

## STEEL IN FRANCE IN 2008

### Editorial

In the eyes of the world, 2008 will remain an exceptional year.

It was only a year ago that we wrote that 2008 should not experience a decline from a global economic point of view and that the prospects of the steel industry in Europe would experience positive trends.

Our assessment today is much more pessimistic. The housing crisis in the United States, which has spread to several European countries, followed by a financial crisis, lead to an economic crisis at the end of the year. For its part, Europe experienced exceptional growth in the first quarter before it was affected by the crisis.

As for the global steel industry, it experienced strong growth in production up until the month of September before collapsing in the course of the final four months; the most striking example is that of China which has seen an annual progression of 1 % against a growth rate close to 20 % in the past few years. In regards to French production, it has shrunk by 7 %.

What were the main events in the industry in 2008?

- the merging of steel manufacturers, such as the association between the Jinan Iron and Steel Group and the Laiwu Iron and Steel Group to become the second largest Chinese steel manufacturer, acquisitions or acquisition projects such as that of the American steel manufacturer Esmark by Severstal or even the setting up of a joint venture between ArcelorMittal and the Valin Group,
- the reduction in imports to the European Union from non European countries including China, following a sharp rise in 2007,
- the significant variations in the prices of raw materials. Generally speaking, prices reached a record high in the summer of 2008. From September, the prices of iron-alloys and noble metals rapidly decreased and at the end of 2008/beginning of 2009 they reached lows equal to prices seen before 2003. The example of nickel demonstrates the speed and amplitude of price variations: \$52,000/t in May 2007, \$28,000/t in January 2008 and \$9,600 at the end of December 2008, that is to say, a price which has been divided by 5.5 in 18 months. It is important to note, however, that the price of ores and coke remained at their highest level over the first two months of 2009,
- the continuation of the acquisition of mining assets or shares in companies in the sector by steel companies such as ArcelorMittal, Severstal and numerous Chinese companies.

During 2008, the French Steel Federation (Fédération Française de l'Acier - FFA) was present in several dossiers on the occasion of the "Grenelle de l'environnement" (a multi-party debate on the environment) through participation in 4 workshops, of REACH (Registration, Evaluation, Authorisation and Restriction of Chemicals) seeking to put this European regulation into practice; of the European Union's French Presidency (presentation of the FFA and actions taken in the environmental sector) and of a rail freight and environment seminar (with 9 suggestions for competitive and efficient rail freight).

### 2009

I would not risk putting forward predictions on the evolution of the steel industry's situation, in the course of the year, especially since the first quarter of 2009 has already seen a very significant fall in the production of raw steel on a global level (-22.5 %), in Europe (-43.8 %) and in France (-39.7 %). In this extremely difficult economic climate, which has led many national and international steel companies to take rapid measures, (such as stopping production equipment, reducing stocks, fixed costs, etc), I will content myself in encouraging the necessary reorganisation of our federation to consider the situation which its members are faced with. The future functioning of our federation must respond to a double objective: an optimisation of its organisation and costs, and better efficiency in the services rendered to its members.

In order to do this, it has been decided to refocus the FFA's assignments around general management and three principal centres of activity: standardisation; statistics and economic data; defending the interests of members, in the areas of steel use, environment/health and transport in particular.

Bernard Creton  
Managing Director

## THE MARKET

The year 2008 was characterised by a downturn in the global economic cycle, following four consecutive years of exceptional economic growth. The dramatic nature of this turn around pushed the global economy into recession at the end of the year. The excess of credit in the past few years generated increasing imbalance which proved to be untenable. The surge in the prices of raw materials continued up until the summer. As a result, the rise in the cost of oil hit hard until it gave way to a rapid fall.

The turbulence in the financial markets which began in the summer of 2007 transformed into a full-blown crisis in the financial and banking system, which amplified the general economic crisis already taking place.

Following increasing worries about inflation up until the summer, which led to a rise in interest rates, particularly in Europe, fears emerged concerning a return to deflation during the period of a dramatic fall in economic activity. In parallel to this, falls in the housing market accelerated.

At the end of the year, the numerous support plans in several economic zones attested to the severity of the crisis.

**GDP Growth in %**

	2007	2008
World	4.0	2.2
European Union 27	2.9	0.8
North America	2.2	1.1
South America	6.2	4.8
Asia	6.6	3.7

Source : Global Insight

Following exceptional growth in the first quarter, European growth and notably that of the Euro zone, reduced from the second quarter onwards. The increase in the price of energy and agro-food products reduced the purchasing power of households, leading to a dip in personal consumption. In addition, the continued appreciating value of the Euro up until July put European exporters at a disadvantage. In this context, companies have progressively reviewed their investment expenses with a view to reducing them, a revision which became more marked during the last quarter. Once again, the European landscape was distinguished from the rest. Germany, penalized by net incomes in decline, has for several years observed a quasi-stabilisation in its personal consumption. It enjoyed the dynamism of its exports for a part of the year, but the latter collapsed from November. Italy entered into a recession from the second quarter; its internal demand suffered as a result of the deterioration of the job market, whereas its exports were restricted due to a decline in the competitiveness of its products. Over the year, the Italian economy has been in decline by 1 %; that of Spain's, whose growth has been close to 4 % in the last few years, has dramatically slowed down as a result of the marked reduction in personal consumption and the collapse of the housing sector.

As for France, its growth has benefited, in the course of the last few years, from household expenses, as much in consumption as in housing investment; these factors lost their dynamism in the spring. The brutal reduction in housing investment was then transmitted to companies in a global context in dramatic decline. In total, economic growth will have been inferior to 1 %, close to the Euro zone's average.

In this climate, the **activity of sectors using steel in the European Union** registered strong performances in the first two quarters with a rise close to 1 % following an exceptional year in 2007; this then deteriorated with a fall of 11 % in the last quarter brought about by the slump in the car industry of almost 30 %. France has not been spared and has registered an even more severe thrashing from the steel consumer sectors.

The **registrations of individual and company cars** in the European Union reduced by 8 %, the French market was close to stabilising, whereas the Spanish market collapsed by 28 %. **Production** declined by 7 % in Europe, while vehicle stocks increased at the end of the year. In France, the production of all light and industrial vehicles was registered as being in decline throughout the year, with a fall of 15 %. **The mechanical engineering sector** enjoyed a very busy schedule, but then the situation deteriorated in the autumn, with investments being frozen and exportation orders grinding to a halt. The year ended with a modest growth and a decline of 7 % in the last quarter.

**The metal work sector** suffered throughout the year as a result of the weak activity of the car industry, before falling by 13 % in the last quarter. Over the whole year, the sector was in decline by 3.2 %.

As for the **construction sector**, the year 2008 will have been the year of a turn around in the growth cycle in several European countries. The residential sector had begun to make a turn around in 2007, but it intensified in the course of 2008. The non-residential sector, which had resisted well during the first half of the year, subsequently underwent the consequences of the fall in industrial activity. In 2008, the sector's activity will have decreased by 1 % in Europe and 2 % in France.

**As a consequence, the apparent steel consumption of the European Union decreased by 4.5 %**, after 4 consecutive years of abundant growth, nearing 4 %. The brutal collapse of net consumption, from September, led to a historically high level of stock at the end of the year, despite the adjustments in the deliveries of European producers during the last quarter. **Apparent consumption has thus fallen by 20 % in the last quarter, leading to a decline of 7 % over the year.** In France, apparent consumption has declined by nearly 8 % with a collapse of more than 30 % in the last quarter.

**DOMESTIC MARKET (steel finished products)**  
(kt)

Supply	2008	Variation in %
French mill deliveries	6861	- 4.9
Imports	9887	- 7.9
<b>TOTAL</b>	<b>16748</b>	<b>- 6.7</b>

**French market supply** in finished steel products decreased by 6.7 %, with a fall of 28 % in the last quarter.

### European Union foreign trade

**Imports** of steel products to the European Union from third countries registered a decline of 20 %, thus marking a break with the steep increases registered since 2003. For long products, there was a decrease of 29 % and 15 % for flat products. Imports from China, which still occupy a large part of the imports from less-developed countries with 19 %, equalling the imports from Russia, have fallen by 32 %.

**Exports** of steel products to third countries have noticeably progressed after 2 years of decline, with a rise of 6.5 %. They have therefore regained the level they reached in 2005. This increase in exports mainly concerned long products, with a growth of 43 %, while exports of flat products declined by 11 %.

**The trade balance** has improved; it remains deficit for flat products, but it has become positive for long products.

	French foreign trade (in kt)							
	Steel products				Processing products			
	Exports		Imports		Exports		Imports	
	2008	Var. %	2008	Var. %	2008	Var. %	2008	Var. %
<b>European Union countries (27)</b>	13510	- 5.5	14010	- 5.5	1070	- 11.6	1957	- 7.2
<b>Third countries</b>	1655	- 5.1	462	44.4	799	5.8	168	- 13.0
of which:								
Western Europe	631	1.6	122	- 18.7	126	21.2	60	10.4
Central and Eastern Europe	15	- 51.6	47	- 41.3	4	- 92.6	12	- 29.4
United States	173	- 40.8	11	- 84.3	91	37.9	11	57.1
China	44	- 2.2	59	- 1.7	28	3.7	42	- 10.6
Other third countries	792	4.9	223	- 52.7	550	9.1	43	- 21.8
<b>TOTAL</b>	<b>15165</b>	<b>- 5.5</b>	<b>14472</b>	<b>- 7.6</b>	<b>1869</b>	<b>- 4.9</b>	<b>2125</b>	<b>- 7.6</b>

Source : Customs(\*) Steel products = finished steel product + semi-products for re-rolling.

**French imports** of steel products and products from first processing decreased by 7.6 %, brought about by the decline in steel consumption.

**French exports of steel products and products from first processing decreased also by 5.4 %.**

**As a result, the external balance of exchanges of steel products and products from first processing improved after several years of deterioration.**

# WORLD STEEL PRODUCTION

	Production (kt)			Variations	
	2 006	2 007	2 008	2007/2006	2008/2007
<b>European Union</b>	<b>206 987</b>	<b>209 740</b>	<b>197 986</b>	<b>+ 1.3 %</b>	<b>- 5.6 %</b>
of which: Germany	47 224	48 550	45 833	+ 2.8 %	- 5.6 %
Spain	18 391	18 999	18 640	+ 3.3 %	- 1.9 %
France	19 852	19 250	17 879	- 3.0 %	- 7.1 %
Italy	31 624	31 547	30 575	- 0.2 %	- 3.1 %
United Kingdom	13 871	14 317	13 520	+ 3.2 %	- 5.6 %
<b>Other Western European countries</b>	<b>28 205</b>	<b>30 608</b>	<b>31 754</b>	<b>+ 8.5 %</b>	<b>+ 3.7 %</b>
of which: Turkey	23 315	25 754	26 806	+ 10.5 %	+ 4.1 %
<b>Eastern European countries</b>	<b>119 906</b>	<b>124 169</b>	<b>114 136</b>	<b>+ 3.6 %</b>	<b>- 8.1 %</b>
of which: Russia	70 830	72 387	68 510	+ 2.2 %	- 5.4 %
Ukraine	40 891	42 830	37 107	+ 4.7 %	- 13.4 %
<b>North America</b>	<b>131 791</b>	<b>132 698</b>	<b>124 504</b>	<b>+ 0.7 %</b>	<b>- 6.2 %</b>
of which: United States	98 557	98 181	91 350	- 0.4 %	- 7.0 %
<b>South America</b>	<b>45 298</b>	<b>48 232</b>	<b>47 442</b>	<b>+ 6.5 %</b>	<b>- 1.6 %</b>
of which: Brazil	30 901	33 782	33 712	+ 9.3 %	- 0.2 %
<b>Asia</b>	<b>676 184</b>	<b>761 940</b>	<b>768 070</b>	<b>+ 12.7 %</b>	<b>+ 0.8 %</b>
of which: P.R. China	422 989	494 899	500 488	+ 17.0 %	+ 1.1 %
South Korea	48 455	51 517	53 323	+ 6.3 %	+ 3.5 %
India	49 450	53 080	55 050	+ 7.3 %	+ 3.7 %
Japan	116 226	120 203	118 743	+ 3.4 %	- 1.2 %
<b>Middle East</b>	<b>15 376</b>	<b>16 452</b>	<b>16 646</b>	<b>+ 7.0 %</b>	<b>+ 1.2 %</b>
<b>Africa</b>	<b>18 780</b>	<b>18 755</b>	<b>17 091</b>	<b>- 0.1 %</b>	<b>- 8.9 %</b>
<b>Australia – New-Zealand</b>	<b>8 691</b>	<b>8 783</b>	<b>8 424</b>	<b>+ 1.1 %</b>	<b>- 4.1 %</b>
<b>World</b>	<b>1 251 218</b>	<b>1 351 377</b>	<b>1 326 053</b>	<b>+ 8.0 %</b>	<b>- 1.9 %</b>

Source : World Steel Association

Growth of global steel production continued until September before being abruptly suspended in the last quarter. It decreased by 1.8 % after nine years of uninterrupted growth. Most of the global economic zones registered a slowdown in their production in the course of the past year.

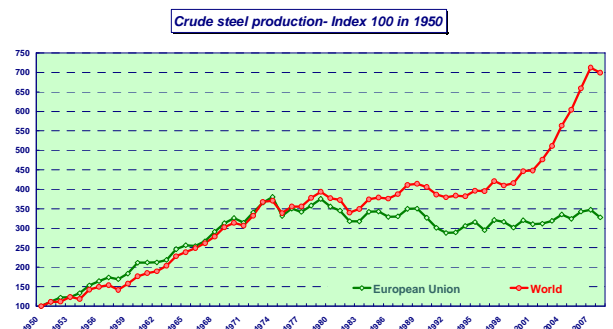
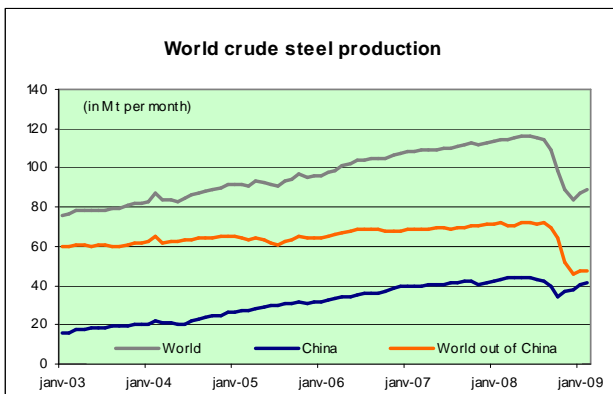
Thus, Asia registered a growth of 0.9 %. Chinese production slowed to a rate of 1.1 % over the year, following a growth which exceeded 20 % per year over the period from 2000 to 2007. Asian steel production accounts for 58 % of global steel output.

In North America, production declined by 5.9 %. Its influence on the global production of steel represents less than 10 % and continues to diminish.

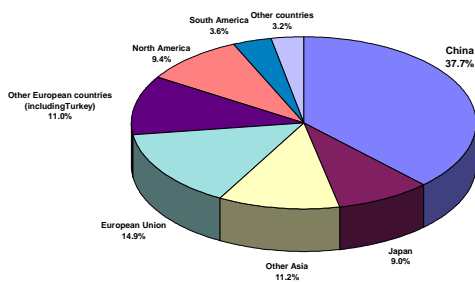
Steel production in South America has fallen by 1.9 %.

In the European Union, steel production has decreased by 5.6 %, with Germany and the United Kingdom decreasing at the average rate of the zone. The decline was weaker in Spain and Italy with -1.9 % and -3.1 % respectively. In the new member countries of the European Union, production has dropped sharply by more than 12 %.

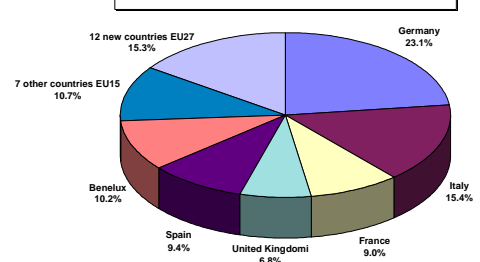
French steel production has fallen by 7.1 %. The influence of the European Union on global steel production amounts to 15 %.



World crude steel production - Year 2008



Crude steel production - European Union 27 - Year 2008



# ENERGY SUPPLIES

## IRON ORE (kt)

	2007	2008*	Variation in % 2008/2007
Imports	20,746	19,171	- 7.6 %

- Preliminary figures

## Main sources of imports

Brazil:	64.5 %	Mauritania :	13.4 %
Canada:	9.6 % :	Australia:	8.8 %

## SCRAP (kt)

	2007	2008*	Variation in %
Domestic Collection	8,756	8,866	+ 1.3 %
Imports	2,058	1,981	- 3.7 %
Total supplies	10,814	10,847	+ 0.3 %
Consumption	10,163	9,873	- 2.9 %

\* preliminary figures

## ENERGY

Coke and bituminous coal consumption down by 5.7 % and external purchases by 9.5 %.

# ENVIRONMENT – SUSTAINABLE DEVELOPMENT

Climate change, REACH and Grenelle de l'environnement were again the priority issues for the steel industry in France.

## Climate change

Following intense negotiations in December, under the French Presidency, the "Climate and Energy" package was voted in by the European Parliament on 17 December 2008. The text, which particularly concerns the steel industry, is the revision of the directive on the trading of CO<sub>2</sub> emission permits.

European manufacturers rallied together to change the text proposed by the Commission. The FFA played its role alongside the government and French politicians by focusing its efforts on subjects specific to steel. The privileged access to the French Presidency gave it a key role in the process. A large proportion of the steelworkers' issues were taken into consideration, particularly the necessity to preserve the competitiveness of French and European steelmakers.

Everything therefore is possible, but will necessitate intense work from the federations on a national and European level in order to lead, in concrete terms, to satisfactory measures over the next two years. To finalise the project, the European Union must organise the work of experts in which the 27 states are represented. The list of work groups is impressive, the work is extremely complex and monitoring it will be an immense task for the steel industry.

Simultaneously, the Poznan international negotiation meetings at the end of 2008, with a view to preparing for Copenhagen in December 2009, have a certain practical significance for our activity because, in the event of an international agreement, we will be required to reduce our emissions by 30 % rather than 20 %. In this light, the tendencies of American policy under the Obama administration must be carefully observed.

In terms of world steel, the development programme of a sectorial agreement continues, but for the moment without us being able to say whether it will have any effect on the current international negotiations.

## REACH

The "pre-registration" phase occupied a large portion of the year, since the deadline for pre-registration was on 1<sup>st</sup> December. While 300,000 pieces of data were expected, more than 2 million were registered by the agency in Helsinki. This is due to the great confusion in the regulations which led a number of actors to pre-register substances as a precautionary measure.

The strategies to follow for the steel industry were globally determined for Eurofer (the European Confederation of Iron and Steel Industries) and adapted for France on a national level as part of the FFA working group. This group took care to take common positions on the main judicial uncertainties which remain and to ensure liaison with the French authorities.

A period of uncertainty and of intense clarification and investigation work has begun.

As far as Eurofer is concerned, the FFA actively participated in the mutualisation of preparation work for dossiers in 2008 and will continue to do so in 2009.

One of the main subjects on which uncertainties persist is the case of scrap metals, which, if they were not classified as they are at the moment, as waste, should meet the needs, in one way or another,

of REACH. These regulatory aspects can have very significant legal and commercial repercussions, and they will again be the focus of discussions on a European and national (France) level that the FFA will continue to coordinate as part of its working group.

## "Grenelle de l'environnement"

The Grenelle de l'environnement was also a big drain on resources, it was given less publicity in the media in 2008 than at the beginning of 2009, but necessitated intense monitoring from manufacturers. Indeed, 33 operational discussion groups with the state had to be monitored. The FFA monitored the Groupes Santé Environnement et Déchets (Environmental Health and Waste Groups) more closely.

The laws for the programming and application of the Grenelle were more or less written at the end of the year, and their legislative process will end before the summer of 2009. The fiscal measures were defined for the programming of the 2009 financial law.

The TGAP (Taxe Générale sur les Activités Polluantes – General Tax on Pollutant Activity) was reinforced (new tax on dust emissions, small reinforcement of the tax on discharge). A rather heavy tax on trucks (one billion euros per year for the totality of road vehicles) was put in place. In 2009 discussions began on an eventual carbon tax. All of this works towards a real global debate on taxes and social contributions, which had been promised by the government but has still not taken place.

Furthermore, numerous implementing provisions have already seen the light of day, or will do over the course of 2009, by unification with laws that are currently the subject of discussion.

In return, the positive conclusions from Grenelle (funds for building renovation, large-scale construction works) will, in light of the crisis, be even more vital than previously predicted for our activity. French steel producers must be attentive and capitalise on the situation. The FFA assists them in what can sometimes be very diverse steps, such as the desire to modernise the constructive recommendations of the Administration in the regulations, so that they do not penalise the metal construction industry.

A very important aspect of the conclusions drawn from Grenelle is the acceleration of works on the environmental advertising of products. Indeed, evaluation methods which currently exist on environmental impacts give very varied results for steel. Those which are fair for our products must be favoured. There is an image issue, but in time, taxes could be put in place on this basis. These very technical discussions may therefore lead to very operational marketing aspects. Different working groups on this subject in France necessitate active monitoring by the FFA; international coordination is also necessary.

## Other European work

2008 also saw intense legislative activity on other subjects:

- **directive on waste**, very important for a material which is 85 % recycled,

- **directive on the integrated prevention of pollution**, currently being reviewed, along with the revision of references of the best available technology for steel production which forms the base of permits to exploit our sites and mobilise the FFA and numerous experts among the members.

# RECYCLING

Between 2007 and 2008, the consumption rate of scrap iron to produce one tonne of crude steel has risen from 52.8 % to 55.2 %. This increase can be explained by the growth, from the electric route (which is a predominant consumer of scrap metal) which has gone from 38.7 % to 40.4 %, in a context of decreasing national steel production.

For **end-of-life products**, forecasts for recycling rates for domestic packaging are in the order of 68 % for a deposit of 475,000 t, (the official figures can not be given until July), while the forecasts for industrial packaging are around 80 % for a deposit of 145,000 t. For other products, considering the efforts developed as much for the DEEE (Déchets d'Equipements Electriques et Electroniques – Scrap Electric and Electronic Equipment) with the participation of ECO organisations (Organisation de cooperation économique – Economic Cooperation Organisation), as for tyres with the participation of ALIAPUR (a French subsidiary for the evaluation of tyres), we can

expect to see a noticeable rise in the rate of the recovery of steel from end-of-life products.

Remind ourselves of the estimates according to diverse sources including the ADEME (Agence de l'environnement et de maîtrise de l'énergie – French Environment and Energy Management Agency)

Markets	Steel recycling rate
Packaging	68 %
Electroappliances	75 %
Car industry	97 %
Construction	75 %

In relation to previous years, demand for scrap iron decreased significantly in the final quarter of 2008 due to the cyclical effects of the economic crisis. The situation will remain bleak for 2009 with hope for improvement in 2010; as this does not work in favour of improving the recycling rate.

## INVESTMENTS – RESEARCH & DEVELOPMENT

Main investments announced, started or completed in 2008 are divided into three categories:

### 1. Environmental safety, energy savings and safety improvement

- ArcelorMittal Atlantique et Lorraine started a new sulphation line (ammonia removal in coke oven gas) in Florange.
- Ascométal Allevard kept on complying its slag landfill with standards.
- Ascométal Fos sur Mer replaced the dedusting system of scarfing at the blooming mill.
- Ascométal Hagondange improved the filtration on the dust exhaust system of the steel plant.
- Ascométal Les Dunes revamped the retention tanks under the main transformers of the plant.
- Riva group's French plants completed the water treatment improvement programme.
- Alpa Gargenville (Riva group) started up a new exhaust gas analyser, a new Saralle electric arc furnace with a distant control room to improve safety and a PLC for the detection of water leakages based on the pressure variations in the water circuits of the electric furnace.
- SAM Montereau (Riva group) built a new truck park with the valorisation of 26 000 tons of electric furnace slag.

### 2. Satisfaction of customer needs and quality improvement

- ArcelorMittal Atlantique et Lorraine revamped the #22 continuous caster in its Dunkerque plant to improve slab quality (especially segregation and internal soundness); the revamped caster started up successfully in February 2008. A new wiping system was put into operation during the summer of 2008 on the #1 hot dip galvanising line in the Mardyck plant.
- ArcelorMittal Atlantique et Lorraine completed the second and last stage of the automation revamping of the reversing roughing mill on its Florange hot strip mill to improve the thickness control and the quality of hot rolled coils.
- ArcelorMittal Méditerranée revamped the #1 slab caster in its Fos sur Mer plant in order to meet the quality needs of its customers from the automotive industry, who require improved surface quality and internal soundness; maximum slab width was increased to 1800 mm.
- Ascométal Allevard completed the first step of the installation of robots on the flat bar finishing line.
- Ascométal Fos sur Mer put into operation a 100 % ultrasonic testing on one of its bar finishing lines.
- Ascométal Hagondange strengthened the ultrasonic testing on its bar finishing lines.
- Development and trials of new technologies and new control systems for reheating and annealing furnaces ; appraisal and industrial trials of innovative burners (GDF-Suez partnership) allowing to reduce fuel consumption of the furnaces as well as CO<sub>2</sub> and NO<sub>x</sub> emissions.

- Ascométal Les Dunes improved the efficiency of one of its two quenching tanks.
- Iton-Seine Bonnières started up a new Danieli rougher in front of its bar mill.
- SAM Montereau installed a new Danieli rougher in front of its wire mill.

### 3. Cost reduction and capacity increases:

- ArcelorMittal Méditerranée started up a new charging car in August 2008 in its Fos sur Mer coke oven plant.
- Ascométal Hagondange started up a new bar mill (cost of the project: M€ 50).
- LME spent M€ 30 in its Trith Saint Léger plant, mainly split between the completion of the new heavy section mill, the initial phase of the erection of a second continuous caster and the initial phase of the revamping of the light section mill.

### Research & Development

During the year 2008 the ArcelorMittal R&D in the production process area has reorganized itself in order to adopt a global functioning devoted to all the group's production units. The R&D efforts are targeted at the group's priority objectives: control of the use of raw materials and energy, production cost cutting, control of the quality of products and the process robustness, decrease in the environmental impact of production-related activities. Moreover the R&D studies and develops innovative technologies that will allow for a breakthrough in production processes towards route shortening and a drastic reduction of energy and raw materials consumption.

The end of the year 2008, marked by the sudden downturn in the economic situation, led the R&D to strengthen its activities aiming at production cost cutting.

The examples below show some of the major contributions of R&D to the strategic objectives of ArcelorMittal group.

#### 1. Control and optimisation of the use of raw materials and energy

- Comprehensive appraisal, thanks to pilot tools, of the value in use of coals and iron ores, allowing to use increased amounts of non-coking coals and very fine ores.
- Development of global models of raw material allocation allowing to optimise the raw material distribution between the plants while having regard to technological and industrial local constraints.
- Development and implementation of global models of management and optimisation of energy and gases that are produced by an integrated plant in order to adapt gas recycling in real time according to the needs of the plant while limiting as much as possible the recourse to natural gas purchase.

#### 2. Production cost cutting, product quality, process robustness

- Controlling the lifetime of heavy equipments: routine inspection in operation of the wear of coke ovens and blast furnace hearths.

- Development and implementation of a measuring device allowing to make an in-line estimate of the sinter reducibility on the ore sintering strand.
- Development of a ladle desulphurising technique allowing to reach, in a reliable and efficient way, the very low sulphur contents that are required for some grades.
- Improvement of the surface quality of continuously cast slabs thanks of the continuous caster conditions.
- Development and industrial implementation of an innovative device measuring the efficiency of metallurgical stirring in steel ladle, using vibration analysis techniques.
- On-site optimisation of electromagnetic stirring systems in continuous caster moulds.
- Industrialisation in several plants of an innovative descaling technology in the hot strip mill with a drastic reduction of energy consumption while maintaining product quality.
- Development of a finite-element model for width control in the finishing mill allowing to optimise the control laws on the industrial installation.
- Development of new tension control strategies for tandem mills leading to a significant decrease in strip breakages and to a better width control.
- Implementation of a mathematical model for the control of pickling baths with an optimisation of line speed versus scale amount to be removed while reducing the acid consumption.
- Development of innovative lubrication technologies in the roll bite (flexible lubrication) for cold rolling mills allowing to decrease roll wear and to increase the mill capacity.
- Industrial implementation on galvanising line of a set of new technologies for the electromagnetic strip stabilisation and the strip wiping working together to increase line speed while decreasing zinc consumption and securing a perfect coating thickness homogeneity.
- Progresses in the prediction of the mechanical properties of steels during the production process.

### 3. Control of the environmental impact of the processes

The ULCOS programme (Ultra Low CO<sub>2</sub> Steelmaking) is going into its fourth year. Several interesting and promising results have been got.

The feasibility of the blast furnace concept with top gas recycling was proven during a test campaign at a small-scale experimental blast furnace in Sweden. Top gas is decarbonated and then recycled through tuyeres and in the lower stack; this allows to decrease coke consumption (and hence CO<sub>2</sub> emission) by more than 20 %, in accordance with forecast. The technology of gas decarbonation in a VPSA plant (Vacuum Pressure Swing Adsorption) proved to be particularly efficient.

CO<sub>2</sub> recovery and storage appear to be technologies that are necessary for low CO<sub>2</sub> steelmaking; underground storage of CO<sub>2</sub> was deeply investigated, in partnership with specialised institutions, and potential locations of storage sites were identified. Iron ore electrolysis constitutes a very long term breakthrough solution; laboratory trials were conclusive in terms of quantity of produced iron and electrical efficiency; an alkaline water electrolysis pilot plant capable of producing about 4 kg of iron is now available.

In the field of by-products recycling, the recycling process of sludges and dusts (blast furnace, oxygen converter, electric arc furnace) by reduction and melting in an electric arc furnace is now well designed and will lead to an industrial application in Isbergues plant ; the zinc-enriched product can be valorised directly in the zinc treatment and refining industry. In addition, several treatment and valorisation techniques of steelmaking slag were studied; they constitute attractive solutions to avoid landfill disposal of these by-products.

New techniques aiming at reducing SO<sub>x</sub> and NO<sub>x</sub> emissions from iron ore sinter plants were tested at laboratory scale and may lead to industrial validation in the year 2009.

## TRANSPORT

### Rail:

At the end of 2008, the rail freight market (excluding the SNCF) consists of seven private companies. Among them, the ones that dominate are the German subsidiary of Deutsche Bahn, Euro Cargo Rail, Veolia and Colas Rail, a subsidiary of the Bouygues Group.

The market share of these companies has not ceased to progress, rising from 0.4 % in 2006, to slightly above 8 % in 2008.

It must be mentioned that SNCF traffic has fallen below 40 billion of t.km in 2008. The steel industry still remains the railway's main client with almost 55 % of the industry assigned to this mode of transport, compared to 42 % by road and 3 % by waterways.

However, the year appears to be rather uncertain concerning the continuation of the single wagon, in particular, whose role in rail transport represents for the steel industry some 50 % of the flow.

Indeed, the policy of cost reductions and the pursuit of maximum profitability do not incite all the rail operators to commit themselves and invest in this mode of transport. The disappearance of the individual wagon will irreversibly penalise the development of the

railway in France. In Germany, however, in an internal reorganisation of the demand, this problem has already been resolved for several years now.

In addition, in the course of 2008, the FFA will have strongly participated with MEDEF in creating a regulatory agency for **independent** rail freight. The bill should ratify the establishment of this agency in the course of 2009.

### Road:

The steel industry, but also other industrial sectors like chemistry, wish to see a modification in road transport from 40 to 44 t, which would also facilitate the loading of coils.

The situation is complex in European terms, first of all, where the standardisation of 44 t does not seem to have unanimous support from the member states. For their part, the French public authorities are themselves extremely prudent concerning an authorisation of the circulation of 44t trucks, for numerous reasons: deterioration of the roads, penalization of rail transport...

## STANDARDISATION

For the standardisation office (Bureau de Normalisation de l'Acier – BN Acier), 2008 registered, as a continuation of 2007, with a new fall in the number of French standards published; with 23, of which 22 were European or International, compared to 26 in 2007.

Over the course of 2008, BN Acier monitored the standardisation work of 35 European and international active authorities, out of the 57 authorities within its field. The number of European standards or technical reports (prepared or taught by the ECISS, European Committee for Iron and Steel Standardization) approved in field of steel products and the primary alterations of steel reached a total of 396 documents at the end of 2008. As of today, the number of people signed up to the ECISS work programme is 114, which is up 3.6 % in relation to the end of 2007, including 30 new studies (that is 26 % of the total, another decrease compared with the previous year).

In European terms, 2008 will have seen the end of the reflection on the structural revision of the ECISS to take into consideration the evolution of its work programme and the resources available for the organisation of secretariats of standardization authorities. A

structure reduced to 12 technical committees instead of 22 technical committees and 18 sub-committees was approved at the end of the year.

The total number of meetings held by the French, European or international standardisation authorities, monitored by BN Acier engineers (105 meetings), is in slight progression in relation to 2007 (+3 %).

The other meetings that BN Acier engineers attended in 2008, correspond to activities related to standardisation: participation in product certification authorities (AFNOR Certification, AFCAB, ASQPE), in accreditation authorities (COFRAC), in professional bodies (AIMCC, CEPMC, EUROFER) and in organisations entrusted with regulation and the follow-up thereof (DGCCRF for food use, DG Santé for contact with drinking water, and GRO D PRO, mirror authority of the Permanent Construction) at the heart of which the BN Acier engineers represent the steel industry. The number of these meetings (57 in total) remained at the same level as in 2007.



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