Light Metals 2013

Proceedings of the symposia sponsored by the TMS Aluminum Committee at the TMS 2013 Annual Meeting & Exhibition, San Antonio, Texas, USA March 3-7, 2013

Edited by
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PREFACE

It is my honour to welcome you to the 142nd TMS Annual Meeting and Exhibition at San Antonio, Texas and to present the *Light Metals 2013* proceedings. As always, *Light Metals 2013* is the collective output of the huge intellectual efforts by Authors, Session Chairs, Subject and Symposium Organisers, and TMS Support Staff. We owe these colleagues our sincere thanks.

We are meeting with the aluminium smelting industry continuing to face difficult times, with ongoing oversupply and metal prices generally declining through 2012. Enduring post GFC instabilities in a number of economies around the world mean that right now the light at the end of the tunnel is not easy to see.

During tough times, the typical response of companies is to “tighten the belt” to conserve cash, which unfortunately leads to lower attendance at meetings such as this. I firmly believe that participation at the TMS Annual Meeting, with its inherent technical interchange opportunities, should not be seen as a cost to be cut, but rather as an investment to be made. As a Graduate at the Comalco Research Centre, a request to attend my first TMS meeting in 1987 was approved on the basis that I find plant improvements that deliver net savings more than ten times the attendance cost. The considerable cost of travel to the United States meant this was not a trivial task. I can say, however that this target was easily exceeded for the first, and all subsequent TMS meetings I attended as a Comalco employee. The target was also exceeded for all the TMS meetings attended by others that I approved travel for, as they had the same task. The ideas that will give you this return on investment are to be found in the papers in this volume, Author presentations, informal discussions over coffee, visiting the Exhibition, and very importantly, from the contacts made that can last a career.

In addition to economic issues, and the sustainability and energy concerns that are inherent parts of our business, we now face a further challenge. The changing quality of raw materials, most notably petroleum coke for anodes, is increasing Casthouse metal impurities. A special Keynote Presentation session is devoted to this topic during the meeting. Les Edwards has done an excellent job of organising this session to cover the issues from raw materials and process impacts through to metal quality considerations. I believe impurities are a growing concern that will require serious attention right across our industry and urge you to attend the Keynote session and engage with the issues. The contribution of Steve Lindsay to this topic deserves special recognition as he is making a Keynote Presentation as well as presenting papers related to impurities in four of the Aluminum Committee sponsored symposia.

On behalf of the organisers of the Light Metals 2013 conference and proceedings, I would like to thank the TMS staff for their support and ability to deliver on our requests. I would also like to thank Steve Lindsay and Carlos Suarez (Past and current Chair of the Aluminum Committee) for their support. My deepest gratitude go to the Authors for their efforts, and the Subject Organizers who have done most of the work: Pat Clement, Les Edwards, Mark Cooksey, Gyan Jha, Kai Karhausen, Zhengdong Long, Subodh Das, William Golumbfskie, and Tongguang Zhai.

To end on a positive note, I am sure that you will find that *Light Metals 2013* maintains the position of this series as the preeminent source of developments in aluminum process knowledge and as such can help us through the difficult current times.

Barry A. Sadler
EDITOR'S BIOGRAPHY

BARRY A. SADLER
LIGHT METALS 2013 EDITOR

Barry Sadler has been involved in the aluminium industry for more than 30 years in a range of positions, but always with a focus on anode carbon technology. He has a Ph.D. in Metallurgy, and commenced his career in 1982 at the Comalco Research Centre (CRC) in Melbourne, Australia. Barry established the Carbon Technology Group at CRC before moving to Comalco’s New Zealand Aluminium Smelter (NZAS) as Carbon Plant Manager in 1989. After more than seven years at NZAS, and following a stint as the General Manager of Organisational Effectiveness for Hamersley Iron, Barry was appointed as a Corporate Technical General Manager at Comalco Aluminium’s headquarters in Brisbane, Australia. Barry resigned from Rio Tinto/Comalco in 2002 to successfully set up “Net Carbon Consulting Pty Ltd”. As a consultant, he provides advice, training, and support to clients on improving carbon plant performance and process technology, always maintaining a strong focus on the practical application of statistical thinking and methods to process management. Barry has authored or co-authored over 25 technical papers, is a regular lecturer on anode technology at post-graduate courses run by the University of Auckland, and has been an invited speaker at a range of conferences and meetings. He has been an active member of TMS for 25 years as a presenter, session chair, subject organiser, and member of the Aluminum Committee.
ALUMINUM KEYNOTE: IMPURITIES IN THE ALUMINUM SUPPLY CHAIN AND ELECTRODE TECHNOLOGY FOR ALUMINUM PRODUCTION

Les Edwards is Vice President of Technical Services at Rain CII Carbon based in Houston, Texas. He has been with Rain CII since 1998 and is responsible for customer technical support, R&D activities, laboratory services, and quality management. Les has been a regular contributor to TMS meetings over the last 20 years as an author, presenter, and session chair. Les was Program Organizer of the Carbon Technology sessions at the 2001 TMS meeting. Prior to joining Rain CII Carbon, he spent 11 years working in the aluminum industry in Australia, based at the Comalco Research Center in Melbourne. Les holds a B.S. from the University of Western Australia and an M.B.A. from Tulane University in New Orleans.

ALUMINA AND BAUXITE

Pat Clement graduated from the Colorado School of Mines with B.S. and M.S. in Metallurgical Engineering. He originally joined ASARCO Inc. as a Research Engineer working in various non-ferrous metals. After leaving ASARCO he worked for Brush Wellman in the powder fabrication of Beryllium components. Pat began working in the alumina industry in 1994 when he joined Ormet at their alumina facility in Burnside, Louisiana, eventually becoming Technical Manager for the facility. He is currently a Technical Specialist for Alcoa at their Point Comfort Operations Alumina Refinery.

ALUMINUM ALLOYS: FABRICATION, CHARACTERIZATION AND APPLICATIONS

Zhengdong Long is an Alloy Development Engineer at Kaiser Aluminum in Spokane, Washington, United States. He has been active for over a decade in the area of physical and mechanical metallurgy of aluminum alloy and superalloys. Dr. Long's diverse experience includes casting, thermo-mechanical processing, mechanical properties, corrosion behaviors as well as casting and rolling process modeling. He specializes in microstructure characterization and mechanical behavior of metallic materials. His principle research interests are in the development of industrial processes for manufacturing. He has two patents to his credit and more than 30 published papers. He received his doctorate in Materials Science and Engineering from Central Iron and Steel Research and Institute in Beijing, China, in 2000.
ALUMINIUM PROCESSING

Kai F. Karhausen is department manager for process technology at the central Rolled Products R&D of Hydro Aluminium in Bonn, Germany. Dr. Karhausen earned his doctorate at the RWTH Aachen and worked in the industrial aluminum research for 15 years both in Norway and Germany. His principal work is focused on the modeling and optimization of materials behavior in industrial production processes. Dr. Karhausen has issued 75 scientific presentations and publications. In 2003 he was awarded the Georg-Sachs-Preis of the German Materials Society (DGM) for important achievements in the field of integrated modeling of metal forming and materials behavior.

ALUMINUM REDUCTION TECHNOLOGY

Mark Cooksey is Program Leader - Process Integration at CSIRO Process Science and Engineering, where he leads a group of approximately 90 engineers, physicists, chemists, and technical staff to develop step-change technologies for the resource processing industries. He is also responsible for the aluminium smelting project portfolio at CSIRO. Mark’s career began in 1997 as a Research Engineer at Comalco Research Centre, initially working on the development of improved aluminium alloys and aluminium casting processes. After becoming a Senior Research Engineer in 2000, he gradually moved toward aluminium smelting research. He also worked for GE Plastics as a Production Technologist in 2003. Mark joined CSIRO in 2004 as a project leader for multiple research projects in aluminium and magnesium production. In 2008 he was appointed Group Leader - Process Engineering, managing approximately 30 engineers and technical staff. While at CSIRO, Mark has completed a Ph.D. in Chemical and Materials Engineering, developing a technique to directly measure ohmic resistance in aluminium reduction cells.

CAST SHOP FOR ALUMINUM PRODUCTION

Gyan Jha has spent 31 years in the aluminum sheet and packaging business. Currently CTO for Tri-Arrows Aluminum, Gyan has extensive experience in all aspects rigid container sheet processing and the manufacturing of aluminum for packaging. Gyan’s work experience includes 25 years at Tri-Arrows Aluminum (formerly ARCO Aluminum).
# ALUMINUM COMMITTEE

## 2012-2013

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Bechtel Corporation
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John F. Grandfield
Grandfield Technology Pty. Ltd.
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