

## TECHNICAL AND SOCIAL PROGRAMME MAPLA 2009 / MANTEMIN 2009

4-6 November, Enjoy Antofagasta Hotel, Chile

### WEDNESDAY, 4 NOVEMBER

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

17:30-18:15 **Authors' and Session Chairs' Meeting.** Brac Ballroom.

19:00-20:15 **Inaugural Ceremony.** Capri and Menorca Ballrooms.

**Words of Welcome.** *Romke Kuyvenhoven*, Organising Committee Director Member, MAPLA 2009 / MANTEMIN 2009.

#### **Opening Addresses.**

- *Claudio García*, MAPLA 2009 Chairman, División Los Bronces, Anglo American Chile

- *Arnaldo Burdiles*, MANTEMIN 2009 Chairman, Compañía Contractual Minera Candelaria

**Keynote Address "Copper Mining: Present and Future".** *Diego Hernández*, Base Metals President BHP Billiton, Chile.

20:15-22:30 **Welcome Reception, courtesy of Finning CAT.** Foyer.

### THURSDAY, 5 NOVEMBER

08:20-08:30 **Day 2 Programme Presentation and News Updates.** *Romke Kuyvenhoven*, Organising Committee Director Member, MAPLA 2009 / MANTEMIN 2009.

#### PLENARY SESSION 1- Capri and Menorca Ballrooms – 5 November

**Chair:** *Claudio García*, Los Bronces Division, Anglo American Chile.

08:30-09:15 **Recent Advances on Intelligent Maintenance Systems and Prognostics Technologies for Zero-Breakdown Equipment and Systems.**

*Jay Lee*, Director of NSF Industry-University Cooperative Research Center on Intelligent Maintenance Systems, USA.

09:15-10:00 **Aligning Maintenance and Operations through Value-Based Decisions.**

*Peter Knights*, Professor y BMA Chair in Mining Engineering of the Department of Mining Engineering at the University of Queensland, Australia.

**10:30- 10:50 Poster Session & Coffee Break, courtesy of DICTUC TRIBOLOGÍA. Foyer.**

<b>MAPLA 2009 TECHNICAL SESSIONS</b> Santorini and Capri Ballrooms – 5 November	<b>MANTEMIN 2009 TECHNICAL SESSIONS</b> Menorca Ballroom – 5 November
<p><b>Session 1: MAINTENANCE MANAGEMENT</b></p> <p><b>Chair:</b> <i>Rubén Rojas, Sociedad Minera Cerro Verde, Peru.</i></p> <p>10:50-11:10 <b>How to Select and Benchmark Maintenance Engineering Software Solutions.</b> <i>Edith Carmona, Universidad Técnica Federico Santa María, Chile</i></p> <p>11:10-11:30 <b>Failure Analysis: A Maintenance Tool.</b> <i>Raúl Henríquez, Universidad de Antofagasta, Chile</i></p> <p>11:30-11:50 <b>Technological Solutions For Eliminating Losses at Mining Operations.</b> <i>Luis Felipe Aguirre, Mincom International, Chile</i></p> <p>11:50-12:10 <b>Methodology And Justification Of Predictive Maintenance: A Case Of Real-Time Vibration Monitoring.</b> <i>Jorge Figueroa, Pablo Herrera, Gonzalo Soteras, Sergio Urra and Sebastián Goldsack, SPM Ingeniería en Mantenimiento, Chile</i></p> <p>12:10-12:30 <b>An Integrated Vision of Asset Management Systems, the Missing Link during the Downturn.</b> <i>Genaro Pérez, IXC Consultores, Chile</i></p>	<p><b>Session 2: ADVANCED TECHNIQUES AND TECHNOLOGICAL DEVELOPMENTS</b></p> <p><b>Chair:</b> <i>Rodrigo Pascual, Pontificia Universidad Católica de Chile.</i></p> <p>10:50-11:10 <b>Threat Management Process For Shovel Fleet.</b> <i>Enrique Zuleta, Gonzalo Viñas and Yerko Fuentes, Minera Escondida Ltda., Chile</i></p> <p>11:10-11:30 <b>Test of Shell Polymol EPX 0 Grease in Toro 007 Shovel at Codelco Andina.</b> <i>Luis Salazar, Shell Chile S.A.C. e I., Chile</i></p> <p>11:30-11:50 <b>LED Technology for Mining Equipment.</b> <i>Eric Lazo, Minera Esperanza S.A., Chile</i></p> <p>11:50-12:10 <b>Actual Impact Of The Tooth Metric System On The Operating Continuity Of The Mine.</b> <i>Hernando Reyes and Juan Hinojosa, Compañía Contractual Minera Candelaria, Chile</i></p> <p>12:10-12:30 <b>Reliability Modeling of Draglines for Availability Estimation and Maintenance Planning.</b> <i>Sebnem Düzgün and Nuray Demirel, Middle East Technical University, Mining Engineering Department, Turkey</i></p>
<p><b>12:30- 14:00 Lunch, courtesy of WEIR MINERALS. Exterior Tent.</b></p>	

<b>MAPLA 2009 TECHNICAL SESSIONS</b> Santorini and Capri Ballrooms – 5 November	<b>MANTEMIN 2009 TECHNICAL SESSIONS</b> Menorca Ballroom – 5 November
<p><b>Session 3: ADVANCED TECHNIQUES AND TECHNOLOGICAL DEVELOPMENTS</b></p> <p><b>Chair:</b> <i>Gonzalo Bernstein</i>, Minera Los Pelambres, Chile.</p> <p>14:00-14:20 <b>Energy Conservation System In SX Plant S.C.M. El Abra.</b> <i>Juan Jara</i> and <i>Víctor Leiva</i>, Sociedad Contractual Minera El Abra, Chile. <i>Luís González</i>, Tyco Flow Control, Chile</p> <p>14:20-14:40 <b>Distance Training in Automation and Control Technologies Using Virtual Laboratories with Remote Access.</b> <i>Henry Gómez</i>, Tecsup, Peru</p> <p>14:40-15:00 <b>Diagnostic Experiences and Fault Correction in Transformer-Rectifiers in SX-EW Plants.</b> <i>Patricio Lagos</i>, <i>Ricardo Fuentes</i>, <i>Luís Neira</i> and <i>Gerardo Pacheco</i>, IDT S.A., Chile. Presented by <i>Jorge Estrada</i></p> <p>15:00-15:20 <b>Tribology-Based System Reliability.</b> <i>Rodrigo Bulnes</i> and <i>Pedro Sariago</i>, Universidad Técnica Federico Santa María, Chile</p> <p>15:20-15:40 <b>Major Maintenance 2009 Chagres Smelter: Safety Strengths and Weaknesses.</b> <i>Marcelo Figueroa</i> and <i>Rubén Barrientos</i>, Anglo American Chile División Los Bronces, Chile</p>	<p><b>Session 4: ADVANCED TECHNIQUES AND TECHNOLOGICAL DEVELOPMENTS</b></p> <p><b>Chair:</b> <i>Jaime Tapia</i>, Minera Esperanza, Chile.</p> <p>14:00-14:20 <b>Implementation of Torq Reg System In Bucyrus BE 49R III Drill Rigs.</b> <i>Hernando Reyes</i> and <i>Juan Hinojosa</i>, Compañía Contractual Minera Candelaria, Chile</p> <p>14:20-14:40 <b>Transmission Replacement Device.</b> <i>Orlando Zepeda</i>, Compañía Contractual Minera Candelaria, Chile</p> <p>14:40-15:00 <b>Cyclostationary Analysis of Vibratory Signal from Diesel Engines.</b> <i>Daniel San Martín</i> and <i>Gonzalo Daza</i>, Universidad Técnica Federico Santa María, Sede Concepción, Chile</p> <p>15:00-15:20 <b>Restoration Factor in Repairable Systems: Baseline for Consistent Reliability Forecast.</b> <i>Luis Sánchez</i>, Departamento de Ingeniería Mecánica, Universidad de Antofagasta, Chile</p> <p>15:20-15:40 <b>Phase Array Ultrasound Technology – Inspection Applications in Electrical Shovel and Earth Moving Equipment.</b> <i>César Castillo</i>, P&amp;H Minepro Chile S.A., Chile</p>
<p><b>15:40- 16:20 Poster Session and Coffee Break, courtesy of MinePro P&amp;H. Foyer.</b></p>	

<b>MAPLA 2009 TECHNICAL SESSIONS</b> <b>Santorini and Capri Ballrooms – 5 November</b>	<b>MANTEMIN 2009 TECHNICAL SESSIONS</b> <b>Menorca Ballroom – 5 November</b>
<p><b>Session 5: ADVANCED TECHNIQUES AND TECHNOLOGICAL DEVELOPMENTS</b></p> <p><b>Chair:</b> <i>Edwing Pullvermuller, Cia. Minera Maricunga, Chile.</i></p> <p>16:20-16:40 <b>Use of Sonar Flow Measurement for Performance and Condition Monitoring of Slurry Pumps.</b> <i>R. J. Maron, P.J. Rothman and C.V. O’Keefe, CiDRA Minerals Processing, USA. A.M. van der Spek, Zdoor B.V., Holland</i></p> <p>16:40-17:00 <b>Friction Welding Application to a Special D3 Steel Cylindrical Bar.</b> <i>Michael Rojas, Juan Ramos, Juan Troncoso, Héctor Vera and Hernán Ochoa, Universidad de Antofagasta, Chile. Osvaldo Fornaro, Universidad Nacional del Centro de la Provincia de Buenos Aires, Argentina</i></p> <p>17:00-17:20 <b>Setting Adjustment System Modification for Traditional MP1000 Cone Crushers.</b> <i>Carlos Tabilo y Miguel Arriagada, Metso Minerals S.A., Chile</i></p> <p>17:20-17:40 <b>Milling - Energy Intensive and High Maintenance, Overcoming the Challenges Using Frequency Converters.</b> <i>Tatiana Ravani Von Ow, ABB Switzerland Ltd., Switzerland</i></p> <p>17:40-18:00 <b>ODS and FEM in Bucket-Wheel Excavator at Codelco RT for the Analysis of Dynamic and Structural Issues.</b> <i>Guillermo Ríos and Hans Kuhn, SKF Chilena S.A.I.C., Chile</i></p> <p>18:00-18:20 <b>Strategic Asset Management via Cost Benefit Analysis of a Reliability Program.</b> <i>Antonio Álvarez, Meridium Inc., USA</i></p>	<p><b>Session 6: MAINTENANCE MANAGEMENT AND SAFETY</b></p> <p><b>Chair:</b> <i>Esteban Molina, Andina Division, Codelco Chile</i></p> <p>16:20-16:40 <b>Extended Life of P&amp;H 2800XP Shovels, Up to 150.000 Hours of Operation.</b> <i>Jorge Díaz, Carbones del Cerrejón, Colombia</i></p> <p>16:40-17:00 <b>Applied Technical Leadership to the Utilization of an Information System ERP.</b> <i>Víctor Barrientos, División Mantoverde, Anglo American, Chile</i></p> <p>17:00-17:20 <b>Central Planning for Mine Equipment Maintenance, Applied to In-House and Third Party Maintenance Tasks.</b> <i>Pablo Gálvez, Minera Esperanza, Chile</i></p> <p>17:20-17:40 <b>Training and Development Programme for Caterpillar Technical Personnel, Finningpro Service.</b> <i>Cristián Silva, Finning Sudamérica, Chile</i></p> <p>17:40-18:00 <b>Improving of Reliability in Starts Systems of Mining Trucks Fleet.</b> <i>Carlos Quezada, Minera Escondida Ltda., Chile</i></p> <p>18:00-18:20 <b>Visible Field Programme</b> <i>Gastón Burgos, Compañía Contractual Minera Candelaria, Chile</i></p>
<p><b>19:00- 22:30 Cocktail and Welcome Banquet, courtesy of FLSmidth Minerals. Foyer and Exterior Tent.</b></p>	

## FRIDAY, 6 NOVEMBER

### CAPRI AND MENORCA BALLROOMS

08:20-08:30 **Day 3 Programme Presentation and News Updates.** *Romke Kuyvenhoven*, Organising Committee Director Member, MAPLA 2009 / MANTEMIN 2009

PLENARY SESSION 2- Capri and Menorca Ballrooms – 6 November	
<b>Chair:</b>	<b><i>Arnaldo Burdiles</i>, Minera Candelaria, Chile.</b>
08:30-09:15	<b>Maintenance Management at Minera Esperanza.</b> <i>Christian Thiele</i> , Minera Esperanza General Manager, Chile
09:15-10:00	<b>Making the Business Case for the Whole Life Cycle Asset Management.</b> <i>John Woodhouse</i> , Executive Director of The Woodhouse Partnership, England
<b>10:30- 10:50 Poster Session &amp; Coffee Break, courtesy of MinePro P&amp;H. Foyer.</b>	

MAPLA 2009 / MANTEMIN 2009 TECHNICAL SESSIONS Santorini and Capri Ballrooms – 6 November	MANTEMIN 2009 TECHNICAL SESSIONS Menorca Ballroom – 6 November
<b>Session 7: MAINTENANCE MANAGEMENT</b>	<b>Session 8: MAINTENANCE MANAGEMENT AND ADVANCED TECHNIQUES</b>
<b>Chair:</b> <i>Eduardo Nilo</i> , El Teniente Division, Codelco Chile.	<b>Chair:</b> <i>Claudio Olgún</i> , Minera Escondida, Chile.
10:50-11:10 <b>Audits as an Effective Tool to Add Value in Maintenance.</b> <i>Pedro Rojas</i> , Codelco Andina, Chile	10:50-11:10 <b>Resource Optimization for M&amp;R Contracts of Mining Truck Fleet.</b> <i>Gonzalo Navarro</i> , Departamento de Ingeniería Mecánica, Universidad de Chile. <i>Francisco Aguirre</i> , Komatsu Chile S. A. <i>Rodrigo Pascual</i> , Laboratorio de Gestión de Activos Físicos, Centro de Minería, Pontificia Universidad Católica de Chile

<b>MAPLA 2009 / MANTEMIN 2009 TECHNICAL SESSIONS</b> <b>Santorini and Capri Ballrooms – 6 November</b>	<b>MANTEMIN 2009 TECHNICAL SESSIONS</b> <b>Menorca Ballroom – 6 November</b>
<p>11:10-11:30 <b>Prioritization from a Business Perspective: The System Efficiency Influence Diagram.</b> <i>David Godoy</i> and <i>Rodrigo Pascual</i>, Pontificia Universidad de Chile, Chile</p>	<p>11:10-11:30 <b>Productivity Analysis of a Haul-Transport System in an Open Pit Copper Mine</b> <i>Javier Rebolledo</i>, <i>Sebastián Silva</i> and <i>Walter Tejada</i>, Departamento de Ingeniería Mecánica, Facultad de Ciencias Físicas y Matemáticas, Universidad de Chile. <i>Rodrigo Pascual</i>, Centro de Minería, Pontificia Universidad Católica de Chile</p>
<p>11:30-11:50 <b>Redesigning a Copper Mineral Processing System from a Business Perspective.</b> <i>Rodrigo Madariaga</i> and <i>Rodrigo Pascual</i>, Universidad de Chile, Chile</p>	<p>11:30-11:50 <b>Value Trees: A New Approach for Process Visualization.</b> <i>P. Knights</i>, <i>C. Opazo</i>, and <i>A. Otto</i>, CRCMining, Australia. <i>C. Erazo</i>, Rio Tinto Iron Ore, Australia</p>
<p>11:50-12:10 <b>Management Model For Cumulative Workloads.</b> <i>César Arróspide</i>, Maintenance Engineering Ingeniería Ltda., Chile</p>	<p>11:50-12:10 <b>Application of Diesel Engine Analyzer Based on Ultrasound and Vibration in CAT 793/797 Trucks.</b> <i>Cristián Carvajal</i>, <i>Rodrigo Pérez</i> and <i>Andrés Fuica</i>, Minera Escondida Ltda., Chile <i>Francisco Díaz</i>, Carbones del Cerrejón, Colombia.</p>
<p>12:10-12:30 <b>Change and Technologies Management Implementation for the Maintenance Process</b> <i>Carlos Espinoza</i>, Compañía Contractual Minera Candelaria, Chile</p>	<p>12:10-12:30 <b>Real Time Machine Monitoring System Fluicheck</b> <i>Graham Martin</i>, Caledonia Instrumentation Systems Ltd., Scotland and <i>Ron Dunfee</i>, The Lubrizol Corporation, USA. <i>Bernardo Bollmann</i>, Adizol Ltda., Chile</p>
<p><b>12:30- 14:00 Lunch. Courtesy of METSO. Exterior Tent.</b></p>	

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<p><b>Session 9: BEST MAINTENANCE PRACTICES</b></p> <p><b>Chair:</b> <i>Fernando Gutiérrez</i>, Codelco Norte Division, Chile.</p> <p>14:00-14:20 <b>Increased Availability and Reliability of Lagunas Norte Crushing Facility.</b> <i>Carlos Gutiérrez, Juan Huete and César Chuquimaqui</i>, Minera Barrick Misquichilca, Peru</p> <p>14:20-14:40 <b>Operating Reliability: Maximizing the Economic Benefit of Investment Projects.</b> <i>Alessio Arata and José Luís Villarroel</i>, Centro de Desarrollo de Gestión Empresarial S.A., Chile. <i>Fredy Kristjanpoller</i>, Universidad Técnica Federico Santa María, Chile. Presented by <i>Pablo Viveros</i></p> <p>14:40-15:00 <b>Managing Critical Spare Parts in Mining Processes.</b> <i>Samuel Suazo</i> and <i>José Córdova</i>, Codelco División El Teniente, Chile</p> <p>15:00-15:20 <b>Best Practices in FLAC Maintenance.</b> <i>Marcelo Tapia</i>, Minera Escondida Ltda., Chile</p> <p>15:20-15:40 <b>Reduced Maintenance Costs in Power Systems Through Reliability Analysis.</b> <i>Mauricio Álamos</i> and <i>Bernardo Reyes</i>, ABB S.A., Chile</p>	<p><b>Session 10: BEST MAINTENANCE PRACTICES</b></p> <p><b>Chair:</b> <i>Raúl Stegmaier</i>, Universidad Técnica Federico Santa María, Chile.</p> <p>14:00-14:20 <b>Reliability Improvement on 3516 Diesel Engines of CAT 793 Trucks.</b> <i>Rodrigo Pérez</i> and <i>Andrés Fuica</i>, Minera Escondida Ltda., Chile</p> <p>14:20-14:40 <b>Management Control of the Truck- Factor by means of Accuweight System in Minera Candelaria.</b> <i>José Luis Pérez</i>, Compañía Contractual Minera Candelaria, Chile</p> <p>14:40-15:00 <b>Haul Truck Tires Service Life Extension.</b> <i>Orlando Zepeda</i>, Compañía Contractual Minera Candelaria, Chile</p> <p>15:00-15:20 <b>Managing Technological Obsolescence in Electromechanical Shovels.</b> <i>Sergio Maya</i>, Minera Escondida Ltda., Chile</p> <p>15:20- 15:40 <b>Centralised Oil Analysis Management System.</b> <i>Eduardo Carvajal</i>, Minera Escondida Ltda., Chile</p>
<p><b>15:40- 16:20 Poster Session and Coffee Break, courtesy of Shell Chile. Foyer.</b></p>	

<b>MAPLA 2009 TECHNICAL SESSIONS</b> Santorini and Capri Ballrooms – 6 November	<b>MANTEMIN 2009 TECHNICAL SESSIONS</b> Menorca Ballroom – 6 November
<b>Session 11: BEST MAINTENANCE PRACTICES</b>	<b>Session 12: BEST MAINTENANCE PRACTICES</b>
<b>Chair:</b> <i>Carlos Zapata</i> , Minera Escondida Ltda., Chile.	<b>Chair:</b> <i>Gerardo Delgado</i> , Minera Escondida Ltda., Chile.
16:20-16:40 <b>Practical Approach to Remote Condition Monitoring of MV Drive Line-Ups.</b> <i>Bartłomiej Kosiba</i> , ABB Corporate Research Center, ABB Switzerland Ltd., Switzerland. <i>Maciej Wnek</i> and <i>Stefano Legani</i> , ABB Switzerland Ltd., Switzerland. <i>Michał Orkisz</i> , ABB Corporate Research Center, Poland. <i>Cristián Riquelme</i> , ABB S.A. BU Minerals, Chile	16:20-16:40 <b>Electrical Reliability Improvement Process in 495B-BI Shovel Fleet.</b> <i>Sergio Maya</i> , <i>Álvaro Méndez</i> and <i>Juan Campos</i> , Minera Escondida Ltda., Chile
16:40-17:00 <b>Cleaning Gearless Motors at Collahuasi.</b> <i>Marcos Cid</i> , <i>Luís Salinas</i> , <i>Arcadio Rendiles</i> and <i>Carlos González</i> , Compañía Minera Doña Inés de Collahuasi, Chile	16:40-17:00 <b>Improved Practices in Electric Maintenance Applied to Caterpillar Equipment.</b> <i>Alfredo Gómez</i> , <i>Pablo Toledo</i> and <i>Rodrigo Huerta</i> , Minera Spence S.A., Chile
17:00-17:20 <b>Insulation of Ring Gear Motors to Operate at High Altitude.</b> <i>Marcos Cid</i> , Compañía Minera Doña Inés de Collahuasi, Chile. <i>Julio Cortés</i> and <i>Juan Ledesma</i> , Proyecto Desarrollo Los Bronces, Anglo American Chile, Chile. <i>Patrick Gels</i> and <i>Kurt Tichler</i> , Industry Sector Industrial Solutions, Siemens AG, Germany	17:00-17:20 <b>PM Optimisation in Mining and Mineral Processing Industries.</b> <i>Steve Turner</i> and <i>Juan Carlos Duarte</i> , OMCS International, Colombia
17:20-17:40 <b>Electrical Measurements of Gearless Sag and Ball Mills Using Collahuasi Equipment, Staff and Experience.</b> <i>Marcos Cid</i> , <i>Luís Salinas</i> and <i>Carlos González</i> , Compañía Minera Doña Inés de Collahuasi, Chile	17:20-17:40 <b>Impact of Contaminant Control on the Life of Mine Equipment Components.</b> <i>Juan Maita</i> , Compañía Minera Maricunga, Chile. <i>Adolfo Leiva</i> , Finning S.A., Chile
17:40-18:00 <b>Increased Reliability in Wound-Rotor Motors in Beneficiation Plant at S.C.M. El Abra.</b> <i>Mack Rojas</i> , Sociedad Contractual Minera El Abra, Chile	17:40-18:00 <b>Modification of Cyclone Box in Trucks.</b> <i>Carlos Quezada</i> , Minera Escondida Ltda., Chile

## **CLOSING CEREMONY. Capri and Menorca Ballrooms.**

18:20-18:40 **Event Outcome and Final Comments.** Organising Committee MAPLA 2009 / MANTEMIN 2009:

*Claudio García*, MAPLA 2009 Chairman

*Arnaldo Burdiles*, MANTEMIN 2009 Chairman

*Carlos Barahona*, Executive Director MAPLA 2009 / MANTEMIN 2009

*Romke Kuyvenhoven*, Organising Committee Director Member MAPLA 2009 / MANTEMIN 2009

**18:40- 20:00 Closing Cocktail. Foyer.**