Austmine study, released at the Austmine 2013 International Conference and Exhibition in Perth, in May, shows that Australian Mining Equipment, Technology and Services (METS) contribute 6.4% to the Australian economy and is one of Australia’s largest export sectors. This ground breaking survey, conducted in December 2012 through March 2013, is the largest undertaken to date of the sector.

Surveying 860 METS companies, it was found that the sector generates A$90 billion in revenue and 84% of the companies are Australian owned. The surveyed companies export a total A$27 billion with an estimated A$15 billion component being generated specifically from METS related activity.

Elizabeth Lewis-Gray, Deputy Chair, Austmine: “Not only is the METS sector significant in size and scope, but it is highly innovative and its close collaboration with mining companies has become a source of innovation which has been leveraged to create world-leading, highly sought after mining solutions.”

“METS companies spent in excess of A$1.6 billion in R&D in FY2012, with 58% of those surveyed contributing to this total,” Lewis-Gray said. “This is a very impressive number and is certainly well above other industry averages and signifies a high level of commitment to innovation. Collaboration between mining companies and with other supply companies is equally as high.”

Imdex is a major Australian player in the exploration sector. Effective November 1 last year it acquired ioGlobal, which provides cloud-based data management solutions for mining and mineral exploration.

Bernie Ridgeway, Imdex Managing Director explains that the “acquisition enhances our product offering, broadens customer base and increases exposure to all stages of the project life cycle. New cloud based solutions are being trialled by major resource companies and major drilling contractors.”

ioGlobal provides innovative software-as-a-service (SAAS) data management solutions to major, intermediate and junior resource and service companies. It seamlessly links field data collected by service providers to resource companies. Field data is collected, validated, stored and accessed immediately for analysis and management reporting via a secure web portal.

Software is an area in which Australian companies are particularly well known and active worldwide, and as usual there is much news from that sector.

Enterprise Optimisation has emerged over the past 15 years as an integrated philosophy, methodology and software, to support boards and management identify strategies to maximise the cash potential of mining assets, regardless of orebody. Whittle Consulting has built on the success of its globally recognised pit optimiser, which was developed 30 years ago. The pit is now only one of ten mechanisms (the others being shown in the diagram) used in Enterprise Optimisation.

Mark Jones, Partner Whittle consulting says that “until now, it has been impossible for companies to optimise all parts of their operation or portfolio simultaneously. The methods and software were not available.

“We see companies adopting new approaches to Life of Mine (LOM) planning and moving along the continuum from partial or no optimisation to completing Enterprise Optimisation with the commensurate value uplift. As companies optimise for cash, they also begin to see LOM...
 plans yielding higher NPVs also use less water and energy and having a smaller carbon footprint.

“We have learnt much from clients as we have been conducting Enterprise Optimisation studies over the past 15 years. The result has been we are now able to generate realisable improvements in NPV of the assets optimised by 5-35% over a base case.”

Mining is a complex business with the typical mine having approximately 250,000 independent variables and at least 600,000 constraints. Enterprise Optimisation directly addresses the production schedule challenges of mining and processing operations with multiple pits, mining faces, underground mines, multiple metal or mineral products, stockpiling and blending opportunities, and alternative processing options.

“This complexity creates significant long-term planning and analytical problems for LOM planners often overwhelming the capabilities of available mining optimisation software and methods,” Jones continues. “LOM planning is regarded as ‘technical’ and is sometimes distant from those responsible for corporate strategy. The silo approach to LOM planning has meant that sub-optimal LOM plans were prepared, leading to sub-optimal operational and day-to-day mine schedules.

Strategic planning, scenario analysis and trade-offs for the entire mine enterprise are too often poorly understood by boards and management.”

Enterprise Optimisation aims to harness complexity by simultaneously addressing all steps in the value chain and all assets in the enterprise portfolio together, for all time periods of the planned operation.

Jones explains that “a variety of methods [Activity Based Costing, Lersch Grossman, Theory of Constraints adapted to resources from manufacturing, Ken Lane’s cut-off grade theory and operational modelling] are combined with resource models in our Prober C proprietary software to calculate the optimal schedule yielding the highest practical NPV.

“Those three trade-offs that make LOM planning complex are the depleting orebody, the time value of money [as measured by NPV] and the opportunity cost of key decisions.

“When we decide what to process and mine in one period, we constrain the available options for all future periods. We also use the limited capacity of key resources, the mill, the port or the mining fleet, which means that there is an opportunity cost trade off that needs to be evaluated.

“For a gold resource, if we plan to run 1 g/t Au through a mill when there is the potential to extract blocks of 5 g/t material still available in the pit or underground and run these through the mill instead, then we are missing out on early cash if we do not evaluate this alternative. A common issue is the difference between two blocks of ore in a block model both assigned a value per tonne of say $1,400 containing say 3g/t Au. If one block processes four times quicker through the mill, because it is in a softer orebody, is easier to blast or fracture, then the rate at which cash can be extracted from one block versus the other is significantly different. Recognition of these differences is central to Enterprise Optimisation.

“For large coal operations, the trade off is around the key bottlenecks in the system i.e. the port, the barges, or the rail links. Mostly coal is shipped based on production, not on its specific qualities or attributes. A company is putting tonnes of low Calorific Value [CV] with high sulphur coal through a port or on barges, means there is an opportunity cost trade off to be evaluated with inventories of high CV coal with low sulphur.

“The capital markets will continue to criticise resource companies for their profligate use of capital, lack of capital efficiency and productivity until they observe a change of thinking.

“The limitation is no longer the methods and software tools and the tacit acceptance of existing LOM planning methods. Proven approaches for LOM planning such as Enterprise Optimisation are available to significantly enhance the value of resource assets and need to be applied industry wide to protect margins and increase cash yields.

“Application of this Australian innovation, informs, supports and challenges boards and management to review the variety of options available to extract the maximum value from the assets under their stewardship. It also enables them to take full responsibility for strategic decision making and maximising financial, environmental and social outcomes.”

ARANZ Geo recently signed a corporate software license agreement for Leapfrog® software with Teck Resources. The agreement provides Teck and its subsidiaries with a corporate license to Leapfrog Geo and Leapfrog Mining. Prior to executing the corporate agreement Teck completed a nine month evaluation of Leapfrog software. The corporate license means Leapfrog software, Leapfrog Geo and Leapfrog Mining in particular, will be available to all operations within Teck, from early stage exploration through to long term mine planning.

Shaun Maloney, CEO at ARANZ Geo, says, “We’re delighted we’ve signed this corporate license agreement with Teck. We look forward to working closely with Teck to meet their ongoing geological modelling needs.”

Leapfrog is a leading 3D geological modelling software suite that has revolutionised the way mining geologists produce geological models and make decisions.

Dingo Software, a leader in heavy asset management software and services, is forming, what it claims, is the world’s first Global Asset Wellness network. “Customers will now be able to receive expert maintenance insights on a wide range of mining assets anywhere, anytime” said Paul Higgins, CEO of Dingo. After
PerfectDig delivers almost instant feedback on how digging complies with designs, providing a tool for better understanding of site issues and decision-making.

developing this Cloud-based approach with customers in 2007, Dingo's Asset Wellness network now protects over 70,000 major components daily, having received and processed tens of millions of data samples from a large range of sources including oil analysis labs, vibrations systems, VIMS, Komatsu VHMS, Detroit DDEC, Cummins Cense, Equipment Management Systems, SAP, tyre wear, component inspection reports and images, CMMS work orders, undercarriage wear, and fluid consumption.

Data entering the 24-7 network is transformed into proactive work using Dingo’s Trakka software, which first filters the information using sophisticated rules and statistics, passing identified problems to teams of experienced maintenance experts for real, contextual decisions. This announcement links Dingo's global Insight and Action Centres and extends coverage across all time zones, meaning lower risk and higher responsiveness for customers. Dingo's network is comprised of dedicated Asset Insight centres in Brisbane and Denver, connected to Asset Action centres in the UK; Muswellbrook, New South Wales; Timmins, Ontario; Fernie and Kamloops in British Columbia; Madisonville, Kentucky; Silver City, New Mexico; Boise, Idaho; and Elko, Nevada. This Asset Wellness network is connected to customers through the Cloud-based Trakka software and to data sources through Dingo’s Connector Library.

"Much like in human health, asset intensive industries are looking for ways to push the boundaries of what it means to operate in an optimum state", said Higgins. "While ‘health care’ triggers images of hospitals treating the ill, ‘Wellness’ describes groups of people enjoying long and full lives, through regular exercise and proactive measures. This vision captures what Dingo is bringing to the world of Asset Management.” In a recent example, a Dingo customer, whose five mines are served by Dingo’s Denver Insight centre, realised a 19% improvement in average life across an entire mining system. This was achieved through close monitoring of health indicators, combined with rapid action on recommendations issued directly from Dingo's Network, to maintenance staff.

"Users benefit from analysis of the largest OEM-independent database of comparative machine performance information,” commented Colin Donnelly, Dingo's Director of Engineering. “Our goal is to make it easy for asset managers to find and fix problems before they become an expensive failure, and to take care of their machines so they can maximise their longevity." In mining, Dingo says its systems “drive real results of increased availability and reduced operating costs, which provide typical payback of >3:1 within 12 months.”

Peter Johnson, Maptek's General Manager, Australia says “PerfectDig promises to change the way mining companies measure, communicate and control the construction and successful delivery of mine plans.” Maptek has just released this revolutionary new product, following several months of field trials with key Australian customers, and says it is confident that short term planning and activity scheduling will become more proactive and productive as a result.

"PerfectDig provides the fastest, most accurate and most accessible method for measurement, analysis, reporting and communication of mine design conformance in the world today, and is an almost entirely automated process,” Johnson explains.

The system combines two of Maptek’s widely used mining technology solutions - Vulcan mine planning and design software and the I-Site 3D laser scanner - with existing site GPS. It leverages these capabilities to provide real-time, detailed comparison between existing work areas in an open pit environment and the intended mine design for that area. The PerfectDig workflow is almost entirely automated and uses a mine’s existing I-Site scanners, mine designs and GPS equipment.

Descriptive scenes containing images and other information make the results accessible to all stakeholders and provide a completely unambiguous communication method. These scenes are made available through the PerfectDig Online web service for access by any users with a connected device. No training is required, and the results are available anywhere - in the pit, in the office, or on an iPhone. The time taken from deciding to scan the scene to accessing the results is around ten minutes.

Maptek developed PerfectDig in response to the widespread difficulties in both communicating and understanding design intention and in measuring and tracking conformance with design. A large part of a surveyor’s work involves picking up progress and comparing designs manually, preparing a report for production supervisors, setting out designs again and hoping for the best. Apart from the safety risk of having surveyors around working areas of mines, the time and effort taken here usually does little to avoid variation from design, as it is often several hours before any result is available. Mining does not stop to wait for those results.

Identifying undercut walls, cling-on on top of walls and other issues while machinery is still in the area means that problems can be rectified before equipment is moved or before the next pass/flight is started. It is too late once the area can no longer be reached. Unstable walls and equipment standoff can delay resource recovery which in turn affects production forecasts, cost per tonne and overall mine performance. PerfectDig improves this situation by providing very fast feedback between pit designers and production crews.

Using existing methods for setting out design and machine guidance inevitably results in variation between as-built and design during the development of a new pit design. Significant time and effort is often spent to control the development to allow designs to be accurately delivered, and avoid downstream costs or risks. PerfectDig reduces rework, as the feedback to production crews is much faster, and the equipment and surveyors on site are able to be more productive overall. Drill and blast performance, dilution and grade control, geotechnical stability and safety are all improved. Reducing variance and providing frequent, accurate information about
conformance to design are fundamental manufacturing production quality principles. PerfectDig creates a robust quality feedback loop around the critical production processes in a mine.

The measurements are reliable and accurate, coming directly from an I-Site scanner. The comparison with design is relevant to key design parameters such as depth to design floor or wall angle on sections (with customisable design tolerances and specific analysis performed by the user). Timely feedback is available at the stages where it can have a positive impact on the quality of the process.

The ability to extract images of scenes from PerfectDig for reports or presentations provides a wider range of users with access to 3D spatial analysis data than previously, without investment in 3D software and without significant training required. PerfectDig should deliver better decision support and understanding of site issues. “PerfectDig is good manufacturing practice applied to mining,” Johnson says.

Micromine’s exploration and mine design solution; Micromine 2013 was launched in Indonesia at the East Asia: Geology, Exploration Technologies and Mines Convention held May. Micromine Founder and Managing Director, Graeme Tuder, attended the event to officially launch Micromine 2013. Tuder spoke to delegates about the solution, with a focus on its new Implicit Modelling module.

Micromine Indonesia Regional Manager, Myke Jones, explains “Using the module, it is effortless to create and visualise the most complex wireframes. The module uses industry-standard radial basis (RBFs) to model grade volumes, lithology boundaries, faults and surfaces. These wireframes are readily displayed in Vizex, Micromine’s 3D environment, and are a valuable tool for finalising geological interpretations”.

Jones adds, “Micromine provides explorers with an in-depth understanding of a project so prospective regions can be targeted more accurately, increasing the chance of the project’s success. Miners are provided with easy-to-use modeling, estimation and design tools to simplify day-to-day design and production tasks”.

“Consistent with all Micromine releases, the new features in Micromine 2013 focus on intuitive usability with enhanced workflow methodologies and logical processes. Productivity gains continue to be an area of focus through faster processing speeds, flexible import and export functions and compatibility with third-party applications”.

This release includes two new modules; Stratigraphic Modelling and Implicit Modelling, along with many enhancements and further improvements to all other modules.

Recently, Micromine has responded to the growing need for mine operations to reduce costs and improve efficiencies through the release of its new Pitram Production Reporting Service, a managed service and an extension of its mine control and management reporting solution, Pitram. It can be used to record, manage and process mine site data related to equipment, personnel, locations and materials, providing an overall view of the current mine status and increasing clients’ control over their operations.

The new Pitram Production Reporting Service is a managed service, for a simple, single monthly fee, supplied and supported directly by Micromine, including all hardware, software, ongoing database and server administration, software updates, help desk, off-site backups, disaster recovery and remote monitoring.

Operations Manager, Michael Layng, explains “The service is ideal for small to medium size underground and open pit operations that want to introduce Pitram’s advanced reporting capabilities without incurring the expense of installing the entire solution and investing in the resources to manage it. The service is quick and easy to implement, and can be up and running in as little as five days. Also, minimal training is required due to the simple and secure user interface based on the familiar Internet Explorer web browser.

“A pre-configured Pitram Microserver is installed by Micromine onsite. Site personnel connect to the device using their standard Internet Explorer application to enter data and generate reports. To minimise interference with the site and to ensure the quality of the service, Micromine’s Remote Operating Centre personnel regularly check the operating status of the site Microserver, run health checks, schedule system maintenance and provide database administration support including automated backup of the site’s data.

“Given the current economic environment, it is becoming increasingly critical that mine operations improve their bottom line and increase profits through the utilisation of technologies and services which help them to reduce costs and improve efficiencies. “Many medium and small mine sites are dependent on Excel or Access to create production reports from paper based activity reports and timesheets, resulting in inefficiencies including the unproductive use of staff time and data entry errors. Additionally, the long time-gap between an activity taking place and generating a report doesn’t promote informed and effective decision making. The service helps operations overcome these problems at minimal expense.”

The service reduces administration costs and improves efficiencies as multiple and unreliable data sources are replaced by one electronic data depository. All data related to mine events and activities is entered into Pitram by site personnel to generate and access key reports, including production reports, grade control reports and stockpile management reports. Through the provision of accurate and timely reports, and current and historical mine site data, management is better positioned to make informed decisions and undertake effective analysis.

Using Pitram’s reports, management can also monitor key performance indicators including availability and utilisation of equipment, operator performance, production metrics and consumable usage. Knowing how an operation’s assets are performing allows users to identify areas of constraint. Improvement plans can then be implemented which ultimately lead to a reduction in operating costs and increased production.

Because the service is managed by Micromine, key personnel can focus on their primary tasks rather than disparate reporting and system maintenance, increasing their individual productivity.

Like all Micromine offerings, the service is flexible and can be customised to an operation’s specific requirements. For example, data entry forms can be modified and custom reports can be created. Also, additional functions such as ODBC, Excel and CSV connectors can be added to allow the input

Minemax has released iGantt 4.0, which includes several new features, including an optional Optimizer module, performance improvements, and changes based on customer
Codelco had completed its enterprise-wide implementation of OAS. It was announced in June that Codelco’s operations run as efficiently as possible. In the majority of projects the cost of haulage is a significant component of the overall mining cost. Given that in feasibility studies the stated level of accuracy of costs can be 10%, Snowden asks how you can be “confident that you have achieved this if you haven’t demonstrated the haulage profiles over the life of the project are accurate and consistent with the overall site layout over time?”

“The truth is that many consider a spreadsheet approach to haulage estimation sufficient to provide this accuracy. However, in Snowden’s experience such estimates in some cases can be wrong by a factor of 50% or more. The wrong haulage estimates will not only lead to an incorrect estimate of operating cost, but also distort capital cost too due to errors in fleet estimation. Errors in fleet estimation can take a long time to resolve, given the long lead times to get equipment to site. At Feasibility level, when financiers are being asked to invest, this approximation approach may not be appropriate.

“The approximation approach is taken because the current alternative, to manually design haulage paths in a general mining package, can take weeks for a life of mine plan; time that most mining studies do not have. The manual approach does also not allow for updating as new information becomes available. Finally, this approach will likely be suboptimal, particularly in complex terrain, as the user is unable to resolve some complex trade-offs associated with road construction costs and haulage operating costs.

“Snowden set out on a mission to be able to address all issues of optimality, efficiency and transparency simultaneously so that its engineers and the industry in general could cut down on the time taken to complete a study properly and allow a more strategic approach to this problem.”

It has developed a solution called Haulage Optimisor which completes strings for each haulage profile over the life of the project in a matter of minutes, whilst resolving operational constraints (including minimum turning circles and maximum gradients), operating costs (including hourly haulage costs and fuel costs) and capital costs (road construction and cut and fill requirements) in an optimal manner. This provides transparency to support fleet and cost estimation, confidence in finding the lowest cost solution, and the efficiency to consider multiple scenarios over a short period of time.

A case study considers the planning of a road that connects two points. Between the two points is some complex terrain. The case study
shows two alternative routes (Road 1 and Road 2). Road 1 was generated to minimise cut and fill costs, and Road 2 was generated to minimise a balance of cut and fill costs and truck utilisation costs. Therefore the two routes take quite different routes.

<table>
<thead>
<tr>
<th>Road</th>
<th>Cut (km³)</th>
<th>Fill (km³)</th>
<th>Distance (m)</th>
<th>Travel time (min)</th>
<th>Haulage cost ($/t)</th>
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<tr>
<td>1</td>
<td>40</td>
<td>23</td>
<td>2,522</td>
<td>7.05</td>
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<td>2</td>
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A comparison of the roads shows that the design that balances cut and fill costs with travel time (Road 2) generates a lower mining cost by 0.06/t through reducing travel time by 45 seconds, as outlined in the table below. This represents an 8.6% reduction in costs.

The solution method is applicable to complex mining terrain as well as finds roads and ramps within pit and waste dump designs.

**RungePincockMinarco (RPM)** has launched what it describes as “the first fully integrated EFM application specifically built for the mining industry, XERAS for Enterprise™.” This represents the next generation of RPM’s leading budgeting and financial modelling software product XERAS™, which is used by major mining companies all over the world.

Launched with the support of global ERP powerhouse SAP, XERAS for Enterprise seamlessly integrates SAP’s Financial and Maintenance Management modules with the financial modelling capabilities of XERAS. This integration allows for unprecedented levels of financial visibility and cost control, from individual mine sites through to corporate management reporting systems.

Speaking at the product's launch in Brisbane, Australia, RPM's CEO Richard Mathews said, “The focus of the industry has clearly shifted to running productivity improvements. Across our global client base we are seeing a growing demand from Boards and senior management for increased visibility, control and predictability of capital and operating cost structures. The ability to explain the difference between actual and planned financial results and to predict the financial implications of changes in the mining environment is of critical importance to our customers.”

Mathews went on to say, “We’ve listened to what our customers have been telling us and specifically asking for. They wanted us to take the visibility they get at an operational level from our market leading XERAS product and extend it across the Enterprise and we have done that with SAP.”

“Never before has a complex mining company had the ability to see the immediate financial impacts of a change in an operational mine plan reflected in real time in a corporate budgeting and reforecasting systems.”

XERAS for Enterprise represents the first of RPM’s technology products to take the strategic step forward into the enterprise environment. XERAS for Enterprise followed closely behind the successful launch of RPM’s enterprise

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enabled XERAS 8.0, the previous week.

Commenting on this milestone, Board member and company founder, Dr. Ian Runge said, “The conversion of physical attributes of a mine plan into a cost by consumable category was the basis for the original development of XERAS over 20 years ago. To see this natural extension in which mining executives now have full financial visibility from the mine site all the way through to the corporate ERP is very satisfying to say the least.”

XERAS for Enterprise provides many new significant business benefits which Darren Rostron, RPM’s XERAS Product Manager explains. It “gives our customers the ability to perform in depth plan versus actuals analysis. It not only provides variance reporting but also lets you get under the covers so you can truly understand the reasons and underlying logic behind the causes.

“It allows you to reforecast dynamically on the go. When unexpected events occur, such as equipment failure, weather events, or a major drop in commodity prices XERAS for Enterprise quickly helps you understand the financial impact on the business and make informed decisions.”

The product “standardises financial costing models, enabling fast consolidation and central control of underlying assumptions. The days of manually rolling up financial models into giant spreadsheets are over. Its rapid consolidation of multiple budgets allows operational and financial managers to understand their future financial position across their entire global operations.

“The improved cost visibility provided means that senior management are able to drill down through all the layers of the financial plan, right through to the underlying base assumptions at a particular site if they want.

“It makes the crucial job of financial modelling, budgeting and reforecasting much simpler. With XERAS for Enterprise, it’s easier for financial managers to make decisions with confidence. Having a single source of truth for financial planning is paramount in today’s mining environment.”

Mathews concluded by saying, “One of the most frequently asked questions in mining today is why actual costs are different to the original budget or the recent reforecast. XERAS for Enterprise gives you the power to answer this question quickly and accurately right from your desktop.”

It allows mines to consolidate all financial costing models at the push of a button, reforecast rapidly and have full financial drill-down to operational costing models.

**iVolve** develops and manufactures intelligent industrial technologies that help:
1. Improve production outcomes
2. Decrease operational costs
3. Improve safety / reduce risk.

This is achieved through the monitoring, capture and analysis of real time operational data.

iVolve's technology solutions for mining focus on delivering process and efficiency improvements, which directly relate to production, maintenance, safety and asset management. “This enables our clients to reach and exceed production targets, lower maintenance costs, while significantly decreasing site safety incidents. iVolve has assisted customers achieve average productivity gains of between 8 and 12%.”

**XODB (Xtract Open Database)** claims to be the only open, free and usable multi-purpose enterprise data standard and software in the

**With a centralised platform for conducting analysis and generating different scenarios using auditable and validated information, XERAS for Enterprise bridges the gap between the mine and the boardroom. It exposes the strengths and weaknesses of the mine plan and provides critical information which management can use to act upon**
industry. Xstract has extended XODB with a raft of new features and capabilities, including a new distributed document sharing system for improved understanding of operations across multiple sites and divisions. It is now possible to download for free software with data synchronisation capability (offline or online), geospatial, document, project, exploration, delivery, CRM, and sample management systems.

As big-data extends its reach from oil and gas into the hard-rock space, Xstract is positioning itself to offer best practice services around this new technology. Andrew Grosser, Technologies Architect, Xstract: “We believe that the mining industry is no longer willing to accept closed systems. It’s a thing of the past. As we move into a cost-constrained period in mining, mine owners are looking to find improved cost savings and process efficiencies. You can’t do that when your business is in disconnected silos, so we are encouraging everyone to share data between their divisions. Xstract is going to empower junior producers and give them technology that only senior producers have been able to afford so far. We are going to connect the best performing service providers to mine owners, to improve understanding and analysis of operating information which we expect will lead to real improvements in mine growth and efficiency through scalable access to important information. Xstract has built a system which can grow from a single operator to a global 100,000 user team.”

Perhaps the most exciting feature to recently come out of XODB is the new universal document management capability. You can now store documents across all of your information. “XODB will enable businesses to centralise the management of all geological and mining information for companies in the one place. By improving the way we store data, we can improve the way we get it out. Such knowledge is valuable, especially now. Xstract can help businesses leverage their existing information investments at very little cost,” says Grosser.

Xstract is not alone in the development of its open and revolutionary new product. It has also seen contributions and support from government and industry since XODB was released last year. Xstract has already developed a plan for XODB to support mine planning, mine execution/operations, and closeout, and is currently seeking industry partners to validate the up and coming design.

If you would like to contribute to this project, or get your free copy of XODB, visit http://xodb.xstractgroup.com.

Open pits
HELLA Australia has introduced what it describes as “another first” for mining high output lighting with its Australian designed and manufactured HypaLUME® LED floodlight. Suitable for both DC and AC applications, this floodlight has been designed to withstand the rigours of demanding outdoor and industrial area lighting requirements.

Producing more than 20,000 Lumens output through 56 state of the art HELLA high power colour matched LEDs coupled with three specialised optical distributions, the HypaLUME has been designed to excel in multiple lighting applications, consuming far less power compared to conventional industrial lighting.

It consumes a mere 240 W at 24 V DC, translating to a luminous efficiency which is close to 100 Lumens per Watt. This means that the HypaLUME provides similar light levels to a 400 W metal halide light fitting, at far less power consumption. This energy saving can be easily converted to expense and CO₂ reductions.

The LEDs operate at a colour temperature of 5,700 K to provide a near daylight environment wherever they are used, ensuring high colour rendering to assist with critical work tasks and providing a comfortable work area.

Protected from reverse polarity and short circuit faults due to its innovative electronics, the HypaLUME light emission remains consistent across a wide range of voltage applications. The LED driver board and housing ensure advanced thermal management that draws heat away from the LEDs to ensure long operating life, which is guaranteed by HELLA’s class leading five-year LED light output warranty.

A UV stable, high impact and chemical resistant lens protects the LEDs from any possible environmental damage. A variety of bracket options are available for HypaLUME mounting, including mobile and fixed brackets, pole and cable suspension mounts which cover a wide range of aiming options.

Designed specifically for the challenging requirements of the mining industry, along with general industrial requirements, HELLA’s HypaLUME is designed to operate over an extreme temperature range, ranging from -40°C to +50°C with no decrease in light output whatsoever.

There are three launch variants of the HELLA HypaLUME LED floodlight now available:

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Optic</th>
<th>Voltage</th>
<th>Bracket</th>
</tr>
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<tbody>
<tr>
<td>HMF2000WMOB</td>
<td>Wide</td>
<td>18-52V</td>
<td>Mobile</td>
</tr>
<tr>
<td>HMF2000CMOB</td>
<td>Close</td>
<td>18-52V</td>
<td>Mobile</td>
</tr>
<tr>
<td>HMF2000LMOB</td>
<td>Long</td>
<td>18-52V</td>
<td>Mobile</td>
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Typical applications for the floodlights are diverse and wide ranging, including; loading bays, wharves, tunnels, large equipment, warehouses and the like. Any application where a durable, maintenance free, low power consumption light fitting is required is a perfect fit for this lighting product.

According to HELLA Mining General Manager, Stuart Ellacott, “The HypaLUME represents the next generation of highly efficient, yet economic industrial area lighting products. The light quality that each HypaLUME produces simply cannot be compared with conventional lighting based on operating costs, service life and light output quality throughout each unit’s service life. In designing and manufacturing these LED floodlights, we have taken into account the feedback gained from many sites and operators, equipment manufacturers and lighting users to produce a flood light that combines real world performance with energy efficiency.”

HELLA Australia is one of HELLA’s Global Technologies Architect, Xstract: “We believe that the mining industry is no longer willing to accept closed systems. It’s a thing of the past. As we move into a cost-constrained period in mining, mine owners are looking to find improved cost savings and process efficiencies. You can’t do that when your business is in disconnected silos, so we are encouraging everyone to share data between their divisions. Xstract is going to empower junior producers and give them technology that only senior producers have been able to afford so far. We are going to connect the best performing service providers to mine owners, to improve understanding and analysis of operating information which we expect will lead to real improvements in mine growth and efficiency through scalable access to important information. Xstract has built a system which can grow from a single operator to a global 100,000 user team.”

Perhaps the most exciting feature to recently come out of XODB is the new universal document management capability. You can now store documents across all of your information. “XODB will enable businesses to centralise the management of all geological and mining information for companies in the one place. By improving the way we store data, we can improve the way we get it out. Such knowledge is valuable, especially now. Xstract can help businesses leverage their existing information investments at very little cost,” says Grosser.

Xstract is not alone in the development of its open and revolutionary new product. It has also seen contributions and support from government and industry since XODB was released last year. Xstract has already developed a plan for XODB to support mine planning, mine execution/operations, and closeout, and is currently seeking industry partners to validate the up and coming design.

If you would like to contribute to this project, or get your free copy of XODB, visit http://xodb.xstractgroup.com.
Once fitted with the Duratray bodies by the local Cat dealer, the machines are shipped direct from Melbourne, Australia to Washington State in the USA. Upon arrival, the Haulmax units are transported some 2,500 km north to Yellowknife in Canada, where they embark on the slow and treacherous journey along the ice road. Stretching 500 km, the ice road is the only form of land access to Canada's northern mining operations, including Ekati.

The ice road takes six weeks to construct over frozen lakes and when complete, offers only a short, six to eight week, window each year for the mine to transport all of its required annual supplies. During construction of the ice road, crews clear the snow and drill holes in the ice, flooding certain areas to build up the thickness of the road so it will be strong enough to handle the weight of a fully loaded freight truck. The minimum acceptable thickness of the ice road is 107 cm. Everything from diesel fuel, to ammonium nitrate for explosives, to earthmoving machines and spare components must be transported within this window. It is critical for Haulmax to meet these strict delivery requirements to ensure the 3900 trucks are available to meet production requirements.

On site at the mine, in sometimes soft underfoot conditions where superior braking capacity, surefootedness and ground pressure is critical, Haulmax says its trucks "also offer excellent retardation with dual rear drive axles and eight wheels, ensuring greater traction and performance safety."

Loadrite has a new onboard weighing system for large mining excavators and shovels. Loadrite X2650 is designed to ensure accurate and instant haul truck payload weight data. Designed for excavators ranging from 200 to 800 t, it will have its official launch at AIMEX, following a successful trial of the system at a large mine in New South Wales.

The X2650's ability to deliver accurate weight information for every bucket of material loaded makes it stand out from other products, said Loadrite Product Manager, Excavator Series, Gordon Hain. "Until now, most mining operations have relied on payload systems on haul trucks to measure payload weight. However, on haul trucks the data is not provided until after the bucket has been dumped into the truck, so accurate data is only available after the truck has left the load out location," he said. The result is a flat payload distribution curve for the fleet, with the mean not matched with the target payload.

"By then, precious time has been wasted if you discover the truck is over- or under-loaded," said Hain.

"In contrast, by using the X2650, which is fitted to the excavator, operators can accurately measure each bucket load of material before it is put into the truck. This puts the power back into the hands of the operator, allowing them to make better decisions."

Hain said the X2650 was a dynamic in-motion weighing system, meaning it measured the payload during the loading procedure – thereby having no impact on the loading time. "This maximises overall productivity as it reduces under-loading trucks or the need for trucks to return to the face if they've exceeded the overload capacity. The result is a payload distribution curve centred on the target payload with low variance.

"Realtime data is very valuable to large mining operations, which are focusing more on enhancing productivity and reducing operating costs as they strive to increase profitability and overcome falls in commodity prices."

Following the success of the initial trial at the NSW mine, it is now fitting the X2650 across its excavator fleet – a total of six machines– with the goal of maximising the potential cost savings the system can deliver.

"When you consider the ownership and operating cost of the fleet over the course of a year, each time a large haul truck needs to return to the face, plus the associated lost time, and machinery stress, the savings can add up to hundreds of thousands by getting loads right the first time," Hain said.

The X2650 also makes it easy for mine operators to comply with the commonly accepted “10-10-20” OEM load policy, which can result in the warranty being voided if the haul truck is 20% overloaded.

"To comply with the 10-10-20 policy, all loads must be below 110% of the target payload with only 10% of all loads between 110 and 120%,” he said.

“The bucket-by-bucket accuracy delivered by
the X2650 takes the guesswork out of the process, enabling excavator operators to meet these load requirements and protecting the investment made in equipment.”

Hain said the X2650 was easy to use, while capturing a wealth of critical productivity data which can be used to track and record overall load out performance. It “reports on tonnes moved per hour, individual cycle times and total tonnage moved by excavators or haul trucks. This information can be transferred wirelessly for analysis and reporting.”

Accuracy is assured to within 13% in a wide range of demanding operating conditions, adding to overall system benefits. “In comparison, the dynamic payload information provided in haul trucks is generally only accurate to within 5% – and that’s only after the truck is a few hundred metres down the road from the loading site location.”

Development of the Alpha coal mine in the Galilee Basin is a significant step closer with GVK Hancock announcing Thiess has been appointed preferred mine operations contractor. An Early Services Agreement signed in June will see GVK Hancock working exclusively with Thiess to develop a 10-year mine plan and budget. Thiess' technical, engineering and plant expertise will be applied to develop the operational strategy and management plans, aiming for the thermal coal mine to be a worldclass, cost competitive operation.

GVK Group Managing Director Coal and Infrastructure, Paul Mulder noted that Thiess had successfully undertaken the operations for the Alpha bulk sample pit initiated by Hancock Prospecting in 2010. Thiess Managing Director Bruce Munro said Thiess is excited to extend its working relationship with GVK to develop the next phase in Alpha's operational development.

"It's important to the development of the Galilee Basin that we deliver efficient and flexible mining solutions that will provide certainty of delivery regardless of the commodity cycle. As a greenfield project, Thiess and GVK Hancock will take innovation to another level and embed industry leading technology and best practice from the early planning stages," Munro said.

Thiess Executive General Manager Australian Mining, Michael Wright said the team is expected to finalise the operational strategy, mine planning and management plan by the end of the year.

“The next six months are a critical time for Thiess and GVK Hancock to work together to reinvigorate Australia's position as the world leader in safe and highly productive operations. This means resetting the paradigm on everything from plant and equipment, local sourcing to robust employee relations. It's about setting the tone for what will be Australia's largest coal mine,” said Wright.

Alpha's first coal is to be extracted by 2016. When fully commissioned, the mine will produce 32 Mt/y of thermal coal for the Asian export market.

Thiess offers specialist expertise across all phases of mining, from mine development and infrastructure, coal handling preparation plants, resource optimisation and mine planning, mine engineering, operations and maintenance, environmental management, rehabilitation and mine closure. Today, Thiess mines more than 100 Mt of coal and ore, moving some 600 million m3 of overburden each year across its 15 mines in Australia, Indonesia and India. The operations are supported by one of the largest mining fleets in the world, with a replacement value of $3 billion.

Thiess is part of Leighton Holdings and other recent news came in late June, when Leighton Contractors was awarded a A$1.3 billion contract variation to mine the Kings deposit at the Solomon Hub for Fortescue Metals Group. This takes the total value of work under the Solomon Hub agreement to A$2.8 billion, the largest single contract award in the history of Leighton Contractors.

In September 2012 Leighton secured the full service, five-year contract (with two-year extension option) to deliver whole-of-mine management at the Pilbara iron ore project. The initial award was to mine the Firetail deposit, valued at A$1.5 billion. Fortescue's decision to award the Kings deposit activates the full scope of the contract.

The contract includes operating and maintaining the open-pit mining fleet, mine planning, ore quality control, ore processing facilities and associated infrastructure, such as the airport and village. Fortescue is providing the bulk of the capital to purchase the mining plant and equipment.

The Solomon Hub, located some 60 km north of Tom Price in Western Australia, will produce 60 Mt/y of iron ore from the Kings and Firetail deposits, and employ more than 1,000 people.

Leighton Holdings Chief Executive Officer, Hamish Tyrwhitt, said: “Our unique position as the world's largest contract miner, combined with our scale and diversity, continues to generate opportunities for the Leighton Group at the same time as delivering expertise and value to the mining sector.”

Leighton Contractors Managing Director, Craig Laslett, said: “This award is an indication of our strong relationship with Fortescue and our ability to meet the challenges of the project during the ramp up to this phase. This contract is the result of Leighton Contractors’ 30 years of experience in contract mining, mine services and mine management for our clients.

“Over three decades we have developed the ability to safely embed efficiencies and technology that improve cost structures, as well as the flexibility to resource rapidly to increase levels of production. It’s a framework that gives us confidence in the mining services market and our ability to respond to the changing nature of our industry, clients and projects.”

Laslett said plans to sub-contract more than $200 million of work at the Solomon Hub to Indigenous organisations were well advanced and Leighton had committed to ramping up to 20% Indigenous engagement at the project within three years.

“We believe that we have both an opportunity and a social obligation to support and foster the growth of Indigenous businesses in all of the industries within which we work,” he said. “In this area our strategy and focus is on training and employment, and assisting Indigenous people, corporations and communities to build successful and sustainable business partnerships.”

Specialist mining consultancy AMC Consultants has conducted numerous prefeasibility and feasibility studies analysing mining technology applications in open pit and underground mining. This has given AMC insights into the advantages and limitations of different systems; the level of development and current status of these systems; client preferred technologies and the risks associated with implementation and successful operation.

Craig Stewart, Business Improvement Manager /Principal Mining Consultant notes that “excavation technology has not changed
significant over the last few decades. The conventional excavating equipment changes have been mainly increasing in size and production capability. Surface miners are an example of recently implemented new technology. They are being considered as an alternative in operations today and in early stages of studies. However, their applicability is not as widespread as other more established excavation methods.”

AMC considers surface miner technology to be applicable to semi-hard material—where the ore lenses are thin and conventional excavation methods result in excessive dilution—and to flat lying orebodies. The limitations are:

- Lower trucking productivity due to the smaller size of the trucks utilised due to the size of surface miners and their ability to load them more efficiently
- Higher operating costs, however this is offset by lack of drill and blast costs
- High sensitivity to rock properties (UCS) which has cost and productivity implications.

Conversely, transportation technology has advanced significantly. This area is a focus because it forms the largest component of the open pit mining process. Numerous transportation methods have been considered, however only a few have progressed to be considered more seriously and even fewer implemented to date.

Transportation methods considered by industry, which AMC has considered in studies and evaluated, are:

- Conventional trucks
- Trolley assisted trucks
- Mobile in-pit crushing and conveying (IPCC)
- Semi-mobile in-pit crushing and conveying
- Automated trucks
- Hoist up side of pit (HUSOP) Truck up-lift in pit (TULIP).

Of the above, trolley assisted trucks and IPCC have been primarily considered for improving transportation. AMC has costed projects using these technologies and, using AMC’s benchmarking database, compared them with conventional truck haulage systems.

Implementing these systems requires different approaches to mine design, planning and scheduling compared to traditional approaches. In evaluating these systems, AMC has established a network of suppliers to estimate productivities and costs and have a detailed understanding of the planning and scheduling approaches required to implement these systems successfully.

**Underground**

In underground mine design, AMC takes a holistic approach to incorporating new technologies into the mining cycle. This recognises the interrelationships between activities, ensuring the impacts of the technology are considered on the whole cycle, not just one part.

The interplay between people, systems and technologies must be considered for the new technologies to be successful. The different parts of the mining cycle can be summarised in the figure.

AMC considers new technologies need to be designed into the mining cycle, not retrofitted into existing designs. This point is sometimes overlooked and can lead to suboptimal outcomes.

Recent changes in technology have helped advance concepts that have been considered—and in some cases trialled—in the past. These include:

- Tunnel boring machines (TBM) and shaft boring systems (SBS)
- Automated/semi automated production drills, LHDs and trucks.

“Innovative materials handling systems are also being developed—such as Railveyor, and Grind and Pump (from underground)—which require a different approach to mine design and equipment interaction,” Stewart continues.

AMC have reviewed operations where the productivity of newly implemented automated technologies has been less than anticipated. Analysis of the entire mining cycle has revealed bottlenecks in systems completely unrelated to the new technology implementation. In other operations, new technologies have been introduced without adequate attention paid to workforce training. This can also lead to suboptimal performance and even rejection of new technologies.

Using a combination of business improvement methodologies such as benchmarking, bottleneck analysis, operational health checks and reviews, AMC is able to identify opportunities for improvement in new technology implementation and monitor any ongoing changes.

AMC’s consultants have the experience in mining operations to evaluate and apply current and future technologies. AMC has knowledge of planning and scheduling approaches for the alternatives, with access to an established network of suppliers who assist with cost estimation enables accurate assessments of options and recommendation of optimal outcomes.

With many years of design evolution and experience in the worlds largest grizzly and gyratory crusher applications, Transmin provides some of the most advanced rockbreaking solutions available. Transmin’s Rocklogic™ range of intelligent control systems for fixed boom assemblies is ideal for any site with high throughput demands or at risk of costly collisions. The system recently won the Machine Builder category at the 2013 PACE Zenith Awards.

Improving mine safety and efficiency are the main goals behind the intelligent automation system, designed in response to increasing industry demand. The company updated International Mining on the Rocklogic system installed on four Transmin rockbreakers located at an expanding underground mine site in New South Wales. The site is progressing its development of a remote operation centre to control the operations. “Rocklogic allows a single operator to operate multiple underground machines from a remote control room. Remote operation protects the operator's health by removing them from exposure to hazardous mining conditions,” Senior Engineer Dr Adrian Boeing explains. Adoption of the technology has allowed the site to continue operations during blasting and eliminated delays introduced by operators travelling underground.

Transmin has also seen an increasing demand for remote operation technology at open pits, with the Rocklogic system being deployed to a number of mines in the Pilbara. “Remote operation technology enables sites to operate
the equipment from a safe office environment, which can be a city-based control room located thousands of kilometers away. Eliminating the need for FIFO operations and on-site accommodation are just some of the many attractive elements drawing major mining companies to adopt remote operation technology.

To enable intelligent remote operation, each rockbreaker is equipped with ruggedised sensors, specifically fitted to calculate the machine’s position relative to the surrounding plant. This information is used in the collision avoidance system to compute the closest obstacles to the rockbreaker and pre-emptively reduces the rockbreaker’s speed to avoid collisions. “Our 3D Collision Avoidance technology significantly increases safety and efficiency by eliminating downtime and maintenance costs from collisions. Remote operators feel confident knowing a collision system is actively protecting them” said Boeing.

The sensor information can also be used to automatically move the machine to pre-programmed positions, allowing the breaker to automatically park and deploy at the request of an operator. “Automated Movement technology ensures the rockbreaker provides fast, efficient, and consistent motions. This allows operators to multi-task during machine start-up, deploy, park, and shut-down operations.”

Rocklogic can also integrate with a number of fleet-management systems to optimise the interactions between unloading vehicles and the breaker. “Rocklogic can communicate with the vehicles to formalise the communications process between equipment. This improves throughout by eliminating delays and prevents collisions between vehicles and the rockbreaker from occurring when a driver isn’t paying attention”

Boeing said the next development planned for the technology was fully autonomous rock breaking. “What that requires, is identifying the rock automatically, scheduling when to deploy the rockbreaker to that position, and optimally breaking the rock”. Transmin will be presenting the Rocklogic technology at IM’s upcoming Rapid Development Conference in Sydney in August.

Designed to operate in hazardous environments, the Alminco Scorpion is available in air/hydraulic and electro/hydraulic options and is suitable for use under roof heights of between 1.5 and 4.2 m. The air hydraulic Scorpion has low air requirement and low ground pressure. Used for roof, rib, face and floor drilling, the Scorpion can be adapted to suit all requirements.

The unit can be upgraded to include a work platform, and adaptation options include Alminco SDRB and Hilti OnStep. Operators have the option of wet, mist or dry drilling. Safety features include multiple e-stop locations, full guard, interlocking tram and drill controls and quiet operation. A comprehensive plant safety file is provided.

APC Technology has designed and manufactured a customised tagging system for a major Australian underground mining client. “This tagging solution met a range of requirements, as specified by the client,” explained Regional Sales Manager Ken Duldig.

These included the incorporation of a radio-frequency identification (RFID) card reader system; connectivity and integration from the unit to existing systems on location; plus meeting the budget and additional scope of work as set by the company.

“Key features include stainless steel construction to maximise durability, dual sealing to prevent dust and liquid getting in, and customised metal work and electrical control panel wiring,” said Duldig. “The success of stage one production led to an expansion of the initial order.”

APC Technology’s Zone 2/22 hazardous location panel PC recently received full certification to IECEx. Scott Begbie, Managing Director commented that the company has been supplying “rugged solutions to companies working in hazardous locations for over 20 years. The combination of our Industry knowledge plus the Design and Manufacturing Facilities in Adelaide, means one of our company’s unique benefits is the ability to react quickly to the needs of the market.”

Keith McDougle, Engineering Manager at APC Technology further added, “The Zone 2/22 Panel PC is rich with features including a rugged glass resistive touchscreen, stainless steel construction, 15” or 19” display, standard I/O’s or the option to customise based on individual client requirements. This fully sealed panel PC incorporates the latest industrial grade electronics and offers a range of options to suit the budget or situational requirement of any company.”

Bearcat Tyres, one of Australia’s premier tyre, wheel and service providers, this year celebrates 40 years of business. Glen Wolfenden, National Major Accounts Manager explains the strength behind this very successful business. “Our model is very unique in today’s tyre business. We are directly owned by the manufacturer (Camoplast Solidair) and our distribution, sales and service are all part of a vertically integrated global system. If you combine the strength of our global positioning such as leading brand OEM synergies, global R&D and test centres, raw material production and elite manufacturing processes with our local capabilities such as wheel manufacturing, JIT distribution, on-site mobile tyre fitting, flat-proofing installation, fleet monitoring and tyre flat proofing the package is just phenomenal.”

Bearcat continues to invest in equipment and products that will expand the total package offer to clients. Such has been the case with the commissioning of new tyre grab trucks to enable them to fit tyres up to 49” on-site. Following the success of their Amberstone brand Bearcat is also working with local partners to design state of the art tyre pressure monitoring systems at an affordable price.

“We aim to deliver lowest cost of ownership to our customer’s operations. Having such a broad range of products means that we can genuinely supply the very best solution for the application” Wolfenden continues. “By supporting our products with fleet checks, inspections and TPMS units we can clearly

Alminco Scorpion

Welding Bearcat wheels
support business with the information on product performance that is lowering their operating costs – not just saving a couple of bucks on the purchase price”. As Bearcat continues to deliver innovation to the mining industry many larger mining companies are beginning to see the value of their business partnerships. “More than ever safety and reliability are paramount in mining. We are very fortunate to have mining contractors and local tyre suppliers that support our quest to test and develop new product”. Through these previous trials Bearcat now has class leading, industry approved products such as heavy duty 3” tyres, specialty wheels and tyre flat proofing for underground coal machines.

Further to the coal tyre supply ability; Bearcat has entered into testing of aperture-style quick fit puncture proof tyres for hard rock underground mining equipment. Currently in service on jumbo drill rigs the 24" option is returning good results in the first trial with an estimated four times the life advantage over the standard pneumatic option. With a positive trial plans are to ramp up sizing of the triangle aperture designed solid tyres to meet the requirements of larger equipment. 

Hydraulic Controls will show its newest manually operated roof bolter and rib bolter logic blocks, Trouble Shooting Kits, hydraulic integrated circuits and a stainless-steel water valve for mining applications at AIMEX. The logic blocks, which are designed to work with various drill rigs that install roof and rib support bolts, are manufactured to Mining Design Guideline (MDG) specifications covering bolting and drilling equipment in underground mines. The Sydney-based company will also feature its locally made hydraulic integrated circuits (HICs), which can be manufactured to specifications as required by the customer. Its stainless-steel water valves are designed to control the flow of cooling or flushing water in hostile mining environments. The valves were developed to meet demand for normally open and normally closed valves that can work at water pressures of 240 bar and flows of 120 litres/min. The valves can pilot operate to start or stop water flow and are also fitted with a bypass valve for manual operation.

Peak3 has been nominated as a Systems Category finalist in the Chamber of Mines and Energy of Western Australia, Safety and Health Innovation Awards 2013. Peak3 has become a world leader in applied monitoring, particulate management and diesel engine efficiency solutions and is recognised as a specialist in its field. Its customised programs are implemented in mining to improve asset management, resulting in overall increases in productivity and reduced costs while improving the working environment for employees. “Engines performing well produce less emissions and use less fuel,” the company notes.

“Using breakthrough technology, Peak3 has developed customised solutions for hazardous ‘confined space’ diesel emissions and particulate reduction. In addition to developing our own proprietary technologies, we provide our clients with global best-of-breed monitoring, treatment and management solutions, setting the pace in reducing emissions, maximising productivity and improving working conditions in the industry.”

Nautitech Mining Systems will be unveiling a new high-precision underground gas sensor among a range of specialist electronics products at AIMEX. According to Nautitech representative Nick Smith, it’s Ex ia rated sensor has been purpose-built for coal mines and is currently undergoing the final stages of its formal certification process. “Compared to its predecessor, it has significantly improved ingress protection, a higher rate of precision and faster warm-up and response times,” said Smith. “It will be available for use with new shutdown systems or as a retrofit kit for existing systems.”

Another new product is the Spitfire power-line modem, which takes data from underground machines, such as shearsers and continuous miners, and transfers it to the surface via the trailing cable – allowing improved system control and productivity analysis.

“Underground testing on multiple longwall shearsers in Australia has shown a link capacity that ranges from 110 Mbps for a 450 m trailing cable, up to 160 Mbps for 280 m,” said Smith. “During six months of testing, there were no communications outages; we believe this is a breakthrough in power line modem performance for mining.”

Elexon Mining has a system to automate measuring ore recovery and flow in cave mining, called the Smart Marker. It is a blast resistant, long-life radio frequency identification device (RFID) that is installed in orebodies of sub-level or block cave mines. The reader automatically detects, logs and time-stamps the Smart Markers as the devices are extracted with the ore on the production level. Mining operations are not interrupted by Smart Marker detection. Ore recovery is then analysed to show mining performance, while identifying areas for improvement.

Ernest Henry Mining in northwest Queensland started using the technology last November. Senior Strategic Planning Engineer Alex Campbell’s role involves overseeing the caving and geotechnical aspects of the cave start-up and the transition to underground mining at the copper, gold and magnetite mining operation. A second Smart Marker system will be used at the mine in 2013, to assist in characterising the flow properties of the sub-level cave blast rings, Campbell said at the time. “The main things we are trying to focus on include, characterising width and depth of draw, as well as primary, secondary and tertiary flow behaviours over multiple levels.” The system will also assist to determine drill and blast performance including the back break and apex recovery, which has an impact on overall cave flow.

Meanwhile, Elexon is currently trialling a new generation product - the Networked Smart Marker system. These are based on Smart...
A Gekko facility at Ballarat Goldfields

Markers and provide communications through rock, and detect in-ground movement. This will allow cave propagation to be measured in real-time. The system has been developed to provide a more accurate and reliable alternative to traditional cave back monitoring systems, as these systems usually experience cable breaks in the moving rock mass above the cave back, which in turn causes misleading information about the actual position of the cave back to be reported. This system is currently being trialled at a block cave operation in Australia.

Processing

Gekko Systems has a particular interest in highly capital-effective and low environmental footprint plants. The company has been instrumental over the past 16 years in developing and applying alternative, low-energy flowsheets using gangue rejection and pre-concentration concepts to minimise comminution.

In 2012, Gekko formed, in conjunction with global knowledge leader in this field Randy Agius, the Cyanide Detox Group. The group is focusing on providing a strong service and support program for customers that will include options for both greenfield and brownfield operations.

Comprising members of Gekko's Chemical Technology Team, capabilities and opportunities exist to provide:

- Technical and economic valuation of options
- Process engineering packages
- Comprehensive detox laboratory test work programs
- Innovative and effective modular approach
- Cost effective solutions
- Equipment supply, installation, supervision, commissioning and an ongoing service contract.

Gekko draws on the latest technologies and methods for detoxifying cyanide, including SO₂/O₂, H₂O₂ (peroxide) and Caro's Acid processes. The company understands the benefits and pitfalls of every detox method and offers specialist advice using this knowledge.

The test work protocols completed at both Gekko's Australian and Canadian laboratories are critical to the design and operation of detox equipment and systems. All laboratory test work and optimisations are completely scalable to full plant-sized detox operations.

There are a number of technologies available for detoxification of cyanide contaminated tailings dams and facilities and the choice of the best method is complex, due to:

- Environmental regulations vary with respect to the allowable concentration limits in the treated tailings
- The various detoxification techniques vary widely in their ability to eliminate certain species
- The chemical composition of the tailings from each plant is unique
- Reagent consumption and cost varies between countries and locations.

Gekko's chemical engineering team has benefited from working with Agius, who has brought and shared his expertise and experience of 120 proven global installations – including over 30 successful SO₂/O₂ installations.

Both laboratories are operated by knowledgeable professionals.

Over the last few decades, innovations have advanced cyanide detoxification processes for the global mining industry. Now, as part of Gekko's Cyanide Detox Group, the accumulated wealth of experience and intellectual property are available for clients to take advantage of cyanide detox recommendations. These are wholly based on Gekko's unique knowhow of cyanide detox processes and core technologies.

International Magnetic Solutions' Scale Busta Magnetic Scale Eliminator is designed to remove scale from pipes in underground mines. It focuses an intense magnetic field through a pipe wall into the water to be treated. Victor Cassar, Managing Director, said this softened and removed concrete-hard scale from pipes with the scale simply washing out with the water. "Water and time do the removal work."

Scale Busta does not require chemicals, while it also prevents further scale build-up and keeps new installations free from scale.

The company also has a purpose-built diagnostic procedure for determining if magnetic wet drum separators are faulty. Cassar said that when, for example, a plant was known to be wasting magnetite, the diagnostic tool could help to identify irregularities such as magnets moving within a drum assembly, magnetite ingress or magnet damage.

“The IMS test results will confirm if the condition of the magnet wet drum separators is a contributing factor and that information can be used to decide whether they simply need to be adjusted or if it's necessary to go to the significant expense of pulling them out of service for repairs.”

Steinert's next generation of wet drum separator's (radial pole) make use of special magnet arrangements which result in a 120% increase in the average magnetic force index measured over the entire operating gap through which the slurry passes. Applications:

- Heavy media recovery in dense media plants - magnetite or ferrosilicon - is at ≥ 99.95% efficient
- Iron ore processing - the WDS separates magnetic iron ore such as magnetite from waste rock - at P80s commonly down to 28 μm.

MinAssist is a boutique consulting group specialising in process mineralogy, developing programs to assist the industry to optimise value and reduce technical risks. "We bring value to clients in unifying process mineralogy and metallurgy," explains Will Goodall, Managing Director/Principal Consultant.

"Operating since 2006 our consultants bring a unique mix of expertise across mineralogy and metallurgy that allows our clients to effectively use process mineralogy to generate value for their projects."

There is constant pressure to reduce costs and improve efficiency without adding appreciable risk to their projects. Process mineralogy provides a very useful tool in achieving these goals through building a fundamental understanding of the ore types feeding the process, and monitoring their behaviour through the plant. Using this information MinAssist has extensive experience in developing and implementing process improvement programs in a wide range of commodities, including gold, silver, PGM's, copper, lead/zinc, uranium, Fe ore, tin/tungsten and industrial minerals.

The service is focussed on data analysis and interpretation. Goodall says "we believe that the analytical skills in laboratories varies between commodities and applications, and MinAssist has a policy to work with the best laboratory for a given project; ensuring that our clients always get the best quality data. This allows our services to concentrate on the areas that add real value to a project; namely understanding and implementing the data that
is generated. We work closely with both clients and laboratories to ensure that an appropriate program is implemented and then provide a simple and targeted report that addresses the project deliverables directly.

The complexity of process mineralogy as a tool can be overwhelming, and to address this MinAssist has developed a series of pre-defined Circuit Health Checks that a busy project metallurgist can select straight ‘off the shelf’, run with a minimum of hassle, and gain some quick recovery benefits. Simply select the most applicable health check study, collect the relevant sample and MinAssist will do the rest. “Our goal is to ensure that using process mineralogy as a tool is easy and accessible, adding real value to projects and helping project metallurgists to be more efficient by gaining a thorough understanding of the problems they are faced with,” Goodall says.

This suite of programs is focused on bringing cost savings, recovery improvements and general risk reduction through improved understanding of ore types. The suite is constantly evolving as new areas for efficient process improvement are developed. The packages available now include health checks for grinding, flotation and tailings.

The Grinding Health Check provides a simple mineralogical-based program that examines the optimum grind size for liberation of target minerals by QEMSCAN analysis. The grinding circuit can account for up to 40% of energy costs within a process circuit. Understanding the behaviour of material through the grinding circuit is a significant step on the right path for reducing costs, minimising energy use for sustainable practice and ultimately improving recoveries in down stream circuits.

The Tailings Health Check provides a process mineralogical study of the tailings stream that gives a valuable insight into the proportion of recoverable versus non-recoverable losses; and may pinpoint some material that can be recovered without major operational changes. Can recovery be improved at an acceptable operational cost and still maintain the desired concentrate grade?

The Flotation Health Check examines the liberation of target minerals in flotation feed and determines a theoretical maximum grade-recovery curve. This simple information can be used as a benchmark for the flotation circuit to guide what the best performance could be expected to be for a given particle size distribution.

RME is best known for its mill relining system, with its centrepiece the seven or eight axis liner placement mill relining machine. These machines are available in maximum liner capacities from 500 to 8,000 kg, representing “the ultimate in new liner replacement capability,” the company says.

However, there are other innovations in the RME bank of solutions. For instance, there is a solution for High Pressure Grinding Rolls (HPGR) maintenance. Developments in the size of the rolls and in the surface of the rolls has brought about the need to develop a solution that is capable of transporting these rolls offline, to undertake scheduled maintenance activities. RME has a machine for this purpose.

Also, there is the tuyere punch for the nozzles through which air is blown into copper smelter blast furnaces. These increase the efficiency of the blast furnace. Although the nozzles are often water cooled, one maintenance function that needs to be undertaken is ‘punching’ out cooled copper which may block the tuyeres. The tuyere punch that RME designed and manufactured provides a safe and effective machine for undertaking this task.

Chemical Plant & Engineering (CPE) specialises in the design and manufacture of quality process equipment, including high efficiency tank agitators and mixers. The high efficiency RTF4 hydrofoil is used for blending and solids suspension at lower viscosities.

CPE says “the RTF4 hydrofoil delivers high volumetric flow rates whilst drawing up to half the power requirements when compared to competitor hydrofoils. The engineering technology behind the RTF4 provides an unparalleled flow for power solution for various agitation applications including blending, solids suspension or a complex reaction.

“When assessing the effectiveness of an agitator, often motor size is the key variable considered. However, for a more effective assessment of an agitators capability, the critical performance measurement is the agitator flow rate. The flow rate is the volumetric displacement of fluid and can be characterised as the number of times the tank contents are turned over per unit of time.

“The RTF4 Agitator delivers greater flow for a given power input.” This is achieved by a number of design features. Firstly, the blade is slim at the tip where speed is the greatest and wide at the base where speed is the lowest. This shape results in uniform flow across the impeller diameter producing the most efficient pumping action.

RME tuyere punch
The RTF4 is designed with a pronounced twist at the base, gradually decreasing towards the tip. This creates an even velocity profile whilst minimising turbulence behind the impeller blades.

CPE says “the key to high pumping is the arch of each blade. This is geometrically designed to travel through the liquid at a shallow angle with the leading edge while allowing the trailing edge to direct powerful currents downwards.”

The profiled edge of the RTF4 eliminates turbulence as the blade rotates through the fluid. This also has the added benefit of reducing erosion caused by particle to blade collision.

“The RTF4 creates an axial flow pattern with a very even velocity profile across the impeller and the low shear design essentially eliminates any turbulence from the impeller blades. As a result, [it] has the lowest power consumption for a given discharge velocity, which can result in energy savings of up to 60%.

“An additional benefit of the RTF4 is the low torque requirement for a given amount of flow, therefore reducing drive and shaft sizes.”

Huntsman Performance Products' Australian business has provided the leadership for Huntsman’s global business development in mineral processing reagents, and has successfully developed the POLYFROTH® range of frothers for froth flotation and the POLYSIL® silica coagulants for hydrometallurgical processes. These products are finding wider use in the global mineral processing industry as the industry seeks to achieve improved metallurgical performance, cost efficiency and an improved environmental and safety impact of the reagents they use.

The development of the POLYFROTH® range of flotation frothers has been undertaken by Huntsman at its Melbourne based Research and Development Centre and has been the result of the evaluation of both common and novel chemical compounds in laboratory and pilot flotation tests and extensive plant trials throughout Australia, Canada, USA, Chile, Brazil and the Middle East. Huntsman’s frother development program has also benefited from participation with the mining industry through association with a frother specific Australian Mineral Industry Research Association (AMIRA) managed industry research program.

Originally targeted as an alternative for MIBC in coal flotation, POLYFROTH W22 has been shown to offer improved metallurgical recoveries for given concentrate grades at lower addition rates in the flotation of base and precious metals. W22 is non-flammable and has a lower VOC (Volatile Organic Carbon) emissions compared with the commonly used frothers such as MIBC. Its non-hazardous classification results in a lower compliance costs associated with its transportation, storage, handling and use.

The success with this has led to the development of a range of products based on the core patented chemistry of POLYFROTH W22, that are now also manufactured at Huntsman’s major USA manufacturing facilities in southern Texas. These include grades of products specifically developed in Australia to meet the demands of storage and handling in the Northern Hemisphere winters. These products are now in use across Australia, Canada, USA, the Middle East and are finding favour in projects under development in South America, Sub Saharan Africa, northern Europe and across the Asia Pacific region.

The Australian business has been a leader also in the development of cost effective silica coagulants to assist the removal of colloidal silica, particles less than 0.5 μm in diameter, from hydrometallurgical processes used for the recovery of copper, molybdenum, nickel, and uranium. Colloidal silica is a contributor to the formation of three phase emulsions ‘crud’ in SX processes that impedes the phase transfer of the chelated metal ions between the metal enriched organic phase and the acid leach liquors. Incomplete disengagement of the organic and aqueous phases also results in entrainment losses of the organic phase containing the metal and the expensive extractant reagent to the barren liquor (raffinate).

POLYSIL® RM1250 and RM2050 coagulants are added to the PLS prior to the addition of flocculant to reduce the stability of the colloidal silica particles resulting in the rapid growth of the small particles into particles large enough to be effectively flocculated by conventional flocculants and thereby removed from the process. The POLYSIL RM series coagulants typical reduce colloidal silica by 60% and total silica (soluble and colloidal) by 30%. This can be the difference between an efficient process and an inefficient one.

The POLYSIL RM series coagulants can also be used effectively to reduce the fouling of ion exchange (IX) resins by colloidal silica in IX processes for both acid leach and carbonate leach processes. These liquid coagulants have proven to be cost effective alternatives to the predominantly solid powder based coagulants in common use.

The powder coagulants represent an inhalation hazard and require dissolution prior to use. Huntsman POLYSIL coagulants are non-hazardous low viscosity liquids that are easily transported and can be used directly or with prior dilution. The RM series coagulants are currently in use in Australia and Sub Saharan Africa and are under evaluation for operations and projects in Canada, Brazil, Africa and Europe.

Bulk handling

At the Austmine conference in Perth, Intium was awarded the Austmine 2013 Innovation Award for its Roller Condition Monitoring (RCM) system. Submissions were judged against the following criteria:

- Significance of the impact or outcomes of the discovery or innovation, particularly in relation to other achievements within the field

Another innovation by Huntsman has been the development of an aid to frother selection and optimisation. The POLYFROTH frother properties chart combines the core frother properties of froth strength and froth character (represented by dry or wet) with a logical naming convention to assist selection and optimisation of frother to provide the optimum metallurgical performance typified by grade and recovery with optimum froth strength and efficiency. The 50 series frothers are the weakest least persistent frothers. The 50 series are the strongest most persistent frothers. W denotes water soluble or water dispersible, H denotes water insoluble. (C) indicates availability of product grades with cold temperature storage stability.
Novelty of the achievement, its application or future application
International significance of the discovery or innovation.

The RCM system is a revolutionary improvement to ore handling. It monitors the bearing condition of conveyor belt rollers and assists customers to identify problem rollers before they fail and cause expensive conveyor downtime. Users can also reduce rates of incorrectly changed rollers. This leads to greatly reduced maintenance time and less wasted equipment.

The RCM system monitors rollers on an entire conveyor and identifies which rollers are displaying pre-failure behaviours.

When using the RCM system, maintenance can be performed when and where it’s needed. The system also provides the ability to conduct a complete condition report from anywhere in the world via a networked, web-based platform. Intium believes the RCM “can save customers millions of dollars in production losses caused by shutdowns to address roller failure and cascading equipment damage.”

Its benefits include:
- Automated, continuous, rigorous monitoring of bearings, reducing incidence of undetected faults and consequential catastrophic failures
- Direction of maintenance teams to problem rollers for pre-failure change-out
- Enables multiple change-outs per shutdown, thereby reducing incidence of unplanned shutdowns
- Increased personnel safety through reduced manual monitoring by staff near conveyors
- Reduced risk of belt fires caused by seized rollers
- Increased efficiencies through automation and access to consistent data across operations.

RCM provides automated warnings of problem rollers and there is a smart mesh wireless sensor network which permits installation in restricted access and underground locations. The web-based dashboard interface has multiple levels of reporting, based on user’s role and data requirements. Storage of historical data over the life of the installation allows trending and batch quality analysis.

Remote system monitoring by Intium detects sensor or other system failures. It incorporates existing roller/frame numbering with RFID readable sensor tag and is designed for rapid retrofit installation and commissioning.

Bisalloy Steels will unveil what it describes as “the hardest quenched and tempered steel made in Australia” at AIMEX. According to Bisalloy Steels’ Business Development and Strategy Manager, Tom Matinca, Bisplate 600 was developed in response to requests from mining companies focused on reducing operational costs. “The introduction of Bisalloy’s Bisplate 600 grade provides considerable savings over and above clad-plate products by delivering comparable wear performance at significantly reduced costs for the wear material, as well as for the fabrication and installation,” he said.

Bisplate 600, along with the company’s full range of high tensile and abrasion-resistant quenched and tempered steel, is manufactured in an efficient continuous-flow process.

Bisalloy’s AIMEX display will also include a new low-friction Bisplate option that can handle wet and sticky ore types while offering a very low friction service, as well as very high tensile strength steel in structural applications.

Alloy Steel International says “Arcoplate is more than a wear liner or a wear plate. Arcoplate is a total wear solution that saves time and money.

“Arcoplate is the world’s most wear-resistant fused-alloy steel plate. The wear plate is proven to outlast traditional wear liner products by as much as six times. The smooth dense, chromium-carbide rich overlay layer makes Arcoplate the perfect choice!”

Arcoplate’s metallurgical, engineering and design team notes that in fixed plant application, particle abrasion is the major source of production downtime. When the stress on a metal component exceeds the elastic limits of the metal, it deforms beneath the point of impact and laterally across the surface away from the impact point. Very brittle metal cannot withstand deformation so it may crack from either a severe blow or repeated lighter blows.

Even if the metal is ductile enough to avoid cracking, repeated impact often compresses the surface, sometimes causing the metal to ‘mushroom’ at the edges and eventually chip off. “By extending the life of wear components, Arcoplate is proven to reduce lost time and save money. Typical components subject to impact wear include transfer chutes, load out systems, hoppers and truck trays.”

In one application, screen discharge feed chutes were lined with Arcoplate and outlasted the life of the chute. Arcoplate’s smooth surface finish enhances the polishing effect. This lowers the coefficient of friction, prevents damp material hang up and encourages better material flow. This chute has no bolting holes in the liners. The fixing studs are fired at the low carbon steel backing plate and bolted onto the chute frame. This feature eliminates a common wear problem known as comet tail erosion that emanates from the bolted area on the wear surface.

This same technology, can be used on fan liners. Cement plants, coal-fired power generation plants, and any mining operation where dust particles affect fan life can benefit from this plate.

Flow dynamics is an important factor to consider in fixed plant design. “The Arcoplate team has been helping mining companies large
International Mining

and small, for over 20 years, in designing the right flow pattern to reduce particle wear. The team can also help design the right wear liner configuration for your operation.”

Worldpoly will show the latest release of its Australian-made PolyRover630 polyethylene pipeline welding machine at AIMEX. The latest updates to the welding machine range, which is specifically designed for use in rugged and remote terrain, will all be demonstrated.

“Decreased overall welding time by the use of high-force welding, reducing workload and the need for extra support equipment on remote sites allows for faster, more efficient welding of PE and PP pipelines,” said Sales Manager Nikita Hall.

“The PolyRover’s practical design includes a hydraulically lifted facing tool and heating plate, hydraulic pipe lifters left and right, hydraulic pump and controls all on-board the main frame.”

For trench welding, PolyRover630s’ complete welding unit – including controls, all four clamps, facing tool, heating plate and hydraulic unit – can be easily removed from the chassis.

“The hydraulics are from Bosch Rexroth and internationally serviceable, and the machines are easily operated and pre-wired for the attachment of Worldpoly or other data loggers,” explained Hall.

Worldpoly is an Australian owned and based company that has been involved in the polyethylene pipe and fittings industry for more than 30 years.

“Leaders in the development and production of international standard PE pipe welding fusion equipment, we export to more than 90 countries,” said Hall. “Not only do we manufacture and supply some of the best PE welding machinery on the market, we also offer international training, support and advice.”

Austmine says its member Davies Wear Plate Systems solves “problems that alternative products create or don’t address. This is achieved through the use of unique manufacturing and fastening methods which are complemented by a range of safe lifting, handling, installation and removal tooling and a remote real-time monitoring system. Seeking a distinct competitive advantage, the founder and now Technical Director - Brian Davies, developed a range of novel wear products which Davies WPS has gone on to supply to the mining industry throughout Australia as well as several international sites.”

Clients of Davies Wear Plate Systems include mining companies such as FMG, Rio Tinto, BHP Billiton, Xstrata, Barrick Gold, AngloGold Ashanti, MMG, Goldfields Ltd and KCGM.

A recently completed project was for FMG’s Solomon Hub Expansion. For this contract, both Davies WPS’s wear liner systems and remote wear monitoring system were installed at the Firetail and Kings Valley ore processing sites. In addition to this, other notable projects include recently completed installations at Rio Tinto’s Western Turner Syncline Expansion and MMG’s Golden Grove upgrade.

Operations safety

ARA Group will focus on “unmatched fire safety technology for fire prevention” at AIMEX. “Our FirePass Oxygen Reduction Fire Protection systems achieve the ultimate goal in fire protection: fire prevention,” said Janelle Mattila, Marketing Manager. “They produce and use breathable air for fire prevention in protected rooms, preventing any hazard to human occupants and any damage to protected rooms and their contents,” Mattila said. “The FirePass agent is simply oxygen-reduced air with no chemicals or gases involved so the systems are also environmentally friendly.”

Established in 2001 and headquartered in Sydney, ARA provides facility and infrastructure services. It supports the mining industry through ARA Electrical, ARA Fire, ARA Security and ARA Manufacturing.

Immersive Technologies has developed simulators for underground coal mining. These feature a previously unseen degree of simulation realism and Immersive Technologies’ ingenious new RealMove™ natural movement system. Immersive says that “bolstered with a demonstrated capability to deliver quantified improvements in cost savings, productivity and safety; [it] offers a degree of training effectiveness not previously available to underground coal mining operations.”

“Until now, there has been no training solution on the market which fully addresses the unique training requirements for underground coal equipment operators. These new products highlight our ongoing approach to invest in driving customer safety and profitability though our industry leading technology and extensive mining experience,” says Richard Beesley, Underground Coal Business Unit Manager.

The simulators provide an authentic and comprehensive recreation of a coal mining work environment and support continuous miners, shuttle cars, roof bolters, longwalls and miner bolters.

In recent years on surface, the demand for dozer operators working on coal stockpiles has grown dramatically, increasing the need for specialised training in what is considered one of the most hazardous environments for dozer operators. Committed to making mines safer, Immersive has developed technology to specifically address operator safety in coal stockpiling. This technology is embedded in an upgrade to the range of Advanced Equipment Simulators.

Coal stockpiling operations pose a high risk to operator safety and can lead to injuries or death if correct procedures are not followed; incidents can also halt operations and significantly impact repair and maintenance costs. The simulation training based technology developed by Immersive focuses on reducing the operational risk of dozer stockpile

New features for the latest version of SimControl, the software at the heart of the Immersive Technologies’ PRO3 Advanced Equipment Simulator, address the risks of coal stockpile operations.
operations by:

■ Creating enhanced operator awareness of surroundings
■ Training operators to minimise the risk of falling into a void
■ Assessing competency of dozer operators to comply with and follow safe operating procedures.

“We are continually developing new technologies that give our customers the highest return on their investment. These new features are developed for the latest version of SimControl, the software at the heart of the PRO3 Advanced Equipment Simulator and ensure our customers receive the maximum benefits from their simulation training,” said Peter Salfinger, CEO of Immersive Technologies.

Rio Tinto’s Hail Creek Mine and Glencore Xstrata were instrumental in the development of this technology. Both companies are major producers of coal and work with Immersive to ensure simulator technology is effective and accurate for onsite operations.

Glencore Xstrata has recognised value in being able to take operators out of a potentially dangerous training environment with little ability for trainer interaction; into a realistic hands-on approach where operator errors can occur without sacrificing safety. This site, along with many others, only has one stockpile so any type of training halts production; simulator technology has proved to be advantageous in keeping operations running at full capacity while training operators to be safer and more productive.

In a development to reduce fuel costs, Immersive has partnered with Australian-based Downer to launch a fuel efficiency technology aimed at giving mine management an affordable way to address the challenges of rising fuel costs and environmental responsibility. This technology is embedded in an upgrade to Immersive’s range of Advanced Equipment Simulators. It is designed to give operators the skills and knowledge they need to operate in a productive manner while assessing and eliminating behaviors that cause excess fuel consumption.

As the industry heightens its focus on reducing costs and increasing productivity, Immersive has worked closely with Downer, one of Australia’s leading mining contractors, and major OEMs to deliver a solution that reduces fuel consumption through the improvement of operator knowledge and skills. This enables mining operations to specifically target and quantify fuel inefficient behaviors during simulator training sessions.

The simulator technology includes detailed monitoring of operator behaviours that directly relate to excess fuel consumption, including levels of throttle and brake application for specific situations. This has resulted in an enhanced assessment tool for managers to determine which fuel inefficient operator behaviors are most prevalent on their site and represent the greatest opportunities for savings.

“This technology is a further example of Immersive Technologies working with the mining industry to solve their challenges. We took similar steps to assist the industry during a time of severe tyre shortages. Our customers now commonly report increases in truck tyre life of over 10% following the implementation of our tyre preservation technology into their training programs,” said Salfinger.

EPC and consulting

METS (Mineral Engineering Technical Services Pty Ltd) has expanded its range of engineering services and training courses. Its engineering expertise has been expanded following the recent acquisition of CDMS Consulting Engineers, a provider of mechanical design, structural design and design verification with the following services:

■ Mechanical and structural engineering design, and engineering design verification
■ Fitness-for-service assessments
■ Product development
■ Project management
■ The design of fabrication and construction aids
■ Expert witness assistance.

These complement the company’s established mineral processing testing and interpretation, civil and structural engineering design services, as well as its People for Plants labour hire service.

MIPAC’s Canadian office has won an order to deliver an IsaControl package – tailored instrumentation and control services – for Goldcorp’s Eleonore mine IsaMill™ in James Bay, Quebec. The order comes off the back of an instrument design project MIPAC conducted for the Xstrata Technology IsaMill.

“MIPAC has worked with Xstrata Technology on numerous IsaMills around the world and has demonstrated that we are the experts in implementing IsaControl packages,” MIPAC Canada Regional Manager Ryan Twible says.

“Our approach is tried and tested, offering seamless integration, multi-language operation, minimal time to production, scaleability and connectivity.

“Clients are quickly realising that IsaControl is essential to getting an IsaMill™ up and running without delay so it makes sense to go with the specialists.”

The Eleonore IsaMill is expected to start production in late 2014, with a doubling of plant throughput to 7,000 t/d, averaging more than 600,000 oz/y of gold production. The IsaMill™ is currently being constructed on site.

“MIPAC works with local engineers to ensure their site preferences are accommodated,” Twible says. “We also offer flexibility on both programmable logic control (PLC) and distributed control system (DCS) platforms.”

Control is usually configured on the PLC platform using major brands but IsaMills can also be controlled directly from a DCS where configuration is fully integrated using the local site standard. IsaControl typically includes:

■ Control system cabinet
■ Supply of PLC / DCS hardware
■ Logics and graphic configuration
■ Optional Human Machine Interface (HMI) for PLC local control
■ Factory acceptance test (FAT) documents for panel and software
■ Design drawings.

In another project with Xstrata Technology, MIPAC is helping to develop a 1.2 Mt/y copper smelter at First Quantum’s Kansanshi mine. Working as part of the Xstrata Technology project group, MIPAC’s engineers are delivering the instrumentation and design for an ISASMELT™ primary copper smelter and associated waste heat boiler, as well as the full plant-wide distributed control system to span the entire field plant.

Kansanshi is located in Zambia’s Northwest province, 15 km north of the town of Solwezi and about 180 km northwest of the Copperbelt town of Chingola.

“MIPAC and Xstrata Technology are designing, configuring and commissioning the plant-wide process control system for the entire smelter complex,” Lead Electrical, Instrument and Control Engineer Brian Forrester explains.

“The project started in late 2011 and ‘heat-up’ is expected in 2014.”

Intech Engineering is completing an advanced water project for Glencore Xstrata’s McArthur River mine that will provide significant
improvements to the infrastructure at the mine to ensure more effective water management and environmental outcomes. Drawing on Intech’s water management experience (which includes projects for Western Areas in Western Australia, As Consolidated gold mine in Victoria, Carpentaria Gold in Queensland and Straits Resources in New South Wales), the final system will feature:

■ 20 km of HDPE piping
■ Up to 20 pumps including three large 800 kW submersible pumps
■ 5,100 million litres of new storage dams
■ Pumping rates in excess of 1,000 litres/s
■ A sophisticated control system incorporating fuzzy logic.

The skyline around Geraldton, Western Australia, recently received a new addition towering over its busy port precinct. A Liebherr LHM 280 mobile harbour crane was commissioned in early June by Qube Bulk and was immediately put to work loading mineral concentrate cargoes utilising Qube’s innovative Rotabox containerised bulk system.

Todd Emmert, Director of Qube Bulk’s operations, said it would revolutionise loading and discharging cargo in the port with faster slew and luffing speeds. “We will increase our operational efficiency by 37.5%, increasing available port capacity for current and future Geraldton port clients.”

Qube pioneered the design and development of container rotating tippers with integrated lid lifters and has been successful in attracting new concentrate exporters to the port as well as convincing existing port users to make the switch to a containerised bulk solution and reduce their supply chain costs.

The Rotabox system enables ores and concentrates to be transported and loaded into vessels without creating a dust hazard, as the containers are lowered into the ship’s hold, the lid is then lifted when the container is out of the breeze, rotated to empty, and the lid replaced before leaving the protection of the hold.

Antony Perkins, Qube’s Director of Project Development, said “we handle a lot of concentrate through shiploaders across Australia and it’s a messy and expensive business. We looked for an alternative and there was nothing on the market so we set about to design and build our own system. As bulk haulage operators and stevedores we not only build the gear but we operate it. So we know day in day out how it operates and this has driven the continuous improvement on the design because we use it”.

Lightweight Qube Concentrate Containers (QCCs) are also designed to minimise internal and external hang ups of product with minimal flat surfaces for container loading spillage to sit on or ‘C’ channel on the bottom like traditional bulk containers that trap dirt or concentrate. QCCs are also well tested with some boxes having been rotated over a thousand times under full payload with no signs of cracking or fatigue.

The containers come in a number of heights and cubic designed to minimise unnecessary weight depending on bulk density of the product and transport restrictions, up to 35 t of product is achievable in WA.

Currently in its third generation, Qube’s Rotabox was designed to be self-powered with a light tare weight, making it suitable for use with ship’s cranes. This is appealing to exporters in ports that do not have access to shore cranes, like many of the 28 ports around the country where Qube is present.

Rotabox’s versatility also allows it to be operated from a shore crane and as Qube has multiple units available in Geraldton, vessels can be loaded simultaneously by both types of cranes, delivering a productivity boost. Qube has nine units in operation around Australia with two more units for coal exports due soon.

Emmert said interest in Qube’s Rotabox system has been driven by two factors. “Firstly, projects without fixed infrastructure at port seeking to access port capacity and secondly, established exporters are reviewing their supply chains in an effort to make them more environmentally sustainable. Our system is proven to be best practice in environmental management and is well positioned to assist exporters make the transition from bulk shed and shiploader into Rotabox seamlessly.

“We are receiving dusting readings that are less than 10% of the port’s declared approval limits. At this stage, we haven’t even looked at putting in mist sprays, as the addition of water raises the potential to cause issues with the product”.

In addition to loading copper, zinc and nickel concentrates, Rotabox has tackled difficult to handle byproducts from mineral sands and refined zinc producers and is slated to begin exporting thermal coal.