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The Changing European Steel Workforce

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Global Political Economy (GPE) Research Group

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The aims of the project are to:

1. Promote Lifelong Learning within the European Steel Industry
2. Support workers' adjustment to new ways of working.
3. Promote equal opportunities.
4. Support workers' adjustment to new technologies.
5. Provide workers with transferable skills.

In meeting these aims the project undertook the following:

1. Mapped existing qualifications using new and existing research to ascertain the level of need in new and transferable skills.
2. Developed transnational qualification modules comprising new and transferable skills.
3. Developed an on-line training programme.

The duration of the project was three years, from December 2000 to November 2003.

The research for the Reports was undertaken by: Peter Fairbrother, Dean Stroud, Amanda Coffey, Jan Clark, Jenifer Daley, Nikolaus Hammer and Steve Davies, with contributions from all partners.

The Reports are:

1. New Steel Industry Challenges
2. The Internationalisation of the World Steel Industry.
3. The European Steel Industry: From a National to a Regional Industry.
4. The Changing European Steel Workforce.
5. Skills, Qualifications and Training in the German Steel Industry: A Case Study
6. Skills, Qualifications and Training in the Italian Steel Industry: A Case Study
7. Skills, Qualifications and Training in the Netherlands Steel Industry: A Case Study
8. Skills, Qualifications and Training in the Polish Steel Industry: A Case Study
9. Skills, Qualifications and Training in the British Steel Industry: A Case Study
10. Future Skill Needs in the European Steel Industry
11. Training and Qualifications in the European Steel Industry.
12. The Question of pan-European Vocational Qualifications
13. Equality and Diversity in the European Steel Industry

The Changing European Steel Workforce

Introduction

The European steel industry is changing in dramatic ways. It has moved from a state run and regulated industry to one that is increasingly operating across borders and boundaries. The industry is slowly shifting from one where the emphasis was almost solely on steel output to a broader consideration of downstream activity. Increasingly attention is being given to the place of steel products in different sectors and for varied uses. As part of these developments, the steel workforce is in the process of changing, although in some respects this is both embryonic (gender) and by default (age).

Within this process, the starting point is to note that the world steel industry is taking on a global form. Throughout the 1980s and 1990s, steel companies began to reorganise so as to lay the foundation for an increasingly international industry. The implications of these changes have meant that steel companies have begun to look beyond previous boundaries: geographical, sectoral, and in terms of trade. The impact on employment has been marked, not only in relation to numbers employed but also in relation to the composition of steel workforce. This workforce is changing in uneven ways, particularly in terms of gender, generation, and occupational status.

More specifically, at a European level, the industry is exploring new technological innovations as a way of improving productivity as well as the quality of steel products. It is an industry that has been transformed from a predominantly state-owned and nationally focused industry to one where the dominant companies are in a process of establishing themselves as international industries, with a recent history of merger and acquisition within Europe and beyond. These developments involve a recomposition of the steel workforce as part of an internationalised industry, a technologically changing industry, and in terms of skills requirements. Such changes have consequences for the organisation and control of labour in this industry.

The prevailing feature of the European steel workforce is that is aged and largely manual. It is also an industry in which very few women are employed, at least on an aggregate basis. However, the changes in process are likely to create the conditions for a recomposed steel workforce. If this is so then questions will be raised for this industry in relation to gender, ethnicity, generation and occupational and qualification profiles. These are the themes that are explored in this Report.

The starting point for an analysis is the current composition of this workforce. Although the available data is limited in its scope, it is nonetheless possible to develop a picture of a workforce that is on the threshold of major change. The argument is that this is a workforce, where the beginnings of a generational polarisation is becoming pronounced, where there is likely to be a feminisation of sections of the workforce including operational activity over the next two decades and where there is likely to be a recompostion of the occupational profile of the industry.

Section One: Questions of Data

To address these themes, Europe-wide aggregate data were sought, including data pertaining to each of the project partner countries. This process of data gathering was not straightforward. At a

European level, there is a body of data, on the steel industry, which permits a general picture to be developed, particularly in relation to numbers, age and occupation. This data can also be presented in relation to country. However, more precise and disaggregated data is less readily available.

Some data were identified from a variety of sources, including national and on line employment databases, industry sources and project partners. Since it was desirable to get any available information, the detail was requested for the 'steel industry' (and metals industry) at the company, industry or national level, whatever was available. Although many countries/sources responded to the request, some proved fruitless, as the data were 'not available' or what was available was not useful in this context. As a result, it was not possible to corroborate the authenticity of the data received by comparison from various sources. Data were collected, where available, for all 15 EU countries and the two accession countries involved in the project, Lithuania and Poland.

Two points should be made from this mapping exercise.

- *Access and quality of the data*: Comprehensive aggregate data on the steel or basic metals industry are not consistently available across Europe. For some countries there appears to be a paucity of data, making it difficult to draw worthwhile comparisons. This will remain a salient factor in any systematic attempt to comprehensively map qualifications (and thereby skills) across the (European) steel industry as a whole.

- *Inconsistency in classifications*: Data varies in terms of time coverage, detail, and classifications/definitions employed. In the process of preparing the data, it became apparent that significant differences between the countries related more to different definitions of similar concepts and different ways of reclassifying national data rather than true differences in the economies. However there remains uncertainties about the extent to which the industry classifications and/or definitions employed are comparable across countries.

The coverage allows for the data to be used comparatively or in conjunction with similar data (if necessary), and the occupational and personal detail allow for an informed discussion of these issues within the steel industry.

The aggregate data presented in this report are based on different definitions of the steel industry. This reflects the difficulties experienced locating social demographic data for the European steel industry (and the metals industry per se). We draw on ECSC (Eurostat data using SIC 27.1), UK Standard Industrial Classifications (SIC) 92 (Office of National Statistics 2003 update) and International Iron and Steel Institute definitions to define the industry. The way the data are defined is included as a note to each table and figure. Occupations are defined according to ECSC (Eurostat data) definitions and International Standard Classification of Occupations (ISCO) 88.

Section Two: Aggregate Employment Patterns in the European Iron Steel Industry (ECSC)

The European steel industry is a major employer, standing at 270,000 in the year 2000. This level of employment, however, hides at least twenty years of decline. A glimpse of the scale of the decline is given by the data for seven years during the 1990s (Table 1).

Table 1: Steel Employment in Ten Major EU Countries ('000s)**, 1993 – 2000**

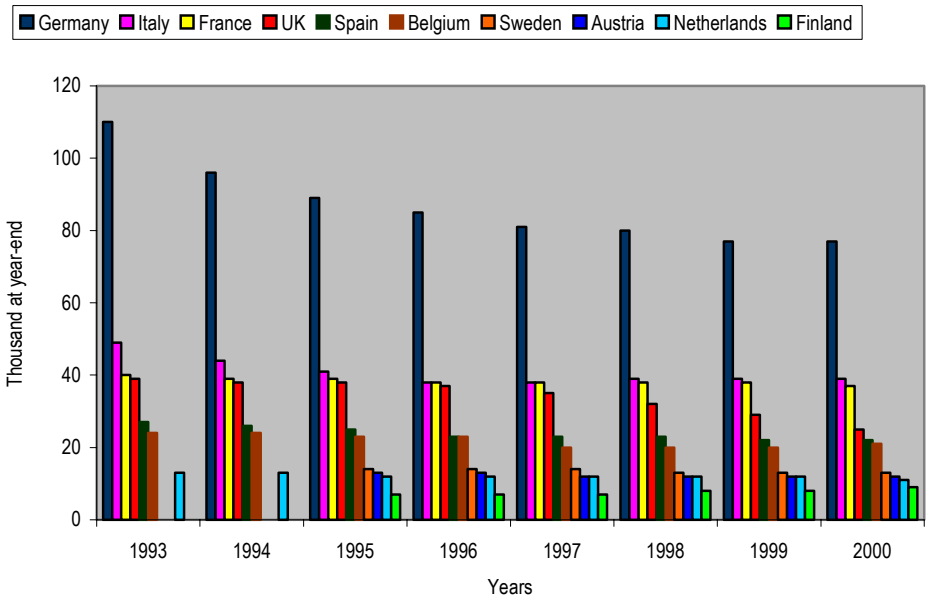
Country / Year	1993	1994	1995	1996	1997	1998	1999	2000
Germany	110	96	89	85	81	80	77	77
Italy	49	44	41	38	38	39	39	39
France	40	39	39	38	38	38	38	37
UK	39	38	38	37	35	32	29	25
Spain	27	26	25	23	23	23	22	22
Belgium	24	24	23	23	20	20	20	21
Sweden			14	14	14	13	13	13
Austria			13	13	12	12	12	12
Netherlands	13	13	12	12	12	12	12	11
Finland			7	7	7	8	8	9
Total EU	**317**	**293**	**314**	**301**	**290**	**287**	**280**	**275**

Notes: Steel Industry as defined by ECSC classification
Source: Sigrid Fickinger @ Eurostat from Questionnaire 231 and 234 New Data Bank Steel (Oracle)

There are two noteworthy points to make. First, there has been marked decline in employment levels among steel producers in the EU during the 1990s. Historical data suggests that this is part of a long-term decline in employment in the steel industry that effectively began in the late 1970s. In the context of ongoing technological innovation as well as merger and acquisition, not only with in the EU but beyond, then this pattern is likely to continue. Second, steel employment in the EU countries is located principally in six countries, with Germany being the largest location for employment in the steel industry.

These patterns are depicted in Figure 1.

Figure 1: Steel Employment in Ten Major EU Countries, 1993 – 2000 ('000s)



Notes: Steel Industry as defined by ECSC classification
Source: Sigrid Fickinger @ Eurostat from Questionnaire 231 and 234 New Data Bank Steel (Oracle)

It is against this pattern of change that steel employment can be further disaggregated, thereby laying the foundation for an examination of the implications for skills profiles and training.

Section: Three: The Socio-demographic Profile of the European Steel Workforce

Five measures of the socio-demographic profile of the European steel industry are used: gender, age, ethnicity and inward migration, occupation and education and training qualifications. Each will be presented in turn.

Gender

In the absence of detailed Eurostat data on the gender distribution of the steel workforce, the starting point is a set of diverse data on the European metals industry (SIC 27) (Table 2). The Report also draws upon some indicative data on the steel industry from a small number of countries (Table 3):

Table 2: The Metals Industry Workforce Employed according to Gender, in Selected European Countries, 1999/2000 ('000s and %s)

COUNTRY	YEAR	MALE	% OF TOTAL	FEMALE	% OF TOTAL	TOTAL
Austria**	1999	27,553	88	3,634	12	31,187
Belgium***	2000	24,609	94	1,479	6	26,088
Denmark	-	-	-	-	-	-
France	-	-	-	-	-	-
Germany+	1999	294,758	87	42, 631	13	337,389
Greece	-	-	-	-	-	-
Italy	-	-	-	-	-	-
Lithuania++	1999	136,100	88	18,600	12	154,700
Luxembourg	-	-	-	-	-	-
Netherlands+++	1999	47,800	92	4,100	8	51,900
Poland##	2000	-	-	-	-	48,503
Portugal	-	-	-	-	-	-
Spain	-	-	-	-	-	-
Sweden#	2000	25,990	85	4,590	15	30,580
UK	2000	131,602	89	16,278	11	147,880

Notes: (a) Metals industry as defined by UK SIC (92) 27
(b) Totals shown are the maximum valid totals (that is, excluding missing values).
(c) - data not available.
Source: * Quarterly Labour Force Survey, ** Statistik Gov, *** ONS Belgium, + Statistisches bundesamt, ++ Astra Machinery – Vidmantas Tutlys, +++ CISY-HRS-PSA-IDP Weiland, # statistical office (SCB), ## Sekretariat Metalowcøw (Adam Ditmer).

Overall, women constitute a small proportion of workers in the metals industry, no more than 15 per cent in Sweden, the country with the largest proportion of female workers. Belgium and the Netherlands stand out in that they have a smaller proportion of women employed in the metals sector than Austria, Germany, Lithuania, Sweden and the UK. On the basis of this data it is likely that the numbers in the steel industry as such will be low and particularly in steel production.

While the available data on employment in the steel industry is limited, what is available points to the fact that fewer women are likely to be employed in the steel industry than the metals industry as a whole.

Table 3: The Steel Industry Workforce Employed according to Gender, in Selected European Countries, 1999/2000 ('000s and %s)

Country	Year	Male	% of Total	Female	% of Total	Total
Belgium***	2000	18,188	96	842	4	19,030
Germany+	1999	100,817	90	11,040	10	111,857
UK*	2000	34,447	94	2,126	6	36,573

Notes: (a) Totals shown are the maximum valid totals (that is, excluding missing values).
(b) Steel as defined by UK SIC (92) code 27.1 only.
Source: * Quarterly Labour Force Survey, *** ONS Belgium, + Statistisches bundesamt

Women workers in the metals industry are more likely to appear in the younger age bands, constituting between 10 and 20% of the metals manufacturing workforce. Broader evidence about the increased employment of women in traditional industries, such as metals, suggest that these trends are likely to increase over time (Fonow and Ehrardt, 2001). If this is so, then there are likely to be knock-on implications for sub-sets, such as steel. Apart from the broad shift that is taking place in most European countries, where women are increasingly finding employment across all sectors, it is also likely that more women will be recruited into the steel industry. This is an industry that faces potential shortages in new areas of activity (such as marketing) as well as in the more traditional operational areas, because of the relatively rapid ageing of the steel industry workforce (see Workpackage Five Report for further details).

Age

One consequence of major restructuring, involving staff reductions is that the age profile changes, as older workers are encouraged to leave and there is minimal recruitment. The current age profile is presented in Table 4 and Figure 2.

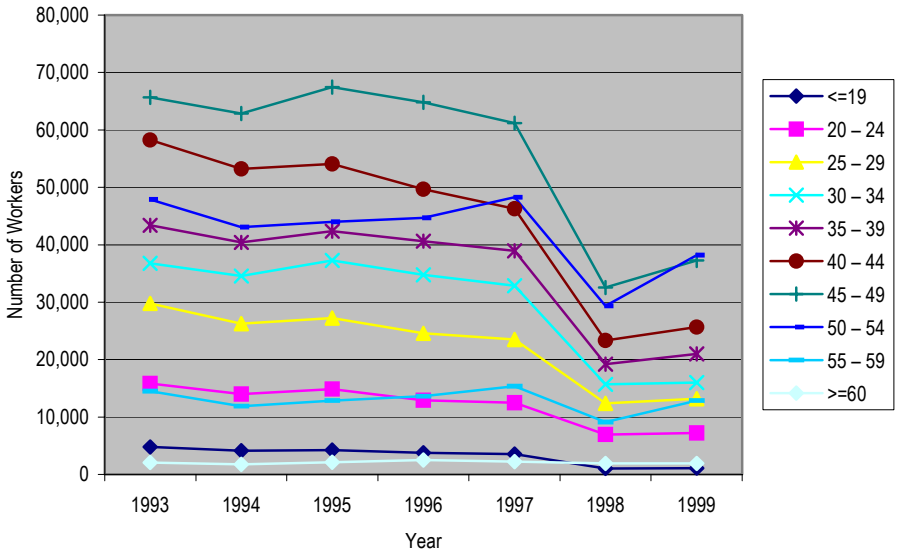
Table 4: The Age Profile of the EU Iron and Steel Workforce, 1993 – 1999 (ECSC)

Age Bands	1993	1994	1995	1996	1997	1998	1999
<=19	4,758	4,099	4,238	3,747	3,502	1,024	1,082
20 – 24	15,855	13,976	14,878	12,931	12,483	6,924	7,226
25 – 29	29,756	26,239	27,210	24,549	23,496	12,343	13,196
30 – 34	36,782	34,564	37,273	34,740	32,890	15,672	15,987
35 – 39	43,408	40,400	42,378	40,601	38,948	19,202	20,997
40 – 44	58,257	53,203	54,076	49,676	46,280	23,327	25,653
45 – 49	65,672	62,861	67,479	64,809	61,158	32,516	37,265
50 – 54	47,881	43,054	43,969	44,676	48,258	29,362	38,208
55 – 59	14,502	11,882	12,830	13,633	15,353	9,100	12,881
>=60	2,055	1,740	2,095	2,502	2,198	1,879	1,878
Total	**318,926**	**292,018**	**306,426**	**291,864**	**284,566**	**151,349**	**174,373**

Notes: Steel Industry as defined by ECSC classification
Source: Questionnaire 234, New Data Bank Steel (Oracle) (Eurostat1 – excel)

In relation to age, the largest concentration of the iron and steel workforce is in the 45-49 year age bracket. More broadly most workers are in the age band 40 – 54 years: a relatively old and it can be assumed stable workforce.

Figure 2: The Age Profile of the EU Iron and Steel Workforce, 1993 – 1999 (ECSC)



Notes: Steel Industry as defined by ECSC classification
Source: Questionnaire 234, New Data Bank Steel (Oracle) (Eurostat1 – excel)

If the figures are grouped according to ten-year age bands, then it is apparent that there is a shift away from a more evenly distributed workforce according to age, towards one where the age weighting is towards the higher age brackets. The pattern is presented in Table 5.

Table 5: Proportion of EU Iron and Steel Workforce in Ten Year Age Brackets, 1993 – 1999
(% Total EU)

	Percentage of EU Total Workforce						
Age Bands	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**
<=19	1+	1+	1+	1+	1+	1-	1-
20 – 29	14	14	14	13	13	13	12
30 – 39	25	26	26	26	25	23	21
40 – 49	39	40	40	39	38	37	36
50 – 59	20	19	19	20	22	25	29
>=60	1-	1-	1-	1-	1-	1+	1+
Total	**318,926**	**292,018**	**306,426**	**291,864**	**284,566**	**151,349**	**174,373**

Notes: Steel Industry as defined by ECSC classification
Source: Questionnaire 234, New Data Bank Steel (Oracle) (Eurostat1 – excel)

To the extent that this limited time series is indicative of a trend, then the EU steel companies face a growing problem with the age distribution of the workforce. These patterns are confirmed in the six largest European steel employing countries, Germany, Italy, France, UK, Spain and Belgium (see Appendix One). Two points are noteworthy from this data. In every case there has been a major decline in absolute numbers employed in the steel industry, but in each case there has been a marked aging of the populations as an increasing proportion of the workforce enters the 50-54 age bracket. This is especially noticeable in Italy. Towards the mid to end 1990s, there has been increased recruitment of workers in the age bracket 20 – 30 age bracket, suggesting that there is a polarisation of the workforce. As time goes by this is likely to become acute, and raises very important questions about the replacement of older workers over the next five years and the training of younger workers to take on the jobs currently done. In some instances this may also provide the occasion for employers to seek to reshape the work organisation in steel plants, for example in Germany promoting team working which at present is relatively under-developed. Such developments raise significant questions for trade unions, in promoting a worker friendly transformation in work patterns and work organisation.

Ethnicity and Inward Migration

Data on the racial and ethnic composition of the EU steel sector workforce was particularly difficult to locate. The most comprehensive data set that was available was for the Basic Metals Industry.

No time series data was available. It is thus difficult to draw any real conclusions about developments and changes in the ethnic composition of the European steel industry. However, the data collected does allow some understanding of the ethnic profile of the European Basic Metals Industry workforce in particular countries and, furthermore, an understanding of the way minority groups are distributed across the occupational hierarchy. It is possible to draw some indication of what is happening in the steel industry from the data available on the Basic Metals Industry and what data is available on the steel industry.

It is evident from Table 6 that Germany employs significantly more workers from outside Germany and the EU (in the region of 12% for Metals and 9% for Steel) than the UK (in the region of 3% in Metals and Steel) – in both the Basic Metals and Steel industries. This perhaps reflects the large number of Turkish (and other nationality) workers that comprise the German steel industry workforce (Wallraff 1988, Akgündüz 1993, Steinart 1995). The relatively large number of workers from outside the Netherlands (but within the EU) reflects similar patterns of inward migration to work in the basic metals industry. There are historical reasons why the metals and steel industries in particular EU countries, such as Germany and the Netherlands, have attracted more migrant labour than other member states (Akgündüz 1993, Castles and Kosack 1973, Cohen 1987). The puzzle is why the UK steel industry does not reflect the pattems of immigration into the economy during the 1950s, 1960s and into the 1970s. The data confirms these patterns.

Table 6 Number of Employees by Country of Birth (Basic Metals Industry and Steel Industry)

Country	**Number of Workers Employed in the Basic Metals Industry**					
Country of Birth	HOME		EU NATIONAL*		OTHER	
UK (2000)	Male	Female	Male	Female	Male	Female
	126,730	15,261	1,115	0	3,381	1,017
Germany (2000)	287,094		14,222		36,073	
Netherlands (1995 Social Unit)	Not Available		582		81	
	Number of Workers Employed in the Steel Industry					
UK (2000)	Male	Female	Male	Female	Male	Female
	32,702	2,126	547	0	1,198	0
Germany (2000)	96,927		3,801		11,129	

Note: For the UK the steel industry is defined using UK SIC(92) code 27.1 only. The Basic Metals industry is defined using UK SIC(92) code 27.

Source: Source: Netherlands: CISY-HRS-PSA-IDP Weiland, Germany: Statistisches bundesamt, UK: Database – Dataarchive (Quaterly Labour Force Survey)

Table 7 gives some indication of the way workers whose country of birth is different from the country they are working within are dispersed across the occupational hierarchy.

Table 7 Occupational Status by Country of Birth (Basic Metals), 2000

	OCCUPATIONAL STATUS	NATIONALITY OF EMPLOYEES					
		HOME		EU *		OTHER	
UK		Manual	Non-manual	Manual	Non-manual	Manual	Non-manual
	Legislators, Senior Officials, Managers	-	17,807	-	-	-	-
	Professionals	-	4,457	-	-	-	487
	Technicians and Associate Prof.	9,211	9,124	-	547	607	444
	Clerical	3,148	9,108	-	568	-	410
	Service and sales workers	-	355	-	-	-	-
	Crafts and related trades workers	40,753	-	-	-	-	-
	Plant and Machine Operators, etc.	38,072	-	-	-	1,769	-
	Elementary Occupations	9,553	403	-	-	1,057	-
	TOTAL	100,737	41,254	0	1,115	3,433	1,341
SWEDEN	Legislators, senior officials & managers	-	1,880	-	150	-	-
	Professionals	-	1,270	-	60	-	70
	Technicians and similar professionals	-	2,780	-	180	-	80
	Clerks	-	1,180	-	-	-	-
	Service workers and sales workers	-	-	-	-	-	-
	Craft and related trades workers	1,690	-	180	-	30	-
	Plant and machine operators	16,520	-	1,850	-	640	-
	Elementary Occupations	1,030	-	90	-	110	-
	TOTAL	18,970	7,110	2,120	390	780	150

Note: (a) For the UK, the basic metals industry is defined using UK SIC (92) code 27 and occupations using International Standard Classification of Occupations (ISCO) 88.
(b) For Sweden, the basic the basic metals industry is defined using ISIC-Rev.3 code 27 and occupations using SSYK (Standard för svensk yrkesklassificering)

Source: Sweden: SCB Statistical Office, UK: Database – Data-archive (Quarterly Labour Force Survey)

Workers from outside the UK but from within the EU are located in non-manual technical, associate professional and clerical positions. In Sweden workers from members states are located in similar positions. However, Sweden also recruits a significant number of low-grade manual workers from within the EU. If the data is correct the UK recruits no workers from the EU into these positions. More significantly, where Sweden and the UK employ workers born outside the EU, they are much more likely to be placed in low grade manual occupations than elsewhere in the occupational hierarchy. On this basis it is possible to surmise that much migrant labour from outside the EU in the steel industry is either low skilled and/or unable to secure jobs in line with their actual skill levels.

Whilst it is difficult to draw robust conclusions from the data on the ethnic and racial profile of the steel industry workforce, the data suggests that a number of countries employ a significant number of migrant workers to work in the steel industry. Migrant workers thus seem to provide an important and significant contribution to the steel industry in some EU member states. The data also indicates that where ethnic minority groups are employed in the steel industry, they occupy low

skilled occupations. Even so, it is reasonable to conclude that because of the way the steel industry is developing (for example, the increased emphasis on technological development and down-stream production and changing forms of work organisation), coupled with increasing legislative intervention promoting equality and diversity, that recruitment patterns will begin to change. In these circumstances, it is possible that migrant communities will begin to benefit from a more open and liberal recruitment approach.

Occupational Trends

There has been a steady change over the last decade in relation to the balance between manual and non-manual occupational categories, as depicted in the set of data below (Table 8 and Figure 3). For the whole of the EU the pattern is as follows:

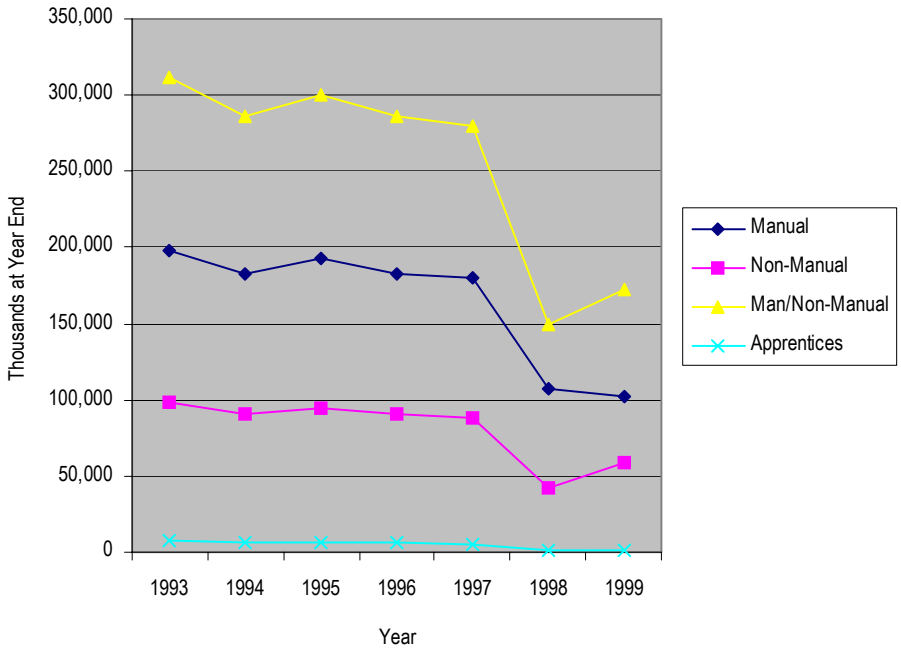
Table 8: The Occupational Profile of the EU Iron and Steel Workforce, 1993 – 1999 (ECSC)

Occupation	Manual	Non-Manual	Man/Non-Manual	Apprentices	Total
Year					
1993	198,437	98,929	311,469	7,457	318,926
1994	182,038	91,144	285,622	6,396	292,018
1995	193,353	94,301	300,162	6,264	306,426
1996	183,277	90,394	285,898	5,966	291,864
1997	179,500	87,711	279,218	5,348	284,566
1998	107,294	42,791	150,085	1,264	151,349
1999	102,517	58,517	172,690	1,683	174,373
Percentage decline	**48.3%**	**40.8%**	**44.6%**	**77.4%**	**55.3%**

Notes: Steel Industry as defined by ECSC classification
Source: Data source: Questionnaire 234, New Data Bank Steel (Oracle) (Eurostat1 – excel)

During the 1990s there has been a sharper decline in manual rather than non-manual levels of employment. This trend in part reflects the changing technological base of the industry as well as the shifting focus toward downstream activity, and the occupations implied by such a move.

Figure 3: The Occupational Profile of the EU Iron and Steel Workforce, 1993 – 1999 (ECSC



Notes: Steel Industry as defined by ECSC classification
Source: Data source: Questionnaire 234, New Data Bank Steel (Oracle) (Eurostat1 – excel)

Of most significance is the massive decline in apprenticeships attached to the iron and steel industry, a little under a quarter of the level in 1993. Such a drop reflects the absence of any significant recruitment into the iron and steel industry during the decade, and it raises profound questions about the training and development of the next generation of iron and steel workers in the EU.

These broad patterns are reflected in differential ways in the country specific data. It can be expected that there will be an increased recruitment of non-manual staff, as the patterns of change in the steel industry take effect. This is likely to be a result of the re-classification of jobs, involving multi-skilling and task enhancement as well as the opening up of areas of work not traditionally associated with the steel industry, such as the increase use of information technology and the increased emphasis on technological development, especially for down-stream production.

Steelworker Qualification Profiles

The steel industry is changing in comprehensive ways. Increasingly, the industry is reorganising work processes, developing new areas of work and becoming involved in downstream activity. Such changes have knock-on effects in relation to training and learning as well as recruitment, with pressure to develop and promote a more highly skilled and qualified workforce. One difficulty faced

by the industry in realising these ambitions is that it has traditionally relied upon the recruitment of local and often relatively poorly qualified labour force. Until relatively recently, this was an industry that secured a skilled workforce via internally promoted training and learning.

The following describes the steel industry qualification profile across Europe, using aggregate data. Again, as with the collection of aggregate data more generally, the data on steelworker qualification profiles is uneven and patchy. Problems were not restricted to locating data, but were also experienced in terms of reliability. Further, the qualification data is not available as a time series and so change in qualification profiles over time cannot be discerned. Beyond these limitations there is an on-going problem in comparing qualifications across Europe (see Report 8).

In the face of these limitations, the approach adopted is to present the most robust data, covering three countries and to draw out the comparisons accordingly.

Table 9. ISCED Framework applied across the principal education and training qualifications of Germany, the Netherlands and the UK

Level	Germany	Netherlands	UK
ISCED 5, 6, 7	All first and higher degrees All Meister and Techniker	University 3 years or more HBO Higher professional ed	All first and higher degrees. All teaching, nursing qualifications HNC/HND
ISCED 3	Abitur Fachhoch-schulreife All apprenticeship passes or equivalent	VWO pre-university ed HAVO senior general secondary ed MBO secondary ed	1 or more A level passes, GNVQ 3 and equivalent, VQ 3 and equivalent. Trade apprenticeship GNVQ 2 or equivalent NVQ 2 or equivalent
ISCED 2	Leaving certificate of the Realschule or equivalent	MAVO Junior general secondary ed VBO Pre-vocational education	1 or more O level/GCSE passes, 1 or more CSE passes
ISCED 0, 1	No qualifications	Primary education only	No qualifications

Source: Murray and Steedman 2000, p. 5, Table 1.

This data give some indication of the qualification profile of the European steel industry. The International Standard Classification of Education (ISCED) framework (see Table 9) is used to classify the data. ISCED provides the most rigorous measure of the skills/ability required to reach a recognised level of qualification (i.e. input). This Report draws upon an established ISCED based qualification framework to establish the extent of low skills in six countries (of which only the three relevant countries are shown here) and to chart the progress in reducing low skills stocks between 1985 and 1997/98 (Murray and Steedman 2000).

The data is discussed in two stages. First, the data for two selected European countries is presented. A second section focuses in more depth on a comprehensive UK data set. This allows a better understanding of what steelworker qualification profiles look like, at least in one major European steel producing country.

Selected Qualification Data

Taking two countries, Germany and the UK, both significant steel producing countries, as exemplars, the results suggest that substantial numbers of workers in these two countries either have no or minimal formal qualifications. This data is presented in Table 10.

Table 10: Qualification profile (by gender) employed in steel in various countries

ISCED	LEVEL 0		LEVEL 1		LEVEL 2		LEVEL 3		LEVEL 4		LEVEL 5,6,7		Not Indicated[1]	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F
UK	3,904	1,314	4,427	0	3,976	812	14,868	0	0	0	6,811	0	461	0
Germany+	-		-		96,444		3,450		-		7,146		4,817	

Notes: (a) - missing.
(b) For Germany, discrete categories are uncertain.
(c) Steel Industry as defined by ECSC classification
Source: UK: Quarterly Labour Force Survey, Germany: Statistisches bundesamt

The bulk of the qualifications in these two countries are at ISCED levels 0, 1 and 2, confirming other related data (see Moinov 1990, International Labour Office 1992, Fuller and Unwin 1999). Women, especially, are more likely to have minimal qualifications than men. This pattern most likely reflects the gendered processes of learning and recruitment in the steel industry.

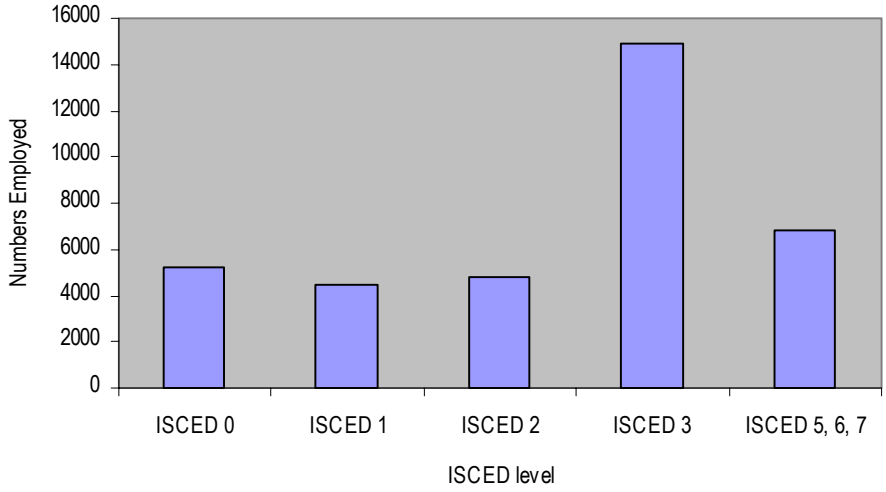
Nonetheless, there are important differences in cross-national comparisons between the two countries. The German steel industry, for example, does not employ individuals at ISCED level 0 and 1. In contrast, the UK industry employs a significant number of individuals (26.3 per cent of its workforce) at these two levels. Still, the UK also employs substantially more workers at ISCED level 3 than Germany (40 per cent of the UK workforce compared to 3.1 per cent in Germany), whose workforce primarily comprises workers educated to ISCED level 2 (86.2 per cent in Germany compared 13.0 per cent in the UK). The number of highly educated workers within the industry is broadly comparable between the two countries in terms of number, but in relative terms the UK possesses more workers educated to ISCED levels 5, 6 and 7 (18.6% of the UK steel industry workforce possess higher level qualifications, compared to 6.3 per cent in Germany).

Given the established and longstanding educational systems in each country, including vocational education provisions, both in relation to entry into the industry as well as continuing education and training, it is reasonable to conclude that the European steel industry tends to comprise a relatively lowly qualified workforce. It can be further inferred that where countries have dual vocational educational systems, such as Germany, Netherlands, France and Belgium, then there is the likelihood that the qualification threshold for entry into the industry is likely to be higher than in countries such as the UK, with their more voluntarist educational and recruitment practices.

The UK: A Special Case?

A closer examination of the UK data casts some light on the relation between qualifications and the socio-demographic profile of the industry. As discussed, it is evident that the UK steel industry employs a significant number of poorly qualified workers. The majority of workers are qualified no higher than ISCED level 3. More significantly, however, a large number possess no qualifications (ISCED 0) or qualifications no more than ISCED level 1 or 2 (see Figure 4).

Figure 4: Qualification profile employed in steel in the UK



Notes: Steel Industry as defined by ECSC classification
Source: UK: Quarterly Labour Force Survey

A significant proportion of the workforce, approximately a sixth, is nevertheless qualified to ISCED level 5, 6 or 7. The majority of the more highly qualified tend to be from the younger age bands (<=24 to 35-39). As might be expected, the less well qualified tend to comprise older workers (40-45 to >=65). The indications are that an older and less well qualified workforce will be replaced by the more highly qualified workforce that developments in the industry demand.

Men cover the lower ISCED levels (i.e. 0 - 2) in roughly equal numbers and comprise all those employed in steel and qualified to ISCED level 3 and above. Women are clustered around levels 0 and 2, and as a proportion of the workforce they are more likely to have no qualifications when compared with men. Women are much less likely to have higher level qualifications, which raises important questions for the gendering of work and employment in this industry as well as for training and learning programmes. Older women are the less likely to possess formal qualifications, this presumably reflects educational and recruitment patterns over time.

In the UK steel industry men were found to be employed predominantly in the professionals/legislators, engineers/technicians and craft/production areas. Women, on the other

hand, were found to be employed in administrative/clerical and technician areas. Within their respective occupational sectors, women were more likely to have minimal qualifications and be clustered at the lowest levels where they have similar or higher levels of qualifications to men. More generally, the UK workforce is polarised between younger more highly qualified workers high in the occupational hierarchy and older less qualified workers in the production process. The numbers of workers from minority ethnic groups in the steel industry is small, possibly reflecting the recruitment patterns of the industry over time. The two main ethnic groups in the UK are Afro-Caribbean and Asian. Specifically, there is a cluster of Afro-Caribbean workers in the 'craft and related trades' group with no qualifications (ISCED 0). Asian workers are clustered around 'plant and machine operator' categories and tend to be qualified to ISCED 1.

Overall, the broad patterns that characterise the UK (and German) steel industry qualification profile indicate that the industry continues to employ a significant number of poorly qualified workers. This feature of the industry is balanced by large numbers of more highly qualified workers, but it seems that the occupations that face the most change – production level – remain poorly qualified (and aged). Women and racial minorities also tend to be proportionately less qualified than the male and white workforce. The many different ways that the qualification profile of the steel industry workforce is polarised has implications for the industry on a number of levels.

The Qualification Profile

Three conclusions can be made about the qualification profile of the European steel industry workforce. First, there is a positive relationship between a comprehensive and integrated Vocational Education and Training system and the qualifications of steelworkers. It is likely that the there will be thresholds applied to qualifications required for jobs at different levels of the occupational profile. It is likely that this in part is an outcome of the social partnership arrangements that often apply where dual vocational educational systems operate (for comparative data from another European traditional industry, see Fairbrother *et al*., 2004). Second, the European steel industry is relatively low skilled as indicated by qualifications. In the situation where the industry is beginning to change, with an increased emphasis on high skill jobs, then the industry faces problems in relation to recruitment and continuing education and training. Third, it is likely that younger workers and newly recruited workers will come with higher level qualifications than was the case in the past.

Section Four: Assessment

The composition of the European steel workforce is in a process of change. While the data is varied and uneven, it is possible to identify three broad patterns that are beginning to characterise this workforce.

First, this is an industry, as with the metals industry more broadly, that is predominantly male. This industry has largely been defined and organised in relation to male employment identities. It is now in a situation where individuals, mainly male, face social change in terms of their employment and work, and where increasing numbers of women are likely to be employed. Such developments arise because of the changing patterns of work, associated with computerisation of production processes, the closer integration between production and support activity, and the extension of

employment in such areas as marketing and related commercial activity. While the evidence is limited the aggregate indication is that women are more likely to be employed in the younger age bands for the metals industry, and if this is so then it is also likely as the generational patterns of employment change then so too will the gender composition.

Second, the generational patterns in the steel industry are much clearer and the evidence is more robust. Drawing on the Eurostat data, the image of the steel industry as a largely aged workforce is confirmed. This industry is one where the bulk of the workforce are located in the age bracket 45-49 years and where because of labour shedding policies as well as the limited recruitment policies in each country, the skewing of the age profile is likely to become more pronounced. Throughout the 1990s the European steel industry was characterised by an employment level of between 12 and 14% in the age band 20-29. Such a pattern suggests a polarisation of generations, as the long standing, relatively stable older workforce, face work reorganisation and technological change, while the younger sections of the workforce are likely to enter the industry with distinctive educational experiences that are more directly suited to the changing patterns of work in the industry.

Third, this patterning of the steel workforce assumes a particular aspect when the trends in occupational status, distinguished in terms of manual and non-manual employees, are taken into account. There is a disproportionate decline in the industry of manual jobs, which is consistent with the types of work and employment changes that are taking place in the industry as a whole. While the majority of employees remain in manual occupations within the industry, it is also the case that the proportion employed in non-manual areas is increasing as a proportion of the workforce over a relatively short space of time. As part of this trend, it is also likely that companies will begin to recruit both a more diversified workforce and one that is more highly qualified. Hence while overall numbers employed in the steel industry is declining, sharply, a long term trend, there is a relative increase within this industry of those employed in non-manual areas, presumably, new areas of employment associated with technological change and the extension of activities in marketing and related areas.

These broad patterns raise particular question in relation to skills and qualification profiles in the steel industry. Against the background of on-going restructuring of the European steel industry the recomposition of the steel workforces is likely to raise distinct questions for the skills and qualification profiles of the emerging workforce. It suggests that education and training programmes should take into account the diversity of these workforces, specifically in relation to gender, age and occupation. In the case of older workers, for example, this is likely to be employees who left school early and whose approach to learning are not necessarily geared to formal methods of instruction. Indeed, the patterns of instruction in many steel plants may underwrite informal patterns of learning. In contrast it may be that younger workers approach learning in terms of their more recent pedagogical experiences, at school and other forms of vocationally relevant training. The point is that it is necessary to ask what are the most relevant forms of education and training for groups within the workforce or whether there is a content that is appropriate for all. More specifically, training programmes need to adopt pedagogies that are geared to the learning needs of workers.

References

Akgündüz, A. (1993) 'An analytical review of labour migration from Turkey to Western Europe, in particular to Germany and the Netherlands (1960-1974)'. *Sociologische gids*, Sep-Oct 1993, Vol.40, No.5, p.352

Castles, S. and Kosack, G. (1973) *Immigrant Workers and Class Struggle in Western Europe*. London Oxford University Press

Cohen, R. (1987) *The New Helots: Migrants in the International Division of Labour*. Vermont, Gower.

Fairbrother, P., Hall, D., Davies, S., Hammer, N., Stroud, D., Thomas, S. (2004) *Future Skills Needs In The European Electricity Sector: A Report for EPSU, EMCEF and EURELECTRIC*. Cardiff School of Social Sciences/Global Political Economy, Cardiff University and Public Services International Research Unit, University of Greenwich

Fonow, M. M. and Ehrardt, K. (2001) *Women of Steel Survey*. The United Steelworkers of America: Statement of Policy on Sexual Harassment, The United Steelworkers of America.

Fuller, A. and Unwin, L. (1999) 'Credentialism, national targets, and the learning society: perspectives on educational attainment in the UK steel industry.' *Journal of Education Policy* 14(6): 605-617.

International Labour Organisation *(1992) 'Recent Developments in the Iron and Steel Industry'.* Sectoral Activities Programme Report 1*:* Geneva ILO

Moinov, S. (1990) Technological change in the iron and steel industry and its effect on employment and training. *Sectoral Activities Programme Working Paper 27*: Geneva ILO.

Murray, A and Steedman, H. (2000) 'Skill profiles of France, Germany, the Netherlands, Portugal, Sweden and the UK' *European Journal Vocational Training* No. 22 pp. 3-14 CEDEFOP

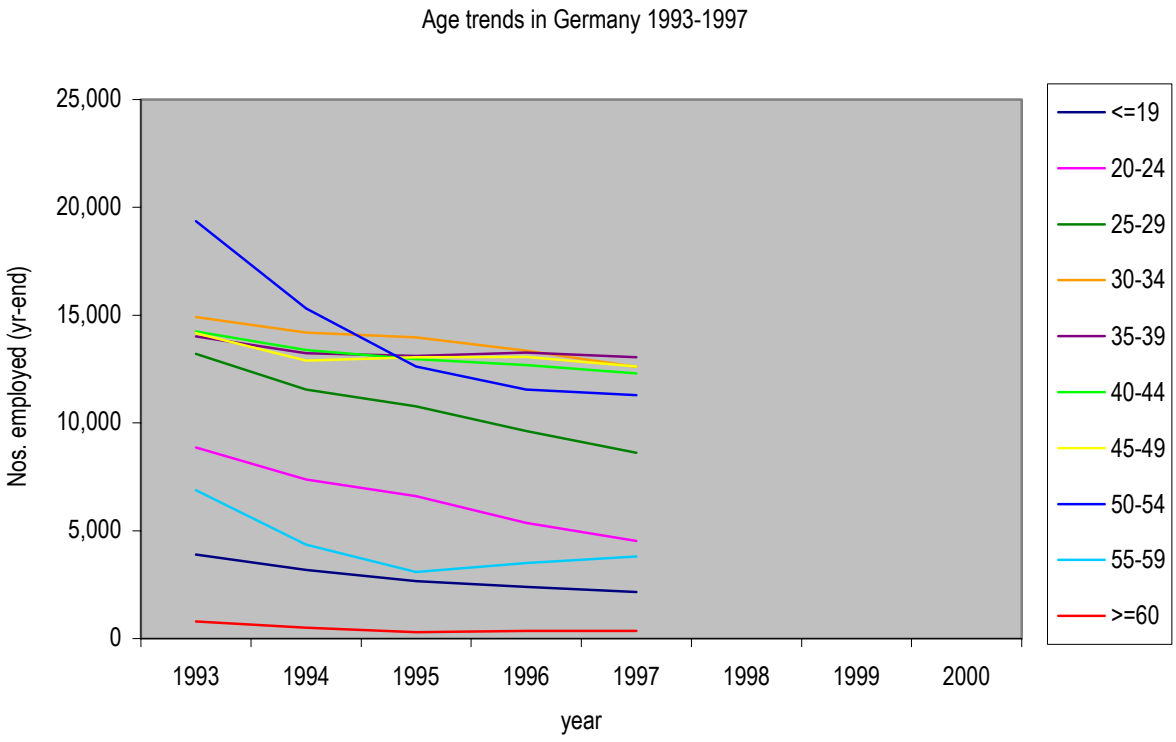
Steinert. J.D., (1995) Work in West Germany: migration agreements with Italy, Spain, Greece and Turkey and the start of the organised recruitment of foreign workers. *Archiv für Sozialgeschichte* Vol.35, pp.197-210

Wallraff, G. (1988) *Lowest of the Low*. London, Methuen.

Appendix One: Age Profile of six major EU Countries

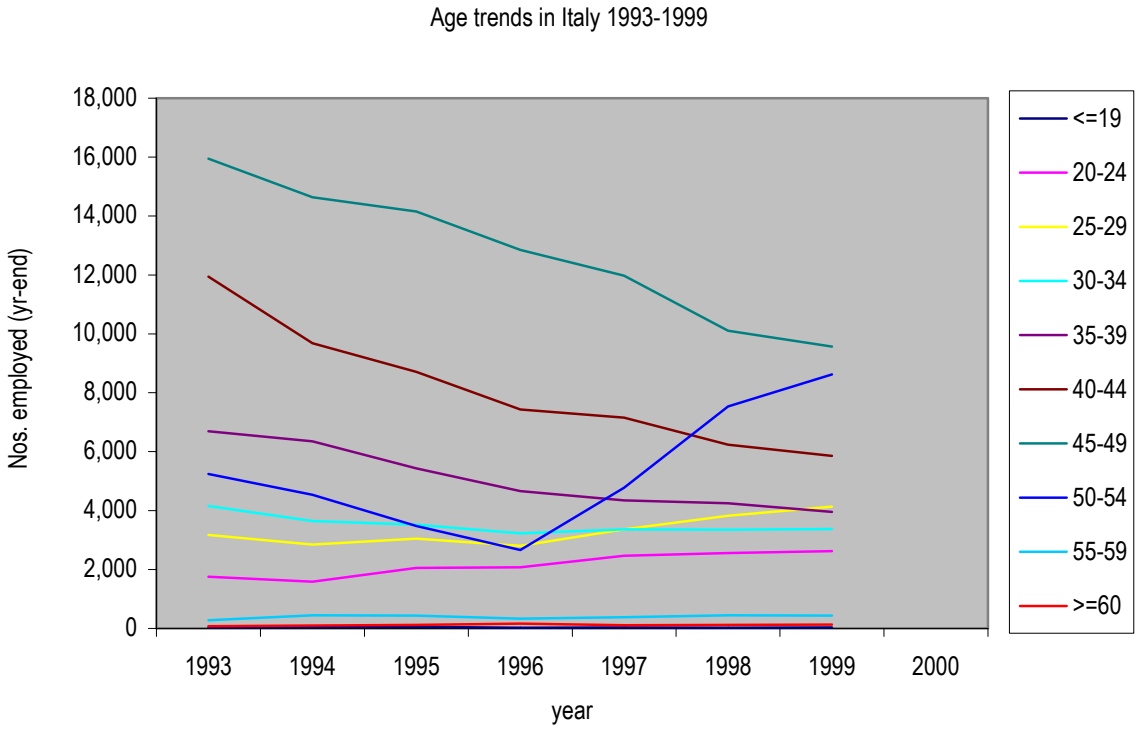
Age Trends within Ten Largest Steel Employing Countries

GERMANY								
Age Bands	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**
<=19	3,895	3,186	2,674	2,389	2,164			
20-24	8,858	7,376	6,605	5,372	4,536			
25-29	13,205	11,542	10,765	9,634	8,612			
30-34	14,914	14,183	13,967	13,345	12,594			
35-39	14,012	13,236	13,109	13,269	13,048			
40-44	14,245	13,381	12,963	12,690	12,296			
45-49	14,164	12,885	13,042	13,065	12,621			
50-54	19,350	15,313	12,618	11,547	11,288			
55-59	6,887	4,362	3,093	3,501	3,805			
>=60	798	506	302	355	362			
Total	**110,328**	**95,970**	**89,138**	**85,167**	**81,326**			



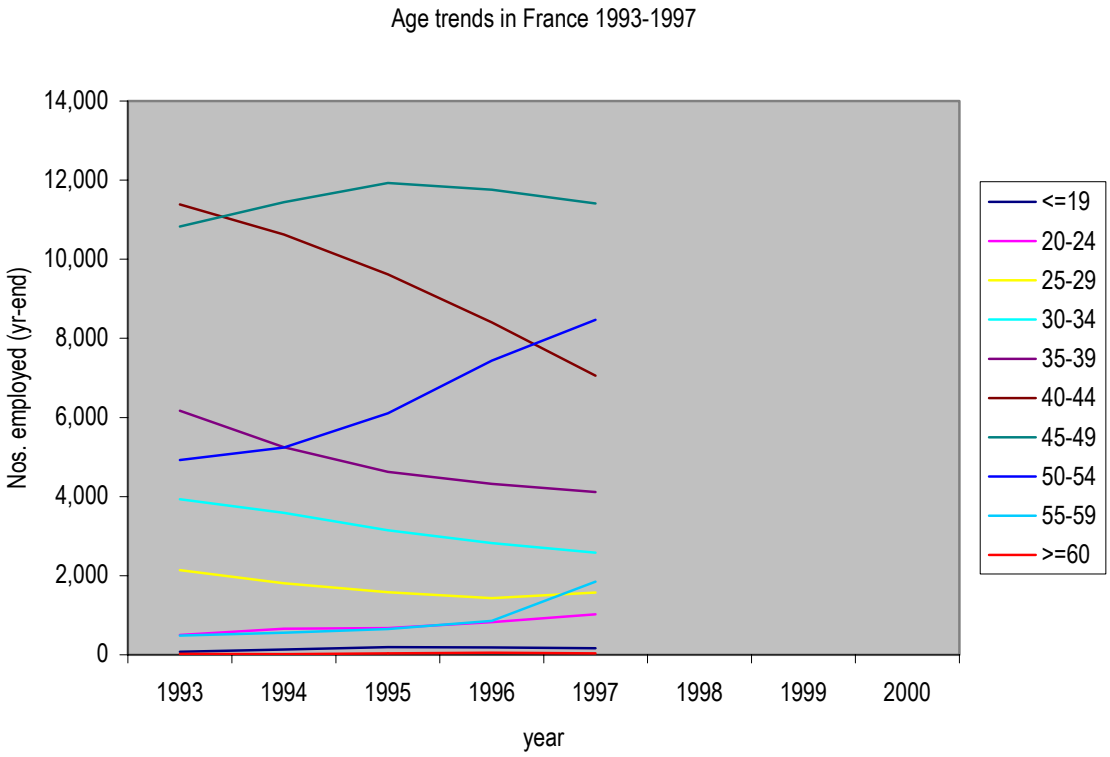
Source: Data source: Questionnaire 234, New Data Bank Steel (Oracle) (Eurostat1 – excel)

ITALY								
Age Bands	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**
<=19	32	45	58	22	27	16	29	
20-24	1,758	1,582	2,050	2,068	2,466	2,556	2,626	
25-29	3,171	2,838	3,044	2,800	3,366	3,825	4,130	
30-34	4,154	3,644	3,519	3,222	3,366	3,353	3,368	
35-39	6,691	6,352	5,434	4,665	4,346	4,244	3,951	
40-44	11,940	9,680	8,705	7,434	7,159	6,238	5,859	
45-49	15,946	14,638	14,151	12,851	11,976	10,103	9,562	
50-54	5,242	4,530	3,474	2,668	4,782	7,541	8,622	
55-59	273	447	431	327	385	444	431	
>=60	77	96	113	155	102	116	124	
Total	**49,284**	**43,852**	**40,979**	**36,212**	**37,975**	**38,436**	**38,702**	



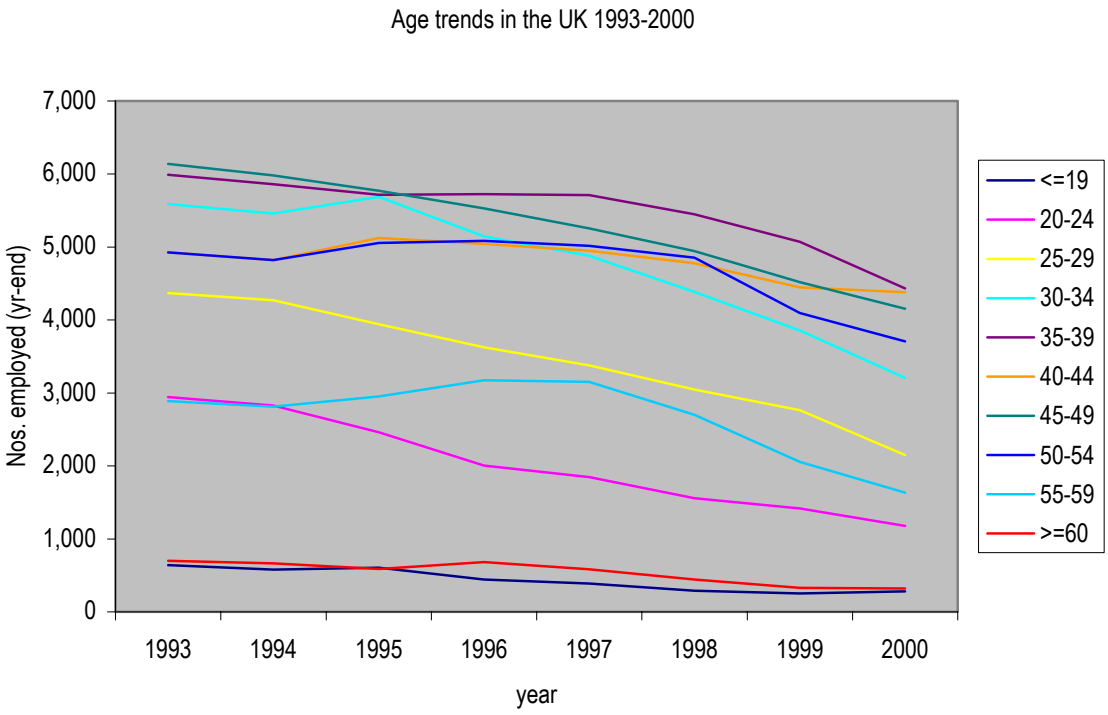
Source: Data source: Questionnaire 234, New Data Bank Steel (Oracle) (Eurostat1 – excel)

FRANCE								
Age Bands	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**
<=19	75	134	198	189	165		171	
20-24	505	659	673	823	1,021		985	
25-29	2,142	1,809	1,581	1,431	1,575		1,997	
30-34	3,934	3,590	3,149	2,829	2,578		2,176	
35-39	6,166	5,252	4,628	4,320	4,116		3,590	
40-44	11,391	10,626	9,613	8,408	7,058		5,114	
45-49	10,832	11,440	11,933	11,755	11,408		10,109	
50-54	4,924	5,241	6,109	7,438	8,469		10,239	
55-59	486	555	656	861	1,853		3,095	
>=60	21	18	38	52	39		91	
Total	**40,476**	**39,324**	**38,578**	**38,106**	**38,282**		**37,567**	



Source: Data source: Questionnaire 234, New Data Bank Steel (Oracle) (Eurostat1 – excel)

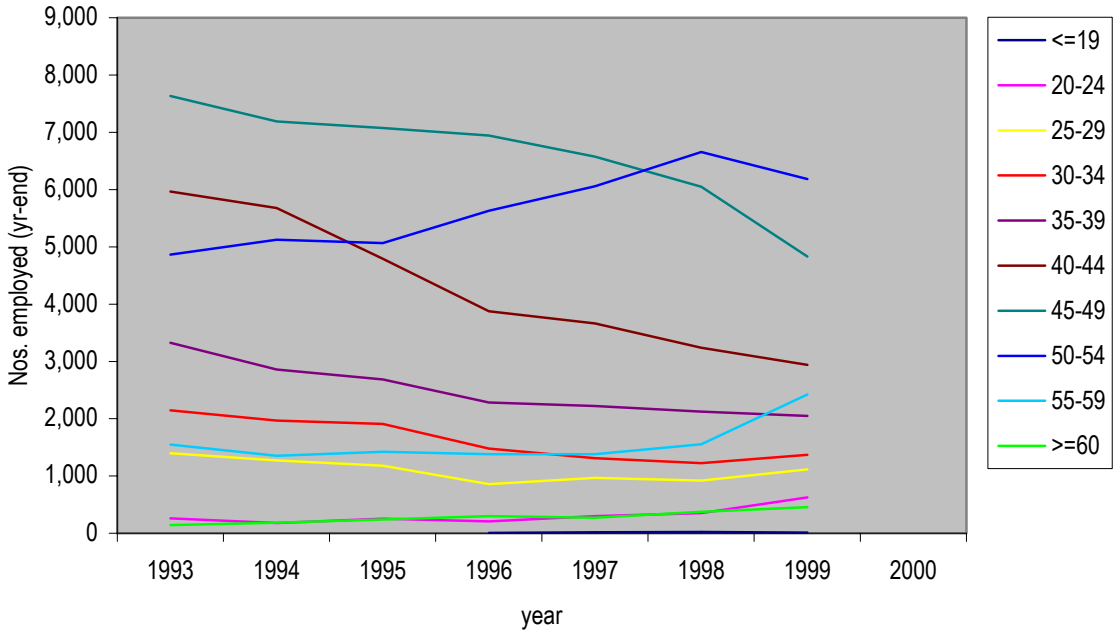
UK								
Age Bands	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**
<=19	640	580	605	442	387	291	253	281
20-24	2,944	2,830	2,461	2,005	1,847	1,555	1,418	1,179
25-29	4,368	4,270	3,941	3,625	3,380	3,047	2,764	2,148
30-34	5,588	5,460	5,687	5,144	4,881	4,384	3,857	3,207
35-39	5,990	5,860	5,715	5,723	5,713	5,449	5,071	4,430
40-44	4,928	4,820	5,124	5,040	4,947	4,779	4,443	4,380
45-49	6,140	5,980	5,771	5,529	5,255	4,943	4,519	4,154
50-54	4,929	4,820	5,054	5,086	5,018	4,855	4,095	3,707
55-59	2,889	2,810	2,952	3,175	3,153	2,702	2,058	1,633
>=60	699	665	587	681	583	445	327	319
Total	**39,115**	**38,095**	**37,897**	**36,450**	**35,164**	**32,450**	**28,805**	**25,438**



Source: Data source: Questionnaire 234, New Data Bank Steel (Oracle) (Eurostat1 – excel)

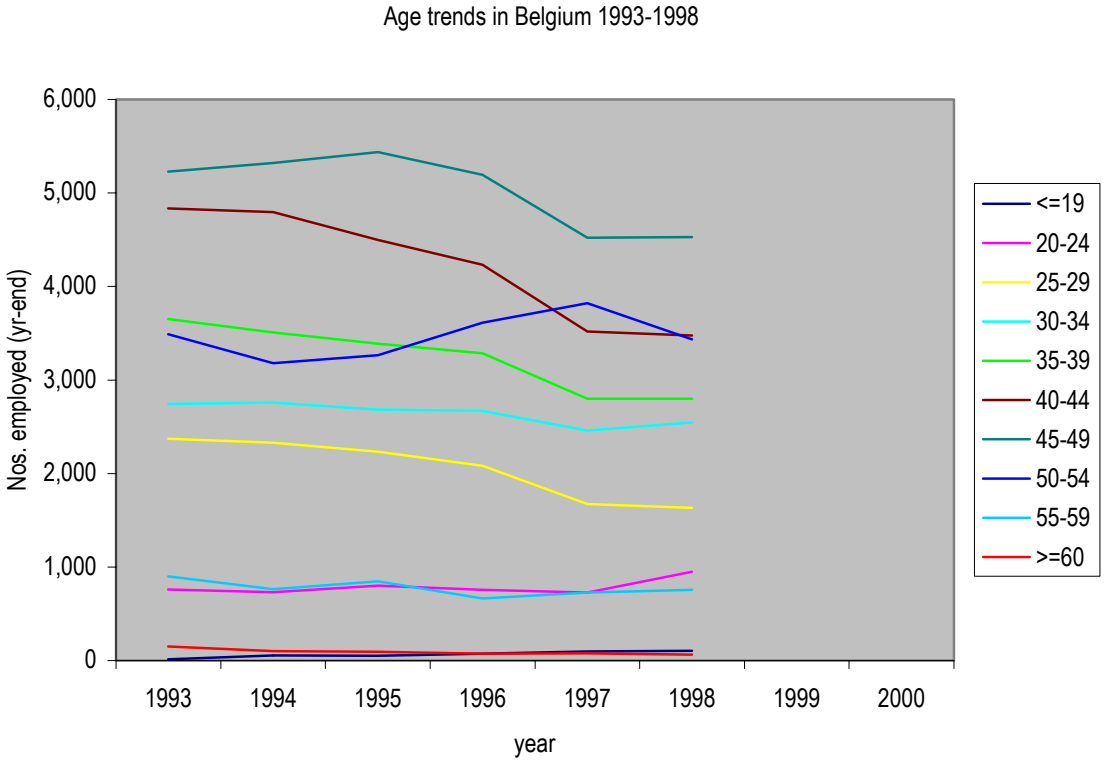
SPAIN								
Age Bands	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**
<=19	7			5	19	21	11	
20-24	259	179	255	209	298	355	624	
25-29	1,398	1,273	1,179	860	968	917	1,113	
30-34	2,148	1,967	1,907	1,476	1,308	1,223	1,370	
35-39	3,327	2,861	2,683	2,281	2,225	2,127	2,047	
40-44	5,968	5,678	4,795	3,877	3,665	3,241	2,942	
45-49	7,634	7,189	7,074	6,943	6,577	6,051	4,832	
50-54	4,864	5,125	5,065	5,629	6,061	6,659	6,183	
55-59	1,548	1,355	1,422	1,378	1,378	1,556	2,422	
>=60	140	184	237	297	274	376	454	
Total	**27,293**	**25,811**	**24,617**	**22,955**	**22,773**	**22,526**	**21,998**	

Age trends in Spain 1993-1999



Source: Data source: Questionnaire 234, New Data Bank Steel (Oracle) (Eurostat1 – excel)

BELGIUM								
Age Bands	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**
<=19	12	54	50	74	95	102		
20-24	761	728	801	755	726	950		
25-29	2,371	2,330	2,232	2,083	1,671	1,634		
30-34	2,743	2,757	2,683	2,667	2,459	2,544		
35-39	3,652	3,507	3,388	3,284	2,800	2,798		
40-44	4,834	4,794	4,497	4,231	3,517	3,476		
45-49	5,227	5,321	5,437	5,195	4,521	4,529		
50-54	3,488	3,177	3,266	3,612	3,820	3,436		
55-59	898	763	847	664	726	756		
>=60	150	100	93	73	75	62		
Total	**24,136**	**23,531**	**23,294**	**22,638**	**20,410**	**20,287**		

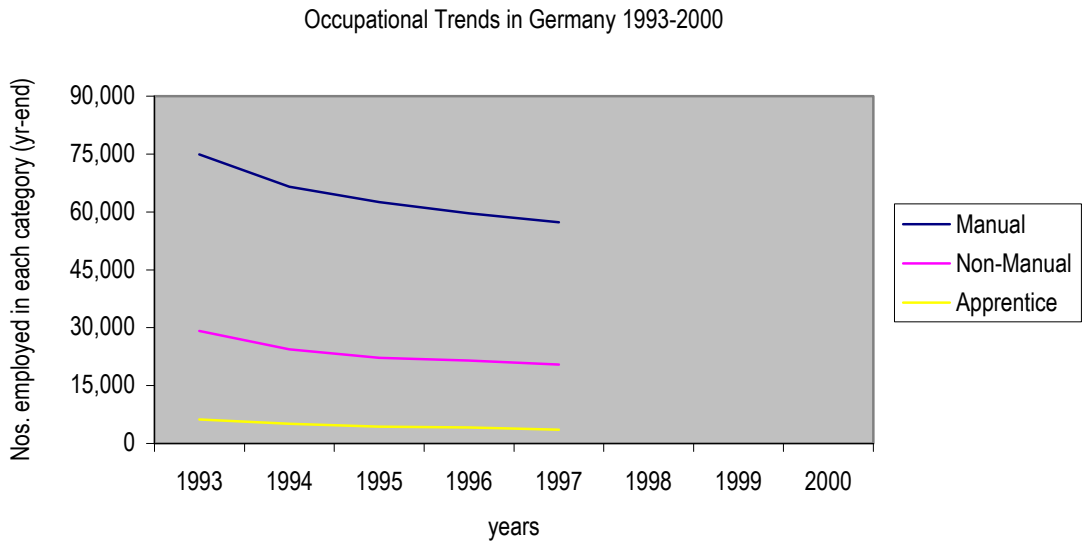


Source: Data source: Questionnaire 234, New Data Bank Steel (Oracle) (Eurostat1 – excel)

Appendix Two: Occupational Trends in Six major EU Countries

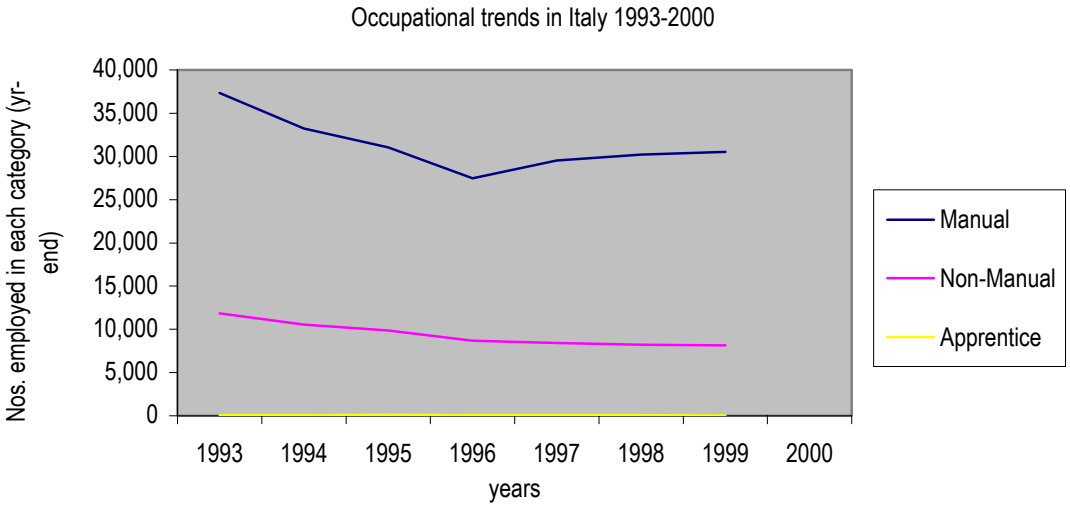
Occupational Trends within Ten Largest Employers

GERMANY								
Occupation	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**
Manual	74,945	66,493	62,577	59,628	57,323			
Non-Manual	29,168	24,414	22,214	21,452	20,428			
Apprentice	6,215	5,063	4,347	4,087	3,575			
Total	**110,328**	**95,970**	**89,138**	**85,167**	**81,326**			



Source: Data source: Questionnaire 234, New Data Bank Steel (Oracle) (Eurostat1 – excel)

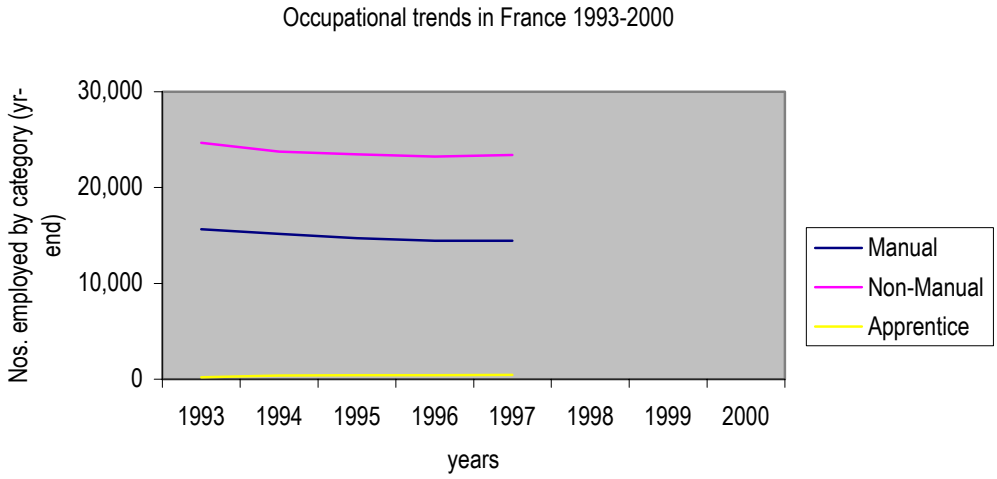
ITALY								
Occupation	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**
Manual	37,345	33,227	31,029	27,458	29,507	30,205	30,514	
Non-Manual	11,858	10,564	9,851	8,682	8,436	8,191	8,148	
Apprentice	81	61	99	86	55	72	40	
Total	**49,284**	**43,852**	**40,979**	**36,226**	**37,998**	**38,468**	**38,702**	



Source: Data source: Questionnaire 234, New Data Bank Steel (Oracle) (Eurostat1 – excel)

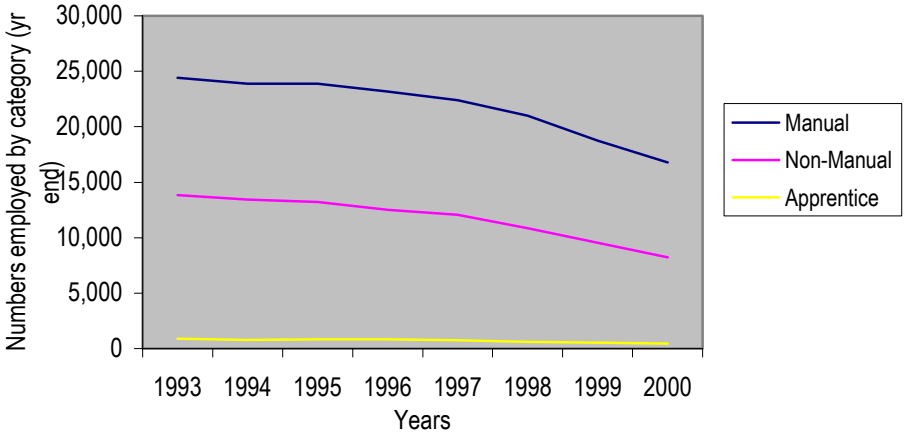
FRANCE								
Occupation	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**
Manual	15,639	15,172	14,705	14,441	14,434		14,013	
Non-Manual	24,656	23,763	23,454	23,243	23,393		23,091	
Apprentice	181	389	419	422	455		463	
Total	**40,476**	**39,324**	**38,578**	**38,106**	**38,282**		**37,567**	

Note: The available figures present France with a larger non-manual rather than manual workforce in the steel industry. There is no way to verify these figures.



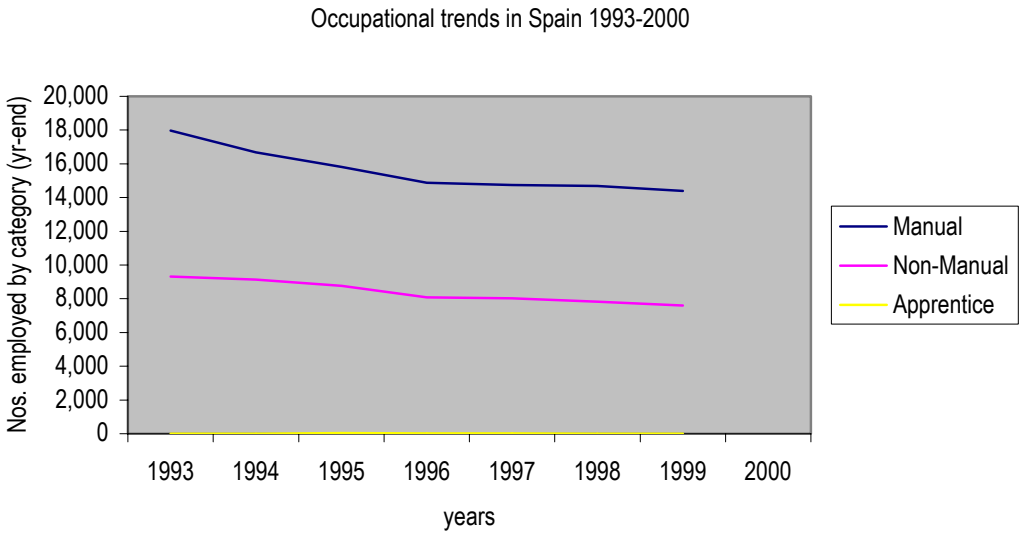
Source: Data source: Questionnaire 234, New Data Bank Steel (Oracle) (Eurostat1 – excel)

UK								
Occupation	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**
Manual	24,422	23,892	23,896	23,169	22,404	20,995	18,747	16,784
Non-Manual	13,828	13,443	13,221	12,523	12,068	10,869	9,544	8,228
Apprentice	903	784	831	835	757	621	540	452
Total	**39,153**	**38,119**	**37,948**	**36,527**	**35,229**	**32,485**	**28,831**	**25,464**



Source: Data source: Questionnaire 234, New Data Bank Steel (Oracle) (Eurostat1 – excel)

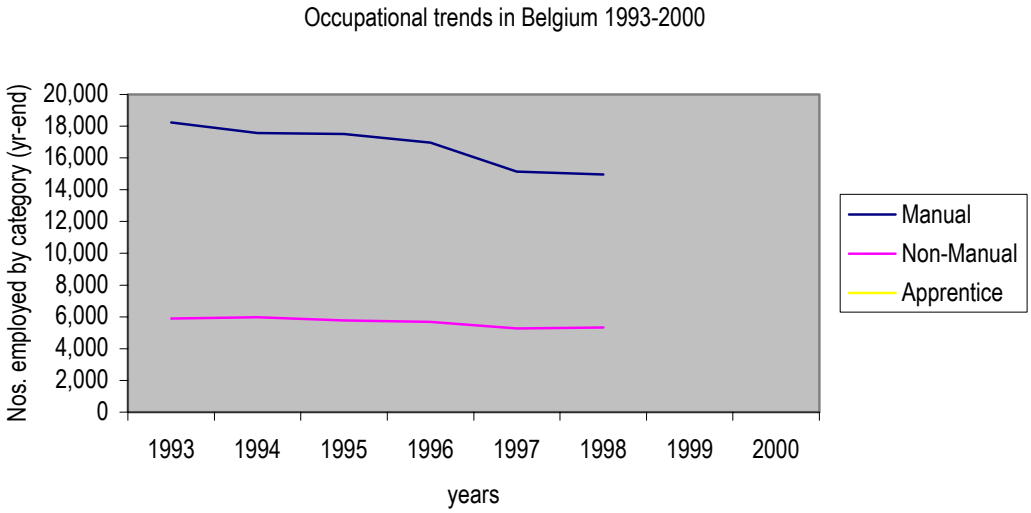
SPAIN								
Occupation	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**
Manual	17,978	16,687	15,821	14,866	14,733	14,693	14,395	
Non-Manual	9,315	9,124	8,762	8,073	8,020	7,829	7,597	
Apprentice	1	1	34	16	20	4	6	
Total	**27,294**	**25,812**	**24,617**	**22,955**	**22,773**	**22,526**	**21,998**	



Source: Data source: Questionnaire 234, New Data Bank Steel (Oracle) (Eurostat1 – excel)

BELGIUM								
Occupation	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**
Manual	18,238	17,565	17,512	16,962	15,140	14,965		
Non-Manual	5,898	5,966	5,782	5,676	5,270	5,322		
Apprentice								
Total	**24,136**	**23,531**	**23,294**	**22,638**	**20,410**	**20,287**		

Source: Data source: Questionnaire 234, New Data Bank Steel (Oracle) (Eurostat1 – excel)



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