

Journal Comment

Furnace Tapping 2014

Furnace Tapping 2014 was the first event of its kind, focusing on the challenges associated with the tapping of furnaces and ways in which these challenges are currently addressed. The conference was inspired by an in-house event arranged by Dr Lloyd Nelson – then employed by Hatch Africa – in 2003, and the need for peer-reviewed papers published in the open literature. This was identified when I conducting a literature survey for my PhD studies, which focused on enhancing the tap-hole design for silicomanganese furnaces.

The event was hosted by the SAIMM, at Misty Hills, on 27–28 May 2014. It consisted of two days of presentations – produced as proceedings of peer reviewed papers—and a one day post-conference tour.

As first keynote speaker, Dr Lloyd Nelson (Anglo Platinum, South Africa), delivered a thoroughly researched review of the literature available on the design, operation, and maintenance of furnace tap-holes in ironmaking, ferroalloys, and base metals. Dr Nelson illustrated the extent of the work that has been done in blast furnace ironmaking to progress towards an understanding of the factors influencing tap-hole life, and highlighted the need for cross-commodity benchmarking of tapping practices and tap-hole management systems, to seek further incremental improvements in safety and performance.

Dr Nic Barcza (Mintek, South Africa) in his keynote address focused on process-related aspects influencing tap-hole life and furnace tapping in general. Using a number of examples, Dr Barcza explained why feed material characteristics and control, smelting conditions – in particular operating temperature, and slag and metal or matte compositions upon tapping created problems in tapping of furnaces. He emphasized the detrimental effect of excessive superheat when tapping either slag or metal/matte.



'Liquid magic' – metal and slag being tapped at Transalloys. The photograph was used on the cover of the printed proceedings for Furnace Tapping 2014 (photograph by Joalet Steenkamp)



Almost too close for comfort – conference delegates admiring the scale of blast furnace tapping at ArcelorMittal South Africa Vanderbijlpark Works (photograph by Maryke Pelsler)

The third keynote address was delivered by Ragnhild Jensen (Elkem, Norway), representing Dr Halvard Tveit, and focused on the improvements made in the tapping of silicon through research sponsored by the Norwegian Ferroalloy Producers Research Association (FFF).

Of the 17 peer-reviewed papers, five documented tapping practices at existing operations. P.G. Geyer and Z. Halifa described blast furnace tapping practice at ArcelorMittal South Africa Vanderbijlpark Works; W.S.B. van Beek, T.J. Goff, P.E. Nel, and E. Rex gave an overview of the design, operation, and maintenance practices relating to tap-hole management of a PGM smelting furnace (Lonmin); S.G. Mgenge and J.D. Steenkamp described furnace tapping practice at Tronox Namakwa Sands; L. Thomson described the monitoring, repair, and safety practices for electric furnace matte tapping (Sudbury Integrated Nickel Operations, Canada), and D.J. Rioux reviewed Teck's KIVCET lead tapping experience (Teck Metals, Canada). The papers by Thomson and Rioux were sourced by Dr Lloyd Nelson.

The 12 remaining papers included reviews of current operations and descriptions of technologies available for tap-hole design, monitoring, closure, and maintenance.

I. Nolet reported on an industry survey conducted on the tapping of PGM-Ni mattes; L. Els, P. Cowx, P. Smith, and R. Nordhagen analysed and optimized fume extraction from a ferromanganese furnace tapping operation (Eramet Sauda, Norway), and J.D. Steenkamp, J. Gous, P.C. Pistorius, M. Tangstad, and J.H. Zietsman conducted a wear analysis of a tap-hole from a SiMn production furnace (Transalloys, South Africa).

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Tap-hole design technologies were addressed by I. McDougall, who described the use of water-cooled tap-hole blocks at Tenova Pyromet.

Tap-hole monitoring technologies were discussed by M. Hopf, who described the monitoring of wear of water-cooled tap-hole blocks by the OPTISAVE fibre-optic method (Saveway), and W. Braun, P. Gebski, R. MacRosty, R. Pula, A. Sadri, and W. Ying addressed tap-hole monitoring technologies (Hatch Goba).

A. Diententhal related the history of the development of tapping equipment and tap-hole closure technologies (TMT Tapping Measuring Technology) and S.C. Essack explained how a slag tap-hole could be closed using a slag flow valve (Tenova Pyromet).

Tap-hole repair technologies were addressed by P. O'Shaughnessy, H. van der Merwe, and S. Botes, who explained how the UCAR®V repair solution could be used to repair tap-holes (Graftech), and L.H. Lindstad, who described the maintenance and larger repairs of tap-holes and tapping spouts (Elkem Carbon).

A. Rödfalk, J.P. Nilsson, N. Brogden, P. Bloemer, A. Lyons, and O.J. Østensen described an automatic ladle level measurement system for monitoring ladle fill rate during tapping (AGELLIS Group), and A. Filzwieser, S. Konetschnik, and E. Dreyer explained why ionic liquid cooling technology would be the safest way of furnace tapping (METTOP).



'That high' – Dr Lloyd Nelson explaining the intricacies of furnace tapping during one of the tea breaks (*photograph by Joalet Steenkamp*)

Of the 203 delegates, who filled the venue to capacity, the majority (161) were from South Africa. Other delegates were from Austria (5), Canada (4), Chile (2), Germany (5), Namibia (3), The Netherlands (2), New Caledonia (1), Norway (13), Sweden (4), UK (1), and Zimbabwe (2). Companies well represented at the event were Anglo American Platinum Ltd (16), DMS Powders (7), Elkem Carbon (7), Exxaro Resources (6), Hatch Goba (8), Mintek (11), Samancor Ferrometals (13), Samancor Middelburg Ferrochrome (6), Tronox (12), and the University of Pretoria (12).

The post-conference tours to Anglo Platinum Waterval Smelter, Transalloys and the blast furnaces at ArcelorMittal South Africa Vanderbijlpark Works were well attended.

The event was sponsored by RHI AG, Thos Begbie & Co, Agellis Group, Hatch, Dango and Diententhal South Africa, Trefimet, and Elkem.

The organizing committee consisted of Renier Meyer and Isabelle Nolet (Hatch Goba), Buhle Xakalash (Mintek), Hannes Goosen and Vicky Visser (Dango and Diententhal South Africa), Johan Gous (Transalloys), Kevin Hay (independent), Hennie Burger (Tronox South Africa), and Nanne Vegter (Exxaro Resources). The proceedings were edited by Antony Cowey (independent).

The SAIMM takes pride in announcing that it will be hosting a follow-up conference, Furnace Tapping 2018, in South Africa in May 2018. To maintain the high standard of technical papers in the proceedings of Furnace Tapping 2014, the SAIMM envisages for Furnace Tapping 2018 further documentation of tapping practices by existing operators, as well as reviews of current operations and descriptive case studies in which technologies available for tap-hole design, monitoring, closure, and maintenance were applied. Furthermore, the SAIMM would like to include papers with strong contributions from research institutions (focusing on the application of CFD modelling with associated assumptions, including properties of materials and validation of these models; studies on tap-hole clay; studies on refractory interaction with slag/metal/matte specifically under the tap-hole conditions); as well as papers addressing health and safety aspects related to the tapping of furnaces.

Looking forward to meeting you at Furnace Tapping 2018.

J.D. Steenkamp

*Chairperson of the Organizing Committee
Furnace Tapping 2014*