

The Extract



From the CEO

CSRP has been carrying out research of relevance to the minerals industry since 2003 and will now bid for a five year funding extension in the Commonwealth Government's 11th Cooperative Research Centre selection round in March 2009. Since our inception we have delivered significant education, research and technology developments for the minerals industry and CSRP2 will take these achievements to the next stage – practical implementation in the field.

Notwithstanding the current turmoil in the global economy, the worldwide demand for mineral-based products will, in the medium and longer terms, continue to increase exponentially due in particular to the ongoing modernisation of developing countries. This is good news for metal and mineral resource-based businesses and for major mineral exporting countries like Australia. Meeting this demand will be good for the global economy and will improve social equity by providing material goods to an increasing proportion of the world's peoples.

CSRP has added value to the Australian (and global) minerals industry in a number of areas. The total value of CSRP's research output has been independently estimated to be in

excess of \$450 million. CSRP2 will take many of the research outcomes of CSRP and undertake substantial development activities to maximise uptake and value to end users in the near, medium and longer term. In addition CSRP2 will also develop technologies in new areas of research which were identified in the first stage of CSRP.

The proposed research programs for CSRP2 are:

Program 1 – Sustainable Operations

- 1.1 SUSOP® sustainable development management technique
- 1.2 Greenhouse gas reduction options
- 1.3 Influence public policy, regulations and standards to support sustainable development initiatives

Program 2 – People Resources

- 2.1 Postgraduate and undergraduate support program
- 2.2 Retaining and exploiting the knowledge of late career professionals
- 2.3 Schools program (including the CRC Association award-winning Science Teachers program)
- 2.4 Training courses for SUSOP®

Program 3 – Mine to Metal Optimisation

- 3.1 Fundamental comminution models
- 3.2 Mine to mill optimisation
- 3.3 Mill to smelter optimisation

Program 4 – Utilisation of Mineral By-Products

- 4.1 Low greenhouse gas concretes (including geopolymers, granulated slags, coal combustion products (ash), Bayer residues)
- 4.2 Bauxite residues for construction and agricultural uses
- 4.3 Mineral processing by-products (minor elements, sulphide wastes, mineral sands, etc.)

A broad range of industry participants in CSRP has shown clear commitment to supporting the extension to CSRP2. These participants range from major global corporations to niche specialists in the industry covering many mineral commodities.

As you can see it's a busy and exciting time leading up to 20 March. Should you wish to find out more information on the bid, please contact me on +61 8 6436 8734 or email stevan.green@csrp.com.au, or visit www.csrp.com.au

Stevan Green
CEO



Evan Jamieson, Alan Jones and Stevan Green investigate the ReSand® stockpile. Image © Garside Images.

JK Rotary Breakage Tester



The inside of a commercial JK Rotary Breakage Tester characterisation device. Image © JKMRRC.

In a quintessential example of the power of collaborative research, CSRP has enabled the Julius Kruttschnitt Mineral Research Centre (JKMRC) to design and build an innovative rotary breakage tester with substantial sustainability and economic benefits for Australia and the world.

CSRP and the JKMRRC have taken an innovative approach to quantifying the energy-breakage relationship of ore processing by designing, building and commercialising a pioneering JK Rotary Breakage Tester (JKRBT). This novel device will allow mineral processors to produce valuable metals using less power, less consumables, and less water, resulting in production of less greenhouse gases.

The JKRBT allows characterisation of the properties of mineral ores to be realised 10 times faster than the conventional "Drop Weight Test" – thus allowing mineral processing machines to be designed and operated much more optimally than is currently possible.

The expected value of the JKRBT to the Australian mining industry has been independently assessed to be in excess of \$120 million (not including carbon credits!) and has the potential to reduce greenhouse gas emissions from mineral processing in Australia by an estimated 5 million tonnes CO₂(e) per year – the equivalent of around 500,000 households.

"An important outcome for industry, resulting from international collaboration between industry and researchers"

Dr Neville Plint, Head of Research & Development, Anglo Platinum (South Africa)

ReSand®

Bauxite from the Darling Range in Western Australia contains significant quantities of quartz, resulting in a higher proportion of coarse bauxite residue being processed. This coarse residue is almost identical to crushed rock and has a particle size distribution like sand. Once neutralised and washed free of salt, this product has excellent properties for use in the construction industry. CSRP projects at Curtin University of Technology have identified ReSand® as suitable for general fill, for use in embankments and also in the construction of roads. ReSand® has also been classed as suitable as a substitute for fine aggregate in concrete production.

A pilot plant has been constructed and commissioned at Wagerup, south of Perth. Over 5000 tonnes of ReSand® are being produced to enable demonstration projects, with particular emphasis upon road construction. During November, staff from the CSRP headquarters visited the ReSand® pilot plant and inspected the stockpiles.



CSRP and Alcoa staff on a site visit to the ReSand® pilot plant. Image © Garside Images.

The JKRBT uses kinetic energy to crush rocks; ore particles pre-sized into narrow fractions are accelerated in a rotor and ejected to impact an anvil (stator). A vibrating feeder controls the feed rate to ensure that breakage takes place in a single particle mode. After impact breakage, the product is collected from a container underneath the rotor-stator system.

With CSRP acting as a catalyst, the JKRBT has been developed, manufactured in Australia and marketed at a remarkable pace, with seven units already deployed worldwide at: Anglo Research (Johannesburg, South Africa, two units), Barrick Gold (Brisbane), BHP Billiton (Newcastle), Rio Tinto (Kennecott, USA), Teck Cominco (Trail, Canada) and the JKMRRC (Brisbane). A marvellous outcome in just over 3 years from the original concept!

4th Student-Industry-CRC Symposium

What happens when you get mining and energy Cooperative Research Centre students together with representatives from a range of industries? You have an excellent forum in which to network, to share experiences, to allow students to present their work to each other and to industry; and to learn that the world of research extends greatly outside their immediate topic and discipline.

CSRP, in conjunction with the other mineral and energy sector CRCs, once again hosted the Student-Industry-CRC Symposium from 8-13 February 2009 at Fairbridge Village in Pinjarra, Western Australia.

Some two dozen students from 10 different universities around Australia participated in the event. The week began with an overview of issues within the industry by Dr Jim Avraamides of CSRP in his presentation "Perspective on Sustainability in the Minerals Industry". Dr Avraamides' talk explored technologies that increase efficiencies in production as well as delving into the creation of new value streams being developed from what was formerly viewed as waste products.

All students presented their research and fielded questions concerning their work. Additionally, industry tours of CSBP Ltd and Hls melt in Kwinana and the Alcoa Pinjarra Alumina Refinery as well as Alcoa's Huntley mine site. In each case, tour leaders helped students connect academic research to real-world applications.

The postgraduates also participated in two workshops presented by CSRP collaborators from the University of Queensland's Sustainable Minerals Institute. One workshop presented by Dr Janine Lay ("Communication: Your Secret Weapon") called on students to develop more effective communication skills. The

other offered by Dr Glen Corder ("SUSOP® – Getting Sustainability into Practice") challenged participants to "design in" sustainability features when engineering a new plant or mine site.

The week ended with an industry roundtable session entitled "Starting a booming career in the middle of an economic bust" with Mr Aidan Giblett (Newmont), Dr Evan Jamieson (Alcoa and CSRP), Mr Mark Edwards (Hatch) and Mr Simon O'Leary (Orica) volunteering their time to the students.

The week also offered time away from academics and industry, allowing students to interact in less formal ways. Nature walks, swimming pool volleyball, nightly sundowners and the annual Quiz Night presented ample opportunity for network building. Once again, student presentations were scored by a panel of judges and cash prizes were awarded.

Visit www.csrp.com.au/education/students/symposia.html for further information.



Student and staff attendees at the 2009 Student-Industry-CRC Symposium held in Pinjarra, WA. Image © CSRP.

Sustainable Development Indicators in the Minerals Industry 2009 Conference

SDIMI 2009 is the fourth in a series of international conferences aimed at enhancing the contribution of the global minerals industry to the goal of sustainable development. The conference is being held from **6-8 July 2009** on the Gold Coast in Queensland.

This conference will focus on the application and integration of sustainable development principles in the minerals industry, and will encompass the social and human, as well as the environmental and technological, dimensions of sustainability. A strong representation of sustainability researchers and

practitioners is expected from the Australian and international minerals industry, research organisations and the government sector.

CSRP is confirmed as a conference supporter and plans are underway for a **half-day CSRP session** on sustainable development case studies, including presentations and a panel discussion.

Visit www.ausimm.com.au/sdimi2009 for updates and further information.

CSRP'08 Conference



Dr Dan Churach presenting at the CSRP'08 conference says that now is the time to develop new professionals with a sustainability paradigm built into their education. Image © CSRP.

The second CSRP conference was held over two days on Tuesday 18 and Wednesday 19 November 2008 at Customs House in Brisbane. Over 80 people attended, including a very pleasing number of industry representatives from Alcoa, AMIRA, BlueScope Steel, BHP Billiton, Worsley, GHD, Hatch, Rio Tinto, Rio Tinto Alcan and Xstrata. Numbers were affected somewhat by the economic downturn and the decision by a number of companies to limit non-essential travel. The Governing Board was represented by Erica Smyth and Don McKee.

Stevan Green and Erica Smyth welcomed the delegates and invited them to reflect on the past five years of achievements; whilst also acknowledging CSRP's position as we move along the curve from research towards implementation.

An opening plenary was then given by Dr John Cole, General Manager of the newly opened Queensland Office of Clean Energy. Dr Cole set the scene by discussing the challenges we face in meeting all of societies requirements into the future.

The two days of technical presentations that followed, were generally of a high standard and provoked questions and discussion from the audience. Further inspiring comments on the value of suitably educated science graduates and the importance of taking sustainability seriously were given over dinner by Professor Peter Andrews, the Queensland Chief Scientist.

The Industry Panel session again proved to be very popular and generated much discussion. The industry panel discussion was chaired by Erica Smyth and comprised of Bruce Fraser (AMIRA), Evan Jamieson (Alcoa) and Joe Pease (Xstrata). After a brief opinion piece by each representative, the audience engaged in an open discussion on topics including better engaging with industry, communicating positive science to the public and preparing for CSRP2.

Those attending agreed that it was a great opportunity to catch up on the various activities of CSRP and to interact with colleagues from interstate.

“It was good to see you at the conference and it was a fantastic time to catch up and share with everyone. Thank you for organising such a wonderful event.”

We hope our Participants will join us at this and other CSRP events in 2009.



Discussion during the industry-led panel session. Image © CSRP.