Monday April 11th

09.00  Technical Session 1  
Chairmen: B.K. Loveday (University of KwaZulu-Natal, South Africa) and C.M. Evertsson (Chalmers University of Technology, Sweden)

09.00  Keynote Lecture: Are we there yet? The Long Drive to a Step Change in Efficiency  
J. Pease (Mineralurgy Pty Ltd, Australia).....1

09.40  Using the comminution energy curves to assess equipment performance  
G. Ballantyne and M. Powell (JKMRC, Australia).....19

10.00  A demonstration of combining technologies to substantially reduce milling energy and CAPEX requirements in the processing of refractory gold ores  
D. Capstick and R. Van Ommen (FLSmidth, South Africa).....24

10.20 Coffee, exhibition and poster viewing

11.10  Significantly improved energy consumption, particle liberation, and size reduction by VeRo Liberator® comminution  
G. Borg, F. Scharfe, O. Scharfe, A. Kamradt, and C. Lempp (PMS, and Martin Luther University, Germany).....31

11.30  Investigating steel media differences in microstructure, hardness, abrasion and fracture toughness  
A. Sabih (McGill University, Canada), P. Radziszewski (Metso, Canada) and I. Mullany (Hatch, Canada).....43

11.50  Dynamical cost and profit optimization comminution circuit  
M. Bengtsson, G. Asbjörnsson, E. Hulthén and C.M. Evertsson (Chalmers University of Technology, Sweden).....58

12.10  Increasing efficiency by selective comminution  
M. Hesse and H. Lieberwirth (Institute of Mineral Processing Machines, Germany).....77

12.30  Unlocking additional value by optimising current comminution strategies to process Grade Engineering streams  
C. Carrasco, P. Bode, L. Keeney (Co-operative Research Centre for Optimising Resource Extraction (CRC ORE), Australia) and T.J. Napier-Munn (JKMRC, Australia).....103

12.50 Lunch

14.00  Technical Session 2  
Chairmen: L. Auret (Stellenbosch University, South Africa) and G. Borg (Martin Luther University, Germany)
Numerical study of the influence of irradiation parameters on the microwave-induced damage of rocks for industrial applications
M. Toifl, P. Hartlieb, R. Meisels, T. Antretter and F. Kuchar (Montanuniversitaet Leoben, Austria).....122

Modelling reduction and liberation for rare earth minerals applications
L. Guldris, M. Bengtsson, E. Hultén and C.M. Evertsson (Chalmers University of Technology, Sweden).....143

Fault detection and root cause analysis for a simulated milling circuit
B.J. Wakefield, B.S. Lindner and L. Auret (Stellenbosch University, South Africa).....159

Neurocontrol of a ball mill grinding circuit by use of covariance matrix adaptation evolution strategies
S.L. Hunter (University of Stellenbosch, South Africa) and C. Aldrich (Curtin University, Australia).....194

Advanced grinding circuit control using on-line analyzer systems
A. Rantala, J. Kaartin, O. Haavisto and I. Kejono (Outotec, Finland).....213

Speed is the key factor: optimizing grinding process in comminution circuits by using variable speed drives
T. Cebeci, B. Klein, C. Wang (University of British Columbia, Canada), I. Atutxa and I. Legar (Ingeteam Power Technology, Spain).....232

Simulation as a tool to enable world’s best mill relining practice – a sense-making tool for decision makers
P. Rubie, G. O’Shannassy, F. Yap and J. Russell (Russell Mineral Equipment, Australia).....245

Technical Session 3
B. Tordoff (Carl Zeiss, UK) and G. Ballantyne (JKMRC, Australia)

Keynote Lecture: The business of grinding: plant grinding process improvement tools for metallurgists and company management
R.E. McIvor (Metcom Technologies, Inc., USA).....264

From flowsheet design and equipment selection to circuit optimization – CITIC SMCC’s comprehensive solution
J. Tian and S. Morrell (CITIC SMCC Process Technology Pty Ltd, Australia).....273

The commissioning and start up of the MMG Las Bambas milling circuit
E. Ruiz, J. Villanueva, E. Delgado, H. Zimanyuca (MMG Las Bambas, Peru) and J.T. Kalala (Hatch, South Africa).....287

Prediction of liner evolution for a cone crusher using DEM
P.W. Cleary, S. Cummins, G.W. Delaney, M.D. Sinnott (CSIRO Data61, Australia) and R.D. Morrison (JKMRC, Australia).....328
Improving crusher performance by comparing various control strategies on a verified simulation
C.W. Steyn (Anglo American Platinum, South Africa) and R.P. Brown (Stone Three Mining, South Africa).....331

Monitoring and validation of life time prediction of cone crusher with respect to loading and feeding conditions
M. Evertsson, J. Quist, M. Bengtsson and E. Hulthén (Chalmers University of Technology, Sweden).....340

DEM modelling of the novel multi-shaft mill
R.J. Bracey, N.S. Weerasekara and M.S. Powell (JKMRC, Australia).....352

12.00

12.20

12.40

13.00 Lunch

14.00 Technical Session 4
Chairman: C. Aldrich (Curtin University, Australia)

14.00 Dry finish grinding with HPGRs: the next step ahead in mineral comminution?
E. Burchardt (ThyssenKrupp Industrial Solutions, Germany).....365

14.20 Technical and economic assessment of a non-conventional HPGR circuit
P. Rosario and K. Lee (Hatch, Canada).....375

14.40 Modelling HPGR Edge recycling with progressive grinding data
F. Heinicke, H. Günter (KöppernAufbereitungstechnik GmbH & Co. KG, Germany) and H. Lieberwirth (Institute for Mineral Processing Machines, Germany).....391

15.00 Rigorous characterisation of ball milling requirements from HPGR products
G. Ballantyne, E. Lessing, F. Van Der Meer, R. Stocco and M. Hilden (JKMRC, Australia).....402

15.20 Dynamics in double roll crushers
P. Hillmann and H. Lieberwirth (Institute of Mineral Processing Machines, Germany).....411

15.40 Energy consumption applied to high pressure grinding rolls modelling with population balance models
H. Anticoi, E. Guasch, S.A. Hamid, J. Juan de Felipe, J. Oliva and P. Alfonso (Universitat Politécnica de Catalunya Barcelona Tech, Spain).....428

16.00 Coffee
During the coffee break Aubrey Mainza and Indresan Govender will present a short introduction to the potential use of PEPT in developing comminution and classification models for design, optimisation and control

17.45 Coaches leave for conference dinner at Kirstenbosch Botanical Gardens

Wednesday April 13th

09.10 Technical Session 5
Chairman: H.-R. Manouchehri (Sandvik Mining, Sweden) and H. Dundar (Hacettepe University, Turkey)

09.10 Keynote Lecture: Comminution modelling in the context of integrated process prediction
M.S. Powell (JKMRC, Australia).....440

09.50 Closed circuiting the HPGRs: air classification-their operations and efficiencies
O. Altun, H. Benzer and H. Dundar (Hacettepe University, Turkey).....445

10.10 Operational parameters affecting the Vertical Roller Mill performance
D. Altun, H. Benzer, N. Aydogan (Hacettepe University, Turkey) and C. Gerold (Loesche GmbH, Germany).....459

10.30 Coffee

11.20 Assessing the performance of the Vertical Roller Mill grinding a Platreef ore
W. Little, A. Mainza, M. Becker (University of Cape Town, South Africa), C. Gerold, J. Langel (Loesche GmbH, Germany) and S. Naik (Anglo American Technical Solutions, South Africa).....469
11.40  **16 Years of successful operation of a Loesche Vertical-Roller-Mill Type LM 50.4 in a hard rock application at Foskor Pty (Ltd) in Phalaborwa**
P. Jacobs, G. Seopa, M. Mofokeng, D. Nienhaus(Foskor Pty Ltd, South Africa) and C. Gerold, (Loesche GmbH, Germany).....480

12.00  **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 (JKMRC, Australia), P.W Cleary and G.W Delaney (CSIRO Data61, Australia).....493

12.20  **Cumulative rates models for AG/SAG Mills**
A. Hinde (AH Consulting, South Africa).....507

12.40  Lunch

14.00  **Technical Session 6**
Chairman: M. Battersby (Maelgwyn Mineral Services Ltd, UK)

14.00  **Predicting coupled rock breakage and slurry transport in a 3D pilot SAG mill using a coupled DEM-breakage-SPH model**
P.W. Cleary, G.D. Delaney (CSIRO Data61, Australia) and R.D. Morrison (JKMRC, Australia).....526

14.20  **A rapid SAG mill grindability program and mill sizing analysis for Borden Gold**
J. Starkey, J. Heddderson and S. Reeves (Starkey & Associates Inc., Canada).....530

14.40  **The influence of feed size distribution on the SAG mill circuit performance indices – the Tarkwa case study**
A.N. Mainza, P.A. Bepswa (University of Cape Town, South Africa), G. Nutor, S. Arthur, J. Obiri-Yeboah, and M. Lombard (Goldfields Ghana Limited, Ghana).....535

15.00  **Optimisation of secondary crushing stage before single stage SAG mill at Freda Rebecca**
E. Mudoti, T. Neube, T. Magoronga, T. Mapanzure, T. Muganyi, S. Shibwe (Freda Rebecca, Zimbabwe), A. Hinde (Mintek, South Africa) and J.T. Kalala (Hatch, South Africa).....544

15.20  **An assessment of different ore responses to changes in SAG mill operating conditions**
P.A. Bepswa, A.N. Mainza (University of Cape Town, South Africa), S. Mwansa, M. Phiri and C. Chongo (First Quantum Minerals, Kansanshi Mining PLC, Zambia).....563

15.40  **Evaluating the potential throughput benefit of adopting Derrick fine screening technology in a PGM slag ball mill circuit**
E. Ford, P. Mudau, A. Hinde (Mintek, South Africa), A. Jain (Derrick Corp., USA) and N. Barkhuysen (Derrick Corp., South Africa).....575

16.00  Happy Hour, Vineyard Gardens
Accompanying guests welcome

Thursday April 14th

08.50  **Technical Session 7**
Chairmen: A.R. Heath (Outotec, Australia) and N. Wilshaw (Grinding Solutions Ltd, UK)

08.50  **Adding pebbles to a ball-mill to improve grinding efficiency**
S.G. Nkwanyana (Mintek, South Africa) and B.K. Loveday (University of KwaZulu-Natal, South Africa).....586

09.10  **Grinding mill optimization through SmartMill™ technical and commercial analysis**
M. Perrucci and M. Pischtschan (ABB, Switzerland).....599

09.30  **Coarse particle milling: Herbst-Fuerstenau characterization for scale-up in the abnormal breakage region**
C.L. Schneider, T.F.M.B. Duque (CETEM, Brazil) and D.B. Mazzinghy (Iron Ore Brazil-Anglo America, Brazil).....610

09.50  **The axial grinding media distribution in the IsaMill at different operation conditions**
D. Schons and A. Kwade (Technical University Braunschweig, Germany).....632

10.10  **Rheological effects in wet stirred media milling**
S. Breitung-Faes and A. Kwade (TU Braunschweig, Germany).....643
10.30 Coffee

11.10 Developments in stirred media milling testwork and industrial scale performance of Outotec HIG mill
H. Lehto, V. Keikkala (Outotec Oy, Finland), I. Muzinda (FQM Kevitsa Mining Oy, Finland), P. Kurki (Outotec Research Centre, Finland) and A. Paz (Outotec Pty Ltd, Australia)....657

11.30 A power model for fine grinding HIG Mills
A. Heath, A. Paz (Outotec, Australia), V. Keikkala and H. Lehto (Outotec, Finland)....676

11.50 An initial review of the metallurgical performance of the HIGmill™ in a primary milling application in the hard rock mining industry
H. Erb, M. van de Vijeijken (Swiss Tower Mills Minerals Ltd, Switzerland), Y. Hanuman, C.M. Rule (Anglo Platinum, South Africa), W.C.E. Swart (Kumba Iron Ore, South Africa), H. Lehto and V. Keikkala (Outotec, Finland)....689

12.10 Pursuit of best practices with the Stirred Media Detritor (SMD)
A. Moore, M. Gallimore (Metso Mining & Construction Technology, USA) and P. Radiszewski (Metso Minerals, Canada)....697

12.30 The effect and control of vortex stability in Stirred Media Detritors with regard to grinding performance
S. Bailey, K. Hadler, N. Wilshaw (Grinding Solutions Ltd, UK), F. Lepoint and B. Clermont (Magotteaux International S.A, Belgium)....720

12.50 Lunch

14.00 Technical Session 8
Chairman: A. Mainza (University of Cape Town, South Africa)

14.00 Understanding the effect of pressure profile on stirred mill impeller wear
P. Radiszewski and A. Moore (Metso, Canada)....734

14.20 Evaluation of process parameters and grinding aid dosage strategies in a dry laboratory stirred media mill
P. Prziwara, S. Breitung-Faes and A. Kwade (Technische Universität Braunschweig, Germany)....743

14.40 Impact of the stirred mill grinding mechanism on the grinding performance and media consumption
H. Erb (STM Minerals, Switzerland), C. Cronje, T. Mahlangu (Randgold, South Africa), B. Ebell (DRD Gold, South Africa), Y. Hanuman (Anglo Platinum, South Africa) and H. Lehto (Outotec, Finland)....750

15.00 Vertical Stirred Mill scale-up and simulation: model validation by industrial samplings results
D.B. Mazzinghy, J.F.C. Russo (Iron Ore Brazil- Anglo American, Brazil), C.L. Schneider (CETEM, Brazil), J. Lichter (Anglo American, USA) and R. Galéry (Universidade Federal de Minas Gerais, Brazil)....767

15.20 Ceramic bead behaviour in ultra fine grinding mills
P. Hassall (SEPR Saint-Gobain ZirPro, France), V. Keikkala (Outotec Oy, Finland), T. Komminaho and L. Kotila (FQM Kevitsa Mining Oy, Finland)....782

15.40 How grinding media affects wet grinding process in stirred mills
I. King, H. Deng, A. Wang, R. Xu, C. He (King’s Ceramics & Chemicals Co. Ltd, China) and Q. Li (East China Normal University, China)....792

16.00 Stirred milling: does it have an impact on the pulp chemistry and subsequent flotation response?
C.J. Greet, J. Kinal and G. Small (Magotteaux Australia Pty Limited, Australia)....802

16.20 Conference Summary
A. Mainza (University of Cape Town, South Africa)

16.35 Closing remarks and invitation to Comminution ‘18
A.J. Wills (MEI, UK)
POSTERS

Stirred mills as an alternative to grinding in ball mills
A. Senchenko (TOMS Institute, Russia)....810

Bonded particle model calibration using design of experiments and multi-objective optimization
M. Johansson, J. Quist, and M. Evertsson (Chalmers University of Technology, Sweden)....816

Pulverizing capability prediction of ball mill based on generalized linguistic model with self-initialization
Hui Cao and Dapeng Yan (Xi’an Jiaotong University, China)....841

Modelling particle breakage in a Vertical Shaft Impact Crusher
S. Grunditz, M. Evertsson, E. Hulthén and M. Bengtsson (Chalmers University of Technology, Sweden)....850

DEM Modelling and Simulation of Banana Screen Classification Efficiency
A. Davoodi, J. Quist, E. Hulthén, M. Bengtsson and C.M. Evertsson (Chalmers University of Technology, Sweden)....855

Predicting flows from the dynamic Ergun equation
G.B. Tupper, A.N. Mainza (University of Cape Town, South Africa) and I. Govender (University of KwaZulu-Natal, South Africa)....862

New approach to ball mill modelling as a piston flow process

New insight into ball mill and stirred mill breakage mechanisms provided by Auto-SEM-EDS shape characterisation
L. Little, A. Mainza, M. Becker and J. Wiese (University of Cape Town, South Africa)....880

The influence of speed on a pilot plant SAG mill with a high ball load
M. Lisso, A. Mainza (University of Cape Town, South Africa), B. Clermont and M. Van Den Heever (Magotteaux (Pty) Ltd, South Africa)....901

The statistical challenges of back-calculating breakage parameters from batch milling tests
A. Hinde (AH Consulting, South Africa).....N/A

IsaMill media motion and packing versus operating conditions using DEM/CFD and PEPT
A.P. van der Westhuizen (University of Cape Town, South Africa) and U. Enderle (NETZSCH-Feinmahltechnik GmbH, Germany).....N/A

Prediction of Tromp-function by system-parameters
P. Büttner, H. Lieberwirth (Institute of Mineral Processing Machines, Germany) and F. Heinicke (KöppernAufbereitungstechnik GmbH, Germany).....N/A

The investigation of operating parameters in a vertical stirred mill in an ultrafine grinding application
G. Edwards and A.P. van der Westhuizen (University of Cape Town, South Africa).....N/A

A granular flow model of an annular shear cell
S. Bremner, A. Mainza (University of Cape Town, South Africa) and I. Govender (UCT and University of KwaZulu-Natal, South Africa).....N/A

Fundamentally derived scale-up rules for tumbling mills
I. Govender (University of Cape Town, South Africa).....N/A