CBI MARKET SURVEY

THE CASTINGS AND FORGINGS MARKET IN THE EU

Publication date: January 2007

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This survey was compiled for CBI by Facts Figures Future in collaboration with Kommanet

REPORT SUMMARY

This CBI market survey profiles the castings and forgings market in the EU. The castings and forgings market in individual EU countries is discussed in separate market surveys. These market surveys as well as the EU export marketing guidelines for castings and forgings can be downloaded from http://www.cbi.eu/marketinfo.

Industrial demand
The engineering and the construction industry offer good opportunities for developing country (DC) exporters. Since in both industries many cast and forged parts and products are used, the production output of both industries is a good indication for the industrial demand for cast and forged parts. Both the engineering and construction industry performed well in the period 2001-2005. For the next few years, output of both industries is forecast to grow due to positive projections for the European and world economy, and, and as a result, the demand for castings and forgings in both industries. Central and East European (CEE) countries will account for the larger growth figures.

Innovative applications of aluminium and magnesium
The trend of growth in the number of innovative applications of aluminium and magnesium is expected to continue, as the automotive industry seeks new ways to save weight and gain fuel efficiency and performance. Moreover, other segments will benefit from these experiences.

Kyoto effect
Due to the growing care for the environment, in several industries – for example the power generation industry – the search for energy efficiency and the limitation of CO_2 and NO_x emissions – which is sometimes called the "Kyoto Effect" – has led and should lead to increased use of energy-efficient applications such as electric variable speed drives and energy-efficient engines, turbines, motors and generators. As a result, prospects for cast and forged parts in such applications are bright.

Engineering industry benefits from the accession of CEE countries
The transformation of CEE countries into market-oriented economies is beneficial to the EU engineering, foundry and forge industry. A division of labour has arisen which enables EU firms to utilise a cheap labour supply to improve price competitiveness in international markets. Especially for end products that face quick price erosion, the price pressure on components and systems leads to relocation of production.

Outsourcing of engineering production to LCCs
In recent years, a lot of engineering production has been outsourced to low cost countries (LCCs), and many multinationals already have their own subsidiaries in LCC countries. Until now, outsourcing often concerned large volumes of standard products and parts that could easily be made in LCCs. Industry experts expects the trend to continue even more in the future, which may lead to a deceleration of demand growth for castings and forgings of the EU engineering industry.

Production
The EU industry is the second largest in the world for ferrous castings – far behind China – and the largest for non-ferrous castings and for forgings. After limited growth in the period 2001-2005, the foundry and forge industries are expected to show better growth in 2006 and 2007, as EU foundries and forges are completely booked for the years 2006 and 2007. EU manufacturers are optimistic about their chances of survival, despite serious problems in gaining access to scrap metals at competitive prices, the risk of labour shortage, relatively high wage costs (especially in Western Europe) and the obligatory focus on eco-efficiency improvement. The reason is a partial shift towards higher-value tailor-made products which reduces their reliance on mass production of commodity steel with technical characteristics

easily matched by competitors. Moreover, as a result of the increasing raw material and energy prices, the labour factor in the cost price has decreased, strengthening the competitive position of (especially the West) European foundries and forges.

Imports
EU-imports continued their upward trend. Compared to 2001, total imports increased 25% in value (to € 209 billion) and 10% in volume (154 million tonnes). This shows the increasing internationalisation of the industry, as well as the general price increase due to higher raw material prices. The largest importer by far was Germany, followed by France, the UK, Italy and Spain. Iron and steel products was the largest imported product group (€73 billion), followed by parts of machinery, railway equipment or vehicles (€53 billion) and articles of iron, steel or base metal (€35 billion). The role of the developing countries is growing. In 2005, DCs supplied a total value of € 14.0 billion to the EU, representing a serious growth of 85% compared to 2001. As a consequence, DCs have enlarged their relative share in imports to 6.7%. The largest DC suppliers to the EU for all product groups were China and Turkey. At some distance came India and Brazil, while South Africa and Mexico ranked fifth and sixth. Among the DCs that saw the largest increase in exports to the EU were Oman, Cuba, Morocco, Colombia, China, Albania and Bosnia and Herzegovina.

Trade structure
The most common target groups for DC exporters are Original Equipment Manufacturers (OEMs), subcontractors of OEMs, agents, importers and foundries or forges. Although there are several options, supplying directly to OEMs and subcontractors of OEMs has some advantages and could be one of the most interesting trade channels, because there is a larger chance of a long-lasting relationship. DC exporters should therefore put efforts into building up supplier relationships with OEMs and subcontractors of OEMs in the EU. Also, by working together, DC exporters have better chances in succeeding as they are able to offer higher-added value products to EU customers.

Price
A major trend that affects the costs and revenues of castings and forgings production is price pressure, resulting in importers/agents and OEMs as well as their suppliers keeping on looking for opportunities to reduce cost prices of parts. This may be underlined by the fact that prices in the engineering industry increased only 6% in the period 2000-2005. In the meanwhile, the industry had to deal with increasing raw material and energy prices. EU producers have tried and will try to translate increasing production costs into surcharges as soon as possible, although success depends on the supplier-customer relation and the kind of product. The larger a supplier is or the smaller a customer is, the larger is the negotiation power of a supplier. Also, the less the product is a commodity product, the larger is the negotiation power.

Opportunities and threats for DC exporters
Especially when the cast or forged product is worked and the used material is not just iron but more sophisticated such as nodular iron or (non-ferrous) steel, opportunities for DC exporters grow exponentially. According to industry specialists, the general rule is that the more sophisticated the casting – referring to the material used and to the degree of working –, the larger the labour factor in the landed cost price and the larger the interest of EU companies to outsource to DCs. Obviously, the major threat for DC exporters is a further decrease of the labour factor in the cost price because in that case the competitive advantage of the DC exporter, to the extent that it is based on low labour costs, deteriorates. Furthermore, DC exporters have to compete with China and to a lesser extent Turkey, the major DC suppliers of castings and forgings to the EU. Moreover, as long as wage costs in CEE countries remain relatively low, DC exporters will have to face strong competition from CEE foundries and forges.

1 INTRODUCTION TO CBI'S MARKET INFORMATION

CBI provides a wide range of documents containing EU market information. All CBI market information is targeted at developing countries. For the definition of developing countries used in CBI market surveys see appendix B List of developing countries.

Sector specific market information
CBI publishes market information for about 37 market sectors.
For each market sector, the following kind of information is available:

- CBI market surveys on **the EU market in general**, focusing on developments and trends in the field of market size (consumption, production and trade), distribution and prices in the EU. E.g. 'The fresh fruit and vegetables market in the EU'.
- CBI market surveys on **the market in specific EU countries**, focusing on developments and trends in the field of market size, distribution and prices in the EU country concerned. E.g. 'The fresh fruit and vegetables market in Spain'. On average, about 20 documents per market sector are available. Those EU countries responsible for the highest share of total EU imports from CBI target countries are discussed in documents of about 10 pages. Less relevant EU countries are discussed in fact sheets of about 2 to 3 pages.
- CBI market surveys on a **specific product(group)** within the market sector concerned, focusing on developments and trends in the field of market size, distribution and prices in the EU and a number of specific EU countries as well as on business practices. E.g. 'The EU market for papaya'.
- **EU export marketing guidelines**, explaining how to conduct an external analysis (market audit) and internal analysis (company audit), a SWOT analysis and dealing with the decision-making process whether or not to export to the EU.
- Information on **market access requirements**, focusing on legislative and non-legislative requirements based on environmental, consumer health and safety and social concerns in the EU and in specific EU countries.

General trade related information
Besides information on specific market sectors, CBI also publishes more general trade related information, the so-called Export manuals. At the moment, the following Export manuals are available:

- Exporting to the European Union – trade-related information on the EU
- Export planner - how to plan your export process
- Your guide to market research - practical and low cost research methods
- Your image builder - how to present yourself on the EU market
- Your show master - selection, preparation and participation in trade fairs
- Digging for gold on the Internet - internet as a source for market information
- Website promotion - how to promote your website in the EU

These Export manuals can be downloaded from the CBI website at http://www.cbi.eu/marketinfo. Go to 'Search CBI publications'.

How to use the different CBI market information tools
If you are new on the EU market, it is advised to start by consulting the more general Export manuals, like 'Exporting to the European Union' and 'Export planner', before consulting sector specific information. If you are a more experienced exporter, you can use these manuals as reference material while focusing on the specific information for your market sector.
Concerning the sector specific information, you are advised to start with the information on the EU market in general and the EU export marketing guidelines. After consulting this information, you should have gained a better idea on which surveys on the market in specific EU countries are most interesting to consult. It is advised also to check if a survey on your specific product(group) is available. And it is strongly advised always to check the documents on market access for your product.

Finally it is stressed that CBI market information serves as a basis for further research, meaning that you should - after consulting the CBI information - further research your EU target markets for more detailed and specific information related to your specific situation.

The castings and forgings market in the EU

This CBI market survey covers the EU market for castings and forgings. The emphasis of this survey lies on those products that are of importance to DC suppliers. Statistical market information on industrial demand, production and trade, and information on trade structure, prices and market access is provided. Opportunities and threats for DC exporters are highlighted and sources for more information are provided.

For information on how to get involved in the EU marketplace reference is made to the EU export marketing guidelines. These EU export marketing guidelines can be downloaded from http://www.cbi.eu/marketinfo and are especially interesting for more experienced exporters. Go to 'Search CBI database' and select the market sector concerned and the EU.

If you are a starting exporter, it is advised to read this survey together with CBI's 'Export planner' and to use the interactive tool 'EMP Document Builder' on the CBI website.

CBI market surveys covering the market in specific EU countries, specific product(group)s or documents on market access requirements can be downloaded from the CBI website. Go to 'Search CBI database' on http://www.cbi.eu/marketinfo and select the market sector concerned and an EU country.

2 INTRODUCTION TO THE EU MARKET

The European Union (EU) is the current name for the former European Community. Since January 1995 the EU has consisted of 15 member states. Ten new countries joined the EU in May 2004. Negotiations are in progress with a number of other candidate member states. In this survey, the EU will be referred to as the EU25, unless otherwise stated.

For general information on EU member states, reference is made to CBI's Export manual 'Exporting to the European Union (2006)'. Information can also be found at the official EU website http://europa.eu/abc/governments/index_en.htm or the free encyclopaedia Wikipedia http://en.wikipedia.org/wiki/Portal:Europe.

Monetary unit: Euro

On 1 January 1999, the Euro became the legal currency within twelve EU member states: Austria, Belgium, Finland, France, Germany, Italy, Ireland, Luxembourg, The Netherlands, Spain, and Portugal. Greece became the 12th member state to adopt the Euro on January 1, 2001. In 2002 circulation of Euro coins and banknotes replaced national currency in these countries. Denmark, United Kingdom and Sweden have decided not to participate in the Euro. In CBI market surveys, the Euro (€) is the basic currency unit used to indicate value.

Table 2.1 Exchange rates of EU currencies in €, average yearly interbank rate

Country	Name	Code	2005	2006
Cyprus	Pound	CYP	1.741	1.741
Czech Republic	Crown	CZK	0.034	0.035
Denmark	Crown	DKK	0.134	0.134
Estonia	Crown	EEK	0.064	0.063
Hungary	Forint	HUF	0.004	0.003
Latvia	Lats	LVL	1.439	1.441
Lithuania	Litas	LTL	0.290	0.289
Malta	Lira	MTL	2.329	2.337
Poland	Zloty	PLN	0.249	0.257
Slovakia	Crown	SKK	0.026	0.026
Sweden	Crown	SEK	0.108	0.108
United Kingdom	Pound	GBP	1.463	1.467

Source: Oanda http://www.oanda.com (January 2007)

3 PRODUCT CHARACTERISTICS

On the basis of information of industry experts, the following product groups have been compiled, based on trade codes from Eurostat, the statistical body of the EU:[1]

- Copper and zinc products
- Plastic and rubber products
- Parts of machinery, railway equipment or vehicles
- Articles of iron, steel or base metal
- Iron and steel products
- Light and ultra light products

Table 3.1 shows that most product groups contain both cast and forged products, as well as other products. These other products are also part of this survey and are more or less related to castings and forgings. Please note that there are numerous castings and forgings with a wide range of applications and therefore, Table 3.1 is only meant to give a few examples. Refer to Appendix A for all products that may be interesting for DC exporters.

Table 3.1 Examples of castings, forgings and other products, per product group

Product group	Cast products	Forged products	Other products
Copper and zinc products	Construction: • construction hardware Engineering • induction motor rotor • many other applications such as bearings, bushings, gears, fittings, valve bodies	Engineering • electrical fittings for e.g. semiconductor process equipment • fuse caps • other parts of electrical applications • ground lugs in electrical transformers • cable lug on electrical cables • parts for refrigerator hinges	• bars, rods and profiles • wire and foil
Plastic and rubber products	-	-	• bars, rods, sticks, tubes and profiles • plates, sheets, film, foil, tape and articles
Parts of machinery, railway equipment or vehicles	Engineering • gas turbine parts • parts of engines and motors engine blocks such as pistons, gearboxes, cranks and crank shafts • wheel centres	Engineering • axles • cranks and crank shafts • levers and linkages • door hinges	-
Articles of iron, steel or base metal	Construction • profiles, manhole covers, rings and frames • catch basin grates and frames • construction hardware Other products • railway construction material • locks and padlocks	Construction • construction of frames for buildings • construction material of infrastructural works such as dams, water gates and bridges • bolts and nuts Other products • anchors	• sheet piling • wire
Iron and steel products	-	-	• rolled and (deep) drawn metal products • bars, rods, angles, shapes, sections and wire • other semi-finished products
Light and ultra light products	Construction • parts for aluminium profiles and frames • construction hardware such as door locks	Construction • windows and doors Engineering • shafts, sleeves and disks,	• bars, rods and profiles • plates, sheets and strip • structures and parts of structures • extruded articles

[1] Unfortunately, Eurostat does not make a distinction between castings or forgings.

Product group	Cast products	Forged products	Other products
	Engineering • transmission housing and pistons • engines and structures • parts of electric appliances, hand tools, and other machinery • induction motor rotors	pistons • connection rods • roller bearing sleeves and other rings • crankshafts • wheel spindles • axle beams, gears • steering arms	

To what extent these product groups are interesting for DCs becomes clear from Section 6, in which the import market for the product groups is discussed. As EU industrial demand figures of these product groups are not available and as castings and forgings can be found virtually everywhere, Section 4 discusses two industries that offer many opportunities to DC exporters: the engineering- and the construction industry. Also see the CBI market surveys covering the EU market for engineering products and for pipes and process equipment for more information on some related products.

Statistical product classification

Combined nomenclature (CN)

In this survey, trade data based on the Combined Nomenclature are used. These data are provided by Eurostat, the statistical body of the EU.. The Combined Nomenclature (CN) contains the goods classification prescribed by the EU for international trade statistics. The CN is an 8-digit classification consisting of a further specification of the 6-digit Harmonised System (HS). HS was developed by the World Customs Organisation (WCO). The system covers about 5,000 commodity groups, each identified by a six-digit code, arranged in a legal and logical structure. More than 179 countries and economies use the system. Please refer to Appendix A for a list of the selected products and their CN codes.

Statistical data: limitations

Trade figures quoted in CBI market surveys must be interpreted and used with extreme caution. In the case of intra-EU trade, statistical surveying is only compulsory for exporting and importing firms whose trade exceeds a certain annual value. The threshold varies considerably from country to country, but it is typically about € 100,000. As a consequence, although figures for trade between the EU and the rest of the world are accurately represented, trade within the EU is generally underestimated.

Furthermore, the information used in CBI market surveys is obtained from a variety of sources. Therefore, extreme care must be taken in the qualitative use and interpretation of quantitative data. This puts limitations to in-depth interpretation of relations between consumption, production and trade figures within one country and between different countries.

The HS classification given differs from the product groups and products mentioned in the paragraphs above, which puts limitations to in-depth interpretation and of the possible relations between import and export figures on the one hand and consumption and production figures on the other hand.

Please note that product groups discussed in this survey have changed from the product groups discussed in previous editions. This also means that values and volumes of imports and exports of the product groups are different from those in previous editions.

4 INDUSTRIAL DEMAND

4.1 EU market size

The size of the industrial demand for castings and forgings is difficult to measure, as these products are used in a very wide range of applications. Because there are no demand data for castings and forgings available, Section 5 (Production) and Section 6 (Imports) may be used to get a rough indication of values and volumes in the EU.

Main castings markets

According to the European Foundry Association (CAEF), the most important market segments for castings in the EU are the automotive industry (50% of all castings), mechanical and electrical engineering (30%), the construction industry including public utilities (10%) and others such as aeronautics and electronics (10%). While iron castings largely (>60%) go to the automotive industry, steel castings are especially used in the construction, machinery and valve making industries.

Main forgings markets

According the Federation of European National Forging Associations (Euroforge), as with castings, the major end user of forged products is the automotive (cars and trucks) industry, accounting for 58% of total forgings demand. Beside automotive, mechanical engineering (11%) and agricultural machinery (8%) are the most important segments for the EU forging industry. Mining machinery and railways both account for 2% and aerospace equipment accounts for 1% of the forgings market. Finally, Euroforge reports a relatively large group 'others' (18%), which covers segments such as construction, electrical engineering, maritime and the power generation industry.

4.2 Market segmentation

In consultation with industry experts it has been decided to focus on two major industries in the EU which offer good opportunities for developing country (DC) exporters: the engineering and the construction industry.[2] Since in both industries many cast and forged parts and products are used, the production output of both industries is a good indication for the demand for cast and forged parts in those industries. Refer to Section 3 for examples of casting and forging applications in the engineering and the construction industry. This subsection will be concluded with a market segmentation by material used, as markets for one specific metal may be much different from markets for another metal.

Engineering industry

The EU production in the engineering industry grew 7% in the period 2001-2005, totalling €647 billion in 2005. Refer to Table 4.1 for more information on the market size of the several engineering categories, as well as the estimated shares of castings and forgings in these categories.

Table 4.1 EU engineering production, by category and including the production value share of castings and forgings, 2001-2005, € million

Categories	Share of castings and forgings*	2001	2005	Change '01-'05
Mechanical engineering		**380,018**	**419,113**	**10%**
Lifting and handling equipment	10%	45,066	50,907	13%
Non-domestic cooling and ventilation equipm.	10%	36,759	39,047	6%
Machine tools, woodworking mach., welding equipm.	***	40,843	38,393	-6%
Pumps (70%) and compressors (50%)	50-70%****	28,779	34,365	19%
Machinery for mining and construction	15-25%	24,610	29,745	21%

[2] Although automotive is a very large segment, DC exporters of castings and forgings are advised not to focus on this segment because of the very intensive competition. Refer to Section 8 for more information.

Categories	Share of castings and forgings*	2001	2005	Change '01-'05
Bearings, gears and other driving elements	50%	23,409	29,459	26%
Agricultural machinery	30%	26,330	28,940	10%
Valves and taps	60-70%	22,378	25,031	12%
Engines and turbines, ex. aircraft, vehicle	40%	18,804	20,270	8%
Machinery for paper and paperboard production	25%	14,657	18,316	25%
Machinery for food, beverage and tobacco processing	25%	14,267	16,552	16%
Machinery for textile, apparel and leather production	60-70%	13,835	11,976	-13%
Industrial furnaces and furnace burners	10%	6,141	5,923	-4%
Machinery for metallurgy	20-25%	5,128	5,390	5%
Other machinery**		1,639	2,731	67%
Electrical engineering		**227,579**	**227,994**	**0.2%**
Electrical distribution and control apparatus	5-10%	59,478	59,237	3%
Electric motors, generators and transformers	30-40%	41,545	42,813	0%
Electric domestic appliances	5-25%	34,073	33,709	-1%
Other electrical equipment	5-25%	26,100	26,404	0%
Electrical equipment for engines and vehicles	5-25%	23,425	25,231	8%
Lighting equipment and electric lamps	5-25%	15,409	15,356	1%
Accumulators, primary cells and batteries	5-25%	5,661	5,608	-1%

* Based on estimations of industry experts and the German Foundry Association.
** Only reported by the statistical offices of Hungary, Poland and Slovakia.
*** While machine tools have a large share of castings and forgings (40-50%), woodworking machinery (10-20%) and welding equipment (5%) have a far smaller share of castings and forgings.
**** Pumps consist for about 70% of castings and forgings, while compressors consist for about 50% of castings and forgings.
Source: VDMA (2006)

As becomes clear from Table 4.1, several categories contain a relatively large production value share of castings and forgings. Of the most relevant categories, "bearings, gears and other driving elements" (+26%), "pumps and compressors" (+19%), "valves and taps" (+12%), "agricultural machinery" (+10%) and "engines and turbines" (+8%) performed well. Refer to Table 4.2 for an overview of the leading EU markets in these main castings and forgings consuming engineering categories, as well as the fastest growing markets per category.

Table 4.2 Leading markets ('05) and fastest growing markets in EU ('01-'05), by main castings and forgings consuming engineering categories

Category (share of castings and forgings)	Leading markets (share of total EU production)	Fastest growing markets '01-'05 (growth)
Machinery for textile, apparel and leather production (60-70%)	Germany (41%), Italy (28%), France (8%), Belgium (6%) and the Czech Republic (5%)	Slovakia (167%), Czech Republic (49%) and Denmark (47%)
Pumps (70%) and compressors (50%)	Germany (34%), France (16%), Italy (13%), UK (12%) and Belgium (4%)	Hungary (516%), Czech Republic (119%), Slovakia (77%) and Austria (40%)
Valves and taps (60-70%)	Germany (43%), Italy (22%), France (9%), UK (7%) and Denmark (6%)	Czech Republic (67%), Hungary (64%), Poland (57%) and Portugal (44%)
Bearings, gears and other driving elements (50%)	Germany (52%), Italy (18%), France (9%), UK (4%) and Sweden (3%)	Slovakia (192%), Hungary (183%), Poland (139%), Belgium (61%), the Czech Republic (53%) and Austria (47%)
Machine tools (40-50%), woodworking mach., welding equipment	Germany (53%), Italy (18%), France (6%), Spain (5%) and the UK (4%)	Hungary (67%), Poland (38%) and Austria (34%)
Engines and turbines, ex. aircraft, vehicle (40%)	Germany (27%), Italy (18%), France (15%), UK (13%) and Finland (7%)	Hungary (144%), Austria (125%), Czech Republic (104%) and France (45%)
Electric motors, generators and	Germany (34%), Spain (11%), Italy (9%), France (8%) and the	Hungary (97%), Ireland (67%) and Slovakia (50%)

transformers (30-40%)	UK (7%)	
Agricultural machinery (30%)	Germany (24%), Italy (23%), France (14%), UK (8%) and the Netherlands (5%)	Czech Republic (54%), Poland (40%) and Finland (40%)

Source: VDMA (2006), industry specialists and Facts Figures Future (2007)

Some major conclusions can be drawn from Table 4.2:

- Germany is by far the major market in most of the categories, while Italy is number two in most categories.
- France is often number three, while the UK is number four in 60% of the categories. In one category Spain is number two, but on average, Spain is number five in the EU.
- Central and East European (CEE) markets are the fastest growing markets in the EU.

Outlook

Due to positive world and EU economy forecasts (+4.4% and +2.3% in 2007), the European Engineering Industries Association expected a strong (2.5%) growth in the EU engineering production for 2007, with CEE countries accounting for the larger growth figures.

Construction industry

Table 4.2 shows the construction sales – including residential construction, non-residential construction as well as civil engineering – in most EU countries. After some good years, the European construction industry grew to €1,205 billion in 2005.

Table 4.2 EU construction, by country, 2002-2008, € million

Country	2002	2005	2006 forecast	2008 forecast	Growth '02-'05	Growth '05-'08
EU	**1,157,140**	**1,204,666**	**1,235,203**	**1,279,937**	**4%**	**6%**
Germany	213,751	198,452	200,774	206,329	-7%	4%
UK	177,243	189,908	192,750	205,339	7%	8%
Italy	179,391	182,454	181,950	182,219	2%	0%
France	166,069	176,512	183,088	186,002	6%	5%
Spain	140,262	161,030	168,163	175,502	15%	9%
The Netherlands	64,612	64,530	67,142	70,397	0%	9%
Ireland	25,656	31,035	32,825	34,383	21%	11%
Austria	26,850	28,669	29,371	30,494	7%	6%
Belgium	25,337	26,695	28,390	28,461	5%	7%
Portugal	30,282	26,037	25,195	24,720	-14%	-5%
Denmark	22,924	24,748	25,123	25,973	8%	5%
Poland	21,872	23,945	26,070	30,266	9%	26%
Finland	20,291	22,270	23,080	22,974	10%	3%
Sweden	20,005	20,795	22,214	23,523	4%	13%
Czech Republic	11,394	14,194	14,876	16,446	25%	16%
Hungary	8,673	10,300	10,821	13,076	19%	27%
Slovakia	2,528	3,092	3,371	3,833	22%	24%

Source: Euroconstruct (2006)

In line with the industry's average annual growth of 1.8% in the period 1996-2005, the European Network for Construction Forecasting (Euroconstruct) expects a comparable growth in the period 2006-2009, to more than €1,300 billion in 2009. The year 2006 was expected to show the largest growth figures (2.5%). For 2007 and 2008, construction activities in Western Europe are forecast to slow down due to a downturn in new residential construction and civil engineering output. While construction in Western Europe is mainly concerned with maintaining, extending and improving existing infrastructure, construction in CEE countries is focused on new infrastructure and buildings. Construction in those countries is therefore forecast to increase 7-8% annually in 2006-2009. Civil engineering will account for the largest growth (+10% annually), while the residential and non-residential building sectors will also perform well. Together, these factors suggest a positive outlook for the EU as a whole.

Segmentation by material used
As this survey covers a very wide range of metals with different market segmentations, the market segmentation of most materials covered by this survey is discussed in this section. Please note that the segmentation data presented are not limited to castings and forgings only.

Steel
The construction sector accounted for 24% of the total steel demand in 2005. Other major end users were automotive (18%), mechanical engineering (13%), metal ware (13%) and tubes (13%). Only 60% of steel products were shipped directly to the main end users while 40% were being routed by stockists and service centres to make it ready for final consumption.

Aluminium
The transport (automotive and aircraft) industry is the largest consumer of aluminium in all forms, in 2005 accounting for 33% of EU demand, followed by construction (26%), packaging (18%) and engineering (15%). In the automotive industry, castings and forgings of primary aluminium compete with cast iron and steel. Furthermore, aluminium competes with steel and high-performance plastics as a material for car frames and body panels. In the packaging sector, there is still some potential in the EU regarding the displacement of steel. There is competition for aluminium in larger sizes of containers from plastics and steel. The second largest aluminium application in packaging is foil, competing mainly with plastic and paper.

Construction
After a period of growth, the construction sector in the EU15 used about 2.5 million tons of aluminium in 2004, representing a turnover of about €70 billion. Aluminium extrusions and sheets competes with plastics in windows and doors and also with coated steel in industrial buildings. Around 1.6 million tons were used for profiles, making this sector by far the largest market for extruded aluminium products, and accounting for about 50% of the total market. Furthermore, a substantial amount of 700,000 tons was processed into rolled products. Finally, 200,000 tons of aluminium were used in castings for a range of building applications.

Zinc
The construction sector and the automotive industry are the major end users of zinc. Zinc is especially used in the production of galvanising alloys (47%) and die-casting alloys (14%). Furthermore, it is an ingredient of brass and bronze and it is also an important material for architecture and interior decoration, such as brass doorknobs, taps and lighting fixtures. A recent development for the use of zinc has been the Electric Fuel Zinc-Air Battery System, used to power vehicles with zero emissions. Results of a test in German mail delivery vehicles showed that this innovation is a promising environmentally friendly form of fuel for the future.

Copper
Electrical cables account for 48% of the total demand for copper in the EU. Other major end users are construction (27%), engineering (12%) and electrical equipment (8%). Copper is very important for fuel efficiency and safety in modern transportation systems. A normal vehicle uses about 25-30 kilogram of copper in its ignition, brake-lighting and safety systems. Furthermore, the EU' high speed train network uses 10 tons of copper per kilometre of track in the power cabling, signalling and electric motor components.

4.3 Patterns and trends in industrial demand

Innovative applications of aluminium and magnesium
In recent years, the EU has proved to be the worldwide leader in the innovative use of aluminium, ahead of North America and Japan. In light vehicles for example, the use of innovative aluminium applications has grown almost 45% since 2002 to more than 30 kilograms per vehicle. For 2006, it is estimated that 2,180 million tons of aluminium will be

used in light vehicles production in the EU, with an average of 118 kilograms per vehicle. This trend is expected to continue, as the automotive industry seeks new ways to save weight and gain fuel efficiency and performance. Moreover, other segments will benefit from these experiences.

Contrary to aluminium, the use of magnesium alloys in light vehicles is still small; only 3 kilograms per vehicle. However, prospects for the use of magnesium are very positive. For example, die casting applications of magnesium in the automotive sector are expected to double in the next decade, and in the next 5 to 10 years additional sheet and extrusion applications of this metal are expected. Studies by major car manufacturers have even identified a potential for over 100 kilograms per vehicle, with most of the potential future demand expected to be for power train (engine blocks and transmission housings) and structural and crash safety applications (bumpers, crash boxes, doors and wheels).

Kyoto effect

The care for the environment has become a strategic political issue in the EU. In the power generation industry, the search for energy efficiency and the limitation on CO_2 and NO_x emissions – which is sometimes called the "Kyoto Effect" – should lead to increased use of electric variable speed drives. In the years to come, the electric drives markets for wind energy, gas compression (a substitute market for gas turbines) and material handling will account for the largest growth. Like the electric drives market, the motors and generators market will show good growth due to the Kyoto effect as well, especially in the area of marine propulsion and wind power generation. As a result, prospects for cast and forged parts in such applications are bright.

Engineering industry benefits from the accession of CEE countries

The transformation of CEE countries into market-oriented economies is beneficial to EU engineering. A division of labour has arisen which enables EU firms to utilise a cheap labour supply to improve price competitiveness in international markets. Many West European companies have transferred (parts of) their production to CEE countries. Especially for end products that face quick price erosion, the price pressure on components and systems leads to relocation of production. For DCs, this development offers opportunities as companies within the new EU countries will also have to rely on DC exporters when increasing price pressure will force them to look for cheaper sources. Although these countries have had no or very little experience with doing business with DC exporters, as they themselves had a major labour advantage, this will change within a few years.

Outsourcing of engineering production to low cost countries (LCCs)

In recent years a lot of engineering production has been outsourced to LCCs and many multinationals already have their own offices in LCC countries. Until now, outsourcing often concerns large volumes of standard products and parts that can easily be made in LCCs. Industry experts expect the trend to continue even more in the future, which may lead to a deceleration of demand growth for castings and forgings of the engineering industry.

Opportunities and threats for DC exporters

The main opportunities and threats for DC exporters are:

+ Price pressure on components and systems as a result of an increasingly global competition, leading to increased sourcing in LCCs.
+ Growing engineering and construction markets in Western Europe and especially in new EU countries leads to an increasing demand for castings and forgings. With regard to the engineering markets, several categories with a large share of castings and forgings in their production performed well in the period '01-'05.
– Shift of engineering production towards LCCs.

4.3.1 E-business in the EU castings and forgings sector

Many SME companies in DC struggle with the e-business topic. One of the most important questions here is: What are interesting e-business applications for SME companies in developing countries that want to export to the EU? To answer this question, CBI developed a practical system to monitor e-business developments per sector. The highlights for the castings and forgings sector follow below.

Main findings EU experts
In December 2006, experts and buyers in the EU were asked to fill out a questionnaire. An online questionnaire survey was conducted about the use of marketplaces. At the same time, EU buyers and experts were interviewed about the importance of the different e-business applications by phone.

Marketplaces
In the online questionnaire (n=73) among EU buyers, over 15% of the respondents stated that they already made use of marketplaces and trade leads to do business with SME suppliers in castings and forgings from developing countries. Of the people who said that they already made use of e-marketplaces, 72% stated that they will keep on using these instruments in the future. For the future, almost 29% of all EU buyers indicated that they will make use of e-marketplaces to do business with SME suppliers in castings and forgings from developing countries. Compared to the 15% that currently does so, this means that the percentage of users in the future will nearly double.

The following marketplaces of interest for the castings and forgings industry were mentioned by the respondents: Marine parts - http://www.marineprovider.com, Shipserv Tradenet - http://www.shipserv.com and Sourcing parts - http://www.sourcingparts.com.

Other, more general, e-marketplaces that were mentioned by the EU buyers were:
- Ariba – http://www.freemarkets.com.
- Europages - http://www.europages.com.
- Kompass - http://www.kompass.de.
- Thomas Register - http://www.thomasglobal.com.
- WLW - http://www.wlw.de.

E-marketplaces for castings and forgings that were not mentioned by the EU buyers are About.com – http://metals.about.com, Forge Finder – http://www.forgefinder.com and Subcontract Solutions - http://www.subcontractsolutions.com/SSMP/index.asp.

From interviews with 'Subcontract Solutions' and 'Sourcing Parts', tips were gathered for DC exporters on how to make use of e-marketplaces:
- Differentiate real opportunities from "quotes for benchmarking".
- An e-Marketplace is not the end but the beginning of a channel. Follow ups after first contact are very important.
- Communication is important. Fill out the profile as completely and honestly as possible. This makes you most trustworthy.
- Just bidding on an e-marketplace is not enough, promoting your company is even more important.

A website that provides quality information about marketplaces in B2B is http://www.emarketservices.com. This website provides case studies on companies with practical experience in using e-marketplaces and sector specific industry reports. Another interesting feature of this website is the directory of e-marketplaces around the world.

Furthermore, CBI's external expert for castings and forgings states that e-marketplaces are very well suited for first contact and continuous contacts if a good relationship already exists.

However, for incidental orders (especially with high quality or technical requirements) e-marketplaces are less interesting. In this case, direct contact is often needed.

E-business in general requires a very open and honest communication, the CBI expert also observes. It is therefore important that exporters who make use of e-business applications always communicate correct and realistic data and information. This is something that all exporters have to keep in mind.

Other relevant e-business applications

EU experts mentioned the following relevant e-business applications for DC companies:

- Search engine marketing. Create a high ranking at search engines in order to become visible on the Internet. For more information about search engine marketing please refer to the CBI manual on website promotion "how to promote your website in the EU" which can be found on http://www.cbi.eu/marketinfo.
- Links on other websites. Having a link to your own company website on another website.
- E-mail follow up. Answering e-mails that have been sent to your company properly and fast.
- Online product catalogue. Create a product catalogue on your website with pictures, specifications and technical descriptions. A good example of an online product catalogue can be found on http://www.tycoflowcontrol-eu.com/products.asp.
- Present certificates or information about certifications on the website. http://www.gietech.de/english/company/quality.html.
- Information on an EU buyer website, a so called purchase partner application form, gives opportunities to get in touch with potential clients and gives information about buyers' requirements. A good example of information on an EU buyer website can be found on http://www.daf.com. Click on "suppliers" to see a whole page dedicated to all kinds of supply issues, including a "how to apply" section.
- Joining an e-marketplace. Present products on an e-marketplace to do business with visitors of that e-marketplace. Good examples of e-marketplaces are http://www.subcontractsolutions.com/SSMP/index.asp and http://www.sourcingparts.com.
- Electronic customer relationship management (E-CRM). E-CRM enables an organization to extend its infrastructure in ways that offer new opportunities to learn customer needs, add value, gain new economies and reach new customers.
- Electronic transaction processing. Important for order placement, invoicing and paying an order.
- Shipment notification. Tell clients when the products are shipped.
- Just in time service. Ordering and receiving goods JIT, which means when the client wants to have them. This is to minimise stock and therefore costs and storage room.
- Satisfaction research. Important to keep in touch and to know what clients think. Via the Internet this is fast, cheap and easy.
- Production status. Inform customers on the status of their product. Where is it in the production process and when will it be ready for shipment.

Must haves on websites

When asked for their opinion on the outline of a website from a company that they would consider contacting, EU buyers named the following features:

- Company information (when founded, history).
- Product information (pictures, technical drawings, possible specs).
- Information about production capacity.
- Information about the production process.
- Contact details (including the name of the direct contact person).
- Information about languages that are spoken and written.
- References/success stories.

More information EU experts
More information can be found in the document 'E-business in the castings and forgings sector'. Download it at http://www.cbi.eu/marketinfo, select 'castings and forgings' and 'European Union' in the scroll down menu and subsequently hit 'market surveys' in the filter search.

4.4 Useful sources

Construction industry
- Council of EU Producers of Materials for Construction (CEPMC) – http://www.cepmc.org
- European Construction Industry Federation - http://www.fiec.org
- European Network for Construction Forecasting - http://www.euroconstruct.org
- Example of a catalogue of construction castings http://www.nfco.com/literature/adobe/neenah_catalog-r12.pdf
- Examples of construction castings at Alibaba - http://www.alibaba.com/productsearch/Construction_Casting.html
- Examples of construction forgings at Alibaba - http://www.alibaba.com/productsearch/Construction_Forging.html

Engineering industry
- European Association of Gas and Steam Turbine Manufacturers - http://www.eunitedturbines.org
- EU Association of Internal Combustion Engine Manufacturers - http://www.euromot.biz
- European Committee of the Machine Tool Industries - http://www.cecimo.be
- European Committee for Valve Industry (CEIR) - http://www.ceir-online.org
- European Committee of Associations of Manufacturers of Agricultural Machinery - http://www.cema-agri.org
- European Committee of Associations of Manufacturers of Gears and Transmission Parts - http://www.euro-trans.org
- European Committee of Compressors, Vacuum Pumps and Pneumatic Tools - http://www.pneurop.org
- European Committee of Textile Machinery Producers - http://www.cematex.org
- European Engineering Industries Association – http://www.orgalime.org
- European Fluid Power Committee - http://www.cetop.org
- European Power and Electronics and Drives Association - http://www.epe-association.org
- Europump - http://www.europump.org
- Examples of engineering castings at Alibaba - http://www.alibaba.com/productsearch/Engineering_Casting.html
- Examples of engineering forgings at Alibaba - http://www.alibaba.com/productsearch/Engineering_Forging.html

Other useful sources
- Association of European Plastics Manufacturers - http://www.plasticseurope.org
- European Aluminium Association (EAA) – http://www.eaa.net
- European Confederation of Iron and Steel Industries (Eurofer) – http://www.eurofer.org
- European Zinc Association - http://www.iza-europe.info
- International Copper Study Group (ICSG) - http://www.icsg.org
- International Lead and Zinc Study Group (ILZSG) – http://www.ilzsg.org
- International Magnesium Association (IMA) - http://www.intlmag.org
- International Nickel Study Group (INSG) – http://www.insg.org
- International Rubber Study Group (IRSG) - http://www.rubberstudy.com
- News sites at http://www.alunet.net, http://www.magnesium.com and http://www.theengineer.co.uk, http://www.pumpengineer.net, http://www.stainless-steel-world.net, http://www.valve-world.net and http://www.worldpumps.com

5 PRODUCTION

5.1 Size of production

The foundry and forge industries are very differentiated and diverse. They consist of a wide range of installations, from small to very large, each with a combination of technologies and unit operations selected to suit the input, size of series and types of product produced in the specific installation. The production of both industries will be discussed separately.

Castings

The EU foundry industry is the second largest in the world for ferrous castings – far behind China – and the largest for non-ferrous. Table 5.1 shows an indication of the total castings production in the EU. The data have been collected by the European Foundry Association (CAEF) and contains not only data of member associations, but also data of non-member countries. Data for Ireland, Luxembourg and some of the new EU countries have not been provided; however, it is known that activity in these countries is low compared to the listed countries. In 2005, the EU production of metal castings totalled 15.2 million tons, an increase of 7% compared to 2001. The growth in production value in the mentioned period was twice as big – 14% - to €25,1 billion in 2005. Germany was by far the largest producer, accounting for about one third of total EU production volume. While the UK saw the largest growth in both value and volume between 2001-2005 (about +40%) and most other countries saw an increase in both value and volume as well, Belgian and French production decreased in the period mentioned.

Table 5.1 Production value and volume of castings by EU member country, 2001-2005, € million/ 1,000 tons

	2001		2003		2005		Change '01-'05	
	value	volume	value	volume	value	volume	value	volume
EU	**22,082**	**14,292**	**22,381**	**14,808**	**25,072**	**15,243**	**14%**	**7%**
Germany	9,445	4,651	9,315	4,723	10,985	5,108	16%	10%
Italy	-	2,393	-	2,441	-	2,541	-	6%
France	5,611	2,530	5,134	2,517	5,314	2,341	-5%	-7%
UK	1,900*	906	2,596	1,222	2,700*	1,261	42%	39%
Spain	1,835	1,098	1,961	1,150	2,453	1,308	34%	19%
Austria	1,045	306	1,029	299	1,118	324	7%	6%
Poland	746	745	1,007	729	1,106	802	48%	8%
Czech Republic	439	472	443	547	440*	518	0%	10%
Sweden	-	298	-	292	-	342	-	15%
Finland	304	130	293	121	368	138	21%	6%
Belgium	394	150*	250	100*	364	143	-8%	-5%
The Netherlands	199	131	193	126	-	-	-	-
Portugal	164	125	150	130	176	139	7%	11%
Hungary	-	121	-	156	36	170	-	41%
Lithuania	-	26	12	18	13	15	-	-43%
Denmark	-	91	-	89	-	93	-	3%
Slovenia	-	119	-	150	-	-	-	-

*estimated
Source: CAEF (2006)

As shown in Table 5.2, total production of castings in 2005 consisted for the major part of ferrous-metal castings (almost 80%). Within ferrous-metal castings, iron castings – although declining by 3% in the period 2001-2005 – accounted for more than half of the production. Nodular iron showed almost 30% growth between 2001-2005 – for a small part at the cost of malleable iron – and in 2005 it accounted for almost 40% of ferrous-metal castings in the EU.

Compared to ferrous metal castings (+5% between 2001 and 2005), non-ferrous metal castings performed much better (+20%). This was especially due to the rise in production of

light and ultra light castings. As opposed to this growing use of aluminium and (especially) magnesium, the use of copper and zinc for casting decreased 9% in the period 2001-2005.

Table 5.2 EU production volume of castings by type, 2001-2005, 1,000 tons

	2001	2003	2005	Change '01-'05
Ferrous metal	**11,377**	**11,519**	**11,923**	**5%**
Iron	6,736	6,585	6,505	-3%
Nodular iron	3,394	3,597	4,429	30%
Malleable iron	124	94	102	-18%
Steel	690	746	758	10%
Non-ferrous metal	**2,765**	**3,189**	**3,320**	**20%**
Copper alloy	281	334	255	-9%
Light and ultra light	2,204	2,649	2,821	28%
Zinc	242	238	220	-9%
Other alloy	14	15	16	16%

Source: CAEF (2006)

In addition to Table 5.2, the group of ferrous metal castings, although growing in volume, declined 3% in value in the period 2001-2005. As an opposite trend, the production value of ferrous metal castings rose approximately 20% in 2004 and 2005, while the volume grew only a few percent. In both years, this phenomenon was mainly due to the fact that rising raw material prices were passed on to the customer in the form of price tags. The group of non-ferrous metal castings grew 13% in value in the years 2001-2005. While the share of the two groups of total production volume was 80% versus 20% in 2005, in total production value this ratio was 60:40, partly due to the higher raw material prices involved.

Forgings

Table 5.3 shows an indication of the forgings production volume in the EU. In 2005, the members of the Federation of European National Forging Associations (Euroforge) produced 5.5 million tons of forgings, an increase of 4.4% compared to 2002. Germany was by far the largest producer in 2005, accounting for 47% of the total of all Euroforge members. The Czech Republic accounted for the largest growth of 55% in the period 2002-2005, for the major part due to strong exports. The only countries that saw a decrease in production were Italy (-10%) and Belgium (-11%).

Table 5.3 Production volume of forgings by Euroforge members, by EU member country, 2002-2005, 1,000 tons

	2002	2003	2004	2005	Growth '02-'05
Total	**5,293**	**5,242**	**5,551**	**5,528**	**4.4%**
Germany	2,290	2,335	2,570	2,620	14%
Italy	1,400	1,210	1,210	1,261	-10%
France	503	488	515	521	4%
Spain	290	291	316	321	11%
UK	295	272	294	294	0%
Poland	252	264	264	263*	4.4%
Czech Republic	150	234	234	232	55%
Sweden	77	81	81	89	16%
Belgium	36	30	30	32	-11%
Slovenia	-	21	21	23	10%**
Finland	-	16	16	20	25%**

*Partly estimated.
**Growth calculated for the period 2003-2005.
Source: Euroforge (2006)

As shown by Table 5.4, in the period 2002-2005 drop forging, press and upset forging grew 14%, open die forging decreased 12% and cold forging grew the fastest of all (19%). Finally, close die forging for non ferrous metal – accounting for less than 1% of total production in

2005 – declined almost 50% since 2002. As total Euroforge production increased 4% in 2002-2005, the decreasing number of factories of Euroforge members since 2002 (-4%) implicates a growing output per factory (+9.3%). As the number of employees per foundry remained almost stable, the output per employee also grew 9%.

Table 5.4 Production volume of forgings by Euroforge members, by type, 2002-2005, 1,000 tons

	2002*	2003	2004	2005	Change '02-'05*
Drop forging, press and upset forging	**3,545**	**3,633**	**3,872**	**4,047**	**14%**
• Production of forging industry (subcontracting)	2,541	2,701	2,886	2,998	18%
• In-house production of the automotive industry	294	315	336	330	6%
• In-house production of the finished assembly (subcontracting)	283	237	249	295	1%
• Forged catalogue items**	427	380	401	424	-1%
Cold forging	**342**	**359**	**383**	**409**	**19%**
• Production of cold forging industry	275	292	310	334	21%
• In-house production of consumer industries	67	67	73	75	12%
Open die forging	**1,361**	**1,233**	**1,275**	**1,196**	**-12%**
• Ring rolling	348	377	394	396	14%
• Other open die forging***	1,013	787	815	800	-21%
Close die forging for non-ferrous metal	**46**	**17**	**21**	**24**	**-48%**
Number of forge plants	**610**	**672**	**668**	**595**	**-4%**

Source: Euroforge (2006)
* excluding production of Finland and Slovenia.
** i.e. producers of standard parts for resale, such as flanges & fittings, piping, connectors, armatures, tools, machineries, etc…
*** excluding forged steel bar, blanks and railway rolling stocks.

Outlook

As most end users' industries are blooming, EU foundries and forges are completely booked for the years 2007. According to industry specialists the same goes for China. Some outsourced orders of small series even came back to the EU, as the order lead times of the Chinese foundry kept on increasing. Clearly, the Chinese foundry prioritised high value orders and finally, production returned to the EU. The growth in the industry is underlined by the International Iron and Steel Institute (IISI), indicating that the EU steel use in 2006 has been strong, with the construction and engineering industries leading in demand. As one of the major economies in the EU, the strong recovery in Germany has contributed to the 8% growth in (apparent) EU steel demand. For 2007, the IISI expects a weakening demand (-1.1%), while the average growth is expected to be 2.5% annually till 2010 and 1.7% annually in the period 2010-2015. While Western Europe will only record growth figures of 2.0% and 1.3% in the periods mentioned, the new EU countries will account for the higher growth figures.

5.2 Trends in production

Structural changes in the industry

The EU casting and forging industries are basically SME industries, with 80% of companies employing fewer than 250 people. In the EU foundry industry, for example, the average number of employees was about 100 per factory in 2005. In most EU countries the number of employees per foundry has decreased since 2001. Labour force in Austrian foundries shrank the fastest of all, by almost 50%. Especially the number of unskilled workers went down, evidence for the Austrian foundries' strategy towards top quality services. As a result of this strategy, the average turnover per worker increased from €83,000 in 2001 to €130,000 in 2005. This trend, though less powerful, is visible in virtually all EU countries. According to specialists, it was especially thanks to strong investments in innovative technologies that the EU industry succeeded in reducing the unskilled labour force and in improving processes and product quality. For the years to come, this trend is expected to continue, although to a lesser

extent in CEE countries because in these countries the wage costs have usually not yet reached the level at which an efficiency increase is necessary to survive.

Specialisation in the EU
The enlargement of the EU has led to a growing interest in foundries and forges in the new EU countries. For the countries concerned, the opening of their markets, combined with inward foreign investment, has lead to the implementation of new techniques, resulting in rising productivity and reducing their effects on the environment. Due to the (as yet) low wage costs in these countries, their competitive strength lies in jobbing factories (small series factories), mainly producing large castings, and in factories producing a broad range of products. To compete on the world market, West European foundries now focus on their technological skills, selecting niche markets which require complex castings with high precision, specific quality requirements, or those that need a quick or just-in-time delivery.

Large influence of the automotive sector
The high dependence on the automotive sector has a major influence on activities in the industry and concerns various aspects such as location, quality standards and innovation. One example of this dependence is that the automotive industry's shift towards lighter vehicles has lead to an increased demand for aluminium and magnesium castings.

Eco-efficiency
In recent decennia, the EU metal industry has been forced to focus on improving its so-called eco-efficiency. Regarding some of the major aspects of eco-efficiency – energy productivity and CO_2 emissions - the steel industry is particularly representative: between 1975 and 2000 the EU steel industry has cut its energy consumption and CO_2 emissions by 47% and 50% per ton of finished steel respectively. Other major aspects of eco-efficiency are described in the following sub-subsections.

Raw materials eco-efficiency
Innovation in the EU has been focussed on a better functionality and a reduction in material used. Well-known examples are the steel and aluminium beverage cans, but a better example is copper, for which important improvements in materials consumption have been made in the manufacturing of electricity cables. The thicker a cable, the better the conductivity and the lower the energy loss over the life-time of the cable. The copper itself contains part of the energy needed for the production. Through a Life Cycle Assessment, focused on energy, the industry has developed manufacturing processes based on an optimum consideration for the energy needed for the production, the use and the recycling of the cable.

Recycling
Recycling of metals accounts for 40-60% of EU unwrought metal output and is crucial for reducing emissions. Although currently used technologies are very efficient, the energy consumption in the process is still very high. Processing secondary metals saves energy and is therefore less environmentally intensive than producing primary metals, particularly in the case of aluminium and steel. For example, one ton of secondary steel generates only one fifth of the CO_2 emissions caused by one ton of primary steel production.

Supply risk
In recent years, the EU non-ferrous metal industry has faced serious problems in gaining access to scrap metals at competitive prices due to strong competition of some of the EU's largest trading partners. As a result, the industry has been forced to compensate for scrap material with ores and concentrates. In some cases, shifting to other input is not possible and has already led to reduced production or closure of sites, for example in the scrap copper sector. Over the next decade, this trend is expected to continue and may force several EU plants to cease operations. The producers to be most likely affected are aluminium and copper casters.

Risk of labour shortage
Both in West European and CEE countries, the industry faces a reduced interest among youth and students to become foundry or forge specialists or metallurgic engineers. In the UK it is even worse: skill shortage has continued to be a concern despite foundry closures and the resulting pool of skilled labour. This is because many former foundry workers decide to seek employment in another industry. As a result, the recruitment of labour from other EU countries has continued, with Poland being the most popular source of labour. While in the short term the UK foundries may be free of labour shortage, it is not a long term solution for the UK industry, since the Polish industry may start to face a labour shortage as well.

Optimism
Manufacturers in the EU are becoming more optimistic about their chances of survival. The reason is a partial shift towards higher-value, tailor-made products such as products that provide extra corrosion-resistance to the exteriors of cars or white goods. This will also reduce their reliance on mass production of commodity steel with technical characteristics easily matched by competitors. Some industry specialists say that the higher raw material prices have helped. By way of illustration, when steel should cost the same as dirt, customers did not necessarily expect so much from the supplier. Now prices have gone up, there is more of a dialogue about technical improvements and value for money. Moreover, as a result of the increasing raw material and energy prices, the labour factor in the cost price has decreased, strengthening the competitive position of the EU foundries and forges.

In spite of the optimism, there are some serious challenges for the EU industry. Remaining competitive is the most important, in particular concerning increasing prices of energy and materials. Other challenges will be ambitious environmental requirements, needs to improve sectoral skills, and managing structural change.

Opportunities and threats for developing country (DC) exporters
As wage costs keep on taking a large share in the costs of several cast and forged products (in Germany for example almost 50%), many of them can be very well manufactured in DCs. Of course there are still processes in EU foundries and forges that can be further automated, but investments will always be critically weighted against outsourcing to DCs. Especially when the cast or forged product is worked and the used material is not just iron but more sophisticated such as nodular iron or (non-ferrous) steel, opportunities for DC exporters grow exponentially. According to industry specialists, the general rule is that the more sophisticated the casting – referring to the material used and to the degree of working –, the larger the labour factor in the landed cost price (up to 40% in a DC) and the larger the interest of EU companies to outsource to DCs. Obviously, the major threat for DC exporters is a further decrease of the labour factor in the cost price because in that case the competitive advantage of the DC exporter, to the extent that it is based on low labour costs, deteriorates.

5.3 Useful sources

Some useful sources for further research include:
- European Foundry Association (CAEF) - http://www.caef-eurofoundry.org
- Federation of European Materials Societies - http://www.fems.org
- Federation of National Forging Associations (Euroforge) - http://www.euroforge.org
- Umbrella site of the German Steel Institute VDEh, the German Steel Federation and other organisations and institutes - http://www.stahl-online.de

6 IMPORTS

6.1 Total EU imports

Refer to Table 6.1 for the EU-imports of castings and forgings. The highlights in brief:

- Increase in total imports by 25% in value and 10% in volume between '01 and '05: confirmation of increasing globalisation in the industry as more products are bought from outside the EU and of increasing raw material prices which have been translated into price surcharges.
- Germany confirmed as largest import market by far in the EU.
- Emerging markets in new EU countries: high growth figures in imports.
- While extra-EU imports decreased 8% in value and 22% in volume, DCs' imports increased very fast: 85% in value and 35% in volume.

Table 6.1 Imports of castings and forgings by EU member countries, 2001-2005, € million / 1,000 tons

	2001		2003		2005		% Change '01-'05	
	value	volume	value	volume	value	volume	value	volume
Total	**167,701**	**140,447**	**170,512**	**144,769**	**209,380**	**153,830**	**25%**	**10%**
Intra EU	**114,368**	**98,617**	**119,673**	**102,383**	**160,169**	**121,224**	**40%**	**23%**
Extra EU	**53,333**	**41,830**	**50,838**	**42,386**	**49,211**	**32,606**	**-8%**	**-22%**
DC	**7,556**	**10,072**	**8,470**	**10,999**	**13,967**	**13,612**	**85%**	**35%**
Germany	34,877	25,171	34,677	24,639	39,836	25,619	14%	2%
France	24,585	19,071	23,127	18,285	28,023	18,767	14%	-2%
UK	19,577	11,816	19,126	10,986	21,844	10,948	12%	-7%
Italy	16,868	19,131	16,999	19,537	21,254	20,201	26%	6%
Spain	10,716	11,581	11,709	13,494	14,016	12,798	31%	11%
Belgium	10,985	10,576	11,071	11,984	13,861	13,797	26%	30%
the Netherlands	9,419	6,974	9,594	7,439	11,324	8,361	20%	20%
Austria	6,484	4,108	6,834	4,329	8,423	4,458	30%	9%
Poland	3,644	3,729	4,334	4,224	8,250	6,445	126%	73%
Sweden	5,703	3,506	5,935	3,972	7,344	4,298	29%	23%
Czech Republic	4,035	3,606	4,694	3,845	7,058	5,903	75%	64%
Denmark	4,240	2,974	4,245	3,490	5,392	3,449	27%	16%
Hungary	2,394	1,567	2,948	1,795	3,813	2,030	59%	30%
Portugal	2,909	3,679	2,809	3,444	3,254	3,188	12%	-13%
Finland	2,337	1,825	2,231	1,582	2,870	1,566	23%	-14%
Slovakia	1,309	1,193	1,735	1,432	2,555	1,869	95%	57%
Ireland	2,304	1,115	2,115	1,324	2,453	1,267	6%	14%
Greece	1,585	3,639	1,998	2,931	2,269	2,540	43%	-30%
Luxembourg	1,426	2,668	1,459	2,701	1,551	2,582	9%	-3%
Slovenia	1,017	1,042	1,145	1,154	1,545	1,217	52%	17%
Lithuania	360	378	542	566	854	784	137%	107%
Estonia	368	378	497	702	663	662	80%	75%
Latvia	279	390	351	464	539	602	93%	55%
Cyprus	166	268	208	388	263	390	58%	45%
Malta	114	63	127	62	127	90	12%	42%

Source: Eurostat (2006)

6.2 EU imports per product group

As can be seen from Table 6.2, all product groups, except copper and zinc products, increased in both import volume and value over the '01–'05 period. The largest growers were plastic and rubber products and parts of machinery, railway equipment or vehicles. In all product groups the share of the new EU countries increased fast (between 3% and 7% in '01-'05) at the cost of the former EU15 countries. One extreme example is Poland in the product group 'parts of machinery, railway equipment or vehicles': its share grew from 0.02% (€ 12 million) in 2001

to 2% (€ 1 billion) in 2005. Of the new EU countries, Lithuania grew the fastest of all, followed by Poland, Slovakia and Latvia. Main highlights per product group are:

Copper and zinc products
- Small decrease in EU-imports in value (-1.8%) between '01 and '05, but an increase in volume (16.3%).
- As in '01, the largest importers in '05 were Germany, Italy and France
- Largest intra-EU suppliers: Germany, France, Italy. Total intra-EU supply grew 3% between '01 and '05.
- Most imported products: 1) copper wire and 2) copper plates, sheets and strips.
- Products that saw strong growth between '01-'05: 1) cloth, grill and netting of copper wire, 2) articles of zinc, 3) nails and similar articles of copper and 4) stranded wire, cables and plaited bands of copper.

Plastic and rubber products
- Increase in EU-imports both in volume and value: 25% and 20% between '01 and '05.
- Largest importers ('05): Germany (-2% compared to '01), France and the UK (both stable)
- Largest intra-EU suppliers remained Germany, Italy and Belgium. Total intra-EU supply grew 5% between '01 and '05.
- Most imported products: 1) plates, sheets, film, foil and strip of non-cellular plastics, 2) self-adhesive plates and other flat shapes of plastics and 3) articles of vulcanised rubber
- Products that saw strong growth between '01-'05: 1) strips, rods and profile shapes of cellular rubber, 2) articles of vulcanised rubber, 3) plates, sheets, film, foil and strip of non-cellular plastics and 4) plastic and rubber products

Parts of machinery, railway equipment or vehicles
- Increase in EU-imports in both volume and value: 24% and 6% between '01 and '05.
- Largest importers ('05) remained Germany, the UK and Italy, but all three countries lost 1--2% share.
- Largest intra-EU suppliers remained Germany, Italy and France. Total intra-EU supply increased 8% between '01 and '05.
- Most imported products: 1) parts of turbo-jets or turbo-propellers, 2) parts of ship derricks, cranes and several construction machinery, 3) parts of gas turbines and 4) parts of machines and mechanical appliances, not elsewhere specified.
- Products that saw strong growth between '01-'05: 1) parts of tools, 2) parts of several machinery (such as machinery for working rubber or plastics and for construction), 3) bulldozer or angle dozer blades, 4) turbo-propellers, 5) parts of gas turbines, engines and motors and 6) cranks and crank shafts, non-driving axles of closed-die forged steel and aluminium parts and accessories for tractors and transport vehicles.

Articles of iron, steel or base metal
- Increase in EU-imports in both volume and value: 15% and 31% between '01 and '05.
- Largest importers ('05): Germany (-3% compared to '01), France (stable) and the UK (+1%).
- Largest intra-EU suppliers: Germany, Italy, France (top 3 unchanged). Total intra-EU supply increased 10% between '01 and '05.
- Most imported products: 1) articles of iron or steel (excluding cast articles) 2) screws, bolts, nuts, coach screws, screw hooks, rivets and other articles of iron or steel and 3) structures and parts of structures such as bridges and bridge-sections, lock-gates, towers, lattice masts, roofs, roofing frameworks, doors and windows and their frames and thresholds for doors, shutters, balustrades, pillars and columns.
- Products that saw strong growth between '01-'05: 1) cast grinding balls and similar articles for mills, 2) springs and leaves of iron or steel, 3) base metal mountings, fittings and similar articles suitable for furniture and 4) other articles of iron and steel (excluding cast articles).

Iron and steel products

- Increase in EU-imports in both volume and value: 8% and 50% between '01 and '05.
- Largest importers ('05): Germany, Italy (-1%) and France (-2%).
- Largest intra-EU suppliers: Germany, France and Belgium (top 3 unchanged). Total intra-EU supply increased 3% between '01 and '05.
- Most imported products: flat-rolled products of iron, (non-) alloy and stainless steel.
- Products that saw strong growth between '01-'05: 1) iron and non-alloy steel in primary forms, 2) flat-rolled products of alloy steel and 3) semi-finished products of iron or non-alloy steel.

Light and ultra light products

- Increase in EU-imports in both volume and value: 5.3% and 5.9% between '01 and '05.
- Largest importers ('05): Germany (-1%), France and the UK (both stable).
- Largest intra-EU suppliers: Germany, France and Italy (top 3 unchanged) . Total intra-EU supply increased 5% between '01 and '05.
- Most imported products: 1) aluminium plates, sheets, strip, bars, rods, profiles, 2) aluminium foil and 3) aluminium structures and parts of structures.
- Products that saw strong growth between '01-'05: 1) titanium tubes and pipes with attached fittings, 2) articles of magnesium, 3) stranded wire, 4) cables and plated bands of aluminium and 5) articles of titanium.

Table 6.2 EU imports and leading suppliers of castings and forgings to the EU, 2001-2005, share in % of value

Product	2001 € mln	2003 € mln	2005 € mln	Leading suppliers (%)	Share (%)
Total	167,701	170,512	209,380	Intra EU : Germany (20), France (9), Italy (8) Ext EU excl DC: USA (6), Switzerland (2), Russia (2) DC : China (2), Turkey (1), India (1), Brazil (1), South Africa (0), Mexico (0)	76 17 7
Copper and zinc products	6,838	5,586	7,956	Intra EU : Germany (28), France (14), Italy (7) Ext EU excl DC: Russia (3), Switzerland (2), USA (2) DC : Turkey (2), China (1), India (0), Peru (0), Chile (0), Serb.Monten. (0)	84 11 5
Plastic and rubber products	20,116	21,283	24,184	Intra EU : Germany (26), Italy (12), Belgium (8) Ext EU excl DC: USA (4), Switzerland (3), Japan (2) DC : China (1), Turkey (1), India (1), Thailand (0), Brazil (0), Indonesia (0)	84 12 4
Parts of machinery, railway equipment or vehicles	50,047	47,985	52,951	Intra EU : Germany (19), Italy (8), France (6) Ext EU excl DC: USA (17), Switzerland (4), Japan (3) DC : China (1), Turkey (1), Brazil (0), India (0), Saudi Arabia (0), South Africa (0)	64 31 5
Articles of iron, steel or base metal	26,970	28,955	35,216	Intra EU : Germany (24), Italy (10), France (6) Ext EU excl DC: USA (3), Switzerland (3), Taiwan (2) DC : China (7), Turkey (1), India (1), Malaysia (0), Croatia (0), Thailand (0)	76 13 11
Iron and steel products	48,800	52,019	73,268	Intra EU : Germany (16), France (11), Belgium (11) Ext EU excl DC: Russia (3), Ukraine (2), Switzerland (1) DC : Turkey (1), China (1), Brazil (1), India (1), South Africa (1), Mexico (0)	82 11 7
Light and ultra light products	14,930	14,683	15,806	Intra EU : Germany (21), France (8), Italy (7) Ext EU excl DC: Switzerland (4), Norway (4), USA (3) DC : Turkey (2), China (1), Croatia (1), Egypt (1), Venezuela (0), South Africa (0)	77 17 6

Source: Eurostat (2006)

6.3 The role of the developing countries in imports per product group

Refer to Table 6.3 for the EU-imports per product group from DCs, while Table 6.2 includes an overview of supplying DCs. For the aggregate of all product groups, the main highlights are:

- EU imports from DCs grew more than three times faster than total imports.
- DCs realized an increasing share in EU imports, from 4.5% in 2001 to 6.7% in 2005

- Total share of DCs was largest in articles of iron, steel or base metal. The products with the largest shares for DC imports were anchors and grapnels (26%), base metal mountings and fittings (22%) and castors (20%). Some other products from DCs that accounted for more than 20% of total imports were stranded copper wire (26%) and some parts of machinery.
- Among the DCs that saw the largest increase in exports to the EU were Oman, Cuba, Morocco, Colombia, China, Albania and Bosnia and Herzegovina.

Main highlights per product group are:

Copper and zinc products
- Total share of DCs: 4.8% in 2005 (3.8% in 2001)
- Major DC suppliers: Turkey, China, India. Compared to 2001, India replaced Serbia Montenegro as number three DC supplier
- Compared to '01, especially Egypt, Argentina, Brazil, China, Turkey and India grew fast.
- Most important products: 1) (stranded) copper wire, cables, plaited bands, 2) copper plates, sheets and strips and 3) articles of zinc.
- Products that saw strong growth between '01-'05 are: cloth, grill and netting of copper wire, copper foil, stranded wire, cables and plaited bands of copper and other articles of copper.

Plastic and rubber products
- Total share of DCs: 3.9% in 2005 (was 2.3% in 2001)
- Major DC suppliers remained China, Turkey and India.
- Compared to '01, especially Oman, Lebanon, Chile, Argentina and Saudi Arabia grew fast.
- Most important products: 1) plates, sheets, film, foil and strip of non-cellular plastics (49% of the category), 2) articles of vulcanised rubber and 3) plates, sheets, film, foil and strip of plastics.
- Products that saw strong growth between '01-'05 are: 1) plastic monofilament, rods, sticks and profile shapes, 2) sheets, film, foil and strip of non-cellular plastics, 3) self-adhesive plates and other flat shapes of plastics and 4) rods, tubes and profile shapes of non-cellular rubber.

Parts of machinery, railway equipment or vehicles
- Total share of DCs: 4.9% in 2005 (was 3.4% in 2001)
- Major DC suppliers remained China, Turkey and Brazil. Brazil replaced Saudi Arabia as number three DC supplier
- Compared to '01, especially Sri Lanka, Pakistan, China, Moldova, Albania, Algeria, Turkey and Bosnia and Herzegovina grew fast.
- Most important products: 1) parts of machinery in the category ship derricks, cranes, construction machinery, 2) aluminium road wheels, parts and accessories for tractors and motor vehicles for the transport of ten or more persons and 3) parts of machinery for working mineral substances.
- Products that saw strong growth between '01-'05 are: 1) parts of several machinery (such as machinery for preparing or making printing blocks, for the manufacture of food or drink, for making up tobacco, for milking and dairy and for calendaring or rolling machines), 2) parts of several tools (such as pneumatic tools and tools for working stone), 3) track fixtures and fittings and mechanical traffic control equipment for railways and tramways, 4) bulldozer or angle dozer blades, 5) rolls for metal-rolling mills, 6) turbo-propellers and 7) cranks and crank shafts of open-die forged steel.

Articles of iron, steel or base metal
- Total share of DCs was 10.9% in 2005 (6.7% in 2001) and major DC suppliers were China, Turkey and India.
- Compared to '01, especially North Korea, Saudi Arabia, Bosnia and Herzegovina, Tunisia, China, Argentina and Vietnam grew fast.

- Most important products: 1) screws, bolts, nuts, coach screws, screw hooks, rivets and other articles of iron or steel, 2) structures and parts of structures
- Products that saw strong growth between '01-'05 are: 1) sheet piling of iron or steel whether or not worked or assembled, 2) nails, tacks and similar articles of iron or steel, 3) wire of iron or steel, barbed, twisted hoop, single flat or loosely twisted double wire, 4) screws and similar articles of iron or steel, 5) base metal mountings, fittings and similar articles suitable for furniture, 6) cloth, grill, netting and fencing of iron or steel wire, 7) structures and parts of structures and 8) cast grinding balls and similar articles for mills.

Iron and steel products

- Total share of DCs: 7% in 2005 (was 5% in 2001)
- Major DC suppliers: Turkey, China and Brazil. China replaced South Africa as number two DC supplier
- Compared to '01, especially Georgia, Egypt, Cuba, Morocco, China, Colombia and Egypt grew fast.
- Most important products: 1) flat-rolled products of iron or non-alloy steel, 2) bars and rods of iron or non-alloy steel and 3) semi-finished products of iron or non-alloy steel
- Products that saw strong growth between '01-'05 are: 1) flat-rolled products of alloy steel, 2) iron and non-alloy steel in primary forms, 3) bars and rods of alloy steel and 4) stainless steel in primary forms.

Light and ultra light products

- Total share of DCs: 6.3% in 2005 (was 4.8% in 2001).
- Major DC suppliers: Turkey, China and Croatia. China and Croatia replaced Venezuela and Egypt as number two and three DC supplier.
- Compared to '01, especially Malaysia, South Africa, Bosnia Herzegovina, Oman and China grew fast.
- Most important products: 1) aluminium plates, sheets, strip, bars, rods, profiles, 2) aluminium wire and foil and 3) aluminium structures and parts of structures such as bridges and bridge-sections, towers, lattice masts, pillars and columns, roofs, roofing frameworks, doors and windows and their frames and thresholds for doors, shutters, balustrades.
- Products that saw strong growth between '01-'05 are: 1) titanium bars, rods, profiles and wire, 2) cloth, grill, netting and fencing of aluminium wire, 3) structures and parts of structures and 4) articles of magnesium.

Opportunities and threats for DC exporters

Opportunities for DC exporters:

+ Increasing share of DC suppliers in EU-imports for all product groups
+ Growing EU-imports in absolute terms from DC suppliers as well
+ Generally speaking, exports of labour-intensive products to the EU are doing well; this is underlined by the average growth of DC exports of machinery parts.
+ Average value of imports from DCs increased 37%, while total EU imports only increased 14% compared to 2001. There are some products that saw a large increase of the average import price. For example, import prices of titanium articles from DCs increased more than 90%, while the average EU import price of this product decreased 10%. This suggests that the EU increasingly imported high value titanium articles from DCs. The same, but to a lesser extent, goes for the following products:
  - Parts of machinery for manufacturing paper products and beverages
  - Axles, for electrical purposes, wheels and parts thereof for locomotives or rolling-stock
  - Railway or tramway track construction material of iron or steel such as rails, switch blades and crossing pieces
  - Parts of steam and other vapour turbines
  - Titanium bars, rods, profiles and wire
  - Turbo-propellers
  - Semi-finished products of iron or steel

- Grinding balls and similar articles for mills, cast
- Parts and accessories of closed-die forged steel for several industrial vehicles
- Sheet piling whether or not worked and assembled

Major threats for DC exporters:
– Strong competition from China, which is the largest DC supplier in several product groups
– There were several products, imported from DCs, that saw large price decreases in the period '01-'05, or relatively small price increases compared to total EU imports of those products. For example, import prices of parts of food machinery from DCs increased only 13.9%, while the price of total EU imports of this product more than tripled. This may suggest that the EU increasingly imported low value parts from DCs, while it may also be partly due to increased price pressure as a result of competition. The same, but to a lesser extent, goes for the following products:

- Parts of machinery for preparing or making up tobacco
- Track fixtures and fittings and mechanical equipment for railways and tramways
- Parts and accessories for machine-tools for working metal
- Non-driving axles of closed-die forged steel for tractors and specific motor vehicles
- Cranks and crank shafts of cast iron or cast steel
- Copper springs
- Screws, bolts, nuts and similar articles of iron or steel
- Parts of electric motors, generators and generating sets of cast iron or cast steel
- Parts of hydraulic turbines and water wheels
- Parts and accessories for machines-tools for working hard materials
- Brakes and parts thereof for railway or tramway locomotives or rolling-stock
- Parts of lifting and handling machinery
- Moulding boxes for metal foundry
- Strip, rods and profile shapes, of cellular rubber
- Cylinders and parts for calendaring or other rolling machines
- Parts of book-binding, textile preparation or sewing machinery
- Buckets, shovels, grabs and grips for machinery

Table 6.3 Castings and forgings supplied to the EU by DCs, 2001-2005, € million / 1,000 tons / share (%) of imported value

	2001			2003			2005		
	value	vol	share	value	vol	share	value	vol	share
Copper and zinc products	259	82	3.8%	260	99	4.6%	384	106	4.8%
Plastic and rubber products	457	150	2.3%	602	230	2.8%	938	374	3.9%
Parts of machinery, railway equipment or vehicles	1,707	285	3.4%	1,849	407	3.9%	2,604	626	4.9%
Articles of iron, steel or base metal	1,812	1,091	6.7%	2,281	1,606	7.9%	3,835	2,527	10.9%
Iron and steel products	2,601	8,174	5.3%	2,780	8,329	5.3%	5,217	9,542	7.1%
Light and ultra light products	720	289	4.8%	698	329	4.8%	988	438	6.3%

Source: Eurostat (2006)

6.4 Useful sources

- EU Expanding Exports Helpdesk
  ➔ http://export-help.cec.eu.int/
  ➔ go to: trade statistics
- Eurostat – official statistical office of the EU
  ➔ http://epp.eurostat.cec.eu.int
  ➔ go to 'themes' on the left side of the home page
  ➔ go to 'external trade'
  ➔ go to 'data – full view'
  ➔ go to 'external trade - detailed data'

7 EXPORTS

Refer to Table 7.1 for the EU-exports of castings and forgings. The main highlights:

- Total EU exports in 2005 increased 29% in value compared to 2001. In volume, this growth was only 15%. This difference is especially due to rising raw material prices.
- The EU is a net exporter – total export value is 20% more than total import value.
- Germany is by far the largest exporter, accounting for more than a quarter of total EU exports. Italy is second largest, followed by France and the UK.
- Although the exact value of re-exports can not be given by means of Eurostat, industry experts confirm that re-exports play a minor role.
- Almost every country realized good growth in export volume; the exceptions were Ireland, Finland, Luxembourg and Denmark. Finland, however, saw an increase in export value of 43%, as such being one of the countries that managed to increase exports of high added value products.
- Product groups: iron and steel products were exported the most in 2005 (accounting for almost one third of all exports), followed by parts of machinery, railway equipment or vehicles (28%) and articles of iron, steel or base metal (17%).
- Largest growth in exports between '01 and '05 was also realized by iron and steel products (+56%), followed by articles of iron, steel or base metal (+32%) and plastic and rubber products (+23%).
- Most products were exported within the EU (67%). Germany, France and the USA were the most important destinations for EU exports.

Table 7.1 Exports of castings and forgings by EU member countries, 2001-2005, € mln / 1,000 tons

	2001		2003		2005		% Change '01-'05	
	value	volume	value	volume	value	volume	value	volume
Total	**195,867**	**142,878**	**199,738**	**152,087**	**251,920**	**165,000**	**29%**	**15%**
Intra EU	**118,197**	**104,609**	**121,326**	**106,816**	**169,024**	**127,532**	**43%**	**22%**
Extra EU	**77,670**	**38,269**	**78,412**	**45,271**	**82,896**	**37,469**	**7%**	**-2%**
DC	**21,403**	**11,751**	**24,524**	**17,175**	**31,903**	**17,670**	**49%**	**50%**
Germany	51,622	29,718	53,127	31,794	63,856	35,257	24%	19%
Italy	23,564	14,118	23,292	14,101	30,158	16,703	28%	18%
France	24,815	18,925	23,410	19,656	27,452	19,801	11%	5%
UK	19,460	8,185	17,952	8,542	21,598	10,129	11%	24%
Belgium	16,045	17,800	16,175	18,251	20,732	19,755	29%	11%
the Netherlands	10,283	7,548	11,446	9,519	14,226	10,394	38%	38%
Austria	8,113	5,815	8,894	6,497	11,459	7,155	41%	23%
Spain	8,293	7,300	8,750	7,771	11,070	8,101	33%	11%
Sweden	8,153	4,770	8,574	5,040	10,565	5,019	30%	5%
Czech Republic	4,720	5,685	5,243	5,960	7,713	6,296	63%	11%
Poland	2,842	4,725	3,180	4,966	7,132	6,104	151%	29%
Finland	3,941	3,187	4,486	3,927	5,627	2,751	43%	-14%
Denmark	3,307	1,534	3,500	1,580	4,083	1,503	23%	-2%
Slovakia	1,792	3,715	2,325	4,302	3,445	4,129	92%	11%
Hungary	1,782	1,236	2,005	1,171	3,336	1,944	87%	57%
Luxembourg	2,606	5,198	2,514	4,704	2,873	4,683	10%	-10%
Portugal	967	950	1,286	1,467	1,700	1,755	76%	85%
Slovenia	1,094	581	1,161	664	1,682	826	54%	42%
Greece	1,122	771	1,014	845	1,268	980	13%	27%
Ireland	812	281	683	173	731	172	-10%	-39%
Estonia	212	129	313	361	432	448	104%	246%
Latvia	172	608	226	678	416	837	143%	38%
Lithuania	98	92	140	114	323	250	231%	171%
Malta	24	2	32	1	29	4	20%	115%
Cyprus	28	5	9	4	11	6	-61%	28%

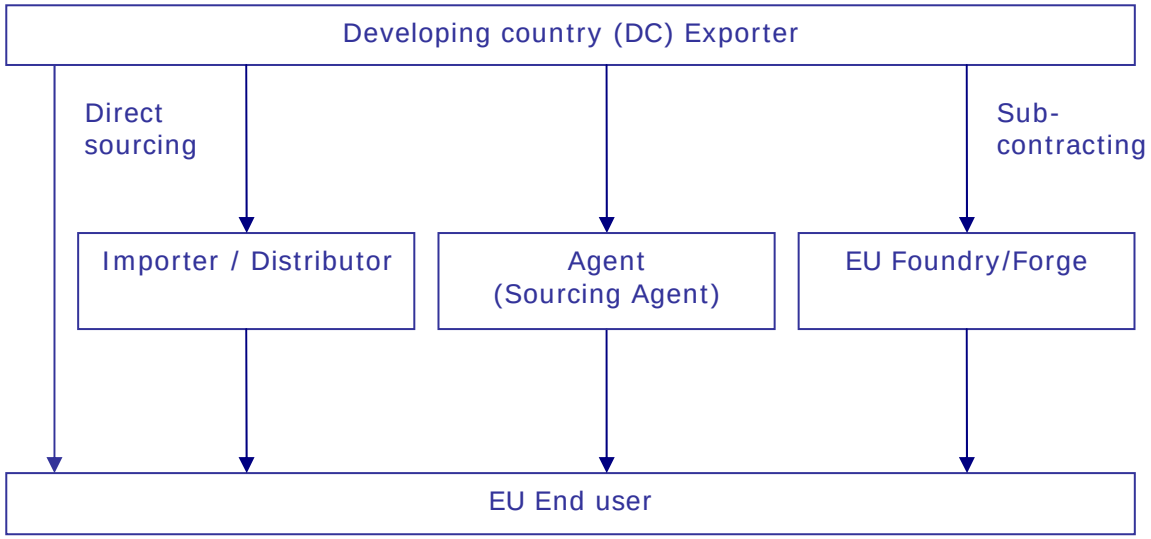
Source: Eurostat (2006)

8 TRADE STRUCTURE

8.1 Distribution channels

Figure 8.1 gives an idea of the trade channels for castings and forgings in the EU. Of course there are other options and possibilities, depending on the product characteristics and the end user. Figure 8.1 applies in principle to every EU country, although the shares of the several channels may differ from country to country and from product group to product group.

Figure 8.1 Trade channels castings and forgings in EU



Definition of EU end user

Before discussing relevant trade channels, it is wise to sharpen the definition of the EU end user. As can be read in Section 4, major EU end users of castings and forgings are operating in different segments. The most important segments are discussed below.

- **Engineering.** DC exporters of castings and forgings may find many prospects in this segment. Beside the Original Equipment Manufacturers (OEMs), the sector consists of many subcontractors of OEMs that produce assembled parts such as units, modules and subsystems. These subcontractors - often SMEs – use a considerable number of castings and forgings. Most important is that quality requirements in this sector are not as high as in the automotive industry.
- **Construction.** The construction industry is a large end user of castings and forgings as well. The industry consists of many large pan-European construction conglomerates, which is shown by the fact that the top ten of them alone accounted for €120 billion in sales in 2005.
- **Automotive.** Although this is a very large segment, DC exporters of castings and forgings are advised not to focus on this segment. Quality requirements are usually very high, competition is mainly on price and, above all, the order quantities involved are far too large to be met by the average DC exporter. For more information on trade structures in the automotive industry, turn to the CBI survey covering the EU market for mobile equipment parts.

Relevant trade channels

As can be seen from Figure 8.1, trade channels in the EU are ‘direct sourcing’, ‘importer/distributor’, ‘agent’ and ‘subcontracting’. These trade channels are discussed below.

Direct sourcing

Most often, end users in the EU buy their castings and forgings directly from an EU foundry or forge. It is difficult for DC exporters to start supplying them directly, as it involves very large

contracts due to the considerable demand of these large end users. Moreover, several of them aim to reduce the supply-chain costs with single sourcing concepts. Nevertheless, direct sourcing gives a better chance of a long-lasting relationship and therefore DC exporters should put efforts into building up supplier relationships with end users in the EU. Quality is a major selection criterion. Although the OEMs often manage supplier selection programmes with strict selection criteria, these companies know that starting a new supplier relationship takes time and efforts of both parties and that quality failures may occur in the first few months.

A considerable number of large OEMs have already developed a global sourcing management system in which the sourcing of parts in LCCs is an important aspect. Such companies with experience in sourcing from LCCs may be good prospects, but there are still many more prospects in the EU, without experience in sourcing from DCs.

Importer/Distributor

Virtually all importers of castings and forgings also take care of the distribution of the product. They know local markets thoroughly and have a very good network in the EU target market. Most importers have built up strong relationships with end users and are sometimes regarded as their preferred house supplier. Importers buy on their own account and their activities are increasingly focused on additional services around the product itself, e.g. marketing, quality assurance, sourcing and transfer of knowledge, stock keeping, fast delivery and after-sales service. In order to maintain their competitiveness, they need to be well informed about their customers and the market, making maximum use of information sources and the available infrastructures. Most importers have several suppliers, which enables them to supply the customer fast and keep him satisfied.

In most cases, exporters do not know the importers' customers. As a rule of thumb, importers must mark up their landed cost price with 15-35% in order to be able to sell a product. Sometimes, the importer supplies to a distributor. In such a case, the distributor's margin is often the discount they are allowed by the importer (about 10%). As such, a distributor is not a direct customer for DC exporters. Furthermore, in some cases the importer may decide to act as an agent. This will especially be the case when it concerns a major delivery of parts to one of his customers and when competition is strong. In such a case, the importer will settle for a lower commission. There are also some examples of EU foundries that have set up a trading company. One of them is the Dutch foundry 'Nijmegen Iron Foundry' (http://www.nijg.com), which – because of increasing competition from LCCs like China – set up the trading company TTI (http://www.tti-bv.com) to manage imports of castings particularly from China but also from other LCCs.

Although in some cases this may be the preferred channel for a DC exporter, please keep in mind that, in a number of cases, DC exporters have experienced that the relation with an importer is not an enduring one. In these cases which concerned relatively standard parts, the importer decided to change to another, even cheaper source after a period of time.

Agent

For a better access to potential customers in a new country, agents may be a good choice. They are often one-man businesses specialized in one product group, such as valves and fittings. They do not keep stock but only close the deal between the supplier and the customer. The supplier remains (also financially) responsible for the goods until they have been delivered to the customer. In return, the agents receive a commission, which depends on variables like the character of the product and the size of the order. The mark up of agents generally varies between 3 and 7%. They often deal in tailor-made products and not so much in standard products with a high turnover rate that need to be available from stock on demand. While the traditional importer can act as an agent at times, agents are sometimes asked by their customers to keep (some) stock in order to be able to supply them faster. The role of the agent will probably increase in the future as end users will look for lower purchasing costs.

Several agents have built up strong relationships with customers and are sometimes regarded as their preferred house supplier. These agents may act as a professional intermediary, also in cases of quality problems or when communication with the end user is necessary. Contrary to that, other agents may only be focussed on closing the deal and are not willing to interact in case of problems. DC exporters should be aware of that.

Another channel worth mentioning here is the sourcing agent, although in many cases there may be hardly a difference between a sourcing agent and an importer/distributor when considering responsibilities and margins. Such a sourcing agent often has an office overseas and is specialized in matching supply in DCs and demand in the EU. A sourcing agent may deal with OEMs and subcontractors in the EU, but sometimes also supports an EU foundry or forge in the search for a reliable subcontractor in a DC.

Subcontracting

Subcontracting means that a DC exporter performs a full process for an EU foundry or forge. It often concerns labour intensive production. Sometimes subcontracting is also referred to as 'off loading'. The willingness to form subcontractor relationships with DC exporters differs from country to country. Generally speaking, the German companies take the lead in the EU in this area, in several cases forming joint ventures with DC exporters. In some other countries there are pioneers as well. In the Netherlands, for example, the aluminium foundry Eurotech (http://www.eurotechgroup.nl) has developed sustainable subcontractor relationships with DC exporters in which knowledge transfer plays an essential role.

According to some industry specialists, EU foundries and forges will increasingly form partnerships with DC exporters, while other specialists fear that EU foundries and forges will only act as intermediaries. In that case, they will miss any opportunities arising from a potential shift of taxation away from import tariffs. In the case of partnerships, the EU foundry or forge will take care of design, research and development, while the DC exporter will be responsible for the actual production. So far, this primarily concerns large volumes of standardized products, but this is set to change in the future.

Share in distribution

It is not possible to give an overview of the shares of all trade channels for castings and forgings in the EU as there are so many different kinds of products and end user segments. First of all, catalogue items are the products that are most suited to trade by intermediaries. Opposite to that, complex products are more tailored to the needs of the customer and are less suitable to hold in stock. The agent is better positioned to match demand and supply in that case. One industry expert also expected that the role of the agent will increase in the future due to the lower margins end users aim for. The most important of all is the overall assumption that direct sourcing will increase in the future due to the growing number of trade leads and marketplaces in which buyers and sellers of castings and forgings meet virtually. Some EU buyers already purchase their products via these digital platforms.

Differences in EU countries

The trade channels mentioned generally apply to all EU countries. However, some differences regarding the trade structure for the engineering industry can be mentioned. Especially in Northern Europe (Scandinavia, but also Belgium, the Netherlands and the UK), the importers- and distribution channel is generally well developed and sophisticated. This is mainly because these countries have not had major production of engineering products themselves, and have been dependent on imports for years. This in contrast to countries which have (had) a strong manufacturing tradition, like Germany. In these countries, experience with importing is comparatively low and experience has to be built up. Contrary to Germans, Italians are well known for their trading in castings and forgings. Furthermore, in Central and East European (CEE) countries the importers- and distribution channel is still of minor importance due to the former (Soviet) state-regulated trade in these countries.

Suggestions to DC exporter
Some major points on how to become a successful exporter to the EU market are discussed in this subsection.

Adding value by joining forces
In order to be competitive in the EU market, certainly when competing with Chinese producers, it is important that DC exporters add value to their product. The more sophisticated the casting, the higher the labour factor in the landed cost price and the larger the interest of EU companies to source in DCs. See Subsection 5.2 for more information on this issue. DC exporters have better chances in succeeding when they join forces. By working together, they can offer not only a loose part or component to the customer in the EU, but also a higher-added value product. For example:
1. Company A casts or forges a crankshaft;
2. Company B treats the crankshaft and fits a bearing wheel;
3. Company C finishes the product and adds a coating to the component;
4. EU subcontractor does the final assembly and fits the component with other ones into an end product.

Selection criteria
For potential customers, low cost prices are important, but they are no guarantee for business. They are basing their selection of exporters increasingly on:
- Product quality (compliance with specifications and standards)
- Flexibility (quantity, labelling, packaging units)
- Reliability (quality, delivery time, cost)
- Pro-active attitude to provision of additional services
- Quality of the organisation
- Total landed costs (product, transport, damage, required control, etc.)

Internet
Internet offers many opportunities for DC exporters. A website showing well-defined products, competitive advantages and customer references, even if not serving as a sales channel, would help a lot to create a trustworthy environment.

8.2 Useful sources

This subsection mainly discusses sources which exporters may use to find prospects for their own businesses. It should, however, be noted that they mainly cover the engineering industries and they are meant as an example. For useful sources in the automotive industry, please refer to the CBI market survey covering the EU market for automotive components. For more names and websites of associations, intermediaries, end users and manufacturers, refer to the CBI market surveys covering the castings and forgings market in individual EU countries. Section 4 and Section 5 may also contain relevant sources.

Intermediaries
In a number of EU countries, associations of agents or importers/distributors can provide a list of their members. Some examples of such associations are:
- France: Federation of French Commercial Agents – http://www.comagent.com
- Germany: Association of Commercial Agencies and Distribution – http://www.cdh.de
- The Netherlands: association of intermediaries - http://www.vnt.org

Engineering trade associations
- Association of European Pump Constructors - http://www.europump.org
- European Committee Of Associations Of Manufacturers Of Agricultural Machinery - http://www.cema-agri.org
- European Committee of Textile Machinery Manufacturers - http://www.cematex.org

- European Committee of National associations of Plastics and Rubber Machinery Manufacturers (representing eight EU countries) – http://www.euromap.org
- European Federation of Materials Handling and Storage Equipment - http://www.fem-eur.com
- European Packaging Machinery Association - http://www.europama.org
- Virtual industrial exhibition - http://www.directindustry.com.

Other useful sources

- Ariba E-market place - http://www.freemarkets.com
- Example of a supply management website (of Rolls-Royce) - http://www.suppliermanager-online.com.
- Marine parts E-market place - http://www.marineprovider.com
- Metals About - http://metals.about.com. This site contains an extensive list of metal suppliers and intermediaries.
- Shipserv Tradenet E-market place - http://www.shipserv.com
- Sourcing parts E-market place - http://www.sourcingparts.com
- Subcontract solutions E-market place - http://www.subcontractsolutions.com

9 PRICES

9.1 Price developments

The differences in production processes, the large number of possible materials, the different volumes (weight, size, shape) and batch sizes and the wide range of end products make it hard to provide an overview of market prices. Moreover, they differ from statistical prices because products are imported as e.g. car parts or locks and not as castings or forgings, resulting in large price differences. However, some trends in the EU that affect prices of castings and forgings can be given.

Price pressure
In general, prices and margins are and will continue to be under pressure. This may be underlined by the fact that prices in the engineering industry increased only 6% in the period 2000-2005. In that period, the global economic recession, problems within the EU economy, the global competition and increasing production costs have placed severe pressure on the prices and therefore on the margins of intermediate goods in the supply chain. Therefore, importers/agents and OEMs as well as their suppliers keep on looking for opportunities to reduce cost prices by 10-30%.

Soaring raw material prices
In recent years, soaring prices of materials like plastics, aluminium, steel and scrap steel have caused problems in the EU industry. This has been particularly visible in the aluminium die-casting sector, where several companies have felt an increased pressure on profits when raw material price increases could not be passed on to the customer. In case of any changes in raw material prices, EU producers will try to translate them into material-cost surcharges as soon as possible. For the German foundries for example, an increase of 20% in the cost of raw materials will push production costs up by about 4%, almost twice the percentage of the return on their sales. Although in recent years, EU producers have benefited from a strong Euro, as virtually all raw materials are imported at Dollar prices, a possible price decrease of the Euro will definitely have negative effects for them.

Since reliable history records and forecasts of major raw materials prices are becoming more and more significant in planning, controlling, and pricing, these are given in Table 9.1. Although cost prices may fluctuate by as much as €50 per ton from month to month, these figures reflect the opinion of leading industry specialists of the Economist Intelligence Unit (EIU). Table 9.1 shows that most raw materials will finally decrease in price, due to stabilisation in the world supply and demand balance.

Table 9.1 Industrial raw materials prices, history and forecasts

Commodity	unit	2004	2006	2008	Change '04-'08
Aluminium	US$/ton	1,721	2,486	2,125	23%
Copper	US cents/lb*	129.5	296.5	253.5	96%
Lead	US cents/lb	40.3	49.9	35.5	-12%
Nickel	US$/lb	6.3	7.5	5.2	-17%
Tin	US$/lb	3.9	3.5	3.5	-10%
Zinc	US cents/lb	47.7	144.4	102.5	115%
Rubber	US$/ton	1,480	2,113	1,987	34%

*lb=pound
Source: Economist Intelligence Unit (July 2006)

Price of energy on the rise
Metals production and processing is highly energy intensive. Therefore, the recent rapid increase in electricity prices in some EU countries has affected the competitiveness of the EU industry as far as those price increases were higher than in other regions. Especially

commodity production was badly hit by the high energy costs, as its prices are set globally and therefore increases in energy costs which occur solely in the EU can not be passed on to the customers without significant losses in market share. As electricity prices are also influenced by climate change policies related to the EU's Emission Trading Scheme (ETS), electricity prices may rise further in the coming years. On the other hand, however, the EIU expects the price for crude oil to fall by around 12% in 2007 and 9% in 2008.

Wage costs

The unusual rise in raw material and energy prices has led to a slight decline in the share of wage costs in total production costs in the last few years, especially in the EU countries with higher wage costs. Howeverin Germany, for example, wage costs still account for almost 50% of the average production costs in the metal industry. This showsthat increasing wage costs in the EU will have a strong impact on production costs in the future. Refer to Table 9.3 for more information on EU wage costs. Please note that labour efficiency is not taken into account. Generally speaking, the labour efficiency in West European countries is higher than in Central and East European countries.

Table 9.3 Wage costs per man-hour in the metal industry, by country, 2000-2005

	2000	2005			
Country	Total	Gross Wage	Other costs	Total	'00-'05
Denmark	23.48	21.20	7.12	28.32	21%
Germany-West	25.39	15.67	12.20	27.87	10%
Finland	20.90	14.65	11.34	25.99	24%
Belgium	22.90	13.50	12.14	25.64	12%
Netherlands	21.04	13.93	11.52	25.45	21%
Sweden	22.21	13.88	9.79	23.67	7%
Luxembourg	19.22	14.90	7.64	22.54	17%
Austria	19.79	11.99	10.17	22.16	12%
France	18.11	11.07	10.31	21.38	18%
UK	19.05	14.01	6.46	20.47	7%
Ireland	14.59	13.94	5.53	19.47	33%
Italy	15.62	9.07	8.65	17.72	13%
Germany-East	15.51	10.53	6.83	17.36	12%
Spain	13.98	9.33	7.92	17.25	23%
Greece	8.70	6.62	4.49	11.11	28%
Portugal	6.14	4.21	3.16	7.37	20%
Czech Republic	2.98	2.79	2.24	5.03	69%
Hungary	2.90	2.76	2.12	4.88	68%
Slovakia	2.57	2.41	1.65	4.06	58%
Poland	3.17	2.42	1.38	3.80	20%
Switzerland	23.64	16.83	8.73	25.56	8%
USA	21.48	13.31	5.96	19.27	-10%
Japan	24.14	10.53	7.37	17.90	-26%

Source: Orgalime (2006)

9.2 Useful sources

Sources of prices include:

- CAEF Eurofoundry - http://www.caef-eurofoundry.org
- Eurofer – http://www.eurofer.org/statistics/scrap.htm
- European Engineering Industries Association (Orgalime) – http://www.orgalime.org
- London Metal Exchange – http://www.lme.co.uk

Please refer to the CBI market surveys covering the castings and forgings market in individual EU countries for trade associations, trade press, internet sources, e-commerce websites, names of prospects and trade fairs. All of these sources may give exporters access to price information.

10 MARKET ACCESS REQUIREMENTS

As a manufacturer in a developing country preparing to access EU markets, you should be aware of the market access requirements of your trading partners and the EU governments. Requirements are demanded through legislation and through labels, codes and management systems. These requirements are based on environmental, consumer health and safety and social concerns. You need to comply with EU legislation and have to be aware of the additional non-legislative requirements that your trading partners in the EU might request.

10.1 Legislative requirements

European legislation is compulsory for all products traded within the EU. Therefore, as an exporter in a developing country you have to comply with the legislative requirements that are applicable to your products. For information on legislation, go to 'Search CBI database' at http://www.cbi.eu/marketinfo, select your market sector and the EU in the category search, click on the search button and click on legislative requirements for an overview of all documents on legislation.

10.2 Non-legislative requirements

Social, environmental and quality related market requirements are of growing importance in international trade and are often requested by European buyers through labels, codes of conduct and management systems. For information on non-legislative requirements go to 'Search CBI database' at http://www.cbi.eu/marketinfo, select your market sector and the EU in the category search, click on the search button and click on your subject of interest under non-legislative requirements for an overview of all documents on the subject concerned.

10.3 Packaging, marking and labelling

Legislative requirements
You can download information on requirements on packaging, marking and labelling in specific EU countries from the CBI website. Go to 'Search CBI database' at http://www.cbi.eu/marketinfo, select your market sector and the EU country of your interest, click on the search button and click on 'market surveys' for an overview of documents on the country of your interest.

Customer requirements
Packaging should always make sure that products arrive dry and undamaged in Europe. The long transportation time to Europe may cause the products to arrive damaged in the harbour. The higher humidity in Europe may, for example, cause corrosion to the product. Depending on the product, castings and forgings are packed in wood (steel), plastic or in containers. In general, most products have their own specific ideal packaging. It would be best to identify the customers' expectations and what they are used to and then conform to those requirements. The customer or freight forwarders in the EU should be able to have this information and could advise exporters on the correct packaging material (e.g. skids, Europallet, Eurocartons, Netcontainers and seaworthy wooden crates).

Choosing the correct package size is important, since using the wrong package or wrong container can raise transportation costs and have a negative effect on the exporter's business. The usual sizes in international transport are 300 x 400 mm or 600 x 400 mm for packages and 1,000 x 1,200 mm or 800 x 1,200 mm for pallets. In practice, several shipments have been and are still sent back to the supplier due to bad packaging. The following websites on packaging may be helpful to exporters in order to pack properly and to prevent bad packaging.

Useful sources

- American Society for Testing & Materials - http://www.astm.org. Performance testing of shipping containers and systems
- Examples of packed cast parts - http://www.ferrycapitain.fr/painting.htm
- International Safe Transit Association - http://www.ista.org/. Click for example 'test procedures'.
- Marine Container Transport - http://postharvest.ucdavis.edu/Pubs/Marine_Transport/Marine_Transport.shtml
- Material Handling Equipment - http://www.ie.ncsu.edu/kay/mhetax/UnitEq/. Department of Industrial Engineering, North Carolina State University. Examples of packaging and pictures
- National Wooden Pallet and Container Association - http://www.nwpca.com. Go to 'resource centre', 'standards & specifications' and then 'standards' for a uniform standard for wood pallets.
- PACKit module of the International Trade Centre - http://www.intracen.org/ep/packaging/packit.htm

10.4 Tariffs and quota

Products from outside the EU entering the market are in some cases subject to tariffs. The import tariff may depend on the product and the country of origin. Some countries face special limitations, advantages or agreements. DCs benefit from several trade preferences, of which the most important one is called 'Generalised System of Preferences' (GSP), which was initiated in 1968 by the United Nations Conference on Trade and Development (UNCTAD). As a result, for castings and forgings originating in DCs tariffs hardly exist, although it also depends on the degree to which the products cause, or threaten to cause, serious difficulties to producers of similar or directly competing products. Furthermore, there are practically no quotas. To determine import duties and/or quota for your own product(s) and from your specific country, consult the Taric database of the EU (http://ec.europa.eu/taxation_customs/dds/en/tarhome.htm). The explanations of the country groups mentioned (SPGA, SPGL, SPGE) can be found in the Taric database as well.

Value Added Tax (VAT) is a tax, levied by the individual member countries in the EU. It is added to the price of products and services and will therefore influence the price companies have to pay. These VAT-rates differ per EU country and are discussed in the related CBI market surveys covering the castings and forgings market in individual EU countries.

You can download information on requirements on tariffs and quota in specific EU markets from the CBI website. Go to 'Search CBI database' at http://www.cbi.eu/marketinfo, select your market sector and the EU country of your interest, click on the search button and click on 'market surveys' for an overview of documents on the country of your interest.

APPENDIX A HS CODES

Plastic and rubber products	
400690	rods, bars, tubes, profiles and other forms of unvulcanised rubber, incl. mixed rubber, and articles of unvulcanised rubber, incl. mixed rubber
400819	strip, rods and profile shapes, of cellular rubber
400829	rods, tubes and profile shapes, of non-cellular rubber
401610	articles of cellular rubber, n.e.s.
401699	articles of vulcanised rubber (excl. hard rubber), n.e.s.
3916	monofilament of which any cross-sectional dimension > 1 mm, rods, sticks and profile shapes, of plastics, whether or not surface-worked but not further worked
3919	self-adhesive plates, sheets, film, foil, tape, strip and other flat shapes, of plastics, whether or not in rolls (excl. floor, wall and ceiling coverings of heading 3918)
3920	plates, sheets, film, foil and strip, of non-cellular plastics, not reinforced, laminated, supported or similarly combined with other materials, without backing, unworked or merely surface-worked or merely cut into squares or rectangles.
3921	plates, sheets, film, foil and strip, of plastics, reinforced, laminated, supported or similarly combined with other materials, or of cellular plastic, unworked or merely surface-worked or merely cut into squares or rectangles
Copper and zinc products	
7407	bars, rods and profiles, of copper, n.e.s.
7408	copper wire (excl. surgical sutures, stranded wire, cables, plaited bands and the like and other articles of heading 7413, electrically insulated wires and strings for musical instruments)
7409	plates, sheets and strip, of copper, of a thickness of > 0,15 mm (excl. expanded sheet and strip copper and electrically insulated strip)
7410	copper foil whether or not printed or backed with paper, paperboard, plastics or similar backing materials , of a thickness excl. any backing of <= 0,15 mm
7413	stranded wire, cables, plaited bands and the like, of copper (excl. electrically insulated products)
7414	cloth incl. endless bands , grill and netting, of copper wire, and expanded metal, of copper
7415	nails, tacks, drawing pins, staples and similar articles, of copper or with shafts of iron or steel and heads of copper, screws, bolts, nuts, screw hooks, rivets, cotters, cotter-pins, washers incl. spring washers and similar articles, of copper
7416	copper springs (excl. clock and watch springs, spring washers and other lock washers)
7419	other articles of copper, n.e.s.
7904	zinc bars, rods, profiles and wire, n.e.s.
7905	plates, sheets, strip and foil, of zinc
7907	articles of zinc, n.e.s.
Parts of machinery, railway equipment or vehicles	
840690	parts of steam and other vapour turbines, n.e.s.
841090	parts of hydraulic turbines and water wheels, n.e.s.; hydraulic turbine regulators
841121	turbo-propellers of a power <= 1.100 kw
841122	turbo-propellers of a power > 1.100 kw
841191	parts of turbo-jets or turbo-propellers, n.e.s.
841199	parts of gas turbines, n.e.s.
841290	parts of engines and motors, n.e.s.
842091	cylinders for calendering or other rolling machines (other than for metals or glass)
842099	parts for calendering or rolling machines, n.e.s. (other than for metals or glass and excl. cylinders)
843120	parts of fork-lift trucks and other works trucks fitted with lifting or handling equipment, n.e.s.
843139	parts of machinery of heading 8428, n.e.s.
843141	buckets, shovels, grabs and grips for machinery of heading 8426, 8429 and 8430
843142	bulldozer or angledozer blades, n.e.s.
843143	parts for boring or sinking machinery of subheading 8430.41 or 8430.49, n.e.s.
843149	parts of machinery of heading 8426, 8429 and 8430, n.e.s.
843290	parts of agricultural, horticultural or forestry machinery for soil preparation or cultivation or of lawn or sports-ground rollers, n.e.s.
843390	parts of harvesting machinery, threshing machinery, mowers and machines for cleaning, sorting or grading agricultural produce, n.e.s.
843490	parts of milking machines and dairy machinery, n.e.s.

843590	parts of presses, crushers and similar machinery used in the manufacture of wine, cider, fruit juices or similar beverages, n.e.s.
843691	parts of poultry-keeping machinery or poultry incubators and brooders, n.e.s.
843699	parts of agricultural, horticultural, forestry or bee-keeping machinery, n.e.s.
843790	parts of machinery used in the milling industry or for the working of cereals or dried leguminous vegetables or machines for cleaning, sorting or grading seed, grain or dried leguminous vegetables, n.e.s.
843890	parts of machinery for the industrial preparation or manufacture of food or drink, n.e.s.
843991	parts of machinery for making pulp of fibrous cellulosic material, n.e.s.
843999	parts of machinery for making or finishing paper or paperboard, n.e.s.
844090	parts of book-binding machinery, n.e.s.
844190	parts of machinery for making up paper pulp, paper or paperboard, n.e.s.
844240	parts of machinery, apparatus and equipment for preparing or making printing blocks, plates, cylinders or other printing components, n.e.s.
844390	parts of printing machinery and machines for uses ancillary to printing, n.e.s.
844820	parts and accessories of machines for extruding, drawing, texturing or cutting man-made textile materials or of their auxiliary machinery, n.e.s.
844839	parts and accessories of machines of heading 8445, n.e.s.
844849	parts and accessories of weaving machines looms and their auxiliary machinery, n.e.s.
844859	parts and accessories of machines of heading 8447, n.e.s.
845090	parts of household or laundry-type washing machines, n.e.s.
845190	parts of machines for washing, cleaning, wringing, drying, ironing, pressing, bleaching, dyeing, dressing, finishing, coating or impregnating textile yarns, fabrics or made-up textile articles; parts of machines used in the manufacture of linoleum
845290	parts of sewing machines, n.e.s.
845390	parts of machinery for preparing, tanning or working hides, skins or leather or for making or repairing footwear or other articles of hides, skins or leather, n.e.s.
845490	parts of converters, ladles, ingot moulds and casting machines of a kind used in metallurgy or in metal foundries, n.e.s.
845530	rolls for metal-rolling mills
845590	parts of metal-rolling mills, n.e.s.
846691	parts and accessories for machine-toolsfor working stone, ceramics, concrete, asbestos-cement or like mineral materials or for cold-working glass, n.e.s.
846692	parts and accessories for machines-tools for working wood, cork, bone, hard rubber, hard plastics or similar hard materials, n.e.s.
846693	parts and accessories for machine-tools for working metal by removing material, n.e.s.
846694	parts and accessories for machine-tools for working metal without removing material, n.e.s.
846792	parts of pneumatic tools for working in the hand, n.e.s.
846799	parts of pneumatic tools for working in the hand, hydraulic or with self-contained electric or non-electric motor, n.e.s.
846890	parts of machinery and apparatus for soldering, brazing, welding or surface tempering, non-electric, n.e.s.
847490	parts of machinery for working mineral substances of heading 8474, n.e.s.
847790	parts of machinery for working rubber or plastics or for the manufacture of products from these materials, n.e.s.
847890	parts of machinery for preparing or making up tobacco, n.e.s.
847990	parts of machines and mechanical appliances, n.e.s.
848010	moulding boxes for metal foundry
84803010	moulding patterns of wood
84831021	cranks and crank shafts, of cast iron or cast steel
84831025	cranks and crank shafts, of open-die forged steel
84831029	cranks and crank shafts (excl. of open-die forged steel or cast iron or cast steel)
84831041	cranks and crank shafts (excl. 8483.10-30), of cast iron or cast steel.
84831051	cranks and crank shafts of open-die forged steel (excl. those for civil aircraft of subheading no 8483.10-10 and those built up from several parts)
84831057	cranks and crank shafts (excl. for civil aircraft of subheading 8483.10.10 and of open-die forged steel or cast iron or cast steel)
8485	machinery parts not specified or included elsewhere in this chapter (excl. parts containing electrical connectors, insulators, coils, contacts or other electrical features)
85030091	parts of machines of 8501.10-10 to 8502.40-90, (excl. non-magnetic retaining rings), of cast iron or cast steel

85030099	parts of machines of 8501.10-10 to 8502.40-90 (excl. non-magnetic retaining rings and of cast iron or cast steel)
860719	axles, for electrical purposes, and wheels and parts thereof for railway or tramway locomotives or rolling-stock; parts of bogies and bissel-bogies, n.e.s.
860729	brakes (other than air brakes), and parts thereof, for railway or tramway locomotives or rolling-stock, n.e.s.
860730	hooks and other coupling devices, buffers, and parts thereof, for railway or tramway locomotives or rolling-stock, n.e.s.
860799	parts of rolling-stock of heading 8603, 8604, 8605 or 8606, n.e.s.
86080010	track fixtures and fittings and mechanical signalling, safety or traffic control equipment for railways and tramways
87086091	non-driving axles and parts thereof, of closed-die forged steel, n.e.s., for tractors, motor vehicles for the transport of ten or more persons, motor cars and other motor vehicles principally designed for the transport of persons, motor vehicles
87087050	aluminium road wheels, aluminium parts and accessories thereof, for tractors, motor vehicles for the transport of ten or more persons, motor cars and other motor vehicles principally designed for the transport of persons, motor vehicles for the…
87087091	wheel centres in star form, cast in one piece, of iron or steel, for tractors, motor vehicles for the transport of ten or more persons, motor cars and other motor vehicles principally designed for the transport of persons, motor vehicles for the…
87089992	parts and accessories of closed-die forged steel, for vehicles of 8701.10-10 to 8705.90-90, (excl. 8708.10-10 to 8708.99-50)
Articles of iron, steel or base metal	
7301	sheet piling of iron or steel, whether or not drilled, punched or made from assembled elements; welded angles, shapes and sections, of iron or steel
7302	railway or tramway track construction material of iron or steel, the following: rails, check-rails and rack rails, switch blades, crossing frogs, point rods and other crossing pieces, sleepers cross-ties , fish-plates, chairs, chair wedges
7308	structures and parts of structures e.g., bridges and bridge-sections, lock-gates, towers, lattice masts, roofs, roofing frameworks, doors and windows and their frames and thresholds for doors, shutters, balustrades, pillars and columns , of iron or…
7312	stranded wire, ropes, cables, plaited bands, slings and the like, of iron or steel (excl. electrically insulated products and twisted fencing wire and barbed wire)
7313	barbed wire of iron or steel; twisted hoop or single flat wire, barbed or not, and loosely twisted double wire, of a kind used for fencing, of iron or steel
7314	cloth, incl. endless bands, grill, netting and fencing, of iron or steel wire, expanded metal of iron or steel (excl. woven products of metal fibres of a kind used for cladding, lining or similar purposes)
7315	chain and parts thereof, or iron or steel (excl. watch chains, necklace chains and the like, cutting and saw chain, skid chain, scraper chain for conveyors, toothed chain for textile machinery and the like, safety devices with chains for securing…
7316	anchors, grapnels and parts thereof, of iron or steel
7318	screws, bolts, nuts, coach screws, screw hooks, rivets, cotters, cotter-pins, washers, incl. spring washers, and similar articles, of iron or steel (excl. lag screws, stoppers, plugs and the like, threaded)
7320	springs and leaves for springs, of iron or steel (excl. clock and watch springs, springs for sticks and handles of umbrellas or parasols, shock absorbers and torque rod or torsion bar springs of section xvii)
73251099	articles of non-malleable cast iron, (excl. 7325.10-20 to 7325.10-91, n.e.s. in chapter 73)
732591	grinding balls and similar articles for mills, cast (excl. such articles of non-malleable cast iron)
732599	cast articles of iron or steel, n.e.s. (excl. articles of non-malleable cast iron, and grinding balls and similar articles for mills)
7326	articles of iron or steel, n.e.s. (excl. cast articles)
8301	padlocks and locks key, combination or electrically operated , of base metal; clasps and frames with clasps, incorporating locks, of base metal; keys for any of the foregoing articles, of base metal
830220	castors with mountings of base metal
830242	base metal mountings, fittings and similar articles suitable for furniture (excl. locks with keys, hinges and castors)
830249	base metal mountings, fittings and similar articles (excl. locks with keys, clasps and frames with clasps incorporating locks, hinges, castors and mountings and fittings suitable for buildings,

	motor vehicles or furniture)
Iron and steel products	
7206	iron and non-alloy steel in ingots or other primary forms
7207	semi-finished products of iron or non-alloy steel
7208	flat-rolled products of iron or non-alloy steel, of a width >= 600 mm, hot-rolled, not clad, plated or coated
7209	flat-rolled products of iron or non-alloy steel, of a width of >= 600 mm, cold-rolled cold-reduced , not clad, plated or coated
7210	flat-rolled products of iron or non-alloy steel, of a width >= 600 mm, hot-rolled or cold-rolled cold-reduced , clad, plated or coated
7211	flat-rolled products of iron or non-alloy steel, of a width of < 600 mm, hot-rolled or cold-rolled cold-reduced , not clad, plated or coated
7212	flat-rolled products of iron or non-alloy steel, of a width of < 600 mm, hot-rolled or cold-rolled cold-reduced , clad, plated or coated
7213	bars and rods of iron or non-alloy steel, hot-rolled, in irregularly wound coils
7214	bars and rods, of iron or non-alloy steel, not further worked than forged, hot-rolled, hot-drawn or hot-extruded, but incl. those twisted after rolling (excl. in irregularly wound coils)
7215	bars and rods, of iron or non-alloy steel, cold-formed or cold-finished, whether or not further worked, or hot-formed and further worked, n.e.s.
7216	angles, shapes and sections of iron or non-alloy steel, n.e.s.
7217	wire of iron or non-alloy steel, in coils (excl. bars and rods)
7218	stainless steel in ingots or other primary forms (excl. remelting scrap ingots and products obtained by continuous casting); semi-finished products of stainless steel
7219	flat-rolled products of stainless steel, of a width of >= 600 mm, hot-rolled or cold-rolled cold-reduced
7220	flat-rolled products of stainless steel, of a width of < 600 mm, hot-rolled or cold-rolled cold-reduced
7221	bars and rods of stainless steel, hot-rolled, in irregularly wound coils
7222	other bars and rods of stainless steel; angles, shapes and sections of stainless steel, n.e.s.
7223	wire of stainless steel, in coils (excl. bars and rods)
7224	steel, alloy, other than stainless, in ingots or other primary forms, semi-finished products of alloy steel other than stainless (excl. waste and scrap in ingot form, and products obtained by continuous casting)
7225	flat-rolled products of alloy steel other than stainless, of a width of >= 600 mm, hot-rolled or cold-rolled cold-reduced
7226	flat-rolled products of alloy steel other than stainless, of a width of < 600 mm, hot-rolled or cold-rolled cold-reduced
7227	bars and rods of alloy steel other than stainless, hot-rolled, in irregularly wound coils
7228	other bars and rods of alloy steel other than stainless, angles, shapes and sections of alloy steel other than stainless, n.e.s.; hollow drill bars and rods, of alloy or non-alloy steel
7229	wire of alloy steel other than stainless, in coils (excl. bars and rods)
Light and ultra light products	
7604	bars, rods and profiles, of aluminium, n.e.s.
7605	aluminium wire (excl. stranded wire, cables, plaited bands and the like and other articles of heading 7614, electrically insulated wires, and strings for musical instruments)
7606	plates, sheets and strip, of aluminium, of a thickness of > 0,2 mm (excl. expanded plates, sheets and strip)
7607	aluminium foil, whether or not printed or backed with paper, paperboard, plastics or similar backing materials , of a thickness excl. any backing of <= 0,2 mm
7610	structures and parts of structures e.g., bridges and bridge-sections, towers, lattice masts, pillars and columns, roofs, roofing frameworks, doors and windows and their frames and thresholds for doors, shutters, balustrades , of aluminium
7614	stranded wire, cables, plaited bands and the like, of aluminium (excl. such products electrically insulated)
76169100	cloth, grill, netting and fencing, of aluminium wire (excl. cloth of metal fibres for clothing, lining and similar uses, and cloth, grill and netting made into hand sieves or machine parts)
810490	articles of magnesium n.e.s.
81089010	titanium tubes and pipes with attached fittings, suitable for gases or liquids, for civil aircraft
81089030	titanium bars, rods, profiles and wire n.e.s.
81089090	articles of titanium n.e.s.

Source: Eurostat (2006)

APPENDIX B LISTS OF DEVELOPING COUNTRIES

Afghanistan
Albania
Algeria
Angola
Anguilla
Antigua and Barbuda
Argentina
Armenia
Azerbaijan
Bangladesh
Barbados
Belarus
Belize
Benin
Bhutan
Bolivia
Bosnia & Herzegovina
Botswana
Brazil
Burkina Faso
Burundi
Cambodia
Cameroon
Cape Verde
Central African rep.
Chad
Chile
China
Colombia
Comoros
Congo Dem. Rep.
Congo Rep.
Cook Islands
Costa Rica
Côte d'Ivoire
Croatia
Cuba
Djibouti
Dominica
Dominican republic
Ecuador
Egypt
El Salvador
Equatorial Guinea
Eritrea
Ethiopia
Fiji
Gabon
Gambia
Georgia
Ghana
Grenada
Guatemala
Guinea
Guinea-Bissau
Guyana
Haiti
Honduras
India
Indonesia
Iran
Iraq
Jamaica
Jordan
Kazakhstan
Kenya
Kiribati
Korea, rep of
Kyrghyz Rep.
Laos
Lebanon
Lesotho
Liberia
Libya
Macedonia
Madagascar
Malawi
Malaysia
Maldives
Mali
Marshall Islands
Mauritania
Mauritius
Mayotte
Mexico
Micronesia, Fed. States
Moldova
Mongolia
Montserrat
Montenegro
Morocco
Mozambique
Myanmar
Namibia
Nauru
Nepal
Nicaragua
Niger
Nigeria
Niue
Oman
Pakistan
Palau
Palestinian Admin. Areas
Panama
Papua New Guinea
Paraguay
Peru
Philippines
Rwanda
Samoa
São Tomé & Principe
Saudi Arabia
Senegal
Serbia
Seychelles
Sierra Leone
Solomon Islands
Somalia
South Africa
Sri Lanka
St. Helena
St. Kitts-Nevis
St. Lucia
St. Vincent and Grenadines
Sudan
Surinam
Swaziland
Syria
Tajikistan
Tanzania
Thailand
Timor-Leste
Togo
Tokelau
Tonga
Trinidad & Tobago
Tunisia
Turkey
Turkmenistan
Turks & Caicos Islands
Tuvalu
Uganda
Ukraine
Uruguay
Uzbekistan
Vanuatu
Venezuela
Vietnam
Wallis & Futuna
Yemen
Zambia
Zimbabwe

List of CBI countries – January 2007 - CBI supports exporters in the following Asian, African, Latin American and European (Balkan) countries:

Armenia
Bangladesh
Benin
Bolivia
Bosnia-Herzegovina
Burkina Fasso
Colombia
Ecuador
Egypt
El Salvador
Ethiopia
Georgia
Ghana
Guatemala
Honduras
India
Indonesia
Jordan
Kenya
Macedonia
Madagascar
Mali
Moldova
Montenegro
Morocco
Mozambique
Nepal
Nicaragua
Pakistan
Peru
Philippines
Rwanda
Senegal
Serbia
South Africa
Sri Lanka
Suriname
Tanzania
Thailand
Tunisia
Uganda
Vietnam
Zambia