

Fives Solios' solutions for anode baking

Implementation of wireless communication for secured firing and control systems

In anode baking, wireless networks are becoming the logical modern solution with standard PLCs. However, whenever safe communication between safety PLCs are used for secured control of the baking furnace, wireless communication has encountered numerous drawbacks due to the nature of safety communication protocols and the interference with other WiFi systems in the baking furnace area.

Fives Solios' Firing & Control Systems now make use of WiFi for the secured baking of anodes.

It is the result of extensive development work with major PLC suppliers aimed at finding the right combination of modems and antenna and to fine tune the PLC's and WiFi systems so that operation performance and safety requirements are fully met.

Enhanced development for high performance sealing

In anode baking plant, efficient refractory port sealing is an important condition required to reach rated flows inside flue walls. Fives Solios has developed a new technology which was tested at the Mozal smelter to enhance this sealing function. The Fives Solios solution is based on the use of advanced materials that combine flexibility and resistance to the extreme conditions in the furnace. It consists of a flexible membrane held between two rigid plates which encloses the inner refractory port when inflated. As a consequence, cold air ingress into the fume exhaust ramp is considerably reduced which results in an increased draft level in the flue wall. It also improves combustion conditions and reduces unburnt pitch deposits in the exhaust ramp and downstream ducts.

Innovative solutions presented at TMS 2011 in San Diego.

Fives Solios attentive to its clients

Fives Solios is a customer-oriented organization fully committed to the development of innovative solutions. The new Chief Executive Officer of Fives Solios, Daniel Brunelli-Brondex, answers three questions to explain it.

Fives Solios is made up of four companies: two are located in France, one in England, one in Canada, and four services subsidiaries. How can Fives Solios customers benefit from this organization?

Fives Solios is able to fulfill its customers' requirements thanks to an increasing product range and a strong geographical presence on four continents. The Solios group was created in 2003 and is based on three centers of excellence: Carbon, Gas Treatment and Casthouse.

This organization and the technologies available allow us to provide our customers with reliable solutions and adequate support to meet their growth strategies, such as the large increase of smelter capacity. Furthermore, our permanent establishments are aiming to get closer to our main customers. Our Montreal office is close to Alcoa and RTA as well as the main engineering companies (SNC Lavalin, Bechtel, Hatch).

In the last ten years, Fives Solios has set-up Service subsidiaries, such as Solios Services Al-A'ali in Bahrain to serve our Middle East customers, Solios Services Southern Africa, Solios Vostok in Russia and Solios Services in China. These entities develop a long term partnership with our customers and provide them after-sales services and on-going local assistance.

How did Fives Solios adapt to accompany its customers during their development worldwide and their continuous research of innovation?

Historically, the French companies used to accompany Aluminium Pechiney in its development. From the beginning of the eighties, the set-up of a subsidiary in Montreal was aimed at supporting the growth of primary aluminium production in North America. Later, each company gradually diversified its assistance towards all major aluminium producers. In order to meet our clients' new requirements, Fives Solios has developed key competences in terms of project management, site supervision and

knowledge management of a large panel of local subcontractors.

In addition, Fives Solios belongs to a large international group, Fives, which sustains our development with financial and institutional back-up. This support endows our customers with additional benefits when they invest in larger and evermore sophisticated projects, which amount to several billion dollars.



Daniel Brunelli-Brondex
C.E.O. of Fives Solios

What does Fives Solios propose to answer to these largest smelters' needs and constraints?

Proposing innovative technologies and developing proprietary know-how have always been Fives Solios' spearheads. Innovation efforts are directed to meet our clients' expectations in terms of performance, capital cost and respect for the environment. Fives Solios invests continuously in R&D programs and has developed technologies such as Xelios, the latest generation of vibro-compactors, to improve anode quality despite a continuous decrease in raw material quality.

Our gas and fume treatment centers also benefit from this continuous research policy: for example, our state of the art gas treatment centers combined with the addition of Yprios dual pot

suction technology has allowed in recent years a 30% reduction in the smelters' total fluoride emission, at the lowest operating cost. These results have been obtained despite the fact that pot emissions doubled in the last 20 years with the advent of high amperage pots operated with acidic electrolytic bath. Moreover, to accompany our customers in their constant evolution, Fives Solios sets up R&D co-development agreements with technological leaders to ensure that we tailor our innovation towards their present and future needs. Lastly, in order to meet the market requirements, we have greatly diversified our fabrication locations. In 2011, thanks to our engineering subsidiaries in Chennai and Shanghai, we manufacture and export more equipment from India and China, while optimizing construction and local contents where the new smelters are built. ■

"Thus, Fives Solios is more than ever present near its customers to meet their needs and grow at their side."

FIVES SOLIOS GOOD NEWS FOR YOU

FEBRUARY / 2011

EDITO

The primary aluminium market rebounded in 2010 both in terms of production and market price. Encouraged by an optimistic aluminium outlook, capacity restart and new investments should be sustained at reasonable levels in 2011 and beyond. However the driving force behind the growth of the aluminium industry comes mainly from the developing regions of China, India and Middle East, with some opportunities in regions with abundant water resources such as Canada or Russia.

In 2010, Fives Solios pursued its development in India through contracts with Vedanta and Hindalco, whilst extended its collaboration with some existing customers by getting orders from Chalco, Sohar Aluminium, RTA, Alouette and Aluar. Most notably, Fives Solios consolidated its position as a worldwide leader in the primary aluminium market. The past year represented a new high for Fives Solios in terms of orders intake, thanks to the only large scale investment outside of China, implemented by the newly formed JV between Ma'aden and Alcoa in the Kingdom of Saudi Arabia. Fives Solios companies were awarded four significant orders in our main fields of expertise.

2010 constituted also a milestone with the completion and ramp-up of all our facilities at Qatalum and EMAL smelters. Fives Solios strives constantly to better serve the primary aluminium producers by proposing innovative and cost effective solutions suited to fulfill the needs of our customers. Research and Development, Corporate Social Responsibility and Sustainability remain an essential part of our business mandate.

Fives Solios remains your partner for designing today the plants of the future.

Daniel Brunelli-Brondex,
C.E.O. Fives Solios



fives solios

Fives Solios is proud to be a major supplier for Ma'aden Aluminium Company

The ability to provide highly performing technological solutions, combined with its strong expertise in managing large international contracts, including its previous experiences in the Middle East, led Fives Solios to obtain major contracts from Ma'aden, in Saudi Arabia, in 2010.

Ma'aden Aluminium Company, a Joint Venture between Saudi Arabian Mining Company and Alcoa, has decided to build an aluminium smelter as part of Phase 1 of an industrial complex located at Ras Az Zawr on the East Coast of Saudi Arabia.

This state-of-the-art greenfield smelter will produce 740,000 tpy of aluminium with two reduction lines of 360 pots each, based on AP37 technology.

In the frame of this project, Fives Solios was awarded with the following contracts:

- The Liquid Pitch Marine Terminal at the port, designed to unload liquid pitch from ships at a rate of 300 tph and to store it in 2 x 6,000 t tanks. This facility will include specific features such as liquid pitch magnetic coupling

pumps to avoid pitch spillage for a better working environment, a Regenerative Catalytic Oxidizer (RCO) to treat the emitted pitch vapours and 2 HTM electrical heaters.

- Two 40 tph Green Anode Plants including coke and pitch unloading facilities, the carbon butts recycling unit, and a twin anodes cooling tunnel. The Green Anode Plants will feature the innovative and proven solutions already in operation in the region such as Rhodax® for dry material preparation, IMC® (Intensive Mixing Cascade) technology for paste mixing and cooling, Xelios, the high performance vibrocompacting unit fitted with vacuum and top back pressure, and Amelios, a real time "data-mining" solution for process analysis and follow-up.

2x40 tph Green Anode Plant



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These high performance technologies will bring significant investment and operating cost savings, together with benefits in terms of anode quality and pot performance, compared to conventional plants.

- A 62 tph Bath Processing Plant equipped with a Rotary Breaker. This facility will include raw bath feeding, bath grinding and classifying, ground bath storage and utilities.

- Four Gas Treatment Centers (GTCs) consisting of 18 TGT-RI dry-scrubber modules, fitted with the Yprios dual ducting system to reduce emissions during pots opening for operation and maintenance. The GTCs also include air pins designed to cool down potline gas, Forced Cooling Networks to cool down pot shells, and a fresh and fluorinated alumina handling system.

The Fives Solios dry-scrubbing technology can maximise the pots amperage and productivity whilst reducing global emissions of the smelter.

- Fifteen Furnaces for the Casthouse with associated launder systems:

- 5x135 t Tilting Holding Furnaces for slab Vertical Direct Casting,
- 5x100 t Tilting Holding Furnaces for ingot casting,
- 3x85 t Tilting Holding Furnaces for billet casting,
- 1x36 t Static Melting Furnace capable of receiving a 32 t coil, and 1x90 t Tilting Melting furnace fitted with a bottom mounted EMS, both for the scraps remelting facility,
- 5 Siphoning systems.

When completed, Ma'aden casthouse will include the largest capacity of modern furnaces worldwide.

These high performance technologies will bring significant investment and operating cost savings.

The various Fives Solios' entities have developed numerous synergies to deal with this project's main challenges in terms of legal, banking, fiscal and commercial subjects.

Following the successful completion of Alba 5 in Bahrain, Sohar Aluminium in Oman, Emal in the United Arab Emirates and Qatalum in Qatar, the award of major contracts by Ma'aden Aluminium Company confirms the leading position of Fives Solios in the field of primary aluminium production in the Gulf area. ■

CONTRACTS

A new Xelios in China

In May 2010, Fives Solios obtained a contract from Chalco Liancheng for a Xelios vibrocompacting machine, to be installed at their new aluminium smelter located next to the existing plant, in China.

The production capacity of this brownfield smelter will reach 380,000 tpy of aluminium, based on SAMI technology operating at 340 kA. This twin table machine will enable the production of large-sized anodes in order to meet customers' requirements.



Xelios vibrocompacting machine

In 2010, India remains an important market

Following a successful year in 2009 in India, Fives Solios has pursued its breakthrough into the Indian market, by obtaining two contracts for Firing & Control Systems for both Vedanta at their Balco Aluminium plants in Korba and Hindalco at their Mahan and Aditya smelters.

These projects will be implemented through a consortium made up of Fives Solios and the

Fives Engineering subsidiary in India. A large part of the equipment will be manufactured by Fives India, which will also be responsible for the final ramp assembly on site. The Hindalco contract will implement control system with safety PLCs using Wifi communication, and will include CO modules for combustion monitoring, a technology specially developed by Fives Solios.

Sohar Aluminium renews its confidence in Fives Solios

As part of the amperage increase of their electrolysis pots, Sohar Aluminium wants to improve the processing capacity of the two existing Gas Treatment Centers (GTCs) supplied by Fives Solios.

In December 2010, Fives Solios was awarded a contract for a water spraying system into the ducts upstream of the GTCs, in addition to air dilution, for better efficiency of gas cooling.

This system, from RTA technology, represents an alternative solution to cool down the gases at the Centers' inlets, in order to allow the smelters to boost their potline amperage, and particularly for smelters of high capacity in the Gulf region, where ambient temperatures are very high during summer months.

Sohar Aluminium Gas Treatment Center



A long-term collaboration with Alouette

After the contracts for the supply of their Gas Treatment Centers (GTCs) and Fume Treatment Centers (FTC) during phases 1 and 2, Aluminerie Alouette extended its collaboration with Fives Solios in June 2010, by awarding it with a contract for the supply of one Sonair type bag-house, and associated equipment to collect particulate

coming from their hot bath treatment plant. The fumes are further treated by the 18-pot GTC for the capture of gaseous fluoride.

The main purpose of this addition is to prevent the accumulation of contaminants in the fluorinated alumina in the 18-pot GTC and its disturbing effects.

Alouette Gas Treatment Centers

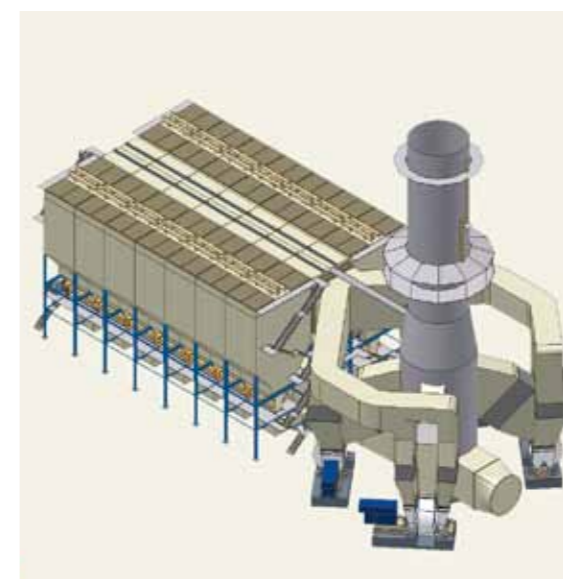


Ozeos, the new generation of filters for the AP60 technology

In October 2010, Rio Tinto Alcan awarded Fives Solios with a turnkey contract for one Gas Treatment Center (GTC) to treat the gases coming from their pilot reduction line of 38 pots based on RTA newest AP60 technology, located in Jonquiere, Quebec.

The project consists of the design, supply, installation, commissioning and start-up of a GTC fitted with 5 Ozeos filters.

Ozeos is the most advanced innovative dry-scrubbing solution for high amperage modern smelters. It is the latest technology developed by Fives Solios to improve the efficiency of the gas dry scrubbing and to reduce the GTC footprint.



Ozeos filters

Improvement of the environment at Aluar

At the beginning of 2010, Fives Solios was selected by Aluar to upgrade the pitch vapor collecting systems for both anode production lines at their Puerto Madryn smelter in Argentina. This contract includes the supply of an RTO

(Regenerative Thermal Oxidizer), specifically dedicated to the solid pitch melter and the liquid pitch tank. It also covers the improvement of the layout of the whole pitch vapor collecting ducts as well as the increase of the processing flow.

PROJECTS UNDER EXECUTION

Fives Solios has successfully started-up all its facilities in the Middle East

After the production of the first anode in February 2010 at the Qatalum smelter in Qatar, the Green Anode Plant which includes both the Rhodax® and IMC® processes, as well as Xelios for anode forming, gradually reached its 60 t/h rated capacity. Today, this is the highest capacity ever reached in one single line.

The Firing Equipment & Control Systems on anode baking furnaces are fully operational and confirm Fives Solios' ability to implement a full WiFi communication network (with safety PLCs).

The Qatalum operation team took over the 4 Fume Treatment Plants followed by sea water scrubbers to treat the gases coming from the electrolysis pots, and the Fume Treatment Center on anode baking furnaces.

The 11 Holding and Melting Furnaces and the Casthouse Water Cooling Systems were also fully completed in 2010.

In the meantime, the Bath Processing Unit at EMAL, in the United Arab Emirates, was completed. This facility implements Celsius, the clean bath cooling and crushing solution developed by Fives Solios. It enables to process hot bath and meet the highest environmental standards.

These achievements demonstrate Fives Solios' capabilities to execute large turnkey projects worldwide. ■

Emal Hot Bath Processing Unit

