Building plants that work

You have to get a lot of things right to build a plant that works.

Of course the big picture must be right – doing the right project, in the right place, at the right time.

After that, the devil is in the detail. You need a sound design, good execution, good commissioning, and ongoing support after commissioning. You need to operate and maintain your plant in the long run, long after the construction company has left. That’s when all the “little” details become important – how easy is it to operate, how good is the maintenance access, what happens in a power failure, where are the spillage points and how do we clean them up? Are the instruments reliable and is the process control strategy robust – can it handle plant “noise” and unexpected disturbances?

Plant operators know that these details make the difference. They also know that it takes another operator to get them right. Someone who has lived through the problems, had to do the maintenance, operated during a midnight power failure, cleaned up the spill. Someone who has “closed the loop” on previous designs; lived with previous decisions and improved them, over and over.

This is why Xstrata Technology provides a technology “package”. Just as a car is more than an engine, technology is more than a single piece of equipment. Technology is a system. All the elements of the system have to work with each other and with the people in the plant.

We want our cars designed by people who love cars and driving. So should our plants be designed by people with experience and passion to make each one work better than the last.

Joe Pease, Chief Executive,
Xstrata Technology (XT)
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Our Brisbane Office will be moving mid year to Level 10, 160 Ann St, Brisbane – all phones and email will be the same.
HyperSparge™ Highlights

The HyperSparge™ is an energy efficient way of adding oxygen or air to process solutions. Originally developed for the Albion Process, the application for the technology is widespread, ranging from mineral processing, waste water treatment and processes requiring fermentation such as food and pharmaceuticals. The design of the sparger nozzle, inspired by the Lavel nozzle used in early model diesel engines, enables high velocity gasses to be dispersed into very fine bubbles, allowing extremely efficient interaction of the gas with the process.

Mike Hourn, Hydrometallurgical Manager at XT said the interest in the technology has been high, considering the equipment has only been on the market for 18 months. He said the initial installations were naturally in the Albion plants, including the San Juan de Neiva and Nordenham zinc refineries, and the Las Lagunas project in Dominican Republic, but there has been several orders for the spargers for oxygen injection into cyanide leach plants, Eh modification at several flotation operations, aeration in a waste water operation, as well as a leaching project.

Mike also said that one of the orders was a retrofit of the HyperSparge™ to 40 existing spargers in a Canadian concentrator. The existing spargers were of a variable opening design that was subject to frequent plugging with solids. Fitting the HyperSparge™ supersonic injection nozzle to these spargers increased the reliability and also boosted metal recovery – a low cost solution!

There are now over 260 HyperSparge™ units sold to projects in 8 countries in a range of mineral processing and water treatment applications.

Commissioning the Kazzinc Copper Smelter and Refinery

After much preparation, construction and testing, the Copper ISASMELT™ furnace has begun operation at Kazzinc's Ust-Kamenogorsk Metallurgical Complex (UKMC). The furnace began smelting concentrate on July 22, 2011, after a few days of heat-up that went exactly to schedule. The furnace was under the direct control of Kazzinc operators who had been coached by Xstrata Technology commissioning specialists, including an extensive training program at the Mount Isa copper ISASMELT™ in Australia. Within just a few shifts after heat-up, the furnace had achieved its design throughput (measured on a shift basis). The smelter team is now gradually ramping up the entire copper smelter to achieve its design production on an annualised basis.

Thirty days after the first concentrate was fed to the ISASMELT™, the first Copper Cathode was produced at Kazzinc’s new copper refinery, using IsaKidd technology. Much celebration was had by the Kazzinc operations on the production of the first cathode, after the successful start-up and commissioning (see photo).

Xstrata Technology supplied an extensive list of equipment to both the copper smelter and refinery at UKMC.

With a capacity of 70,000 tpa of cathode copper, the Kazzinc copper smelter and refinery are small by world standards, but they are an important part of Kazzinc Ltd's integrated base metal operation at UKMC where 11 other refined metals, and numerous by-products, are also produced. Ust-Kamenogorsk is the coldest place that an ISASMELT™ Furnace has ever operated, with temperatures dropping as low as -36°C during this (northern) winter!

A second ISASMELT™ will be commissioned at UKMC during 2012. It forms part of Kazzinc’s lead smelter modernisation.
Australia’s First Robotic Cathode Stripping Machine

CST’s Lady Annie Mine, the copper oxide heap leaching operation in North West Queensland, has recently installed the first robotic cathode stripping machine in Australia. The operation also uses Isa Process™ cathode plates to produce LME Grade A copper.

Ola Eriksson, Engineering Manager for IsaKidd at Xstrata Technology, said the development behind the robotic stripper had taken several years, with extensive trials being undertaken at Xstrata Copper’s CRL copper refinery in Townsville. The advanced roller technology positioned on the redesigned stripping wedge, sited between the copper plate and the stainless steel cathode, allowed for frictionless movement of the wedge for stripping down the face of the cathode. What this means, is that the cathode plate is protected from any scratches or marks, prolonging the cathode life, and reducing maintenance cost. Ola says the robotics used to manipulate the wedge was the step change that was needed in the industry, moving away from expensive and noisy mechanical and hydraulic systems, to a quite, low cost operation achieved by the advanced robotics. Ola said that while this application was designed to produce small tonnages of copper (between 28,000 to 30,000 TPA planned long term), the stripping machines supplied by XT, came in a variety of sizes, and can easily accommodate some of the largest plant designs.

Currently XT is working on several cathode stripping machines using the proprietary robotic technology for a Norwegian copper refinery due for delivery in 2012.

The first ZipaTank™ modular slurry tank prototype is on its way to being completed in March this year. The prototype is a 5 m x 5 m agitated tank, which will be used in one of Xstrata’s Queensland operations to store mineral concentrate slurries.
Mongolia Coal in step with Jameson Cells

The high demand for coal has seen strong activity in coal exploration and project development over the last couple of years. This has resulted in the opening up of new coal provinces as well as expansions in existing ones. Jameson Cell was the chosen flotation technology for a number of these coal projects, with commissioning of these cells being recently completed at Energy Resources’ LLC Ukhaa Khudag (UHG) coking coal operation in the South Gobi Province of Mongolia, and at the Benga Coal operation in the Tete region of Mozambique.

Lyndon Ryan, Process Engineer with Xstrata Technology (XT), who helped commission the Jameson Cells at these operations, said the simplicity of the Jameson Cell to install and commission, as well as their ease of operation, were big advantages in these emerging mining regions of the world. The high quality components and very low spare parts requirement of the Jameson Cell has proven to be another great selling point given the remoteness and extreme climates at these sites.

The UHG washplant in Mongolia has expanded rapidly with Stage 3 currently under construction. Each stage of the project consists of a modular washplant designed to treat 5 MTPA of coal and has two large B6000/20 model Jameson Cells in the flotation circuit to produce a high quality coking coal product.

CEEC THE FUTURE – for Eco-Efficient comminution

CEEC is a not-for-profit company whose mission is to accelerate knowledge and technology transfer in the field of crushing and grinding. Xstrata Technology is one of several sponsors of this initiative, whose objective is to raise the awareness of research findings, alternative comminution strategies and installed outcomes.

XT has been on the front line of improving the efficiency of comminution for years, through the development of the IsaMill™ for ultrafine grinding, and its cross over to deliver energy efficiency into coarser applications, and believes the outcomes of the CEEC initiative to be important to further improve the industry. Crushing and grinding consumes over half the power on a mine site, and up to 4% of global power generation is estimated to be used in comminution. So there are big gains to be made with just a small improvement!

CEEC facilitates the transfer of information, knowledge and technology to industry, to improve energy efficiency of comminution and lower processing cost as a result of optimum and improved comminution practice. For more information go to www.ceecthefuture.org.

XT’s Northern Exposure – Update from Vancouver

Xstrata Technology's team in Vancouver has been steadily increasing capabilities over the last 3 years to meet the growth in the resources sector in the Americas. In that time, the office has been heavily involved with 13 IsaMill™ projects that have either been installed, or in the process of being installed in the North American region, as well as several Jameson Cells involving nickel, potash and oil sands flotation.

The increased number of projects and enquiries has resulted in the Vancouver office becoming more independent, with capabilities built up in project management, engineering, procurement and logistics, as well as legal support. This complements the mineral processing specialist that originally started up the base for the region in 2007.

Greg Rasmussen, Principal Metallurgist for XT Canada, said the build up in resources in the office has enabled even better coordination in projects from the start to the finish. “While we have always had a good relationship with our offices overseas in putting together good quality projects on schedule, nothing beats the ability to drop in next door to the project manager, or logistics people to work through any issues that arise”. The build up in resources has also allowed the Vancouver office to project manage European projects.

To cater for the growth in personnel at Xstrata Technology over the last couple of years, the office was moved into new premises in West Pender Street in central Vancouver in November last year.

Upgrading Early Jameson Cells to Latest Design

Jameson Cells have been in commercial operation since 1989, with the current Mark IV design cells rolled out in 2009. The biggest difference between the current cells with the older versions (Mark I or II) is the vast improvement in the design of the downcomer assembly. A major overhaul in the design has resulted in cells that are easier and faster to install, achieve much more consistent process performance, simpler operation and a significant reduction in maintenance and spares requirements. The slurry lens orifice, a crucial component that forms the high pressure jet inside the downcomer, has exceeded expected wear life of 5-7 years in coal operations. In fact, no coal operating site has replaced this part due to wear since its introduction to the Mark III design in 2000.

Le Huynh, Jameson Cell Manager at XT, says old style Mark I and II Jameson Cells installed in the 1990’s can be easily retrofitted with the latest Mark IV design downcomer assembly. Upgrading provides all the benefits of the latest design Jameson Cells but at a fraction of the cost of installing new cells because the tank, the largest and most expensive component of an installation, can be reused.

A large and well-known operation in the Bowen Basin coking coal region of Central Queensland is the first site to upgrade their entire flotation circuit to the Mark IV design Jameson Cells. The upgrade involves fourteen large circular cells with over two hundred downcomers. The retrofit includes the downcomer replacement, as well as installation of the latest design slurry and air distributor using low wear pulled nozzle technology, stainless steel wash water ring system installation and new instrumentation to allow easier process control and quick flotation optimisation.
ISASMELT™ – All Fired Up in Zambia

XT’s ISASMELT™ technology has been selected for a new copper smelter for Kansanshi Mining Plc (KMP, 80% owned by First Quantum Minerals (FQM) and 20% owned by Zambia’s state-owned ZCCM Investment Holdings). The smelter is currently under design, with planned commissioning due in 2014.

The new copper smelter will be built at KMP’s Kansanshi mine site, situated in the North West Province of Zambia, approximately 15km north of the town of Solwezi. The new installation will have a nominal design feed rate of 1.2MTPa, making this ISASMELT™ one of the biggest smelters in the region.

Phil Partington, Xstrata Technology’s project manager for the KMP copper smelter project, said the smelter will be designed to treat a mixture of copper concentrates and will produce blister copper. The operation will also produce sulphuric acid, which is a valuable by-product and will be used for FQM’s copper leaching operations. The technology package being supplied includes engineering design, a comprehensive package of key equipment in the ISASMELT™ plant, commissioning services and training. Also included is a plant wide control system for the copper smelter.

ISASMELT™ technology is no stranger to the African region, with operations at Mufulira and Chambishi, both using ISASMELT™ technology for copper production.

With the addition of KMP’s ISASMELT™ plant the total amount of copper bearing feed licensed for treatment in ISASMELT™ furnaces worldwide will be 10.5 million tonnes per year. From this experience, Xstrata Technology has developed a technology package that focuses on the critical areas that are required to establish a smelter and get it operating quickly. This includes the supply of the engineering package, technical services and key equipment that are required to come together seamlessly to produce a quality ISASMELT™ operation.

Proposed site for the new ISASMELT™ at FQM’s Kansanshi operation (photo courtesy of FQM’s Investor Presentation, Jan 2012)
2D barcode marking and scanning for IsaKidd Cathode Plates

Cathode Plate Manufacturing in Townsville has taken a leap forward to introduce 2D Barcode marking (QR coding) onto its latest cathode plate order. The new system allows for improved, automated tracking of the cathode plate through all phases of manufacture and packaging in Townsville, as well as effective tracking of the plate throughout its life cycle in the customers tankhouse.

Ola Eriksson and his team at Townsville, in conjunction with Quick Laser in China, custom-built a laser etching machine that automatically applies the 2D bar code along with a “human readable” serial number to both sides of the cathode blade simultaneously, prior to assembly of the plate.

Ola said that several different methods were investigated to affix the code to the plates, with laser etching finally being chosen due to its robustness for the life of the plate. The coding on the cathodes will provide a huge benefit to tankhouses, as it enables an easy way of tracking cathodes, saving time and money, as well as enabling preventative maintenance to take place on machinery and cathodes.

The laser etching machine has been integrated into the plate manufacturing line at Townsville, with a custom built computer based scanning and tracking system, developed between Noel Kimlin (XT Townsville) and POSMarket software, also being implemented into the operation. This allows the cathodes to be simply scanned by wireless hand held readers to record the code and plate serial number directly into the computer prior to final assembly and packaging. This also automatically generates the required packing documents, as well as storing the plate information into a central database.

Ola said that a big thanks goes out to all involved with the development & implementation of the 2D marking and scanning system. This a great example of a simple idea, that will greatly support our clients operations, as well as enabling us to produce and deliver cathode plates more efficiently to our clients.

Telfer Takes Jameson Cells

In the last few years, Jameson Cells have been installed at a number of base metal operations around the world, including Prominent Hill in South Australia, Phu Kham in Laos and Lumwana in Zambia. All these cells have been installed in cleaner scalper applications. The latest to join the list is Newcrest’s Telfer gold/copper operation in Western Australia.

Two E3432/8 model Jameson Cells were commissioned at Telfer in mid-November 2011, after being ordered in May of the same year. The cells were designed to produce very clean, final grade, copper concentrate at the head of the conventional cleaner circuit. The two cells were successfully commissioned and fully operational within a week. Metallurgical performance exceeded expectations with copper recoveries above 80% and with 90% non-sulfide gangue rejection. Further projects at Telfer will see the introduction of a M3000 IsaMill™ (1.2MW), which will be used in the copper regrind circuit to improve mineral liberation. Also a M5000 IsaMill™ (1.5MW) will also be installed to regrind a pyrite product, which will enable the liberated copper and gold to be floated prior to leaching.
The increase in precious metal price with the resources boom has seen resurgence in interest for the BBOC™ technology. Having been first developed over 20 years ago, the BBOC™ technology has been improved and developed to provide a highly productive process route for precious metal refineries.

The BBOC™ process is ideally suited to treat lead and copper refinery slimes, pgm bearing feeds, as well as Retorted Parkes crust from lead operations. It works by melting mixtures of precious metals and impurities in a cupel, through which oxygen is then blown via a lance entering through the bottom of the cupel. This oxidises the impurities, (such as base metals), that separate to the top of the melt with a high grade precious metal product or doré forming on the bottom. The slag and product are then poured from the cupel individually via a central pivot.

Importantly, the oxygen is lanced directly into the reaction zone, which leads to greater oxygen utilisation as well as maximising the specific reaction rate – in some cases up to 15 to 20 times that of a top blown conventional cupel. The lance is shrouded with inert gas and is repositioned in the reaction zone continuously, achieving maximum lance life, as well as high oxygen utilisation. Using the lance at the bottom of the cupel, overcomes the problems associated with top blown processes, where the oxygen has to pass through a slag layer, as well as affecting the separation of the slag from the metal. The design also allows for simple gas capture systems, and excellent hygiene, as the reduced gas use minimises fuming.

The latest BBOC™ was designed, fabricated and delivered last year to a client to produce doré from Retorted Parkes crust. Commissioning of the new BBOC™ will be completed in 2012 with the assistance of personnel from Xstrata Technology. The BBOC™ in this operation will produce high grade silver ingot, of 99.99% purity, with a capacity of 350t/year.

XT has slowly built up its business from the fallout of the 2007 global financial crisis, and the resulting slowdown of the mining industry. This was recognised recently with XT winning the Large Services Award category of the 2011 Queensland Export Awards, and then becoming a finalist in the Australian National Export Awards.

Brendan O’Rourke, Project Manager for XT, represented Xstrata Technology at the Queensland event, said it was an honour to win the award. Brendan said it was XT’s high level of commitment to providing robust technology and support to its overseas clients, which enabled XT to be recognised in the awards.

The high demand for XT’s high quality and energy efficient technology for the minerals and metal processing industries, have seen it placed in many of the worlds largest operations, and has enabled XT to service and support more clients through international offices and bases, such as the recently opened base in United Kingdom.