



fives

Designing today the plants of the future

2010 Annual Report

# Table of contents

<b>Profile</b>	<b>01</b>
<b>Foreword from the Chairman</b>	<b>02</b>
<b>Key figures</b>	<b>04</b>
<b>Highlights</b>	<b>06</b>
<b>At the heart of Fives</b>	<b>08</b>
Corporate governance	10
Corporate Social Responsibility	12
Human Resources	16
Innovation	20
<b>International</b>	<b>24</b>
<b>Markets</b>	<b>30</b>
Aluminium	32
Steel	36
Glass	40
Automotive & Logistics	42
Cement	46
Energy	50

## The concept...

This year, we have decided against publishing factually representative photographs of our equipment and installations in favor of introducing a little art and imagination into the world of industry. We have also looked in a new way at the physical aspect of industry and used it as the basis for a graphic recomposition that illustrates our commitment: "Designing today, the plants of the future".

# Fives in 2010

€ **1,049** *million of sales*  
of which close to **55%**  
*in emerging countries*

€ **223** *million*  
*of shareholders' equity*

**5,639** *employees\**

\*consolidation scope at Dec. 31, 2010

**Our vision:** only innovative solutions will allow future industrial growth that is both sustainable and profitable. Fives provides new industrial solutions to address these challenges.

## METALS

### Aluminium

Fives Solios

### Steel

Fives Bronx

Fives Celes

Fives DMS

Fives Industries

Fives Stein

## CEMENT

Fives FCB

Fives Pillard

## AUTOMOTIVE & LOGISTICS

Fives Cinetic

## ENERGY

Fives Cail

Fives Cryogenie

Fives Nordon

Fives North American

Fives Pillard

The concept... continued →

Created as original artwork or assembled in a montage, these images originate from real-life pictures. Open the page to discover the originals.



Inside cover • Battery of cooling fans for a cement plant furnace shell



Page 1 • High-automated sorting system



Page 4 • Series of anode conveyors



Page 14 • Aluminium plant under construction



Page 16 • View of the interior of a cement plant's furnace



Page 18 • Carbon steel slab



Page 30 • Steel slabs conveyor bridge



Page 32 • Stock of aluminium ingots



Page 34 • Partial view of a fume treatment center on an anode baking furnace



Page 42 • Crankshaft being grinded by a Landis machine



Page 44 • High speed parcel sorting system



Page 46 • Clinker melting in a cement furnace



Page 6 • Partial view of a green anode plant under construction, dedicated to aluminium production



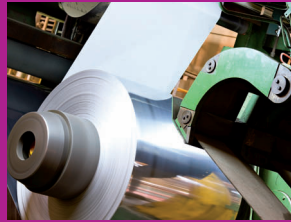
Page 8 • Gas treatment center, aluminium plant



Page 12 • View of a sugar plant from a beet field



Page 20 • Steel coil



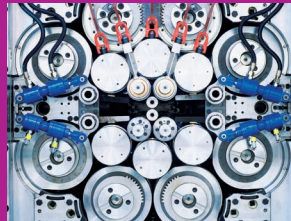
Page 22 • Winding stainless steel strip



Page 26 • Tin-plate annealing line



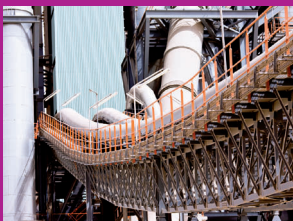
Page 36 • Steel slabs coming out of the furnace



Page 38 • Heart of a stainless steel rolling mill



Page 40 • Plate of photovoltaic glass



Page 48 • Strip conveyors in a cement plant



Page 50 • Gas burner flame



Page 52 • Brazed aluminium heat exchanger



# Profile

Fives Overview 2010

An industrial engineering group,  
**Fives designs and supplies process equipment, production lines and turnkey plants** for the world's largest industrial groups in the **aluminium, steel, glass, automotive & logistics, cement, energy** and **sugar** sectors.

Located in nearly thirty countries and with more than 5,600 employees across six continents, the Group is known for its technological expertise and competence in executing large-scale international projects. The Group's know-how and solid field experience allow it to manage projects as a whole while respecting deadlines and fulfilling performance commitments.

The effectiveness of its R&D programs enables Fives to design forward-thinking industrial solutions that anticipate client needs in terms of profitability, safety and compliance with environmental standards. This strategy is also supported by a human resources policy putting people first which promotes initiative-taking, technical excellence and team spirit.

# More than just a year of transition, 2010 ultimately proved to be a year of recovery

Just as it did in 2009, Fives ended 2010 with an acquisition. Following on from the Japanese company Decker - now Cinetic Decker Filling K.K. - it was the turn of Bronx International Inc. and its British subsidiary Bronx Taylor Wilson Ltd. to join the Group through a transaction finalized on November 30, 2010. Bronx International is an engineering company that leads the world in the design and supply of finishing equipment and mechanical processing for pipes and tubes. Among its customers are some of the world's major steelmaking corporations and tube manufacturers, such as Vallourec and Baosteel. In 2010, Bronx, which has since become Fives Bronx, reported consolidated sales of approximately \$80 million.

2010 also ended on another positive note: the Group order backlog rose during the year to once again break through the symbolic €1 billion barrier. With total orders in excess of €1.2 billion in 2010 and due to rise further this year, driven in particular by the fast-growing economies of the emerging markets, Fives can go into 2011 with renewed confidence.

As forecast, sales was significantly lower in 2010, at €1,049 million (down 18% on 2009) as a result of a smaller order backlog at the start of the year (€834 million, compared with €1,359 million a year earlier). The effects of this lower sales figure on consolidated operating profit were offset by the action taken in all Group subsidiaries to reduce costs and working capital requirements, whilst simultaneously increasing spending on commercial activity and Research & Development. In fact, consolidated operating profit, at €59.2 million, actually ended 5% up on 2009, also thanks to the sustained margins generated from contracts under implementation. With net profit of €33.5 million, up significantly (66%) on 2009,

€214 million of cash and €223 million of equity, Fives is well placed to step up its pace of growth in the years to come.

The many major commercial successes achieved in 2010 reflect the competitiveness of the Group's products and services. They also validate the strategy of recent years, prioritizing innovation and development as well as the Group's growing presence in the world's emerging economies.

Fives DMS secured a number of orders in China for rolling mills and production line mechanical equipment, not only with traditional customers like Baosteel and Tisco, but also with newcomers, such as Jisco and ESS. At the start of the year, Fives Stein began work on an order of strategic importance: two silicon steel annealing line process furnaces for Baosteel, thereby taking a foothold in a market of the future. Fives Solios was awarded a series of orders in Saudi Arabia for the future Ma'aden Aluminium plant, a joint venture between the state-owned Saudi Arabian Mining Co. and Alcoa. A number of landmark orders were received in the Automotive and Logistics Division, most notably from Ford and General Motors in the USA, Renault in Morocco, PSA Peugeot Citroën in Russia, MNG Cargo in Turkey and Yamato in Japan. In Energy, Fives Nordon once again won major contracts from EDF for the maintenance of its nuclear power plants in France.

*“ Fives is set for a very good 2011, and should see increases in all its key performance indicators. ”*

2010 and the opening months of 2011 were also marked by a number of successful commissioning operations in all our business sectors, but especially in Steel, with the operational startup of several rolling mills and treatment lines in China, Korea, Brazil and India; in Aluminium, with the startup of installations supplied by Fives Solios for the Qatalum plant; and in Cement, with the acceptance of turnkey plants handed over by Fives FCB to QNCC in Qatar, Titan in Egypt, Vinaincon Corporation in Vietnam, and the successful startup of Holcim Apasco in Mexico.

More than just a year of transition, 2010 ultimately proved to be a year of recovery. Given its strong order backlog at year end 2010 together with the orders taken in the first quarter of this year, Fives is set for a very good 2011, and should see increases in all its key performance indicators.

In the longer term, the markets served by the Group will continue to be supported by growing urbanization and infrastructure needs, the quest for energy-saving and eco-friendly technical solutions, and the demographics of the emerging markets in which Fives now generates nearly 55% of its revenue. In each of its business lines, the Group possesses the expertise and the technologies needed to satisfy these underlying trends.

It is by remaining faithful to its roots and culture, by building on its strengths (cost control, risk management and project management expertise), by continuing to put innovation and international growth at the heart of its strategy and by attracting and integrating new talent to enhance Group diversity that Fives will embark on a new and profitable path to growth.



**Frédéric Sanchez**  
Chairman of the Executive Board





## 2010, a very successful year for Fives

**T**hanks to the Group's cohesion, reactivity, financial stability and technological lead in the majority of its business lines, Fives performed remarkably well throughout the turbulence caused by the global crisis over the past two years, and delivered excellent results for 2010.

**Order intake and closing order book:** in 2010, Fives again achieved a high level of order intake (the third best performance in the company's history).

After the recession of 2009, Fives succeeded in extracting maximum benefit from the economic recovery that began in 2010. With the help of sustained commercial activity, the Group was able to rebuild its order book, and started 2011 with excellent forward visibility of workloads in the majority of its business lines.

**Sales, operating profit and operating profit before amortization:** against the backdrop of lower business levels as a result of a reduced opening order book, Fives returned a remarkable operating performance to deliver a set of results superior to those for 2009.

This performance was achieved thanks to the Group's ability to manage and execute contracts and the quality of technologies it delivers. It also illustrates the responsiveness of the Group, which was successful in implementing the necessary adaptive measures from the start of the crisis.

**Breakdown of sales by geographical area:** with its multi-sector expertise and international presence, Fives has benefitted from the investments made in growing industries and geographic areas.

Although the metals sector continues to make the largest contribution to sales, 2010 saw impressive progress from both Automotive and Energy divisions. In terms of geographic distribution, sales for the year were driven substantially by contracts in Asia, with markets in China and India remaining very active despite the global crisis. In the rest of the world, the distribution of sales was well balanced.

**Closing net cash position and shareholders' equity:** Fives maintains a particularly strong and healthy financial structure.

Despite having funded the acquisition of Bronx, at the end of 2010, from its own cash reserves, the Group was able to maintain a high level of cash through to the end of the year, and is able to report a strong balance sheet. The notable growth in shareholders' equity also attests to the sound management applied throughout the global economic crisis.

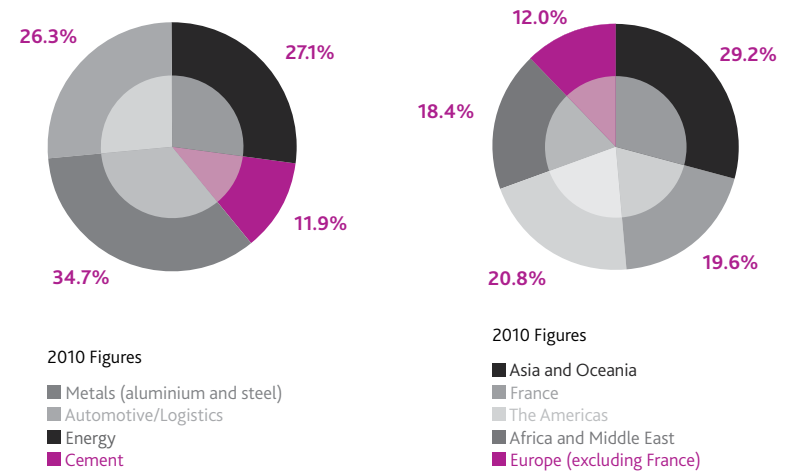
**Research & Development:** innovation is central to Fives' strategy.

Group expenditure on R&D, which increased once again in 2010 to end the year at the record level of €19.8 million, has increased by nearly 70% in five years. Fives once again confirms its ambition to increase its technological lead and continue to offer innovative solutions to its clients.

Order intake and closing order book



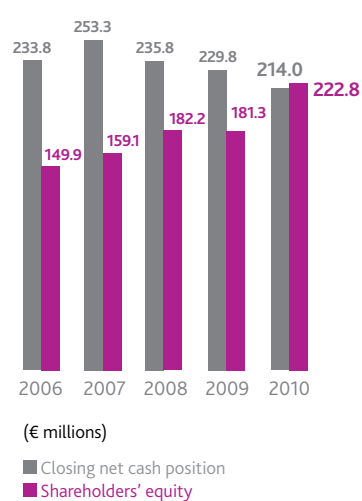
Breakdown of sales by end market and geographical area



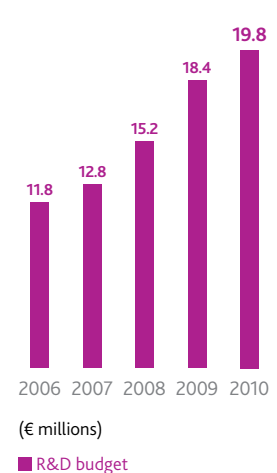
Sales, operating profit and operating profit before amortization



Closing net cash position and shareholders' equity



Research & Development





## In 2010, Fives was awarded a number of **significant contracts**

### January

- Fives Cinetic was awarded a contract by Renault to supply all the handling equipment for the sheet-metal and final assembly shops of its greenfield project in Tangier, Morocco. This new plant will produce 175,000 vehicles per year across a range of three models.
- Fives Nordon was selected by Areva to design and supply surge lines for the Taishan 1 and 2 EPR in China.

### February

Fives Solios was awarded a new contract by Vedanta to supply turnkey firing and process control systems for four anode baking furnaces at the Balco aluminium plant in Korba. This demonstrates the competitiveness of its offer on the Indian market thanks to the Group's local subsidiary Fives India.

### March

In China, the renowned steelmaker Baosteel once again demonstrated its trust in the Group with an order for two horizontal furnaces to equip new grain-oriented silicon steel annealing lines.

### April

- Nine years after commissioning the first bright annealing line at its Baoxin plant in Ningbo, China, Baosteel awarded Fives DMS the contract to supply a second bright annealing line which will produce 80,000 tonnes of austenitic and ferritic stainless steel strips per year.
- Also in China, following an order placed for a slab reheating furnace at the beginning of 2010, Handan Steel ordered two more billet reheating furnaces from Fives Stein's local subsidiary, confirming the superiority of Digit@l Furnace® technology.
- Fives Stein was also awarded a record contract for twelve flat glass lehrs by Chinese glassmaker Xinyi Glass. This order includes eight complete lehrs for photovoltaic glass production lines.

## May

- Jisco (Jiuquan Iron & Steel Co. Ltd.), China's third-largest producer of stainless steel, signed a major contract with Fives DMS for the supply of four 20-roll cold rolling mills for the second phase of its plant expansion project.
- PSA Peugeot Citroën appointed Fives Cinetic to build the assembly workshop for its production facility in Kaluga, Russia.
- Fives Cinetic was also awarded a contract to automate seven sorting centers by MNG Kargo, one of Turkey's leading express courier companies.

## June

- After the successful start-up in 2008 of the world's largest hot annealing and pickling line, Fives DMS was once again selected by Tisco (Taiyuan Iron & Steel Co., Ltd.) to supply a stainless steel bright annealing line with the world's highest annual production capacity, at 150,000 tonnes.

• At the same time, Fives DMS was selected by Tisco to supply a cold rolling mill dedicated to the production of "bright" strips. This new rolling mill breaks all records, and will be the world's largest in terms of production capacity at 133,000 tonnes per year, and in terms of rolling speed at 1,200 meters per minute.

- Fives Nordon signed a five-year framework agreement with EDF CIPN for the P4 reactors of its nuclear power stations in France. The contract is for nuclear island standards compliance and performance upgrading conversion works for the twelve units concerned.
- In China, Fives Cryogenie was awarded a contract by Daqing Petrochemical Company to supply seventeen heat exchangers, two cold boxes and eight separation drums. This comes as part of the company's plans to increase the ethylene production capacity of its Daqing site to 1.2 million tonnes per year. Its presence in China positions Fives Cryogenie as the only local supplier with European expertise.

## August

In the United States, Fives Cinetic was awarded an order by Chrysler for the conversion of an engine assembly line, crankshaft, cylinder head and cylinder block machining lines and automatic storage and retrieval systems.

## October

Thanks to the heating quality and the energy and environmental performances delivered by its Digital technology, Fives Stein won an order for two slab reheating furnaces in the United States for Allegheny Ludlum Corp., the world-leading producer of a broad range of carbon steel, stainless steel and high value-added special steel.

## November

- Yamato Transport appointed Fives Cinetic to design and supply a fully-automated sorting center as part of its plans to build a new logistics terminal adjoining Haneda International Airport in Tokyo. The system will incorporate three cross belt sorters and six slide sorters to provide the capacity to handle 66,000 items per hour, using a highly adaptable operating mode to cope with peak flows and volumes.
- Fukuyama Transporting, one of Japan's leading transporters, awarded Fives Cinetic a contract to supply a sorting system for its new logistics terminal. The system will incorporate cross belt technology capable of handling 11,000 items per hour, dispatched to 73 different destinations.

## December

- Ma'aden Aluminium Company, the joint venture formed by the state-owned Saudi Arabian Mining Co. and Alcoa, selected Fives Solios technology as part of the construction, on the Ras Az Zwar site in Saudi Arabia, of the world's largest integrated aluminium production facility. The Group will supply two green anode plants, each with a capacity of 40 tonnes per hour, as well as a liquid pitch unloading and storage terminal. Fives Solios also received orders, to be included in the order book for the first semester of 2011, for four gas treatment centers on electrolysis pots and fifteen melting and holding furnaces to be used for the production of aluminium billets, slabs and ingots.
- As part of its contribution to the construction of the Flamanville EPR, Fives Nordon received an additional order from Areva for coating of reactor wall penetrations.

## ACQUISITION

In November, Fives acquired Bronx International Inc., and its UK subsidiary Bronx/Taylor-Wilson Ltd., a world leader in the design and supply of finishing equipment and mechanical processing for pipes and tubes. Bronx' direct customers are producers of steel and non-ferrous bars, pipes and tubes, among them large industrial groups from the steel sector.

Fives Bronx, headquartered in North Canton, Ohio (USA), has a widespread commercial outreach and a large range of facilities established across the world. Fives Bronx employs approximately 70 staff and achieved sales of around \$80 million in 2010, fuelled by good business results in particular in Brazil, Russia and Asia.

Through this acquisition, the Fives group strengthens its metal activities through the expansion of its product offering.





# At the heart of Fives

Fives **Overview** 2010

- Corporate governance
- Corporate Social Responsibility
- Human Resources
- Innovation



A strategy driven by an **Executive Board**, working closely with its

#### The Executive Board

- **Frédéric Sanchez**  
Chairman of the Executive Board
- **Lucile Ribot**  
Member of the Executive Board - Group Chief Financial Officer
- **Martin Duverne**  
Member of the Executive Board - In charge of the Energy and Logistics divisions

#### The Executive committee

*From left to right and top to bottom*

- **Daniel Brunelli-Brondex**  
Head of the Aluminium division
- **Jean-Marie Caroff**  
Head of the Group International Development Department
- **Alain Cordonnier**  
CEO of Fives FCB (Cement division)
- **Michel Dancette**  
Head of the Corporate Social Responsibility Department

- **Jean-Paul Sauteraud**  
Head of the Group Legal Department
- **Michelle XY Shan**  
Vice-President Business Development China
- **Jean-Camille Uring**  
Head of the Automobile division
- **Paule Viallon**  
Head of the Group Human Resources Department

“ A strategy conducted by an Executive Board... ”



“ ... and supported by an operational Executive committee ”

# Executive committee

## The Executive Board

Composed of three members, Frédéric Sanchez (Chairman), Martin Duverne and Lucile Ribot, **the Executive Board** is responsible for Fives' management and implements the Group's strategy. It meets as often as required.

## The Supervisory Board

Composed of seven members, Jacques Lefèvre (Chairman), Guillaume Jacqueau (Vice-Chairman), James Arnell, Stéphane Etrov, Fabrice Georget, Arnaud Leenhardt, Vincent Pautet,

**the Supervisory Board** meets at least four times a year to review the quarterly report submitted to it by the Executive Board.

Throughout the year, it performs the checks and controls it considers appropriate and may request any documents it deems useful in the accomplishment of its role.

**The Accounts committee** and **the Appointments and Remuneration committee** are each composed of certain members of the Supervisory Board and provide insights for its decisions.

## The Executive committee

**The Executive committee** meets at least once every two months under the chairmanship of Frédéric Sanchez.

Composed of the members of the Executive Board and the Group's main operating managers, this authority for strategic orientation and information exchange meets to examine specific issues and assist the Executive Board in reaching decisions concerning matters falling within its domain. In particular, the Executive committee deliberates on matters of common interest and on questions of coordination between the Group's various entities.





# CSR, a central challenge for Fives

**T**hrough its status as a supplier of capital goods and turnkey industrial plants, Fives is close to the energy and environmental challenges facing manufacturing industry. The Group must also address the social and community issues raised by its operating locations, its history and its multicultural teams of employees. To meet these challenges, Fives has implemented a Corporate Social Responsibility (CSR) program whose priority initiatives were identified with the Executive committee.

The CSR commitments of Fives cover four main areas:

#### • Environment

Fives is under an obligation to monitor its environmental footprint in two ways: on the one hand in its own operating locations and on the other hand via the equipment it develops for high energy consuming industries with significant environmental footprints, such as the production of steel, glass, aluminium and cement.

#### • Market

Since the end of 2007, all Group subsidiaries share the same brand name, visual identity and reputation. Subsidiaries' practices and their risk management policies are therefore naturally liable to receive closer scrutiny. Furthermore, the Group's high performances in terms of energy efficiency, environment and safety must be highlighted to give the Group a leading edge on its markets. Finally, Fives' business activities rely to a large extent on the work done and equipment supplied by sub-contractors, whose record will have a direct effect on the Group's own; and so securing their progressive CSR commitment is a top priority for Fives.

#### • People

As an engineering group working at the cutting edge of technology, the continued growth of Fives depends on its human capital and the expertise, motivation and exemplary behavior of its people. Fives operates in nearly 30 countries, and in many of them faces challenges in providing social benefits and in attracting talented young people to join the mechanical engineering industry.

The work carried out in the industrial facilities of Fives and on the sites operated by its clients implies many and varied safety issues which differ from project to project. Similarly, the export-driven nature of the Group's business interests makes foreign travel-related security a key concern.

#### • Governance

The Group's subsidiaries are diverse in terms of their history, geographical zone and culture. This means that the sharing of best practice and the development of synergies between them are key factors to the Group's efficient long-term operational success.

To address these issues, Fives is committed to:

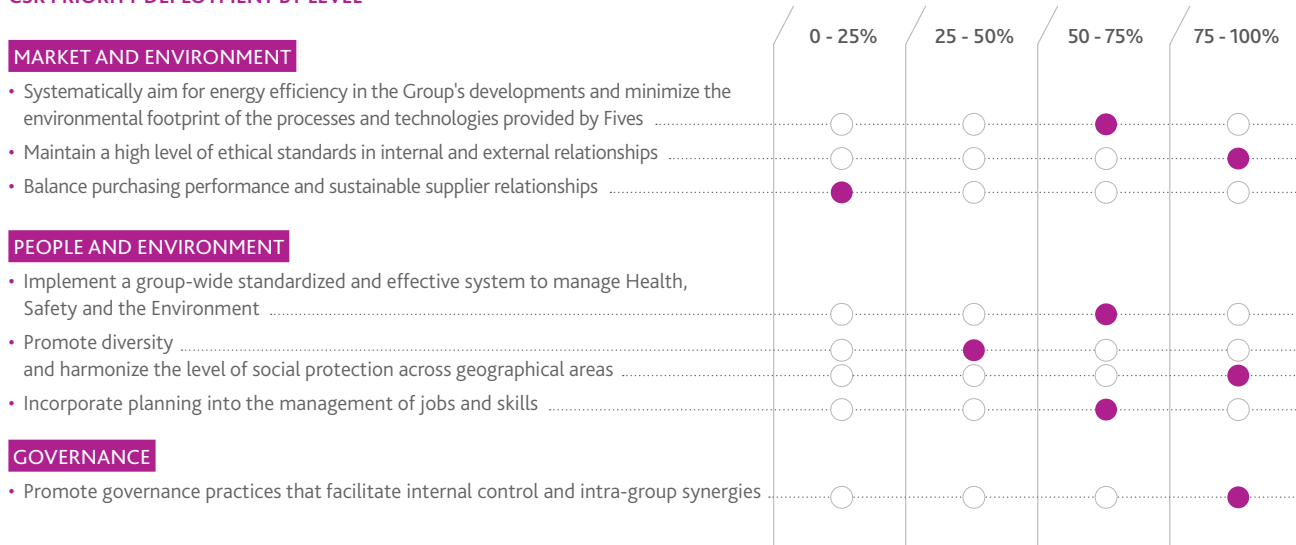
- **Minimizing its direct environmental footprint** and indirect impacts resulting from the industrial capital goods supplied by the Group;
- **Acting responsibly and fairly** in its markets, and promoting social responsibility to its stakeholders;
- **Respecting individuals** and providing its employees with safe working conditions, fair conditions of employment and opportunities to develop their skills and careers.

These commitments were translated into seven CSR priorities in the form of an action program introduced in 2009 and comprising:

- directives imposed on Group companies (fight against corruption, employee appraisals, health and safety measures, etc.);
- initiatives offered as an option to Group companies, which are then free to implement them or not;
- local initiatives, which may then be proposed to other Group companies.

As the following table shows, at the end of 2010 there were three initiatives approaching their target deployment level, three that had received significant input in 2010 and will continue to do so 2011 and 2012, and two launched or implemented in a single country.

## CSR PRIORITY DEPLOYMENT BY LEVEL



“ “ *The subsidiaries' management committees are now all aware of the Group's CSR challenges. The next step is to work locally, company by company, and find a way of engaging with the teams, close to their everyday operations.* ” ”



**Estelle Fontenay**  
Group CSR Manager



## Health, Safety and Environment: a Group priority

**F**ives faces many Health, Safety and Environment (HSE) challenges, both in its own facilities and when supporting its teams at work on client projects and sites. Since the appointment of a Group HSE Coordinator in 2009, Fives has implemented a number of Group-wide practical initiatives.

The Group has set out three types of HSE priority.

- The management of its own facilities, and especially its manufacturing sites (in terms of safety organization, compliance with official environmental and safety standards, waste management, equipment and installation maintenance, personnel training and accreditations, management of service providers and temporary staff, etc.);
- The safety of employees when traveling internationally where political, security and health risks can change very quickly;
- Involvement on client premises. Group companies very often operate on client premises (plants and/or construction sites) when involved in assembly work, the supervision of assembly work, equipment commissioning and/or equipment maintenance. Such involvement may last any length of time from a few days to several years, and may involve one supervisor or several thousand sub-contractor operators. Depending on the circumstances, responsibility for the work involved may lie entirely with the Fives subsidiary company concerned, or with the client or with other service providers.

Faced with these HSE challenges, the Group CSR Department continued in 2010 to deploy a number of initiatives first introduced in 2009.

### **Improving subsidiaries' knowledge of HSE issues and developing an HSE culture**

The international Fives reference document of job profile guides and HSE best practices was presented and made available to subsidiary companies. In addition to ensuring consistency of practices and the continual upgrading of content in Group documentation, such as risk prevention plans, this database provides subsidiary companies with the opportunity to expand their knowledge and develop their own HSE culture.

### **Improving subsidiaries' HSE practices**

In 2010 a campaign of fifteen audits in the Group's major plants worldwide was conducted. The aim of the audits was to provide a clearer understanding and appreciation of the HSE issues faced by subsidiary companies. They also sought to identify strengths, best practices and areas for improvement, and build a joint progress plan laying down a prioritized structure for the initiatives required. These cross-referenced audits are always conducted by internal HSE auditors: the Group HSE Coordinator and one of the eight

“ Given the diversity of the issues involved and the environments in which our people work, embedding HSE within the Group’s subsidiaries and encouraging individuals to take responsibility for it are the cornerstones for improving our HSE record. ”

*Pascal Mercier, Group HSE Coordinator*

subsidiary HSE Coordinators appointed as Group auditors. The subsidiary companies involved see these Group audits as a valuable resource for improving their own HSE practices.

**Building a network for dialogue and experience sharing**

Four seminars were held during the year for subsidiary company HSE Coordinators from different regions (French-speaking Europe, English-speaking Europe, China and the USA/Canada). These events enabled the creation of a Group HSE Coordinator Network, which is proving invaluable as a forum for sharing and swapping experience and best practices.

**Supporting subsidiaries**

The Group CSR Department also provided on-demand support for subsidiary companies in the form of special training programs or presentations to management committees on issues such as the adoption of HSE challenges, organizational change and encouragement of staff to take greater responsibility for HSE.

In 2011, the CSR Department will focus its HSE audit program on construction and installation sites, using an expanded team of Group auditors. They will provide close monitoring of subsidiary company action plans, and will continue to implement initiatives within the HSE Coordinator Network, encouraging the exchange of good practices and assisting subsidiary companies to improve HSE skills.

*In 2010, the Group had  
**22** industrial sites\*  
 and **26** combined sites\*\*,  
 regional facilities and test centers  
 spread throughout the world*

*\*sites with a significant and permanent industrial activity*

*\*\*sites combining an office environment and an industrial or test-oriented activity*

**A good safety record in 2010**



*Although individual subsidiary results were varied, the safety record for the Group as a whole improved during the year, Group accident frequency fell from 11.54 to 8.61; and the corresponding severity rate from 0.318 to 0.208. Fives Nordon particularly contributed to this improvement, with the implementation of an ambitious action plan focused principally on encouraging involvement and the acceptance of responsibility throughout the line management structure:*

- *management involvement in revising the risk evaluation procedures for plants and construction sites, as well as in monitoring the associated initiatives;*
- *the involvement of individual managers through HSE inspections and informal discussions;*
- *increased frequency of communications campaigns and the introduction of a safety challenge for all personnel;*
- *formation of a Fives Nordon safety committee to bring together all the company’s plant and on-site safety coordinators and provide a forum for sharing HSE problems and swapping experiences;*
- *increased training opportunities for staff and management.*

*Throughout 2011, all of the Group’s companies will continue the action plans already underway, with the aim of delivering further improvements in the company’s safety performance.*





Throughout the world,  
**teams** contributing  
to **the success** of the Group

In an international and multicultural group like Fives, one of the most important roles of the human resources function is to create a management culture common to all subsidiaries and yet observant of local specificities. It is also to lay down major fundamental principles shared by all, such as respect for employees, openness, objectivity and evaluation, promotion of workplace diversity and non-discrimination.

**Giving managers the shared human resources management tools they need**

As part of building a shared management culture and practices, the Group's human resources approach has for a number of years focused on deploying identical policies in all Fives' operating countries. These policies provide the channels through which diversity, dialog, gender equality and other important issues can be promoted, and their deployment provides the perfect opportunity to raise awareness of issues addressed in detail in management training courses, such as discrimination and stress.

In France, more than **215** people have been seconded by one Group company to another since the system was introduced at the end of 2008

These managerial processes are designed to help managers ensure that they have the right people, skills and organizational structure in place to ensure the best possible operation of the company. It also enables them to identify high potential, and, more proactively, to prepare for the future by anticipating foreseeable changes and their impact on the way their business unit will evolve.

**Following the career of each employee**

Because, regardless of the country they work in, their nationality or their culture, the 5,600 staff members are above all part of a Group, the Human Resources Department ensures that they benefit from the same entitlements in terms of evaluation, career progression and development.

To this end, the size of the Fives Group is a distinct advantage, since it enables career-long individual monitoring, with personal interviews and meetings at different stages:

- In the first few months after joining the company: **the starter meeting.** This is a face-to-face interview held with all new employees to ensure their successful induction and assess their satisfaction with their job. It also provides the first opportunity to discuss career development openly and freely, as this meeting is entirely confidential.

**“** As in 2009, the Group’s companies in 2010 had to adapt to the context of the global recession, then plan for the recovery. One of the fundamental roles of human resources during this period was to support change. In order to retain the positive outcomes of the very substantial efforts made to recruit employees in previous years, maintain motivation levels, ensure the loyalty of valued employees and meet our social responsibility commitments, the Group examined every possible alternative before considering labor force reductions. The trust-based relationship between the Group and its people was supported through a variety of measures: training initiatives, part-time working, shorter working hours, the spreading of working time over multiple years and, most importantly, the many occasions on which personnel from one company were seconded to another. These all enabled our business to remain operational and fully prepared to rise to the new challenges of the market. **”**



Paule Viallon  
Head of the Group Human Resources Department



- Every year and throughout the employee's career: **the annual appraisal interview and career management committees**. The annual appraisal interview provides each employee with feedback on the value of their contribution, and allows for the definition of targets and for further discussion about individual career prospects. The results of these appraisal interviews are used as a base for the **career management committees** at which employee contributions are analyzed (in 2010, these committees covered 40% of Group employees). Dedicated to measuring the quality of the Group's employees, their performance as individuals and as a group, these committees also provide the opportunity to decide on promotions and job moves as well as ensuring that succession plans are in place, but also to identify ways to support employees and their development (training, coaching, etc.).

- As often as necessary: **"career booster" meetings**. Initiated either by the Group Human Resources Department or by individual employees themselves, "career booster" meetings allow individuals to express their ambitions for career progression directly to the Group. Since the career booster procedure was introduced in 2009, the Human Resources Department has met with more than 160 employees. These meetings have led to career moves within an employee's existing company, but also to many transfers between Group companies, including those in other countries. They have also helped Fives to retain some of its most promising people, and offer them opportunities that they may not necessarily have had in their own business unit. These transfers contribute to building bridges and bonds between subsidiaries, creating opportunities for mutual understanding, making the Group a reality and developing a strong feeling of belonging.

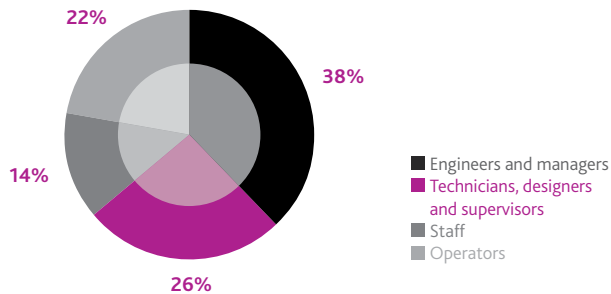
All these measures, in combination with the systematic publication both internally and on the Fives website of all vacancies within the Group, help to ensure that every employee who wishes to progress has their intentions and ambitions taken fully into account.

In 2010, the Fives group had a workforce of **5,639** people of more than **50** nationalities

**84%** are male  
**16%** are female

**28%** of women employees are engineers or managers

Breakdown by category



### Stepping up training in 2010

In both 2009 and 2010, the commitment of the Group to invest in its people and enable them to develop their skills was illustrated through the high level of training carried out. During the year, 59% of employees were able to benefit from at least one training initiative, a substantially higher proportion than in 2008 and previous years. Subsidiaries are able to use external training institutes but are also increasingly using their own employees to provide in-house training, who through their contribution bring their colleagues the benefit of their expertise and share their best practices with them. By building on the skills and know-how already in place within the Group's teams, this process helped to ensure that this massive investment remains within the allotted training budgets.

**59%** of group employees attended a training course in 2010







# Innovation, a key factor in Fives' growth

**R**enowned worldwide for its technological prowess, Fives has put innovation at the heart of its strategy. In order to remain at the highest level, Fives applies an open policy of highlighting the creativity of its teams whilst anticipating future market demand.

#### Encouraging the emergence of new ideas

Fives has chosen to open up its innovation process both by increasing the number of joint programs with its clients and suppliers and by offering its employees the chance to become involved through Innovation Awards introduced in many group subsidiaries. This has led to the emergence of many recent innovations, including the Eolios pitch fume treatment technology developed by Fives Solios in the aluminium sector, and the ultra-fast Wet Flash Cooling® technology developed by Fives Stein in the steel sector.

**Making the right choices**

Choosing between R&D programs is a delicate task, so Fives works with each of its business lines to define a clear differentiation strategy, maintaining constant contact with the market in order to ensure the appropriate, dynamic and smooth management of development priorities.

**Targeting excellence**

Every year, a number of partnership agreements are signed with public and private research organizations in France and internationally. These agreements enable Fives to benefit from the latest advances in pure research and to maintain a high level of scientific expertise. Such agreements have enabled Fives Stein and INSA (the French National Institute of Applied Sciences) to work together on a project to study rapid-cycle techniques in the manufacture of high elastic limit steels. Cooperation programs are also in place with the German Fraunhofer-ISE institute and the Dutch research organization TNO for the development of photovoltaic glass production technologies.

**Combining theoretical and experimental research**

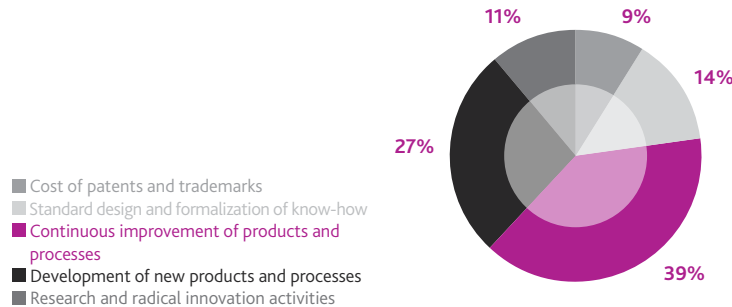
In addition to the many digital simulation software packages implemented in its subsidiary R&D departments, Fives has also developed a number of source codes and simulation systems specific to its own business lines in order to reduce development program costs and lead times. In many instances, and particularly in combustion technologies, the final phase of development involves laboratory testing. Fives consequently operates nine testing centers dedicated solely to research, as well as seven combined research and development testing centers, in order to be able to conduct its own experimental research programs.

“ *The Innovation Awards initiatives organized by the Group’s subsidiaries act as great catalysts in encouraging the emergence of new ideas. These awards offer every employee the opportunity to contribute to the process of development by putting forward ideas to improve what already exists or to introduce a radical step change. By stimulating the spirit of competition between employees, they also increase the chances of arriving at original ideas which would probably not have been considered without the special structure and context provided by an innovation competition. In 2012, the Group-wide “Grand Prix Fives” will reward the winners of innovation competitions organized in subsidiaries during 2011.* ”

Nearly **€20 million** was spent on **Research & Development** in 2010

**Breakdown of R&D expenditure by type**

Fives constantly strives to balance its portfolio of R&D projects, which revolves around both the improvement of its existing equipment and research on long-term topics such as carbon capture and storage.



Joaquim Correia  
Group Intellectual Property Manager



### Using demonstrators to convince the market

The final phase of an industrial equipment development program often involves the production of an industrial-scale or semi-industrial-scale demonstrator. These installations are used to verify that the level of performance calculated from digital models or extrapolated from small-scale models will be effectively achieved under real-life industrial operating conditions.

In 2010, Fives installed two major demonstrators, one on a client site and the other in its own facilities:

### HEX-800 - Collaboration between Hydro, the Norwegian University of Science and Technology (NTNU) in Trondheim and Fives Solios for the development of a heat exchanger for cooling aluminium electrolytic cells exhaust gas

This program, for a total cost exceeding €2.5 million, aims to test heat exchanger technology for the heat recovery of gas aluminium electrolytic cells, using an invention belonging to NTNU and the aluminium producer Hydro. Prototypes installed in Hydro's aluminium smelters in Norway will verify and optimize heat exchanger design and validate their performance in real industrial conditions. The cooling of the cells' exhaust gas and the heat recovery will significantly reduce the power consumption of the fume treatment plant.

### EcoTransFlux™ - transverse flux induction high-speed strip heating technology

The transverse flux high-speed heating technology developed over the past ten years by Fives Celes opens up many new opportunities for the annealing of stainless steels (reducing energy consumption and removing the need for the pickling stages) and for the production of new high-strength carbon steels (allowing for the reduction in the weight of road vehicles).

To finalize development of its EcoTransFlux™ technology and demonstrate its performance in terms of consistent heating spread and reliability, Fives Celes has installed an industrial-scale demonstrator in its testing center. This demonstration model is capable of simulating the annealing process on steel strip 1,500 mm wide. This investment was supported by the European LIFE+ program and ADEME, the French Environment and Energy Management Agency.

FIND OUT  
MORE  
[www.ecotransflux.com](http://www.ecotransflux.com)

“Fives’ strategy in terms of innovation is all about encouraging the emergence of new ideas, adopting the best of them and converting them into innovative solutions that will meet the needs of our clients.”

Thierry Valot, Head of Group Innovation

Fives operates **11** test centers\* in Europe,  
**4** in the USA and **1** in Japan

\*centers dedicated solely to R&D or incorporating installations dedicated solely to R&D

including **18** **34** innovations patented in 2010  
in energy and environmental  
performance

**1,476** patents in force at Dec.31, 2010

**336** patent families in force at Dec.31, 2010

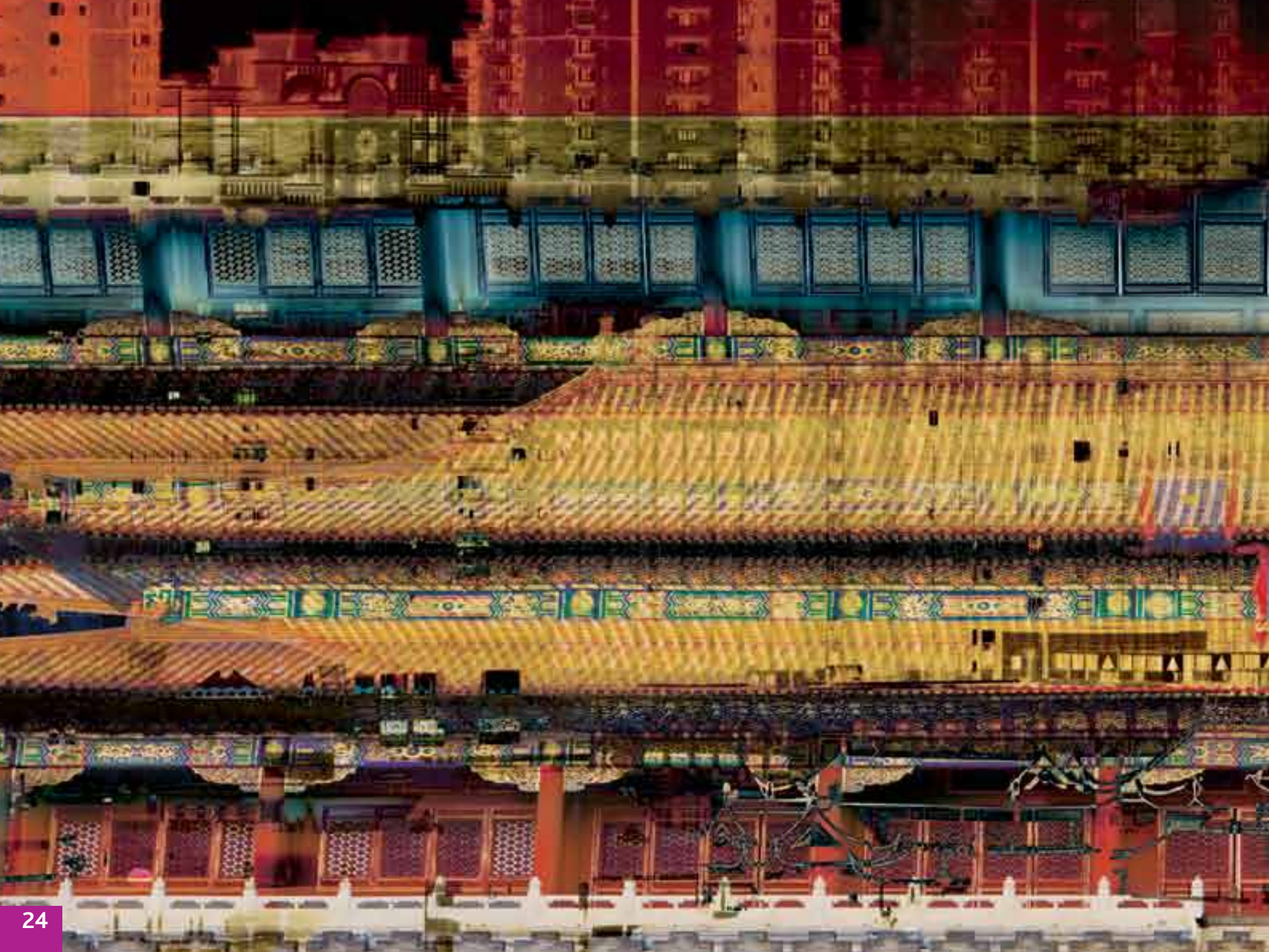
### “Engineered Sustainability”, the label of excellence



In 2010, Fives introduced an eco-labeling policy for its products and services. When Fives clients choose an item of equipment carrying the “Engineered Sustainability” label, they can be certain that they are buying a technology that delivers the best-possible level of performance in terms of safety, energy efficiency and environmental performance through deliverables such as reduced polluting discharges, greenhouse gas emissions and water consumption. The specifications of equipment applying to receive this label are subjected to specific analyses, their operating efficiency is optimized in the greatest detail, and the best technologies are used in their design and development. Operator training, operational support systems and many other measures have also been introduced to help operators reduce their environmental footprint by using their equipment optimally at all times.

The “Engineered Sustainability” program will be progressively introduced throughout the Group, with the aim that the vast majority of equipment produced will carry the label by 2014.





# International

Fives Overview 2010





# Fives, a global presence

**W**ith over 70 locations in nearly 30 countries, Fives has a truly global reach. Constantly seeking to reinforce its international market positions, key to its growth, the Group made a point last year to increase its resources in strategic markets.

## **An international network present on high potential markets**

A well organized network of commercial offices in Asia (China, India, Japan, Thailand and Vietnam) as well as in Russia, Brazil, Mexico and Turkey complement the sales operations of each of the Group's subsidiaries. Through them, Fives reinforces its local commercial expertise and the Group is able to pool each individual subsidiary's experience in a given region.

2011 should see the opening of two new commercial offices, one in the Middle East and the other in Africa, to promote Fives products and services in these high-potential markets.

**Fives' operational presence in China and India:  
a powerful lever for performance  
and competitiveness**

The operating companies created in recent years in Shanghai and Chennai provide all Group companies with the crucial capacity to deliver the local portions of contracts. The aim is to draw on local manufacturing and procurement skills whilst protecting the proprietary technologies of the Group and ensuring the level of quality and performance expected by the clients. These entities also act as competitive purchasing platforms for international projects, for both equipment and engineering.

In 2010, Fives Engineering Shanghai expanded its range once again by creating a division in China to supply low-voltage electrical and control panels. These materials will be produced entirely by the company, from design and manufacture in a dedicated facility right through to commissioning. The performance of this type of service has been tested in many projects conducted by Group companies in China and elsewhere and it has proven to be an appropriate and profitable model of local integration.

The Fives India platform set up in Chennai also successfully delivered on its contractual commitments for the Balco and Hindalco projects. The experience gained has enabled the company to position itself as a strategic partner of Fives Solios to support its development in India and the Middle East, and as a partner for other Group companies from 2011 onwards.

“ *In 2010, the Fives Group once again proved its international credentials: its ability to stay in close contact with markets and to position itself successfully at an early stage in project development, its ability to respond and compete successfully in the countries that require a strong local presence, and its ability to integrate newly acquired companies from Japan or North America. Fives is in a position to offer its clients the full benefit of the Group experience and history on their territory.* ”



Jean-Marie Caroff  
Head of the International Development Department



# More than 70 offices across nearly 30 countries



## Europe

**France:** Paris  
(Headquarters), Bar-le-Duc, Évry, Givors, Golbey, Grigny, Héricourt, Lautenbach, Le Bignon, Marseille, Montévrain, Nancy, Saint-Germain-en-Laye, Saint-Laurent-les-Tours, Seclin, Vaulx-en-Velin, Villeneuve-d'Ascq

**Belgium:** Brussels, Falisolle

**Germany:** Taunusstein

**Italy:** Milan, Turin

**The Netherlands:** Rijsenhout

**Romania:** Arges

**Russia:** Moscow

**Slovakia:** Trnava

**Spain:** Bilbao, Madrid, Valladolid

**Switzerland:** Allschwil

**Turkey:** Istanbul

**United Kingdom:** Bedford, Derby, Didcot, Keighley, Kingswinford, Southend-on-Sea, Wombourne

## Asia, Oceania

**Australia:** Sydney

**India:** Kolkata, Chennai

**Japan:** Kobe, Tokyo, Yokohama

**PR of China:** Beijing, Shanghai, Suzhou, Tianjin

**South Korea:** Seoul

**Thailand:** Bangkok

**Vietnam:** Ho Chi Minh City

## The Americas

**Brazil:** São Paulo, Sertãozinho

**Canada:** Montreal, Ontario

**Mexico:** Mexico City, Saltillo

**United States:** Birmingham (AL), Canonsburg (PA), Chardon (OH), Cleveland (OH), Farmington Hills (MI), Hagerstown (MD), Louisville (KY), North Canton (OH), Pittsburgh (PA), South Beloit (IL)

## Africa, The Middle East

**Bahrain:** Manama

**Qatar:** Doha

**Morocco:** Tangier

**Saudi Arabia:** Al Khobar

**South Africa:** Bruma

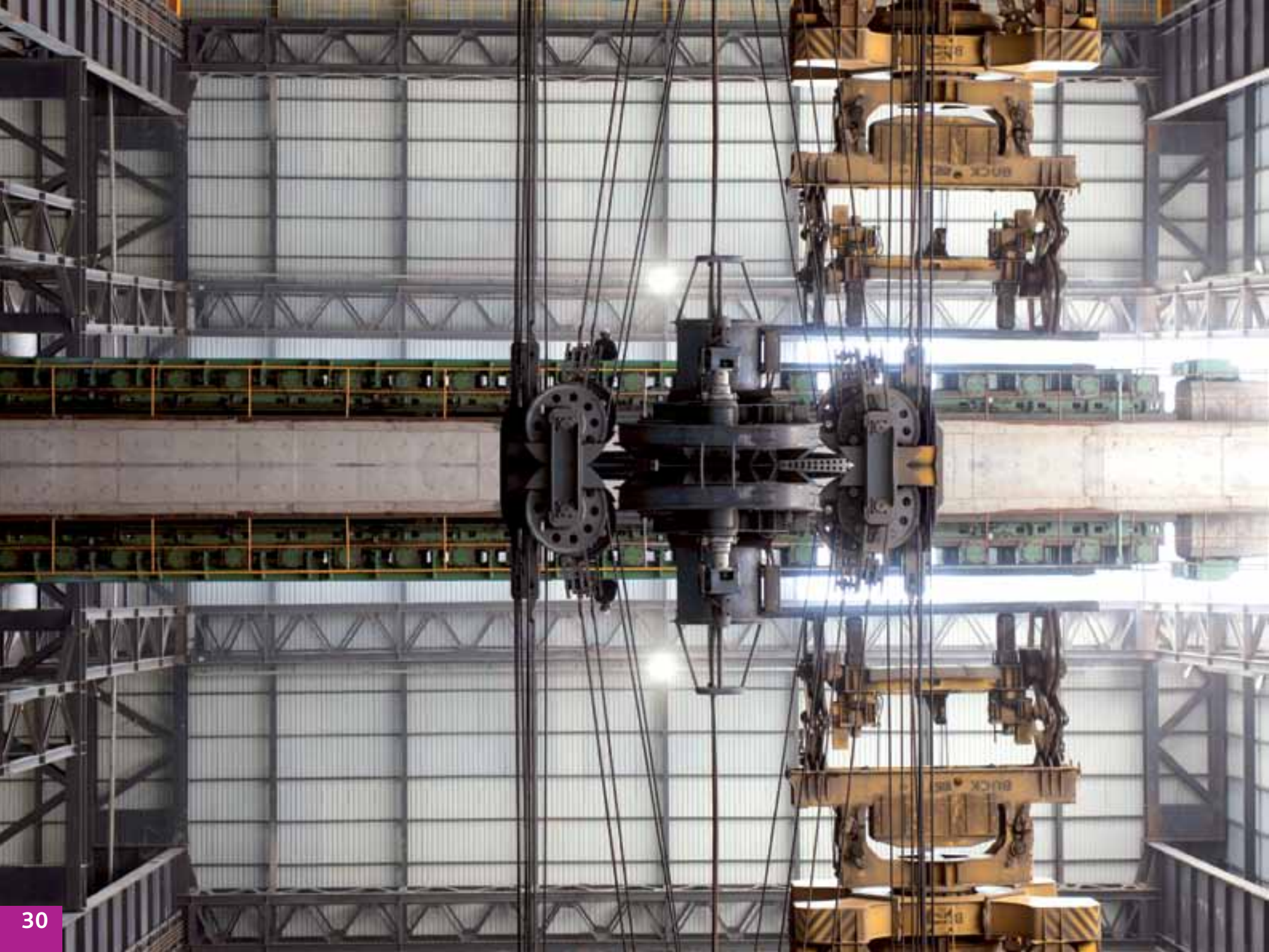
## Fives, the power of an international network

The substantial international presence of Fives in countries whose economies came out of the 2009 recession fastest and in the best condition, was one of the most important factors in the strong uptake in orders registered in 2010. The network of Fives commercial offices made a major contribution to this success, with the following notable examples.

- In China, where the market was the quickest to upturn, the commercial presence of the Group enabled it to record close to €200 million of order intake in 2010. Several significant orders were taken by Fives DMS and Fives Stein in the steelmaking sector.
- In Russia, after several years of promotional groundwork, Fives Cinetic achieved an historic breakthrough in the automotive industry, both from traditional clients (PSA Peugeot Citroën in Kaluga) and from joint ventures (Renault AvtoVaz in Togliatti). Elsewhere, Fives Pillard won contracts to supply Russian cement producers with their first Novaflam® burners.
- In Turkey, Cinetic Sorting Spa secured a contract to supply the first sorting center to use cross belt technology, thereby setting a valuable benchmark in this high-potential market. The Group's permanent presence alongside Turkish industrial companies should also enable it to ride the upturn in new capital investment, especially in the steelmaking sector.

These non-exhaustive examples illustrate the strength of the Fives international network and its effectiveness in conquering markets worldwide.





# Markets

Fives Overview 2010

- Aluminium
- Steel
- Glass
- Automotive & Logistics
- Cement
- Energy



In the primary aluminium sector, the recovery in end markets was confirmed, as the world economy returned to growth. The market evolution also confirmed the trend of a gradual shift of investments from the main production areas of Western Europe and the United States, to regions where energy is cheaper and access to raw materials easier. Against this backdrop, the Group recorded its best-ever level of orders in 2010 with, in particular, major contracts in Saudi Arabia and India.

**The year was marked by the large-scale involvement of Fives Solios in the construction of the world's largest integrated aluminium production facility in Saudi Arabia**

In mid-2010, Ma'aden Aluminium Company, the joint venture formed by the state-owned Saudi Arabian Mining Co. and Alcoa, began construction work on an industrial complex whose first phase includes an aluminium smelter and rolling mill, to be followed by a second phase comprising a bauxite mine and an alumina refinery. Once completed, this facility will be the largest integrated aluminium production facility in the world, with an expected capacity of 740,000 tonnes per year.

As part of this project, Ma'aden awarded Fives Solios several orders. The first one is a turnkey contract relating to the carbon sector which includes two green anode plants (each with a capacity of 40 tonnes per hour) integrating Rhodax® and IMC® (Intensive Mixing Cascade) technologies, the Xelios new generation vibrocompactor, the coke and pitch truck unloading and storage units, the carbon butts recycling unit, as well as a pitch vapor treatment

“ Site safety, emissions reduction and the ongoing pursuit of maximum energy efficiency from our equipment are central to our strategy.”

*Daniel Brunelli-Brondex, Executive committee member, Head of the Aluminium division*

system and a liquid pitch marine terminal with two tanks of 6,000 tonnes each. Fives Solios also received orders for four gas treatment centers or two series of three hundred and sixty electrolysis pots, and fifteen melting and holding furnaces to be used for the production of aluminium billets, slabs and ingots.

This project also involves other Fives Group companies: Fives Cinetic for the supply of the anode conveyors, Fives Industries for the manufacture of four vibrocompactors which form anodes as well as a roll crusher to equip the carbon butts recycling units, and Fives India which will be in charge of the supervision of the manufacture of proprietary equipment.

#### **Fives Solios continues to open up the Indian market**

Fives Solios was awarded orders by Hindalco and Vedanta to supply turnkey firing and control systems for the former's Mahan and Aditya plants, and the latter's Balco plant in Korba. These projects will be undertaken within a consortium with Fives India, which will be responsible for the manufacturing of the majority of the equipment. These new orders follow on from the contracts awarded in 2009 by Vedanta for the supply of four potline gas treatment centers, and by Hindalco for the supply of two green anode plants on the same sites; and they reflect the strong position now occupied by Fives Solios in the Indian market.

#### **Fives Solios sets the benchmark in the Middle East**

2010 saw completion of the commissioning phase for a range of plants and equipment supplied by Fives Solios in Qatar and the United Arab Emirates.

Following production of the first anode at the Qatalum site in February 2010, the green anode plant gradually increased production to 60 tonnes per hour, the highest rate ever achieved by a single production line. The anode baking furnace firing and control systems were accepted, as were the eleven melting and holding furnaces and casthouse water cooling system. Lastly, the Qatalum operations teams took over operational control of the four electrolysis potline gas treatment centers and associated seawater scrubbers, as well as the anode baking furnace fume treatment center.

Also during the year, Fives Solios completed commissioning of the bath processing unit at EMAL (Emirates Aluminium) in the United Arab Emirates, which uses the company's proprietary Celsius hot bath cooling and grinding process.

As part of increasing the amperage of its electrolysis pots, Sohar Aluminium intends to boost the processing capacity of the two gas treatment centers supplied by Fives Solios in 2008, and awarded the company a turnkey contract covering the installation of a new type of potline cooling system that injects water into the suction ducts.

## FIVES' OFFERING

### • **Electrolysis**

Gas treatment centers on electrolysis pots and bath processing units.

### • **Carbon**

Green anode plants, fume treatment centers, firing equipment and process control systems for anode baking furnaces and carbon butts recycling units.

### • **Casthouse**

Holding and melting furnaces, heat treatment furnaces, and casthouse water cooling systems.





## KEY REFERENCES

- **Hindalco (India)**  
2009-2010: 2 green anode plants and a control and firing system for anode baking furnaces.
- **Vedanta (India)**  
2009-2010: 4 gas treatment centers and a firing and process control system for anode baking furnaces.
- **EMAL (U.A.E.)**  
2008-2009: turnkey supply of a hot bath processing unit.
- **Qatalum (Qatar)**  
2007-2010: turnkey supply of a green anode plant, 4 pot gas treatment centers, a fume treatment center for the anode baking furnaces, the holding and melting furnaces for the casthouse with a water cooling system, the firing equipment and process control system for the anode baking furnaces and the liquid pitch marine terminal.
- **Sohar Aluminium (Sultanate of Oman)**  
2006-2008: turnkey supply of a green anode plant, 2 potline gas treatment centers, the fume treatment center for the anode baking furnace, holding and melting furnaces for the casthouse with a water cooling system and a liquid pitch marine terminal.
- **Alcoa Fjarðal (Iceland)**  
2005-2007: supply of the bath processing unit, 2 gas treatment centers and 4 holding furnaces for the casthouse.

*Genios, the latest technology for electromagnetic stirring for the aluminium casthouse*



*Fives Solios entered into a joint development agreement with a European secondary aluminium producer for the installation of Genios onto one of their furnaces. The Genios is Solios's latest technology for electromagnetic metal movement.*

*This innovative solution allows for the aluminium to be stirred or transferred from the furnace to a casting machine from a single wall mounted unit.*

*With Genios, aluminium producers can expect to save money, energy and obtain homogeneity of the alloy while reducing cycle time, equipment maintenance and environmental impact. The current model is designed to homogenize the metal temperature to within 5°C after stirring, and improve control of the metal to the casting machine, which can reach 20 tonnes per hour.*

*After several years of in-house development, the partnering arrangement with a secondary producer was identified as the ideal means to further develop this product.*

*The aluminium plant produces 100,000 tonnes per year of alloys. The client wants to improve metallurgical quality, cycle time and reduce costs. The intention is for Genios to replace an existing mechanical pump at the completion of this project.*

*The project started in 2010 and will allow Fives Solios to demonstrate all the capabilities of this new system in the course of 2011.*



This will be the first time that Fives Solios will have supplied this system, which offers an alternative method of cooling gases at the center inlet, and responds to the demand from plants keen to boost the current rating of their electrolysis pots, and particularly that of high-amperage plants around the Gulf, where ambient temperatures are very high.

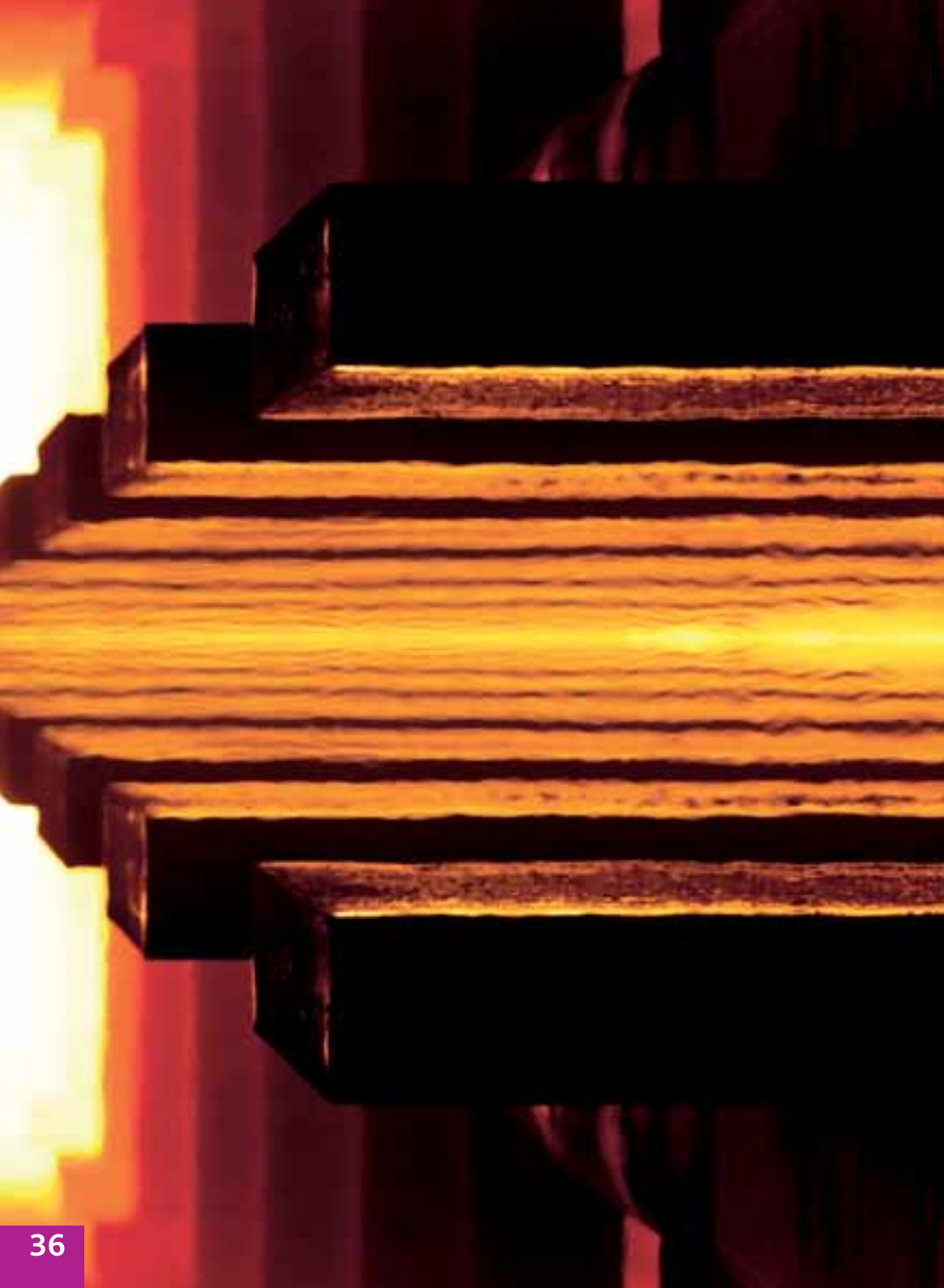
**World-acclaimed innovative technologies**

Fives Solios received an order to supply a Xelios vibrocompacting machine for the new Chalco Liancheng aluminium plant in China. This plant will produce 380,000 tonnes of aluminium per year on a site close to the existing plant constructed in 2002, for which Fives Solios supplied the fine grinding line. The Xelios twin-table vibro-compacting machine developed by Fives Solios for anode forming is the first new-generation machine of its kind to be sold in China, and will enable production of the larger anodes required by this client.

Rio Tinto Alcan also placed a design order with Fives Solios for the supply of a new electrolysis pot gas treatment center (GTC) for its pilot plant at Jonquières in Quebec (Canada) based on the company's completely new AP60 electrolysis pot technology. The order became effective in January 2011. The project involves the design, supply, installation and commissioning of the GTC, fitted with five Ozeos filters which use the very latest innovative technology developed by Fives Solios for dry treatment of gases in modern high-amperage plants. The system is particularly efficient in terms of its gas treatment performance and footprint. Innovative solutions like these enable Fives Solios to help its customers achieve their operating cost reduction and energy performance targets.







**A**fter the 2009 recession, 2010 heralded a significant recovery in global steel production (+15%), reversing the declines seen in the previous two years and resulting in a record production total of 1.4 billion tonnes. Market growth was driven principally by capacity investment in emerging economies. In these favorable market conditions, Fives was awarded major orders by China's largest steelmakers and was able to take advantage of a number of opportunities in industrialized countries, in particular the United States of America.

**Fives confirms its status as the preferred supplier of Baosteel in China**

Baosteel, China's leading steelmaker, is a large owner and operator of Fives equipment and installations, and it reiterated its confidence in the Group in 2010 with an order with Fives Stein for two horizontal furnaces to equip new grain-oriented silicon steel annealing lines.

Also during the year, Fives DMS was contracted to supply a second bright annealing line for the Baoxin site at Ningbo Beilun. This new production line will be capable of producing 80,000 tonnes of austenitic and ferritic stainless steel strip per year in widths up to 1,350 mm. Fives Engineering Shanghai, the Group's Chinese production facility, will manufacture all the mechanical components locally. This contract follows on from the first line of this type, which was delivered to the client in 2003.

In 2010, the Group also commissioned two continuous annealing lines and one automotive galvanizing line for Baosteel Stainless Steel Branch (BSSB). The first coil was successfully manufactured in August, and the client also completed acceptance of

“We continue to pursue our objective of helping our steel producing customers use less energy, by improving the energy efficiency of our equipment.”

Jean-Luc Rondreux, CEO of Fives Stein

the ZR21 stainless steel rolling mill, which represents the technological ultimate in 20-roll Sendzimir rolling mills. High-speed performance testing of this equipment has delivered strip speeds of 1,000 meters per minute.

#### **Digit@l Furnace®, unrivalled energy and environmental performance**

In 2010, the widely-recognized quality of Digit@l Furnace® technology and its energy and environmental performance were largely responsible for a number of major orders for the Group.

The latest generation of these furnaces is equipped with Advantek®, a new range of burners developed by Fives Stein and run by an expert combustion control system which ensures quality and stability of production.

The beginning of the year saw the startup of a major order from Usiminas, one of Brazil's leading steelmakers, for the supply of a new Digit@l Furnace® slab reheating furnace and the upgrading of two existing furnaces at its Ipatinga plant in Brazil.

Fives Stein also signed a contract for the complete supply of two slab reheating furnaces, each with a production capacity of 250 tonnes per hour for use on the hot rolling line of the Allegheny Ludlum Corp. plant at Brackenridge, USA. As the world-leading

producer of a broad range of carbon steels, stainless steels and high value-added special steels, this client has embraced Digital technology for its ability to reheat a broad range of steel grades at consistently high levels of quality and flexibility.

Furthermore, Handan Steel, a subsidiary of China's leading steelmaking Corporation Hebei Steel and long-standing client of Fives in the country, placed an order during the year for a fourth slab reheating furnace, following the successful commissioning of the third furnace of this type on the same site.

#### **Fives, recognized expertise in steel processing lines**

Tisco (Taiyuan Iron & Steel Co., Ltd.), which operates a stainless steel bright annealing line upgraded by Fives DMS, chose to invest in a new high-capacity line for its facility in Shanxi province 500 miles from Beijing. This flagship client once again showed its faith in the Group with the award of a contract to provide a production line capable of producing 150,000 tonnes per year of bright annealed products: the highest capacity in the world for this kind of line. This project follows the commissioning a few years ago of the world's largest hot annealing and pickling line: the so-called "Jumbo Line".

## FIVES' OFFERING

### • Stainless steel

- Digit@l Furnace®, reheating furnaces
- Reversible cold rolling mills
- Skin-Pass rolling mills
- Annealing and pickling lines (hot and cold)
- Bright annealing lines
- I-BAL (bright annealing line with EcoTransFlux® inductive heating and Flash Cooling®)

### • Silicon steel

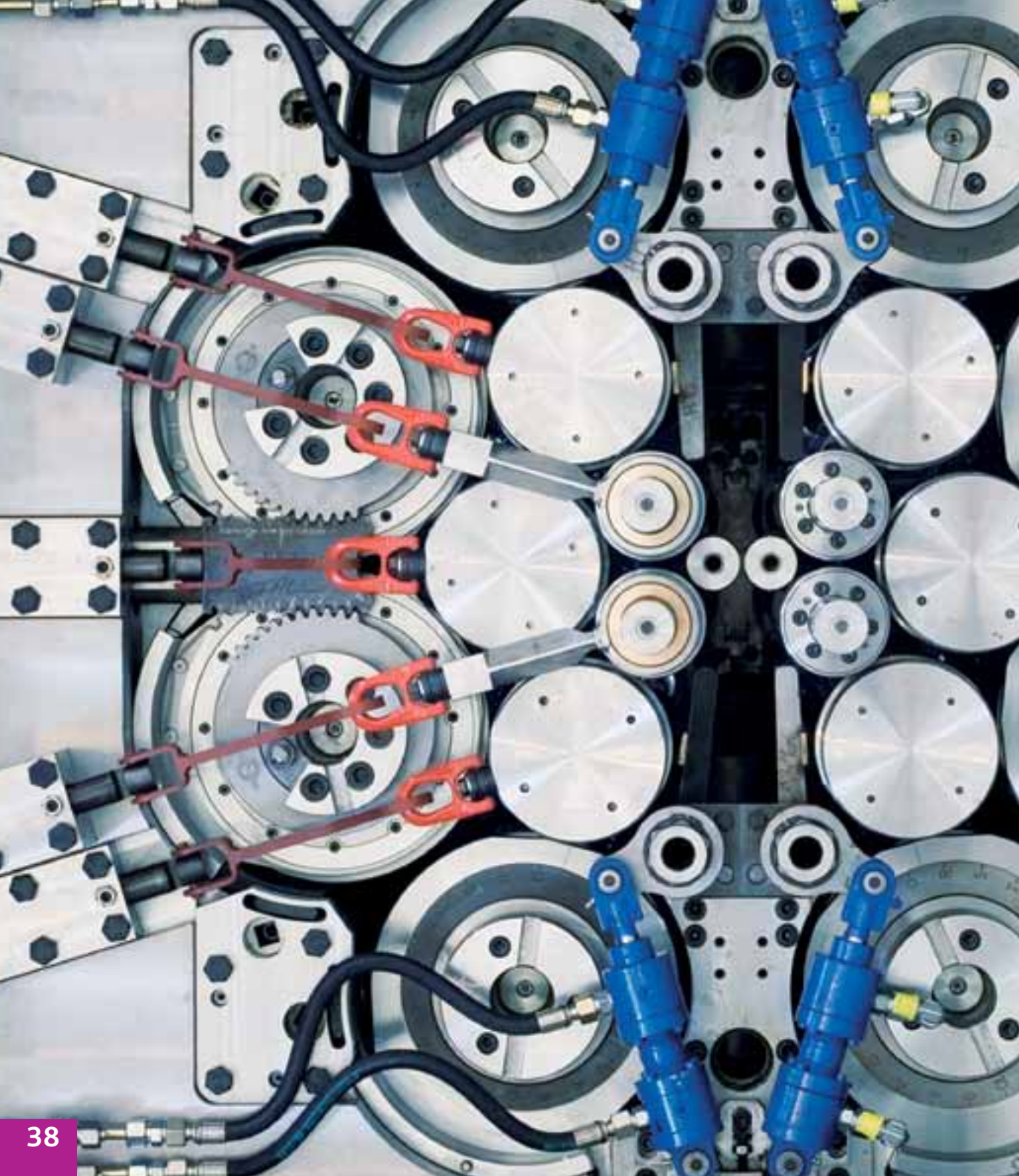
- Digit@l Furnace®, reheating furnaces
- Reversible cold rolling mills
- Annealing and pickling lines
- Decarburizing and coating lines
- Annealing and coating lines

### • Carbon steel

- Digit@l Furnace®, reheating furnaces (long and flat products)
- Tunnel furnaces and heat treatment furnaces
- Welded tube lines
- Continuous annealing lines (carbon sheet and tin-plate)
- Continuous galvanizing lines (horizontal and vertical)
- Organic coating lines (convection and induction)
- Combined and compact lines

### • Steel and non-ferrous metals

- Finishing equipment and mechanical processing for bars, tubes and pipes



## KEY REFERENCES

- **Baosteel (China) 2004-2010:** supply of 2 galvanizing lines for automotive, 2 tinplate high-speed annealing lines (800m/min), 4 vertical furnaces for continuous annealing and galvanizing (automotive) lines for carbon steel, and 2 horizontal furnaces for silicon steel and one rolling mill for stainless steel.
- **Posco (Korea) 2007-2011:** supply of a rapid wet Flash Cooling® system, 2 vertical furnaces for galvanizing (automotive) lines equipped with the Flash Cooling® technology, 2 rolling mills and one slab reheating furnace for the ZPSS site in China.
- **Anshan Iron & Steel (Angang) 2010:** supply of 2 ZR type rolling mills for silicon steel.
- **Shougang Jingtang (China) 2008-2010:** 4 vertical furnaces for galvanization and continuous annealing lines, including one continuous annealing with a capacity of 1,000,000 tpy, equipped with Flash Cooling®.
- **Outokumpu (Finland) 2009:** mechanical equipment of a stainless steel annealing and pickling line.
- **Tisco (China) 1997-2012:** supply of the world's largest stainless steel annealing and pickling line with a capacity of 1,150,000 tpy, the "Jumbo Line", 8 ZR type rolling mills and one refurbishing of rolling mill.
- **ThyssenKrupp (USA) 2007-2011:** supply of 3 rolling mills and one Skin-Pass for its new Alabama plant.
- **Allegheny Ludlum Corp. (USA), ArcelorMittal CST (Brazil), Celsa (Spain), Çolakoğlu (Turkey), Essar (India), OMK (Russia), Severstal (Russia), Usiminas (Brazil), Welspun and Jindal Steel & Power Ltd. (India) 2007-2013:** supply of Digit@l Furnace®, selected for their heating quality and their unmatched energy and environmental performance.

**EcoTransFlux™, the new flux induction high-speed strip heating technology**

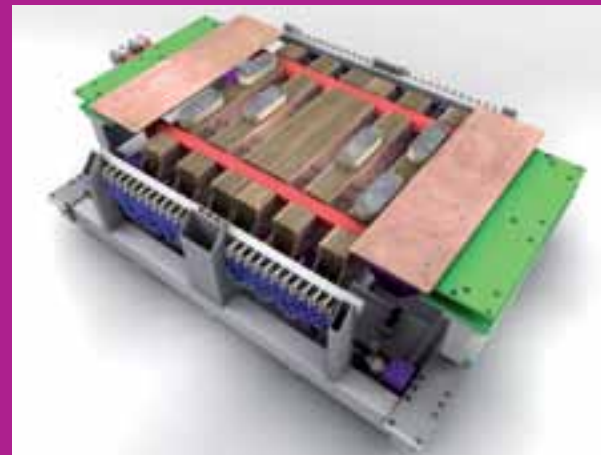


*By quadrupling the steel strip heating gradient achieved by conventional technologies, the transverse flux heating technology developed by Fives opens the way to entirely new steelmaking processes.*

*In stainless steel production, the speed increase delivered by induction heating enables the annealing cycle to be conducted in a protective atmosphere, thereby completely removing the need for the highly-polluting acid pickling stage.*

*In carbon steel production, the combination of induction heating and Flash Cooling® technologies enables the production of a finer grain, making it possible to produce new grades of steel with very high elastic limits that can be used to reduce the weight of automobiles.*

*This modern, compact, low-temperature technology has also attracted the attention of steelmakers on the basis of its lower maintenance requirement and the ease with which it can be integrated into existing production lines.*



Eastern Special Steel, another Chinese steelmaker and newcomer to stainless steel production, also awarded the Group a contract to supply its first combined annealing and pickling line, which will include a wet-type oxide breakdown system entirely designed by Fives DMS.


**China's largest steelmakers vote for Fives DMS rolling mills**

Tisco placed an order with Fives DMS to supply a new cold rolling mill dedicated to the production of "bright" strip. With a production capacity of up to 133,000 tonnes of steel per year and a rolling speed of 1,200 meters per minute, this new mill will break all records. It will also incorporate a series of special features designed specifically for this client, and will enable production of high-quality thin steel products down to just 0.2 mm. The performance profiles for this rolling mill were determined on the basis of the ZR21 rolling mill previously supplied to Tisco, which has delivered total satisfaction in terms of production, reliability and quality.

Also during the year, Jisco (Jiuquan Iron & Steel Co. Ltd.), China's third-largest producer of stainless steels, contracted Fives DMS to supply four 20-roll cold rolling mills for phase two of its plant expansion project.

Finally, the Group received acceptance of the final ZR rolling mill supplied to Angang (Anshan Iron & Steel) to produce grain-non oriented, grain-oriented and - at a future time - high permeability grain-oriented silicon steels, which are the most difficult silicon steels to manufacture.





**2**010 saw a recovery in investment in the European and Russian hollow glass sectors, a recovery from which the Group was able to benefit as a result of its traditional activity in conditioning channels. In the flat glass sector, business remained buoyant in China where production capacity continued to grow. In a still-difficult trading environment, the Group successfully established its position in growing sectors requiring special expertise, such as glass for flat screens and photovoltaic applications.

**Fives technologies continue to set the benchmark for high-precision flat glass and float glass**

Fives Stein received a series of orders in the flat glass forming sector, confirming its leading position in high-precision glass applications.

The Korean group LG awarded the company a contract to supply equipment for its first production line of extra-thin glass for flat screen applications.

Xinyi Glass, a Chinese glassmaker, also choose the Group's expertise for the record supply of twelve flat glass lehrs, including eight complete lehrs for photovoltaic glass production lines.

Also in 2010, Taiwan Glass placed an order with the Group for the supply of annealing lehrs for the world's two largest float glass production lines. The new installation will be capable of annealing up to 1,200 tonnes of glass per day.

On the commissioning front, Fives Stein achieved a successful start-up of the first float glass production line for its customer Düzce Cam, a subsidiary of the Turkish regional glassmaker Okan Cam. This line has been designed to produce 600 tonnes per day of premium-quality float glass (2-12 mm thick) for the automotive and construction industries. The group also commissioned the complete 550 tonnes per day float glass production line supplied to Sejal Architectural Glass in India.

**Globally recognized expertise in hollow glass, fiber glass and special glasses**

The year saw a large number of new orders: in China for the production of reinforcement fiber glass, in Italy and Portugal for packaging glass conditioning channels, and in Belgium for the reconstruction of a furnace for the production of soft glass for use as building insulating material.

The Aktis glassmaking group will also be using Fives Stein technology in the heat conditioning section of its new packaging glass plant in the Russian province of Rostov, as will the Turkish group Sisecam, which has placed an order for two packaging glass and table glass treatment lines.

**FIVES' OFFERING**

Thermal equipment and production lines:

- for float glass (melting furnaces, tin baths, annealing lehrs and air pollution control systems),
- for flat glass (melting furnaces, rollers and annealing lehrs),
- for hollow glass and special glasses (melting furnaces, conditioning equipment and ancillary equipment).

**KEY REFERENCES**

• **Obeikan Glass Co. (Saudi Arabia) 2008-2010:** complete\* float glass production line of 800 tpd.

• **Okan Cam (Turkey) 2008-2010:** float glass production line of 600 tpd.

• **Sejal Architectural Glass (India) 2007-2010:** complete\* float glass production line of 550 tpd.

• **YugRosProdukt (Russia) 2007-2009:** complete\* float glass production line, cutting line and nitrogen and hydrogen production stations.

• **China Southern Glass (Guangzhou, China) 2003-2005:** 2 complete hot ends for float glass lines of 550 tpd and 700 tpd.

• **Fuyao Group (China) 2003-2005:** float glass production line of 600 tpd for automotive production.

• **Goa Glass Fibre Ltd. (India) 2009:** re-design and enlargement of the furnace system and supply of patented oxy-gas burners onto fiber glass lines.

\* (i.e. melting furnace, tin bath, lehr and air pollution control)

**SunBath®: a new technology for photovoltaic glass production**



*In 2010, Fives Stein received an order from a leading American glass manufacturer to produce the industrial prototype of a new production technology for photovoltaic glass. SunBath®, which is covered by three patents and enables the application of precision films to a continuous ribbon of glass during the production process to deliver the properties required by photovoltaic panel manufacturers. This initial contract rewards all the Research & Development commitment put into the development of this process, and places Fives Stein in a strong position in this fast-growing market.*





The recovery that began at the end of 2009 in the automotive industry continued in 2010 with regional variations. Emerging economies such as China, India and Brazil continued to build new capacity, while in industrialized countries, the policies aiming at rationalizing and consolidating production capacity which started in previous years continued to weigh in 2010. At the same time, the accelerating pace of sustainability initiatives enabled the Group to secure major orders in new engine and automatic gearbox development programs, and the switch to a new air conditioning refrigerant (HFO). In logistics, Canadian, European and Japanese courier companies continued to automate their sorting centers, generating a series of major orders for the Group.

**Fives Cinetic maintains its high profile in machining and mechanization**

Fives Cinetic was selected by Detroit Diesel to supply the cylinder head washing/deburring system for its HDE engine program. The Fives Cinetic solution offers the only effective response to the cleanliness specifications (particulate size and number) applied by Detroit Diesel to meet the new emissions standards applied to diesel engines in the North American market.

A year after its No.1 machining line was commissioned in July 2009, Brazilian engine parts manufacturer WHB placed a new order with Fives Cinetic for the mechanization of a second crankshaft machining line.

“ Our constant aim is to optimize the design of our systems with regard to both the consumption of energy and fluids and the production of waste and scrap. ”

Jean-Camille Uring, Head of the Automotive division

This new automated line will produce up to 400,000 parts per year, mainly for Volkswagen, and includes seven ETFA T150 gantries, plus associated electrical cabinets and conveyors. At the same time, Fives Cinetic was awarded the contract to supply four new-generation Landis LT2 grinding machines for the same line. This installation will eventually provide WHB with the highest crankshaft machining capacity in Brazil.

#### **Fives Cinetic joins the new EB engine project of PSA Peugeot Citroën in France**

As part of PSA Peugeot Citroën's project for a 3-cylinder gasoline engine, Fives Cinetic won several sizeable orders. On the Tremery site, where two identical machining semi-lines will allow the production of 600,000 engines per year, Fives Cinetic will be responsible for the automation of the crankshaft machining lines, and of the cylinder block and cylinder-head washing machines (supply of six NC Centrispray FM washing centers) as well as crankshaft grinding (ten Landis grinders). On the Mulhouse site, PSA Peugeot Citroën entrusted Fives Cinetic with part of the T9 and T10 cylinder block molding project which comprise the die-casting. The projects will enable production to be started up in 2011.

#### **Acclaimed expertise in assembly lines**

As part of the ongoing powertrain programs underway in the US, Fives Cinetic was awarded an order by Chrysler for the conversion of one of its GEMA engine assembly lines to produce the twin overhead cam Multi Air Tigershark engine developed by Fiat. The project includes converting the engine assembly line, cylinder head machining line (with assembly and testing) and cylinder block machining line, as well as adapting the cylinder head and crankshaft

washing machines and intermediate automated storage systems. Also during the year, PSA Peugeot Citroën awarded Fives Cinetic a significant part of the contract to supply its new final assembly plant at Kaluga in Russia, on the production site it shares with Mitsubishi Motors Corporation (MMC). With an installed capacity of 160,000 vehicles per year, this assembly plant will be equipped with the innovative CFCFrixLine overhead friction conveyor developed by Fives Cinetic. The Group will supply all the flow handling systems and will provide technical support during the production acceleration phase.

Lastly, Renault appointed Fives Cinetic to supply part of its new plant at Tangier in Morocco. The contract covers all the handling equipment for the pressed steel and final assembly shops of the new plant, which will have an installed capacity of 175,000 vehicles per year across three different models. This order follows acceptance of the conversion work on the Nissan final assembly plant in Barcelona: a project completed in record time. All these projects further confirm the widespread recognition of Fives Cinetic expertise by the world's largest automobile manufacturers.

#### **Fives Cinetic pioneers the fast-growing market for new refrigerant filling systems**

Current European legislation aims reduce the potential global warming effect of the refrigerants used in automotive air conditioning systems. Fives Cinetic is pioneering the market in filling systems for new fluids such as HFO, which reduces global warming potential to a level three hundred times lower than that of current fluorinated fluids. This first-mover status has enabled the company to secure contracts from a number of major manufacturers, including General Motors (Oshawa, Canada and Lordstown, USA),

## **FIVES' OFFERING**

### **• Automotive and manufacturing industries**

Automated systems with high production rates for:

- machining,
- foundry,
- automation,
- assembly,
- and integration of industrial processes.

### **• Logistics**

- design and installation of customized logistics solutions (automated handling and high-speed sorting systems),
- computerized solutions for order picking and exit of production lines,
- maintenance of automated systems.







## KEY REFERENCES

---

- **Ford (India and South Africa) 2010:** crankshaft grinders.
- **JINAN Diesel (China) 2010:** crankshaft grinders.
- **General Motors (USA) 2010:** "Family 0" engine assembly line, camshaft grinders. / **(India, Thailand, Uzbekistan) 2009-2010:** 10 crankshaft grinders.
- **Audi (Germany) 2010:** air conditioning refrigerant (HFO) filling system.
- **Canada Post Corporation (Canada) 2010:** high-speed automated sorting systems at the parcel distribution center in Winnipeg (6,000 pph).
- **Yamato (Japan) 2010:** high-speed automated sorting systems, one for Kanagawa (6,000 pph) and another one for Wakayama (10,000 pph).
- **Russian Post (Russia) 2010:** a sorting system for small parcels installed in Moscow in the Russian Post's first automated sorting center (28,000 pph).
- **DHL (Italy) 2010:** high-speed automated sorting systems with a rate of 3,000 pph.
- **Pixmania (France) 2010:** extension of the picking solution of the leading online supplier of high-tech products.
- **Orium (France) 2010:** picking solution for the e-commerce specialized logistics provider.
- **Laboratoire Cerba (France) 2010:** automated processing system of biological tests.

**ECOFLEX™, the grinding machine combining flexibility and low carbon footprint**



Audi (Ingolstadt, Germany) and Honda (Swindon, UK). The introduction of HFO also opens up other opportunities brought about by the application of ATEX regulations to automobile air conditioning system test benches. Thus, Fives Cinetic was awarded a retrofit contract by the leading Japanese equipment manufacturer Sanden to ensure compliance of twenty-eight such test benches over three years.

**Automated logistics handling and sorting systems: an international reputation for reliable, economical technologies**

Yamato Transport Co. Ltd., one of Japan's leading courier operators, appointed Fives Cinetic to design and supply a fully-automated sorting center as part of its plans to build a new 170,000 m<sup>2</sup>, 6-level logistics terminal adjoining Haneda International Airport in Tokyo. The system will be able to handle 66,000 items per hour using a range of different sorting systems and a highly adaptable operating mode designed to cope with peak flows and volumes in order to minimize distribution times for items routed to more than 200 destinations.

Fukuyama Transporting, one of Japan's leading transporters, awarded Fives Cinetic the contract to supply a sorting system incorporating a cross-belt sorter capable of handling 11,000 items per hour routed to 73 destinations. The system will be installed in the company's new logistics terminal.

In the courier industry, the Group was awarded a contract by MNG Kargo, one of Turkey's leading express courier companies, to automate seven sorting centers and meet the very highest processing standards.

These orders underline the substantial success achieved by the cross-belt technology developed and marketed by Fives Cinetic, which is particularly effective in high-speed sorting applications.

**Maintenance: Fives Cinetic enters new markets**

In a year when La Poste - the French national mail company - renewed its contract with Cinetic Service - the Fives Cinetic service division - to maintain seven sorting centers in France, the country's national rail operator SNCF also awarded the company a major 3-year contract to maintain the tools and equipment in four of its rolling stock maintenance technical centers.

*To position itself in a promising market niche, Cinetic Landis has focused its research on the underserved segment of the machine grinding of large revolving parts between 1.5 to 4 meters long and 400 millimeters in diameter, with an option up to 750 mm.*

*The new range of ECOFLEX™ high-precision cylindrical grinders is characterized by its flexibility. Its modular platform allows it to be fitted with either conventional or superabrasive grinding wheels. Its single attachment system allows for multiple tasks and contributes to obtain a better geometric accuracy. The new ECOFLEX™ also incorporates a linear motor with anti-friction bearing cross slides that eliminate frictional "stick-slip" positioning constraints. The high rotational accuracy and stiffness of the grinder's hydrostatic wheel spindle enable higher feed rates, improved finishes and provide consistent, maintenance-free accuracy.*

*From an environmental perspective, the machine was designed to minimize unproductive energy losses (through friction and in the circuit fluid), including an innovation focused on the cooling system, and also to minimize consumption in standby mode.*

*With all these innovations, Fives Cinetic offers a range of highly flexible and configurable grinders, which can be easily adapted to other lengths, diameters and types of components.*





In 2010, the market for new cement production capacity, not including China, was unchanged compared to 2009, but remained a long way short of the record levels observed between 2006 and 2008. Low demand for cement - largely as a result of the sluggish real estate and construction sectors - did nothing to encourage major producers to resume investment in projects that had been put on hold in 2009. Nevertheless, the end of the year saw a slight recovery in global production levels, driven by Asia, Africa and the Middle East. In this market environment, the orders received by the Group focused primarily on supplying grinding plants and combustion systems.

**An unblemished record in meeting deadline and safety imperatives of major international projects**

Following commencement of production on the new 4,000 tonne per day production line for Beni Suef Cement Co. in November 2009, commissioning of this Egyptian cement plant was completed at the beginning of 2010, having met all contractual performance thresholds (lead times, production testing and performance testing) and exceeded even the customer's own clinker and cement production targets for the year. In addition to the overall success of this project, it is important to note one particularly exceptional achievement: after 6.5 million man hours worked on site under optimum safety conditions, the installation assembly and commissioning phase was completed with not a single day lost due to workplace accidents. This exceptional result had been actively

“ *Site safety is a priority for us. We have introduced a dedicated safety team, which works in partnership with the project team to monitor compliance with safety procedures and provide training and awareness for our sub-contractors.* ”

*Alain Cordonnier, CEO of Fives FCB*

targeted through the development of effective procedures, safety training and awareness programs for sub-contractors and the implementation of a dedicated safety team. The success of the project was acclaimed by a world leader in industrial safety and accident prevention, the American company DuPont, who awarded the prestigious DuPont Safety Award to the Beni Suef site.

Fives FCB has therefore once again demonstrated its total control over safety-related risks when delivering its projects, having achieved identical results in a project in Tula, Mexico, several years ago.

Fives FCB also received provisional acceptance for the complete Thai Nguyễn cement plant of Vinaincon in Vietnam, which also has a production capacity of 4,000 tonnes per day. The company also signed the final acceptance certificate with the Qatar National Cement Company for the 5,000 tonne per day Umm Bab 4 line in Qatar.

Fives FCB also started the commissioning of the new 3,500 tonne per day cement plant of Holcim Apasco at Hermosillo in Mexico. This production line integrates the latest cement production technologies developed by the Group: a raw grinding plant with ball mill and TSV™ classifier, an extremely high-efficiency burning line equipped with a 6-stage preheater and a Zero-NOx precalciner, a tire preparation and incineration unit, a Horomill® cement grinding plant and TSV™ classifier. These technologies allow the customer to produce very high quality cement whilst at the same time

reducing electricity, fuel and water consumption to the minimum as well as minimizing carbon and NOx emissions.

All these projects demonstrate once more the high degree of control exercised by the company over delivering its major international contracts.

#### **Fives FCB is appointed by Saudi Arabia on the basis of its expertise in the white cement sector**

At the end of 2010, the Group received an order from Saudi White Cement Co. for the revamping and the increasing of capacity from 700 to 1,000 tonnes per day of its white cement production line no.1 on the Muzahmiah site, in Saudi Arabia.

This contract, which came into force at the beginning of 2011, regards the addition of a kaolin and gypsum crushing plant, the increase in capacity of the raw and cement grinding plants, which will each be equipped with a ball mill alongside the existing grinding mills, as well as a TSV™ classifier. It also includes the modification of the preheater tower including a new precalciner, the replacement of the downstream seal of the kiln, the modification of the clinker cooler and the installation of a 10,000 tonne silo for cement storage.

The timeline for carrying out modifications on the existing equipment will be very short, as the shutdown period which will start in March 2012 will not exceed three months.

## FIVES' OFFERING

- **Complete turnkey cement plants.**
- **Grinding plants and process equipment** for the cement industry and mineral grinding (kilns, ball mills, Horomill®, Rhodax®, Zero-NOx precalciner, TSV™ classifiers, etc.).
- **Clean combustion engineering and systems** for rotary kilns for calcination and drying (Novaflam®, Rotaflam®, etc).
- **Dust collection equipment** for kilns, coolers and grinders.



## KEY REFERENCES

- **Qatar National Cement Company (Qatar)** 1995-2010: turnkey supply of Umm Bab 2 (2,000 tpd), 3 (4,000 tpd) and 4 (5,000 tpd) production lines.
- **Holcim/Apasco (Mexico) 2007-2010 and Holcim (Costa Rica)** 2002-2004: supply of two production lines of 3,500 tpd and 3,000 tpd, using Horomill® technology.
- **Titan / Beni Suef Cement Company (Egypt)** 2007-2010: turnkey supply of a cement plant with a capacity of 4,000 tpd, comprising a 170 tpd cement grinding unit.
- **Vinaincon (Vietnam)** 2005-2010: supply of a complete cement plant of 4,000 tpd using Horomill® technology.
- **Lafarge (Mexico)** 2004-2006: turnkey supply of a 1,500 tpd cement plant in Tula.
- **Cemex (Panama) 2006:** turnkey supply of a cement grinding plant equipped with a Horomill® 3800.
- **Cementos Moctezuma (Mexico):** 13 Horomill® grinding mills, of which the oldest were commissioned 14 years ago.
- **Holcim (Merone, Italy):** conversion of the existing Rotaflam® burner into a Low NOx Rotaflam®.
- **Holcim (Lumbres and Dannes, France / Benelux - Obourg, Belgium):** supply of Novaflam® burners.
- **TPI Polene (Thailand)** 2010: supply of 3 Novaflam® burners of 160 MW each.
- **Cemex (Texas, USA), Graymont (Utah, Pennsylvania, USA) and Polysius (California, USA):** several TGT filters for clinker furnaces and lime kilns.

**Worldwide acclaim for Fives FCB grinding equipment**

When Elpion, the South Korean subsidiary of the OCI Group, decided to produce silicon powder, it asked Fives FCB to conduct laboratory grinding tests on a range of different materials. On completion of a conclusive testing program, Elpion awarded the Group a contract for the design, fabrication and supply of a Rhodax® 600HP grinder, a TSV™ 800 separator and all associated ancillary equipment.

Also during the year, Fives FCB signed a contract with Lalitha Cement to supply two Horomill® 3800 raw grinding mills - each with a capacity of 225 tonnes per hour - for its site in Andhra Pradesh, India.

Fives FCB also began work on its first steel slag grinding installation in China, which will be equipped with a Twin Horomill® and TSV™ system. In addition to grinding this waste product finely enough for it to be recycled as a cementing material, the installation also enables continuous recovery of the metallic iron content of the slag.

Lastly, the Group obtained provisional acceptance of the phosphate processing grinding plant constructed at Somiphos in Algeria.

**The Novaflam® burner, the high-performance rotary kiln combustion solution from Fives Pillard**

The success of the new burner nozzle for rotary kilns was confirmed in 2010 with commissioning of the three most powerful Novaflam® burners yet delivered, which were fitted to three 10,000 tonne per day clinker kilns at TPI Polene in Thailand. With a power rating of 160 MW, each burner accepts a flow rate of 27 tonnes of pulverized coal per hour, and can burn up to 18 tonnes per hour of solid alternative fuel.

Fives Pillard also achieved its first commercial successes in India, of which the most notable include the sale of four Novaflam® burners to Ambuja Cement, Zuari Cement and JK Cement.

Lastly, the Group targeted growth outside its historic cement industry market, and secured a number of orders for rotary kiln combustion systems in the ferronickel, lime and papermaking industries, as well as in other calcination processes, such as lithium, with the signature of a major contract with Galaxy Lithium in China, and the supply of three rotary kiln burners for Elementis Chromium in the USA, one of which was commissioned at the end of the year.

All these projects further confirm the international success and recognition achieved by Fives Pillard combustion solutions.

***D-NOx precalciner: an innovative approach to reducing nitrogen oxide emissions***



*Latest regulations require producers to limit NOx emissions to a level lower than 200 mg/m³(n) at their new plants. Until now, complying with such limits forced producers to install a secondary air pollution control device, called SCR, which is both costly and, under certain conditions, energy consuming.*

*Fives FCB developed an innovative proprietary solution based on a global approach to the NOx issue, with the objective of considerably reducing the investment and operating costs of denitrification.*

*After using computer-assisted modelling, the company perfected the operation of the Zero-NOx precalciner and modified its design to integrate and optimize Fives Pillard's SNCR (Selective Non Catalytic Reduction) denitrification solution, whose cost is seven times lower than traditional SCR solutions.*

*So as to minimize the reactive consumption of the SNCR, NOx emissions must be reduced prior to injecting the ammoniac solution. The Fives FCB Research Centre defined optimal air distribution conditions which would enable this objective to be met: deep air staging with the addition of post-combustion air representing around 20% of tertiary air.*

*The lengthening of the goose neck duct increases the residence time in the precalciner which allows for complete combustion of difficult fuels, while ensuring the efficiency of Fives Pillard's SNCR solution. Therefore, the targets fixed by the new legislation may be met and even exceeded, all with limited reactive consumption.*

*Compared with traditional SCR solutions, the Fives FCB technology allows for a return on investment of 3 million euros for a 3,000 tonne per day production line.*





**D**riven by increasing demand for energy in the world's emerging economies and by increasingly stringent requirements in terms of energy efficiency, the market continued to trend upwards during 2010. The following factors were particularly influential in the markets serviced by Fives:

- The construction of new nuclear power plants in France and China, combined with increasingly intensive maintenance programs for existing power plants.
- Increased consumption of industrial gases, driven by industrial growth in Asia and the robustness of the natural gas market.
- Companies' requirements to renew industrial combustion systems in order to reduce the amount of energy consumed by industrial processes and their environmental footprint.
- The cooperation of the sugar-refining and energy industries to serve the biofuel market.

“ *The combustion technology developed by Fives Pillard and Fives North American allows our clients to significantly reduce their installations' emissions, and meets the most stringent environmental standards.* ”

*Martin Duverne, Executive Board member, in charge of the Energy division*

#### **Fives Nordon, setting the benchmark in the nuclear power industry**

As part of its contribution to the construction of EPR reactors, Fives Nordon received a number of new orders during the year, including one from Areva for procurements, prefabrication and erection of IRWST sump suction lines and boxes at the Flamanville EPR. Fives Nordon was also appointed to design, supply and prefabricate surge lines for the Taishan 1 and 2 EPR in China, as well as the prefabrication of primary branch for the Taishan and Flamanville EPR. Fives Nordon will also supply CGNPC in China with surge lines for ten nuclear reactors now in the installation phase.

Group activity in nuclear maintenance also remained at a sustained level during the year, with the signature of a framework agreement with EDF CIPN for the P'4 reactors of its French nuclear power plant.

Over a five-year period, Fives Nordon will carry out work to modify the nuclear island, as well as standards compliance and performance uprating conversion works for the 12 units concerned.

#### **Fives Cryogenie, recognized expertise in atmospheric gas separation and hydrocarbon processing**

As part of expanding the annual ethylene production capacity of its Chinese petrochemical facility to 1.2 million tonnes, Daqing Petrochemical Company contracted Fives Cryogenie to supply seventeen heat exchangers, two cold boxes and eight separation drums. The Group will supply initial design, detailed design and

project management services, as well as manufacturing the aluminium heat exchangers for assembly and fitting in its Chinese facilities at Suzhou.

Also during the year, GS E&C appointed Fives Cryogenie to produce the cold boxes required to boost the capacity of the Ruwais refinery in the United Arab Emirates for its client TAKREER, which specializes in petrochemical derivatives.

Air Liquide, a major client of the company, contracted Fives Cryogenie to design and manufacture heat exchangers and cold boxes for its oxygen production facilities in India, Russia and China. The same client also confirmed its order for the exchange line for the world's largest helium purification and liquefaction plant at Ras Lafan in Qatar.

Lastly, the Group secured a number of cryogenic pump installation contracts in China. In hydrocarbons, these include four high-pressure VSMPs (Sealed Motor Cryogenic Pumps for installation in explosive atmospheres) for Air Products' Chengdu project and the Caojing II project run by Air Liquide. In atmospheric gas extraction, Kaifeng Air Separation Group Co., Ltd. appointed Fives Cryogenie to supply eight high-pressure cryogenic pumps.

#### **Fives Pillard and Fives North American, undisputed market leaders in high-performance combustion systems**

Thanks to the high-quality combustion system technologies it offers for a broad range of industrial applications, combined with the significant recovery seen in capacity-related capital expenditure

## FIVES' OFFERING

- **Industrial equipment** primarily used in energy production
  - engineering, supply, manufacture and assembly of high pressure piping (new construction or refurbishing);
  - brazed aluminium: plate-fin heat exchangers (for air separation units, ethylene production or natural gas liquefaction);
  - cryogenic pumps.
- **Combustion systems** designed for electric and thermal energy production and for industrial processes.
- **Equipment and complete plants** primarily used in sugar and bioethanol production.





## KEY REFERENCES

- **Air Liquide:** supply of exchangers and pumps everywhere in the world.
- **Hamworthy KSE (South Korea) 2005-2008:** supply of 31 cold boxes and 26 cryogenic pumps for the reliquefaction of liquid natural gas vapours during transport.
- **EPR Flamanville 3 (France) Alstom, 2007-2013:** prefabrication and erection of steam and feedwater piping in the turbine hall. / **Areva NP, 2008-2013:** design, prefabrication and erection of secondary and NSSS auxiliary piping systems.
- **Framatome Olkiluoto (Finland) 2006-2010:** prefabrication of primary coolant piping systems and pressurizer surge line for the EPR reactor.
- **China Nuclear Energy Industry Corp. (China) 2009:** supply of pressurizer surge lines for 6 units for the Changjiang, Fangjiashan and Fuqing plants.
- **Alstom Power Baden (Switzerland) 2008:** supply of 60 postcombustion dual fuel burners for the Fujairah 2 plant in the United Arab Emirates.
- **Total (Lacq, France) 2009:** revamping of two industrial boilers with low NOx gas burners.
- **Outotec GmbH (Germany) 2010-2012:** design and supply of a dual fuel combustion system for the Bhushan Steel Power and Light's plant.
- **Elwood Texas Forge (USA) 2010:** design and supply of 6 regenerative forge furnaces.
- **Vale S/A (Brazil) 2009-2012:** design and supply of 46 special self-inspiring high efficiency gas burners and their associated systems.
- **In partnership with Sutech (Thailand) 2010:** supply of 30 centrifugals for Bangladesh, Cambodia and Thailand.
- **Agro Industrial Pucalá (Peru) 2010:** supply of an In Line shredder and 2 MillMax® extraction mills.
- **Petróleos de Venezuela (Venezuela) 2010:** supply of 4 shredders.

**THOR,  
the new generation of cryogenic  
piston pumps**



*The market trend for cryogenic pumps is towards an increase in flow rates and pressures. In response to this development, Fives Cryomec AG has developed its THOR new-generation high-pressure cryogenic pump for use with natural gas. The design of this pump, which delivers net thrust of twenty-five tonnes, resulted in the filing of two new patents.*

*The use of piston pumps is usually limited to low flow rates and pressures of several hundred bar, but the exceptional performance of THOR in terms of flow, efficiency and reliability opens up markets and applications previously available only to centrifugal pumps. What makes these pumps different is their ability to run continually at high flow rates.*

*Conducted in collaboration with Mitsubishi Heavy Industries, the pilot application for the new pump forms part of the development of a new process intended for use in LNG tankers. Fives Cryomec AG has now embarked on the qualification phase in preparation for the client approval required before making any necessary adjustments to the design of the pump for its future mass production.*



and the upgrading of existing facilities to meet new environmental requirements, the Group received a number of significant orders in 2010.

Fives North American was entrusted by Keystone Steel & Wire Co. with a contract to design and installation of the replacement charge and preheat zone sections for a rod mill reheat furnace, in United States, and by Outotec GmbH, an order for dual fuel combustion system for a new iron ore pelletizing plant in Orissa, India. The Group's skills in the retrofit market were also acknowledged through an order received from Aleris Aluminium Koblenz GmbH for the upgrading of a melting furnace rated at forty tonnes per hour which will enable the client to improve its energy efficiency and to supply products of higher quality.

Lastly, the market success of the Reburnflam® duct burner developed by Fives Pillard was reiterated during the year with a series of orders, including one from Hyundai Heavy Industries in South Korea to equip seven combined-cycle lines for the Riyadh conventional power plant in Saudi Arabia.

**Fives Cail, internationally recognized technologies  
for sugar-refining and bioenergy**

2010 saw further confirmation of the move observed in recent years towards convergence between the sugar-refining and power generation industries, with the formation of partnerships between major players, such as Tereos Internacional with Petrobras and Cosan with Shell, in order to develop biofuels and generate carbon neutral electricity. Fives Cail supports this trend by offering complete extraction plants that deliver high energy performance, as well as high-pressure membrane-wall boilers in India.

The Group was also appointed to supply seven cane shredders for Venezuelan distilleries, and by Agro Industrial Pucalá in Peru to supply an In Line shredder and two MillMax® extraction mills as part of its program to boost capacity and optimize energy consumption. These proprietary technologies reduce energy consumption and even make it possible to inject excess electricity back into the power grid.





Fives - 27 / 29 rue de Provence - 75009 Paris - [www.fivesgroup.com](http://www.fivesgroup.com)