

**DIRECTORATE FOR SCIENCE, TECHNOLOGY AND INDUSTRY
STEEL COMMITTEE**

STEEL INDUSTRY RESTRUCTURING AND EMPLOYMENT

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Introduction

1. Employment in the steel industry is expected to decline in the near term primarily due to the negative impact of the recent financial crisis, increasing consolidation and restructuring, improvements in productivity, and strong competition. The employment structure of the industry is also changing significantly, while the need for training the aging workforce has become more important (box 1). In the longer-term, new downstream occupations may be created, leading to a strong demand for a more qualified and well-educated labour force.

Box 1: Structure of the steel workforce

An ageing workforce

The steel workforce is mainly comprised of blue-collar workers. Manual workers account for almost two-thirds of total employees, and they are overwhelmingly male partly due to the heavy and hazardous working conditions that characterize many jobs. The workforce also appears to be ageing in some regions.

In the EU, the majority of employment is concentrated in the age band of 50-54 years, with 38,208 employees in this category (see Table 2). The data suggest that the most stable age band in terms of employment changes is 50-60 years. This limited time series also points to an ageing steel workforce together with a steady decline in the number of young workers. For instance, eight out of ten employees of age 19 years or below and half of the workforce aged 20-24 years lost their job during the 1993-1999 period.

These patterns are confirmed in Germany, Italy, France, UK, Spain and Belgium and raise the important question of how to replace older workers in the future and encourage training amongst younger workers to allow them to perform the tasks currently being done. In this context, Italy experienced an increase in the recruitment of workers in the age band of 20-30 during the 1990s, with an aim to rejuvenate the labour force.

Table 2: Age bands in the EU steel workforce

Age Band	1993	1994	1995	1996	1997	1998	1999	% change
Less than 19	4758	4099	4238	3747	3502	1024	1082	-77.3
20-24	15855	13976	14878	12931	12483	6924	7226	-54.4
25-29	29756	26239	27210	24549	23496	12343	13196	-55.7
30-34	36782	34564	37273	34740	32890	15672	15987	-56.5
35-39	43408	40400	42378	40601	38948	19202	20997	-51.6
40-44	58257	53203	54076	49676	46280	23327	25653	-56.0
45-49	65672	62861	67479	64809	61158	32516	37265	-43.3
50-54	47881	43054	43969	44676	48258	29362	38208	-20.2
55-59	14502	11882	12830	13633	15353	9100	12881	-11.2
60 and Above	2055	1740	2095	2502	2198	1879	1878	-8.6

Source: Peter Fairbrother, Dean Stroud and Amanda Coffey (2004), "The changing European Steel Workforce", Cardiff University Working Paper series.

Female share of employment is low

Based on available information, it appears that women occupy only ten percent of the steel-industry workforce. In some regions, they are largely absent from production tasks, and are typically employed in laboratory and administrative positions, as well as in auxiliary services to the industry, such as catering and cleaning. In some developing economies, the share is much higher; in 2006, women occupied nearly a fourth of total employment in large and medium-sized steel mills in China.

In eastern and central Europe, the occupational positions of women are quite different and their employment on the shop-floor is widespread. In Poland and the Czech Republic, for example, women account for 17 and 30 percent of the production workforce, respectively, and usually hold warehouse and crane-operator occupations. On the other hand, as part of restructuring programmes in Central and Eastern Europe, the number of women exiting the industry is greater than that of men.

In Western Europe, female production employment is small (between 3 and 7 percent of the workforce), but there is potential for improvement in the future. This is because the steel industry is evolving rapidly, with recent technological developments having drastically changed the production environment making it more attractive for female workers. Females may also be increasingly recruited in downstream activities.

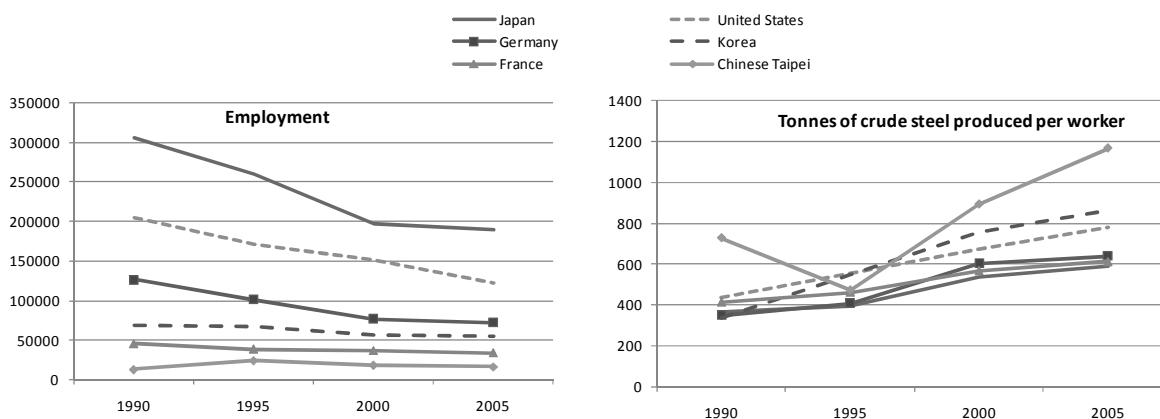
Sources: Benguin, J. (2003), "Industrial Relations in the Steel Industry" European Industrial Relations Observatory Online, <http://www.eurofound.europa.eu/eiro/2004/12/study/t0412101s.htm>

Employment trends

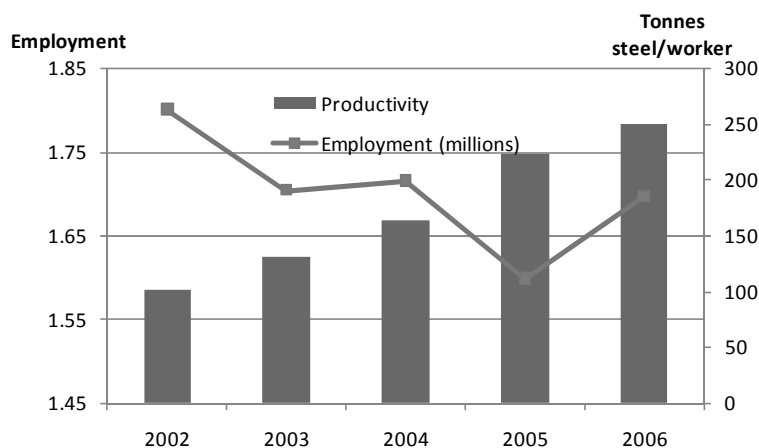
2. Steel industry employment has declined over the last two decades, despite expanding steel production. Though a sombre development from the perspective of those who lost jobs in the process, the trend reflects a very positive productivity development, whereby steel mills have pursued technological enhancements at each stage of the steel production process. In addition to constantly improving the production processes, the industry has had to seek innovations in steel products to match the changing demands of steel consumers. Such technological innovations have changed the structure of employment, through higher demand for skilled labor and workers with better training and education.

3. With employment declining in most countries, productivity measured in tonnes per man year has risen by a factor of 1.5-2.5 since 1990 in many economies. Two technological trends have contributed to this growth in productivity and reduction in employment. First, the share of global steel production that is continuously cast increased from around 60% in 1990 to over 90% today. Steel mills continue to research ways to cast steel as close to the shape of the finished product as possible, *i.e.*, so-called "near-net-shape casting," which should continue to support productivity gains in the future. The second trend has been the shift in production away from labor-intensive open hearth furnaces to basic oxygen furnaces and electric arc furnaces.

4. During 1990-1995, the employment declines observed across economies have been significant (Figure 1). In the United States, the number of jobs fell by a cumulative 40% during the period, in the wake of massive restructuring in the 1980s and 1990s. Significant investment in steel plant modernisation was met with the closure of obsolete and inefficient mills, the updating of aging lines, and installation of more productive plants. Germany and Japan also experienced 40 percent declines in employment. South Korea and France posted employment declines of one-fourth or less during the period. In China, manpower levels rose steadily to approximately 2.4 million in 1990, but then declined reaching some 1.7 million in 2006 (Figure 2). Between 2002 and 2006 alone, Chinese productivity increased more than two-fold, though at 250 tonnes per worker remains low on international comparison.

Figure 1. Employment and productivity trends in selected economies

Source: OECD and regional steel associations.

Figure 2. Employment and productivity trends in China

Source: OECD based on CISA data.

Productivity gains have supported higher compensation costs

5. The high level of labor productivity is a critical factor supporting the creation of high paying jobs as the rise in compensation may reflect productivity growth. According to a survey of nineteen countries using data from the U.S Department of Labor, the average hourly compensation cost, which includes direct hourly payments and employer social insurance expenditures as well as other labour taxes, increased 44 percent during 2001-2005. The survey, which covers Australia, Brazil, Canada, China, the Czech Republic, France, Germany, India, Italy, Japan, Kazakhstan, Korea, Mexico, Spain, Sweden, Chinese Taipei, Ukraine, United Kingdom United States, shows that Germany had the highest compensation cost at USD 34.1 per hour, while Ukraine had the lowest at USD 0.8 per hour in 2005 (see Figure 3). Germany's hourly compensation cost is 34 times higher than that of India and China. As a capital-intensive industry, labor

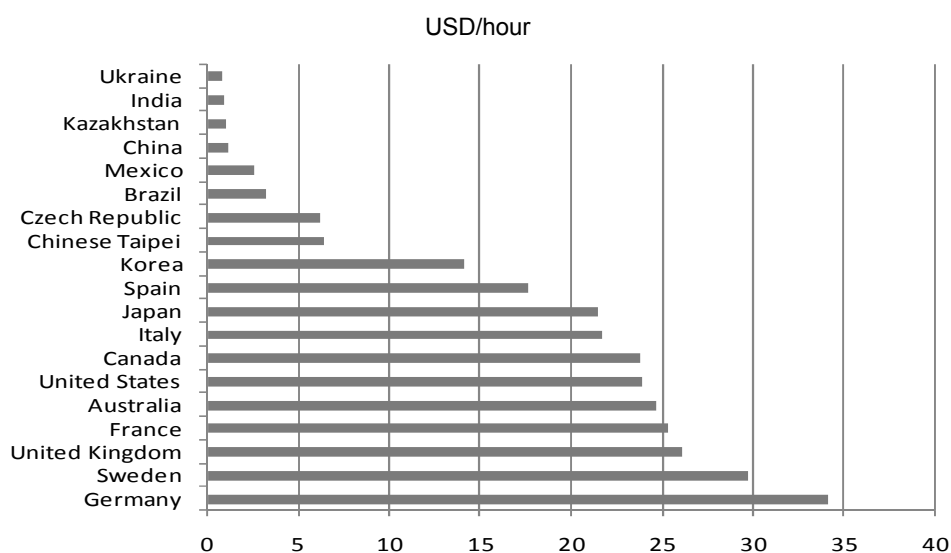
account for only 2.6 percent of the overall steelmaking production costs of an electric arc furnace and 4.2 percent of that a blast furnace¹.

Table 1. Hourly compensation costs (USD/hour)

	2000	2001	2002	2003	2004	2005
Australia	14.4	13.3	15.4	19.8	23.1	24.6
Brazil	3.5	3.0	2.6	2.7	3.0	3.2
Canada	16.5	16.2	16.7	19.4	21.4	23.7
China	0.6	0.7	0.8	0.9	1.0	1.1
Czech Republic	2.8	3.1	3.8	4.7	5.4	6.1
France	15.5	15.7	17.1	21.1	23.9	25.3
Germany	22.7	22.5	24.2	29.6	32.5	34.1
India	0.6	0.6	0.7	0.7	0.8	0.9
Italy	13.8	13.6	14.8	18.1	20.5	21.7
Japan	22.0	19.4	18.7	20.3	21.9	21.4
Kazakhstan	0.5	0.7	0.7	0.9	0.9	1.0
Korea	8.2	7.7	8.8	10.0	11.5	14.1
Mexico	2.2	2.5	2.6	2.5	2.5	2.5
Spain	10.7	10.8	11.9	15.0	17.1	17.6
Sweden	20.2	18.4	20.2	25.2	28.4	29.7
Chinese Taipei	6.2	6.1	5.6	5.7	6.0	6.4
Ukraine	0.3	0.4	0.5	0.7	0.7	0.8
United Kingdom	16.7	16.8	18.3	21.2	24.7	26.0
United States	19.7	20.6	21.4	22.3	23.2	23.8
Average 19 countries	10.4	10.1	10.8	12.7	14.1	14.9

Source: Steelonthenet (based on data from the U.S. Department of Labor, Bureau of Labor Statistics, Metals Consulting International Limited (MCI), recent ILO trends, MCI calculations, steel industry discussions and other public sources).

Figure 3. Hourly compensation costs in 2005



Source: Steelonthenet (2008), "Average Hourly Compensation Cost", http://www.steelonthenet.com/labour_cost.html

¹

See, http://www.steelonthenet.com/steel_cost_eaf.html.

The impact of recent restructuring on employment – the cases of the EU and the US

6. Privatisation has been a key driver behind the restructuring of the steel sector in Europe (see Annex I). During the 1980s, the majority of the EU's steel industry was under state control, which prevented cross-border mergers. Privatisation of the steel industry gave rise to greater integration amongst European steel firms, eventually creating some of the biggest steel companies in the world. In 1979, the UK government decided to reduce subsidies to the steel industry, and abolished the British Steel Company's statutory duties to promote the supply of iron and steel. By the end of 1980, British Steel Company had completed the closure of a number of outdated and loss-making plants and reduced its workforce to 130,000 compared with a total of 268,500 employees at the time of nationalisation².

7. The employment effects of the 1990s consolidation process in Europe appear to have been negative in the short term³. Currently, a handful of companies account for more than 80 percent of output and employment in EU countries. As a result of substantial merger and acquisition activity and mounting economies of scale, the steel industry has now become highly concentrated and the European steel companies are now much more competitive than they used to be.

8. In the U.S., following the widespread bankruptcies of the late 1990s and early 2000s, consolidation and the closure of some smaller steelmaking operations led to deep job cuts that reduced industry employment by tens of thousands in the first few years of this decade. In addition, labour agreements were renegotiated during the course of the industry's consolidation, giving the combined companies much more flexibility in staffing than before. Consolidation through mergers thus appears to have provided an important channel through which to restructure; merged companies were able to reduce their workforces, introduce more job descriptions to increase worker flexibility, alter entitlements benefits, and reduce the manager/production worker ratio, among others.

9. The European and U.S. merger experience reveals that restructuring and consolidation in the steel industry has had a negative impact on employment in the short term. In the long term, the employment effects from consolidation are less adverse in terms of the structure of the workforce, though the number of workers tends to be lower. The remaining workers in the consolidating industry, however, are usually higher paid, higher skilled and enjoy more secure jobs.

10. Restructuring is an essential tool to achieve competitiveness in the industry and needs to be carefully associated with employment policies as it can lead to adverse social effects. The recent restructuring of the steel industry reveals that it can lead to substantial job losses and reallocation. In addition to redundancies, the remaining workers also need to adjust to the changing environment by increasing their flexibility and skills.

The role of training

11. The steel industry has been taking sizeable steps to address sustainability in recent years, and many steelmakers have taken increased interest in workforce training. The World Steel Association reports⁴ that on average, steel companies provided each employee with 10.4 training days in 2006. Some

² Corus webpage http://www.corusgroup.com/file_source/StaticFiles/Corporate/History_BS.pdf

³ For example, in the case of British Steel's merger with Dutch Hoogovens to create Corus in 1999, managers promised annual cost savings of GBP 194 million. In early 2000, Corus management announced that 6,000 job losses in its UK operations would be made during the following two years in an attempt to curtail financial losses. The European Industrial Relations Observatory (2005) also notes that in steel production in the city of Dortmund stopped as a result of the Krupp-Hoesch AG and Thyssen AG merger in 1998, which led to 10,000 job cuts; in Belgium's Wallonia region, several thousand workers were laid off as a consequence of foreign buy outs of domestic steel companies during the 1990s.

⁴ World Steel Association (2008) "2008 Sustainability report of the World Steel Industry", Brussels

companies report providing over 40 training days per employee per year, most of which is computer-based but also classroom and on-the-job training. Companies also cooperate with universities to promote the education of their workers.

Job losses to continue in the future

12. The financial crisis is having a profound impact on steel production, which in turn has triggered a string of layoff announcements by producers worldwide, especially in North America. Employment prospects in the short term have weakened significantly. Over the longer term, given productivity growth in some developed economies on the order of 3-6 percent per annum, steel workforces will continue to decline in line with limited growth in production (Box 2). However, since the level of process automation has already reached high levels in many companies, productivity growth could begin to moderate going forward, thus mitigating the decline in employment to some extent. Industries which are modernising rapidly, such as in Russia, India and China, will experience faster productivity growth, which may impact on workforce levels.

Box 2: U.S. steel workforce projected to decline in the longer term

Long-term employment projections for the United States

The occupational classification study of the U.S Bureau of Labor Statistics estimates that there would be a considerable employment reduction in ten broad job categories during 2006-2016. They encompass management, business, and financial occupations; professional and related positions; sales and related occupations; administrative posts; construction & extraction; installation maintenance-repair workers, production and transportation and material handling occupations as well as their associated thirty-eight sub job categories in the United States.

Job losses would arise from increasing consolidation, improvements in productivity, and strong foreign competition. The study also indicates that the total projected reduction in the steel workforce would amount to 25 percent, and among the broad job categories constructional occupations would decline the most (by 27.8 percent). In the subcategories, the most substantial change would take place in the number of employees in charge of packing (37 percent). These reductions in the U.S. steel workforce would be potentially associated with a significant productivity increase.

13. The structure of employment will continue to change, as the industry faces the challenge of meeting environmental policies to reduce carbon emissions. Thus, over the longer term, it seems likely that the industry will make large investments in human and financial capital in an attempt to reduce the steel industry's carbon footprint and encourage sustainability. This would support demand for scientists, engineers, and other skilled labor as the industry strives to develop new technologies that would allow steel to be made in new, more environmentally friendly ways.

Concluding remarks

14. To conclude, the key messages of this paper include:

- Employment in the steel industry has declined over the last two decades and it is estimated to continue to fall in the near future primarily due to the negative impact of the recent financial crisis, increasing consolidation and restructuring, improvements in productivity, and strong competition.
- The high level of labor productivity is a critical factor supporting the creation of high paying jobs in the steel industry as the average hourly compensation cost is increasing steadily.

- The steel workforce is ageing as the number of young workers steadily declines. In the EU, the majority of employment is concentrated in the age band of 50-54 years, with 38,208 employees in this category.
- Males constitute the majority of employees in the industry. Heavy and hazardous working conditions partly explain the rationale behind the low percentage of the female workforce. Women occupy only ten percent of the steel-industry workforce as they are largely absent from production tasks.
- A majority of European countries (Belgium, Denmark Germany, Greece, Spain, France, Ireland, Italy, Luxemburg, Netherlands, Austria, Portugal, Finland, and the UK) experienced a significant decline in the total number of employees from 1995 to 2001.
- The steel workforce is mainly comprised of blue-collar workers. Manual workers account for two-thirds of total employees. As the technology improves, there will be a further relative decline in the number of manual workers in the future.
- Restructuring and consolidation in the steel industry has had a negative impact on employment in the short term whereas in the long run, the employment effects from consolidation are less adverse.
- Training/re-training is an essential tool to mitigate the adverse employment effects of restructuring. On average, steel companies provided each employee with 10.4 training days in 2006.
- The recent financial crisis is having a profound impact on steel production, which in turn has triggered a string of layoff announcements by producers worldwide, especially in North America. Over the longer term, given productivity growth in some developed economies on the order of 3-6 percent per annum, steel workforces will continue to decline in line with limited growth in production.

ANNEX 1. RESTRUCTURING: THE EUROPEAN EXPERIENCE

Regardless of the manual/non-manual job classification, a number of European countries (Belgium, Denmark Germany, Greece, Spain, France, Ireland, Italy, Luxemburg, Netherlands, Austria, Portugal, Finland, and the UK) experienced significant declines in the total number of employees from 1995 to 2001. Sweden was the only exception with a workforce increase of nearly one-fifth. Job losses were notable in Germany, where the number of employees fell by more than 16 thousand in this period. The merger between Krupp-Hoesch AG and Thyssen AG in 1998 led to massive restructuring, with the closure of the steel mill in the city of Dortmund resulting in the loss of about 10,000 jobs. The redundant employees were led into early retirement or other leave schemes on a voluntary basis. A new recruitment agency was established by Thyssen-Krupp and the city of Dortmund with the aim of providing steel workers with retraining and job placement services.

Employment in Central and Eastern Europe was hit especially hard, particularly in East Germany, Poland and Hungary. The reasons were mixed, but consolidation was the main driver. In East Germany, job losses largely occurred during the privatisation process, while in Poland the decline started well before privatisation and culminated in 77,000 job losses during 1993-2003. In Hungary, the 1992 crisis led to significant job cuts. Even though, the availability of references are limited, it is acknowledged that in Greece the restructuring efforts aimed at reducing government control over steel companies have been associated with substantial job losses in the form voluntary retirement or dismissal.

Job losses in the manual work segment have been somewhat steeper than for non-manual workers. In the EU, the number of manual workers declined by 48.3 percent between 1993 and 1999, while non-manual workers fell by 40.3 percent. Moreover, during this time period, apprenticeships in the EU also dropped more than 70 percent, which can be interpreted as either lack of interest in the training and development of the next generation of iron and steel workers or the establishment of new educational frameworks which meet the qualification demands of workers.