

# Summary Sector Report

A Comparison of the European Metal Industry and Electrical Industry  
Project “Shortage of Skilled Workers”



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## 1. Initial question

In spite of the ongoing problem of unemployment, job vacancies for skilled workers in the manufacturing sector of the metal and electrical industry in Europe can only be filled with difficulties or even not at all. This is true for both – the highly qualified workforce and even more for the skilled workers in the technical fields of work. The situation in some European countries is partly alarming. A closer look at the issue, however, quickly reveals that the situation is being judged quite differently. On the one hand the experts are of the opinion that the shortage of skilled workers – at least from an economic point of view – cannot yet be explicitly identified. On the other hand there are voices – above all from the perspective of the enterprises – who already experience the impact of the shortage of a skilled workforce on the level of qualified skilled work and who think that this is just the beginning of a development which will clearly become more acute in the future.

The project „Shortage of Skilled Workers“ (SOS) accurately analyses the increasing complex of problems of the shortage of skilled workers on the shop-floor level in the manufacturing sector (metal and electrical industry) in six selected European countries in order to make statements on the specific situation of the skilled workers in Europe. Partners from six European countries join forces within the framework of this Leonardo-Project<sup>1</sup>. They aim at the development of personnel-economic instruments in companies for the level of well qualified skilled workers in order to prevent and/or remedy the shortage of skilled workers. Apart from personnel development concepts as well as career and qualification plans, the in-firm transfer of experience knowledge (know-how transfer), initial and further training in companies but also the identification of internal and external personnel recruitment strategies are further starting points in order to identify a lack of skilled workers or potential needs of the companies as early as possible and to initiate target oriented countermeasures.

In a first step, vocational scientific sector analyses were conducted in all participating countries (*Slovenia, the Netherlands, the United Kingdom, Italy, Austria, and Germany*) in order to obtain a precise image of the current situation of the sector with regard to the shortage of skilled workers. The individual sector analyses of all participating countries were compared and analysed. The results of this analysis form the basis of the present summary report. The sector analyses of the partner countries have actually shown that the shortage of skilled workers clearly is a European phenomenon. The empirical results reveal a number of problem areas which may be responsible for the gap of skilled

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<sup>1</sup> The project is supported with funds of the European Commission and own funds of all partners participating in the project.

workers in the sector. These problem fields will be described in detail and evaluated by the project partners in terms of relevance for their respective countries.

The present sector report starts with a detailed description of the manufacturing sector with its different aspects and impacts e.g. on employment and the situation of skilled work. Subsequently changes and development trends will be shown, initial and further training and the relevant qualification structures and requirements will be discussed. Finally an overview of the initiatives and concepts to avoid or reduce the shortage of skilled work will be given.

## **2. Description of the instruments**

A vocational scientific research design was applied for the analysis of the situation of work and skilled work within the manufacturing sector. Vocational scientific research aims at opening up the contents of the world of work and the situation of skilled workers and to thus derive proposals for the shaping of educational and personnel development processes. The world of work and its changes are therefore in the centre of interest. Within the project the instruments of a sector analysis (for the basic survey of the sector) and of case studies (for the survey into the corporate world and the world of work) were applied. The present European summary report is predominantly based on the results of the national sector analyses.

The instrument of a sector analysis (cf. Rauner/Spöttl/Olesen/Clematide 1993; Blings/Spöttl/Windelband 2002; Windelband/Spöttl 2004, Spöttl 2005, Windelband 2006) considerably contributes to the safeguarding of information about organisational structures, economic importance, employment, delimitation of the sector, structure of skilled work, situation of occupations and/or domains. In addition this instrument yields valuable references to training occupations (genesis, training figures, training development and training environments etc.), the special situation of skilled workers and of decision makers (e.g. experts, researchers, stakeholders) and it helps to systematically prepare further in-depth surveys. In the first place the sector analysis requires a precise definition and delimitation of the sector (Spöttl 2005, p. 113). Prior to an exact analysis of the employees' work tasks as well as of the specific situation in the enterprise, the sector must be delimited with the aid of criteria which allow the determination of distinctive fields of action. These criteria will be applied in order to identify similar production or service structures on a European level. Evaluated data, statistics and surveys of an identical (specialist) area are then compared and it will be verified whether they are adequate for the assessment of the sector-specific developments.

The common survey criteria for the characterisation of the sector and the subsequent comparability of the European partners are (cf. Windelband 2006, p. 113):

- Structures and characteristics (sub-branches, employment figures, kind of enterprises,
- Job vacancies, unemployment figures in the sector by regions, areas and sub-branches,
- Economic development (trade, profits and losses etc.),
- The situation of skilled workers in the sector,
- Regional development of the sector,
- Institutional and economic facts as well as relationships between companies and divisions (cooperation etc.),
- Network structures,
- Business fields (niche products, special services etc.),
- Personnel development and recruitment,
- Qualification strategies, concepts for initial and further training (qualification models),
- Change of tasks for the persons engaged in the sector,
- Role of the Social Partners and associations in the sector,
- Innovations (new technologies, laws, Internet etc.) and future development (new business fields).
- Entwicklungen (neue Geschäftsfelder).

Based on these survey criteria the analysis allows

1. the preparation of a detailed sector overview,
2. the delineation of the significance of the sector within the economy and its importance for the labour market,
3. the determination of the status of the situation of skilled work and/or the shortage of skilled workers,
4. the identification of causes and effects of the shortage of skilled workers.

Interviews with key persons and Social Partners in the sector as well as the evaluation of statistical data (employment and training figures, job vacancies, situation of skilled



workers) and scientific publications on the shortage of skilled workers allow the identification of the most important developments and the formulation of in-depth research questions for the ongoing research process.

The access to the sector sketched here allows the selection of companies, business and work processes which can be closer looked at within the case studies in order to identify corporate approaches and measures aiming at a reduction of the shortage of skilled workers and specific qualification deficits on the level of skilled work.

The core statements from the individual companies on the situation of skilled work (occurrence, symptoms, consequences/ impacts) as well as first initiatives form part of the present report.

### **3. Characterization and analysis of the sector**

In order to closely define the manufacturing sector and its delimitation opposite to other (neighbouring) European sectors, the sector was precisely defined within the project. A concentration on the manufacturing sector of the metal and electrical industry (M+E industry) had been agreed upon. The definition is based on the Nomenclature of Economic Activities (NACE) applied in Europe since 1996. According to this nomenclature the manufacturing sector and the term “Manufacturing of goods” encompasses the following areas: C – Mining and Quarrying of Stone, Sand and Clay, D – Manufacturing, E – Electricity, Gas and Water Supply and F – Construction.

Based on this classification, the manufacturing sector can be depicted with the following branches:

#### **Branch group I: „Basic materials and Non-metallic products“ (Departments 23 to 26)**

- Coke, refined petroleum products, manufacture and processing of nuclear fuel,
- Chemical industry,
- Manufacture of rubber and plastic products,
- Manufacture of glass, ceramic products, processing of stone, sand and clay.

#### **Branch group II: „Metal and electrical equipment“ (Departments 27 to 35)**

- Manufacture of basic metals,
- Manufacture of fabricated metal products,
- Machinery and equipment,

- Manufacture of office machinery, computers and other information processing equipment
- Manufacture of electricity generators and transformers etc.
- Radio, television and communication technology,
- Medical instruments, process control equipment, optical instruments
- Manufacture of motor vehicles.

The project concentrates on the branch group II “Metal and electrical equipment” and is defined as follows:

*In the project, the sector of the manufacturing encompasses the metal and electrical sector including the manufacture of products, the marketing and delivery as well as the putting into operation of components or plants at the customer's.*

This special definition of the sector forms the basis for uniform surveys in the individual partner countries. This ensures that the same sector is being looked at in the different countries and that it is clearly delimited compared to other sectors.

### 3.1 Sector structure

The structure of the European sector reveals a lot of common features, starting with a high economic relevance up to a structure of predominantly medium-sized companies.

The contribution to the total economy of the individual Member States of the European Union (EU) varies with respect to the size and the respective specific relevance of the sector for the national economy. The *German* sector is clearly dominating within the EU. Apart from this country, above all *Italy* and the *United Kingdom* play a predominant role in Europe. This is underlined by the turnover figures of these three countries (cf. Table 1).

A comparison of the employment figures of the surveyed countries also reveals the dominating role of *Germany*, the *United Kingdom* and *Italy*. In *Germany*, around 3.4 million people were employed in 2007, compared to 800,000 in the *United Kingdom* and 1.6 million in *Italy* (2001). Due to the size of the states, the employment figures are much lower in the other countries. In *Austria*, 300,000 people were employed in 2005, compared to 100,000 in *Slovenia* (2006) and around 300,000 persons were engaged in *the Netherlands*.

	<b>Austria 2005</b>	<b>Germany 2007</b>	<b>Italy 2001</b>	<b>Slovenia 2006</b>	<b>Nether- lands</b>	<b>United Kingdom 2007</b>
<b>Companies</b>	9,284	Around 22,000	59,894	4,150	18,755 (2006)	55,000
<b>Employees</b>	291,698	3,408,000	1,625,000	103,430	314,100 (2005)	800,000
<b>Total of wages and salaries</b>	13,7 billion Euro	143,9 billion Euro		1,86 billion Euro	<u>labour costs:</u> 14,5 billion Euro (2005)	22,92 billion GBP
<b>Turnover</b>	68,3 billion Euro	876,6 billion Euro		11,312 billion Euro	76,7 billion Euro (2005)	117 billion GBP
<b>Exports</b>	57,6 billion Euro (2006)	552,9 billion Euro		6,155 billion Euro	47,7 billion Euro (2006)	44,54 billion GBP
<b>Size of companies:</b>						
<b>Companies with</b>						
<b>Up to 99 employees</b>	~95%	69,6 %	95,9 %	95,8%	97,3%	94%
<b>100 to 1000 employees</b>	~4%	28,3 %	3,9 %	3,9%	2,5%	~5%
<b>Over 1000 employees</b>	~1%	2,1 % of all M+E- companies	0,2 % of all in manufac- turing sector	0,3% of all M+E- companies	0,2%* (2006)	~1%

\* Number of companies in higher size categories cannot be precisely calculated because the available numbers are figures rounded to multiples of 5 (resulting in zero values in several cells).

Table 1: Key data of the metal and electrical industry in Europe in an overview

The companies are almost all medium-sized enterprises and employ less than 100 employees per company on average. The distribution is more differentiated in the individual countries although the small and medium-sized companies are dominating in all countries. In 2007, more than 22,000 companies were active in the *German* sector. 70 % of all German enterprises employ less than 100 persons. In *the Netherlands* 94 % of the companies working in the metal and electrical sector have less than 50 employees. Only a very small number of companies employ more than 250 persons. In *Austria*, the *United Kingdom* and *Slovenia*, around 95 % of all enterprises are small and medium-sized companies with 1 to 99 persons engaged. Typical Italian companies

(almost 96 %) often have no more than 100 employees. A total of 59,894 enterprises could be identified in *Italy*.

In Germany the five largest individual branches within the manufacturing sector of the metal and electrical industry are e.g.:

- Machine building (29),
- Automotive industry (34),
- Electrical technology (31),
- Metal processing (27) and
- Fine mechanics, optics, watches (33),

accounting for 90.8 % of the persons engaged and 93.2 % of the companies. The metal and electrical industry employ around 10 % of all persons engaged (nearly 40 million) in the manufacturing sector. It is worth mentioning that above all the smaller-sized companies employ the majority of employees. In 2007, the total wages and salaries amounted to 143.9 billion € while the turnover reached around 876.6 billion €. The export figures reached 552.9 billion € (Gesamtmetall 2007).

The *Slovenian* metal industry is mainly composed of four important branches:

- Metal products,
- Machines and appliances,
- Vehicles and trailers and
- Other vehicles and ships.

In the year 2006, these four areas accounted for 4,150 companies employing 103,430 skilled workers, among them around 96 % of the companies with less than 100 persons engaged. The turnover of the sector amounted to around 11.3 billion € and export figures of around 6.1 billion € were registered.

In *Italy* the metal sector is the largest part of the manufacturing sector. Figures of the year 2001 underline that around 382,000 persons were engaged in this sector, i.e. around a quarter of all persons employed in the manufacturing sector. Overall the manufacturing sector employed around 1,625 people in 59,894 companies.

The sector of the *United Kingdom* encompasses a large range of around 76,000 companies which employ between 2 and 2.5 million employees within the NACE nomenclature. In 2007, the Institute of Engineering and Technology (IET) published a study which described the sector as growing. More than 80 % of the companies in the sector can no longer satisfy their own need for employees and depend on regulating

their need with new recruitments. An IET survey of 2006 states that these companies are mainly (63 %) looking for technically experienced skilled workers.

In the year 2005, almost 7 million persons were employed in the *Netherlands*. Only a small share (835,300) could be found in the manufacturing sector. At the beginning of the year 2006, the *Dutch* metal and electrical sector encompassed 18,755 companies, 2 % less than five years earlier. Only the number of companies with just one person engaged has been increasing within the last five years. All other size categories have been declining. The following table gives details on the number of companies in the different subsectors.

Code	Description	Total	Share
27	Basic metals	290	2 %
28	Fabricated metal products, except machinery and equipment	7,825	42 %
29	Machinery and equipment n.e.c.	4,525	24 %
30	Office machinery and computers	205	1 %
31	Electrical machinery and apparatus n.e.c.	995	5 %
32	Radio, television and communication equipment and apparatus	425	2 %
33	Medical, precision and optical instruments, watches and clocks	2,290	12 %
34	Motor vehicles, trailers and semi-trailers	660	4 %
35	Other transport equipment	1,540	8 %
	Total companies	18,755	100 %

Table 2: Companies in metal and electrical manufacturing activity 1-1-2006 (Source: Statistics Netherlands (CBS), Statline (statline.cbs.nl))

The majority of the companies are working in the field of manufacturing of finished metal products and the manufacturing of machines and plants; two out of three companies are part of this category.

In *Italy* the manufacturing sector is divided into eight individual sectors (cf. Table 3). The largest fields of the sector are the fields of metal products, machines and plants and vehicle manufacturing (69.6 % of the enterprises with 65 % of the persons engaged). The field of metal products employed 382,033 persons in 2001, corresponding to just under a quarter (23,5 %) of the total workforce in the manufacturing sector.

Another important sector within the manufacturing sector is the field of machines and manufacture equipment with 503,674 employees in 17,717 companies, corresponding to an employment quota of 31 %. 90 % of the companies are small and medium-sized companies<sup>2</sup> (Source: ISTAT, census 2001). 57 % of the companies are very small enterprises.

<sup>2</sup> Definition according to EU-Commission:  
[http://ec.europa.eu/enterprise/enterprose\\_policy/sme\\_definition/index\\_de.htm](http://ec.europa.eu/enterprise/enterprose_policy/sme_definition/index_de.htm)

<b>ENTERPRISES AND EMPLOYEES IN THE MANUFACTURING INDUSTRY (Census 2001)</b>					
<b>Sectors</b>	<b>Number of enterprises</b>		<b>Number of employees</b>		
	<b>a. v.</b>	<b>%</b>	<b>a. v.</b>	<b>%</b>	
Metallurgy	2,017	3.3	128,850	7.9	
Metal products	22,195	37.1	382,033,	23.5	
Machines and manufacture equipment	17,717	29.6	503,674	31.0	
Office machine and automatic figures processing machines	983	1.6	16,455	1.0	
Radio and TV equipment for telecommunication	2,256	3.8	91,480	5.6	
Medical equipment...	4,248	7.1	83,085	5.1	
Road vehicles	1,750	2.9	174,008	10.7	
Other means of transport	1,847	3.1	85,255	5.3	
Producing industry	59,894	100.0	1,624,661	100.0	
<b>Not comprised: handicraft enterprises</b>					
<i>Source: ISTAT</i>					

Table 3: Enterprises and employees in the manufacturing industry (Source: ISTAT)

The *Italian* economy is clearly marked by tertiary activities. In the year 2001, the share of the local industry was 23.9 %. The quota decreased by 2.6 % compared to the year 1991. Opposed to other service sectors, these units have marked an increase of 5.1 % with regard to their own quota of 1991 whereas 36.9 % were reached in 2001. In the year 2001, only a third of the 18,773,724 persons engaged worked in the manufacturing sector, 17.8 % in commerce, 29.5 % in the field of services and 19.7 % in public and private institutions.

The *Austrian* metal and electrical sector, above all in the industry, is clearly marked by a disproportionally high share of medium-sized and large companies. In December 2006, the share of companies with e.g. more than 250 employees was 24 % in the electrical industry, but just 11 % in the total Austrian industry. Due to the low share of micro companies, the number of persons engaged in the metal and electrical sector is rather high. The comprehensive range of products and its variety is the decisive asset to react to changed market requirements and conditions. This sector is considered a niche market safeguarding the survival of medium-sized companies on the global market by adhering to high qualification standards.

The significance of the sector within the individual countries varies considerably. While regional differences could be identified in the larger European countries, this is difficult to achieve in the smaller countries. Out of the six surveyed countries, clear regional differences could above all be identified in the *United Kingdom*, in *Italy* and *Germany*. In

the *United Kingdom* the majority of the metal and electrical industry concentrates in the West Midlands, the East Midlands and in the South East, in *Italy* above all in northern Italy and in *Germany* in North Rhine-Westphalia, Baden-Wuerttemberg and Bavaria.

In *Germany* the distribution of the companies and the employees within the individual Federal States reveals great differences. Around 65 % of all employees are working in the States of Baden-Wuerttemberg (25 %), Bavaria (20.9 %) and North Rhine-Westphalia (19.5 %). The new Federal States only contribute around 9.4 % to the total employment volume. Only the State of Saxonia with around 135,134 persons employed in its metal and electrical sector has a higher significance for the labour market (Gesamtmetall 2007).

In *Italy* regional differences with regard to the sector presence could be identified as well. The cities of Milan, Genoa and Turin form the “industrial triangle” of Italy. Some other economic centres are located in the north-west and north-east of Italy. Above all the regions of Venetia and Emilia-Romagna count among the economically strongest regions in Europe. The Italian sector is marked by industrial areas where companies most frequently belong to the same industrial branch. The average size of the companies is increasing in relation to their geographical position. The largest companies are located in the north-west whereas the smallest businesses can be found in the south or on the Italian islands.

### 3.2 Employment figures

With regard to the employment figures provided by the individual European partner countries, a clear dichotomy is evident. While the employment figures of the surveyed sectors in *Germany* and *Austria* have remained more or less constant during the recent years, the figures of *the Netherlands* and *Italy* reveal a slight decline. In the Netherlands, the number of persons employed stagnated up to the year 2005 or decreased regionally. A similar development could be identified for *Italy*. According to experts, *Italy's* competitiveness is also likely to decrease in the course of the next years.

At first sight, the *Austrian* employment structure has remained comparatively stable within a period of time of eight years (1998 to 2006). A closer look, however, reveals considerable changes. These changes are predominantly relevant for some industrial branches, e.g. the manufacture of motor vehicles, the manufacture of trailers and semi-trailers of utility vehicles. Between 1998 and 2006, this field has been of increasing importance for the Austrian automobile industry whose employment figures increased by 24 %. However, this industrial branch will strongly depend on temporary delivery contracts with the big car manufacturers in Germany and the United States of America.

Some of these contracts, e.g. for the Magna factory in Graz, will no longer be extended beyond the year 2010 (cf. Federal Ministry of Economics and Labour (BALI-WEB)).

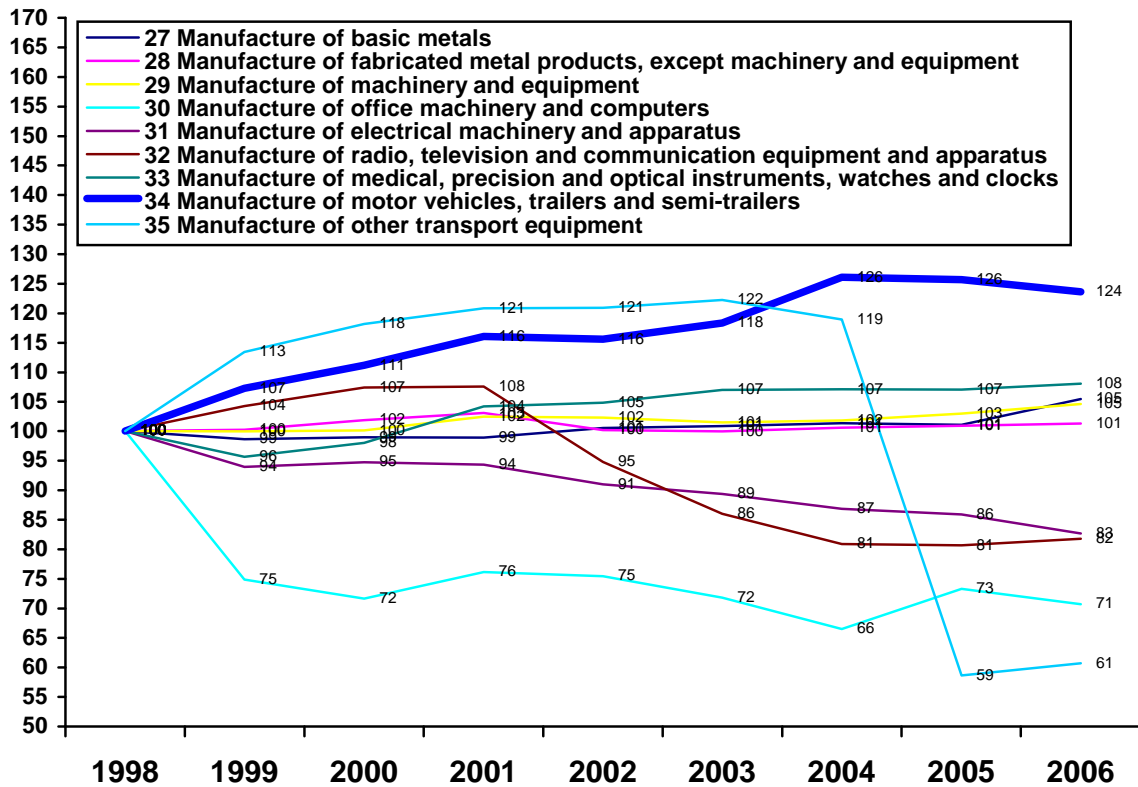


Figure 1: Employees by Economic Sectors (index: 1998=100) (Source: Federal Ministry of Economics and Labour (BALI-WEB) + ibw calculations)

The employment in the economic sector has above all constantly increased in the field of manufacture of motor vehicles, trailers and semi-trailers whereas the manufacture of other transport equipment has registered enormous losses at the end of 2004 after initial increases. The figures decreased by more than half within nine months.

With regard to unemployment, there are regional differences. While the unemployment quota is rather high in Vienna, there are job vacancies in the strongly industrialized Federal States of Upper Austria and Styria as well as in Lower Austria.

Altogether the employment rates in *Austria* have increased by around 200,000 within the last 10 years whereas the number of persons engaged in manufacturing has decreased.



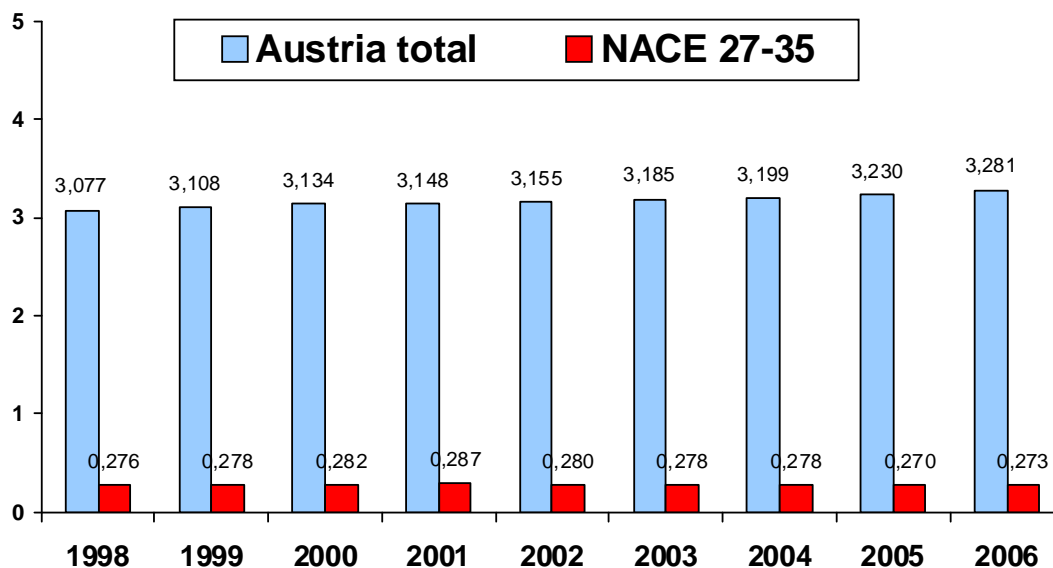


Figure 2: Employees (Annual average; absolute numbers; in millions) (Source: Federal Ministry of Economics and Labour (BALI-WEB) + ibw calculations)

In *Germany*, the employment figures of the M+E industry amounted to almost 3.5 million persons engaged in April 2007. Opposed to other German industrial branches, this sector was least affected by a staff reduction and the employment figures have remained comparatively constant. Compared to other industrialized countries, *Germany* has created employment at the end of the 1990-ies, i.e. around 120,000 jobs in the years between 1999 and 2001. Between April 2006 and February 2007, the employment figures of the M+E industry have increased by 54,000 and reached a new high at the beginning of the year 2004.

The employment development in *Germany* fluctuated in the period of time of 1996 and 2004 between around 3.65 million and approximately 3.45 million persons engaged in the M+E industry. Latest figures underpin a hardly changed trend with regard to the employment situation: Around 3.5 million persons were employed in the year 2007 (cf. Figure 3). However, a change could be witnessed with regard to the increase of reported job vacancies. The eastern part of *Germany* had considerably more job vacancies (+ 5.6 %) than the western part (+ 1.3 %). A lack of specialized workforce is by now a reality and 10 % of the M+E enterprises are already experiencing obstacles in production due to a lack of skilled workers (Gesamtmetall 2007).

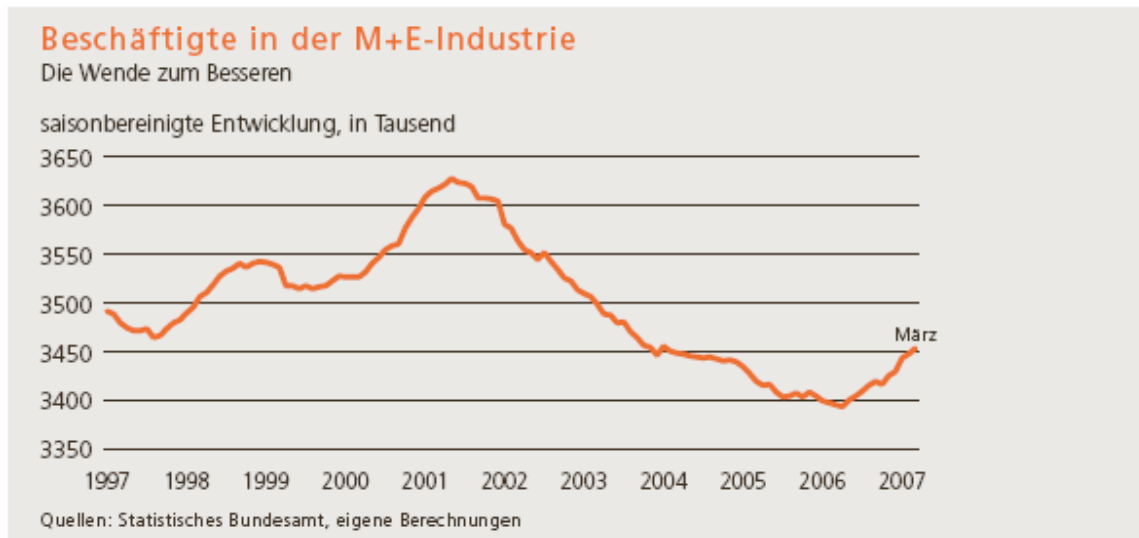


Figure 3: Employees in the M+E-industry (Gesamtmetall 2007c, p. 25)<sup>3</sup>

The employment figures in *Italy* have increased by around 7.4 % in the years between 1995 and 2005. Subdivided into genders, the manufacturing industry employs just under one fifth of women (18.5 %).

The *Italian* labour market has long been characterized by four basic aspects, i.e.:

1. A comparatively low employment rate relating to the total population,
2. a great discrepancy of the unemployment quota on a local level (important differences between the regions, North-South divide),
3. an explicit separation of a labour market drawing benefits from the welfare institutions of the state and an economy-oriented labour market without any safeguarding and
4. a high degree of general unemployment, in young people looking for their first jobs and above all in women.

A further typical feature of the Italian labour market is the striking North-South divide. The north of Italy is highly industrialized and the economically strongest region in Central Europe with just 4 % of unemployment whereas the agricultural south is the structurally weakest region in Central Europe with an unemployment rate of over 20 %. The employment rate in the region of Emilia-Romagna was 45.5 % in the year 2002. Compared to this the Tuscany region clocked 41.6 %, the region Marche 41.5 % whereas the 15 Member States of the European Union reached 42.3 %.

<sup>3</sup> Employees in the M+E-industry, the turn for the better; season adjusted development, in thousand, until March 2007

In the year 2003, the rate of long-term unemployed persons was 0.6 % compared to the total workforce. This was much lower than in other European regions. Compared to the European average, the employment rate in Emilia-Romagna was much higher and reached 68.4 % in the year 2005. This corresponds to approximately 97 % of the goal set by the EU. 413,000 enterprises are active in the region, amongst them around 138,000 handicraft companies and 8,000 cooperatives. The high unemployment in young people of 40 % underpins the economic dimensions. As experts put it, the success factor of medium-sized companies which in the past has prevented mass dismissals on the Italian labour market is likely to succumb to big foreign enterprises due to its low competitiveness. This is above all due to the fact that too little funds were invested in the fields of research and development.

The *Dutch* provinces show similar developments as *Italy*. The most important differences can be identified between the east and the west. When comparing the northern, eastern, southern and western provinces of the *Netherlands*, a tendency of a rough division between east and west becomes visible. While the M+E industry of the manufacturing sector in the east has well developed compared to the total manufacturing sector, the employment figures in the M+E industry in the west of the country have decreased in relation to the total manufacturing.

When dividing the M+E sector into individual sectors, three fields are clearly emerging: Metal products (27 %), machines (26 %) as well as radio, television and communication (18 %). In the years between 1995 and 2005, the employment in the manufacturing sector of the *Netherlands* lagged behind the total economy. In the first half of this period of time the employment figures in the manufacturing sector increased compared to the total employment. In the second half, however, they decreased while the total employment figures remained largely constant. On the whole the development of the M+E sector is similar to the development of the manufacturing sector.

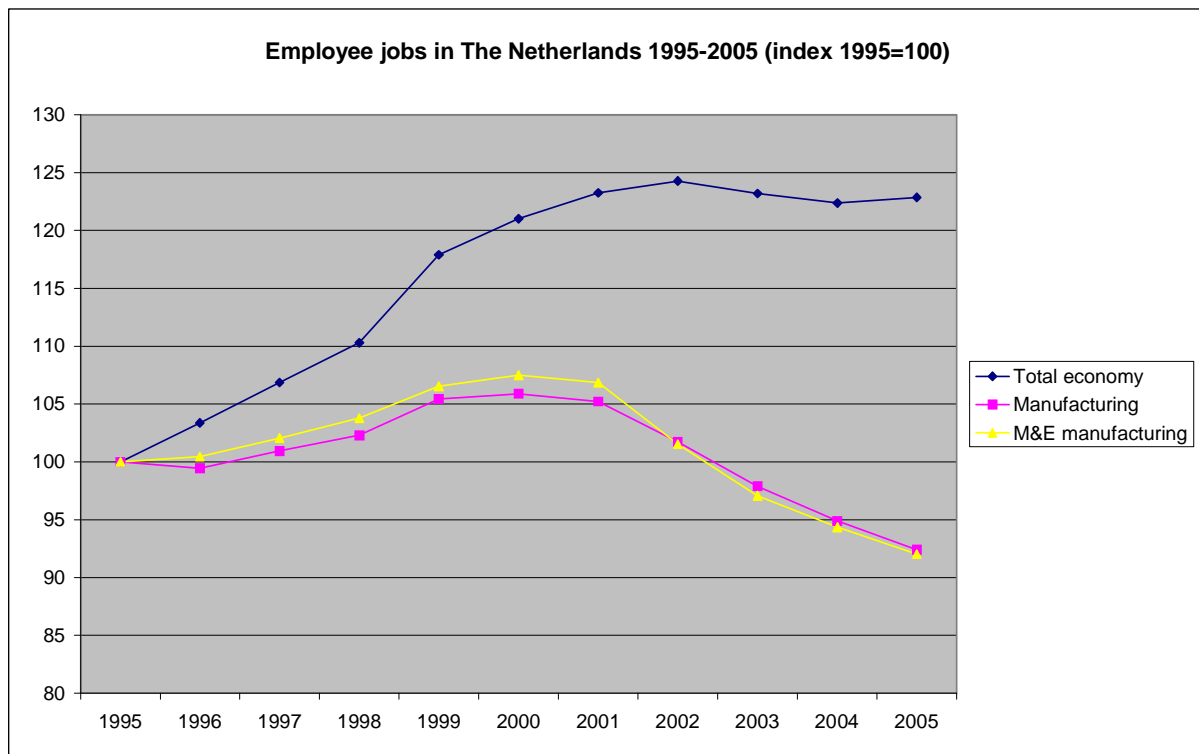


Figure 4: Employment in the Netherlands 1995-2005

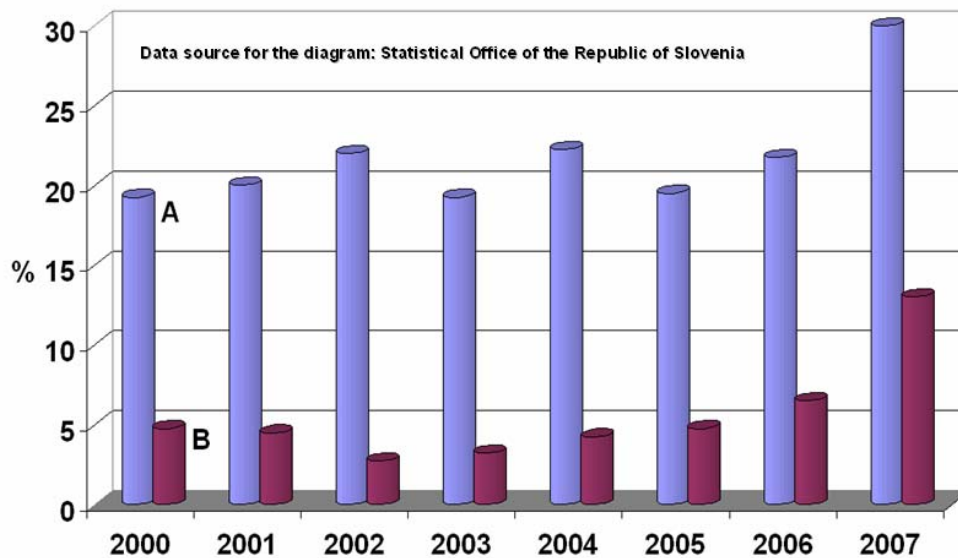
According to *Dutch* statistics, the lowest unemployment rate of 3.2 % compared to other European countries (7 %) was reached in May 2007. With regard to the unemployment of young people (15 to 24 years of age) it is striking that the differences are even greater. In *the Netherlands*, the unemployment rate of young people is 5.7 % compared to the rest of Europe with an average rate of 15.9 %.

In the *United Kingdom*, around 76,000 enterprises employ between 2 and 2.5 million persons. Between March 2006 and March 2007, there were 163,000 employees in Wales (around 13.4 % of all people employed) working in the manufacturing sector. The companies of this sector generate 9 % of the Gross Domestic Product (GDP) (96 billion €) per year and contribute 33 % to the total export figures.

In *Slovenia* the data of May 2007 underpin that the number of employees were 852,857, 230,200 of which were engaged in the processing industry. This corresponds to around 27 % of all persons employed. The industry thus represents the biggest sector related to employment figures.

A comparison of the number of persons engaged in manufacturing within the last five years only revealed a slight change. A downward tendency can be witnessed from the year 2002 on. The employment figures of then 240,000 skilled personnel declined to around 227,000 (lowest in the year 2006), but slightly increased again by 300,000 in the

year 2007. This is why a definite shortage of skilled workers cannot be identified. Nevertheless around 20 to 30 % of the enterprises active in the manufacturing sector point out a slowly developing shortage of skilled workers within the last five years.



**A- shortage of skilled labour force**

**B- shortage of labour force in general**

Figure

5:

Perce

This shortage is already threatening the production and has considerably increased since 2005.

**Figure 5** underpins the strong increase of the shortage of skilled workers (A) compared to a general lack of employees (B).

### 3.3 The situation of skilled workers

The situation of skilled workers in the manufacturing sector in Europe has been deteriorating above all in the technical fields during the past years. An indicator for this fact can be seen in the job vacancies in the individual partner countries. This lack of qualified skilled personnel is by now partly leading to considerable production losses. The causes for this phenomenon are manifold and have often been developing for a very long time. Some of the examples that can be named: less training measures, changes of the qualification requirements or the lacking attraction of the occupation.

#### Job Vacancies

Two central developments could be identified as a symptom for the shortage of skilled workers in the manufacturing sector: First the clear increase of job vacancies and second the increase of job vacancies that can be difficult to fill. The available figures refer to *Austria, the Netherlands* and *Germany*. For these countries it could be clearly shown that it has become more difficult in recent years to fill job vacancies in the sector on the level of skilled work. Furthermore it becomes obvious that the number of job vacancies depends on the educational background.

After the decline of the unemployment figures in the metal and electrical occupations in *Austria*, the registered job vacancies in this occupational group have been continuously increasing since 2002 although not all vacancies are reported to the state-run labour agency. An analysis of the individual occupational groups within the manufacturing sector revealed that the number of job vacancies almost reached the number of unemployed persons in 2006 above all with regard to metal occupations (blacksmiths, locksmiths, toolmakers, plumbers, whitesmiths, assemblers etc.). Statistically there were just 1.8 unemployed persons per job vacancy in the occupational group of blacksmiths, locksmiths and toolmakers. In 2006, there were only three occupations of the metal and electrical sector with more job vacancies than unemployed persons: turners, milling workers and above all welders.

As shown in

**Figure 6**, the unemployment figures increase along with a decreasing educational background. In the year 2006, 16.7 % of the persons with the lowest educational background reported unemployed, opposed by just 3.5 to 6 % graduates of secondary modern schools as well as 2.1 % of university graduates.

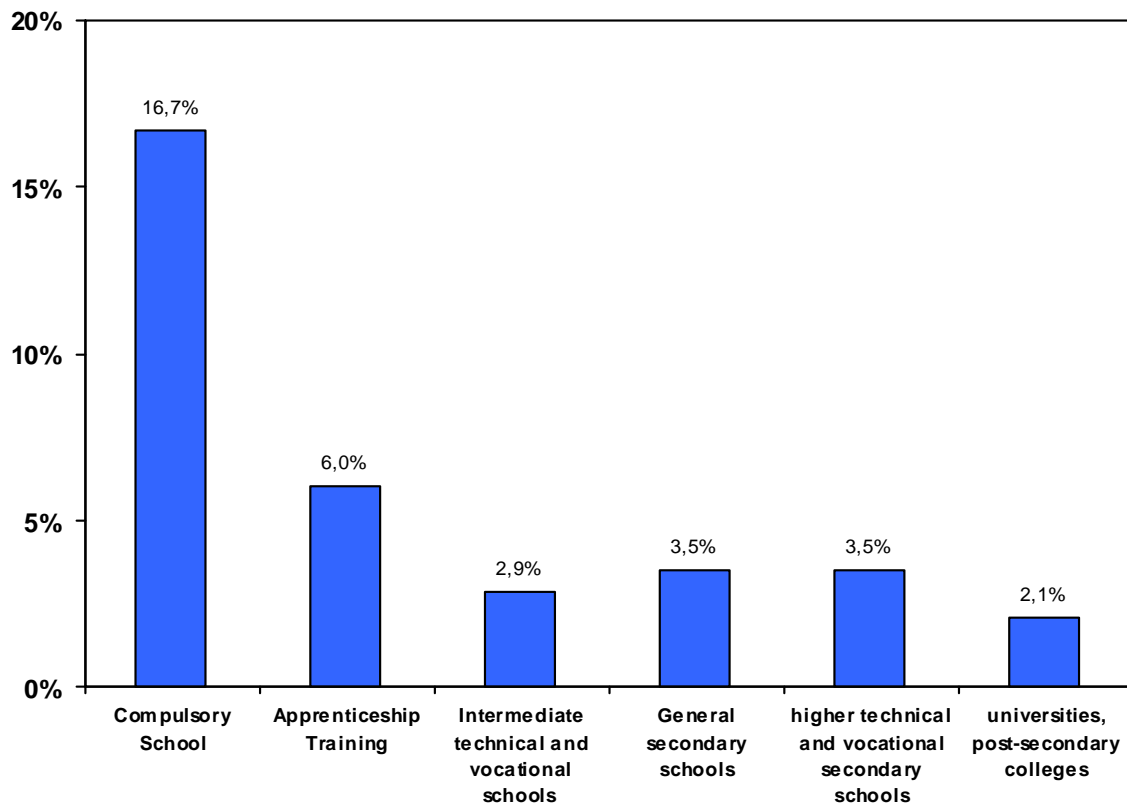


Figure 6: Unemployment rate depending of educational level (2006), (Source: Public Employment Service Austria (AMS)<sup>4</sup>)

Since 2003, the number of job vacancies has clearly increased in *the Netherlands*. Whereas the sectors of metal products as well as machines, automotive vehicles and transport were marked by peak values and slumps in the course of the recent years, the number of job vacancies in the sector “electrical appliances” remained comparatively low. In the Netherlands as well, the number of job vacancies can not be looked at without considering the educational background of the individuals. Approximately 10 % of the job vacancies concern the elementary educational level, 27 % the lower level, 54 % at medium level and 11 % the higher or academic level (cf. Table 4<sup>5</sup>).

<sup>4</sup> Glossary (from left to right): Compulsory schooling, apprenticeship training, secondary vocational schools, secondary schools, technician schools and vocational secondary grammar schools, universities, colleges.

<sup>5</sup> Precise indications on the Dutch figures for the filling of job vacancies or open positions cannot be given as the official statistics do not provide any relevant information. Therefore only data provided by the state-run labour agency could be used. It is important to note that these indications do not reflect the actual job market as the figures only include the actually reported job vacancies.



	<b>Vacancies</b>	<b>Percentage</b>
<b>Total vacancies</b>	<b>2,111</b>	<b>100 %</b>
Elementary level occupations	201	9.5 %
Lower level occupations	574	27.2 %
Lower clerical, commercial occupations etc.	35	1.7 %
Lower agricultural occupations	63	3.0 %
Lower technical occupations	420	19.9 %
Lower building occupations	17	0.8 %
Lower electrical engineering occupations	74	3.5 %
Lower metal working occupations	267	12.6 %
Lower process engineering occupations	37	1.8 %
Lower mechanical engineering occupations etc.	17	0.8 %
Lower transport occupations	51	2.4 %
Medium level occupations	1135	53.8 %
Medium level (para)medical occupations	21	1.0 %
Medium level clerical, commercial occupations etc.	179	8.5 %
Medium level technical occupations	926	43.9 %
Medium level building occupations	67	3.2 %
Medium level electrical engineering occupations (excl. automation etc.)	44	2.1 %
Medium level metal working occupations	515	24.4 %
Medium level mechanical engineering occupations etc.	285	13.5 %
Higher level occupations	186	8.8 %
Higher clerical, commercial, economic occupations etc.	81	3.8 %
Higher technical occupations	101	4.8 %
Higher electrical engineering occupations (automation etc.)	10	0.5 %
Higher electrical engineering occupations (excl. automation etc.)	37	1.8 %
Higher mechanical engineering occupations etc.	47	2.2 %
Academic level occupations	15	0.7 %
Academic level technical occupations	11	0.5 %

Table 4: Vacancies in the Metal and Electrical Manufacturing Sector Registered at the Public Employment Agencies (CWI), June 2007

The field of technical occupations on a medium level covers next to 44 % of the job vacancies corresponding to almost half of the total job vacancies. The majority of all job vacancies, i.e. 69 %, can be found in the technical field. This encompasses 64 % of jobs on a medium level, 28 % on a lower and 8 % on a higher or academic level.

In *Germany* the development of the job situation has been aggravating e.g. for the field of metal and metal products. Compared to the year 2005, there was a clear increase. With regard to the occupational group of the skilled workers, the number of job

vacancies of 16,100 in the year 2006 has almost doubled compared to the year 2005 (7,400) (cf. Figure 7).

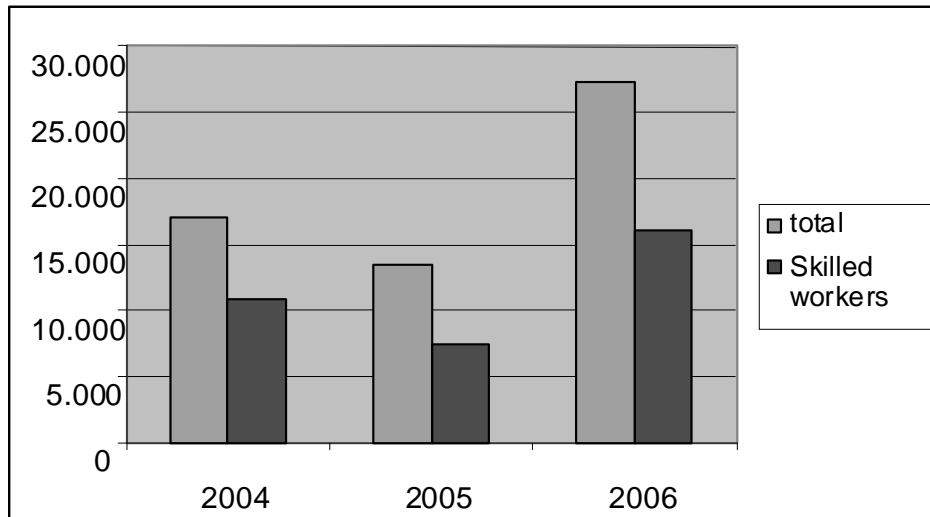


Figure 7: Development of job vacancies in the economic branches metals and metal products (Source: IAB, n.d.)

A comparison of the development of the re-filling of job vacancies clearly reveals that the situation has aggravated. The example of *Germany* indicates the changes to be noted. According to Kettner (2007, p. 5), one fifth of the job vacancies could only be filled with difficulties in the year 2006. These figures encompass all occupational groups.

Even though the number of job vacancies has clearly increased, the economic revival makes it more and more difficult to re-fill jobs in the metal and electrical industry as Kunstmann (General Manager of the Employers' Association Gesamtmetall) put it. Therefore the average time necessary to fill a vacancy has increased by up to 50 % (also cf. Table 5). According to Kunstmann, filling a job vacancy in the machine building sector currently takes 72 days compared to just 45 days in the year 2005. The number of job vacancies has been further increasing during the last months.

Branch	Number of immediately available vacancies in 2004	Share of vacancies difficult to fill	Number of immediately available vacancies in 2006	Share of vacancies difficult to fill
Metal, metal products	11,000	21 %	20,800	31%
Machines, electrical/ electronical technology; automotive	20,900	37 %	38,000	30%
Hotel and restaurant industry	20,900	18 %	51,400	17 %
Traffic, telecommunication	15,800	8 %	50,000	20 %
Banking, insurance companies	10,200	13 %	10,500	19 %
Commercial services	163,500	21 %	335,000	23 %
Other services companies	19,000	8 %	74,600	7 %
Social services	45,400	11 %	140,000	8 %
Public administration	15,300	9 %	47,000	4 %
Total	437,700	18 %	1,033,800	19 %

Table 5: Shares of vacancies that could only be filled with difficulties (Source: Kettner, 2007, p. 5)

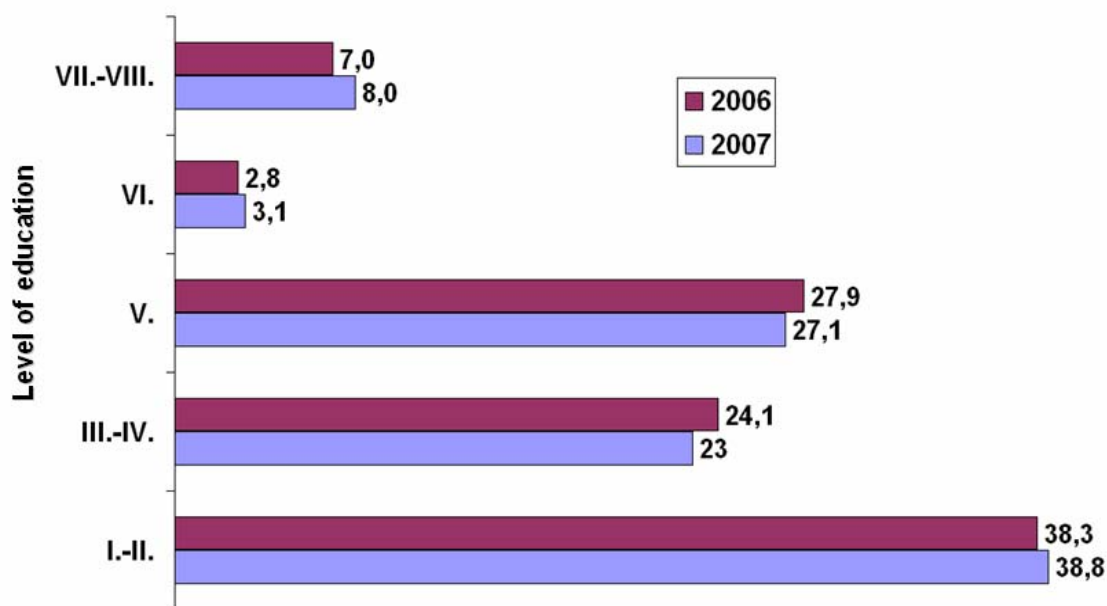
Shortages can above all be identified for the occupation of a chip removal mechanic. Skilled workers are above all in demand in the north and in the Federal States of Hesse, Baden-Wuerttemberg and Bavaria. A regional shortage can also be stated with regard to industrial mechanics in Baden-Wuerttemberg and Bavaria as well as for toolmakers in Baden-Wuerttemberg (IG Metall, 2007a, p. 8).

In a survey by the Institute of Engineering and Technology (IET) published in 2006 in the *United Kingdom*, 63 % of the enterprises indicated that they are looking for skilled workers on technician's level. Only 50 % of the companies were, however, willing to employ graduates from public schools, 76 % looked for university graduates and 50 % for graduates with a diploma. Experienced personnel with highly qualified practical skills are required by 71 % of the companies. In the light of these figures it is not amazing that such personnel can only be found and employed with difficulties. This fact leads to a loss in growth as experience cannot be simply transferred but is developing over the years. This experience required for employees represents the biggest challenge for skilled workers. In some cases the interviewed regional enterprises reported that they conceived courses for skilled workers in order to meet this shortage. This is regarded as an investment in the future as it will take some time until these measures will show the desired impact.

*Wales* shows a different pattern. The Future Skills Wales Survey of the year 2005 stated that it was less problematical for Welsh employers to recruit adequate personnel and to

fill job vacancies than two years earlier. This can also be seen as the direct result of the migration of some of the bigger manufacturing companies such as Sony or Panasonic to Eastern Europe. This survey, however, also shows that approximately 64,000 Welsh employees lack specialist knowledge necessary to carry out their tasks satisfactorily. The identified qualification gaps are above all evident in manufacturing, retail and in the fields of finances, health and education. More than 50 % of the hard-to-fill vacancies concentrate on enterprises with less than 10 persons engaged, even though these companies account for just 19 % of the total employment including handicraft trades.

For *Slovenia* the following can be stated: The prevailing educational levels of the sector can be assigned to Levels I to V. The lowest educational level is the most prominent (approximately 1/3). Therefore companies are facing difficulties in finding adequate applicants and employees as soon as specific work profiles have to be tackled. Above all the occupational groups of locksmiths, welders and metal workers are concerned. Figure 8 shows the unemployment figures of simple and semi-skilled workers (38.8 % in the year 2007) compared to the years of 2006 and 2007.



Data source for the diagram: Statistical Office of the Republic of Slovenia

Figure 8: Registered unemployed by level of education - July 2007

The graph underlines that the group of little qualified persons is most likely to be confronted with unemployment.

### Obstacles for production

The impact of the shortage of skilled workers is partly perceived quite differently. Often companies only react when they are already facing direct losses in production. This is, however, still a problem in Europe as the economic loss caused by a shortage of skilled workers can often not be measured. The following results from the *Netherlands*, *Slovenia* and *Germany* are based on interviews and experts' opinions.

In the *Netherlands*, the National Statistics Office (Centraal Bureau voor de Statistiek – CBS, Statline) carries out a survey among 1,700 manufacturing enterprises every month in order to enquire the economic cycle. This survey encompasses among others data on obstacles for the production, on the shortage of personnel, a lack of capacities and other causes. The survey revealed that 11 % of the interviewed companies of the metal and electrical industry indicated that the obstacles for production were a consequence of the personnel shortage. This percentage has continuously increased since 2006 (cf. Figure 9).

**Personnel shortage as obstacle for production in the metal and electrical manufacturing sector (percentage of firms, by quarter)**

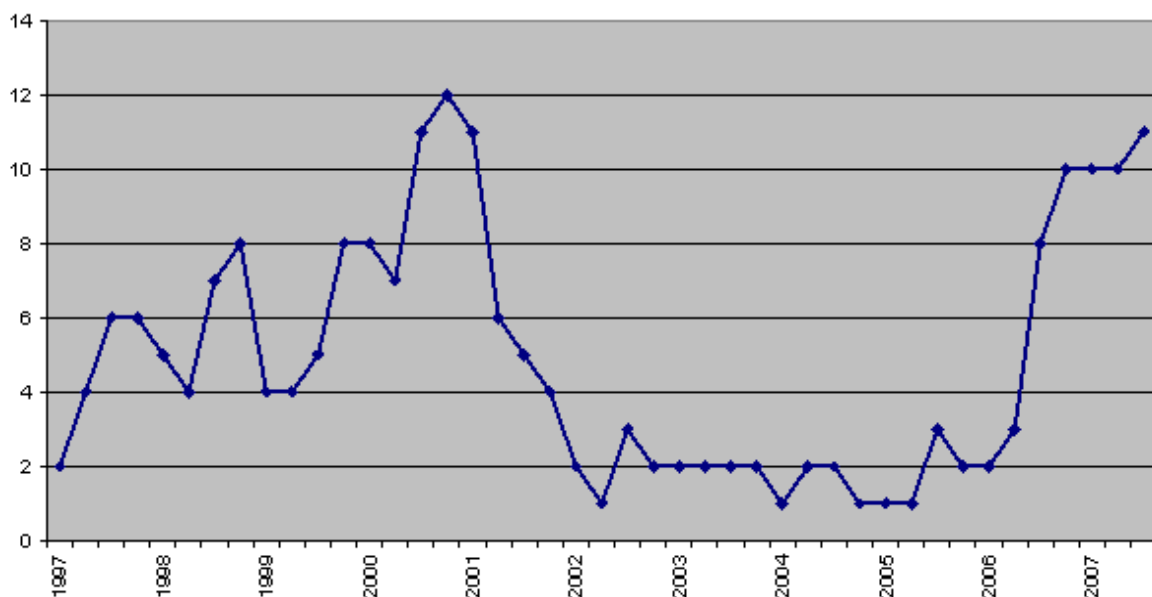


Figure 9: Personnel shortage as obstacle for production in the metal and electrical manufacturing sector (Source: Statistics Netherlands (CBS), Statline (statline.cbs.nl))

However, not all fields of the metal and electrical manufacturing sector are suffering from staff problems to the same extent. In some fields just one out of five enterprises experiences obstacles for production caused by a shortage of manpower. This is above

all true for shipbuilding and maintenance (20 %) as well as for the manufacture of machines and equipment (19 %).

The losses in production are also felt by the *Slovenian* companies. Around 20 to 30 % of the companies acting in the manufacturing sector indicated that the shortage of skilled workers is a decisive factor for the decrease in production performance during the last five years.

In *Germany* the recent problem of job vacancies has resulted in a dramatic increase of production losses and obstacles. In March 2007, according to Gesamtmetall (2007a), this applied for 10 % of the companies operating in the sector. Apart from engineers there was above all a shortage of technicians and well-trained skilled workers. This shortage of skilled personnel on the level of skilled work could be confirmed by the five case studies conducted in Germany. There was a special demand for skilled workers in the occupations of cutting mechanic, industrial mechanic, toolmakers as well as mechatronics and electricians.

The following quotation taken from a German case study illustrates the significance of the already existing losses in production: „We cannot operate two shifts as we lack the staff” (Production Manager (f) of a medium-sized machine manufacturing company). This does not only have consequences for the company itself but also for its suppliers and customers.

#### Changes in the skill level of personnel

As for the skill levels in companies, the shares have increasingly shifted towards skilled employees in recent years whereas the number of un-skilled and semi-skilled workers has decreased in most of the European countries. In *Germany*, about 40 % of the jobs for un-skilled and semi-skilled workers have vanished. The *United Kingdom* has started initiatives for a further development of the specialist training. The causes for the decrease of un-skilled and semi-skilled workers can be found in the ever more demanding requirements of the sector. These new requirements range e.g. from more required technical skills – e.g. handling of materials and machines, the technological variety and flexibility in every day’s work – up to product changes due to customer wishes and to broader fields of responsibility.

Development trends underpin that the *German* M+E industry employed 13 % more engineers and even 30 % more technicians and master craftsmen graduating from a *Berufsakademie* (vocational academy) in 2002 compared to the figures of 1995. An important decrease in employment is to be noted for persons with a vocational initial and further training in the occupational groups of the electrical industry. The group of un-skilled workers was facing a decline by 5.4 % in 2002, the group of the highly skilled

even decreased by almost 22 %. According to forecasts of the working group “Zukunft der Metall- und Elektroindustrie” (Future of the metal and electrical industry), this trend is likely to prevail up to the year 2015, also with regard to the structure of the skill level and the personnel. This means that a development towards higher skills will continue. The working group expects a decrease of the need for semi-skilled and un-skilled workers, skilled workers, master craftsmen and technicians whereas the demand for academics will clearly increase. The employment structure has considerably changed within the last two and a half decades. A higher skill level also increases the employment chances. While the jobs for un-skilled employees and semi-skilled workers have decreased by around 40 %, a comparatively good positioning could be noted on the medium qualification levels (employees with self-relied fields of work, skilled workers). Between the years of 1995 and 2002, the share of un-skilled workers decreased by around 3 % compared to just 1 % of the employees with vocational training. An increase can be identified with regard to the employees with university graduations. This group has increased by around 2 % (cf. Gesamtmetall 2007).

In the *United Kingdom* there is an extensive consensus across all economic areas that the skills of the workforce are not sufficient to uphold the competitiveness in the global economy. There is a disproportion between the share of less qualified staff and the small share of higher qualified personnel. Both companies and the government are aware of these facts and are increasingly investing in specialist training in order to reduce the specialist deficits and to improve production. This is underpinned by the latest figures published by the Office of National Statistics stating that the number of persons engaged in the manufacturing sector has decreased. However, there is a continuous and sustainable increase in production of around 3 %.

Apart from the changed skill level requirements, the demand of companies for skilled workers has also changed. Compared to *Germany* with little more than 20 %, there are 40 % of lower qualified persons in the *United Kingdom*. The lack of qualification is particularly crucial for unemployed persons of employable age. Persons with a qualification level of 4 (cf. Table 6) and above make up for 23 % of all persons of 16 years of age and older, but only for 12 % of the unemployed (Source: National Vocational Qualification – NVQ). The situation of persons without any qualification is the other way round. They account for 17 % of all persons above the age of 16 but for 31 % of the unemployed. These figures refer to a period of time when the demand for labour was comparatively high. A low qualification level can therefore be considered an important factor for the determination of the probability of a person to become unemployed.

Table 6 underpins the distribution (%) of the qualification levels for the United Kingdom. Summing up it may be stated that the number of unqualified staff (14.7 %) is almost half as high as the number of persons with a qualification level of 4 or above (27.8 %).

Percentage Qualified to NVQ Equivalent Levels in 2004					
	+ NVQ 4	NVQ 3	NVQ 2	< NVQ 2	No Quals.
<b>England</b>	27.6	19.4	20.2	32.8	14.1
<b>Wales</b>	25.5	19.3	21.4	33.8	17.0
<b>Scotland</b>	32.1	20.0	18.2	29.8	15.7
<b>N. Ireland</b>	24.5	18.2	21.3	36.0	24.3
<b>UK</b>	27.8	19.4	20.1	32.7	14.7

Table 6: Percentage Qualified to NVQ Equivalent Levels in 2004 (Source: Learning and Skills Assessment Report 2006)

The group of lower qualified persons – below Level 2 – reveals the highest share (32.7 %). The annually conducted National Employer Skills Survey (NESS) identifies the emergence and the scope of the qualification gap among the workforce. With the help of this measuring instrument, NESS has investigated further aspects in 2005. One such aspect is the fact that 25 % of the companies reported that around 4 to 6 % of their staff had considerable gaps in specialist know-how and had to be characterized as “less efficient”. Such gaps can be found in all occupational groups and there is a lack of technical and practical knowledge and skills in some parts of the workforce (Engineering Employers’ Federation; Learning to Change 2005).

*Wales* – compared to the entire United Kingdom – accounts for lower employment figures in those occupational groups requiring higher specialist knowledge. The growth of employment concentrates on little qualified persons compared to occupations at a higher level. The survey also revealed that companies normally offer additional further training for certain working areas to newly recruited staff, e.g. courses for school leavers, university graduates and post-graduates. It is interesting to note that according to the enterprises persons with the required knowledge and skills often lack leadership competences (IET 2007). The further training measures offered by the enterprises generally encompass technical training and counselling, followed by instruction and communication as well as leadership behaviour.

In *Austria*, the part of adults without vocational training is decreasing. According to a data compilation of the year 2001, only 17 % of the adults of 20 to 24 years of age had not (yet) undergone any form of vocational training. The higher qualification of the



population is a very positive asset for the education policy. However, this does not mean that education will be the “lowest” degree of qualification. Data compiled in 2001 revealed that 47 % of the persons of 20 to 24 years of age without Austrian citizenship only went through compulsory education – compared to 13 % of the young people with Austrian citizenship.

### Decrease of training figures

One cause for the increase of the shortage of skilled workers in the sector can partly be blamed to a decrease of investment costs earmarked for the training of skilled workers. This is clearly marked by a decrease of training figures e.g. in *Austria* and *Germany*.

In *Austria*, the training figures have continuously been decreasing since the nineteen eighties. Only since 1995 the number has been slowly increasing. This had a special impact on the industrial sector. The decrease of the number of apprentices is attributed to structural changes and – to a lesser extent – to the demographic development. Although many of the smaller enterprises are participating in training, the majority of the apprentices are still trained in the big enterprises. In 2006, 39 % of all apprentices underwent their training in companies with more than 250 employees. This share is only likely to be higher in the metal and electrical industry. Exact figures are not available.

The decreasing employment in the industrial sector comes along with the economic change towards a service society. Training in this sector has a traditionally lower significance. This in turn has a strong impact on the development of the number of apprentices. As revealed in Figure 10, the numbers of apprentices trained in the industry have almost halved in the years between 1980 and 2006.

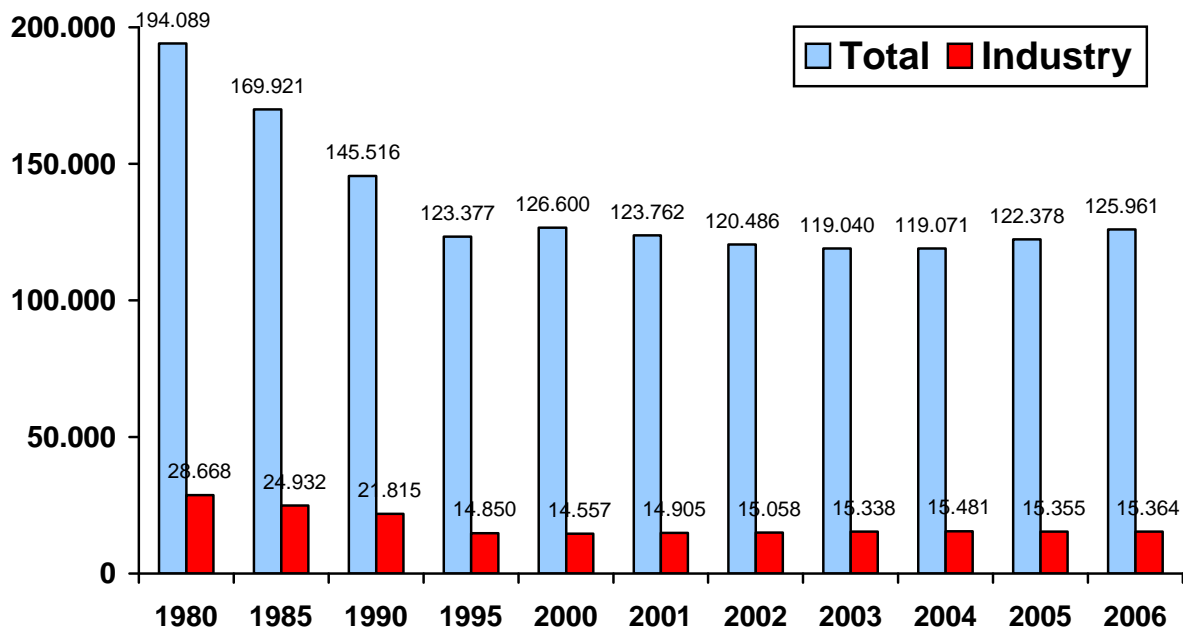


Figure 10: Apprentices in Austria (1980 – 2006) (Source: Economic Chamber)

The case studies conducted in *Austria* yielded a central result: The shortage of skilled workers affects above all those enterprises without an own apprenticeship training and a need for particularly highly qualified skilled workers. The shortage of skilled workers therefore has both a quantitative and a qualitative dimension. With respect to quantity one question remains: What happened to the skilled workers affected by shutdowns of companies? In terms of quality, above all the need for a specific (often – but not necessarily – also a company-specific) know-how is underlined which requires extensive practical experience and which can (not yet) be acquired in the course of a “classical” vocational training course. Persons with comprehensive occupational experience and of maximum middle age are, however, rarely to be found on the labour market. Many companies therefore rely on a know-how transfer from the older to the younger employees, often in a systematic and organized form. This is mostly part of a comprehensive internal and (often also) external further training strategy with special emphasis on training courses offered by the manufacturers of products and machines. The case studies also reveal that the cost conscientiousness and the cost pressure in the companies have increased, also due to the international competition. Therefore hardly any apprentices are trained as their future employment as skilled workers seems to be unlikely or only very uncertain at the time of their training. This missing “pool” of a potential and immediately available workforce leads to bottlenecks in case of a sudden increase in orders. Likewise the in-firm apprenticeship training only reacts to the

success of an immanent growth strategy with a backlog (duration of the apprenticeship training)

In Germany almost 190,000 young people are trained for the occupation of a skilled worker in the metal and electrical industry. In the years from 1993 to 2005, the number of annually concluded training contracts has increased from 49,700 to 67,000. Nevertheless the number of training positions dropped back to 59,000. Some of the Social Partners in Germany consider this decrease of training figures one of the causes for the shortage of skilled workers (Gesamtmetall 2007b).

### Summary

The conducted sector analyses and case studies in all participating countries show among others four indicators and problem areas for a shortage of skilled personnel on the level of skilled workers in the sector:

- 1) Job vacancies,
- 2) Obstacles for production,
- 3) Changes of the qualification structures,
- 4) Decrease of unemployment figures.

Above all the problem area of job vacancies underpins the „mismatch“-problem between the high unemployment figures and the increasing demand for skilled workers. At the same time the number of hard-to-fill vacancies is increasing. In some countries (*the Netherlands, Slovenia, and Germany*) this fact has already led to verifiable obstacles for the production. However for Slovenia and Germany, these figures refer to a great extent to the area of highly qualified skilled personnel. This is transferable on skilled worker level, even if for this no explicit data exists so far.

Another important problem area are the changes of the employment structure. During the last years, the shares have increasingly moved towards the skilled employees. The demand for higher skilled staff has in part considerably increased. Companies often do face serious problems in finding adequate applicants. The applicants' profiles often do not meet the specific requirements of the companies. It has become more and more difficult to find apprentices for certain occupations in certain regions as the interest in technical occupations is declining. This could be one of the causes for the decrease of training figures in the sectors of *Austria and Germany*.

In general a shortage of skilled workers on the level of skilled work is evident in all six countries, so far, however, just on a rather company-related and regional level.

### 3.4 Economic development

In order to compare the economic development of the sectors in Europe, above all, data provided by EUROSTAT were evaluated<sup>6</sup>. The sector “other fabricated metal products” counts among the biggest sub-sector within the metal sector. It accounts of the value added and for around one quarter of the employment in the surveyed sector. In the field of manufacturing of metal products the share was just over a fifth and just below a fifth with regard to manufacture of iron products. The manufacture of metal products contributes to the value added with 15.9 % and with a fifth to employment. The other sub-sectors account for around 7 % to the value added and the sectoral employment.

*Germany* was by far the leading manufacturer of basic metals and metal products in the year 2004. The returns amounted to € 56.6 billion, more than a quarter (26.5 %) of the EU-27 total. Germany employed 1 million people, corresponding to roughly a fifth (20.9 %) of the branch-specific employment. Apart from *France* and *Spain*, *Italy* and the *United Kingdom* were two of the most important manufactures, who – together with *Germany* – earned exactly three quarters of the returns within the EU-27 in the year 2004.

The development of the index of production for the manufacture of basic metals and fabricated metal products (NACE 27-28) for the EU-27 countries was very similar to the development of the total industrial production during the last ten years up to 2006 (cf. Figure 11) although the index for the manufacture of basic metal and fabricated metal products was prone to bigger fluctuations. The average growth rates in manufacturing between the years 1996 and 2006 amounted to 2.2 % p.a. for the manufacture of basic metals, compared to an annual 2.1 % for the entire industry. Within the sector of metal production, the average yearly growth rate (2.6 % p.a.) of the manufacture of fabricated products (NACE class 28) was less important than the manufacture of basic metals (1.5 % - NACE-class 27) in the years up to 2006.

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<sup>6</sup> The figures provided by EUROSTAT refer to the EU-27 countries and are divided according to NACE-categories. Thus figures are available for NACE 27-28, 29, 30-33 and 34-35.

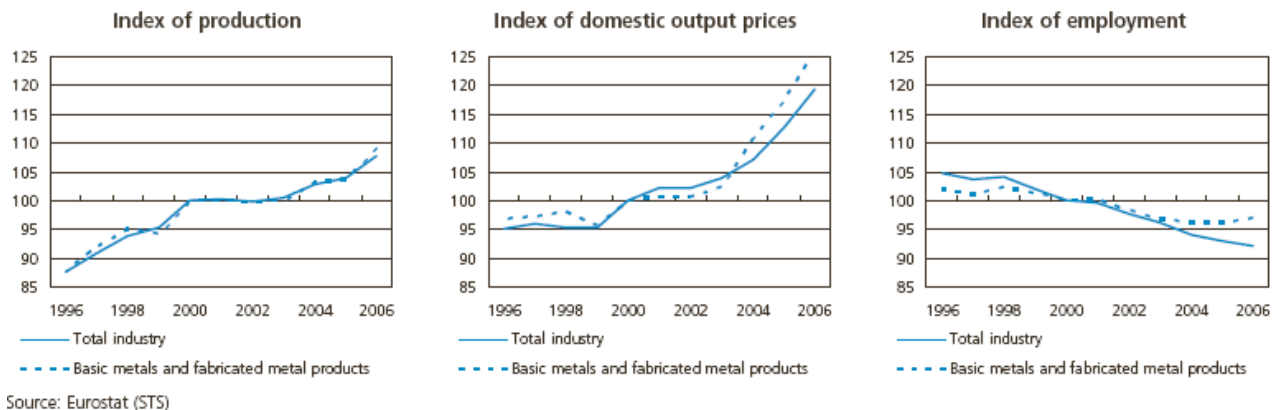


Figure 11: Manufacture of basic metals and fabricated metal products (NACE 27-28), Evolution of main indicators, EU-27 (2000=100) (Eurostat 2008)

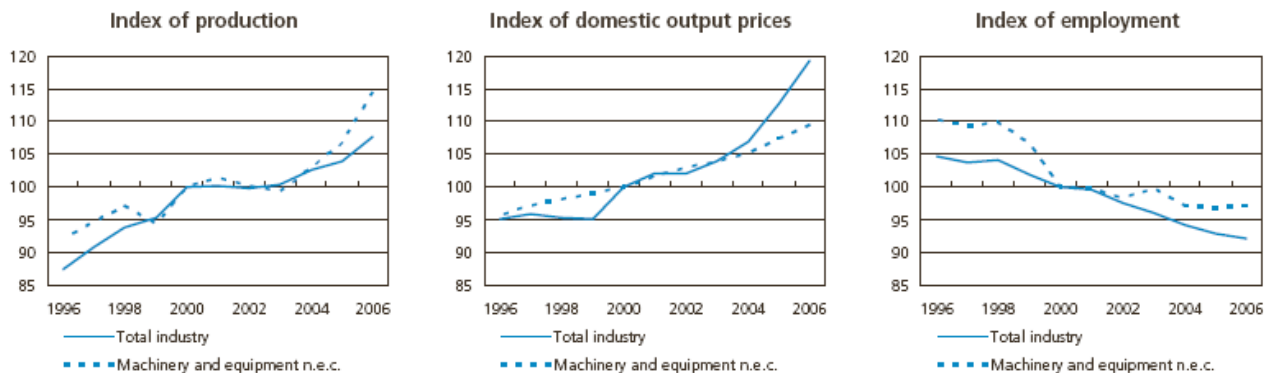
The development of the index of domestic output prices of the EU-27 countries for basic metals and fabricated metal products reflects three patterns between 1996 and 2006:

1. Comparatively stable prices between the years of 1996 to 1999;
2. There was a clear increase in 2000 which could be maintained until 2002 and
3. There was a strong recovery of prices until 2006.

The increase of this price index between the years 1996 and 2002 was confined to 4 %. However, the index increased by 23 % within the last three years of the period of time until 2006 under the recession which partly encompasses increased prices for raw materials and energy. The increase in prices in the manufacturing of basic metals and fabricated metal products was especially strong after 2002 (increase by 42.8 %), higher than the prices for simple precious metals and non-ferrous metals in the year 2005 (increase by 36.7 %).

Compared to the total industry, the index of the decrease of employment in this sub-sector was rather moderate in the period of time between 1996 and 2006 (- 0.5 % p.a. on average).

A glimpse to the sector with regard to NACE group 29 (cf. Figure 12) reveals that the sub-sector machines and equipment is partly deviating just little from NACE groups 27 to 28. For example, the index of production between 1996 and 1998 was above the index of the total industry. The same is true for the time from 2004 on. While the sub-sector manufacture of basic metal and fabricated metal products partly followed the development of the total industry – related to domestic output prices – the sub-sector machines and equipment was different as an almost constant increase could be identified.

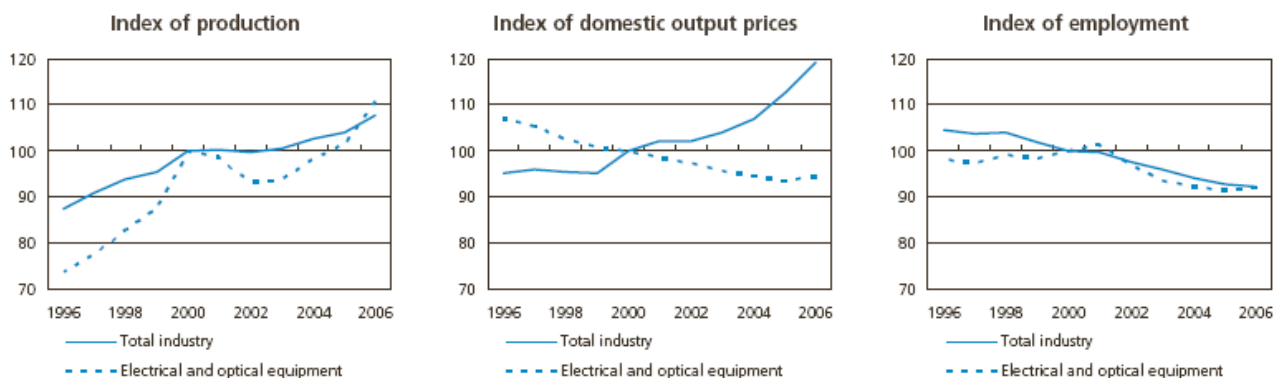


Source: Eurostat (STS)

Figure 12: Manufacture of machinery and equipment n.e.c. (NACE 29), Evolution of main indicators, EU-27 (2000=100) (Eurostat 2008)

Compared to the NACE groups 27 to 28, the index of employment of the sub-sector was, however, considerably higher than the total industry between 1996 and 1999. From 2002 on, this development has slightly decreased.

The sub-sector electrical and optical equipment was selected as an example for the electrical sector. Although the electrical sector seems to be different at first sight, it resembles the metal sector. The curve follows a similar tendency albeit with a gentler run. With respect to the index of production, a continuous growth is visible. On the whole the development of electrical and optical equipment is lower than the development of the total industry (cf. Figure 13).



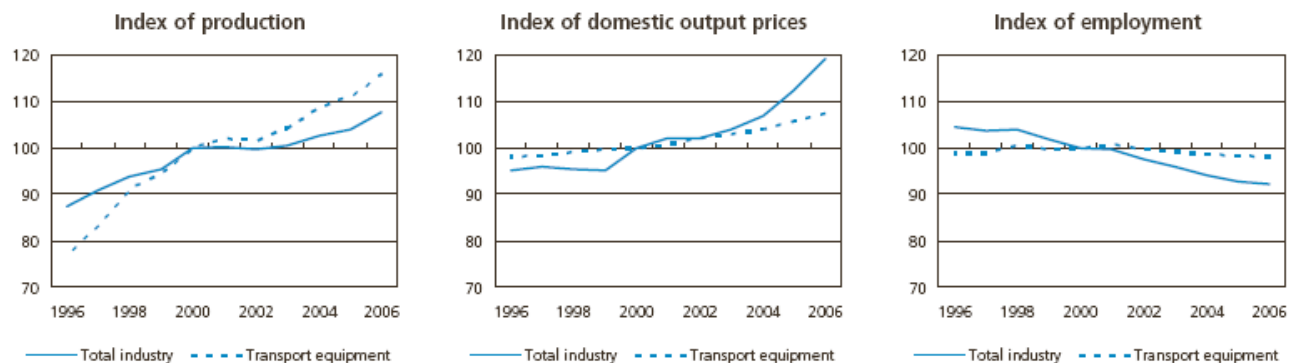
Source: Eurostat (STS)

Figure 13: Manufacture of electrical and optical equipment (NACE 30-33), Evolution of main indicators, EU-27 (2000=100) (Eurostat 2008)

Regarding the index of domestic output prices the sub-sector follows an almost mirror-inverted course compared to the total industry. Similar as in the NACE groups 27 to 28,

the employment rate just misses the development of the industry of the entire sector but approached this rate in 2006.

Finally an overview will be given on the developments in the NACE group 34 to 25, i.e. manufacture of motor vehicles and other transport equipment. With regard to the index of production it is evident that the manufacture of motor vehicles was below the development of the total industry up to the year 1999, was identical until 2000 and that the index then considerably increased compared to the total industry (cf. Figure 14).



Source: Eurostat (STS)

Figure 14: Transport equipment (NACE 34-35), Development of the main indicators, EU-27 (2000=100) (Eurostat 2008)

With regard to the index of domestic output prices the curve was just above the curve of the total industry until the beginning of 2000. Up to 2002, both curves were very close and from 2003 the curve of the manufacture of motor vehicles increased to a lesser extent than the curve of the total industry. The index of employment in the field of manufacture of motor vehicles remains almost unchanged for the period of time between 1996 and 2006.

It has been clearly shown that a mixed balance can be drawn with regard to the economic development. On the whole an increase of production and an increase of returns up to the year 2006 can be stated. This is, however, opposed by decreasing employment figures. According to a press release by EUROTAT (Eurostat 2008a) dated February 2008, the incoming orders in the EU 27 countries have again fallen back by 1.2 % (compared to November and December 2007). “With the exception of shipbuilding, railway vehicles and the aerospace industry, the incoming orders for the industry (...) in the EU-27 have decreased by 0.5 % in December 2007” (Eurostat 2008a). Compared to the same period of time of the previous year the index in the EU-27 has, however, increased by 7.5 %. Without shipbuilding, railway vehicles and the aerospace industry, the increase of incoming orders amount to 6.6 % (cf. Figure 15).

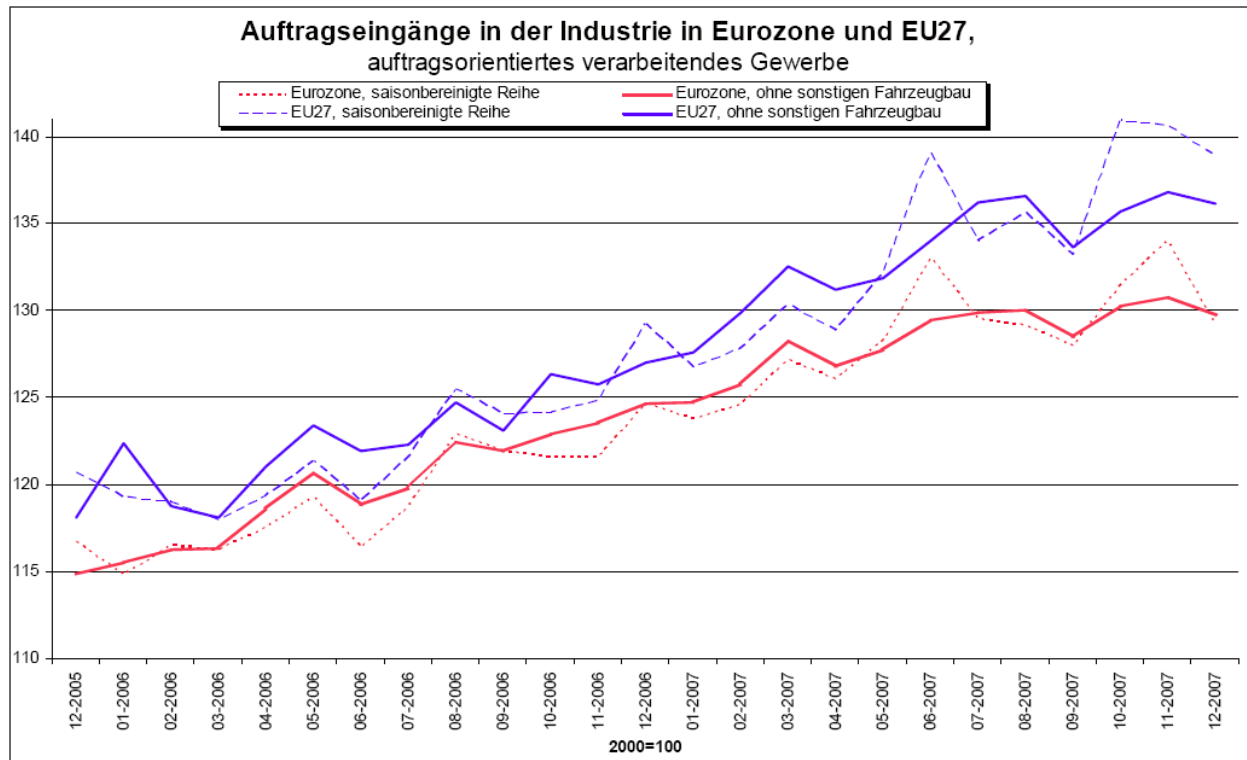


Figure 15: Incoming orders in industry in Euro zone and EU27, order-oriented manufacturing industry (Eurostat 2008a)<sup>7</sup>

The manufacturing sector of machines and equipment in the EU-27 noted an increase in incoming orders of 7.4 % in December 2007, compared to December 2006. As for electrical and electronical products, a growth of 7.4 % could also be stated. However, the manufacture of basic metal and fabricated metal products decreased by 0.2 %. On the other hand the manufacture of motor vehicles increased by almost 16 % within the same period of time.

The index of the incoming orders was around 10 % above the average of the year 2007 in the EU-27 countries. This characterizes a continuous up and down within a constant upward trend.

A closer look at the developments in *Germany* reveals that the M+E sector is currently experiencing a boom. There were 3 % more incoming orders and queries in the first months of 2007 than in the 4<sup>th</sup> quarter of 2006. In April/ May 2007, another 3 % per month could be added. It is worth noting that the companies were successful on both the domestic and the foreign market. The domestic economy has increased by 5 % since

<sup>7</sup> Incoming orders in industry in Euro zone and EU27, order-oriented manufacturing industry; Euro zone, season adjusted series; EU27, season adjusted series; Euro zone, without other automotive industry; EU27, without other automotive industry (read from left to right and from top to bottom)



the beginning of the year, the export business even by 7 %. The investment goods with 6.7 % range above the intermediate inputs and consumer goods (4.5 % and 4 % respectively). A comparison of the first five months of 2007 with the same period of time of the previous year shows that the figures were on the same level as the total figures, domestic and export figures, the intermediate inputs as well as consumer goods with increases between 10 and 11 % (Gesamtmetall 2007a).

The production in the metal and electrical industry is growing along with the order development. In the first three months of 2007 it surpassed the level of the fourth quarter of 2006 by 3 %. The production remained on the reached level at least in the months of April/ May. Compared to the previous year, a growth in production of 9.5 % was noted for the first five months of the year 2007. The degree of utilization of the production plants reached 90.4 % in March which marks the highest rate since the German reunification (cf. Gesamtmetall 2007a).

The expenditures of the companies for innovations are very different in the M+E branches. Based on the turnover, they are highest in the manufacture of vehicles and in medical instruments and control equipment, lowest in the manufacture of fabricated metal products. The sector of manufacture of motor vehicles had considerably increased its expenditure for innovations in 2004, as shown in Figure 16 below.

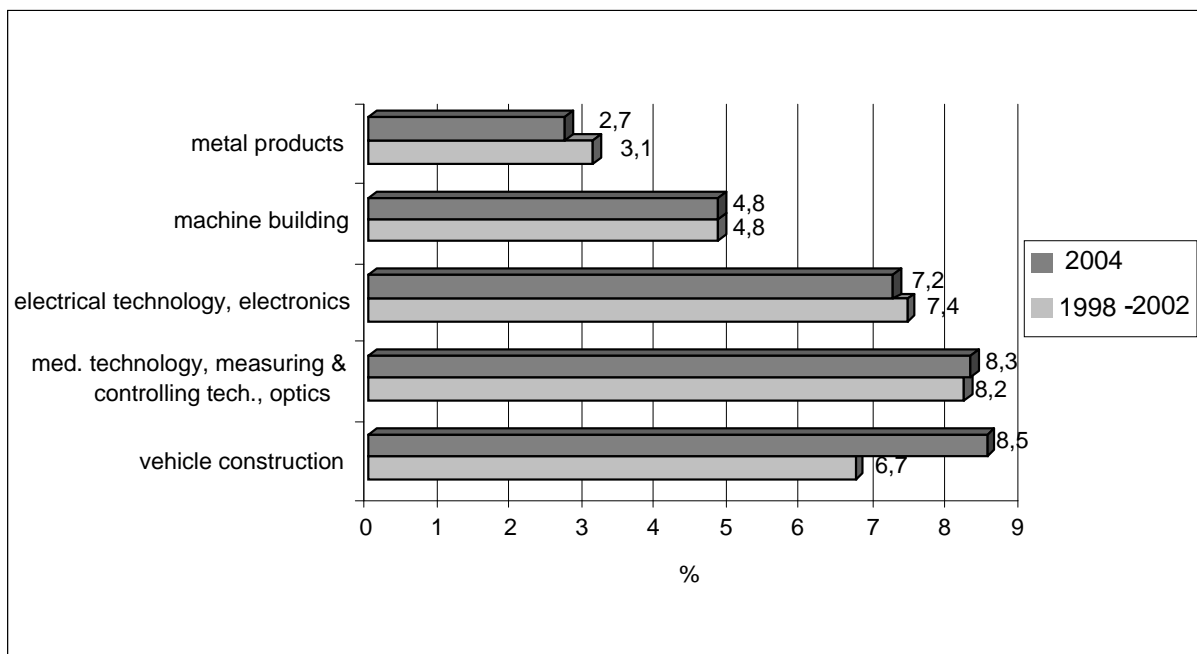


Figure 16: Expenditure for innovation in the metal and electrical industry in per cent of the turnover in 2005 (Source: ZEW, Mannheimer Innovationspanel, 2005)

In *Austria* the future development is estimated to slightly decrease after an increase in production up to 2006. “After the increase of almost 3.5 % in the year 2006 we expect that the GDP growth will decrease along with a deceleration in the field of net exports and investments. Inflation is estimated to be around 2 % at the end of the planning period as returns are nearing their peaks. Although it is planned to reduce the financial deficit for the current and the next year, the periodically adjusted balance will just slightly deteriorate. The government should consider the brisk economic situation and should introduce structural measures in order to reach their ambitious goals. The introduction of a medium-term consumer expenditure would support these endeavours” (OECD Economic Outlook No. 81 – Austria).

The *Slovenian* electronical and electrical industry looks back at a long industrial tradition in the field of the design, the development and the manufacturing of electrical parts, electrical machines and equipment as well as electronical parts, equipment and systems. The considerable occupational specialist knowledge in the fields of modern technology and product development as well as the highest international standards and specifications allow a successful performance on the European and global markets. According to data compiled by the Chamber of Industry and Commerce of Slovenia and the Society of the Metal Industry, the commercial enterprises of the metal industry employ 21.4 of all employees in the manufacturing sector. They accounted for 22.4 % of the profits and 25.7 % of the exported goods within the total manufacturing industry.

The value added per person engaged in the field of the metal industry is rising annually and amounted to € 21,218 in the year 2002. The highest value added per person employed was achieved in the field of manufacture of motor vehicles and trailers (€ 29,534).

In the *United Kingdom*, the Department for Business, Enterprise and Regulatory Reform (BERR) and its respective departments of the states of Scotland, Wales, and Northern Ireland are obliged to help the British industry with its growth in productivity and to develop a world-wide competitiveness. The department supports an optimal process for design, manufacturing, investment options and for the basic interests of master craftsmen of each industrial sector by policies and legal stipulations. The manufacturing forum safeguards an efficient operation and development of the “production strategy” ([www.dti.gov.uk](http://www.dti.gov.uk)) for the manufacturing sector, published in 2002. The forum brings together the government, industry, trade unions, regulatory authorities and other stakeholders in order to promote manufacturing. The main priorities of the forum currently focus on four areas: specialist knowledge, acquisition, investment and image of the manufacturing sector.

It has been shown that an overall good balance can be drawn in terms of the economic development. The surveyed sector marks a clear growth and a similar development has been forecasted for the future. More details on these forecasts will be given in Chapter 4.2.

### 3.5 The role of the Social Partners and the associations

Due to the size of the sector, a great number of associations and trade unions are active in Europe. Table 7 at the end of this chapter gives a detailed overview of all relevant economic associations and trade unions active in the partner countries with a considerable influence on enterprises and the sector as such. A total of 44 important associations and trade unions could be identified within the six participating partner countries. It is, however, expected that this listing is not yet complete.

The significance of the individual associations and trade unions in the countries is quite different. Apart from the well-known big associations there are also smaller ones mostly dealing with specific sub-branches of the manufacturing sector.

The most important employers' associations of the *Dutch* metal and electrical industry are "Metaalunie" (for SME in metal working) and "FME-CWM" (for large enterprises in the metal and electrical industry). The most important unions for the manufacturing sector are:

- FNV Bondgenoten (the biggest trade union in the Netherlands with more than 460,000 members in the fields of industry, metal, transportation, service, trade, agriculture and horticulture),
- De Unie (with more than 97,000 members working in the fields of industry, service and health services),
- CNV BedrijvenBond (represents more than 85,000 employees in manufacturing, transportation and the food industry),
- VHP Metalektro (association of the managing directors of the metal and electrical sector).

These organisations are represented in committees, boards of directors or administrative boards. Most of the regional training centres have e.g. representatives of the social partners in their boards of directors. The social partners are engaged in a great number of projects on national, regional and international levels.

On company and sector level, the social partners are involved in the collective bargaining. Training and personnel development measures form increasingly part of these agreements. Financial measures in the collective labour agreements are realized

in the form of a levy based on a rough calculation of the wages and salaries of the workers in the enterprises. The percentage is usually between 0.10 and 0.64 %. The financial funds are managed by special associations, the training and development funds. The personnel of the companies organised in these unions can apply for investments in training courses and for other actions geared at the development of their personnel. Apart from the financial support of training courses, the training and development funds play a more differentiated role.

The metal and electrical industry has two funds: OOM (training and development fund for (smaller) metalworking enterprises and Stichting A+O (Foundation for the labour market and training in the M+E industry).

In *Germany* and *Austria* there is a similar scenario. The Social Partners are also involved in the shaping of training occupations. The majority of the enterprises of the metal and electrical industry are members of one of the regional employers' associations.

Gesamtmetall is the umbrella organisation of all regional employers' association of the metal industry in *Germany* and safeguards the interests of the employers of the metal and electrical industry. The existing collective bargaining associations have partly developed from mergers of autonomous M+E associations resulting in today's 21 pay scale areas in the Federal Republic of Germany. A number of important contents, e.g. wages and salaries, are differently shaped within these pay scale areas.

The union of the M+E industry is IG-Metall. Around 2.4 million employees of the metal industry, the metal fabricating trade, the textile and clothing industry, the wood and plastics industry as well as the information and communications industry have joined the IG-Metall in order to better bring in and enforce their interests in their companies and in the society. The IG-Metall is a democratic organisation with a voluntary membership. The basic unit of the organisation is the Administrative Office. There are more than 170 Administrative Offices. More than half of them take care of more than 10,000 members each. The IG-Metall considers collective bargaining their most important task and pursues the following aims:

- To safeguard and raise incomes,
- To reduce working times and to shape them according to the interest of the employees,
- To create and save jobs,
- To support qualification (IG-Metall 2007).

In addition, there is a number of commercial associations active in the metal and electrical industry:

- Verband Deutscher Maschinen- und Anlagenbau (VDMA), (German Engineering Federation)
- Zentralverband Elektrotechnik- und Elektronikindustrie (ZVEI), (Central Association of the Electrical and Electronics Industry)
- Verband der Automobilindustrie (VDA), (German Association of the Automotive Industry)
- Deutscher Gießereiverband (DGV), (Association of the German Foundry Industry)
- Bundesverband der Deutschen Luft- und Raumfahrtindustrie (BDLI), (German Aerospace Industries Association)
- Wirtschaftsvereinigung Stahl, (German Steel Federation)
- Wirtschaftsvereinigung Metalle, (German Metal Federation)
- Verband für Schiffbau und Meerestechnik e.V. (VSM), (German Shipbuilding and Ocean Industries Association)
- Wirtschaftsverband Stahl- und Metallverarbeitung (WSM), (German Steel and Metal Manufacturing Federation).

In *Austria*, the Federal Economic Chamber represents the interests of entrepreneurs. Around 370,000 commercial enterprises are organised in the Federal Economic Chamber. Apart from the Chamber, the Industrievereinigung – IV (industrial cooperative) is a voluntary representative of the interests of the Austrian industry with currently 3,500 members. The part of the persons employed in the sector is represented by the Gewerkschaft Metall-Textil-Nahrung (GMTN) (Trade Union Metal-Textiles-Food).

The three biggest and allegedly most influential commercial associations of *Italy* are

- UCIMU (Associazione Costruttori Italiani Macchine Utensili, Robot e Automazione),
- C.I.S.L.-F.I.M. and
- C.G.I.L.-F.I.O.M.

UCIMU is the most important association in Italy and is divided into manufacturers of machine tools, robotics and automation technology. Their members account for the manufacturing of around 70 % of all industrial products. As an official representative of

the industry, the association also acts as a world-wide representative for new technologies.

C.I.S.L.-F.I.M. with more than 4 million members is the second largest trade union in Italy. It represents 14 sectors, including the manufacture of metals. C.I.S.L is a foundation member of the ETUC (European Trade Union Confederation), the ICFTU (International Confederation of Free Trade Unions) and of the TUAC (Trade Union Advisory Committee). The C.I.S.L. and F.I.M. groups, above all C.I.S.L., unite around 190,000 employees of the metal and steel industry.

C.G.I.L.-F.I.O.M (General Italian Working Alliance) is the oldest of the Italian trade unions and with more than 5.5 million members also one of the largest. At present there are 15 national trade alliances and 134 Chambers of Work.

One of the *Slovenian* associations is the Chamber of Industry and Commerce of Slovenia. It represents the commercial enterprises, offers support and advice and aims at strengthening the competitiveness of its members.

The Association of Electronics and Electrical Technology is another important association. As a rule its members are active in the field of electronics and electrical technology. The membership also includes other economic areas with close links to the electro-technical industry and manufacturing. Organisations actively engaging in research and development as well as in vocational education and training are also linked to the association.

In addition there are two metal associations which both are employers' associations at the same time. They predominantly represent companies of the economic fields of manufacturing of metal products, machine building and equipment, automotive industry and transport equipment.

In the *United Kingdom* the role of the Social Partners is very important for the success of strategies for the reduction of a shortage of skilled workers. Through BERR (Department for Business, Enterprise and Regulatory Reform), the government has developed good working relationships with representatives of interests, Social Partners and commercial businesses in the sector. This includes the Trades Union Congress (TUC)<sup>8</sup>, the Organisation Confederation of British Industry (CBI)<sup>9</sup>, the KPMG<sup>10</sup>, the Engineering

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<sup>8</sup> TUC (Trades Union Congress) is Great Britain's organ for working issues and has 66 affiliated associations uniting around 7 million employers.

<sup>9</sup> Die Organisation Confederation of British Industry owes its strength to the size and diversity of its membership. It represents 200,000 companies throughout the United Kingdom. The membership encompasses all business fields.

Employers' Federation (EEF)<sup>11</sup> and the EAMA<sup>12</sup> (Engineering and Machinery Alliance). Thus it is ensured that the need of the industry for well-informed strategy groups is satisfied.

In the *United Kingdom* the individual business areas are represented by a network of employees' representatives, composed of 25 Sector Skills Councils (SSC) and the Sector Skills Development Agency (SSDA). This network of experienced employees of the trade has insight into all areas of the British economy.

In the course of many years, a multitude of regulations and ordinances have been implemented, such as e.g. the legal obligations for employees, but also for employers. In 1998, the government introduced a "working time directive" which was amended in 2003. The basic rights and their protection stipulated by these regulations have an impact on almost every employee and every enterprise in the entire United Kingdom. They encompass:

- An upper limit of the average weekly working time of 48 hours. More working hours can be done if required;
- An upper limit of the average working time of eight within 24 hours. Workers for night shifts are, however, necessary;
- The right to free health check-ups for night shift workers;
- The right to a day off per week;
- The right to a break within the working time if the working day has more than six hours;
- The right to four weeks of paid holiday per year.

Another important corner stone of the government strategy aimed at all workers and both genders was the introduction of a „national minimum salary“ according to age and/or occupational group. This law encompasses almost all workers beyond the age of compulsory schooling if they have a paid employment.

All industries and enterprises are additionally bound by legal stipulations on health and safety determined in the Labour Act (of 1974) and its corresponding amendments. This

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<sup>10</sup> KPMG is a generally highly esteemed company. It was created by four founder members with a background of financing. KPMG offers special strategies to the industry and supports its customers.

<sup>11</sup> EEF (Engineering Employers' Federation) is a corporate body acting on all government levels and representing a membership of around 6,000 companies active in the field of manufacturing, engineering, technology in the United Kingdom.

<sup>12</sup> EAMA (Engineering and Machinery Alliance) is the central association of like-minded persons and represents small and medium-sized manufacturers active in several sub-sectors of machine building.

safeguards the basic rights and responsibilities of employees and employers. A breach of these stipulations can result in high fines and even the imprisonment of company managers and employees.

During the last two decades many British enterprises have implemented new quality management philosophies (TQM). The “Lean Manufacturing” method applied in the metal sector is of special interest as it resulted in saving several hundreds of thousands Pounds by work improvement measures.



Country	Name of the Trade Union and Association	Association for employers or employees	Description
Austria	<b>Wirtschaftskammer Österreich</b> Austrian Federal Economic Chamber	Employers' organisation	The Austrian Federal Economic Chamber forms part of the organisation of the Austrian Economic Chambers. All commercially active manufacturers are legally obligated to become members (around 360,000 members in 2006). The Federal Economic Chamber encompasses all members of the federal state chambers. The biggest of these chambers is the Economic Chamber of Vienna. It exercises important leadership and coordination functions within the Economic Chambers. The participation in the shaping of the most important economic factors within the national legislation takes centre stage of the chamber's activities, as well as the support of the foreign trade. This is attained by the protection of interests, consultation and service offers and educational measures for the enterprises as well as, with regard to the foreign trade area, by the worldwide presence in Austrian foreign trade offices.
	<b>VÖI (IV)</b> Vereinigung der Österreichischen Industrie (Industrievereinigung) Federation of the Austrian Industry	Employers' organisation	In Austria, the Federation of Austrian Industry is officially known as the „Vereinigung der Österreichischen Industrie“. However, most people know the organisation by its shorter form i.e. „Industriellenvereinigung – IV“. The Federation of Austrian Industry has excellent relations with politicians and opinion leaders and maintains a diversified network of contacts. The Federation of Austrian Industry is a lobby group whose main target is to permanently represent the interests of its members in Europe as well as in Austria.
	<b>GMT</b> Gewerkschaft Metall – Textil Trade Union of the Metal and Textile Sector	Trade union	The primary purpose of GMT is to protect the incomes, the terms of employment and the rights of the employees in the metal and textile sectors and the bargaining of collective agreements within the scope of the social partnership and its further development.
	<b>Kammer für Arbeiter und Angestellte</b> Chamber of Labour for Workers and Employees	Employees' organisation	The Chamber of Labour represents the interests of 3 million employees and consumers in Austria. The Chamber mainly pursues the following aims: Fundamental research for the benefit of workers and consumers, participation in and control of legislation, services and international representation.

Country	Name of the Trade Union and Association	Association for employers or employees	Description
Europe	<b>CECIMO</b> (European Committee for the Cooperation of the European Machine Tool Industry)	European Committee	CECIMO, the European Committee for the Cooperation of the Machine Tool Industries, represents the common interests of the European machine tool industry, particularly in relation to authorities and other associations. It promotes the European machine tool industry and its development in the fields of economy, technology and science. The members of CECIMO are national associations of machine tool manufacturers in the European countries. Each country may only be represented by a single association. Membership is open only to associations from European countries which are governed as a market economy and which guarantee a free circulation of goods, capital and payments, possess a freely convertible currency, abide by the rules of GATT and/or the rules of the W.T.O. and grant unrestricted travelling rights to everyone at any time.
	<b>ORGALIME</b> (European Engineering Industries Association)	Employers' association	ORGALIME is the European Engineering Industries Association representing the interests of the Mechanical, Electrical, Electronic, Metalworking & Metal Articles Industries. It speaks for 35 trade federations representing some 130,000 companies in the mechanical, electrical, electronic & metal manufacture and metalworking industries in 23 European countries.
Germany	<b>IG-Metall</b> (Trade Union of the metal working sector)	Trade union	Around 2.8 millions of employees of the metal manufacture sector, the metal working trade, the textile and garment industry as well as the wood and plastics industry have joined the IG-Metall in order to promote their interests in their companies and in the society.
	<b>VDMA</b> Verein deutscher Maschinen- und Anlagenbau (German Engineering Federation)	Employers' association	Since more than a hundred years, employers of the investment goods industry have cooperated within the VDMA. They create the prerequisites for a successful promotion of their interests and for common platforms. Among the members count companies active in machine and plant engineering, tools and components. This includes the entire range of plant automation, software, product related services etc.
	<b>Gesamtmetall</b> „Gesamtverband der metallindustriellen Arbeitgeberverbände e.V.“ (Employers' Association for the Metal and Electrical Industry)	Employers' association	Gesamtmetall is the umbrella association of the regional employers' associations in the German metal sector and represents more than 7,000 enterprises with more than 3 millions of employees.

Country	Name of the Trade Union and Association	Association for employers or employees	Description
Germany	<b>VDW</b> Verein Deutscher Werkzeugmaschinenfabriken (German Machine Tool Builders Association)	Employers' association	Jointly with the special association for machine tools and production systems within the VDMA, the VDW safeguards the interests of the sector vis-à-vis the legislation, government, authorities, employees' associations and the public.
	<b>BDI</b> Bundesverband der Deutschen Industrie e.V. (Federation of German Industries)	Employers' association	The BDI represents the economic and political interests of the industry vis-à-vis the parliament and the government, political parties, important social groups as well as the European Union. The membership comprises 35 industrial sector associations.
	<b>ZVEI</b> Zentralverband Elektrotechnik- und Elektronikindustrie (Central Association of the Electrical and Electronics Industry)	Employers' association	The ZVEI is the pressure group of the electrical industry in Germany with headquarters in Frankfurt/Main. The ZVEI is an incorporated society and member of the federal Federation of the German Industry. It represents political and technological interests on national and international levels and supports international standardization and standardization plans. As an umbrella organisation of 24 professional federations, the ZVEI represents more than 1,400 member companies and is the second largest confederation of industries in Germany (after the German Engineering Federation – VDMA).
	<b>WSM</b> Wirtschaftsverband Stahl- und Metallverarbeitung (German Steel and Metal Manufacturing Federation)	Employers' association	The WSM represents – other than employers' associations – the economic interests of the sector and is one of the biggest trade associations in Germany. WSM is one of 34 member federations of the Federation of German Industries (BDI) and member to ORGALIME, the European Engineering Industries Association.
	<b>WVM</b> Wirtschaftsvereinigung Metalle (German Metal Federation)	Employers' association	The WVM represents the economic concerns of the non-iron-metal industry with 632 enterprises and just 110,000 employees.
	<b>WV Stahl</b> Wirtschaftsvereinigung Stahl (German Steel Federation)	Employers' association	The WV Stahl is the economic federation of the German steel industry with headquarters in Düsseldorf and works under the roof of the steel centre. Founded in 1874, it looks back at more than 130 years of tradition. The WV Stahl represents the sector-political interests of almost all steel manufacturing enterprises in Germany and of related foreign member's enterprises vis-à-vis politics, the remaining economy and the general public.

Country	Name of the Trade Union and Association	Association for employers or employees	Description
Germany	<b>BDLI</b> Bundesverband der Deutschen Luft- und Raumfahrtindustrie (German Aerospace Industries Association)	Employers' association	The BDLI with its 161 members represents the interests of a key branch of the German economy. The most important tasks of the BDLI are the communication with political institutions, authorities, federations and foreign representations in Germany just as to their own member enterprises. The BDLI is officially accredited to the German Bundestag and is working on a range of legally anchored tasks.
	<b>VDA</b> Verband der Automobilindustrie (German Association of the Automotive Industry)	Employers' association	The VDA with headquarters in Frankfurt/Main is the biggest pressure group of the German car manufacturers and their suppliers. The members of this federation are German enterprises acting in the industrial manufacturing of automobiles and their engines, trailers, superstructures and containers as well as automobile parts and automobile accessories.
Italy	<b>UCIMU</b> Associazione Costruttori Italiani Macchine Utensili, Robot e Automazione	Employers' association	The most important association in Italy which groups the manufacturers of machine tools, robots and automation. The members of the Association produce around 70% of the industrial output. As the official representative of the industry, the association additionally acts as a worldwide ambassador for the latest technology developed in Italy.
	<b>ANIMA</b> Federazione delle Associazioni Nazionali dell'Industria Meccanica Varia ed Affine.	Employers' association	This industrial organisation represents all major companies of the mechanical and engineering industry within the Italian Confederation of the Industry – Confindustria. The sector employs 192,400 persons and accounts for a turnover of 33.6 billion EUR and 47 % of export turnover. Established in 1914, the Federation comprises more than 60 different production branches and over 1,000 member companies counting among the best qualified within their own specialised production. ANIMA fosters the interest of the mechanical and engineering industry, representing and promoting in Italy and abroad the companies and their production and supporting the member companies with all their technical and economic problems. The Federation represents the main reference organisation on national and international levels for all Italian companies of the mechanical and engineering industry.
	<b>U.I.L. – UILM</b> (Italian Workers' Union)	Trade Union	„U.I.L. – l'Unione Italiana del Lavoro“ (Italian Workers' Union) is the third largest Labor Union Organization in Italy with around 400,000 members. The federation grouping all workers in the machine tool industry is the UILM.

Country	Name of the Trade Union and Association	Association for employers or employees	Description
Italy	<b>C.G.I.L. – F.I.O.M.</b> (Italian General Confederation of Labour)	Trade Union	The CGIL is the oldest Italian trade union organisation with over 5.5 million members including workers, young people entering the world of work and retired people. The CGIL organisation has a double structure: a vertical one with sector specific organisations (textile, chemical, industrial, etc.) and a territorial one with Labour Chambers located throughout the country. There are currently 15 national Trade Federations and 134 Labour Chambers. The FIOM, the federation of mechanical and steel workers, is also worth mentioning.
	<b>C.I.S.L. – F.I.M.</b> (Confederation of Trade Unions in Italy)	Trade Union	CISL, the second largest (4,083,996 million members in 2000) Confederation of Trade Unions in Italy (14 national sector organisations: e.g. metalworkers, chemical branch, textile workers, public employees, service, agricultural workers, etc.) unites employees, white- and blue-collar employees in their branch or sector organisations. CISL is a founding member of the ETUC (European Trade Unions' Confederation), of the ICFTU (International Confederation of Free Trade Unions) and of the TUAC (Trade Union Advisory Group to the OECD). CISL FIM groups in particular mechanical and steel workers organised in (currently about 190,000).
	<b>ASSIOT</b> Associazione italiana costruttori organi di trasmissione e ingranaggi	Employers' association	ASSIOT is the Italian Association of Gears and Transmission Elements Manufacturers. Founded in December 1971 on the initiative of some companies of the field, ASSIOT numbers 84 companies with approximately 7,300 employees. The Association pursues the objective of co-ordinating, protecting and promoting the technical sector both in Italy and abroad and particularly pursues the following aims: Representing all companies or groups of companies in order to handle issues of common interest; representing member companies in institutes, boards, national and international organizations; studying and solving technical, economic, legal and fiscal problems in the interest of the member companies; safeguarding of knowledge and dissemination of techniques and products originating from member companies; staging of exhibitions and congresses both in Italy and abroad; development of technical and professional training by publishing handbooks and organising and managing courses, as well as promoting all sorts of co-operation between member companies and universities, technical and professional schools; compilation and processing of statistical data and economic information on this field; taking over any other tasks that may be assigned to the association in the interest of the industry or upon request of the companies.

Country	Name of the Trade Union and Association	Association for employers or employees	Description
Netherlands	<b>Metaalunie</b>	Employers' organisation	Employer's organisation for small and medium sized companies in the metal working industry.
	<b>FME-CWM -</b>	Employers' organisation	Employer's organisation for large companies in the metal and electrical manufacturing sector
	<b>FNV Bondgenoten</b>	Trade Union	The largest trade union in the Netherlands, with more than 460,000 members in the industrial, metal, transport, services, trade, agricultural and horticultural sectors
	<b>De Unie</b>	Trade Union	Trade Union with over 97,000 members employed in the industrial, service and health care sectors
	<b>CNV BedrijvenBond</b>	Trade Union	Trade Union which represents about 85,000 employees in the manufacturing, transport and food sectors
	<b>VHP Metalektro -</b>	Trade Union	The Association of managerial staff of the metal and electrical industry
Slovenia	<b>Chamber of Commerce and Industry of Slovenia</b>	Employers' organisation	The Chamber of Commerce and Industry of Slovenia represents the business community, provides support and advice to companies as well as a full range of professional services aimed at strengthening the competitiveness of its members. This blend of features and functions assists the economic growth of Slovenia. The main tasks of the Chamber of Commerce and Industry of Slovenia are to represent member companies and ensure their vital interests, to provide expert information and professional support, to serve the community by performing other tasks entrusted to it by government.
	<b>Electronic and Electrical Engineering Association</b>	Employers' organisation	In compliance with the Companies Act, economic entities predominantly engaged in the industrial production of electrical, electronic and optical products may become members of the Electronics and Electrical Engineering Association. Those economic subjects whose electrical and electronics products only represent their secondary activity can also become members of the Association. Nevertheless they remain linked to the electronics and electrical engineering industry by their products. The Association also harbours organizations active in the fields of research & development and vocational training.

Country	Name of the Trade Union and Association	Association for employers or employees	Description
Slovenia	<b>Metal Processing Association</b>	Employers' association	The members of the Metal Processing Association are companies primarily engaged in one or more of the following production activities: manufacture of metal products, except machinery and equipment, manufacture of machinery and equipment, manufacture of motor vehicles, trailers and semi-trailers, manufacture of other transport equipment. Also companies performing the aforementioned activities as their secondary activity can join the Association if they wish to do so.
	<b>Metals Association</b>	Employers' association	Members of the Metals Association are economic subjects whose primary activity is in the metal production industry. The Association members may as well be business subjects whose metal working activities only represent a secondary activity. Finally, and with a view to mutual interests, development, research and educational institutions also offer their cooperation to the Metals Association.
United Kingdom	<b>COM-MET 2005</b>	Employers' Organisation	COM-MET 2005 is a new initiative launched in November 2000 in order to increase the competitiveness of the UK industry and support it towards greater success in global markets. It is a partnership between the DTI and the production machinery and tooling sectors. The project was formulated as a result of several meetings between 14 trade associations representing companies in these sectors, which recognised that other countries, particularly Germany, the USA and France, had gained lead in the marketplace. The five year programme comprises seven strands which are seen as the key areas where proactive development is needed: e-Business, International Trade; Research & Development; Skills & Training; Marketing Statistics; Rapid Product Development.
	<b>MMMA</b> Metalforming Machinery Makers Association	Employers' Organisation	The main objective of the Metalforming Machinery Makers' Association is to act as the central organisation promoting the interests of companies involved in the manufacture and sale of metalforming machinery and ancillary products in the UK. It is a member of METCOM and organises industry seminars, sometimes with colleges.

Country	Name of the Trade Union and Association	Association for employers or employees	Description
United Kingdom	<p><b>METCOM</b> Mechanical &amp; Metal Trades Confederation</p>	Employers' Organisation	<p>METCOM is a major UK employer organisation seeking to promote the image and importance of the engineering industry, influence the industrial environment, and assist in the improvement of the industry's performance and efficiency. It is a Limited Company, wholly owned by its member associations. It was created in 1988 to provide strength, support and influence through the provision of a range of Central Support Services complementary to members' own needs and requirements, and collective Representational Services both within the UK and EU in particular, on behalf of its current 38 Member Associations. It seeks to raise the importance of the industry, influence the industrial environment and assist in the improvement of the industry's performance and efficiency for the benefit of all its members. The services provided fall into six main areas: Central Services; Administration and Finance; Labour and Personnel; Trade Affairs; Training and Business Support; Health and Safety, and Environment. It offers Training and Business Support Services provided through two of its Member Associations: Met tech and METCOM training.</p>
	<p><b>EAMA</b> The Engineering and Machinery Alliance</p>	Employers' Association	<p>The Engineering and Machinery Alliance (EAMA) is an "umbrella" organisation of like-minded associations that represent SME manufacturers. They act in concert on certain common lobbying issues and other representational activities.</p> <p>They represent smaller and medium-sized manufacturers in several sub-sectors of mechanical engineering.</p> <p>The organisation's aim is to improve the lot of UK manufacturers by raising awareness and understanding of their achievements and potential within Westminster, Whitehall, the Regions and the media, ultimately to get a better policy deal from the government and more enthusiastic recruits to work in manufacturing.</p> <p>Its rationale is that government and opinion formers take more notice of organisations with critical mass than of smaller, individual trade associations.</p>



Country	Name of the Trade Union and Association	Association for employers or employees	Description
United Kingdom	<b>CBI</b> Confederation of British Industry	Employers' Association	<p>The organisation owes its strength to the size and diversity of the membership and represents 200,000 businesses based in the UK. The membership includes all sectors of business – retail, financial services, construction, utilities, professional firms, manufacturers, agriculture, IT and e-business, creative and communications, management, consultancy, transport operators and tourism.</p> <p>The CBI speak for all sizes of business from multi-national organisations to start-up firms. Approximately 80 % of the FTSE 100 companies are CBI members and nearly half of the FTSE 350.</p> <p>Most of the larger members and many of the medium-sized and smaller ones operate internationally. The membership of the CBI is corporate: organisations and companies are members, not the individuals nominated to represent them.</p>
	<b>MTA</b> The Manufacturing Technologies Association	Employers' Association	<p>The Manufacturing Technologies Association (MTA) is the leading UK trade association representing the engineering and allied sectors that lead the world in manufacturing technologies. It represents UK companies and their associates who drive UK manufacturing technology innovation and quality.</p> <p>The association not only represents individual companies but the manufacturing industry both within the UK and globally.</p> <p>Based in London, this enables close contact with government through the DTI, CBI and UKTI.</p>
	<b>EEF</b>	Employers' Association	<p>EEF, the manufacturers' organization, has a membership of around 6,000 manufacturing, engineering and technology-based businesses and represents members' interests at all levels of government and within the wider policy community. Comprising 12 regional associations, the Engineering Construction Industries Association (ECIA) and UK Steel Division, EEF is one of the UK's leading providers of business services in health, safety and environment, employment relations and employment law, world class performance, education, training and skills.</p>
	<b>BMF</b> British Metals Federation	Employers' Association	<p>The British Metals Federation and British Secondary Metals Association have now merged to form the British Metals Recycling Federation. The BMF champions the cause of metals recycling industry, a role they see as vital to the well being of the economy and the environment. They provide training meeting specific needs of the industry in addition to offering guidance and information.</p>

Country	Name of the Trade Union and Association	Association for employers or employees	Description
United Kingdom	<b>MTTA</b> The Machine Tool Technologies Association	Employers' Association	The MTTA was established in 1919 and is the major organisation in the UK representing the interests of companies in the machine tool and ancillary equipment sector – whether they are manufacturers, importers or distributors. The Association's staff is engaged in activities and initiatives designed to provide practical help for individual member companies and to actively promote the UK machine tool sector, in particular, and the UK manufacturing industry in general.
	<b>BSMA</b> British Secondary Metals Association (Non-ferrous metal recycling)	Employers' Association	The BSMA has merged with the BMF to form the BMRF. The aims of the BSMA are to promote and protect the interests of British non-ferrous scrap metal industry. To communicate views and opinions of the Association to national, European and international governments and to seek to influence legislation that may impinge on the industry. To promote the image of the non-ferrous scrap industry in the UK and to impress upon the public the national importance of the industry. To promote educational courses covering all aspects of non-ferrous scrap metal reclamation and recycling.
	<b>AMICUS (UNITE)</b>	Trade Union	AMICUS is the UK's largest manufacturing, technical & skilled persons' union, with over two million members; UNITE is the UK's largest trade union covering every industrial, occupational and professional sector of the economy including Steel, Metals and Foundry, Aerospace and Electrical Engineering, Electronics and IT sectors.

Table 7: Trade Unions and Associations in the Metal Manufacturing Sector

## 4. Development of the sector

The development of the sector in the European countries will be shown with the aid of different criteria, e.g. the impact of the demographic change as well as trends and forecasts for the future of the world of work. They sustainably describe a process of age structures in Europe and give indications of consequences that are already visible but will only take effect in the future. On the other hand, forecasts on future market developments and stagnations with the resulting consequences for the world of work will be shown.

### 4.1 Demographic Change

The demographic development in Europe is very likely to further accelerate the shortage of skilled workers in Europe. As underpinned by Figure 17, the share of the elderly population will dramatically increase. By the year 2050, every second EU citizen will be older than 50 years (EU-Nachrichten No. 41, p. 5).

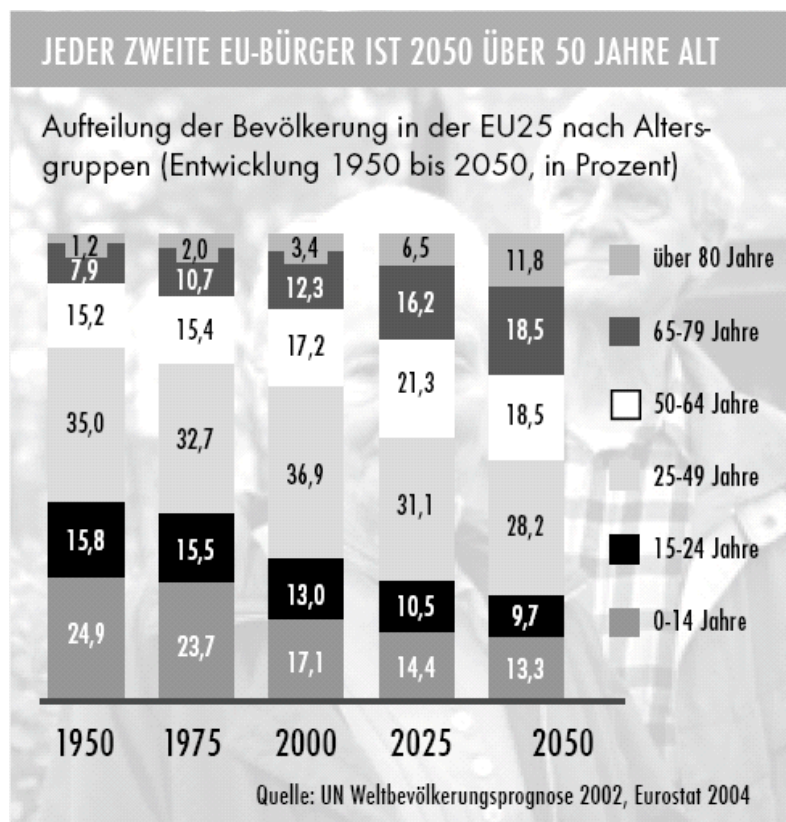


Figure 17: Population development on age groups 1950 - 2050 (Source: UN forecasting world population 2002, Eurostat 2004)<sup>13</sup>

<sup>13</sup> Each second European Union citizen is 2050 over 50 years old, Proportioning of the population in the EU25 on age groups (development 1950 to 2050, in per cent)

Almost all EU Member States are witnessing the same developments: Since the mid-1960ies, the birth rates have been decreasing. In 1970, the birth rate in the EU-25 countries was 2.35 compared to 1.52 in 2007. The *Netherlands* and the *United Kingdom* (approx. 1.70 children per woman) have a quite high birth rate within the European Union. In other countries, this development is more dramatic. For example: The population in *Slovenia* is continuously decreasing. Just almost half as many children are born today than 30 years ago. The birth rate has fallen from an average of 2.17 children in the 1970-ies to 1.2 children in the year 2005.

In comparison with other European states, *Italy* is most affected by the aging process of the population. Apart from declining birth rates, the average life expectancy for Italian men is 80 years, for women 84 years. The share of the inhabitants of 65 years of age and beyond has now reached the 20 % line compared to the total population in the north and in the centre of Italy. The percentage of young people up to the age of 14 amounts to 13 % while the ratio is almost balanced in the south of Italy: 16.1 % of young people vis-à-vis 17.1 % of the elderly. The demographic balance is strongly influenced by the fact that there is currently a high amount of emigrations along with a decreasing number of international immigration figures. The immigrations from abroad help to confine the negative demographic effects and support the population growth. The majority of the immigrants originate from Eastern Europe and from Africa.

*Austria*, however, expects a considerable decrease of the workforce only by the year 2025. With regard to the currently rising retirement age, additional immigration and a higher share of women in the workforce, this can also have a late impact on the labour market and the shortage of skilled workers. From a demographic point of view, an explicit decrease of the workforce – including a shortage of skilled workers – cannot be expected within the next 10 to 20 years. On the other hand, however, the change of the age structures will be an important issue for the workforce in the near future and is likely to exert influence on the potential and the availability of skilled workers.

According to forecasts and model calculations of the Deutsches Institut für Wirtschaftsförderung (DIW) (German Institute for Economic Research), the average age of the workforce in *Germany* will clearly increase. “Against this background the group of the older employees (so-called 50+) will be of more importance for the corporate personnel policy” (Kordey, Korte 2006, p. 11). In the year 2003, one third to one quarter of all gainfully employed at the age of 55 years and beyond were engaged as workers. These employment figures decrease along with the age of the employees. As for the self-employed, the age group of 60 to 64 years reveals almost the same employment figures (22.1 %) as the age group of workers (24.4 %). A differentiation into economic fields without the self-employed shows that the manufacturing industry (21.9 %) has

slightly higher numbers for the groups of the employees of 50 years of age than the total average figures (21.6 %).

When looking at the manufacturing sector and its different occupational groups it is evident that only very few occupational groups have a workforce of 50 years of age and older. Thus the age group of 50+ in the occupational groups of technicians, metalworkers, electricians and mechanics just account for between 18.2 and 27.9 %. “These are typical male occupations where workers are subjected to strong physical strain and often cannot work in their jobs up to the legal retirement age” (Kordey, Korte 2006, p. 22). With respect to company loyalty it was found that young employees rather envisage a change of their employer and the region they are working in than the older staff.

In general it may be stated that the age structure in companies all over Europe will considerably change. But what does it mean if the average age of the workforce in companies is rapidly increasing? Can enterprises still maintain the current level of innovative ability? Enterprises are advised to adapt to alternatives as soon as possible in order to tap into potentials that are still wasted today. This process is not only costly but takes time as well.

The challenges with regard to the changes of the age structure in the society are manifold. Due to the comparatively low number of young gainfully employed, a strong middle-aged workforce and the longer duration of employment of older staff, the companies are facing the following challenges:

- The handling of recruitment problems in younger employees,
- The consequences of an aging personnel,
- The consequences of the retirement or leave of older workers and a possible loss of their know-how,
- The challenges linked to a changed aged structure of the customers (product development, innovation etc.).

Further fields for action can be derived from these problem areas. As already mentioned, the recruitment of skilled personnel is increasingly getting more difficult as less young skilled workers enter the labour market. With the retirement of older employees there is a threat of a loss of know-how, performance and productivity. A concurrent lack of young staff can do a lot of harm to innovations. An adaptation of the corporate culture to these demographic developments is crucial. The same is true for the consideration of an aging customer structure. The natural fluctuation in the form of the retirement of the elderly and the filling of their positions with young employees is thus delayed.

More and more enterprises have already started to analyse the age structure of their staff. One of the prerequisites is to prepare for an older workforce. Above all the smaller and medium-sized companies still have considerable problems as they lack the required funds and as their personnel planning is rather a short-term issue.

#### 4.2 Trends and forecasts

The big trends of globalization combined with digitalisation from the structural change up to the service and knowledge society as well as the aging of the society also have an impact on the world of work in the European metal and electrical manufacturing sector. Nevertheless these developments partially differ in the European countries.

The metal and electrical industry in *Germany* currently has a very big economic impact. According to Gesamtmetall (2004, p. 2), the years to come will witness a structural change towards a service society. Based on this assumption the adaptation process will be reduced by the relocation of manufacturing. It is expected that the real value added will grow at a slower pace (1.5 %) than the total economy (1.8 %). With regard to the individual branches of the metal and electrical sector, a differentiated picture is revealed:

An higher-than-average growth is above all expected for the fields of „data processing equipment“ as well as for “manufacture of basic metal/ metalworking”. The sectors of automobile industry, some areas of machine building and the electrical industry are predicted a slightly slower growth (ibid, p. 2).

The high expenditure for innovations and a well-differentiated range of products of the German metal and electrical industry are heavily depending on the global market as their market place for the safeguarding of profitable lot sizes and high capacity utilization. Gesamtmetall (2004, p. 2) therefore expects that the metal and electrical industry can consolidate their position as export sector number one and that their exports will be growing considerably rapidly than the value added up to the year 2015.

A higher-than-average growth is crucial for the further standing of the sector in international competition. The productivity of the M+E industry has so far increased more rapidly on average compared to the total economy. According to a forecast published by Gesamtmetall (2004, p. 3) this trends is likely to continue unchanged up to the year 2015. An average plus of up to 3 % (compared to 1.5 % of the total economy) is likely to be reached.

According to Gesamtmetall (2004) the overwhelming majority of the company managements expects a great number of changes and growing requirements which can be assigned to two categories: Requirements relating to and influencing the individual employee and requirements related to technological innovations and thus with an impact

on company level (cf. Klinkel 2005, p. 3-8; Gesamtmetall 2004). The individual employee will therefore be more strongly confronted with the following facts:

- An increase/ change of the work tasks triggered by changes/ further development of the technologies,
- A tougher competition,
- An acceleration of the work processes,
- More responsibility,
- More flexible forms of work (e.g. team structures, project and process oriented work structures)
- A permanent adaptation of knowledge and skills due to the increasing variety of materials and relevant technologies,
- An increase of the field of application due to the range and diversity of the applications, e.g. in micro-system technology and nanotechnology,
- An increase/ change of the qualification requirements by the use of new and additional materials and basic materials,
- An increased precision in manufacturing.

On the technological and/or company level, the following processes of change have to be taken into account:

- Acceleration of the necessary reaction times of the companies,
- Continuing innovation processes,
- Tougher flexibility of the production,
- Increased product quality and service,
- Extension of the product offer by increasing individual customer requirements and wishes (impact on range of products),
- Development dynamics exert influence on the design of production systems:
  - More flexible adaptation and/or retrofitting of manufacturing plants for different products will be necessary as well as
  - Shorter working and retrofitting times along with life cycle costs of the manufacturing plants,
- Emergence of new needs for qualification by the creation of flatter leadership and production structures,

- Decrease of manufacturing depth and emergence of network structures across the companies,
- Economization of natural resources, energy and work expenditure by the use of new materials and/or manufacturing and production technologies,
- Increased customer requirements.

Due to a change towards more complex machine systems as well as production and manufacturing processes, a more complex cooperation within the company becomes necessary. In addition the tasks are changing, leading to an increased relevance of product accompanying service tasks (advisory tasks, project management, technical documentation, maintenance/ inspection, instruction/ training, customer services/ hotlines, software/ programming). These tasks will be increasingly assigned to skilled workers (Windelband/ Spöttl 2002, p. 154).

According to the opinion of experts, these factors will predominantly have an impact on the competition and on the export of products and related service tasks. Another important point is the explicability of the knowledge of skilled personnel in order to sustainably make use of, amend and document the know-how. Apart from the already described flexibilization, a modularisation as well as work within team structures are further vital trends in the sector. A comprehensive occupational capacity to act encompassing not only a wide range of specialist skills and abilities but also underlining the importance of social and above all also individual competences forms the basis for the great majority of the employees. The need for skilled workers with an initial and further training oriented to an occupational aspiration is therefore clearly on the rise.

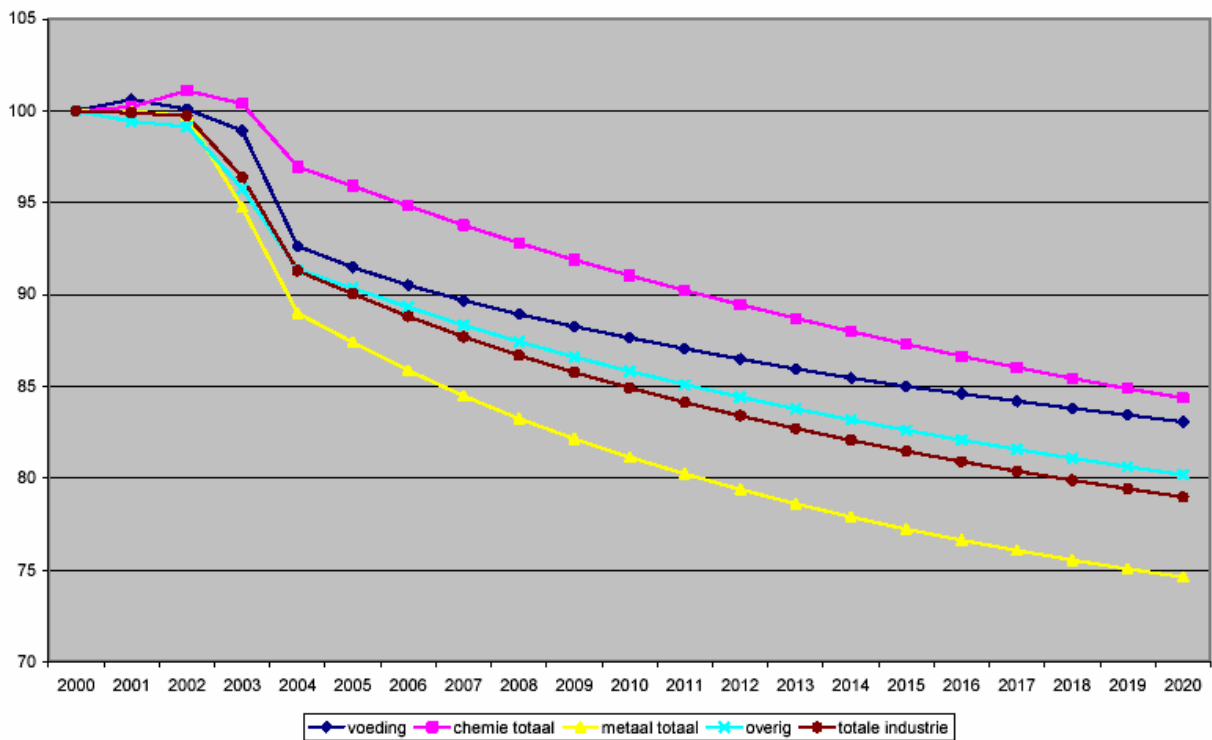
Representative studies in *the Netherlands* reflect the future developments and yield meaningful evidence in terms of the demand for labour. It is important to distinguish between labour demand based on expansion of employment and labour demand based on replacement of employees. Even in sectors with declining employment there can be sufficient opportunities to find a job, if sufficient replacement takes place. After World War II there was a baby boom in *the Netherlands*. People who were born at that time are now moving towards their retirement age.

### Replacement demand (SEOR)

The Institute SEOR (Foundation for Economic Reserach) in Rotterdam has published forecasts for the production sector of both employment and replacement demand. As expected the total industrial employment figures are declining along with the employment figures in the metal and electrical industry. The metal and electrical manufacturing sector will decline even stronger than some other manufacturing sectors like the chemical sector (cf. Figure 18). Another forecast is aimed at the field of



manufacture of basic metals and metalworking and manufacture of fabricated metal products as well as of machine building. The demand for a replacement of the workforce will slowly decline in these areas. Nevertheless SEOR still forecasts a demand of more than 25,000 jobs for the year 2020.



(Legend: 'voeding' = food; 'chemie' = chemicals; 'metaal' = metal; 'overig' = other; 'totale industrie' = total manufacturing)

Figure 18: Forecast of Industrial Employment in the Netherlands (Source: SEOR 2006)

### Recruitment difficulties (ROA)

Every other year the research institute ROA – Researchcentrum voor Onderwijs en Arbeidsmarkt (Research Institute for Education and the Labour Market) publishes forecasts with regard to job opportunities for school graduates. The 2005 edition gives an outlook up to the year 2010. Their model takes account of several factors like growth of employment, replacement demand, entry of new supply and substitution effects. ROA looks at business sectors, occupational categories and educational categories. An index is calculated to express future problems in the supply of personnel. Based on this model ROA concludes that there will be increasingly bigger problems to find applicants with a vocational training in machine building and electrical technology on a lower and medium level.

Level of education	Mechanical engineering	Electrical engineering
Lower	large	large
Medium	large	large
Higher vocational	hardly any	some
Academic	large	large

Table 8: Expected Recruitment Difficulties according to ROA in the Netherlands (Source: ROA 2005)

With regard to the higher educational levels, ROA expects fewer difficulties with the filling of jobs (hardly any in machine building, some in electrical technology) than on academic level where severe problems are expected for both machine building and electrical technology, as shown in Table 8.

In *Austria*, the GDP growth in the field of net exports and investments will slow down within the next two years after an acceleration of 3.5 % in the year 2006. At the same time inflation will be at around 2 % towards the end of the planning period whereas the revenue will approach its complete degree of efficiency. Although it is being considered that the financial deficit will decrease in the course of this and the next year, the cyclically regulated balance will slightly deteriorate. The government is required to take up this brisk economic situation by implementing structural measures in order to attain an ambitious financial target. The introduction of a medium-term expenditure framework would support these endeavours.

The development of the *Slovenian* metal industry is greatly depending on the development of the European industry. Therefore Slovenia adopted the European example and adhered to a sustainable development plan. In practice this means that both the government and the people had to accept a sustainable development policy for a basic orientation of the economic development. The most important features of such a policy are:

- The reduction of the negative impact of technology on the environment;
- A sustainable development was to become the efficient driving force behind the innovation of the manufacturing industry;
- The pro-active role of the manufacturing industry to control and support technological factors should be sustainable and environment friendly;
- A regular optimization of specialist knowledge and skills; transferable competences are becoming more important than specific technological specialist knowledge. The cooperation as well as networked cooperation between companies, industrial sectors and colleagues within enterprises swiftly developed

into key qualifications on organisational level in order to reach competitive advantages.

A SWOT analysis<sup>14</sup> conducted by the centre for international competitiveness at the Chamber of Industry and Commerce of *Slovenia* reveals positive results in terms of the corporate development abilities in the metal sector. Furthermore the analysis showed that in spite of comprehensively restructured and optimized processes in this business field the majority of the workforce could be recruited, above all for the company management. The basis of methods for this branch must be planned for a longer period of time. Otherwise there will be a shortage of skilled workforce and no development at all. At the same time the employees must be continuously further trained in order to change the staff structure and to be able to introduce multi-tasking areas in production.

The Government of the *United Kingdom* will continue to focus its attention on effectively tackling market failures in the provision of training. The EEF (Engineering Employers' Federation) in its report of 2006 feel that both SSC (Sector Skill Councils) and Regional Skill Partnerships (RSPs) have a role in determining business skill needs for economic sectors and regions respectively. RSPs have already published a regional statement of priorities in 2005 and the SSC through SEMTA (Science Engineering and Manufacturing Technology Alliance) have also published full sector agreements.

The survey is strongly based on employment forecasts related to the sector and the occupations. Too little is, however, revealed on what kind of initial and further training is actually needed. The EEF has identified five key problems as barriers for changes of the current market:

- Skill priorities outlined in regional strategies are driven more by targets than employer needs;
- Companies find it difficult to source information about funding for training to bridge the skill gaps;
- The fundamental problem for employers of accessing and funding is still not being addressed.
- The SSCs and RSPs have not been adequately involved in the assessment of the precise skill shortages.
- The smaller and medium-sized enterprises have not adequately been involved in the identification of skill shortages and consequently may not give an adequate picture.

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<sup>14</sup> SWOT-Analysis = Strength-Weaknesses-Analysis for strategic organisation planning with the aid of a matrix. SWOT = Strengths, Weaknesses, Opportunities, Threats

In order to overcome these barriers, companies should be given help and advice with the aim to integrate the development of qualifications into the entire company strategy along with a business plan. This may have advantages for the clientele of SME.

### **4.3 Change of work tasks**

In recent years, almost all European partner countries have introduced new productivity concepts such as Total Quality Management and just-in-time production. It is also planned to establish systems such as Lean Management and an anthropocentric approach to work (sistemi dei produzione antropocentrica).

Total Quality Management (TQM) according to DIN ISO 8402 is „a leadership method of an organisation based on the participation of all stakeholders focussing on quality and aiming at a sustainable long-term business success through satisfied customers as well as for the good of all members of the organisation and for society as such” (Scheib 2005, p. 89, quoted according DIN ISO 8402, 1995).

The consequent involvement of all employees in the quality management process is most important because the principle is valid for all hierarchy levels down to the shop-floor. This underlines that this management concept also comprises new requirements, also for the level of skilled work. The active cooperation of the personnel becomes a maxim and is above all in demand within the framework of a continuous improvement process. The core elements of a continuous improvement process have an impact on the relevant individual requirements for skilled workers: The required process orientation calls for communication and cooperation across all functions. The shifting of responsibility for the work process to the individual employees or working groups is another important feature (cf. Heuser, 2002). The placement of process responsibility needs employees who are ready to take over responsibility and to carry out the work processes in a self-reliant way. Thus the field of task of a skilled worker does no longer only comprise the pure execution of tasks but also their planning, control and assessment (cf. Scheib, 2005, p.92). This development also requires the development of overview knowledge and skills with respect to the entire process and the process operations (work process knowledge).

Lean Management should help the enterprises to build up obsolete hierarchies and to encourage a simplification of operating schedules. Emphasis is on a systematic avoidance of faults and a preventive quality control (Orientaonline, Area occupazionale METALMECCANICA, Studio di area, ISFOL 2005, p. 23). The “Lean Production” concept is closely linked to the customers as the production is need and customer-oriented.

Lean Management concepts are geared to the following aims (cf. Stadelmann, Lux 1995, p.74):

- Customer-oriented lean production with a continuous material flow and just-in-time deliveries (slimming down the distribution),
- Company-wide improvement of quality,
- Acceleration of the development and introduction of new products, above all by Simultaneous Engineering,
- Pro-active marketing: Win new customers and retain old customers,
- Ability to grow and to open new markets by a strategic employment of capital as well as
- Harmonic integration of the enterprise into the society.

„Lean Management requires a philosophy for the entire enterprise focussing on value added and customer orientation. Partly self-reliant groups with a high motivation form the backbone of this management philosophy with roots in Japan which relies on flat hierarchies. With Lean Management and/or Lean Production, economization results from a modern form of work” (Füser 2001, p. 74).

Similarly the British company structure also features parts of the TQM and the Lean Management. Enterprises in the *United Kingdom* are traditionally structured according to their size and the number of staff. The larger enterprises usually adhere to a traditional hierarchical structure with the Chief Executive Officer (CEO) on top of the pyramid of the different departments, assisted by a number of line managers and junior plant managers. Some other enterprises rather rely on a “flat” structure with just a few plant managers. Thus the employees are given more autonomy in terms of the relevant work processes and the management of their own work. This leads to a stronger approach to group or teamwork where the employees are responsible according to the work environment. This is recommended by leading experts with regard to quality management (TQM). Many of the smaller and medium-sized enterprises (SME) do not need such structures. There the CEO can also be the skilled worker who is responsible for the manufacture of the product, for the training of new skilled workers, for the sale of the products and for financial aspects of the enterprise.

The concept of the „anthropocentric production“ (produzione antropocentrica) conceives the enterprise as a learning organisation where the mobilisation of knowledge and performance is safeguarded. This will promote motivation, participation and cooperation of the entire workforce within the company and may result in an advantage in competition for the enterprise.

The fractal enterprise is a company philosophy adopting the holistic solution. Not only sub-areas are analysed but the entire enterprise with all its interrelationships and connections. The fractal enterprise is an open system consisting of self-reliantly acting units with similar aims – the fractals. Apart from the holistic approach, three characteristics are of special importance:

- Self-organisation,
- Self-similarity and
- Dynamics.

The analysed concepts in the six countries increasingly rely on the employees as their central potential. However, the implementation of the described management structures, are not always stringent. Within the different company philosophies of the companies operating in the sector, the team-, project- and process-oriented forms of work are becoming ever more essential. Likewise the interface management as well as the cost, time, and quality management are of increased importance. For the future (reference period of time up to 2015) some experts nevertheless expect a decline of the current holistic structures in favour of a return to structures based on a division of labour.

The substantial changes in the enterprises, such as the decentralization of vertical hierarchies and an increased self-reliance and taking over of responsibility by skilled workers is reflected by the qualitative enrichment of the work tasks. This is basically also relevant for the entire European labour market of the M+E industry.

The results from *Austria* give an excellent summary of the change of skilled work and the trends for the European sector resulting thereof:

- „From physical to mental work“: The increasing mechanisation of the production leads to more intellectual and theoretical requirements (e.g. CAD/CAM etc.).
- At the same time there is a need for all-round and expert knowledge;
- Higher expenditure and more variety with regard to the products and the used materials;
- Increased time pressure: The pace of production itself is growing and the needs and expectations of the customers are increasingly short-notice (e.g. in “need oriented manufacturing”).
- Numerous changes of the requirements and the tasks: Due to a higher complexity and variety: Due to the increased time pressure both requirements and tasks are swiftly and continuously changing.

- Call for more willingness for continuous learning: Due to the accelerated technical and organisational changes the demand for life-long learning is swiftly increasing.
- An overall high need for qualification: Skilled workers in production departments must often be draftsmen as well. They have to apply CAD programmes and transfer drawings based on 3D in products. Operations scheduling and process planning as well become increasingly more decentralized.
- Increase in self-reliance: self-reliance is increasing e.g. in operations scheduling and process planning.
- More intensive customer relations: customer data (e.g. 3D models) are increasingly directly assigned to the responsible skilled worker.

In *German* companies with emphasis on assembly work, the tasks and task levels are different compared to a traditional manufacturing company. In assembly plants the current new design of work leads to a stronger polarization in terms of personnel deployment:

- More semi-skilled workers with temporary contracts and
- More cadres as highly qualified and specialized skilled workers.

In *Germany*, the share of trained skilled workers in the new and less flat production structures in assembly plants is said to amount to up to 20 % today (estimates from surveys and expert interviews). This workforce is preferentially deployed for

- Coping with difficult tasks within assembly groups, e.g. check of the entire electrical system of a vehicle or of the entire vehicle, including documentation of the „vehicle life cycle“ during production. “Throughput” knowledge is highly relevant for these tasks.
- Taking care of fields of pre-assembly: technical skills, knowledge of products and systems or detailed assembly knowledge are of advantage.

As for the unskilled workers it is important that they have a certain technical understanding and safety conscientiousness and that they are able to handle simple tools. Everything else can be imparted during the training-on-the-job process.

Apart from specialist tasks, the workforce in production must increasingly cope with tasks of employees of formally higher hierarchy levels. A qualification level ensuring the coping with these tasks is an important prerequisite. Challenges such as

- The safeguarding of quality, including quality assurance measures and quality checks;
- The organisation of the production and operations scheduling;

- The safeguarding of production including taking care of maintenance tasks and minor repairs;
- The optimization of the production processes;
- The taking over of responsibility

are clearly going beyond the traditional perception of skilled work and underpin the extended range of tasks. A participation in optimization measures of the production, in detailed coordination processes and the company oriented taking over of responsibility add to further fields of tasks for the skilled workers well beyond the traditional range of responsibilities.

The core tasks of skilled work today were formerly self-contained service tasks. Also with regard to the technical tasks, the field of tasks has clearly been extended during the last decade. Tasks encompass e.g.:

- The application of PPS-software,
- The application of a number of manufacturing processes,
- The modernization of plants and
- Fault diagnosis.

These tasks count among the challenges faced by different groups of the workforce during a conventional method of production. The focus is on tasks directly supporting the production. These tasks start where the direct manufacturing of a product ends.

Reorganisation measures in the industry result in a considerable vertical and horizontal diffusion of competences. “Shop-floor” employees take over know-how from higher hierarchy levels (vertical diffusion) and from neighbouring occupations (horizontal diffusion, cf. Figure 19). The productive employees are not only expected to feature specialist qualifications – so far laid down at 90 % in the occupational profiles – but also need additional “soft skills”.

A delimitation of traditional task profiles of the skilled workers (cf. Meyer 2000) towards complementary competences, service dimensions as well as complex and abstract specialist contents can be clearly identified. Complementary competences often originate from other occupations and migrate towards the “shop-floor” level (horizontal diffusion). Service dimensions, however, result from other occupations and formerly higher hierarchy levels and from traditional production structures. Both migrate down to the skilled workers’ level (vertical diffusion). Meyer (2000, p. 188 ff.) states that this “know-how transfer” results in a new role for the skilled workers, in considerable demands for qualification and that it goes well beyond the pure specialist qualification.



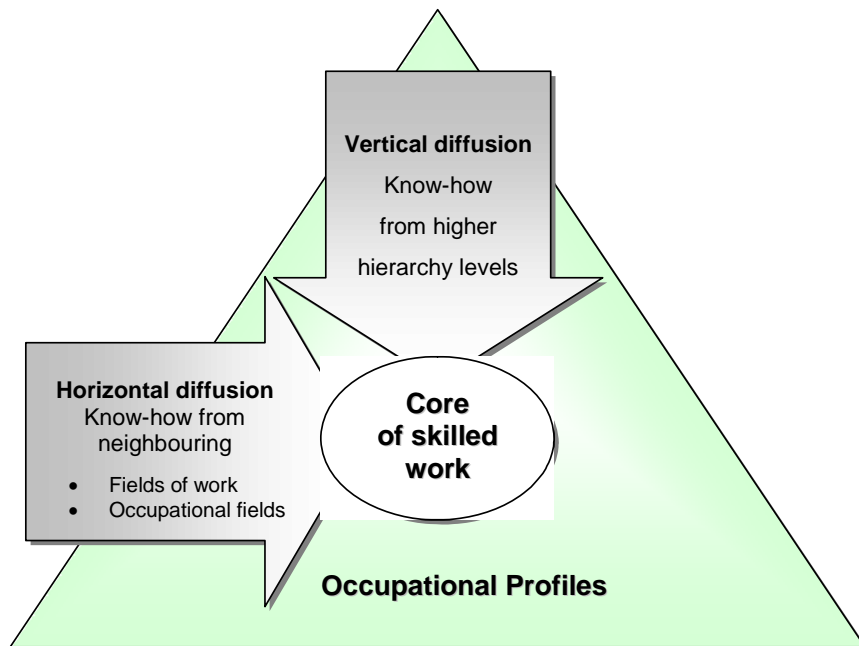


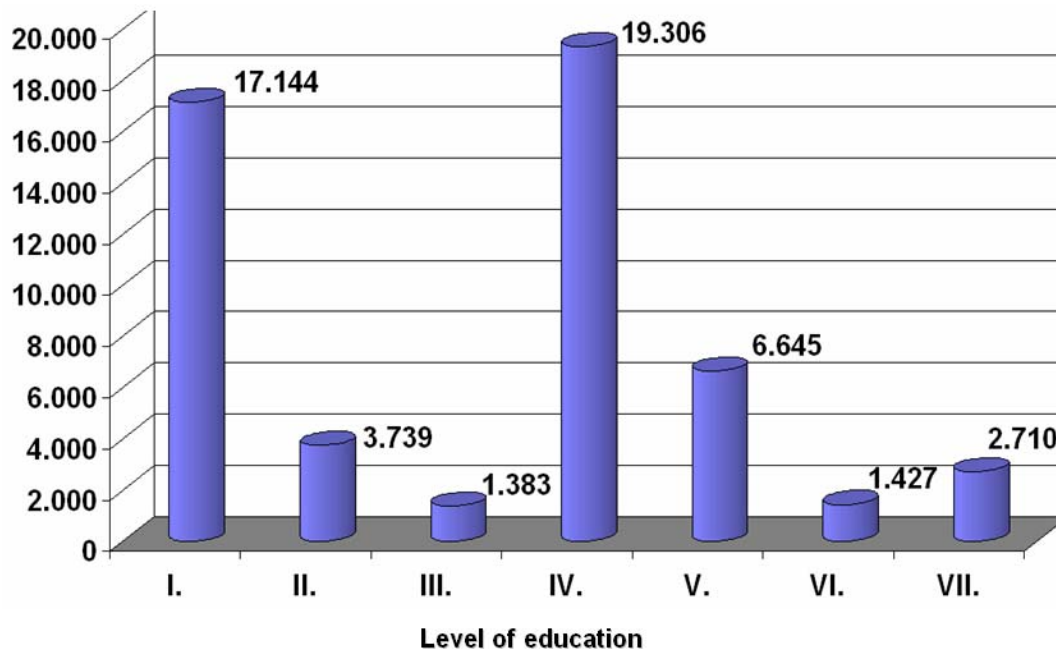
Figure 19: Horizontal and vertical diffusion of „know-how“ due to structural changes (Spöttl et al. 2003, p. 153)

The new industrial structures thus offer opportunities for the shaping of work. Skilled workers can only participate in this process if they are aware of the overall context. As underlined above, this can only be successful if a process category in the sense of a process competence is in the centre of interest. It comprises the in-firm manufacturing process of a product with all its dimensions: As a process or customer-oriented service tasks, as knowledge management, as work organisational, social, economic component which always requires the acquisition of work process knowledge.

A similar development can be shown for *Italy* where the sector has increasingly migrated from technology to service tasks within the last ten years. The flexibility of the work processes and innovation aspects are now most important besides the core business. The industrial automation has increased, too. The majority of the Italian enterprises in the manufacturing sector have realized the great changes that have triggered a modification of the relations between organisational forms and innovative technological systems, especially with regard to the industrial automation technology. A new organisation of work was realized. The knowledge and the handling of e.g. machines are no longer decisive but specialist knowledge and experience.

The work tasks in *Slovenia* have also changed towards a modernisation of the machinery. This should promote a better work organisation and an increase in efficiency of the existing work. This is closely linked to the already mentioned increase of the

training levels and qualification of the workforce. Some time ago it was sufficient to successfully graduate from a training course of a certain occupational group. Now applicants for a job are expected to undergo further training measures with regard to the desired job profile and the respective requirements.



Data source for the diagram: Statistical Office of the Republic of Slovenia

Figure 20: Number of reported needs for workers in terms of level of education in 2006 – D sector (Source: Statistical Office of the Republic of Slovenia)

Figure 20 shows the need for qualifications of the enterprises who are predominantly looking for un-skilled/ semi-skilled (Level I) and qualified skilled workers (Level IV).

In the *United Kingdom* the structures vary between the different sectors of the metal industry. Usually the skilled workers are moving between Levels 2 and 4 depending on the work tasks they are facing. The level of the technicians is located between Levels 3 and 4. These employees usually have undergone a formal specialist training combined with a company-specific and process-oriented practical training. In the future the requirements for skilled workers will also increase in this area. Higher qualification levels are expected to be reached after taking over skills and competencies of higher levels.

## 5. Initial and further training

In *Austria* and *Germany* skilled workers are trained within the Dual System. In *the Netherlands* students have the opportunity to choose for a dual training of for a more

school-oriented training. The Dual System differs from the strictly school systems in *Italy*, the *United Kingdom* and today also *Slovenia* by two characteristic features:

- Learning does not only take place at school but also in the company.
- The training is divided among two training institutions: Company and Vocational School.

Apart from school education in the *United Kingdom* there is also an in-firm vocational training which is, however, not recognised as National Vocational Qualification (NVQ). In *Italy* the in-firm training is predominantly confined to the handicraft occupations. Most of the occupations of the metal and electrical sector have a school-based training course.

A dual training such as in *Austria*, *the Netherlands* and *Germany* no longer exists in *Slovenia*. Young people are instead trained in vocational schools, school centres, secondary vocational schools, technical secondary vocational schools and in vocational colleges. The dual forms of training which have been in operation along with the school vocational training courses in *Slovenia* will be completely abandoned by the year 2008.

## **5.1 Vocational education**

### Germany

In Germany almost 190,000 young people are being trained for the occupation of a skilled worker in the metal and electrical industry. Between the years 1993 and 2005, the number of the annually concluded training contracts has increased from 49,700 to 67,000. However, the number of persons engaged in M+E has fallen during the same period of time. The vocational training quota in the M+E industry of the Federal Republic of Germany was 5.2 % in 2005. In the years of 2003 and 2004, the industrial metal and electrical occupations underwent a reorganisation and all training contents were thoroughly revised. The new occupations are characterized by learning and working within business processes. Specialisations were abandoned in favour of a training in corporate deployment areas which moves the training closer to the business fields of the companies. Apart from a revision in terms of contents, the training design and the examination structure were adapted as well. The reorganisation was also carried through by considering the shaping principles “process orientation”, “flexibility”, “occupational capacity to act” and “learning in the work process”.

As for the metal sector, the following occupations were newly arranged: industrial mechanic, toolmaker, chip removal mechanic, plant mechanic and construction mechanic. In the field of electrical technology/ electronics the reorganisation dated 10.08.2003 determined the following seven training occupations: Electronic technician for automation technology, electronic technician for industrial engineering, electronic

technician for buildings and infrastructure systems, electronic technician for appliances and systems, electronic technician for aviation technology systems, electronic technician for machine and drive technology as well as the system information technician.

### United Kingdom

In the *United Kingdom* young people who wish to undergo a specialist training course can apply for a training course in the industrial sector and a multitude of specialisation after their compulsory schooling. Traditionally vocational training in the technical and manufacturing sector is achieved through training programmes if the employee is to be assessed as an experienced craftsman or technician. The programmes are usually composed of a number of units of the National Vocational Qualifications (NVQ) with academic qualifications in the form of an adequate technical proof and key qualifications.

In the *United Kingdom* the qualification structure of the apprentices can depend on two different levels according to the need of the companies. In some companies, the “Foundation Modern Apprenticeship” (FMA) allows the apprentice to complete Qualification Level 2 and to adapt the respective school and key qualifications to the levels within a two years’ training course.

The “Advanced Modern Apprenticeship” (AMA) for skilled workers usually comprise – according to the preference of the companies – a period of time of three to four years. The first training year usually concentrates on an introduction into the basic technical processes on NVQ Level 2. In the years to come, the apprentices are specialized for Level 3. On this level qualifications will be developed enabling the apprentice to acquire competences in a certain discipline. In most of the cases the first training year is done outside working hours e.g. in a training institution (Further Education College – FEC) or at a private training provider. The apprentice must also acquire five key qualifications on NVQ-Level 2. Three of them must be core qualifications, the remainder wider key qualifications (WKS). The three core qualifications are Communication (Comms), Application of Numbers (AoN) and Information Technology (IT). The two WKS train Problem Solving (PS), Working with Others (WWO) and Improving Own Learning (IOL). Further to National Vocational Qualification and in order to amend the competency elements of the training curriculum, the training ends with a practical examination (handicraft). At the end of the training programme the apprentice must have the minimum knowledge of NVQ Level 3 in an accredited qualification. This is meant to enhance the requirements for knowledge in a training course. This can be a “City and

Guilds<sup>15</sup> graduation or a national graduation of the occupational qualification Edexcel Level 3<sup>16</sup> according to the chosen occupational path.

Companies are increasingly encouraging their apprentices to complete a Level 4 academic qualification to supplement their NVQ over the span of the apprenticeship in an effort to improve the knowledge base of the trainee. This is usually through the Higher National Certificate (HNC) programmes in their chosen vocation and is studied part-time over two years. In some instances, companies use the Foundation Degree programmes in partnership with Higher Education (HE) providers to achieve this aim and provide the worker with relevant continuing professional development (CPD). Both qualifications are linked to first degree programmes at Higher Education institutions so that learners can go on to study for a degree level qualification either on a part-time or full-time basis. Following their training, some of the larger companies offer “Graduate” training programmes to those apprentices who they have identified as having the potential to go on into higher levels of employment within their company. It is not unusual for many of the larger companies to select from a batch of applicants who have more than the minimum requirements and it is not unusual for applicants to already have Level 3 qualifications such as A Levels or a National Diploma in Engineering. However, they may be lacking in the skills and practical experience and must complete a NVQ Level 2 in their particular vocation before progressing to the NVQ Level 3 aspect of their training programme. There are a variety of different models or routes Apprentices can follow to achieve “skilled worker” status depending on the qualification awarding body.

### Austria

Apprenticeship training has a special significance for the manufacturing sector in Austria. Almost all persons engaged on skilled worker level have acquired their special knowledge on this educational path. Companies cherish the dual vocational training (company based training and part-time vocational school) because the apprentices’ abilities can be directly adapted to the needs of the company. The share of school-based training is just around 25 %. In this respect the most important occupational training specializations offered in the dual system are linked to electrical technology and machine tool technology. The duration of the training is 3.5 years. In 2006 around 10,000 apprentices have enrolled in this training course. A total of more than hundred occupational training specializations are being imparted in the manufacturing industry of the metal and electrical sector.

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<sup>15</sup> “City and guilds” is a UK examining and accreditation body for vocational, managerial and engineering training, offering over 500 qualifications in 28 industry areas, spanning from entry level to the equivalent of a postgraduate degree.

<sup>16</sup> <http://www.edexcel.org.uk/home/>

In *Austria*, above all the school education (secondary level) in the field of metal and electrical technology reveals different grades of deviation or mismatch between the apprenticeship training and the (future) work place. Consequently the (full-time) training and apprenticeship courses are rather offered in urban areas (especially in Vienna) while large enterprises tend to settle down in rural regions due to their need for space. In this respect there is a major offer of training programmes in Vienna on the one hand and a reduction of the shortage of skilled workers in some rural but highly industrialized federal states.

### The Netherlands

On 1<sup>st</sup> January 1996, the Dutch Adult and Vocational Education Act came into force. This law aimed at harmonising all the various types of vocational and adult education into a single statutory framework. One of the results of the law was the introduction of a national qualification structure for vocational education.

Centres of expertise on vocational education, training and the labour market represent the link between education and the organized business and industrial sectors. The majority of centres of expertise were established by organized business and industrial sectors, and are arranged according to sector or professional category. The tasks of the centres of expertise for secondary vocational education are laid down in the Adult and Vocational Education Act. The three core tasks are:

- the innovation and maintenance of the qualification structure,
- the monitoring and promotion of the quality of learning in professional practice,
- joint responsibility for the quality of examinations.

All courses within the qualification structure are entered in the Central Register of Vocational Courses (CREBO). This register records which institutions provide which courses, what the exit qualifications are and which learning pathway is involved. It also indicates which courses the government funds and which institutions are authorised to validate examinations. Anyone who wishes may consult the register to find out what courses are on offer and how they fit into the qualification structure.

After the qualification structure had existed for some years, the need for a new competence based qualifications structure arose.

The current knowledge-based, dynamic society and the labour market need professionals with more than just specific technical knowledge. The way of working changes, so learning needs to change as well to prepare future employees for differing requirements, such as working together, planning, entrepreneurship and problem-solving. Radically new teaching methods, programmes and examinations are needed to

develop a new structure better matched to modern society. The switch from thinking in terms of qualifications to thinking in terms of competences is central. The concept of competences is a coherent package of knowledge, skills and attitudes. A new qualification structure is being developed with competences for work, learning and citizenship as central issues. This structure gives more freedom to educational institutions to adopt innovative pedagogical and didactical methods.

The Ministry of Education, Culture and Science asked Colo (the association of centres of expertise on vocational education, training and the labour market) to coordinate this renewal of the national qualification structure. The expertise centres for vocational education, training and the labour market are responsible for defining competences. They will also work more and more closely with educational institutions on this. The aim is to introduce a well functioning, clear and transparent qualification structure for senior secondary vocational education, which offers the possibilities of constant renewal and is an effective instrument for both the labour market and education.

Schools have been experimenting with the new system for a few years. In August 2010 the transition from the old to the new system should be complete.

Kenteq is responsible for the development and maintenance of the qualification structure for (amongst others) metal and electrical engineering occupations. The new competence based structure is still in development. The number of qualifications is being reduced compared to the current structure.

### Italy

At a national level the Italian government is responsible for the general developments and regulations. Therefore all regions have legislative power in the field of vocational education and training and have used of their influence by forming very different VET systems. Some of them are clearly influenced by political directives and by the planning of principles of training initiatives. Some others only give an orientation and basically rely on initiatives of the vocational education and training organisations. There is a formal coordination of VET by the Italian regions but it is not easy to defend many congruent facts beyond an agreement on positions and interest against existing national competences. The regional responsibilities for vocational education and training facilitate the adaptation of the VET activities to regional requirements and needs.

Four different kinds of measures for the development and the implementation of political decisions in the field of VET can be distinguished in Italy:

1. Formal agreement with Social Partners:  
Agreements between the government and the Social Partners comprise individual strategic guidelines for the new shaping of the educational system, among others:

„ to safeguard a certification system as an adequate instrument, a uniform and visible path for life-long learning for everybody, to allow the recognition of educational credits and to certify the acquired competences” (Employment Agreement, September 1996).

2. National framework legislation:

A number of important framework laws and reform laws with an impact on education and training have been passed within the last years.

3. Agreements between the government and the regional authorities:

In the year 2000, the conference of states, communities and the local institutes agreed upon the procedure for the implementation of a national certification system for specialist competences. The agreement states that the Ministry of Labour (in cooperation and coordination with other involved ministries, trade unions and employers’ organisations) formulates applications with regard to the criteria and the methods of the certification of the acquired competences in educational paths. Thus a standardization of the certificates all over the country and their recognition in the European Union shall be safeguarded.

4. Ministerial resolution with regard to legal education and IFTS (Istruzione e Formazione Tecnica Superiore), directory of measures for the support of entrepreneurial initiatives and competitively, 2001; Pilot project for an advance initial training and further training system): The new system of competence accreditation concentrates on the assurance of transparency of the training programmes assessing the individual experiences and on the facilitating of the adaptation of job offers and job vacancies. Competences are defined as a structured concentration of knowledge and skills, normally linked to specific work profiles. They can be acquired in training programmes, through occupational experience, self-relied learning and with the aid of valuable training credits

Three kinds of certification instruments are being envisaged:

- Certification of the vocational education and training qualification,
- Certification of the vocational educational competence,
- Accreditation of competences acquired during the work process or by self-relied learning with the aim of formal training or graduations.

In addition the regions plan the introduction of an education pass (or portfolio) for citizens for the registration of all kinds of certifications.



## Slovenia

The Slovenian constitution guarantees free education to its population. A fundamental education is prescribed by law and is financed by budget resources. In recent years, approximately 6% of GDP have been spent on education. In the year 2002 67% of the population had at least an upper education<sup>17</sup>.

The vocational and technical training by the vocational training law with enactment of 2006 are regulated. It is divided into 20 technical/ vocational fields, within those different training courses can be selected. These training courses differ amongst others according to the vocational standards of several professions and in the level of the qualifications. Individuals, who have acquired a secondary vocational qualification and at least three years of work experience, have the possibility to acquire a secondary technical education by taking a master craftsman, foreman or managerial examination with the competent association. This system of vocational and technical education sets the goal to develop key competences, skills and vocational qualifications at an internally comparable level and to provide knowledge and skills for employment, further education and lifelong learning. Additionally to the courses leading vocational qualifications, the so-called vocational courses are available, which are usually regarded in international comparisons as a form of post-secondary, non-tertiary vocational education.

The kind and the level of the vocational and technical training are legally specified, the structure consists of:

- Shorter vocational education courses,
- Higher secondary vocational education courses,
- Higher secondary technical education courses and
- Combined vocational-technical education courses.

The last one appeals to participants, who already have successfully completed higher secondary vocational education. It lasts approximately two years and ends with a vocational final examination. This technical-vocational education therefore provides vocationally qualified candidates with the possibility of acquiring technical qualification and thus gaining access to higher education. If candidates pass an additional exam in one of the vocational final examination they may also enrol into specific academic higher education courses. A few of these vocational fields are e.g.:

- Electrical engineering and computer science,

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<sup>17</sup> In Slovenia post-compulsory education begins with upper secondary education. It is divided into general upper-secondary education, technical upper-secondary education and vocational upper-secondary education.

- Mechatronics,
- Mechanical engineering, metallurgy and mining.

The training takes place in co-operation with the schools and employers in dual form, if the courses are conceived as workplace training.

At present there are more than 30 valid education programmes for mechanical engineering, metallurgy and mining in Slovenia, whereas the mechanical engineering is a preferential field of training.

## **5.2 Skills level requirements**

Against the background of continuing challenges and requirements, organisational changes and/or restructuring faced by the companies, but also in the face of new fields of tasks for skilled work, new machines, plants and production processes, further training is an essential necessity in order to safeguard competitiveness and to prevent a loss of know-how all over Europe. The German example will further explain this scenario.

In the year 2004, the better part of 87 % of the *German* M+E enterprises was engaged in further training. Thus the participation in further training by M+E industry is nearly three percentage points above the total economic average. Almost half of the industrial expenditure for further training of € 8 billion (Gesamtmetall 2006, p. 73) in the M+E industry are dominated by more work place oriented and self-organised forms of learning (cf. Figure 21). Around 84 % of the companies make use of this form of further training. They have e.g. moved a part of the further training from in-firm seminars to the work places. This underlines the trend towards flexible, work place oriented and above all efficient further training measures. The product and situation-related briefing is still widespread, above all in small and medium-sized companies. It is always practised as soon as the employees have to take over new tasks or if adaptations to changed processes become necessary

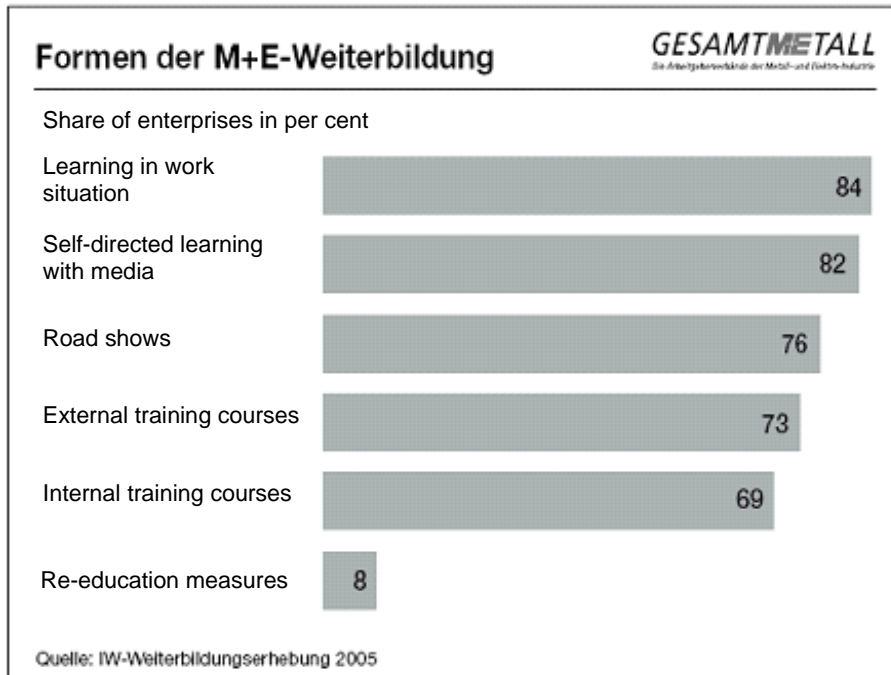


Figure 21: Forms of M+E further training (Source: ME Argumente 2006, p.1)

Based on a concrete need, the briefings are either carried through by the suppliers of the machines or goods or by a colleague or other employees of the company (cf. Table 9). Nevertheless many M+E companies are facing problems in setting aside working time for the further training of their employees as the productively used times have already been reduced by an increasing expenditure in information, consultation and coordination. According to Gesamtmetall (2004, p. 13), 94 % of the companies of the M+E industry expect that the qualification of employees will continuously gain importance in the years to come as the increasing requirements can only be tackled in this way. 59 % of the staff in the M+E industry presume that they will have to undergo further training measures within a shorter period of time. These measures will not only concentrate on the use of new machines or the dealing with work processes but will focus on qualification in a much wider sense:

- The training of an overview of ever more complex production processes,
- the understanding of higher developed, more sophisticated technologies,
- the training of leadership competences and communication skills (Gesamtmetall 2004, p. 13).

The field of formalised further training does only play a minor role in the *Austrian* metal and electrical sector. This is above all true for the institutionalized training organised by institutions of adult education or private course providers. There are two reasons:

1. In many areas the further training system also acts as a substitute for a lacking or inadequate training system. The latter is, however, not applicable for the manufacturing area in all regions where qualified training and apprenticeship systems can be identified on all levels.
2. The need for qualification of the enterprises is rather technology oriented and technology specific. The manufacturers are undoubtedly the most competent actors for qualification measures in these technologies. Therefore the better part of the CET<sup>18</sup> is carried out directly by or jointly with relevant manufacturers of products or machines. Thus the chances to win external further training providers are very limited.

In essence the further training offers of such providers in the field of metal and electrical manufacturing concentrate on computer-aided and computer-controlled design (CAD) and production techniques (CNC). Courses for the handling of specific software (e.g. CATIA) are mainly offered in the field of CAD.

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<sup>18</sup> CET = Continuous Education and Training

	<b>Learning at the workplace</b>	<b>Product-related instruction</b>	<b>Product-related seminars</b>	<b>Holistic further training philosophy</b>
<b>Requirements</b>	Take up, master and co-shape continuous changes	Mastering of new plants, new production technologies (be able to operate)	Learning of new functions, interrelationships of new developments	Further training as a continuous instrument for the improvement of the qualification levels of staff combined with a remuneration concept
<b>Character Emphases (Examples)</b>	Learning of production and assembly methods according to assembly optimization plans, standard working methods ... Learning with the aid of multipliers in teams or groups Learning on demand (On-the-job)	Situation and product related instructions at the workplace, in the company with regard to <ul style="list-style-type: none"> <li>• New plants/ machines/ products,</li> <li>• Changed processes,</li> <li>• Current problem solving situations,</li> <li>• New tasks.</li> </ul>	Learning in traditional seminars beyond the corporate world of work. Popular topics: <ul style="list-style-type: none"> <li>• Control and digital technology,</li> <li>• SPS/BUS systems,</li> <li>• hydraulics, pneumatics, electrical technology,</li> <li>• CNC/CAD,</li> <li>• FMEA/ quality assurance.</li> </ul> Overall topics: „Technician at the customer's“ Team leader training Work safety.	Establishment of an interrelationship between team/ group performance and remuneration system via <ul style="list-style-type: none"> <li>• Knowledge balances,</li> <li>• Skill based matrix.</li> </ul>

 Table 9: Approaches for further training in enterprises <sup>19</sup>
<sup>19</sup> Based on Becker/Spöttl/Stolte (2001, p. 13).

## 6. Initiatives and concepts to fight the shortage of skilled workers

Initiatives and concepts of the manufacturing sector to meet the shortage of skilled work comprise all incentives, impulses and measures etc. that might be useful for the companies and the economy. This is relevant for both the political and the company levels. There are already numerous demands formulated by the political stakeholders, by companies but also by trade unions which will be described in more detail below by taking into consideration the relevant partner countries.

### 6.1 Demands and initiatives for the reduction of the shortage of skilled workers formulated by politics and the social partners

Even though the political initiatives and demands of the social partners in the participating European countries are diverse due to their different structures, the investment into initial and further training could be clearly identified as the common aim. Individual countries have started programmes or initiatives for the special support of the smaller enterprises.

Another common aim is the integration and the employment of women in the labour market. This task is closely linked to the provision of child day care places. Above all the Scandinavian countries as well as *France* and *Belgium* are most advanced in this field. In the other European countries, a respective development could only be identified in recent times, e.g. in *Germany* with the implementation of full-time schools and an increase in nursery school places.

In recent years, reform approaches could also be identified with respect to a longer employment of the workforce and a later and more flexible retirement age. In the face of an aging society and the financial load for the pension schemes resulting thereof, the official retirement age has been raised in a number of countries (e.g. in *Germany* and in *Austria*). However, this measure can only attribute to a relief of the shortage of skilled workers if older employees are actually employed for a longer period of time. *The Netherlands* currently try to make the employment of older staff more attractive (the companies pay less employer's contributions).

For a short-term solution of the shortage of skilled workers many European countries are considering to tap into the potential of a foreign workforce. The prerequisite for a temporary immigration permit is a work contract with a domestic employer. Some countries run special temporary programmes for certain areas. In *the Netherlands*, the "Fast-Track" programme seeks to employ specialists for information and communication technology as well as nurses. In *Germany* there is the "Green Card" programme for communication technology specialists. In the *United Kingdom* the "Highly Skilled Migrant Programme" aims at foreign specialists offering them a simplified immigration procedure. In *Italy* employers have to apply for the work permit within the framework of a special

immigration act whereas the *Austrian* labour market has been explicitly opened in 2007 in order to cater for the shortage of skilled workers (cf. chapters below).

In *Austria* the following measures are currently applied on political level in order to avoid a future shortage of skilled workers and to support quality in education and training:

- Financial allowances for enterprises offering training,
- Apprenticeship training in publicly funded, company-superordinate training institutions,
- Continuous updating, adaptation, further and new development of individual training occupations/ work place profiles (including an increasing modularisation of the training courses),
- Introduction of competitions and quality awards for apprentices and companies.

The last point includes e.g. the “Fit-for-Future” award which was staged for the sixth time in the year 2006 themed “Quality gives you an edge”. Within the framework of this competition, three to four companies with especially high quality initiatives in the field of vocational education and training were assigned to each category – small, medium-sized or large enterprises. On the occasion of the “Fit-for-Future” gala event on 22 March 2007, the winner of each category was honored and awarded a prize.

In addition there are institutionalized forms of regional training alliances in two Austrian provinces (Upper Austria and Tyrol). The development of a third alliance is planned to start in Vorarlberg in 2008. These training alliances on regional level are largely financed by the relevant regional governments. The training alliances aim at promoting additional qualifications for apprentices and enterprises unable to provide parts of work place profiles for the training. These companies are supported by other companies or by training institutions as soon as they need training profile contents. Apart from this, the companies get financial help and advice in terms of organisation, e.g. contacts to partner companies, information on existing training regulations etc.

The training fund of the metal and electrical industry in Vorarlberg (VEM) is an initiative founded by leading institutions of the Vorarlberg electronical and metal industries organised in the Vorarlberg Chamber of Commerce. The companies pay a contribution of 0.24 % of their gross wages and salaries along with their compulsory membership fees. The providers of vocational training receive a supporting premium in order to improve the training quality and to thus safeguard the training of an adequate number of skilled workers. This means that the company receives a premium for each apprentice who has successfully graduated from a two years’ training course. Another part of the fund is used to finance career counselling services and further training programmes of the trainers. One of the most important principles for the success of this fund is the

voluntary membership and the fact that this sector initiative has developed its own momentum directly based on the special demand of the sector for apprentices and skilled workers. In addition it is worth noting that hardly any additional administration costs are caused by the fund as it is integrated into an existing administrative financing structure, i.e. the Vorarlberg Economic Chamber.

In the past, individual initiatives were taken on political level in *Germany* against the shortage of skilled workers. The best-known initiative was the “*Green Card*” offered within the IT sector as an incentive for foreign specialists to come to Germany. At the moment the government is planning an „Initiative of qualification to safeguard the need for skilled workers”. First talks on this issue are scheduled for autumn 2008. Above all some of the trade unions consider this to be insufficient. In summer 2007, IG-Metall started e.g. an initiative for skilled workers to close the gap of skilled work in *Germany* (cf. IG-Metall, 2007a). Although it is said that there is no overall shortage of skilled workers at the moment, problems and indicators are already emerging today: The shortage already shows in individual regions, in certain qualifications, e.g. with regard to chip cutting mechanics, machine building and electrical engineers and IT specialists. The reasons for this development are manifold: insufficient education, no prospective personnel policies in companies, increasing outsourcing or dramatic staff reduction. Training positions in companies for e.g. chip cutting mechanics and electronic technicians were cut down even when the shortage was already evident

The concrete proposals of IG-Metall for the skilled worker initiative in detail (Görner 2007, p. 4ff.):

1. Further qualification for engineers („post qualification“),
2. Abolition of tuition fees,
3. Reduction of drop-out rates of up to 50 % in engineering study courses,
4. Opening of universities and universities of applied science for occupational competency (reduce prejudices, more transparency, incentives),
5. Realisation of a training quota of at least 7 % in all branches,
6. Win women for technical occupations,
7. Systematic development of training for older employees,
8. Introduction of a skilled workers’ monitoring (better assessment of the need for skilled workers, personnel management),
9. Engagement of agencies for temporary employment in initial and further training



10. Highest priority of an active labour market policy at the Bundesagentur für Arbeit (Federal Labour Agency).

According to IG-Metall, at least 100,000 “old” applicants could be trained for a qualified skilled worker occupation within just three years. And young people who find training difficult could be granted the right for assistance during their training course.

Gesamtmetall also demands further action for the fight against the shortage of skilled workers. The following demands are stipulated in their Annual Report 2006/2007 (Geschäftsbericht, p. 53-56):

- Safeguarding a pool of junior M+E workers by securing and maintaining the ability and the willingness to undergo training,
- Communication of the occupational profiles and of the changes in the world of work,
- Safeguarding of an occupational information policy across all Federal States in terms of quality and contents,
- Transparency of the entire image of the companies/ sectors of the M+E industry (care for image),
- Win teachers as multipliers via a good image of the M+E industry,
- Presentation of the products and the techniques of the M+E industry,
- Proof of the commitment of the associations and companies for training (Public Relation policy),
- New models for a more flexible training (safeguarding the attraction of the dual training course),
- In-firm qualification and personnel development,
- Incite an enthusiasm for technology in young people.

Furthermore Mrs. Kunstmann, General Manager of Gesamtmetall, in a guest commentary in the magazine VDI-Nachrichten (cf. Gesamtmetall 2007c) demands the necessary re-design and improvement of the curricula and of didactical emphases during teacher training, the qualification of unemployed persons and the adequate further training of above all older employees. The recruitment of foreign skilled personnel is also an option worth considering in an endeavour to fight the shortage of skilled workers.

The lack of competitiveness of the workforce within the *United Kingdom* has not gone unnoticed by the policy makers and government. Intervention by government is necessary to keep companies well-informed about available provision and if providers are to understand the needs of business and individuals. The government can then

bridge information failures between the supply and demand sides. A particular feature of the Welsh economy over the past three decades was its ability to attract foreign investment. This is a key factor and hugely important given that more than 70 % of the existing workforce will still be there in 2020. Until now, the education and skills system has been focussed on young people.

The EEF (Engineering Employers' Federation) in a report of 2006, feel that there is also a role for the government in contributing to the cost of creating a dynamic, flexible and productive workforce. Over the past few years, the Department for Education and Skills (DfES) has published three White Papers relating to workplace skills as indicated below:

- 21<sup>st</sup> Century Skills: Realising Our Potential (2003),
- Skills: Getting On In Business, Getting On With Work (2005),
- FE Reform: Raising Skills, Improving Life Chances (2006).

The Department for Trade and Industry (DTI) also has an interest in the role of skills in improving productivity and competitiveness and has been involved in the development of the Skills Academies. In addition the HM Treasury commissioned a review of long-term skills. This review is probably the strongest yet to focus the way forward for UK skills and will have massive implications for all levels of education and training providers across the United Kingdom.

The review identified that, although the United Kingdom had been performing well over recent years with an improved skills base and had enjoyed 14 years of unbroken growth and the highest employment rate in the G7, the United Kingdom's skills remained fundamentally weak by international standards.

One of the most important elements of the government's strategy is the establishment of a number of institutions to plan and fund post-16 years of age funding. The first of these is the main funding and planning body for post-16 skills in England – the Learning and Skills Council (LSC). The creation of the LSC, established in 2001, was one of the first and most significant changes to the learning and skills landscape made by the Labour government. It was created to bring the funding of all post-16 education and training under one body. The LSC works with FE colleges, school sixth forms, six-form colleges, Higher Education institutes and other training organisations with the overarching plan to help providers to plan, provide public money and encourage excellence in delivery. In Wales, this function is undertaken by the Department of Lifelong Learning and Skills (DELLS).

Initially, the LSC was set up with a national office and 47 local offices. Since the early days and following a number of reforms, this has seen the creation of regional offices and a scaling back of local offices thereby making the LSC more responsive to regional

needs. Further reforms, following the publishing of the LSC “Agenda for Change” document in 2005, ensure that employers and learners are given more say in how funding for provision is directed.

In addition to the LSCs and DELLS, there are several sector and regional bodies established to determine employer skill needs and tailor provision accordingly and these are discussed below. The first of these are the Sector Skills Councils (SSCs). These are organisations representing the different sectors (25 in all covering 85% of the workforce) and, as mentioned previously in this report, the sector for the companies covered in this project is SEMTA. Each SSC was devised with employer skill needs in mind and has four key goals to:

- Reduce skills gaps and shortages;
- Improve productivity, business and public service performance;
- Increase opportunities to boost skills and productivity of everyone in the sector’s workforce;
- Improve learning supply including apprenticeships, higher education and National Occupational Standards (NOS).

In partnership with businesses in the sector, the SSC construct Sector Skill Agreements which has five stages:

1. In-depth analysis of a sector’s skill needs,
2. Assessment of current training provision,
3. Identification of gaps and weaknesses in workforce development,
4. Review scope of collaboration and employer engagement,
5. Agreement on how SSC and employers will work with key funding partners to ensure training provision.

The creation of Regional Skills Partnerships – RSPs was an idea that came from the 2003 White Paper. The theory was that RSPs would bring together key stakeholders in business, education and skills to plan strategic skills priorities for each Regional Development Area (RDA) linked to regional economic strategies. Once these priorities had been determined, RSPs would then interface with the regional and local arms of the LSC. The 2005 White Paper illustrated how these regional and sectoral bodies would interact to support employer engagement in training and the wider learning and skills sector. The infrastructure that has been put in place is designed to enable better skills for more productive businesses. In theory, this is an employer-led system where

provision is determined by a network of regional and sector bodies that understands the factors driving business skill needs and can influence decisions on training provision.

Within the existing system, employers can also benefit from a range of other government initiatives the latest of which involves an entitlement to government-sponsored training and a regional skills brokerage service. Train to gain, formerly known as the Employer Training Programme (ETP), will arrange training for an employee for a fully-funded Level 2 qualification in line with the government's aim of raising skill levels for those at – or near to – the bottom of the qualification spectrum. The brokerage system will also support firms in accessing training through the Train to Gain programme and also provide advice and guidance on assessing skill needs and sourcing training more generally. Further examples of government intervention over the past five years, has been the introduction of further programmes that include:

- 1998: Establishment of the University for Industry – Ufi. New technologies should drive employers and employees for an improvement of their qualifications;
- 2001: Launch of the „Learn Direct“ brand (The service provides advice and information for individuals and employers on training and skills needs).
- 1998: Establishment of the Union Learning Fund – ULF and the Union Learning Representatives – ULR to help trade unions encourage greater participation in learning at work.
- 2000: Individual learning accounts, introduced in 2000 that offered discounts and incentives for individuals to engage in training up to Level 2. However, the scheme closed in 2001 due to financial irregularities (fraud) although they continued to operate in Wales and Scotland.
- 2001: Foundation Degrees were and still are two-year higher education (HE) programmes linked to a vocational outcome. The degrees, covering some 1,600 subjects, are designed by partnerships of employers and HE institutions and some form of work-based learning is integral to the programme.
- 2005: Proposal for the establishment of the National Skills Academics (NSAs) by the Labour Party. (The management of the academies are employer-led and deliver training to meet the needs of the sector they represent).
- 2006: Establishment of „Unionlearn“ to support the trade unions in their main tasks: support of ULR, promoting learning agreements in the workplace, quality control for the safeguarding of highest quality, contribution to the development of SSA (Sector Skill Agreements), support of trade union participation on learning and skills committees.

- “Skills for Life” was the government’s national strategy for improving adult basic skills and offered free training in literacy, numeracy and ESOL (English for speakers of other languages) for those without a literacy and numeracy qualification at Level 2. The aim was to improve the basic skills and, therefore, employability of 1.5 million adults by 2007.
- Education Agenda for the 14 to 19 year old through the creation of „Specialized Diploma“ in England and the Welsh Baccalaureate programmes. They will provide an alternative to traditional teaching by offering a combination of general and applied learning.
- Annual event „Engineering Week Wales“ at Welsh universities. Young people from schools aged 14 attend FE Colleges to participate in a number of engineering challenges. Through these challenges young people get an insight into “high-tech” skills that an engineer has to have knowledge of and move away from the “oily rag” perceptions in the sector.

The Welsh Assembly Government (WAG) have also announced plans to boost Wales’ economy by matching employees’ skills more closely to the employers’ needs through a new skills and employment strategy that will go out for consultation in the autumn of 2007.

In a recent newspaper article, Skills Minister for Wales John Griffiths said: „Following the publication of the Leitch Review, each of the four UK countries has been working on its own distinctive approach to tackling skills shortages and increasing people’s employability. In Wales, we have also set up an independent review of mission and purpose of four FE Colleges. The new strategy will bring together the views in the Leitch Report on skills needs and the views of the Webb Review on the readiness of our training sector to meet those needs” (Western Mail Newspaper, August 2007).

This comes on the back of the planned celebration of „Vocational Skills Celebration Day“ in Wales for those learners who have been successful in attaining a Level 3 vocational qualification as opposed to a secondary education qualification namely GCSEs and A Levels. Some will use them as a passport for better work opportunities, others to gain access to higher level study through HNCs or a place at university. Certainly raising the profile of vocational qualifications also fits in with the WAG’s agenda for 14 to 19 year old educational agenda that now focuses on giving learners a more balanced experience, spanning both academic and vocational learning.

In June 2005, the *Slovenian* government took up a development strategy. At first the entire social care system was to be extended and the global competitiveness should be improved. At the same time the paper contains the Strategic Goals of Lisbon with a

national adaptation. *Slovenia's* specific development chances and setbacks had been kept in mind. One of a number of special development priorities is to improve the training quality and to support life-long learning. This would further remedy the shortage of skilled workers. The development priorities in detail:

- Adaptable systems of vocational education and training,
- Necessary assessment of the labour market and an active labour market policy,
- Adaptability and mobility on the labour market,
- Support of vocational and technical education and training,
- Support for development researchers starting work in the economy,
- Funding and co-funding of vocational education and training.

In *Italy* there are agreements between the government and the Social Partners aiming at strengthening the educational system. These endeavours encompass among others the reformation of the teaching concept with the aid of a certification system. This reform shall safeguard a uniform and visible path of life-long learning of every individual along with the assessment of the accreditation of training credits within the acquired competences. The new system is geared at providing a new transparency within the training programmes, a better assessment of individual experiences and will facilitate the harmony between the demand and the supply of work. The system will be based on competences, defined as a structured grouping of knowledge and skills usually linked to specific work profiles. These competences should be acquired during the vocational educational programmes. Three variants of certification instruments are thus imaginable:

- Certification of the qualification for vocational teachers,
- Certification of the competence of vocational teachers and
- Accreditation of competences acquired during work or by self-reliant learning with a view to formal training or graduations.

*The Netherlands* try to make it more attractive for companies to employ an older workforce: The companies have to pay two percentage points less of employer's contributions to the occupational disablement insurance fund for employees over 58 years of age. As for the employees, one of the incentives for a retirement beyond the age of 65 are special premiums. "Finally the government has created special programmes to fight ill health and occupational disability in older employees" (Eichhorst, W.; Thode, E., 2002, p. 95). Apart from this, *the Netherlands* have collective agreements on individually extended working times beyond the usual weekly 36 to 38 working hours in some occupations. But also even more openly designed working time models with flex

time are being implemented. Employees can buy and sell working time (cf. Eichhorst, Thode 2002). Further financial incentives were created through the development of human capital in the form of initial and further training and corresponding tax deductions. The employees pay less income tax and the companies less taxes on profit. Apart from tax deductible costs for initial and further training, similar to Germany, another 40 % of the expenditure for further training for older employees are considered tax deductible costs.

While e.g. *German* enterprises are facing serious political problems when recruiting skilled workers from abroad, other countries have already included this practice into their solution approaches in order to meet the shortage of skilled work. The *United Kingdom* and *Austria*, for example, are already recruiting foreign skilled workers.

In May 2007, a statistically proved shortage of skilled workers in the *Austrian* labour market prompted the government to open up the market for additional 800 turners, milling workers and welders from the new European Union member states. Indeed around 300 skilled workers with the required qualifications, predominantly from Hungary, could be recruited until August 2007. The Minister for Economy and Work will approve another immigration campaign of skilled workers in 50 occupations for the year 2008, above all for the building, metal and electrical sector. This acton will be finalized prior to the period of limited work mobility of the new European Union member states between 2009 and 2011.

Half of the companies in the *United Kingdom* participating in the IET survey have recruited workforce from abroad within the last 12 months in order to overcome their specific shortage of skilled workers. Figure 22 shows the countries of origin:

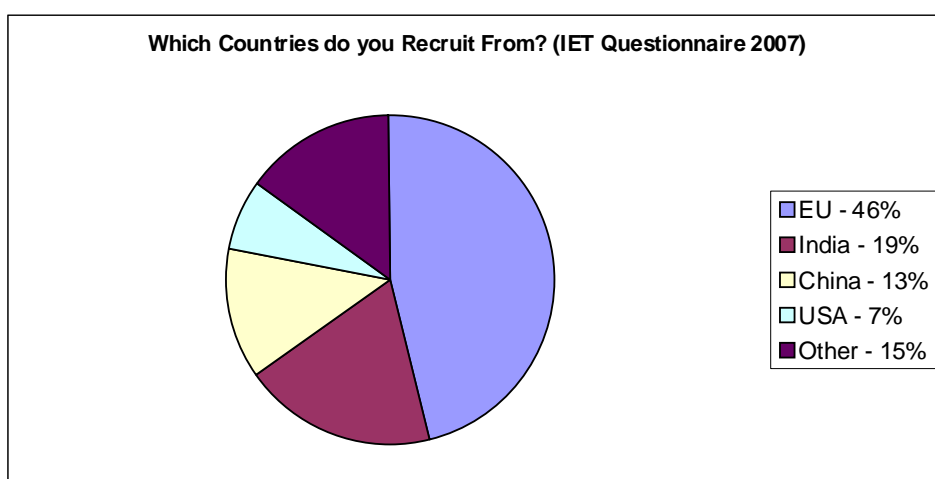


Figure 22: Which Countries do you recruit from? (Source: IET Questionnaire, United Kingdom 2007)

46 % of the recruited personnel come e.g. from the European Union, 19 % from India, 13 % are Chinese and 7 % come from the USA. 15 % come from further countries, e.g. from South Africa. The most important reason for the recruitment is an extension of the staff on all levels, as 33 % of the interviewed enterprises put it.

## **6.2 Initiative by companies**

The case studies conducted by all partners identify a variety of good-practice measures which have in part already been implemented or will be applied in the sector in order to avoid and/or to fight the shortage of skilled workers. The identified measures are described in detail in a separate Good-Practice Report. Not all of the measures have been especially designed to meet the shortage of skilled workers. These measures have been initially developed within the framework of comprehensive personnel marketing or recruitment purposes in the surveyed enterprises. Due to the number of case studies conducted per partner country, the following measures are neither representative nor complete but only show a selection of the identified measures and initiatives. Four overall fields of action can be derived from this range of concepts:

- 1) Recruitment of personnel,
- 2) Qualification and training,
- 3) Loyalty of the employees,
- 4) Industry-wide measures.

The field of recruitment of personnel encompasses operational apprenticeship training, sponsorships and/or co-operations and (regional specific) recruitment strategies.

The recruitment of personnel for enterprises with a shortage of skilled workers is an important factor and a paramount means. Not only the classical form of recruitment is focused on. Individual enterprises, as e.g. in *the Netherlands, Germany and Italy*, have almost abandoned their recruitment via classical job advertisements or just concentrate on regional job-orientation fairs.

Above all in countries with a dual training system, in-firm training is most significant and is a strategic field of action in order to avoid a shortage of skilled workers. In the other countries an intensification of the cooperation between enterprises and vocational schools can be identified. The individual case studies reveal that above all the amount of the commitment invested in training measures from the part of the enterprises is one of the characteristics of good practice. These enterprises have the opportunity to train the junior staff they need as early as possible on their own premises. In addition, enterprises make more and more use of the option to shape the training course accordingly. The case studies clearly identified that one of the most important aspects for SME was to integrate the apprentices into the real production process as early as possible.



In *Austria* the industry also relies on entry tests in order to reveal the individual weaknesses and problems in advance. Thus specific deficits can already be tackled prior to the start of the apprenticeship and during the training itself. This offers enterprises an option to temporarily employ (e.g. for one year) an apprentice who would not have been admitted under different circumstances due to bad test results.

Sponsorships and/or a cooperation of enterprises with pre-schools or schools pursue another strategic means of personnel recruitment. Some enterprises raise the interest in their activities at a very early stage which can add to a positive image. Furthermore the interest in technology can already be developed during childhood and can be subsequently developed. Some of the methods applied so far encompass e.g. job application training, school practical training, project weeks but also the training of the teacher staff as well as the endowment of awards for pupils with innovative developments. In addition a contact to the parents is established and regularly renewed. Further initiatives are the participation in job-orientation fairs and the organisation of activities targeted at girls and women.

With regard to an adequate number of qualified personnel on the skilled worker level, the external recruitment of personnel as a classical variant was deemed difficult by the majority of the enterprises as no adequate skilled workforce is available on the labour market. This is why the companies explicitly try to recruit older skilled workers or already retired skilled staff. On the other hand the participation in regional job fairs is an instrument for the target oriented recruitment of skilled workers in the region. The traditional recruitment with the aid of job advertisements in regional newspapers is currently replaced by the publication of job advertisements on the Internet and on the homepage of the companies. In *Slovenia* skilled workers are also sought via the radio. The recruitment of staff from temporary employment companies is continuously increasing all over Europe. In a lot of countries, among others in the *Netherlands*, the classical form of recruitment via public employment agencies is mostly rejected following rather negative experiences. Strategies such as e.g. head hunting, the payment of premiums ("Fishing for Friends") and job filling via word of mouth are still wide-spread. Just a short time ago, this practice was rather confined to the academic occupational groups.

A need-oriented skills level and a careful analysis of the need for skills are crucial in order to be prepared for the corporate processes and the specific requirements for the daily work. Apart from further training for skilled workers, the qualification of unskilled and semi-skilled workers has become more important.

The field of action of further training and personnel development offers various opportunities to qualify externally recruited employees for the specific needs of the

corporate production fields, to keep the employed skilled workers on a skills level adequate for the respective requirements and to qualify them for future developments. In individual cases also unskilled employees can be “upgraded” to tackle skilled workers’ tasks. The conducted case studies already hinted at some instruments adequate to attain these objectives. For example, the application and the use of a skills or competence matrix can be named. With the aid of this instrument, the qualification status of each skilled worker is documented and the document is used to derive and to control a need for training. Another instrument is the development of targeted in-house seminars conducted by in-firm specialists. This aims at a more efficient access if the need arises and a better adaptation to a company specific need for training. Furthermore a computer-aided administration of the competences of skilled workers and their further training measures are already carried through, e.g. with the aid of SAP as well as e-learning.

Whereas the medium-sized enterprises recognize and practice initial and further training as reasonable strategies to meet the shortage of skilled workers, personnel loyalty still is a rather neglected instrument. However, in some regions with a strong competition of large enterprises, companies are beginning to implement measures to keep their skilled workers in the company. Above all factors such as the image and the corporate culture, health and knowledge management (among others a succession management) and personnel development plans (including a planning of career paths) are decisive factors for the success of this measure.

All these components form part of the instrument of personnel development. Performance appraisals and target agreement interviews are conducted with the skilled workers. Often the necessity of personnel development measures have not (yet) been realized. Further methods of personnel development are e.g. a close contact and communication with the seniors amongst the skilled workers in order to facilitate a timely identification of acute skills deficits calling for subsequent adequate measures. An additional consideration of a methodical and social competence development, the specialist adaptation of the skills of a skilled worker, the implementation of career programmes and of a mentor system (the cooperation of young and old employees) and the application of a skills or competence matrix is gaining more importance.

Measures across the industry can often be found whenever companies cannot – or only with difficulties – train their own staff. This is often true for companies in structurally weak regions. This situation has resulted in the forming of networks and cooperation linking companies to training associations or regional sector networks. A regional sector network in the field of mechanical engineering in a structurally weak region in *Germany*, for example, is considered an innovation network for the strengthening of the business location. Apart from the support of the regional image (the attractiveness), a federation

of sector companies with a regular exchange of information, experience and knowledge, the avoidance of the migration of qualified employees is one of the most important aims. These aims help to strengthen the economic and technological performance of the regional medium-sized companies in the mechanical engineering sector.

In *Austria* and *Germany* joint training systems are a relevant option above all for SME in order to carry through vocational training and to safeguard new skilled workers for the manufacturing sector. Vocational training is thus jointly organised and financed by making mutual use of training capacities. Thus also companies without the option of apprenticeship training can profit from vocational training courses. The identified advantages of these joint training systems are the relocation of training to other companies and training institutions, training activities across the companies, the exchange of apprentices and the comparison of competences, material, trainers and the cooperation in joint projects. The participating enterprises get support in terms of finances, organisation and advice.

In the *Netherlands* a sector specific model for the reduction of the shortage of skilled workers is applied on the technical level. This so-called “Stimulus Labour Market Circle”<sup>20</sup> has already been used for a number of sector specific or regional labour market projects.

1) Work force	a) Prevention of outflow of employees b) Optimization of deployment of employees
2) Education	a) Inflow into (vocational) education b) Improvement of connection between education and labour market
3) Conducting business	a) Relocation of activities (abroad, for example) b) Optimization of labour productivity (business processes, technical innovation)
4) Reserves	a) Use of mobile reserves (school leavers, foreign workers) b) Mobilize hidden reserves c) Use of known reserves (unemployed)

Table 10: Elements of the Stimulus labour market circle (Source: Arbeidsmarktmonitor Zuidelijk Noord-Holland (bijlagenrapport), Research voor Beleid/ SEO Economisch Onderzoek, Leiden, June 2006)

These examples show which measures could be successfully applied for a reduction of the shortage of skilled workers in specific business fields.

<sup>20</sup> Named after the first regional project that has been carried through and tested in the region of Eindhoven.

## 7. Summary and outlook

Based on the empirical surveys conducted in all six participating countries in order to identify the situation of skilled work in companies of the manufacturing sector, the following conclusions can be drawn:

- A shortage of skilled personnel on skilled worker level can be identified in all countries, however, so far only on a rather company related and regional level. The verifiable production losses in the individual countries were mostly related to the field of highly qualified skilled workers. Explicit examples for the level of the skilled workers are not yet available.
- The requirements for skilled workers have been clearly increasing in recent years. This development is above all relevant for the handling of new technologies, organisational forms, materials, requirements for precision and the increasing quality standards.
- Companies are increasingly deploring recruitment problems. This is also proved by the increasing number of job vacancies. This is above all true for *Austria*, *the Netherlands* and *Germany*. These countries clearly show that it has become more difficult to fill job vacancies on skilled worker level in the sector during the last few years. The applicants' profiles often do not meet the specific requirements for the corporate production fields. Long learning-on-the-job phases would be necessary even if personnel are found. Finding apprentices for certain occupations in certain regions has become increasingly difficult as the interest for technical occupations is declining and the percentage of students continuing their study at academic level is rising all over Europe.
- Some experts speak of a normal problem during an economic boom and a home-grown problem of the companies. A lack of commitment for training and personnel development is also responsible for the difficulties with the pool of skilled workers. For example, companies in *Austria* investing in training have no problems in finding skilled workers. Nevertheless the number of apprentices in the sectors of some countries is decreasing.
- Measures and strategies to meet a shortage of skilled workers can be identified on the level of political and corporate initiatives in the different fields of action. A bigger investment into human capital (strengthening of school education, an investment in initial and further training, better cooperation between universities and economy, tax reductions for investments in initial and further training etc.) could be identified as common goals in all countries. Individual countries have

started programmes or initiatives in order to give special support to smaller companies. On enterprise level above all investments for:

- A future oriented personnel development,
- Regional recruitment of personnel (training exchanges, cooperation with schools and pre-schools etc.),
- Initial and further training of all employees,
- Timely employee loyalty,
- Measures across companies (regional sector networks or joint training associations) could be identified.

A detailed description of the developments as well as the forecasts for the manufacturing sector in the metal and electrical industry underpinned that the fact of a shortage of skilled personnel on skilled worker level is no longer a phantom in Europe and that there is an intensive need for action already today. As revealed by the results, this current situation has also a structural background:

- The swift demographic change,
- The decrease of adequate cohorts of young employees,
- Higher requirements for qualification and competences in skilled workers.

Nevertheless cyclic and regional aspects may not be neglected.

The analysed corporate structures show clear starting points for short-term and long-term measures for a reduction of the shortage of skilled workers. Gaps can be closed in the short-term with measures such as the further training of employees or the implementation of a labour force pool. Medium-term solutions such as an exchange of personnel within networks or the participation in joint training networks, however, can already considerably improve the situation of skilled work. An investment into a future-oriented and long-term personnel development, on the other hand, can perhaps completely avoid a shortage of skilled workers. Quite often a combination of these different strategies is the path to success.

Simple instruments for the support of personnel development and thus for the reduction of the shortage of skilled workers will be developed and tested during the further course of the project and in cooperation with enterprises,

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