Issue 18
AP Technology™ newsletter

February 2014
ap-technology.com

AP Technology™

Exceptional value delivery worldwide

AP60 smelter now in full operation

Jacynthe Côté, Rio Tinto Alcan Chief executive, at the inauguration on 16 January 2014

news

Rio Tinto Alcan

AP60 Jonquière

Our latest benchmark technology

Our AP60 technology's enhanced performance delivers lower capital expenditure per tonne of capacity, improved labour productivity, reduced operating costs and a shorter construction, commissioning and start-up schedule for a given capacity.

First trialled at our research and development facilities in France, AP60 pot technology lies at the heart of a new 38 pot demonstration plant – the Arvida Aluminium Smelter, AP60 Technology Centre – in Jonquière, Canada. The multi-phase AP60 technology project will eventually reach a production of 460kt/y, taking into account real estate limitations (a full single production line generates up to 760kt/y).

Meeting all the logistical and operational challenges of a brand-new technology, the 38 pots were successfully started at the end of 2013. The focus for 2014 is to complete the amperage increase up to 600kA in the boosted section, stabilise the pot operation, and fully demonstrate AP60's capability at the industrial scale through exhaustive qualification testing. This includes demonstrating aspects related to the technology such as environment, health, safety and equipment.

Following the demonstration phase, we will continue to develop the next generations of this unique technology at Jonquière, further increasing pot productivity, decreasing capital and operating costs as well as reducing energy consumption and the environmental footprint. In addition to strengthening our global leadership in reduction technologies, these developments will fuel our pipeline of internal growth projects as well as those of our partners and customers.

AP60 technology	1st generation	2nd generation
Amperage	570	600
Full demonstration (planned date)	Q2 2014	2014
Pot production (tonnes/day)	4.3	> 4.5
Specific energy consumption (MWh/t)	13.3	<13.0

Editorial

AP60 technology is a reality

Vincent Christ
Vice president, Technology, Equipment Sales & Services and Value Improvement

I am very proud to announce that Rio Tinto Alcan's AP60 technology is a reality. On 16 January 2014, after a flawless start-up of the first 38 AP60 pots in Jonquière, Canada, we officially inaugurated the Arvida Aluminium Smelter, AP60 Technology Centre in the presence of Quebec provincial and Canadian federal government representatives, local stakeholders, AP Technology™ customers as well as Rio Tinto Alcan senior leaders, employees and guests.

The investment of more than $1 billion to build this unique technology centre underpins our commitment to remain at the forefront of technology development despite the challenging times faced by the global aluminium industry.

Unprecedented productivity and competitiveness
Our AP Technology™ teams are proud to offer this next generation technology to our global customers. AP60 achieves unprecedented levels of productivity and competitiveness from both a capital expenditure and operating cost point of view. A full length single AP60 potline can produce a mindboggling 760,000 tonnes of aluminium per year. AP60 also represents the backbone of our APXe technology which provides even greater energy efficiency.

This advanced industrial facility was also designed for enhanced safety and a much better work environment while continuing to improve electric insulation, ergonomics and fluoride emissions. In summary our technical teams have once again demonstrated their ability to innovate, design, transfer, build and deliver a breakthrough technology on time and meeting technical and financial targets.

Did you know?
Here a few interesting facts about our brand new AP60 technology.

- Each of the 38 AP60 pots is longer than a bus – 18 metres – and twice as long as an AP18 pot.
- Each carbon anode weighs as much as an SUV – 1,420 kilos – is baked for two weeks and is consumed in 28 days.
- The cranes on the AP60 potlines are among the longest in any smelter – 28 metres long.
- Each AP60 pot has the capacity to produce more than four tonnes of metal per day.

Across the board, 2013 has been a very exciting and busy year for us in terms of the start-up and commissioning of AP Technology™ by our global customers in Australia, Bahrain, Canada, India, Saudi Arabia and United Arab Emirates.

Please enjoy reading the interesting updates and news in the following pages. And rest assured that we are committed to continuing to support our global customers by delivering advanced solutions to optimise their operations and success.

Evolving our AP Technology™ platforms to deliver your creeping projects

Despite the severe economic downturn, we are pursuing our key development programmes on three main AP Technology™ platforms:

- AP2X
- AP3X and AP4X
- AP60 and APXe

More than ever we are focussed on maximising the value created in AP Technology™ smelters by implementing our latest developments. We are targetting both high amperage operation (250kA on AP2X, above 400kA on AP4X and 600kA on AP60) and low energy consumption, with demonstrated operation at 12,300kWh/t and ongoing development to reach 12,000kWh/t.

Leveraging our extensive experience in designing and operating pots, our AP Technology™ teams provide custom made solutions specifically adapted to your smelter's needs and maximising your investments. These robust solutions combine:

- Technology bricks validated throughout the technology platform spectrum (lining designs, forced convection network, JIBS, magnetic compensation, process control, new materials and more)
- The industrial performance of smelters based on our AP Technology™ platforms including the Arvida Aluminium Smelter, AP60 Technology Centre
- Design tools, models and experts with proven performance and expertise over the past decades
- A rigorous integration process that ensures flawless implementation of your tailor made solution

Do you have a brownfield or greenfield project?

Do you want to improve your current operation?

Are you looking for high productivity or low energy solutions?

Are you energy or CAPEX constrained or both?

Our AP Technology™ teams have the right solution to meet your needs. We support you throughout your project, from the order of magnitude evaluation, through the engineering and construction phases, until the start-up and normalisation of your operation.

Kitimat

The last straight line before start-up

Kitimat site

At Kitimat, British Columbia, construction continues on the new 384 pot potline, installed in four separate rooms and featuring the latest AP40 technology at 405kA and 13,150kWh/t.

With the first cathode block sealed in a new dedicated shop on 12 December 2013, the Kitimat Modernisation Project (KMP) is on track to deliver its first metal by the end of 2014 as planned.

2014 is going to be a busy year with ramping up all training activities, commissioning, start-up preparation and effectively starting all the new workshops by year end. In addition, the team on site will also have to safely shut down the existing Soderberg lines and relocate the personnel in the new facilities.

The AP Technology™ teams are already fully mobilised to support and contribute to the success of the Kitimat Modernisation Project.

Hindalco

Moving ahead in India

Hindalco smelter site

In India the Mahan Aluminium Smelter Complex is under trial production with the first metal tapped out in April 2013. For the first AP3X potlines, a crossover jumper was designed and installed across 40 pots instead of 180 pots in circuit. This saved some 34 volts (DC) when 32 pots were in operation, reducing fixed losses across the pot busbars. Start-up of the pots is under way along with the balance of the plant facilities.

Hot metal from the smelter is now being cast as ingots and sows in the casthouse and sold on the domestic and international markets. A coal fired captive power plant installed adjacent to the smelter provides power.

Dry out of the anode baking furnace is under way and the first green anode has been produced. Hindalco supplies Mahan with alumina from its captive refinery at Muri and its new Utkal alumina refinery which also started production in 2013.

At the Aditya smelter, Hindalco completed the initial phase of 180 pots and successfully carried out short circuit testing on the rectifier units. Commissioning of the anode rodding and casthouse facilities was completed. Commissioning of the captive coal fired power plant is under way to provide steady power to the smelter facility. The AP Technology™ start-up team is now on site.

Ma'aden site by night

Ma'aden Smelter

Ramp-up in 2013

Located at Ras Al Khair in Saudi Arabia, the Ma'aden Smelter consists of two potlines of 360 pots, featuring AP37 technology with a combined capacity of 740,000 tonnes of aluminium per year.

On 12 December 2012 the smelter celebrated achieving its First Hot Metal milestone which marked the successful commissioning of the first of 720 pots and a key step towards commercial production.

2013 saw the ramp-up of the two potlines.

"The ramp-up and increase of the first potline production are expected to reach production capacity within the second quarter of 2014," Ma'aden said in a Saudi stock market statement.

Sohar Aluminium

Creeping to 400kA on its way

Sohar power plant

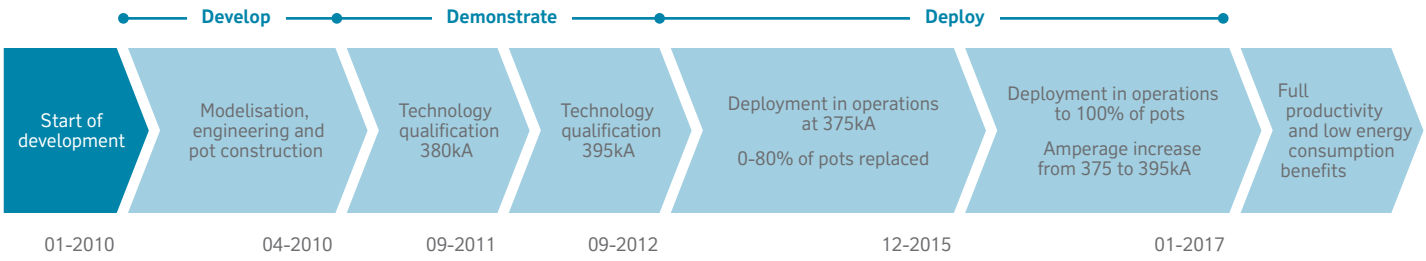
In late 2012 Sohar Aluminium began progressively converting its first generation AP37 pots into AP39 pots as part of its pot renewal programme. The conversion will be completed by the end of 2014. In late 2013 we completed the project's feasibility study including moderate modifications to the plant to deliver the full potential of the creep. Project execution with modifications to the plant workshops started in Q1 2014.

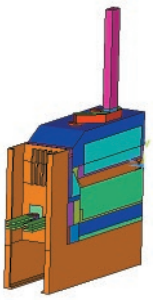
This project will allow Sohar Aluminium to reach an annual production of close to 400,000 tonnes adding about 25,000 tonnes compared to previous levels.

As a shareholder but more importantly as a business partner, Rio Tinto Alcan and AP Technology continue to actively support Sohar Aluminium, from developing the project concept of creeping with AP39 pots as well as during the feasibility study and implementation.

Alouette

AP40LE implementation





Pot modelisation

Rio Tinto Alcan partnered with the Alouette smelter to successfully co-develop AP40LE, a high amperage and low energy consumption pot based on its AP30 pots family. In October 2012 Alouette launched a full pot replacement programme including a new lining design for operating at very low ACD along with a low resistivity anode assembly. The pot's energy consumption ranges from 12.5 to 12.7MWh/t depending on the anode assembly package.

Pots are replaced at the natural failure rate of existing pots and require no special modifications to the potshell, superstructure, shops or handling equipment. The same anode dimensions are also retained, making the project high return and very low investment.

Pots in the plant's boosted development section have been operating at 395kA for more than two years at expected performance. In the rest of the smelter, the same pots are operating at 375kA in implementation and transition mode. Once about 80 per cent of the pots will have been changed, all potlines will perform at 395kA, increasing production by 5.6 per cent compared to pre-implementation figures. This wide operability range testifies to AP40LE's robust design, enabling a smooth transition with minimal disturbances and adaptation.

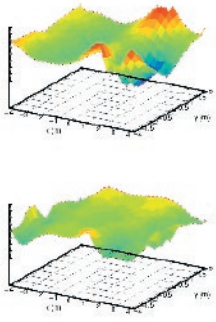
Always higher

But 395kA is not the limit of this low energy pot. With Alouette we are preparing to develop the next generation of LE pots to reach even higher amperages while maintaining very low energy consumption.

AP Technology has a proven track record of successfully delivering AP30 and AP40 technology. Modelisation capabilities enable adapting solutions for a wide range of customer needs and provide the best technology for new smelters or upgrade existing smelters with low energy consumption technology to optimise power blocks. Check out our other pot technologies – AP2X, AP3X, AP4X, AP60 and APXe – on our website.

Boyne

A loop around, a step ahead



Before and after

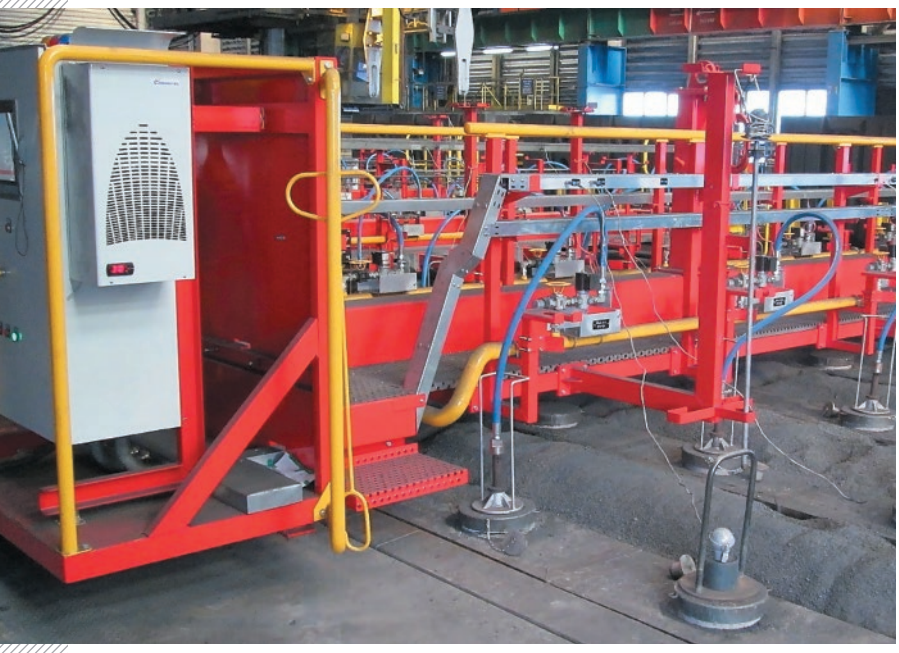
In the race to low specific energy and high productivity, controlling metal pad deformation and metal pad movements in decades old technology pots is key to process sustainability and optimisation.

At Boyne Smelter Ltd (BSL) in Australia, potlines 1 and 2 were built some thirty years ago based on late 1970s Sumitomo technology. Over the last three decades, many amperage creeps, upgrades and optimisations took place on the potlines to keep pace with the ever increasing demand for improved economics. Given the pots' magneto-hydro dynamic balance limitations, BSL launched a feasibility study with the AP Technology™ team in 2011 for a compensating loop to stabilise the pots, unlock further amperage increases and improve energy consumption.

With the business case approved, AP Technology™ leveraged its extensive experience in compensating loops to provide diverse services, including MHD modelling, thermo-electrical studies, basic engineering packages and operating guidelines. BSL conducted the detailed engineering, selected and upgraded the rectifier groups and successfully managed project implementation on time and within budget.

Busbar casting started in April 2013 and construction in the potline 2 basement in June 2013. In less than five months, the compensating loop and rectifier were commissioned and successfully energised. Only a few weeks later, the potline 2 pots were stabilising in line with the MHD modelling, allowing the first step towards higher productivity.

AP Technology™ baking furnaces



Left: Tiger firing system
Right: EMAL 2 anode baking furnace

Tiger:
Up and running at Aluminium Dunkerque

In April 2013 Aluminium Dunkerque became the world's first smelter to start up TIGER, our AP Technology™ Anode Baking Furnace firing system. By mid May the four fires were operating successfully. Following extensive trials in Saint-Jean-de-Maurienne, the system was delivered by RTA Alesa with the active participation of the AP Technology™ group.

Tested under extreme operating conditions that included stalling the fires, the system has proven its reliability. Today it is operating flawlessly delivering results at the edge of anode baking process control technology.

Boosted by these results, AP Technology is already working on an upgraded version of the TIGER firing system. Continuous improvement tools and new developments by our AP Technology and R&D groups will enhance the system's performance and ability to reduce fire cycles compared to other systems.

EMAL 2:
High capacity AP Technology™ anode baking furnace commissioned

As part of the EMAL 2 expansion project, construction of the smelter's anode baking furnace was completed in 2013. With four fires and 68 sections, the AP Technology™ furnace has a capacity of 330kt/y of baked anodes. Furnace commissioning and technical performance assessments are expected to be completed in early 2014.

ALPSYS

Much more than a pot control system

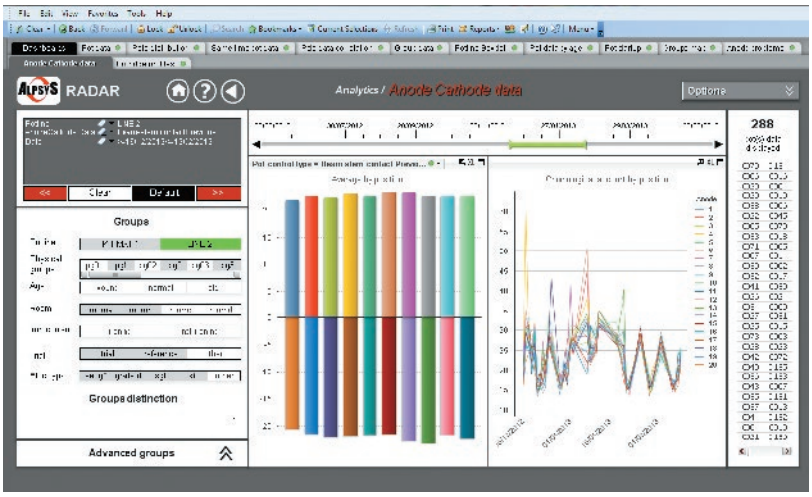
How do you differentiate one pot control system from another?
A pot control system is not an everyday consumer product for which you can find numerous independent comparisons on its performance and main component costs. So on what grounds can you base your evaluation when comes the time to invest in a new pot control system?

On the fact that it is already in operation somewhere else? Of course. On the price? Certainly.

But is this enough?
Since choosing a pot control system is a long term commitment, other key elements need to be considered.

- How large is the installed base?
- What support and services are offered on hardware, software and reduction process expertise?
- Is there a user community?
- Are there R&D activities and support to ensure future improvements?

RADAR



2013: delivering innovations and value
We provide smelter operators with the same ALPSYS product and related services that our own smelters expect to receive from a pot control system supplier. That is why 2013 was a busy and exciting year of delivering innovations and value to our customers.

Starting up the Arvida AP60 ALPSYS system was a key milestone for our new delivery model involving RTA Alesa and Thales. Two legacy customers have confirmed their confidence in ALPSYS by launching system upgrade projects.

On the service and support side, we added Arvida AP60, Laterrière and Alma to our growing list of ALPSYS system customers under maintenance which includes five other smelters.

The additional functionalities available for ALPSYS users also continue to grow thanks to our continuous R&D and industrialisation efforts:

- RADAR, our process intelligence solution, is a quantum leap forward in making process and production data presentation and analysis easier than ever. First installed at Lochaber in January 2013, we continued to develop new functionalities with the solution's second release now available.
- We significantly improved the pot instability procedure: saving energy by reducing the ACD leads to operating pots closer to their limits, often at increased instability levels. ALPSYS's new high/low frequency instability functionality further reduces the pots' specific consumption by avoiding unnecessary resistances and providing more timely alarms of anode induced instabilities. A year ago we rolled out this improvement on both potlines at Alouette.

Last but not least, we launched the first ALPSYS Club and ALPSYS Forum in 2013, supporting a more active ALPSYS community to foster exchanges and generate fresh development ideas.

Thanks to ongoing developments, 2014 promises to be another exciting year for our AP Technology™ solutions and customers.

MESAL™

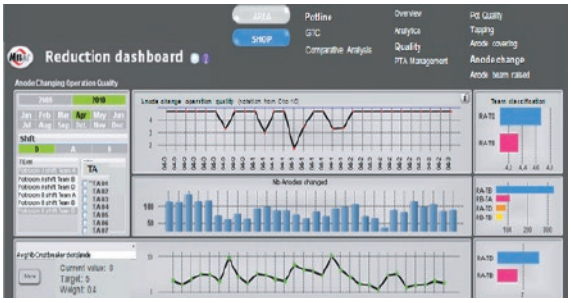
Operational Excellence Platform for Reduction

Due to ever increasing global competition, all primary aluminium producers are facing stronger cost pressures. Today increasing production while reducing production costs is crucial to optimising a smelter's performance.

The concept of Operational Excellence integrates all existing information generated by automation or manual systems into a common framework. This approach facilitates faster analysis and decision-making to achieve an asset's full potential.

The MESAL™ Operational Excellence Platform for Reduction provides a set of integrated tools to support Operational Excellence by:

- Collecting information from various sources (PTA plc, ALPSYS, audits, other MESAL™ modules, MESAL™ plant infocentre, manual measurements,…)
- Generating the relevant KPIs (operation and equipment)
- Turning information into knowledge with a real time dashboard and data analysis tools (cross analysis, trouble shooting, process)



MESAL™ dashboard

Four main areas of focus

- Improve operations quality and consequently technical results
- Enhance the decision-making process
- Increase operators' involvement and responsibility
- Develop proactive management

Four key functions

1. MESAL™ PTA management views provide information regarding PTA location, PTA available functions (combination of tools availability) and PTA transfers from one potroom to another or to a maintenance area (for operational reasons, preventive maintenance or breakdowns).

2. MESAL™ dashboard views help operations teams ensure production performance targets are met and supervisors are following best practices guidelines.

3. MESAL™ infocentre (access to smelter data) with dashboard and analysis tools is the ideal platform for Business Improvement.

4. MESAL™ shift portal empowers supervisors and enables them to focus on the activities that truly impact their results, increasing management's presence on the shop floor. Throughout the shift, it:
   - Helps supervisors optimise their own time
   - Calculates process and production KPIs so supervisors can focus on analysis and correction
   - Displays management instructions (avoiding multiple emails)
   - Eases communication between previous and next teams (log book)

On the move

At Rio Tinto Alcan, we are constantly looking for ways to improve our production activities. One enabler is plant information systems that provide optimal visibility into manufacturing processes to help production teams make better informed decisions. MESAL™ (Manufacturing Execution System for ALuminium), an AP Technology™ product founded on our smelter operational expertise and know-how, does just that.

MESAL™ is delivering significant benefits at five sites worldwide as we continue to develop and roll out the solution across our smelters.

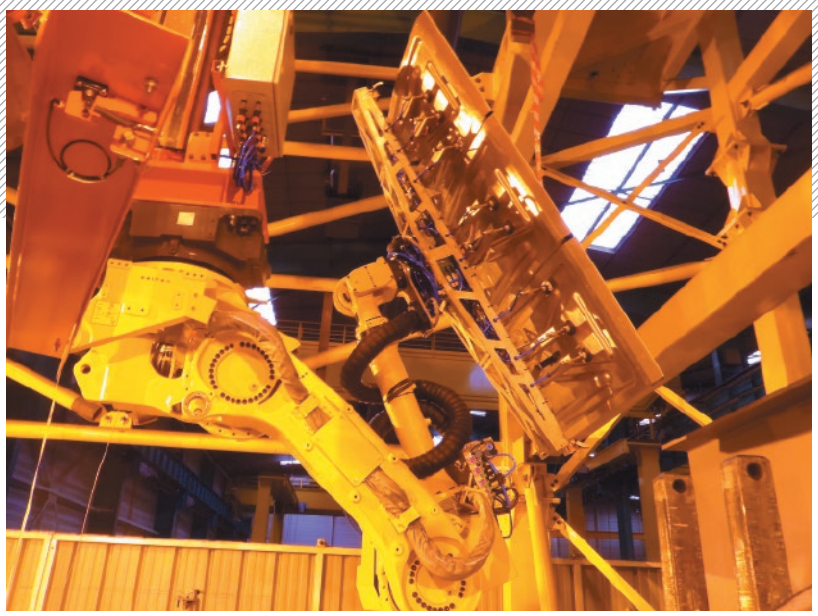
MESAL™ success story

- In 2006: complete MESAL™ solution implemented at Sohar Aluminium in Oman with MESAL™ 2.0 deployed in November 2012. Maintenance support is now available to all smelters using MESAL™.
- In 2009: all MESAL™ common functions implemented at Aluchemie, our joint venture anode plant in the Netherlands.
- In 2010 and 2011: specific MESAL™ Carbon Solution functions deployed at Aluchemie for all anode processes from raw material to final delivery.
- From 2011 to 2012: MESAL™ Casthouse functions deployed at Dunkerque Aluminium in France to manage operations and processes to deliver value-added products.
- In 2013: specific functions deployed at Alma and Laterrière in Quebec.
- In 2014: MESAL™ 4.0, the latest major release, will be deployed at Kitimat Aluminium in British Columbia, Canada, embedding Operational Excellence enhancements and covering all aluminium smelter workshops.

With its unflagging focus on innovation, the MESAL™ team is already designing the next generation solutions to be released in the coming year. It will include the MESAL™ regional concept embedding cloud and mobility capabilities.

Global Smelter Design (GSD)

The AP Technology™ smelter of the future



ECL pot hooding handling equipment

The smart smelter

Over the years the AP Technology™ team has developed a comprehensive set of pot platforms and other key smelter components, meeting customer requirements with a broad range of robust and efficient solutions. But pots and equipment are only a few of the many aspects of a smelter project. At Rio Tinto Alcan, we are taking a fresh look at a complete smelter solution where costs, constructability, operability, maintainability, safety and environment are integrated into a holistic approach. It is the next significant step that goes far beyond how today's smelters are designed.

The AP Technology™ team's Global Smelter Design (GSD) programme capitalises on past experience and proprietary technology, incorporating the latest technologies and products such as automation, robotics, intelligent sensors, new materials and more. We are integrating these new technologies and developing global, next generation smelter solutions built on the following pillars:

Open innovation – Creating partnerships with external and complementary expertise for efficient and rapid results. We are rising to the challenge of exploring totally new ways of looking at solutions. This includes leaner, repeatable transport logistics systems with lighter infrastructure and automation to ensure the right quantities are transported at the right time to the right place while dramatically reducing buffer stocks and queues.

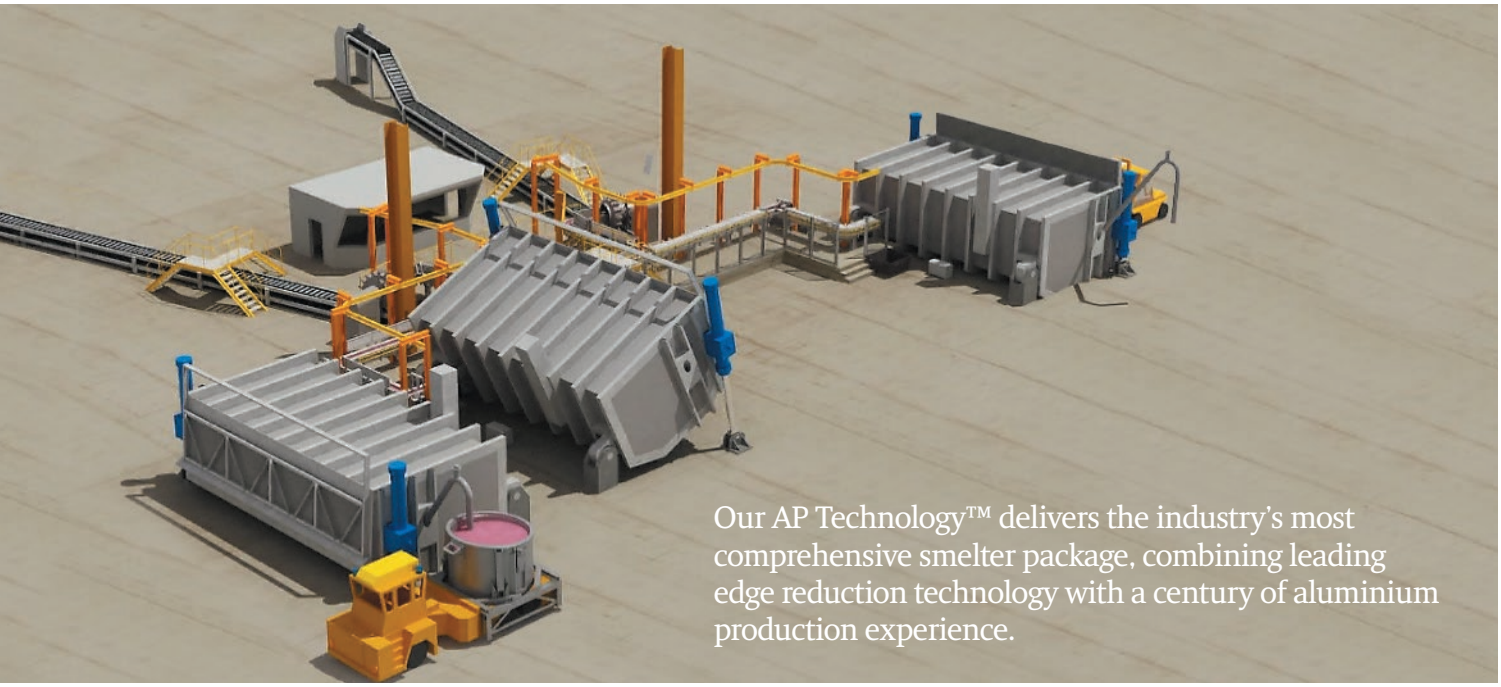
Applied solutions – The GSD roadmap is built to smoothly and continuously integrate breakthrough technologies and solutions into our AP Technology™ smelters, creating value and buy-in at the earliest possible stages for all stakeholders. As an example ECL is developing the BAC (Best Anode Change) to offer a best in class anode change solution. Components of the solution are already commercially available including the single man PTA (Pot Tending Assembly) as well as assisted vision in a challenging environment for accurate auto anode positioning.

From constraints to opportunities – Integrating new technologies into a Global Smelter Design approach allows us to change the way we view constraints. For example inspections or maintenance operations are often perceived as labour intensive, performed under high exposure and requiring equipment downtime. As a consequence these operations are not always conducted as often as necessary and are seen more as extra costs rather than an added value action. With automation, robotics and metrology improvements, these operations can be done safely and autonomously in a constrained or exposed area by a robot equipped with remote sensors. Such solutions enable more regular inspections and maintenance, reduce health and safety risks, increasing equipment availability as well as productivity while reducing overall costs.

These examples offer a taste of how the AP Technology™ smelter of the future builds on first in class processes to adapt rapidly to changing markets trends and constraints through a global, open and applied approach. Visit our website regularly for our latest GSD programme achievements.

Innovative compact casthouse design

Efficient, flexible and safe



Our AP Technology™ delivers the industry's most comprehensive smelter package, combining leading edge reduction technology with a century of aluminium production experience.

One key component of this package is an innovative compact ingot casthouse design that incorporates best practices, modern instrumentation and clever layout to deliver a low cost, efficient and safer to operate ingot casthouse.

The AP Technology™ compact ingot casting package differentiates itself from the competition by having:

- A simplified layout design
- High operating time availability and productivity
- Optimised costs lowering both your initial investment and your operating costs
- Rio Tinto Alcan's high health and safety standards and environmental efficiency embedded into the design

Our AP Technology™ compact ingot casthouse package offers several distinctive features.

- An innovative compact layout developed through extensive modelling based on years of operational experience, incorporating all possible parameters and conditions found in a casthouse including breakdown and maintenance modes. The resulting layout allows the same level of production with one fewer casting furnace, lowering investment and operating costs significantly.
- Metal transfer into the furnaces is performed with minimum metal turbulences, resulting in very low melt losses.
- A furnace design incorporating a careful sealing concept, high efficiency burner and pressure controls provides our customers with low energy consumption per tonne produced.

AP Technology™ compact ingot casting technology is flexible and can be made available both for new smelters as well as existing facilities seeking to increase capacity or improve performance.

End-to-end casthouse services
Our AP Technology™ engineering capabilities cover a broad range of casthouse customer needs from potroom metal delivery to product shipment including:

- Pre-feasibility studies
- Metal flow modelling and casthouse layout simulations
- Basic engineering
- Equipment selection
- Technical support during construction, commissioning and operation
- Training at our Institut Paul Héroult

Our AP Technology™ compact ingot casthouse package can be linked to our Manufacturing Execution System (MESAL™) for optimum integration of operations, planning, stock management, expediting and reporting.

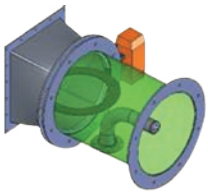
Watch for our AP Technology™ compact ingot casthouse solution which will be showcased at our Kitimat smelter in British Columbia, Canada, currently undergoing a major modernisation.

Sustainable development

AP Technology deploys a wide array of sustainable solutions and services

When people think about AP Technology™, they usually think about the reduction and anode technologies featured in the first part of this newsletter. But AP Technology™ offers more than that.

We have been working for several decades to develop advanced solutions in health, safety and environment (HSE) that help our customers deliver a responsible and sustainable future.



JIBS

- Sustainable environmental solutions that make AP Technology™ smelters as environmentally friendly as possible with minimum impact on their surroundings.
- Sustainable health solutions that provide the healthiest conditions possible for those working at AP Technology™ sites and smelters.
- Sustainable safety solutions for the safest way to build and operate AP Technology™ smelters.

Our AP Technology™ team works with customers to help improve their business sustainability by delivering a wide range of solutions supported by a highly experienced technical group.

Our sustainable solutions
Here are a few examples of our sustainable solutions for both greenfield projects and existing smelters (retrofit):

- JIBS (Jet Induced Boosted Section), the AP Technology™ solution for pot over suction. This AP patented technology is a cost effective alternative to the traditional dual duct boosted suction. Fluoride emissions are reduced by 0.10 to 0.15kg F/t Al and CAPEX by approximately 50 per cent compared to other pot over suction solutions. Now part of our AP Technology™ package, it can be applied to any pot technology.
- Pot gas cooling by water vaporisation is a sustainable and profitable solution that is highly recommended for GTC coping with an amperage increase and/or hot seasons. It offers very significant CAPEX savings when compared to competing solutions such as adding a filter surface or installing a water heat exchanger.
- And there is more to come. We are in the final stage of industrialisation of an unmatched solution for anode butts emission with a measured efficiency of almost 100 per cent! Stay tuned: more news to come in the next newsletter!

Our technical services include:
- Supplying technology packages and solutions with the highest level of commitment to addressing HSE issues
- Providing customers with environment related training through our dedicated training institute, the Institut Paul Héroult (IPH)
- Delivering tailor made technical assistance that leverages our in-depth expertise and extensive resources, ranging from operational excellence support on scrubbing and environmental equipment and processes to specific modelling activities such as workshop ventilation studies, pollutant dispersion modelling and in-pot gas collection optimisation

Hygiene
Our most recent significant achievement is our Industrial Hygiene package which covers sampling and measurement for the most critical human health risks in a smelter: HF, Ft, HAP, CO, SO2, CL2, breathable and inhalable dust, SiO2, fibres, noise and temperature. The IH package is available upon request.

AP Technology™: a step ahead in sustainable development to make a positive difference!

AP Technology™ website

New and improved

In late 2012 Aluminium Pechiney decided to give its website a facelift. The new website launched in March 2013.

Featuring documents and videos, it provides an overview of AP technologies, their implementation around the world and their impact on the history of aluminium. The site is divided into two parts – a 'public' section for the general public and a 'private' section for our customers that features specific tools such as:

- Community news – communication on key topics for each technology and related news
- Forums – HSE and ALPSYS forums inviting users to interact and participate in questions/answers and exchanges
- AP Technology™ technical results – published in a dedicated space for customers belonging to AP Technology™ Clubs

The new site also offers the level of security necessary to ensure the confidentiality of all information exchanged.

Upcoming enhancements
Our goal for 2014 is to expand service to our customers and address their needs by providing new forums on various technologies, a space dedicated to surveys on technical subjects and an enhanced capacity for interaction and exchanges. These new features will be online soon.

We are waiting to hear from you at www.ap-technology.com

AP Technology™ customers: share your HSE best practices and safety alerts with the AP community

The HSE Forum, accessible to AP Technology™ customers registered on the website's private section, is designed to promote exchanges between our customers and partners on HSE related topics.

The HSE Forum gives members the opportunity to post messages or ask the community questions. It fosters conversations around HSE experiences pertinent to our industry and suggestions for improvement and best practices.

We look forward to discussing issues with you on the HSE Forum to continue our shared journey towards a safer workplace.

IP 2.0

In a world where activities are increasingly performed using web 2.0 technologies, we are reviewing the way our intellectual property (IP) is managed and protected when providing AP Technology™ solutions to the market. The challenge is to provide the much needed information on IP sensitive items to our customers in the most user friendly way while preventing this information from reaching unauthorised users.

Until now such IP sensitive information was provided in PDF documents sent to their destination in password protected zip files to ensure their safe delivery to the customer.

Using the latest available technologies, our AP Technology™ teams have decided to provide the AP Technology™ packages to their users through a virtual data room.

Such a system will not only allow secure access to the documents, it will also enable users to adapt the way they access IP sensitive information to meet their needs.

TMS 2014
San Diego, California

At the TMS Light Metals Conference in February 2014, Rio Tinto Alcan will present ten papers and sponsor six presentations. These papers cover the smelting processes of reduction, carbon, environment, casting as well as process control and MES.

1 In the reduction area, we will present a total of eight papers. The first discusses our new AP60 smelter's construction, commissioning and start-up beginning with the development of the first prototype AP60 pots.

The second one is about the AP60 pot's thermal electrical mechanical behaviour during start-up using a quarter pot model. Compared to slice models, this model includes the pot corner and captures longitudinal flex. This enables more realistic predictions especially for structural entities such as shell displacement and deformation, and has been applied to the AP60 pot.

The third paper studies the link between anode effect and bath height and explores its implications for the ALPSYS pot process control system. This is particularly pertinent today given that increasing constraints, including much lower ACD, power modulation and operational disturbances, have led to a recent surge of PFC emissions, pushing the technology in modern smelters to the limit.

Next two University of Sherbrooke papers and three Université du Québec papers sponsored by us will be presented. The first deals with a model for predicting the formation and evolution of crust in pots. The model integrates heat transfer, solid/liquid phase-change and the chemical transformation of anode covering material (ACM). It provides the evolution of the temperature field; the ACM conversion into crust to evaluate the pot's crust thickness; the liquid fraction to explain the bath's melting/solidification and the liquefaction of the crust once formed; and heat flux distribution to calculate components of the pot's top heat losses. The second paper explores the cartography and chemical composition of the deposits found on cathode in pots and provides insight into the mechanisms responsible for forming solid deposits at the cathode surface.

The next paper describes results and observations on the structural characterisation and thermo-physical properties of the side ledge obtained by the analysis of side ledge samples extracted from post-mortem pots. The fourth one is about modelling alumina agglomerate in the pot where all the physical phenomena (heat and mass transfer) between the formation and the complete dissolution of aggregate are described and defined by a set of equations. The last reduction paper is how analysis of the properties of in-situ measurement examples of the temperature signal of the sidewall during the early life of a pot provides useful information in both operation and the diagnostics of the aluminium electrolysis pots.

2 In the carbon field, three papers will be tabled. One is on the development of MIREA, an industrial device for measuring online anode electrical resistance, a characteristic recognised as a significant parameter for pot performance as the carbon material itself contributes to half of the anode assembly voltage drop. More than 600 anodes were characterised at different anode plants around the world. The MIREA apparatus highlighted resistance heterogeneity problems such as highly resistive tops and helped detect non-optimised vibroformers. This equipment is designed to reliably achieve more than one anode measurement per minute and deliver comprehensive data analysis.

A second paper is on the production of slots in green anodes. The most cost effective method for making slots is to form them at the green stage directly in the vibrocompactor or press. However plants struggle to form slots higher than 300 mm due to anode cracks and segregation. Using an approach that combines a rigorous methodology and finite elements modelling, slot height has been maximised. Finite element modelling specialists teamed up with process, production and equipment manufacturing experts to thoroughly analyse each step of the anode manufacturing and handling process. Technical solutions were found to increase the slots' height and ensure a low scrap rate through new slot design and adaptations to existing transport and handling equipment.

The third paper describes the lean engineering methodology used to develop our new 'in house' anode baking furnace firing system in 2011. The new firing system integrates the voice of the customer thanks to a large survey conducted across our smelters that captured customer feedback on existing equipment/ systems as well as recommendations for system improvement and user flexibility. Our Technology and R&D and RTA Alesa Engineering teams worked together to define and develop the system with the support of a very experienced smelter team for the industrialisation process from Saint-Jean-de-Maurienne. The time to market was exceptionally fast with the first full-scale firing system being commissioned flawlessly in April 2013 at the Aluminium Dunkerque smelter.

3 In environment, we will show how many authors confirmed the utility of combining different measurement approaches to ensure that all PFC emissions get measured as the variable but significant presence of PFC emission outside AE. In this paper, we analyse the results obtained by using an FTIR with in-situ and real time analysis and by using an extractive procedure with sampling bags and GC-MS analysis integrating all emissions over an extended period of time.

4 In casting, one presentation is on improving casthouse performance with a new patent pending technology that allows cooling molten metal directly into the trough while casting is under way. Heat extraction in the cooling trough can be controlled according to the molten metal temperature in the furnace and the molten metal flow rate. This innovative approach enables a more efficient use of equipment and a potential reduction of the equipment needed (i.e. number of furnaces) to meet casthouse productivity. It also offers alternatives for smaller footprint casthouses where molten metal could be cast directly from the transport crucibles.

A NYX Dimension Inc. presentation sponsored by Rio Tinto Alcan explains an innovative automated surface inspection for DC cast billets. The surface of each billet is scanned by four lasers while being conveyed at normal speed prior to ultrasonic inspection. Two additional lasers measure the position of the defects as well as the billet length. Up to 26 million measurements are logged per billet. Dimensional analysis is used to categorise surface defects based on the surface topography and the average billet diameter.

5 In analytical technology, a paper will present the 20 year history of LiMCA use since its introduction to the aluminium industry at the TMS Conference in 1994. LiMCA technology has been successfully used by most aluminium producers worldwide for measuring inclusions in molten aluminium. The LiMCA II instrument's versatility has been demonstrated through its use at various points in the casting process. It has been very successful from a process understanding, optimisation and control point of view. In 2004 the LiMCA CM, a fixed implementation best suited for process control applications, was introduced to the industry.

6 In the Smelter Technology group, we will present the last Rio Tinto Alcan paper which is about the key success factors for deploying our manufacturing excellence solution MESAL™. This solution provides a framework and dashboards for operation management, process quality follow-up, measurement and analysis of production performance and optimised inventory management. The paper also focuses on our strategy for standardising and centralising expertise in regional competencies centres with the ultimate goal of establishing a central control centre with a real time 'Lean 0 (zero) Infocentre'.

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At Rio Tinto Alcan, we are committed to ramping up smelter productivity and driving down energy consumption. From AP40 to AP60 for unprecedented productivity and from AP50 to APXe for dramatically lower energy use, our AP Technology™ platforms continue to break new ground.

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