

Technical and Social Programme

20-23 November 2012. Sheraton Hotel and Convention Center, Santiago, Chile

Short Courses

Monday 19 and Tuesday 20 November:

Geotechnical Operations Control of Tailings Deposits, Dr. Raúl Espinace A., Engineer, Universidad Politécnica de Madrid, Executive Director, Geotecnia Ambiental Ltda., and Dr. Gabriel Villavicencio A. Universidad Blaise Pascal de Francia, Geo-technical Consultant.

Tuesday 20 November:

Eco-Efficiency in Mining: Process Optimisation and Integration with a reduced Ecological Footprint, Joachim Vogdt, environmental engineer, general manager IASA Group; Suzan Lynch-Watson, general manager Consulting, Metso-PTI; Robert Valle, Manager Latin America, Metso-PTI.

Tuesday 20 November

16:00-19:00 **Registration**, Foyer

18:00-18:30 **Authors and Session Chair Coordination Meeting**. O'Higgins Ballroom

Inauguration Ceremony. San Cristóbal Ballroom B&C

19: 00-20:00 **Words of Welcome**

Julián Ortiz, Universidad de Chile, Host Institution

Romke Kuyvenhoven, PROCEMIN 2012 Technical Coordinator, Gecamin, Chile

Marcelo Bustos Collao, PROCEMIN 2012 Chair, Gerente de Procesos, Teck Operaciones Mineras Chile

Opening Address

Andacollo expansion project: The transformation from an oxide to a sulphide operation. Hugo Herrera, Teck Carmen de Andacollo, Chile

20:00-22:00 Welcome Reception. Foyer, Courtesy of Teck Carmen de Andacollo

Wednesday, 21 November

Plenary Session 1. San Cristóbal Ballroom B & C Session Chair: Claudio Sougarret, Codelco El Teniente Division, Chile	
08:20-08:30	Day 2 programme update Romke Kuyvenhoven, PROCEMIN 2012 Technical Coordinator, Gecamin, Chile
08:30-09:15	Improved integration of mining and mineral processing activities in future deep operations Gideon Chitombo, WH Bryan Mining & Geology Research Centre, Australia
09:15-10:00	Strategic alliances and standard concentrator – Xstrata Copper Bob Drabik, Executive General Manager, Project development south America; Presented by Fernando Torres, Senior process engineer, Project development South America, Xstrata Copper, Chile
10:00-10:50 Poster Session and Coffee Break	

San Cristóbal Ballroom B		San Cristóbal Ballroom C	
Session 01: Enhancing flotation performance Chair: Juan Yianatos, Universidad Técnica Federico Santa María, Chile	Session 02: Crushing and grinding (part I) Chair: Lindsay Clark, Xstrata Technology, Australia	10:50-11:10	Increase silver recovery, improving the particle size at a rate of 8,000 ton / day by Six sigma methodology <u>Luis Carrillo</u> , Sergio Flores, Jaime Bravo, María Concepción Quintero and Ulises Vargas, Minera Fresnillo, Mexico
10:50-11:10	Principles for optimal operating point selection in cone crushers Pekka Itavuo and Matti Vilkkö, Tampere University of Technology; <u>Antti Jaatinen</u> , Metso Automation, Finland	11:10-11:30	Effect of organics in water on the flotation of copper and molybdenum sulphide mineral <u>Maria Sinche</u> , Daniel Fornasiero and Massimiliano Zanin, Ian Wark Research Institute, University of South Australia
11:10-11:30	Dynamic flow and level simulation of a mobile crushing plant for process control design Presented by <u>Antti Jaatinen</u> , Pasi Airikka, Metso, Finland		

San Cristóbal Ballroom B		San Cristóbal Ballroom C	
11:30-11:50	The use of column flotation to recovery nickel minerals from low grade ores <u>Silvia França</u> and Hudson Couto, CETEM - Centre of Mineral Technology, Brazil	11:30-11:50	Motor selection for primary gyratory crushers – unique loads require a unique motor design <u>Dusty Jacobson</u> , Metso; Bart Sauer and Joe Peeler, Siemens; United States
11:50-12:10	Modern Process Mineralogy and its Role in Flotation Improvement Alan Butcher and Patricio Jaime, FEI Minerals, Australia	11:50-12:10	Outotec HIG mill fine grinding - a process perspective Matti Tarvainen, Harri Lehto, Outotec Finland , Mijail Villar, Outotec Chile
12:10-12:30	Abatement of ions in fresh water taken from salt flats by using lime and its effect on flotation performance Liliana Vasquez, <u>Claudio Muñoz</u> and Constantino Suazo, CMDI de Collahuasi, Chile	12:10-12:30	Theoretical studies on new spheroidal tetrahedron - shaped grinding media for ball mill Lachezar Tsotsorkov, Assarel Medet; Petar Bodurov, Relo-B; <u>Todor Penchev</u> , Technical University-Sofia , Bulgaria

12:30-14:00 Lunch, Courtesy of Teck Carmen de Andacollo

San Cristóbal Ballroom B		San Cristóbal Ballroom C	
Session 03: Special Flotation Session: From flotation modelling to operational performance		Session 04: CRUSHING AND GRINDING (part II)	
Chairs:	Sergio Prado, FLSmidth, Chile and Cesar Gomez, McGill University, Canada	Chair:	Matti Tarvainen, Outotec, Finland
14:00-14:10	Introduction	14:00-14:20	Feed control of mobile rock crushing plant Presented by <u>Antti Jaatinen</u> , Metso; Pasi Airikka and Petri Aro, Metso, Finland
14:10-14:30	Characterisation for simulating flotation plants: Kinetic parameters by grade and size Keila Gonçalves, Ronald Rojas and Marisa Monte, Vale; Claudio Schneider, CETEM, Brazil	14:20-14:40	Automatic control of a crushing plant: Common problems and their solutions <u>Antti Jaatinen</u> , Metso ; Pekka Itavuo, Tampere University of Technology, Finland

San Cristóbal Ballroom B	San Cristóbal Ballroom C
<p>14:30-14:50 Hybrid Energy Flotation™ technology - optimisation of fine and coarse particle recovery Dariusz Lelinski, Devan Govender, Bartosz Dabrowski and Frank Traczyk FLSmidth, USA</p> <p>15:00-15:20 Metallurgical performance of the new flotation plant at Teck CDA <u>Juan Yianatos</u>, Luis Bergh and Luis Vinnett, Universidad Técnica Federico Santa María; Francisco Díaz, Chilean Commission of Nuclear Energy; Luis Torres, Teck CDA, Chile</p> <p>15:20-15:40 Round Table Discussion</p>	<p>14:40-15:00 Predicting effect of media size in ball milling using the mechanistic grinding model <u>Rodrigo Carvalho</u> and Luís Marcelo Tavares, Laboratório de Tecnologia Mineral, Department of Metallurgical and Materials Engineering – COPPE, Universidade Federal do Rio de Janeiro, Brazil</p> <p>15:00-15:20 Case study of dry HPGR grinding and classification in ore processing Presented by <u>Serhat Öno</u>; Frank van der Meer and Siegfried Strasser, KHD Humboldt Wedag GmbH, Germany</p> <p>15:20-15:40 The Grinding Efficiency Challenge – grinding below 100um. <u>Lindsay Clark</u>, Xstrata Technology, Australia</p>
15:40-16:30 Poster Session and Coffee Break	

San Cristóbal Ballroom B	San Cristóbal Ballroom C
<p>Session 05: Tailings and water management Chair: Juan Collao, Teck , Chile</p> <p>16:30-16:50 The task of sizing thickeners, from test-work to industrial operation: Is larger the better option? Presented by <u>Mijail Vilar</u>; Felipe Bañados, Outotec Chile</p> <p>16:50-17:10 Dewatering and filtration: How can surfactant improve it? <u>Wagner Silva</u>, Monica Cassola and Nilson Bartalini, Mining Laboratory, Clariant Brazil</p>	<p>Session 06: Lab and pilot scale metallurgical test work Chair: Tom Shouldice, ALS Global, Canada</p> <p>16:30-16:50 Bond WI as a parameter for the evaluation of ore variability in current grinding plant design practice <u>Claudio Schneider</u>, CETEM Brazil; Douglas Mazinghy and Vladimir Alves, Vale Brazil</p> <p>16:50-17:10 Pilot HPGR test programs and parameters for design Frank van der Meer and Lea Quincke, KHD Humboldt Wedag GmbH, Germany; <u>Ricardo Fernandez</u>, WEIR Minerals South America, Chile</p>

San Cristóbal Ballroom B	San Cristóbal Ballroom C
17:10-17:30 Solid liquid separation inter-relationship between thickeners and filtration equipment <u>Jason Palmer</u> , Outotec Filtration, Finland	17:10-17:30 Laboratory flotation tests . . . who cares? <u>Christopher Greet</u> , Jessica Kinal and Grant Small, Magotteaux Australia
17:30-17:50 Electrosmotic dewatering and consolidation of mineral waste tailings <u>Jonas Addai-Mensah</u> , Ian Wark Research Institute, University of South Australia	17:30-17:50 Predicting the size distribution in the product and the power requirements of a pilot scale vertimill Douglas Mazzinghy and Vladmir Alves, Vale; <u>Claudio Schneider</u> , CETEM; Patricia Faria and Tatiana Alvarenga, Vale; Roberto Galéry, Universidade Federal de Mina Gerais, Brazil
17:50-18:10 Development of the Next Generation Thickener featuring the RadflowTM- Feedwell technology <u>Alexei Krassnokutski</u> , Roymec Technologies, South Africa	17:50-18:10 Risk mitigation and sensitivity analysis in flotation flowsheet selection <u>David Hatton</u> and Doug Hatfield, SGS Canada
Wednesday Evening: no conference activities	
18:10-19:30 IMPC 2014 Committee Members Meeting (by invitation only) San Cristóbal Ballroom B	

Thursday, 22 November

Plenary Session 2. San Cristóbal Ballroom B & C
 Session Chair: Marcelo Bustos, Teck, Chile

08:20-08:30 **Day 3 programme update**
 Romke Kuyvenhoven, PROCEMIN 2012 Technical Coordinator, Gecamin, Chile

08:30-09:15 **Progress and challenges in the area of Mineral Processing in Peñoles Group**
 Carlos Lara, Manager Mineral Processing, Servicios Industriales Peñoles, Mexico

09:15-10:00 **Sierra Gorda project development: about the use of innovative technology for a unique Mo-Cu orebody**
 Claudio García, Sierra Gorda SCM, Chile

10:00-10:50 Poster Session and Coffee Break

San Cristóbal Ballroom B	San Cristóbal Ballroom C
<p>Session 07: Comminution modelling Chair: Suzy Lynch-Watson, Metso PTI, Australia</p> <p>10:50-11:10 SAGDesign™ – Using Open Technology for Mill Design and Performance Assessments <u>John Starkey</u> and Kingsley Larbi, Starkey & Associates Inc., Canada</p> <p>11:10-11:30 Simplified modelling of SAG systems based on phenomenological process – conceptual development <u>Miguel Becerra</u> and Luis Magne; Universidad de Santiago Chile</p> <p>11:30-11:50 Simplified modelling of SAG systems based on phenomenological process – practical development <u>Miguel Becerra</u> and Luis Magne; Universidad de Santiago Chile</p>	<p>Session 08: Auxiliary Mineral Processes and Techniques Chair: Patricia Lara, Hatch Ingenieros y Consultores Ltda, Chile</p> <p>10:50-11:10 A new revision in Plitt's model for hydrocyclones simulation <u>André Carlos Silva</u>, Elenice Silva and Jainer Matos, Goiás Federal University, Brazil</p> <p>11:10-11:30 Modelling granular material flow in silos Elenice Silva, André Carlos Silva and Sulamita Freitas, Goiás Federal University, Brazil</p> <p>11:30-11:50 Using positron emission particle tracking to understand spiral concentrators Kristian Waters, Raymond Langlois, McGill University, Canada; Thomas Leadbeater University of Birmingham, UK</p>

San Cristóbal Ballroom B		San Cristóbal Ballroom C	
11:50-12:10	Using the Monte Carlo technique for mineral breakage simulation <u>André Carlos Silva</u> , and Elenice Silva, Goiás Federal University; José Medeiros da Luz and Américo Bernardes, Ouro Preto Federal University, Brazil	11:50-12:10	(TBC) To be confirmed
12:10-12:30	A Comparative Analysis of Grinding Circuit Design Methodologies <u>Miguel Becerra</u> , Anglo American Copper; Peter Amelunxen Aminpro, Chile	12:10-12:30	Accounting for in-process inventories in and around mineral and metal processing plants <u>Simon Gariepy</u> , Luc Lachance, Donald Leroux, Frédéric Flament, Algosys, Canada
12:30-14:00 Lunch at Bohio Park (Pool area), Courtesy of Weir Minerals			

San Cristóbal Ballroom B		San Cristóbal Ballroom C	
Session 09: CEEC Special Session: Eco Efficiency in comminution Chair: Cleve Lightfoot, BHPBilliton, Chile		Session 10: Flotation fundamentals Chair: Willy Kracht, Universidad de Chile	
14:00	Introduction	14:00-14:20	The use of optical refractometer to measure the concentration of starch solutions in reverse flotation of iron ore <u>Aline Lacerda</u> , Érica Reis, Universidade Federal de Ouro Preto; Alysson Borges, Vale; Brazil
14:05-14:25	Barrick's Grinding Efficiency Improvements Through Targeting Performance <u>James Connolly</u> and Lloyd Buckingham, Barrick, Canada	14:20-14:40	The heterogeneity of the basal plane of molybdenite; its effect on molybdenite floatability and calcium ion adsorption Alejandro López-Valdivieso, Irma Madrid-Ortega, Donato Valdez-Pérez, Bing Yang and Shaoxian Song, Universidad Autónoma de San Luis Potosi, Mexico
14:25-14:45	Implications of ore hardness variability on comminution circuit energy efficiency <u>Peter Amelunxen</u> , Aminpro Chile	14:40-15:00	Turbidity reduction in oil-in-water emulsions <u>Elenice Silva</u> and André Carlos Silva, Universidade Federal de Goiás; Jader Marins, Universidade Federal de Ouro Preto, Brazil

San Cristóbal Ballroom B		San Cristóbal Ballroom C	
14:45-15:05	Optimisation and Continuous improvement of Antamina Comminution Circuit <u>Ed Rybinski</u> , Jorge Gherzi, Frank Davila and Javier Linares, Antamina, Peru; Roberto Valle, Metso PTI, Peru	15:00-15:20	Analytical considerations and numerical simulations of counter current columnar flotation <u>Gerhard Holzinger</u> and Stefan Pirker, Johannes Kepler University, Austria; Lilla Grossmann, Siemens, Germany
15:05-15:40	Panel Discussion and CEEC Medal Award	15:20-15:40	Determining the effect of geographic altitude on bubble size <u>Claudio Muñoz</u> and Constantino Suazo, CMDI de Collahuasi, Chile; Cesar Gomez, McGill University, Canada; Luis Magne and Gilda Titichoca, Universidad de Santiago de Chile
15:40-16:30 Poster Session and Coffee Break			

San Cristóbal Ballroom B		San Cristóbal Ballroom C	
Session 11:	Industrial flotation cases from Mexico, Bolivia, Peru, Brasil and Chile	Session 12:	Flotation Reagents and Water Quality
Chair:	Constantino Suazo, CMDI de Collahuasi, Chile	Chair:	Silvia França, CETEM, Brasil
16:30-16:50	Recovery of gold and silver from a pyrite concentrate, <u>Salvador Gómez</u> , Minera Saucito - Grupo Fresnillo; Pablo Gonzalez, Centro de Investigacion y Desarrollo Peñoles, Mexico	16:30-16:50	Quantifying sphalerite activation with Pb(II): A contact angle study <u>Gloria Dávila-Pulido</u> , <u>Alejandro Uribe-Salas</u> and Fabiola Nava-Alonso, Centro de Investigación y de Estudios Avanzados del Instituto Politécnico Nacional, Mexico
16:50-17:10	Silver recovery from polymetallic flotation tailings Pablo Duran and <u>Verena Block</u> , Minera San Cristobal, Bolivia	16:50-17:10	Experimental design to evaluate a reagent system for a nickel ore flotation Jean Carlo Grijó Louzada and Ronald Rojas Hacha, Centre of Mineral Technology; Mônica Cassola and Marisa Monte, Clariant, Brazil

San Cristóbal Ballroom B		San Cristóbal Ballroom C	
17:10-17:30	Control of the pyrite in the flotation of mineral altered Cu-Au <u>Capcha Limbergh</u> , Concentradora Cerro Corona, Peru	17:10-17:30	Saponified vegetable oils from the Amazon as hematite collectors <u>Denilson Costa</u> , Lucinewton de Moura, Universidade Federal do Pará; Antonio Peres, Universidade Federal de Minas Gerais, Brazil
17:30-17:50	(TBC) to be confirmed	17:30-17:50	Rejection of pyrite: challenges and sustainable chemical solutions <u>Mario Palominos</u> and Carmina Quintanar, Cyttec Chile
17:50-18:10	Flotation studies of a spodumene pegmatite ore Paulo Viana, <u>Claudio Pinto</u> and Rísia Papini, Universidade Federal de Minas Gerais, Brazil; Armando Araujo, ArcelorMittal, France	17:50-18:10	Increased water recovery through remote operations and automation <u>Cesar Guzman</u> and Sebastian Rey, Codelco, Chile
18:10-21:00 Official PROCEMIN 2012 Conference Cocktail and Dinner at Bohio Park (Pool area), Courtesy of SNC-Lavalin Chile			

Friday, 23 November

Plenary Session 3. San Cristóbal Ballroom B & C
 Session Chair: Carlos Lara, Grupo Peñoles, Mexico

- 08:20-08:30 **Day 3 programme update**
 Romke Kuyvenhoven, PROCEMIN 2012 Technical Coordinator, Gecamin, Chile
- 08:30-09:15 **The use of HPGR technology at Los Colorados**
 Fernando Parra, CAP Minería, Chile
- 09:15-10:00 **Applications of solar energy technologies for mining processes**
 Pablo Pastene, Solar energy Director, Fundación Chile

10:00-10:50 Poster Session and Coffee Break

San Cristóbal Ballroom B	San Cristóbal Ballroom C
<p>Session 13: Concentration plant operation and optimisation Chair: Miguel Becerra, Anglo American Chile</p> <p>10:50-11:10 (TBC) to be confirmed</p> <p>11:10-11:30 Improving Ball Mills Operations by Applying MPC & Advanced Control Systems at Minera Los Pelambres Felipe Henríquez, Daniel Silva, César Jiménez, Minera Los Pelambres, Chile</p> <p>11:30-11:50 Lean and six sigma tools applied to improve the management of the concentration operation Pablo Duran and <u>Wilber Churata</u>, Minera San Cristobal, Bolivia</p>	<p>Session 14: Flotation process development and design Chair: Mayeli Alvarez, Universidad Técnica Federico Santa María, Chile</p> <p>10:50-11:10 A hybrid method for the design of flotation circuits Felipe Sepúlveda, Maritza Elorza and Luis Cisternas, CICITEM, Universidad de Antofagasta; Edelmira Galvez, CICITEM, Universidad Católica del Norte, Chile</p> <p>11:10-11:30 Optimisation process with Six sigma at Minera Fresnillo: Flotation <u>Victor Santana</u>, Sergio Flores, Jaime Bravo, María Concepción Quintero and Ulises Vargas, Minera Fresnillo, Mexico</p> <p>11:30-11:50 Concentrate grade improvement on the east pit hypogene ore at Kemess Mine <u>Michel Brissette</u> and Eliab Roman, SGS, Canada</p>

San Cristóbal Ballroom B	San Cristóbal Ballroom C
11:50-12:10 Dissolved copper recovery using thickened acid tailings <u>Cesar Guzmán</u> , Sebastian Rey and Claudia Garrido, Codelco, Chile	11:50-12:10 Lead recovery from metallurgical slag by flotation <u>Paulo Braga</u> and João Sampaio, Centre of Mineral Technology; Carlos Baltar Federal University of Pernambuco, Arnolfo Coelho and João Nunes, Acumuladores Moura, Brazil
12:10-12:30 Development of an Eco-Efficient Mining Process, Presented by <u>Susane Lynch Watson</u> ; Walter Valery, Alex Jankovic, Kym Runge and Kristy-Ann Duffy, Metso PTI, Australia	12:10-12:30 Improving Cu/Ni selectivity at the Vale Bessemer matte flotation circuit <u>Massimiliano Zanin</u> and William Skinner, Ian Wark Research Institute, University of South Australia; Lindsay Doucet and Virginia Lawson, Vale Canada
12:30-12:50 PROCEMIN 2012 Closing Ceremony Preview of upcoming events: Seminars XXV ENTMME; VIII MSHMT and IMPC2014 Conference	
12:50 – 15:00 Farewell Lunch at at Bohio Park (Pool area)	

Poster Presentations

- 1. Energy efficiency improvement in mill operations through raw materials selection**, Beatriz Álvarez and Carlos Reyes, SNC-Lavalin, Chile; Juan Menéndez, Universidad de Oviedo, España; Rosa Dzioba, Universidad Nacional de San Luis, Argentina
- 2. Maximising Reliability of Bulk Handling Equipment through Calibrated Discrete Element Modeling**, Richard LaRoche, DEM Solutions, USA; David Curry and Stephen Cole, DEM Solutions, UK; Andrew Grima and Peter Wypych, University of Wollongong, Australia; Rodrigo Magalhães de Carvalho and Luís Tavares, Universidade Federal de Rio de Janeiro, Brazil
- 3. Requirements, deficiencies and advantages in mineral processes continuous density analysers**, Rodrigo Miranda, Marco Martins, Hugo Gontijo, Jean Cunha and Mônica Vieira, Cemi – Process Technology and Engineering, Brazil
- 4. Beyond the minimum dimension for particle size control**, Andrew Smith, Sympatec, UK; Axel Pankewitz and Christian Behrens, Sympatec, Germany
- 5. World's largest manufactured mills by CITIC HIC and installed at Sino Iron Magnetite 80mtpa plant in Australia**, Rajiv Kalra, CITITC Heavy Industries, China

6. **Using Austin's model to continuous grinding process**, André Carlos Silva, Elenice Maria Schons Silva and José Aurélio Medeiros da Luz, Goiás Federal University / Ouro Preto Federal University, Brazil
7. **Bubble size in high shear rate ejectors and spargers**, Werner Hartmann, Sonja Simon, Robert Fleck and Lilla Grossmann, Siemens AG, Germany
8. **Frother distribution maps in flotation plants: construction procedure and protocols**, Azin Zangoi, Cesar Gomez, and James Finch, McGill University, Canada
9. **Coated-bubble generation by co-extrusion**, Aldo Padilla, Héctor Galleguillos, Universidad de Antofagasta, Chile; Claudio Acuña, Universidad Católica del Norte, Chile; Nicolas Dietrich, Université Toulouse 1, France
10. **Flotation circuit database**, Jorge González and Edelmira Gálvez, Universidad Católica del Norte, Chile; Luis Cisternas, Universidad de Antofagasta, Chile
11. **Strategy to select frother types to improve grade recovery curve, under variable condition of particle size distribution**, Carla Segovia, Universidad Católica del Norte, Chile
12. **Maximising Reliability of Bulk Handling Equipment through Calibrated Discrete Element Modeling**, Richard LaRoche, David Curry, and Stephen Cole, DEM Solutions, USA & UK; Andrew Grima and Peter Wypych, University of Wollongong, Australia; Rodrigo Magalhães de Carvalho and Luís Tavares, Universidade Federal do Rio de Janeiro, Brazil
13. **Decision-making based on indicators for flotation plant design**, Marcelo Montenegro, Edelmira Gálvez and Luis Cisternas, Universidad de Antofagasta, Chile
14. **Driving process improvement through CSIRO enabled technology innovations**, David Robinson, Keith Barnard, Phillip Fawell, John Farrow, Graeme Lane, Rueben Rajasingam, William Yang and Jie Wu, Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia