

MELBOURNE, AUSTRALIA
17 MAY 2003

Figure 1a (left below) & b (right above): The highlight of the workshop was the 'hands-on' measurement of the rheological properties of slurry produced during the workshop in Outokumpu Technology's 10 m high pilot plant.

Perth based Australian Centre for Geomechanics (ACG) was pleased to present the First Minerals Processing and Tailings Rheology Workshop in Melbourne, Australia on 17 May 2003 in conjunction with Rio Tinto Technical Services. Following on from the well attended ACG International Seminar on Paste and Thickened Tailings Seminar, this workshop attracted over 50 professionals and researchers from all over the world including South Africa, Botswana, Alaska, Chile and Canada. The number attending was restricted by the size of the venue and a desire to maximise the return from the "hands-on" sessions to those attending.

The workshop was designed to demystify the complexities of rheology, enabling attendees to further understand how slurry operations and minerals processing benefit from this innovative technology. Throughout the day, the science of rheology was discussed, potential solutions presented, and the challenges highlighted.

The program commenced with several keynote presentations, after which the workshop broke into two groups. Those in the two groups then alternated between practical sessions involving: the measurement of rheology in a laboratory; participating in the production and monitoring of the consistency of thickened tailings produced



in 10m high pilot plant thickener set up by Outokumpu Technology, and listening to three presentations on specific issues relating to the thickening, transport and disposal of thickened tailings.

The keynote lectures began with renowned rheology expert, David Boger, Director and Professor, Particulate Fluids Processing Centre, The University of Melbourne, presenting a brief overview of why rheology is important to the minerals industry and how this science impacts on the design and operation of a range of unit operations in the minerals industry. The processes examined included: thickening, pumping, pipelining, paste technology and tailings disposal.

Next, Mark Cogill, Principal Technologist, Rio Tinto Technical Services, defined and explained the importance of rheology behaviour: newtonian and non-newtonian properties. Cogill then proceeded to explain that mineral slurry rheology is not a fixed parameter and the slurry can indeed be manipulated through variation to ore type, water quality, the environment and of course, the addition of reagents.

Nikk Vagias, Chemist, Rio Tinto Technical Services, spoke about the importance of measuring rheology through yield stress measurement and the shear thinning/ thixotropic measurement. Vagias explored the pros and cons





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of each measurement technique and explained how experience, appropriate equipment such as the 'right' viscometer and a good understanding of mineral processes will aid those responsible for measuring the mine residue. Vagias also discussed the various models used for examining the rheological properties of mineral slurries.

In the first of the special lectures, Peter Scales, Head of the Dept. of Chemical and Biomolecular Engineering, The University of Melbourne, talked about his knowledge of the function and importance of thickeners as is being revealed by current research. He noted that the mining industry is embracing a trend towards the finer grinding of ores and the increased emphasis on such issues as water recovery and the production of high solids tailings. This movement towards high particulate suspensions, underlines the importance of the thickening and filtration processes in tailings facilities. Scales then presented comprehensive overviews of yield stress tests, thickener modelling and filtration predictions.

The next speaker, Dr Lionel Pullum, a Consulting Engineer with the CSIRO, spoke about transportation, in particular the pumping of paste flows and conventional tailings lines. Using graphic computer generated animation, Pullum detailed the various flows of homogeneous and heterogeneous paste and examined the evolution of ultra high concentration pastes.

ACG Senior Consultant, Richard Jewell, concluded the special lectures with a presentation detailing how deposition affects the constitution of rheology. Jewell presented an overview of the sedimentation processes, spreading/beaching, relevant rheological properties, field

measuring and monitoring techniques, through reference to behaviour in the field at a number of sites.

Attendees took full advantage of Rio Tinto's state-of-the-art laboratories at Bundoorra, Melbourne, by engaging in rheology measurement and manipulation exercises. Rheology Solutions generously provided 10 viscometers for use at the workshop, enabling attendees to get a "hands-on" experience in measuring slurry-like substances and seeing what happens to the slurry when reagents such as salt are added.

The attendees also had the unique opportunity to view Outokumpu Technology's pilot thickener in action. This 10 metre pilot plant was made especially available for the workshop and some participants had the opportunity to get 'down and dirty' by measuring the rheological properties of slurries produced during the workshop.

The ACG was enabled to host this event with the generous support of its sponsors, namely, Rio Tinto Technical Services, Rheology Solutions and Outokumpu Technology. The global demand for information about the importance of rheology in paste and thickened tailings operations and the overwhelming success of this workshop have resulted in the planning of another Minerals Processing and Tailings Rheology Workshop to be held in Perth, November 2003.

To order copies of the Rheology Workshop proceedings (including CD ROM) and for further details about the second Minerals Processing and Tailings Rheology Workshop to be held in Perth/Western Australia, 25-26 November 2003, please contact Josephine Ruddle (acg@acg.uwa.edu.au).

Figure 2 (left): Attendees took full advantage of Rio Tinto's state-of-the-art laboratories by engaging in rheology measurements and manipulation exercises.

Figure 3 (right): The ACG's First Mineral Processing and Tailings Rheology Workshop attracted more than 50 professionals and researchers from all over the world, including South Africa, Botswana, Alaska, Chile and Canada.



Figure 4: Workshop organisers: Mark Coghill (Principal Technologist, Rio Tinto Technical Services), David Boger (Laureate Professor, The University of Melbourne), Richard Jewell (Senior Consultant, ACG).