Two additional Xelios in China

At the beginning of 2011, Fives Solios was awarded a contract by Shaanxi Nonferrous Holding Group Yulin New Metal Co. Ltd. for the supply of two twin tables Xelios vibrocompacting machines for their new aluminium smelter located in the Shaanxi Province. This greenfield smelter, using SAGI technology, will produce 700,000 tpy of aluminium. Fives Engineering Shanghai is involved in the manufacturing of some parts of the machine.

This additional contract in China demonstrates the technological advancement of Fives Solios in the field of high density anode forming.

Vibrocompactor revamping in China

In November 2011, Qingtongxia Aluminium awarded Fives Engineering Shanghai with a contract to upgrade their vibrocompacting machines. Fives Solios will be responsible for the engineering and for certain specific supplied items, whereas Fives Engineering Shanghai will be in charge of the main equipment fabrication in China. The contract consists of the supply of a table fitted with pneumatic suspensions, a driving mechanism and a central mould guiding. Thus, the customer will benefit from the latest improvements implemented on Xelios machines.

What is Solios Carbone?

Solios Carbone is a company based in the Lyon area (France), employing 120 people and serving exclusively the Primary Aluminium industry, in particular, the carbon sector of aluminium smelters. We design, supply and build Green Anode Plants, Carbon Recycling Units, Liquid Pitch Terminals, and Firing & Control Systems for anode baking furnaces as well as Bath Processing Plants. Solios Carbone not only develops proprietary processes and equipment, but is also an EPC company, as we deliver complete plants on a turnkey basis, and a Service company, as we provide services and spare parts to our customers.

Thanks to our network of qualified suppliers, fabricators, sub-contractors and Fives’ international network of offices and engineering subsidiaries, our teams of engineers and technicians can operate all over the world.

How did the history of Fives start in Givors?

It started in 1861 when four entrepreneurs, Mr. Parent, Mr. Schachen, Mr. Cailliet and Mr. Houel, joined together to create a company specialized in the construction of railway equipment. They established a factory in the “Fives” neighborhood located in the suburbs of the city of Lille (in the North of France) for the production of steam locomotives and another workshop in Givors (in the South-East of France) to manufacture wheels and axles. Starting from this date, the company, which was renamed “Compagnie de Fives-Lille” in 1865, developed its activities in Givors for over a century and was home up to 8,000 workers during World War I.

Some prestigious achievements that our company had a direct hand in include the design of the Orsay train station’s metallic structure (Paris), the Lafayette bridge (Lyon), the Alexandre III bridge (Paris) and many other bridges all over the world, the Eiffel Tower’s elevators, steam and electric locomotives as well as airplane engines and munitions.

How was the company’s history affected by the evolutions in the industrial world?

The main changes over this period have been the outsourcing of integrated activities such as manufacturing, the migration of our core competencies to technology, high added value engineering and project management.

We have also specialized our know-how in niche markets such as the carbon sector of primary aluminium smelters, and of course our business has become global. Today, Solios Carbone is still located in Givors and is the world leader in its field.

How did you celebrate Fives’ Givors workshop’s 150th anniversary?

We organized an open-house event for the general public in the Fives historic workshop building which is still next to our offices. A photographic exhibition retraced the history of the molten metal flow of the company from 1861 to 2011. Former Fives employees who worked in the factory before its closure in the 1980’s were invited to share their memories through pictures and audio testimonials.

We also presented a "lsocomobile" (a steam tractor) that was built by Fives in the 1920’s, a carbon anode produced by a Fives Solios vibrocompacting machine supplied to RTA/Shaft de Maurienne as well as 3D computer models of the Green Anode Plant we are currently building in Saudi Arabia.

Each step in our evolution was touched upon when we presented a moment of learning about Solios Carbone’s past and present and allowed everyone to share in our history.

This open-house event was truly a moment of learning about Solios Carbone’s past and present.”

Fives Solios and VCM demonstrated Genios’ performance

2011 was a year of contrast. It started with a very bullish outlook driven by strong demand, followed by a number of macroeconomic concerns which pushed the aluminium price down at the end of the year.

Despite those challenging market conditions, Fives Solios has continued to secure contracts with several strategic orders in China, Romania and in the Middle East, and at the same time pursuing the execution of its on-going projects in Saudi Arabia, India and Russia.

During 2011, Fives Solios continued to progress in its Research and Development programme with the first industrial acceptance of the Genios electromagnetic stirring system at a European secondary aluminium producer. Fives Solios also successfully commissioned its latest 3D VCM Scrubbing Technology at the Qatalum Smelter.

Our long standing history for engineering excellence and success in industrial markets was celebrated in 2011 with Solios Carbone’s 150th anniversary.

Another significant milestone will be reached in 2012 as the Fives Group celebrates its 200 years of industrial progress.

Fives Solios strives to always meet its customers’ needs by proposing innovative and cost effective solutions allied with its commitment to Corporate Social Responsibility. Ma’aden Alcoa Aluminium J.V. has thus rewarded Fives Solios at the Ras Al Khair site, with a “contractor of the year” award after the achievement of more than three million hours without a lost working day.

With these sustained achievements, Fives Solios remains your partner for the development of the aluminium plants of the future.

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

Fives Solios and VCM

Fives Solios and VCM selected Genios, the latest generation of Electromagnetic Stirring and Casting Technology developed by Fives Solios, for its easy implementation on existing furnace and its flexibility. The plant is a large modern remelting facility located in Northern Italy, which produces 100,000 tpy of aluminium alloys. The equipment is installed on a 701 capacity static holding furnace.

The bi-directional inductor can produce a moving magnetic field of variable frequency and variable voltage in either direction. As it is positioned on an inclined plane with respect to the bath, a stirring action can be induced by directing the field down the plane. Reversing the direction of the field allows molten metal to be drawn up the plane and effectively pumped from the furnace.

From a technical point of view, the system port is centrally mounted on the rear wall of the furnace. The refractory “window” and mounting flange for the port were installed by VCM according to Fives Solios’ specifications during a normally scheduled shutdown period. They required only simple refractory and structural modifications to the furnace. The inductor was mated to the port closure plate. From an operational point of view, Genios’ stirring action is vertical and smooth so the surface of the metal remains relatively calm while homogeneity is reached, thus minimizing dross formation. When casting, Genios allows for an accurate and reliable control of metal flow to the casting machine. The system is entirely safe as the pumping action stops immediately in case of power failure, and most of the metal drains back to the furnace.

This specific furnace runs with a typical bath depth of 1,000 mm, and the bath depth remaining after casting is less than 100 mm.

Since August 2011, after several months of operation, the transfer metal rate averages 15 to 20 tph, the metal’s uniformity and the alloy mixing have improved and the maintenance savings are very important.

This first successful industrial installation of Genios represents a key milestone to further develop this technology, which can, and cast all in one single unit.

Fives Solios Carbone: 150 years of history

9 September 17th, 2011, as part of the European Heritage Days event, Solios Carbone celebrated its 150th anniversary in Givors (France) by opening the doors of the old Fives workshops. Hugues Vincent, Managing Director of Solios Carbone answers 4 questions to describe this event.

Henry Vincent
Managing Director of Solios Carbone
Fives Solios supplies Ma’aden Alcoa Aluminium Joint Venture at Ras Al Khair

At the end of 2010, Ma’aden Alcoa Aluminium Joint Venture entrusted Fives Solios with several contracts as part of the construction of the phase one of their integrated aluminium complex located at Ras Al Khair in Saudi Arabia. By the end of 2011, the construction was in progress.

Activity on site for Civil Engineering Work started at the beginning of 2011. A peak period is forecasted between February and April 2012, with approximately 3,700 people working under Fives Solios contracts. By the end of 2012, a total of approximately 24,000 tonnes of steel and 33,000m³ of concrete will have been delivered to site. The mechanical erection of the Green Anode Plant started in June 2011 and was 30% completed at the end of 2011. Key process equipment were manufactured in Europe, some of them by Fives group companies. This plant has been 100% designed with 3D software.

Each Gas Treatment Centre (GTC) has 18 filters. The main pieces are pre-assembled in a dedicated area on site. Each large piece of equipment is then transported to the GTC areas, by SPMT (Self Propelled Modular Transport). The 50-meter high stack was erected in three sections. Its lower section alone weighs almost 47 tonnes! At the end of 2011, all the filters for the first GTC were in place. The erection of the second GTC started in January, 2012.

As for the casthouse, the furnaces’ castings are fabricated in the Gulf countries. They are pre-assembled before being forwarded on barges. At the end of 2011, the manufacturing of the five ingot furnaces was completed. The erection sequence on site is due to start in March 2012. These pre-assembled options, both for GTCs and furnaces, were proposed by Fives Solios in order to optimize construction on site, and facilitate the sequencing of operations in very congested areas.

Executing these contracts in such a remote location in Saudi Arabia creates a challenging environment. The teams have achieved outstanding results so far in terms of safety, with more than four million hours worked without any Lost Working Day. The first anode production is planned for June 2012; the first furnace will be ready to receive molten metal by August, and the first Gas Treatment Center will be in a position to treat pot gases by October, in line with the customer’s schedules. Ma’aden Alcoa Aluminium JV has selected Fives Solios’ innovative solutions to achieve its objectives in terms of capital and operation costs, environmental protection, safety and plant performance.

Fives Solios’ supply includes:
- Two 40 tph Green Anode Plants including coke and pitch unloading facilities, the carbon butts recycling unit, and a twin anode cooling tunnel
- Four Gas Treatment Centers fitted with an Ypsilon dual ducting system, air pins, Forced Cooling Networks, and a fresh and fluinated alumina handling system
- A 62 tph Bath Processing Plant equipped with a rotary breaker
- Fifteen Furnaces for the Casthouse with associated launder systems
- A Liquid Pitch Marine Terminal at the port fitted with two 6,000 t tanks

First implementation of port sealing ramps

At the end of December 2011, Fives Solios successfully completed the Performance Tests for the Firing & Control System on Anode Baking Furnaces supplied to Vimetco for their ALRD aluminium smelter in Spain. The contract included the revamping of the Baking Furnaces supplied to Vimetco for their Anode Firing & Control System on Anode Baking Furnaces.

Fives Solios’ capability to develop solutions meeting the new requirements from the industry.

Desulfurization by sea wet-scrubbers results from absorption of SO2 from gaseous phase to liquid phase and reaction of soluble SO2 with basic ions. The absorption phenomenon is accelerated by increasing contact area between gas and liquid phases. SO2 is not easily soluble in water and only the use of basic solutions allows its capture. In wet-scrubbers located in regions bordering coastlines, seawater can be used as a basic solution due to its hydrogen carbonate base. The desulfurization process includes three steps:
- Gas cooling at wet-scrubber inlet
- SO2 removal by seawater
- Mechanical elimination of droplets through a demister
The aim of gas cooling is to saturate the gases prior to the absorption step for improved SO2 removal.

The gas rising up the scrubber will have to make its way through column sections filled with packing material. Water is sprayed above this column counter-current to the gas, to achieve SO2 removal. The packing column is composed of numerous pieces of complex shapes, offering high contact area. At the packing outlet, gas is not yet ready to mix in the atmosphere. Seawater residual droplets, or “mist”, need to be eliminated by a demister located at the top of scrubber, last level before stack.

As a result of the standards reinforcements about fuel quality, petroleum coke sees their sulphurous fraction creeping up. Electrolysis pots emissions are directly concerned, as these compounds finally find their way into the fumes emitted in the electrolysis process. Similarly, national and international standards about air pollution are becoming more restrictive on emissions levels.

To deal with increasing SO2 concentrations in the incoming fumes without affecting stack emissions, Fives Solios has developed its own scrubbers. These are obtaining emission levels well below the latest most stringent environmental regulations.

Sea Water Scrubbing solution for SO2 emission reduction

In November 2011, Fives Solios obtained a contract from Samsung Engineering for the supply of two side-wall furnaces for the recycling unit of the Ma’aden Alcoa Aluminium JV’s rolling mill plant at Ras Al Khair in Saudi Arabia. This secondary aluminium facility will be one of the most technically advanced plants worldwide.

The contract consists of the supply for two static side-wall furnaces each with more than 120 tonnes capacity. These furnaces differ in operation and design to the primary aluminium furnaces in that they are melting solid aluminium scrap, and consist of two chambers, with metal being pumped between the chambers with an electromagnetic pump.

The furnaces will predominantly be used to remelt decorated aluminium scrap. The molten metal from these furnaces will be transported in metal crucibles to the main smelter casthouse.

Alba installation upgrading

As part of their line 5 pot amperage increase, Alba entrusted Fives Solios to upgrade their vibrocompacting machine in order to produce larger anodes.

The contract consists of the supply of a new mould and mould cover fitted with central guiding, with the addition of vacuum and top back pressure. Furthermore, Alba ordered a new roll crusher for the line 1. Fives Solios will be responsible for the equipment supply and supervision of installation, while Solvis Services Al-Ali in Bahrain will be in charge of the site erection.

The excellent results reached at Qatalum demonstrate the high efficiency of this technology. As an example, SO2 concentration measured at GTC 1 and 2 outlets is less than 20mg/Nm³ for each of the 4 wet-scrubbers. For an average inlet concentration of 300mg/Nm³, it means that each GTC prevents the discharge of more than 400 kg/h of sulfur into the atmosphere. This represents an excess of 1,6 T/h on the whole smelter, nearly 39 T/day.

This innovative technology demonstrates Fives’ capability to develop solutions meeting the new requirements from the industry.