 75 MW is possible. This was successfully carried out at the ferronickel producing company Eramet in New Caledonia.

The close collaboration of SMS Demag with University research institutes became manifest at the presentation of a 3D-fluid dynamics modelling software jointly developed by University of Santiago de Chile and SMS Demag. The modelling software is used e.g. for the up-scaling of furnaces and, besides realistic assessment of for example the temperature distribution in the furnace, provides useful data for an adequate furnace design regarding dimensions and cooling devices.



Likewise, the long-standing cooperation in the area of research and development between SMS Demag and IME Process Technology and Metal Recycling at Aachen University was stressed. Professor Friedrich presented the extensive SAF facilities and the wide range of research possibilities at the IME. In the area of SAF the IME disposes of two 100 kW-furnaces on laboratory scale and one 500 kW-furnace on pilot scale built by SMS Demag and, due to its flexible application, used for a variety of test series. For the application in future research projects the furnace shall be reconstructed and modernised by SMS Demag by the beginning of next year.

In sessions 4 and 5 the users from industry presented their longtime and varied experiences in the SAF-technology of SMS Demag. Speakers were Mr. Kauppi of Outokumpu Chrome Oy, Mr. Buenger of Norddeutsche Affinerie AG, Mr. Bronsan of Simcoa Operations Pty Ltd., Mr. Zimmermann of Donau Chemie AG and Mr. Renier of Eramet. The presented SAF-applications ranged from ferroalloy production and slag-cleaning to silicon metal and calcium carbide production. Besides technical topics, also aspects of operational safety and environmental protection were discussed.

At large, the presentations were of a high professional standard. This was confirmed by the discussions after the lectures and during coffee and lunch breaks. Lively conversations and exchange of experiences also took place during the dinner at the brewery Schumacher in Düsseldorf Old Town invited to by SMS Demag. The whole event took place under very pleasant conditions and was rounded off by an interesting sightseeing program of Hamburg.

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