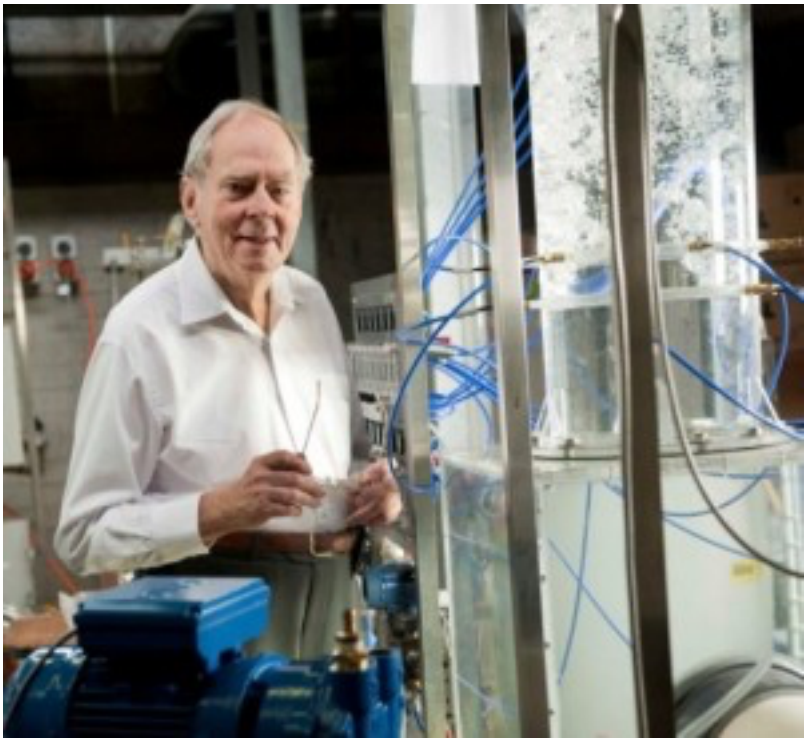
CONCENTRATION Graeme Jameson



Laureate Professor Graeme Jameson is Director of the University of Newcastle's (Australia) Centre for Multiphase Processes, a major centre for research and research training in the science and technology of fine particles and bubbles. He was nominated separately by two people, The Editor of Minerals Engineering, Dr Barry Wills and Rio Tinto's John McGagh, for the concentration award. He is a true pioneer in innovative flotation research, and the inventor of the Jameson Cell which bears his name. This was first introduced 25 years ago at Mt. Isa and is now installed in over 320 operations worldwide. Jameson, now in his 70s, continues to publish innovative work on the fundamental nature of flotation, and last year was awarded the Antoine M. Gaudin Memorial Award at the SME Meeting in Denver.

The University of Newcastle says Jameson's "contribution to the Australian economy and the environment as the inventor of what is considered by many to be the nation's biggest export earner in the last 25 years, has earned him gold status within the minerals industry. The Jameson Cell, a froth flotation device, has netted Australia more than A$26 billion in exports."

His research continues to push the boundaries and he is currently working on a Fluidised Bed Flotation Cell that has the potential to make massive reductions in the energy used in mineral concentration. This has the potential to recover coarse particles as large as 600 µm, reducing grinding energy by as much as half. The new process is ideal for the recovery of copper, gold, silver, nickel, lead and zinc. "A device like this will maximise mineral recovery, as well as yield significant savings in both energy and money" says Jameson. "Another substantial benefit is that reducing the need to produce as much energy also minimises the amount of greenhouse gas emissions created during electricity production."

For many years, Prof Jameson's attention had been focused on improving the effectiveness of extracting valuable minerals from rock. On his first great invention, the Jameson Cell, he says: "I had been looking at ways to improve the flotation process for many years. I knew flotation was important and felt the answer lay in the mechanics of fluids and particles."

The Jameson Cell is a radically different flotation device that changed the way that minerals were recovered and earned Jameson almost legendary status in mining and engineering circles. With cells now in operation across more than 25 countries, it is being used for copper, coal, zinc, nickel, lead, silver and platinum extraction worldwide. The technology has been continuously improved to ensure ease of use and to improve the integrity of the cell. The latest designs combine the original advantages of small bubble size and a small physical footprint with lower maintenance and easier operation. The advantages of the Jameson Cell include:

•Consistent fine bubble generation without the need for external equipment
•No need for mechanical agitation to achieve rapid flotation
•Small physical footprint
•Maximum concentrate grade in a single flotation stage
•Fast response and easy control
•Consistent performance irrespective of feed flow changes
•Simple installation and maintenance with no moving parts.

As well as mineral processing, the cell has also been used for industrial and environmental applications including extracting oil from tar sands in Canada, cleaning up industrial wastewaters in Newcastle and other locations in Australia, and removing blue-green algae from waterways in inland Australia. Finely-ground particles that were once too small to recover and previously were dumped into rivers, or buried, can now be processed. Old mines now have a longer life, and the environmental damage caused by the need open more new mines is reduced. Returning to fluidised bed flotation, the CSIRO has estimated that the energy used in grinding rock to retrieve valuable material is equal to 14% of Australia's electricity production. "In this day and age, the amount of valuable material recovered is very small, representing 1 to 2% of the feed material, so we are grinding 98% of the feed, only to throw it away," Jameson said. "To recover particles of copper ore, for example, it is necessary to grind the whole of the feed to the plant, to a top size that is typically 150 µm – about the size of a human hair," he said. "Currently, because the coarse particles are knocked off the bubbles by the violent, turbulent action in the tank, there is a need to grind the particles to a super-fine state. My theory is that if we can extract these coarse particles, you won't have to grind so fine and you won't have to expend so much energy. Imagine a bed of sand. If you're well away from the water the sand will be pretty stable and if you stand on it, you don't sink. However, if you go a bit closer to the water you can make the sand fluidise just by moving your feet up and down," he said. "The sand stays more or less in the same place but the water in the sand is pumped up and down and momentarily it lifts particles away from their neighbours, so the sand becomes liquid-like and you can sink down into it. The fluidised bed flotation device uses the same principles by pushing air bubbles through the sediment and this creates a quiet environment for the larger particles to attach to the bubbles."

Jameson's reputation for commitment to an issue was formed early in his career and cemented during his early years at the University of New South Wales. There he worked as a chemical engineering cadet in Sydney while studying part-time over an eight year period, saving to pay his living expenses to do a PhD at Cambridge University. He arrived at the University of Newcastle as Professor of Chemical Engineering in 1978. "I see science and technology as agents for improving people's lives. I'm strongly of the view that curiosity-driven research is of great benefit to society, particularly when it is linked, however tenuously, with the solution of a real practical problem. As an engineer, my interest is in striving to fix problems that are important to a particular industry, and have previously proven difficult to solve. I like to identify a problem, do the fundamental research into why the current technologies aren't working, and then come up with a practical solution based on the research," he said.

Prof Jameson's services to engineering, science, industry and the environment were recognised when he was awarded an Order of Australia Medal, AO, in 2005. Other accolades include the CSIRO Medal and being recognised as a Fellow of the Australian Academy of Sciences, the Royal Academy of Engineering in the UK and the Australian Academy of Technological Sciences.