

Oscar Manuel Alruiz
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Professional Qualifications

- Mining Engineer, Specialist in Mineral Processing
- Master of Business Administration
- Registered in Chile as Competent Person in Mineral Processing

Main Experience

Over 30-year experience as a professional engineer. Experience working for international companies and Joint Ventures. Experience consulting for companies in different countries (Chile, Argentina, Peru, and Brazil), and different metals (copper, moly, iron, gold, silver, zinc, and lead). Experience in due diligence process of mining companies. Experience with new technologies such as: HPGR, Pneumatic Flotation cells, Thickened/Filtered Tailings Deposits, and Pressure Oxidation (autoclave) of copper/arsenic concentrates. Also, participation in Greenfield and Brownfield mining projects development from conceptual through feasibility stages. Experience in developing geometallurgical models for copper and iron operations as well as concentrators optimization studies. Experience in designing of copper-moly concentrators and gold cyanidation plants. Experience in construction management, startup and operating of medium size concentrators. Experience in optimizing existent concentrators throughput, and metal recovery.

I. - EDUCATION

- Mining Engineer, Universidad de Chile, 1988 (Extractive metallurgy specialization)
- Master of Business Administration (MBA) 2001, University of Southern Colorado. Pueblo, Colorado, USA.

II. - PROFESSIONAL EXPERIENCE

Present Time (2019 - 2021)

Partner and main consultant at Alruiz Consultoria SpA (ACSPA).
Currently, consulting for CMP S.A. in the develop of geometallurgical models for its Cerro Negro Norte, Romeral and Los Colorados iron ore operations. Also, developing a geometallurgical model for CHINALCO-Toromocho operation in Peru, consulting for Grupo Cenizas at Las Luces operation expansion through HPGR technology and pneumatic flotation cells. Finally, consulting for CRAMSA (desalinated water company) with its mining marketing strategy.

2012 - July 2018. Technology Director and partner at ALTAIR Minería S.A. (ALTAIR) a mining consulting company based in Santiago. Some of the main projects developed during that time were the following:

- Conceptual study for ENAMI (Chile). Use of Pressure Oxidation Autoclave Technology (OUTOTEC) to treat copper/arsenic concentrates and produce copper cathodes. **2017.**
- Agua Rica's **Yamana Gold**, Argentina. 25 ktpd SLC and concentrator Conceptual Study development. **2017**
- Throughput Model (TPH). **SCM LUMINA COPPER.** CASERONES. III Region, CHILE. **2017**
- Short Term Geometallurgical Modelling. Mineração Maracá Indústria e Comércio, **YAMANA GOLD. Alto Horizonte – GO, Brazil. 2016**
- Geometallurgical Model for Production Planning Purposes. **DIVISION ANDINA. CODELCO-CHILE.** Los Andes. IV Region - CHILE. **2015**
- Acting as Owner Team for **ANDINA-CODELCO** in the 244-expansion project review and development of expansion alternatives. The work included treatment capacities scenario proposals and scenarios evaluations, tailings launder capacity evaluation, tailings dam water reclaiming and recycling, and review of the TTD conceptual engineering study developed by SNC LAVALIN. **2015**
- Due diligence process for **Tres Valles** (Chile) mine- crushing- lix-SX-EW mining complex acquisition by Vecchiola Group from Vale Corporation, **2014**
- Production optimization of **Compañía Minera San Geronimo** (Chile) from 80 Kt/month to 120 Kt/month. **2013**

Previous working experience

June 2010 - December 2011, Metallurgy & Projects Manager at Cenizas S.A.

During this period, supervised Don Eduardo's Iron ore testing program at SGS, Lakefield in Canada. Also, in this position was responsible for the development and implementation of metallurgical solutions to improve copper recovery in 5 percentage points for two concentrators Cabildo and Las Luces, and to organize the startup of one copper leaching plant, as well as the development of one feasibility study for a greenfield project (Barreal Seco).

December 2007 to May 2010, Processing Manager, Doña Inés de Collahuasi

- Development of plans and initiatives to improve capital assets utilization. One of the main initiatives was the development of the concept to expand Collahuasi's concentrator from 110 ktpd up to 170 ktpd using the existent grinding equipment.
- Development of the Collahuasi's geometallurgical model.
- Creating and leading of an elite work team to collect, create, and incorporate the best operational practices into Collahuasi's Development group.
- Main achievements: integration of an economic model for long term planning including geology, mining, and metallurgy for Rosario deposit. Supervising the development of the thickened tailings disposal Basic Engineering project as an alternative of water use optimization to support Collahuasi's expansion. Leading

the studies for an integrated environmental solution for gases and water disposal at Patache port molybdenum plant.

2005 to 2007 Projects Metallurgy Manager, Xstrata Copper Chile

- Managing of the metallurgical aspects of three capital investment projects: El Morro (Chile), El Pachon (Argentina) and Las Bambas (Perú)
- Completion of the metallurgical study for a feasibility study for El Morro, a Prefeasibility Study for El Pachon and a Conceptual Study for Las Bambas

2003 to 2005 Metallurgy Manager, Falconbridge Chile

- Member of Falconbridge's technical team responsible to advise and supervise all copper operations: Altonorte smelter, Lomas Bayas Leach-SX-EW. Also, reviewing of the performance and initiatives from Falconbridge Joint Ventures such as: Antamina, and Collahuasi mining complexes.
- Development of the conceptual, prefeasibility and feasibility processing studies of the two world class mining projects El Morro (Chile) and El Pachon (Argentina)
- Leading the engineering study, construction, and implementation of LAROX PF concentrate filter press at the copper slag concentrator in Altonorte smelter.
- Supervising the engineering and leading the implementation for copper slag concentrator in Altonorte smelter from 1,500 tpd to 3,000 tpd using the existing grinding and flotation equipment

2002 to 2003 Independent Consultant

- Minera Las Cenizas, Chile. Conceptual study for the first Thickened Tailing Disposal (TTD) operation approved in Chile at Cabildo concentrator. This study was developed in association with Dr. Eli Robinsky and VST Ingenieros.
- Noranda Falconbridge. Assessment of Altonorte Slag comminution facility to propose ways to increasing throughput to eliminate slag inventory.

1999 to 2001 MBA at University of Southern Colorado, Pueblo, Colorado, USA

1990 to 1999 Processing Manager at Las Cenizas

- Testing program design and execution, supervision of Jacobs Engineering design calculations, and equipment sizing for a Cyanidation plant to produce bullion of a bulk zinc-lead-gold and silver concentrate produced at Alhue concentrator. Santiago, Chile.
- Testing program design and execution, engineering design and calculations, equipment sizing, buying of second-hand main equipment, startup and operation at Las Luces copper-silver concentrator using Raw Sea Water. Taltal, II Region.
- Testing program design, supervision of LAROX design calculations, equipment sizing and participation of startup of the first PF LAROX installed in Chile at Alhue's gold flotation plant. Santiago, Chile

- Increasing throughput at Cabildo's copper concentrator by reduction of particle size product from crushing circuit. Cabildo, V Region

III. PUBLICATIONS

1. **Alruiz, O.M., Morell, S., Suazo, C.J., Naranjo, A., 2009.** "A Novel Approach to the Geometallurgical Modelling of the Collahuasi Grinding Circuit". *Minerals Engineering* 22 (2009), 1060–1067.
2. **Suazo C.J., Kracht W., Alruiz O.M., 2010.** "Geometallurgical Modelling of the Collahuasi Flotation Circuit". *Minerals Engineering* 23 (2010), 137-142.
3. **C.J. Suazo, W. Kracht, O.M. Alruiz.** "A Geometallurgical Model of the Flotation Rate Constant". 49th Annual Conference of Metallurgist of CIM, COM 2010. Vancouver, Canada 319-329.
4. **Flávia F. Batista¹, Mauricio Prado¹, Luiza G. F. Christofaro¹, Joao F. Ferreira¹, Oscar M. Alruiz², Magin E. Torres².** "The construction of a geometallurgical model for Mineração Maracá – Yamana Gold, Brazil". PROCEMIN PROCEEDINGS, 2017.
5. **Constantino J. Suazo¹, Eduardo F. Cortés¹, Oscar M. Alruiz², Magín Torres².** "Construction and Application of a New TPH Model for Caserones", SMC Lumina Copper Chile. PROCEMIN PROCEEDINGS, 2017.

IV. - LANGUAGES

- Native: Spanish
- Second language: English

V. - PROFESSIONAL MEMBERSHIPS

- Chilean Institute of Mining Engineers, since 1989
- Competent Person in Mineral Processing N° 0106 (Chilean commission) since 2011

VI. - PERSONAL INFORMATION

- Citizenship: Chilean
- Chilean ID: 8.878.209-7
- Date of Birth: April 25, 1961
- Married, two sons (13 and 16)

Santiago, April 2021

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