

# Comminution '14



## Sunday 6<sup>th</sup> April

16.30-18.00 Registration and wine reception, with hot and cold canapés (accompanying persons welcome)

## Monday 7<sup>th</sup> April

- 07.30 Registration desk opens  
Light breakfast of filled croissants, tea, coffee and fruit juice
- 08.30 Opening Remarks  
B.A. Wills (MEI, UK) and M.S. Powell (JKMRC, Australia)
- 08.55 Presentation of 2013 MEI Young Person's Award
- 09.00 *Technical Session 1*  
Chairmen: L.M. Tavares (Universidade Federal do Rio de Janeiro, Brazil) and M.H. Moys (University of Witwatersrand, South Africa)
- 09.00 **Keynote Lecture: The next stage of evolution in comminution**  
A. Muir (AngloGold Ashanti, South Africa)
- 09.30 **Implementation of dynamic simulation at Anglo Platinum**  
G. Asbjörnsson, E. Hulthén and M. Evertsson (Chalmers University of Technology, Sweden)
- 09.50 **Mechanistic modeling of the vertical shaft impact crusher (VSI)**  
E.R. da Cunha, R.M. de Carvalho and L.M. Tavares (Universidade Federal do Rio de Janeiro, Brazil)
- 10.10 Coffee, exhibition and poster viewing
- 11.10 **Control systems for improvement of cone crusher yield and operation**  
M. Evertsson and E. Hulthén (Chalmers University of Technology, Sweden) and M. Nordström (Roctim AB, Sweden)
- 11.30 **Validation of product size distribution and throughput predicted by DEM for a cone crusher**  
P.W. Cleary, G.W. Delaney, M.D. Sinnott (CSIRO Computational Informatics, Australia) and R.D. Morrison (JKMRC, Australia)
- 11.50 **Strategies for size reduction control in cone crushers**  
P. Itävuori, T. Väyrynen, M. Vilkkö (Tampere University of Technology, Finland) and A. Jaatinen (Metso Automation, Finland)

- 12.10 **Real-time optimization of a speed controlled cone crusher in an iron ore application**  
E. Hulthén, M. Evertsson (Chalmers University of Technology, Sweden), K. Hofling (Roctim AB, Sweden), E. Öberg, A. Apelqvist and Å. Sundvall (LKAB, Sweden)
- 12.30 **Adaptive mass flow sensor calibration method for crushing circuits**  
T. Väyrynen, P. Itävuori, M. Vilkkö (Tampere University of Technology, Finland) and A. Jaatinen (Metso Automation, Finland)
- 12.50 Lunch
- 14.00 *Technical Session 2*  
 Chairmen: K.P. van der Wielen (SELFRAG AG, Switzerland) and A. Hinde (Mintek, South Africa)
- 14.00 **Modelling the influence on power draw of the slurry phase in autogenous (AG), semi-autogenous (SAG) and ball mills**  
S. Morrell (Citic SMCC Process Technology Pty Ltd, Australia)
- 14.20 **Predicting the evolution of rock size distribution, throughput and product size in AG and SAG mills by incremental damage, chipping, rounding and abrasion**  
R.D. Morrison, M. Powell (JKMRC, Australia), P.W. Cleary, G.W. Delaney, S. Cummins (CSIRO Computational Informatics, Australia) and B. Loveday (University of KwaZulu-Natal, South Africa)
- 14.40 **An extended model for the Drop Weight Test**  
C.L. Schneider and T.B. Duque (CETEM, Brazil)
- 15.00 **Comparison of single particle, Bond and bed tests for fine particle ore breakage characterisation**  
G.R. Ballantyne, F. Shi, B. Bonfils and M.S. Powell (JKMRC, Australia)
- 15.20 Coffee
- 16.00 **Breakage characterization of multicomponent ore**  
L.X. Liu, F. Saeidi and M.S. Powell (JKMRC, Australia)
- 16.20 **What is needed to develop the next generation of mechanistic breakage models in comminution?**  
R. Chandramohan (Ausenco Services Ltd, Australia), B. Bonfils and M. Yahyaei (JKMRC, Australia)
- 16.40 **Modelling particle size reduction in a batch grinding ball mill**  
F. Shi, W. Xie and M. Powell (JKMRC, Australia)
- 17.00 Happy Hour. Vineyard Gardens. Accompanying guests welcome

## Tuesday 8<sup>th</sup> April

- 08.10 Light breakfast
- 08.50 *Technical Session 3*  
 Chairmen: B.I. Pålsson (Luleå University of Technology, Sweden) and I. Govender (University of Cape Town, South Africa)
- 08.50 **Keynote Lecture: Is progress in energy-efficient comminution doomed?**  
T. Napier-Munn (JKMRC, Australia)
- 09.20 **An energy based comparison of vertical roller mills and tumbling mills**  
D.I.T. Plochberger and D.I.M.B. Avila (Cemtec, Austria)
- 09.40 **Energy distribution models in tumbling mills using positron emission particle tracking**  
T. Pathmathas, I. Govender and D. De Klerk (University of Cape Town, South Africa)
- 10.00 **Coarse waste rejection using sensor based technologies**  
W. Millar, D.J. Bowman, R.A. Bearman (Bear Rock Solutions, Australia), D. Miljak and N. Cutmore (CSIRO Minerals Down Under Flagship, Australia)

- 10.20 **Positron emission particle tracking in tumbling mills**  
I. Govender, D. de Klerk and A.N. Mainza (University of Cape Town, South Africa)
- 10.40 Coffee
- 11.20 **Predicting charge motion, slurry flow and rock breakage within and discharge from a 3D pilot SAG mill using a coupled DEM-SPH model**  
P.W. Cleary (CSIRO Computational Informatics, Australia) and R.D. Morrison (JKMRC, Australia)
- 11.40 **Comminution circuit design, what test work is required for a bankable feasibility study?**  
J. Starkey and M. Brissette (Starkey & Associates, Canada)
- 12.00 **Dry grinding: current and future systems in mineral processing**  
E. Burchardt and W. Brandhoff (ThyssenKrupp Resource Technologies, Germany)
- 12.20 **Research of iron ore grinding in a Vertical-Roller-Mill**  
M. Reichert, H. Lieberwith (TU Bergakademie Freiberg, Germany), C. Gerold (Loesche GmbH, Germany), A. Fredriksson and G. Adolfsson (LKAB, Sweden)
- 12.40 Lunch
- 14.00 *Technical Session 4*  
Chairman: H. Lieberwith (TU Bergakademie Freiberg, Germany)
- 14.00 **Wear in high pressure grinding rolls subjected to the composition of heterogeneous abrasive materials**  
Y. Sesemann, C. Broeckmann (RWTH Aachen University, Germany) and A. Höfter (Köppern Entwicklungs GmbH, Germany)
- 14.20 **New population balance model for predicting particle size evolution in compression grinding**  
V.P.B. Esnault, H. Zhou and D. Heitzmann (Lafarge Centre de Recherche, France)
- 14.40 **Sample requirements for HPGR testing procedure**  
V.K. Alves (VALE S.A, Brazil), C.L. Schneider, T.B. Duque (CETEM, Brazil) and A.E.C. Peres (UFMG, Brazil)
- 15.00 **Pellet feed grinding by HPGR**  
F.P. van der Meer and S. Oenol (Weir Minerals, The Netherlands)
- 15.20 **A DEM model of HPGR operation using bed compression models calibrated with a piston die test**  
G.K.P. Barrios, L.M. Tavares (University of Rio de Janeiro, Brazil) and J. Pérez-Prim (DEM Solutions Ltd, UK)
- 15.40 **FLSmidth® F360 HPGR test campaign Rio Tinto Kennecott Utah Copper Mine**  
J. Pownell and T. Bookless (FLSmidth, USA)
- 16.00 Coffee
- 18.30 Coaches depart for conference dinner in Cape Town

## Wednesday 9<sup>th</sup> April

- 08.15 Light breakfast of filled croissants, tea, coffee and fruit juice
- 09.00 *Technical Session 5*  
Chairmen: C.L. Schneider (CETEM, Brazil) and H.-R. Manouchehri (Sandvik Mining, Sweden)
- 09.00 **Keynote Lecture: A multiscale view on comminution**  
W. Peukert (University Erlangen, Germany)
- 09.30 **Predicting breakage rates of fine particles in stirred media mills depending on stressing energy and frequency**  
G. Gronau, S. Beinert, C. Schilde and A. Kwade (Technische Universität Braunschweig, Germany)
- 09.50 **Shear based stirred mill power model – an adimensional analysis**  
P. Radziszewski (Metso Minerals, Canada)
- 10.10 **Technical gaps and challenges for fine grinding**  
L.X. Liu, S. Palaniandy and M.S. Powell (JKMRC, Australia)
- 10.20 **Economical optimization of stirred media milling processes**  
A. Kwade (Technische Universität Braunschweig, Germany)
- 10.40 Coffee
- 11.20 **Development of the Larson/Morrison IsaMill JKSimMet model**  
M. Larson, M. Young (Xstrata Technology, Australia), R. Morrison and Weiguo Xie (JKMRC, Australia)
- 11.40 **VertiMill® - Preparing the feed within floatable regime at lower specific energy**  
S. Palaniandy, M. Powell, M. Hilden (JKMRC, Australia), J. Allen (Metso Mining and Construction, USA), K. Kermanshahi (Metso Minerals Ltd, Australia), B. Oats and Mark Lollback (BHP Billiton, Australia)
- 12.00 **Pilot scale studies in fine grinding with Outotec HIGmills**  
H. Lehto (Outotec Oy, Finland)
- 12.20 **Mixed media milling- a new operating technique for dry agitated media mills**  
C. Martin (RSG Inc., USA)
- 12.40 Lunch
- 14.00 *Technical Session 6*  
Chairmen: R. Chandramohan (Ausenco Services Ltd, Australia) and S. Palaniandy (JKMRC, Australia)
- 14.00 **Vertical agitated media mill scale-up and simulation**  
D.B. Mazzinghy, R. Galéry (UFMG, Brazil), C.L. Schneider (CETEM, Brazil) and V.K. Alves (VALE S.A., Brazil)
- 14.20 **The research for selection of the third mill of a refractory micro-fine iron ore**  
X. Xiao, G. Zhang, X. Zhao, L. Huang, L. Shi and Y. Long (Changsha Research Institute of Mining & Metallurgy, China)
- 14.40 **Ultra fine grinding gold sulphide float concentrates, the economic drivers and challenges**  
D. Capstick (FLSmidth, South Africa)
- 15.00 **Evaluation of grinding media wear-rate by a combined grinding method**  
J. Wang, B. Wang, F. He, X. Zhou, W. Deng, H. Xu (King's Ceramics, China) and Q. Li (East China Normal University, China)
- 15.20 Coffee

- 16.00 **Selecting ceramic media: part 2 evaluating the wear**  
H. Kotzé (Dakot Milling Media (South Africa) and N. Bedesi (Anglo American Platinum, South Africa)
- 16.20 **Thinking outside of the sphere – adventures in space mining**  
P. Radziszewski (Metso Minerals, Canada)
- 16.40 **A standardised methodology for the assessment of high voltage breakage behaviour of ores**  
K.P. van der Wielen, A. Weh, M. Hernandez, R. Müller-Siebert (SELFRAG AG, Switzerland)
- 17.00 Happy Hour. Vineyard Gardens. Accompanying guests welcome

#### Thursday 10<sup>th</sup> April

- 08.15 Light breakfast of filled croissants, tea, coffee and fruit juice
- 09.00 *Technical Session 7*  
 Chairmen: C.J. Greet (Magotteaux Australia Pty Limited, Australia) and P. Radziszewski (Metso Minerals, Canada)
- 09.00 **New cone crusher: excellent product control results in new potential for flow sheet design in high capacity crushing applications**  
F. Silbermann (ThyssenKrupp Resource Technologies, Germany)
- 09.20 **Energy efficiency in comminution: Vibrocone, a crusher having grinding performance**  
H.-R. Manouchehri (Sandvik Mining, Sweden)
- 09.40 **SAG mill functionality optimization by Medium Voltage VFD utilization: Rudnik Alexandrovskiy experience**  
 A. Gaztelu, I. Atutxa and I. Legarra (Ingeteam Power Technology, Spain)
- 10.00 **Mill discharge modification – from a pilot plant testwork to an industrial test at Mortimer UG2**  
J. Dahner (Magotteaux (Pty) Ltd, South Africa), A. Van den Bosch (Magotteaux SA, Belgium) and G. Makgopo (Anglo American Platinum, South Africa)
- 10.20 **Validation of a model for physical interactions between pulp, charge and mill structure in tumbling mills**  
P. Jonsén, J. Stener, B.I. Pålsson and H.-Å. Häggblad (Luleå University of Technology, Sweden)
- 10.40 Coffee
- 11.20 **Testing of a new mechanistic slurry transport model with Positron Emission Particle Tracking**  
 G.B. Tupper, I. Govender, D. de Klerk, A.N. Mainza (University of Cape Town, South Africa), and J. Mann (Anglo American Platinum, South Africa)
- 11.40 **Using attainable region analysis to simulate a full-scale ball mill that incorporates a realistic transport model**  
N. Chimwani, M. Bwalya (University of the Witwatersrand, South Africa), F.K. Mulenga, D. Hildebrandt and D. Glasser (University of South Africa, South Africa)
- 12.00 **Influence of the mineralogical structure in grinding specific energy consumption of itabirite iron ores**  
 D.B. Mazzinghy, H.D.G. Turrer, J.F.C. Russo (Iron Ore Brazil–Anglo American, Brazil) and L.M. Tavares (Universidade Federal do Rio de Janeiro, Brazil)
- 12.20 **Finding the mill setting sweet spot – a DEM assisted case study**  
J. Franke (Outotec, Australia) and P. Cleary (CSIRO Mathematics, Informatics and Statistics, Australia)
- 12.40 Lunch

- 14.00 *Technical Session 8*  
Chairman: A.N. Mainza (University of Cape Town, South Africa)
- 14.00 **Flotation: the diagnostic indicator of comminution circuit performance**  
C.J. Greet, J. Kinal and G. Small (Magotteaux Australia Pty Limited, Australia)
- 14.20 **The design and optimisation of grinding circuits incorporating stack sizer screens**  
A. Hinde, C. Bergmann, (Mintek, South Africa) and N. Barkhuysen (Derrick Corporation, South Africa)
- 14.40 **Grind circuit optimization at Rio Tinto Kennecott using real-time measurement of individual hydrocyclone overflow stream particle size enabled by novel CYCLONetrac<sup>SM</sup> technology**  
C. O’Keefe, P. Rothman, R. Maron, D. Newton, J. Mercuri (CiDRA Minerals Processing, USA), D. Cirulis and M. Holdsworth (Rio Tinto Kennecott, USA)
- 15.00 **Conference summary and open discussion on the future of comminution**  
A.N. Mainza (University of Cape Town, South Africa)
- 15.40 **Closing Remarks and Invitation to Comminution ‘16**  
A.J. Wills (MEI, UK)
- 15.45 Farewell Coffee and Wine in Vineyard Gardens (accompanying persons welcome)

## POSTERS

**Development of a mechanistic model to define the incremental damage mechanics of rock samples**  
R. Chandramohan (Ausenco Services Ltd, Australia) and B. Bonfils (JKMRC, Australia)

**Simulation and pilot testing of a circulating air classifier used in production of manufactured sand**  
R. Johansson and M. Evertsson (Chalmers University of Technology, Sweden)

**Use of temperature for diagnosing mixing in the IsaMill**  
R. Gunda and M.H. Moys (University of the Witwatersrand, South Africa)

**The effect of high shear in a stirred mill on the shape properties of a multicomponent ore**  
L. van de Ruit, M. Becker, W. Little and A.N. Mainza (University of Cape Town, South Africa)

**Development of a laboratory batch test for Vertical Mill sizing**  
M.G. Bergerman (Federal University of Alfenas, Brazil) and H. Delboni Jr. (Sao Paulo University, Brazil)

**Experimental validation of breakage function independence to grinding environment**  
Z. Pourkarimi (IMPRC and Amirkabir University of Technology, Iran) and B. Rezai (Amirkabir University of Technology, Iran)

**Ultrafine grinding in IsaMill for projects in Russia**  
A.Y. Senchenko and Y.V. Kulikov (LLC “TOMS Science-Research and Design Institute”, Russia)

**Fundamentals of roll surface functionality and wear in operation**  
J. Pownell (FLSmidth, USA)

**Experience of SAGDesign test application in grinding technology development for a gold plant at Aleksandrovszkoye deposit**  
A.Y. Senchenko and Y.V. Kulikov (LLC “TOMS Science-Research and Design Institute”, Russia)

**Mill relining optimization for greenfield plant design and brownfield sites’ relining practices through filmed data and simulation**  
J. Russell (Russell Mineral Equipment Pty Ltd, Australia)

**Application of Fourier and Wavelet Methods to an experimental tumbling mill using 3D particle tracking data**  
D.V.V. Kallon, A.N. Mainza and I. Govender (University of Cape Town, South Africa)

**An assessment of the rock characteristics and the ball mill energy requirements at a mine in Ghana, West Africa**

K.A. Boateng (AngloGold Ashanti, Ghana), C.E. Abbey and R.K. Amankwah (University of Mines and Technology, Ghana)

**Mechanical impacts analysis in SAG mills due to small failures in the electric drive**

V. Guerrero and J. Pontt (Universidad Federico Santa María, Chile)

**Modelling the energy spectra of a tumbling mill using DEM**

L. Bbosa, A. Mainza and I. Govender (University of Cape Town, South Africa)

**Mechanistic modelling of grinding in continuous ball mills**

R. Carvalho and L.M. Tavares (Universidade Federal do Rio de Janeiro, Brazil)