

Technology and Innovation

The Technology & Innovation (T&I) group consists of a central team of technology professionals and a number of technology centres that develop leading practice and promote improved practice in mining and processing, asset management, strategic production planning, and project development, execution and evaluation. Emphasis is given to common and visible measures of operational effectiveness, the improvement of analytical tools and development of staff capability and effectiveness.

Most work is dedicated to current technologies and operations but a separate Innovation Centre focuses on step change innovation to confer competitive advantage in development of orebodies likely to be available to the Group in the future.

The total number of employees in T&I at year end was 351, compared with 378 at year end 2007.

Grant Thorne, Group executive T&I, is based in Brisbane, Australia.

STRATEGY

T&I's strategy is to underpin operational excellence in the business units and to increase the contribution of technology to the Group's vision of industry leadership.

T&I's objectives include:

- Working with the business units to deploy technology solutions that increase earnings.
- Developing a pipeline of valuable new investment projects.
- Positioning the Group to develop orebodies that are likely to require innovative mining solutions.

KEY ACHIEVEMENTS

The *Improving performance together* (IPT) asset management programme that started in 2004 was instrumental in assisting Iron Ore Company of Canada in making significant improvements to its mining and ore delivery fleet performance in 2008. Production is affected in winter months by issues with reliability of mine equipment. At extremely low temperatures, most mechanical and electrical systems are stressed. In mid 2007 the T&I team working together with the IOC asset management team implemented the IPT programme to help address these reliability issues. In 2008, mine production fleet availability improved to 78 per cent from average historical levels of 75 per cent. This improvement in mine fleet performance coupled with similar improvements in the reliability of the ore delivery system contributed to improvements in production at IOC in 2008.

The Asset Management Centre Mine Monitoring and Control programme was

implemented in early 2008. This includes the installation of real time, on line equipment monitoring systems. By the end of 2008, over 400 monitoring systems had been installed on haul trucks across the Group. Significant benefits are already in evidence. For example, at Rio Tinto Coal Australia Hail Creek Mine, the ability to monitor and influence the truck operators' use of the service brake is expected to save over US\$250,000 annually in brake repair costs. With this same programme, Rio Tinto Iron Ore has also targeted savings in excess of US\$900,000 and other business units such as KUC have been able to identify and prevent component failures. The consequence is safer operations, more productive use of equipment and lower maintenance costs.

During 2007, RTIO completed order of magnitude studies on a further expansion to 320 million tonnes per annum (Mt/a). T&I applied the IPT Strategic Production Planning (SPP) approach at RTIO, commencing in August 2007 which delivered results in March 2008. T&I, together with RTIO developed strategic scheduling and valuation models and evaluated a variety of options in order to identify the most valuable resource development sequence and mining/processing approach, which increased the expansion base case valuation substantially. In addition, the possibility of a further potential expansion beyond 320 Mt/a was explored. The work was recognised in 2008 when the RTIO/SPP team was awarded the Terry Palmer Award, an internal Rio Tinto award, for its achievements in innovation, collaboration and contribution to the business.

The payload management initiative which is led by the IPT Mining team was instrumental in improving haul truck fleet performance at a number of the Group's mines in 2008. At the seven Pilbara Iron sites where payload management is in special focus, the average load carried by each truck has increased by more than five per cent. Also, load variability has reduced on average by more than ten per cent. Closer operation to design limits and avoidance of overloading were the basis for an additional 15 million tonnes of material movement in 2008 without risk of increased equipment damage.

FINANCIAL PERFORMANCE 2008 compared with 2007

The T&I gross cost in 2008 was US\$158 million, compared with US\$160 million in 2007. Staffing and expenditure was constrained to respond to the deterioration in global economic outlook.

2007 compared with 2006

The T&I group gross cost was US\$160

million in 2007 compared with US\$118 million in 2006. The increase was due to the higher level of activity, reflected also by higher staff numbers, and the continued development and deployment of leading operational practice across the Group.

2008 OPERATING PERFORMANCE Safety

T&I is committed to the safe operation of its facilities and to the safe deployment of its personnel. As a consequence of a single, low severity injury, the T&I all injury frequency rate was 0.24 for 2008 compared with 0.00 in 2007.

Innovation

T&I's Innovation Centre aims to implement Group wide change improvements in the application of technology on behalf of the Group.

The Group has adopted a strategic programme entitled Mine of the Future™. This comprises an interlinking set of projects aimed at delivering demonstrable step change improvements in productivity, cost performance and product quality in both surface and underground mining operations and associated mineral recovery technologies.

A key strategy in pursuit of the Mine of the Future™ is the establishment of long term relationships with world class research and development providers. For example, the Group has established an exclusive long term strategic partnership with the Australian Centre for Field Robotics (ACFR) at the University of Sydney which resulted in the formation of the Rio Tinto Centre for Mine Automation.

The first breakthrough delivered by the Centre for Mine Automation is the successful development and deployment of autonomous blast hole drilling in the Pilbara. This exclusive partnership also leverages the Group's progress in the deployment of driverless haul trucks through a partnership with Komatsu.

Through Mine of the Future™, the Group is also focused on the operation of the first Autonomous Iron Ore mine, designated "Pit A", which is located at the West Angelas mine in the Pilbara. Pit A combines autonomous drilling with autonomous trucks and is fully integrated with the RTIO remote operations centre in Perth which controls the movement of equipment. Pit A achieved a significant milestone in December 2008 when the autonomous truck fleet was commissioned alongside the Group's autonomous drill rig, providing a launch platform for full operation in 2009.

A long term partnership with Curtin University was established in early 2008,

resulting in the formation of the Rio Tinto Centre for Materials and Sensing in Mining. The partnership explores the use of advanced materials in mining applications to increase the operational life of equipment. The partnership also facilitates the transfer of advanced oil industry sensing technologies into mining applications.

Innovation's underground mining activities in 2008 continued to focus on the block cave method which is of particular relevance to the large copper orebodies currently under development. Technologies progressed include rapid mechanical development of shafts and tunnels, remote monitoring in underground mining and innovative underground crushing and sizing solutions.

The Group's capabilities in the field of processing and recovery were enhanced by the formation of the Rio Tinto Centre for Advanced Mineral Recovery, which is a long term partnership with Imperial College London. Progress was made on advancing breakthrough technology targeted to remove barren material from copper ore in order to significantly lift head grades. In addition, breakthroughs in flotation control offer the potential to materially increase recovery in copper applications.

Production Technology

The Production Technology Centre addresses core mining and processing production processes. The IPT programme for Production Technology continued to deliver strong results in 2008. The programme assisted the operating business units in realising over US\$400 million in pre-tax cash flow benefits in 2008 and will remain a key programme in 2009.

Specific mining initiatives included haul truck payload management, off road tyre demand reduction, and the development of an explosives safety standard in surface mining.

The Production Technology Centre also focuses on core metallurgical capability and delivery of processing improvements. During 2008, the Centre focused on the implementation of a structured methodology to identify and eliminate specific points of loss (throughput, recovery, and grade) at the Group's processing operations. Common measures for the performance of concentrators and other fixed plant were introduced globally to enable monitoring and sustain improvements.

Asset Management

The Asset Management Centre focuses on the effective choice and deployment of the Group's equipment for mining and processing. During 2008, it focused on the

continued reliability and performance of equipment across the Group, including the implementation of asset management standards, technical systems and global metrics to compare and monitor the performance of both heavy mobile equipment and fixed plant.

The IPT programme for Asset Management continued to deliver strong results in 2008, assisting the business units to realise over US\$200 million in pretax cash flow benefits. Installation of real time on line equipment maintenance monitoring systems has led to continued improvement in areas such as heavy mobile equipment availability and economic extension of engine and component life.

The Centre also introduced a comprehensive suite of training programmes in 2008 to ensure the functional development of asset management professionals across the Group. Several new asset management Communities of Practice were introduced in 2008 to improve collaboration and knowledge sharing.

Strategic Production Planning

The focus of the Strategic Production Planning (SPP) Centre is to establish leading practice and develop Group wide solutions in mineral resource development, orebody knowledge and mine planning. Attention is directed to developing the skills of staff who are involved in these processes. The Centre also oversees the Group's resource and reserves estimation and reporting process as well as the core technical systems.

A key element of the Strategic Production Planning process is SPP's cooperation with business units to develop comprehensive plans and valuations of strategic development options. Development options which are considered typically include mining and processing methods and capacities, infrastructure alternatives and blending/marketing opportunities.

Results from SPP provide a logical resource development framework for more detailed studies and investment decision making.

Project Development

The Project Development Centre provides guidance, support and training for all aspects of capital projects, from pre-feasibility through to execution and commissioning. It also performs a governance function by conducting project reviews and reporting back to Group operations. The Centre manages capital projects on behalf of the business units and is responsible currently for the execution of the Argyle Diamond underground project, Kestrel mine extension and the Clermont

coal mine project. With construction now largely complete, responsibility for the QMM project in Madagascar was handed back to the Minerals product group at year end.

Technical Risk Evaluation

The Technical Risk Evaluation Centre, whose staff are deliberately reserved from involvement in the formulation of major investment proposals, provides independent review and advice on the adequacy of risk identification and mitigation at key points in the project approvals process. The Centre also sets standards for Risk Analysis and Management more generally across the Group and in 2008 initiated the development of a Group wide risk management and reporting system.

Production Technology Services

Production Technology Services comprises the central team of technology professionals deployed from five regional hubs who provide the breadth of experience and a multi-disciplinary approach to support existing business activity and the pursuit of new, profitable growth. The staff are deployed at the request of business units and the technology centres within T&I.

OUTLOOK

In response to the global economic downturn, T&I has re-aligned its 2009 priorities to support the Group's new key initiatives and commitments. T&I will reduce controllable operating costs and make headcount reductions. T&I plans to reduce its gross operating costs by US\$40 million, or 25 per cent from 2008 levels.

The number of employees is expected to be reduced by about 100, or 30 per cent. These reductions are necessary as a result of lower business unit demand for T&I services as the business units continue to reduce their operating and capital expenditures. Despite these reductions, T&I is dedicated to maintaining the critical capabilities necessary to support and retain the Group's future growth options.

For 2009, T&I's operating priority will be to assist businesses to reduce unit operating costs by intensifying the focus on improving operational excellence and increasing the contribution of technology to the Group's vision of industry leadership. T&I will continue to work with Group businesses to deliver measurable increases in earnings and will continue to assist from a technological viewpoint in the selection of the most attractive investment opportunities.