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# The Expected Effects of the EU Accession on the Machinery Sector in the Czech Republic

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## **Introduction**

Machinery has been historically the core of the Czech industry. The heritage from the Austro-Hungarian empire has left Czech Republic well equipped for becoming specialised on this area and before the wars and the subsequent communist regime, Czech Republic had been economically among the top ten developed countries of the world. During the communist regime, this position was lost, but the potential, many believe, remains to be challenged.

Even in recent years, machinery has become the engine of the Czech manufacturing industry. In 2001 Czech machinery manufactured machines and equipment worth CZK 692 407.7 million, generated value-added of CZK 162 081.3 million and gave employment to 436 070 people working in over 50 thousand companies. The added value share in the GDP of the Czech Republic was 8.6 % in 2000. Machinery is mainly export oriented, with a dominant orientation of its exports towards the EU countries. After the loss of markets in CMEA (Council for Mutual Economic Assistance) in early 1990's, the exports were relatively quickly re-oriented towards the western markets. This has been accompanied by significant improvements in quality of the production. This trend will have to continue even after the accession to the EU if machinery wants maintain its growth.

While machinery can be defined in various ways, we will here use the NACE classification – which divides machinery into the following groups:

1. General engineering
2. Office machinery and automatic data processing machines
3. Electrical machinery and apparatus n.e.c.
4. Radio, television and communications equipments
5. Medical and optical instruments and equipment
6. Road vehicles
7. Other transport equipment

As the status and conditions of the individual machinery sectors are differentiated, it is useful to introduce the main features of the particular sectors. Some of the specific features will be helpful in identifying relevant steps to be taken in order to set a better position after the accession to the EU. We will follow the classification of the Czech Statistical Office (Classification of Products by Activity) in the following three areas, in describing the industry.

## Manufacture of machinery and equipment n.e.c.

This branch in particular has a long tradition in the Czech Republic. It belongs to the most important sectors of machinery due to its size. The structure of this branch is composed of the seven following sectors:

**Table 1-1 - Share of branches in revenues from the sale of products and services in 2001**

	Revenues from sales of products and services in current price 2001	Share of total sales
Manufacture of machinery for the generation and use of mechanical energy (combustion engines, turbines, pumps, valves, bearings)	20 005.5	14.5
Manufacture of machinery and equipment for general purposes (furnaces, dryers, lifting, transport, and air-conditioning equipment)	36 683.5	26.5
Manufacture of agricultural and forest machinery (tractors, ploughs, harvesters, milking systems, loaders)	7 341.7	5.3
Manufacture of machine tools (including forming and welding machines)	20 213.5	14.6
Manufacture of other special purpose machinery (mining, building, food, textile, printing machines)	43 297.3	31.3
Manufacture of weapons and ammunition	3 394.5	2.5
Manufacture of household appliances (electrical and gas apparatuses)	7 509.8	5.4
General engineering	138 445.8	100

*Source: Ministry of Industry and Trade (2002)*

General engineering had an important position in terms of manufacturing industry in 2001 in generating value-added (with the share of almost 10 % of the total value-added of the manufacturing industry). This sector is with its 7 % share of total industry sales on the fourth place out of 15 sectors. It has roughly the same position also with regards to EU, where the share is, however, much higher.

As for the labour productivity in terms of value-added, this sector reaches 33 % of the German average. Revived dynamics of machinery production create firm ground for an increase of productivity in the entire branch, especially in manufacturing of machine tools (including forming and welding machines), manufacture of other special purpose machinery (mining, building, food, textile, printing machines) and manufacture of weapons and ammunition.

The weak spots are mainly lack of finances for revitalization and technology development, lack of low-interest loans and insufficient re-structuralization of some of the production lines. The growth of investment is crucial for the future of the sector. A significant part in this growth is determined by foreign capital; businesses with foreign capital are often profitable and raise the productivity level together with employment rate in the given region.

Among the strong sides of this sector are definitely its export potential and the existing highly qualified labour, which creates potential for research and development.

Harmonization of current legislation with the EU is not a problem in this respect.

## **Manufacture of electrical and optical equipment**

The post-communist restructuring has been the fastest in manufacture of electrical and optical equipment sector. The most important changes in organization and in the structure of production have been achieved in the first half of the 1990's. New companies of small and medium size have been established together with the liquidation of the large enterprises. These new businesses are competitive on the domestic as well as on foreign markets. The inflow of foreign investment has been a significant and positive influence on the sector. The share of this sector on the total sales of the manufacturing industry has been growing since 1995 and is now approaching the standard level of the EU.

The sector includes Office machinery and automatic data processing machines, Electrical machinery and apparatus, Radio, television and communications equipments and Medical and optical instruments and equipment. There has been an expansions of growth noted in regards to these sectors in the recent years and they thus belong to the most dynamic and most growing branches of the Czech industry.

### *Office machines*

The position of office machinery and automatic data processing machines has significantly improved in the recent years. The share of this branch in the manufacturing industry is however insignificant (1.4 % of the outputs), it does, however, have a dynamically rising character (Index 01/00 proves y-on-y rise of sales as high as by 250 %). This increase is related to the inflow of foreign investors and with new businesses establishment. It is assumed that this branch will become the leading horse in the dynamics of production (and export) in regards to manufacturing of electrical and optical equipment. The competitiveness of this field can be demonstrated by the monthly sales statistics calculated per worker. In the first quarter of 2001 it reached the value of CZK 1 002 236 which – in comparison to the average of CZK 131 598 in manufacturing industry – it is not a bad result.

### *Electrical machinery and apparatus*

The share of sales of this sector was around 6 % of total sales in the manufacturing industry in 2001; it reached 7.5 % in terms of the number of workers employed in the whole manufacturing industry and 6 % of value-added in manufacturing industry. Since 1994 this sector has exhibited stable, but not very dynamic growth (in 1997 its share of the sales was almost 5 % and 5.5 % in the value-added).

Majority of the companies were privatised with the help of mostly foreign capital. This capital makes up to 70 % of the value-added of the large size enterprises and employs 58 % of employees.

Important investment was made mainly in production of electrical equipment for automobiles and into accumulators. A growth of output as well as growth of export and productivity is expected to occur in those areas dependent on the development of automobile industry. This sector is export oriented (export reach 70 % share of sales), however a significant role in the exports is played by refining processes (65 % of export).

The near future this branch depends above all on the development of the enterprises with foreign capital, on the growth of labour productivity and on being able to face “ecologization” of production.

## *Radio, television and communications equipments*

The years 1998-2002 were symbolised by strong investment into green-field projects – this resulted in establishing of new production centres for electronic appliances. The share of sales in this sector was almost 3 % of total sales in the manufacturing industry in 2001; it reached 2.4 % in terms of the number of workers employed in the whole manufacturing industry and 3.3 % of value-added in manufacturing industry. This sector exports most of its production and attains positive financial characteristics (ROE was more than double compared to the rest of manufacturing industry). Some of the world top producers are to be found here – for instance AVX Czech Republic is one of the two biggest producers of tantalum condenser (it exports 100 % of its production by which it covers 20 % of the world demand).

The current competitive position of this sector together with FDI inflow creates good conditions for increase of competitiveness even after the accession to the EU. It will be necessary for the Czech producers to participate more in science and research in this area for position improvement of this branch. The more they participate in R&D, the bigger share of production of higher value-added they will have.

## *Medical and optical instruments and equipment*

Medical and optical instruments and equipment are characterized by low share of material inputs and high share of value-added. There is a lack of high-tech technology and specialized materials in the Czech Republic. The share of sales in Medical and optical instruments and equipment was only 1.8 % on the total revenues in the manufacturing industry in 2001; it reached 2.5 % in terms of the share of workers in manufacturing industry and 2.4 % share of value-added in manufacturing industry.

The level of labour productivity in GDP parity reached 40 % of the level in Germany in 1999. Businesses with foreign control take up to 60 % of the value-added created in big and bigger businesses. In comparison to other businesses they achieve better economic results, namely in regards to the level and dynamics of labour productivity. This is shown by the fact that only 38 % of workers of the branch are employed here.

It will be, however, necessary to further increase labour productivity together with competitiveness and share of value-added. More intensive strengthening of R&D is crucial for creating conditions for establishment of research centres.

## **Transport equipment**

Transport industry belongs to an important sector of the Czech machinery. It includes road vehicles and other transport equipment.

### *Road vehicles*

The significance of this sector can be shown by the fact that it creates almost 15 % of the revenues in the manufacturing industry and generates 11 % of the value-added. This sector holds the first position within the manufacturing industry. Its 7 % employment puts it on the seventh place.

Production of cars plays a dominant role in this sector. High pro-export operation contrasts with the remaining sectors of the machinery (it has had an active saldo of trade balance since 1997, till 1998 reached the level of EU). The share with sub-suppliers has been rising in the recent years.

The success of companies in the automobile industry was derived from the change in the ownership structure, which has led to a thorough re-structuralization of businesses. Focus on product quality and compliance with quality norms is an important part in keeping and improving competitiveness.

Regional discrepancies within the sector will be further deepened by construction of new capacities in Central Bohemian Region.

Dynamics of the sector development slowed down (problems with supply for the German market – decrease in demand) but further strengthening may be expected in the future. This applies both in connection with capacity of the newly built automobile factories and more importantly resulting from an intensive car production (including parts and equipment) development aimed mainly for export. In connection with the construction of a new automobile factory in Kolin, the territorial structure of export will change. Export into the Central European region (CEFTA countries) will strengthen.

Worse situation is to come for the production of trucks. Their production has had a decreasing tendency in the past. Late restructuring of some businesses may eventually cause them existential problems, or they may become less important producers of spare parts.

### *Other transport equipment*

Other transport equipment includes the following sectors (their share in the sales in brackets):

- Ships (2 %)
- Rail vehicles (49 %)
- Aircrafts (35 %)
- Motorbikes and bicycles (13 %)
- Other transport equipment (1 %)

The share of sales of this sector in relation to the manufacturing industry as a whole was 1.3 %, its generating value-added 1.8 % and the share of employees was 1.6 % of the whole manufacturing industry. In 2001 the share became even less significant. Some of the branches have stepped back during the transition and their return is not expected (production of bicycles). Stagnation of this sector is to be expected in the future. The long lasting lack of finances had a negative impact on this sector. This lack of finances was, in some cases, connected with complicated and non-transparent ownership structures and with unwillingness of banks to lend financial means (credit crunch). Majority of the sector has much bigger production capacities than the domestic market is able to absorb. These capacities were in the past used namely for the CMEA markets.

The main cause for this back-falling is low generation of value-added, which is hardly comparable with personal expenses. In terms of the labour productivity per worker, this sector exhibits less than one quarter of the level in Germany.

Certain potential may lie in the possibility in joining ERA (European Research Area), as some of the Czech sector research centres possess international prestige (for example the Czech Aeronautical Research and Test Institute – member of Association of European Research Establishment in Aeronautics).



Specialized business able to compete on developed markets will have an advantage after the accession to the EU (such as production of sport airplanes, trams and rail vehicles)

Survival of companies with worse financial situation will depend on their ability to satisfy the demands of the customers and on the continuous restructuring process.

## **Growth Effect of EU Accession**

Manufacturing industry has proven its ability of adaptation to changing market conditions. Despite the Czech GDP decrease by 4 % in constant prices during the 1996-1999 recession, the value-added of the manufacturing industry has increased by 10 %. Machinery accounts for the major part of the Czech export. The share in the total export increased from 42.4 % in 1999 to 47.7 % in 2001. This increase only proves competitiveness of Czech machinery, as most of the export is directed to EU member states (more than two thirds in 2001).

Another growth potential of machinery will be dependent on the level and development of competitive capacity, which may be characterized as a function:

- of labour productivity,
- export kilogram prices,
- export output (share of export in turnovers),
- demand for imports (share of imports in turnovers) and
- share of value-added in production (outputs).

The level of labour productivity in machinery is very similar to the levels in other sectors of manufacturing industry.

**Table 2-1 - Comparing of labour productivity in machinery, Czech Republic and Germany**

<b>In %, Germany = 100%</b>	<b>1999</b>	<b>2000</b>
Manufacturing	40	41
Machinery and transport equipment	37	38

*Source: Gejdos (2002)*

Should the Czech Republic be able to keep its annual labour productivity growth differential 3.5 % higher than the German annual labour productivity growth, we expect the labour productivity in machinery to be roughly 60 % of the level in Germany four years after the accession into the EU. The expected increase of labour productivity from value-added will be structurally different from the productivity increase in the 1990s (when the productivity was raising mainly due to decrease in employment).

The development of the import and export kilogram price relations in machinery in connection to Germany correlates with the development of the manufacturing industry as a whole. In regards to the export growth output, we expect an increase of this relation to 75 % of Germany within four years after the accession.

**Table 2-2 - Development of export and import kilogram price relations in machinery in the Czech Republic in comparison to Germany**

In %, import price = 100 %	Ratio export/import				
	1996	1997	1998	1999	2000
Manufacturing	48.2	52.6	54.1	59.9	65.0
Machinery and transport equipment	47.3	50.4	51.6	61.6	68.9

*Source: Gejdos (2002)*

The impact of such development would be an increase of export output dynamics in relation to import output demands in machinery. Such an assumption can be made if the development of the machinery market is taken into account, where the amount of modern production lines in foreign hands is raising. The difference between businesses owned by foreign and domestic capital inheres also in that businesses with foreign capital expect higher cooperation sophistication. If the domestic businesses are unable to provide firm sub-supplier ground, it will result in an increased demand for import for businesses with foreign owners.

On the other hand, the increase in quality of the products of the Czech sub-suppliers should weaken the demand for import.

Competitiveness of a given industry is determined by both supply and demand factors. The producers from less developed economies might suffer by their lower reputation and harder access to the EU market. They usually compensate for this by lower prices. We expect that the labelling "Made in EU" will help in opening up the EU market.

In terms of foreign market penetration, a more favourable standing should be granted to those Czech manufacturing firms, which have a foreign owner, because they should be able to take advantage of the marketing network of their foreign partner.

In the near future, the Czech machinery is likely to lose its comparative advantage of cheap labour force. It will therefore be crucial for the Czech machinery to focus in acquiring new technologies and we can thus expect an increase in fixed capital investment.

### **Rise of Sales after the EU accession**

Due to the expansive development of some of the machinery industry branches (electro-technical and automotive) we can expect the share of machinery to rise in relation to the whole manufacturing industry.

The table 2-3 depicts the development of the steady rise of the share of sales of machinery compared to the whole manufacturing industry. After the EU accession, we expect this share to stabilize around 40 %.

**Table 2-3 - Share of revenues in machinery as a part manufacturing industry**

In %	Revenues				
	1997	1998	1999	2000	2001E
Manufacturing	100	100	100	100	100
Machinery and transport equipment	28.2	30.2	31.1	32.7	39

*Source: Gejdos (2002), Ministry of Industry and Trade (2002)*

## **Investment**

**During the years 1997 to 2000 the companies with a share of foreign ownership invested in the average higher amounts into new equipment and machines than the average domestically owned companies.** The entrance of these investments significantly contributed to an overall (however not radical enough yet) rejuvenation of the production lines. The domestically owned companies, which do not have enough capital, can find themselves in significant difficulties should then want to invest into the renewal their production lines.

Accession will, over time, change the quality of investment. EU membership symbolically marks the end of the candidates' global labour-cost advantage. Increasing wages have already pushed outward processing work further east. Following accession, the new members states will not be in a position to compete in terms of labour costs with Asia or Ukraine. Nevertheless, the new members will be the low-cost production centres within the EU for at least the next 20 years. Trade effects, productivity gains and investments will be the main drivers of this accelerated GDP growth.

Restructuring, creating advantages of scale from increased export, and shifting employment from less productive sectors into more productive sectors should increase productivity.

One of the problems, which the Czech machinery could face in the future, could be the outcome of the current low investment into R&D. However, we can expect the share of R&D expenses to start rising in the near future.

We can also expect that some companies will have financial difficulties in complying with the new EU directives (such as work safety) and in meeting the requirements for quality certificates (ISO 9000, ISO 14000, VDA 8, TQM, EN 45000, etc.)

## **Opportunities and threats in specific sectors**

- General engineering - the competitiveness of this branch will depend on the technical level of production. The penetration to foreign markets will have to be accompanied by complex consumer service packs (on-time delivery, maintenance service, etc.). The entrance to EU will force the companies to enhance the quality of their supply side, especially in terms of quality, because the advantage of the cheap labour will soon be lost. The implementation of the new technologies should bring certain saving effects (lower operational and maintenance costs) and thus also better perspective for the firms conducting their business in this area. One of the potential risks could be the effects of strengthening of the Czech currency.
- Office machinery and automatic data processing machines – the future growth potential depends mainly on the foreign investors and the degree that they have been satisfied with the performance of their past

investment into the Czech Republic. This sector is technologically intensive and thus requires large volumes of investment. The high level of export oriented production is a good sign and provides good ground for high levels of growth which should continue after the EU accession. The largest producers of IT export most of their production and they have large enough capacities to handle an increase in demand.

- Electrical machinery and apparatus n.e.c. – the strong presence of foreign capital provides good perspective for future development of the segment. The expected rise in demand for electrical machinery in the automotive industry enlarged the production capacities in individual companies and the creation of some new ones. These companies are mostly ready to face the compliance with the EU legislation, although there is still room for improvement in the area of ecology (liquidation of galvanic cells, accumulators and vacuum tubes). The related increase of cost will be reflected in the price of the products, which will further decrease the price difference between the domestic and foreign producers.
- Radio, television and communications equipments – this segment is expected to grow (especially the television production). The investments have increased the quality of the products and they became more competitive. The sector is strongly export-oriented (also due to the high saturation of the domestic market). After the EU accession the export should further grow, also thanks to the realization of new production.
- Medical and optical instruments and equipment – thanks to the high technological demands, the future of this segment is dependant on the level of investments. This segment of the domestic market seems to be very similar with the foreign markets due to. The growth of the industry will be mainly determined by the rise in the productivity of labour (in 1999 the productivity was only 39 % of that of Germany) and the increase in value added proportion of production, which will require high investments in R&D.
- Road vehicles – the growth is dependant on foreign demand and on the productivity of labour, which in some companies already reaches the EU level. The inflow in investment will result in the expansion and building of new factories (green-field investments) and should rise the export level not only to the countries of EU-15, but also to the new member countries. After the EU accession there might be a trace of worsening in the segment of truck production, which is, due to slow restructuring, going through a long period of depression.
- Other transport equipment - the perspective of this segment will be dependant mainly upon the level of restructuring and the readiness of the large companies for tougher competition. It will be important for the Czech producers of rail systems and ships to become a part of the EU supply of chain.

## **Foreign trade and evaluation of net export**

Machinery and transport equipment have been main components of Czech foreign trade, in both imports and exports. Engineering industry products have made a gradual and increasing impact on the overall dynamics and situation in the external trade relations of the Czech Republic. They significantly influence the structural processes taking place especially in Czech industry, and have a strong impact on the territorial orientation of exports and imports. Trade in machinery and transport equipment plays a no less important role in the overall balance of the Czech Republic's foreign trade and its development.

Structural changes in foreign trade with machinery are affected not only by macroeconomic tendencies on the domestic scene (development of investment activities, domestic demand, etc), but also by changes influenced by outside conditions (fluctuation of world prices, slowing down of the world economy and consequently decrease in foreign demand).

In 2001, the increase of investment activities was supported mainly by the FDI inflow. This was to take positive effect in terms of dynamic of machinery export, as the FDI were aimed mainly towards those branches of industry, where automobile, electronic and electro-technical industry absorbed the most significant part of FDI.

The dominant position of foreign trade with machinery as opposed to foreign trade as a whole is shown in the following table.

**Table 3-1 Position of machinery and transport equipment on overall foreign trade**

<b>In Billion CZK, %</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>
Total exports	908.8	1121.1	1269.7
- y-o-y changes	8.9 %	23.4 %	13.3 %
Of which:			
- machinery and transport equipment	385.4	498.4	601.4
- y-o-y changes	13.7 %	29.3 %	20.7 %
Share of machinery and transport equipment in:			
- total exports	42.4 %	44.5 %	47.4 %
- growth of total export	62.3 %	53.2 %	69.3 %
Total imports	973.2	1241.9	1386.9
- y-o-y changes	6.4 %	27.6 %	11.7 %
Of which:			
- machinery and transport equipment	383.3	496.7	585.3
- y-o-y changes	8.2 %	29.6 %	17.8 %
Share of machinery and transport equipment in:			
- total imports	39.4 %	40.0 %	42.2 %
- growth of total import	49.7 %	42.2 %	61.1 %

*Source: Czech Statistical Office (2002)*

## Structure of foreign trade with machinery goods

Section transport equipment (SITC 78+79) has a specific position in machinery. This is to be illustrated in the following table.

**Table 3-2 Development in the structure of foreign trade in machinery and transport equipment**

<b>In billion CZK</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>
Total balance of foreign trade with machinery	2.1	1.7	16.1
- of which: transport equipment (SITC 78+79)	68.7	84.1	95.4
- of which: other machinery (SITC 71+72+73+74+75+76+77)	-66.6	-82.4	-79.3

*in Billion CZK*

*Source: Czech Statistical Office (2002)*

Radical structural changes took place during the 1990's. These oriented the majority of the automobile industry on car production. This fact reflects fast process of re-structuralization of engineering industry products. Development of production was connected to export orientation, as the domestic market has only limited capacity. Production of motor vehicles and transport equipment is one of the most dynamic sectors of manufacturing industry. Table 3-2 suggests that transport equipment has been compensating with its high actives in foreign trade the deficits of the remaining sectors of foreign trade. It is possible to generally characterize export ability of an industry branch as a result of product competitiveness on a particular territory.

After the accession to the EU, however, certain decrease in comparative advantages may be expected. This should be visible mainly in the automobile industry where the comparative advantage of cheap labour force will be lost.

Export and import sets of machinery products shifted during 1999-2001 towards machinery products such as office machines, automatic data processing machines; equipment for telecommunication; electrical machinery, apparatus and appliances. The import in these branches increased by 66.8 % and their export by 95.4 % (between the years 1999-2001).

The chronic problem of the Czech machine manufacture and of industry in general, was insufficient production of apparatus, automation and telecommunications equipment. However, it is expected that this trend could take a different venue after the start of production in newly established manufactures in telecommunication sector (Matsuhita, Celestica...).

There had been a slight increase of import of machinery for production lines between the years 1999-2001 in General engineering, which was caused mainly by the import of new investment sets to new manufactures often established by foreign investors. Import of machines used for production (production of new added value) gives good ground for future development. The trade balance in this sector worsened in comparison to the beginning of the 1990s as a result of the loss of the traditional markets (development economies, etc). However, improvements of the balance of trade may be expected in the future as the dynamics of export could overgrow the dynamics of import. Although the export efficiency (share of export on the turnover) of the sector production does not reach the level as in Germany or Austria, **it does have increasing tendencies**. The current export sector efficiency is 53 % and the increase to 62 % is expected by 2005 and to 65 % to 2008. With this



prognosis, it could be possible that in the horizon of 5 years after the accession, the total balance might be slightly positive.

It is proposed that the trends of 1999-2001 (when the automobile industry firmly established itself) will continue after the accession to the EU. Further strengthening of the SITC position 75+76+77 (see table 3-3) to the expense of general engineering is also expected.

Representation of the main machinery items in import and export is documented in the following table.

**Table 3-3 – Main machinery items in imports and exports**

	1999	2000	2001
<b>SITC 71- power generating machinery and equipment</b>			
Import	7.5	7.5	6.8
Export	6,5	6,6	5.9
<b>SITC 72 - machinery specialized for particular industries</b>			
Import	8.9	8.6	8.7
Export	8.5	7.7	6.9
<b>SITC 73 - metalworking machinery</b>			
Import	4.0	3.2	3.3
Export	4.0	3.4	3.0
<b>SITC 74 - general industrial machinery and equipment</b>			
Import	14.8	13.7	13.6
Export	12.9	12.1	12.6
<b>SITC 75 - office machines and automatic data processing machines</b>			
Import	8.5	8.9	11.0
Export	2.6	4.0	6.5
<b>SITC 76 - telecommunication's and sound recording equipment</b>			
Import	8.0	9.9	7.7
Export	2.3	4.3	7.4
<b>SITC 77 - electrical machinery, apparatus and appliances</b>			
Import	26.2	27.6	28.1
Export	23.5	24.5	21.6
<b>SITC 78 - road vehicles</b>			
Import	20.0	18.4	19.0
Export	36.2	35.4	33.7
<b>SITC 79 – other transport equipment</b>			
Import	2.1	2.2	1.8
Export	3.5	2.2	2.4

*Source: Czech Statistical Office (2002)*

## The territorial division of foreign trade

Changes in the territorial structure of foreign trade in the 1990's reflected themselves heavily on the foreign trade with machinery. Interestingly enough, Czech exporters quickly reacted to the dissolution of CMEA and re-oriented towards the West. In other words, the industry quickly learned to be able to compete in terms of quality on more demanding markets.

As of today, the dominant position in foreign trade belongs to the EU member states. Their share on the total machinery turnover in CR in 2001 was 73.2 %. It is apparent that after the accession to the EU, this number will rise nominally (statistics will be computed from the current candidate states as well), but the real change will be, as to the current conditions, negligible.

Import from countries with developed market economies in 2001 was 77.6 %, where 67.5 % was the share of EU member states (the share of Germany alone was 39.1 % out of the total). In the recent years, the share of import of machinery from developing countries and other countries in transition has been increasing and slightly crowded out the import from EU countries.

The orientation towards developed economies is especially strong when it comes to machinery export. The current trend is strengthening of machinery export into the EU. In 2001 the share of Czech export to developed economies was 85.4 % and 76.3 % to EU countries alone (Germany alone being 39.6 % out of the total). Only small changes are predicted in the territorial structure of foreign trade after the accession to the EU. Exports will be heavily influenced by the economical situation of the target country. This has been already revealing itself on the small growth of German economy, (Germany is the biggest purchaser of Czech machinery goods). The export to Germany has somewhat decreased recently, however the good sign is, that the Czech exporters were able to orient themselves quickly to other EU countries. This shows the competitiveness of the Czech export. As an example the Czech Republic had a negative trade balance with Great Britain in 1999, however, since 2001 this balance is positive. The table below shows the general trends.

Table 3-4 - Territorial structure of export of machinery goods

	<b>The role of main groups of states in the Czech Republic's foreign trade in machinery and transport equipment (in %)</b>		
	1999	2000	2001
Total export	100	100	100
- Developed Market Economies	80.3	80.5	82.1
- of which: EU	75.3	74.3	75.6
- Developing countries	3.8	4.7	3.3
- European Transition Economies and CIS	15.3	14.4	14.2
- of which: CEFTA	12.0	10.8	10.5
- Others	0.6	0.4	0.4

*Source: Czech Statistical Office (2002)*

It is certain that there will be a positive influence in terms of initiation of new production lines caused by the FDI inflow after the accession to the EU. A decline of export to the EU member states may be however expected in the future as some of the export-oriented productions will be directed towards Central and Eastern Europe.

## Refining processes

The biggest part from the total refining processes in foreign trade was taken by a group of machinery products. Import of these items for active refining processes represented more than one quarter of the total import of machinery products in 2001. The export of machinery products after active refining made up two fifths out of the total export of these items in this particular year.

The surplus from processing made it possible to compensate the deficit in machine trade, which did not involve processing because trade balance was highly positive. Exports after inward processing plays an important role in production of machinery goods as we can see in the following table:

**Table 3-5 - Refining processes**

Commodity according to 2-digit SITC	Share of imports for inward processing on total import (in %)		Share of export after inward processing on total export (in %)	
	2000	2001	2000	2001
SITC 7 machinery and transport equipment	23.5	26.9	41.6	40.6
- 71 Power generating machinery and equipment	15.1	14.6	34.7	30.4
- 72 Machinery specialized for particular industries	8.5	6.0	37.1	33.9
- 73 Metalworking machinery	5.4	4.6	33.1	25.4
- 74 General industrial machinery and equipment	13.4	11.8	35.4	28.5
- 75 Office machines and automatic data processing machines	22.1	38.0	80.0	86.0
- 76 telecommunication's and sound recording equipment	9.6	16.4	84.5	90.3
- 77 electrical machinery, apparatus and appliances	53.4	57.3	72.9	66.7
- 78 road vehicles	9.7	9.5	14.9	13.9
- 79 other transport equipment	11.3	16.6	47.9	29.4

*Source: Czech Statistical Office (2002)*

Active refining processes play a dominant role namely in the following disciplines:

- office machines and automatic data processing machines and
- equipment for telecommunication and sound recording.

In these disciplines the share of export after active refining was ranging between 86 % - 90.3 % in 2001. The possibility of decline of the active refining process share on imports and exports or its substitution of higher participation of domestic producers is not to be expected after the accession.

### **Net export evolution**

The development of export and import reflects itself on the partial trade balance of machinery goods. Their development influences the long-term of total foreign trade. After years of passive trade balance in machinery goods (until 1999) there has been a substantial change and foreign trade ended up slightly positive in the trade balance of machinery goods. Most importantly, the machinery goods have kept an active trade balance even in the difficult year of 2002 as many companies were facing unfavourable development of the Czech currency rate during this year. This could be interpreted as a sign of achieving relatively high levels of competitiveness. In comparison to the recent years, the growth of export will be less influenced by the inflow of FDI in future.

## The effect of accession on FDI flows

Foreign direct investment has become a phenomenon to which big hopes are attached in the Czech Republic. A considerable part of the FDI has gone into sectors of manufacturing industry. The following manufacturing industry sectors have been benefiting from the FDI inflow the most:

- manufacture of electrical and optical equipment and
- manufacture of transport equipment.

Foreign investors contribute to the Czech economy not only in terms of providing the necessary capital, but also by introducing effective management and influencing the quality of both formal and informal institutions. The importance of the foreign investment does not derive exclusively from the amount of money for restructuring as such; rather it is the change of ownership and management. Foreign direct investments ease the entrance to foreign markets together with raising the technical-economic parameters and improving the levels of company management. Company surveys support the fact that the biggest problem for the domestic suppliers is penetrating foreign markets<sup>1</sup>.

The numbers of foreign owners, especially in the area of establishment of new companies, are rising mainly in the most dynamic sectors such as automobile industry and electro-technical industry.

The following table shows the inflow of FDI into machinery and manufacturing industry between the years 1993-2002.

**Table 4-1 Czech Republic: Inward Foreign Direct Investment into machinery\***

<b>(In millions of CZK)</b>	<b>1993</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002<sup>a</sup></b>
Machinery	1952	8399	12367	1846	508	10842	15826	40610	26288	16152
Manufacturing	10632	13461	22744	17378	12947	41431	69481	79109	54521	38544
Share in %	18.4	62.4	54.4	10.6	3.9	26.2	22.8	51.3	48.2	41.9

\* Until 1997 data included FDI in equity capital, starting from 1998 data on reinvested earnings and other capital have been included in FDI flows.

<sup>a</sup> Inward in 1.-3.Q 2002

*Source: Czech National Bank*

FDI has become an overwhelming part of investment into manufacturing industry (its share reached 52 % of the total foreign investment in 1999) mainly due to investment incentives. The continuation of its inflow is an important premise for acquiring the predicted level of investment growth. Although businesses with foreign capital exhibit 10 % higher level of investment (according to surveys), the future assumptions suggest their stagnation till 2008.1

Roughly one third of all investment into the manufacturing industry went into machinery and transport equipment<sup>2</sup> sector. The division of the FDI inflow is documented by the following table:

**Table 4-2 Foreign direct investment (broken by machinery sector)**

<b>(CZK, in mil.)</b>	<b>2000</b>	<b>2001</b>	<b>2002<sup>a</sup></b>
Mechanical Products	5145.9	2168.2	3947.0
Electrical machinery and apparatus n.e.c.	4742.0	3397.2	3142.0
Radio, television, communications equipments, office machinery and computers	2114.0	8402.3	1193.0
Medical and optical instruments and equipment	3367.4	1291.0	742.4
Motor vehicles	26298.7	5995.3	6879.4
Other transport equipments	-1058.5	5034.0	248.2

<sup>a</sup> Inward in 1.-3.Q 2002

*Source: Czech National Bank*

FDI as a complementary source of capital experienced a significant growth in the recent years in the Czech Republic. Big industrial investments are mainly aimed towards machinery businesses such as *FIC CZ*, *FOXCONN* – computers, *LG Philips Displays Technology Centre*- televisions, *TPCA* – automotive industry and others.

The attractiveness of the Czech Republic for further investment inflow at the same high rate will be supported by the continuous process of improving the formal and informal institutions connected with the preparations for the EU accession. This process will accelerate especially after the accession. Thus the increase of FDI focused at green-field investments could at least partially compensate for the decrease of FDI connected with privatization.

However, foreign investors will still be able to benefit from vast differences in wages for qualified personnel. Candidate countries will remain attractive investment targets owing to favourable ratios of labour cost to productivity. The geographical position of the Czech Republic as a future member state is another reason to attract FDI. The Czech Republic is relatively close to regions and centres of the most economically developed EU members. It is still desirable to maintain the investment incentives as long as possible.

It may be assumed that after the accession to the EU will the structure of the investment change (decrease of investment in the form of privatisation – many businesses in engineering industry are already in foreign hands). The government will be trying to direct the investment incentives into those sectors with higher added value and to technologically more demanding areas. The manufacturing industries that are to benefit the most from this should be the electro-technical and transport equipment industry.

In regards to businesses in the electro-technical industry, an increase of FDI into new projects is presumed – greenfields and further investments into brownfields, mostly in terms of expansion of the production. The development of investment aimed at electro-technical industry has had a rising tendency (with the exception of 1998). Increase of export and decrease of the dynamics of import may be therefore expected in the upcoming years.

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<sup>2</sup> As of 30 September 2002

Moreover, an increase of the share of the re-investment in FDI is to occur after the accession to the EU. This expectation should apply not only to businesses with growing investment into R&D but also to the less re-structuralized productions. In regards to successful enterprises, repatriation of profit or its transfer to tax-benevolent countries is expected.

Technology demanding machinery sectors (Medical and optical instruments and equipment; radio, television, communications equipments, office machinery and computers) may expect interest from the side of foreign investors after the accession to the EU. It is assumed that the accession into the EU as such will have an impact on the increase of investment in regards to these fields.

Due to the worldwide stagnation of economic growth it is likely that some of the foreign investors will leave the Czech Republic. This applies above all to sectors, where cheap labour is demanded and where the competition of cheap products from Asia threatens the position of Czech producers. It might be assumed that with the growth of labour productivity the wage expenses per employee will also rise. Liquidation of some of the production lines due to the competition coming from Asia has already occurred in the branch "other transport equipment" (e.g. bicycle production).

## Labour market effect of EU accession

In the year 2001 some 33.2 % of workers employed in manufacturing industry worked specifically in mechanical engineering. This percentage accounts for 349 286 employees.<sup>3</sup> Figures accounting for individual sectors such as general engineering, electrical and optical machinery and transport equipment are 126 662, 126 795 and 95 811 respectively. According to the preliminary estimates from the first three quarters of the year there has been a slight decrease of employment in general engineering on one hand while sectors with FDI inflow have experienced a contrary tendency. Employment increased in electrical and optical machinery and transport equipment production. Dynamics of the development of employment in particular sectors sorted according to international NACE classification are to be observed from the table below.

**Table 5-1 Average number of employee in selected sectors <sup>a</sup>**

	2000	2001	2002 <sup>b</sup>	01/00	02/01	02/00
Manufacture of machinery equipment	128383	126662	126420	98.66	99.81	98.47
Manufacture of electrical and optical equipment	124295	126 795	132067	102.01	104.16	106.25
NACE 30 - Office Machines and Automatic Data Processing Machines	2585	3632	5622	140.50	154.79	217.49
NACE 31- Electrical machinery, apparatus and appliances	74646	73404	78895	98.34	107.48	105.69
NACE 32 - Radio, television and communication appliances	26187	27608	26748	105.43	96.88	102.14
NACE 33 - Instrument, Regulation and Automation Equipment, Medical, Optical, and Chronometric Apparatus	20878	22152	20801	106.10	93.90	99.63
Manufacture of transport equipment	92256	95811	102377	103.85	106.85	110.97
NACE 34 - Road vehicles	71272	76448	81994	107.26	107.25	115.04
NACE 35 - Other transport equipment	20 984	19 363	20383	92.28	105.27	97.14
Manufacturing	1039391	1052025	1047194	101.22	99.54	100.75

<sup>a</sup> Organization with more than 20 employees

<sup>b</sup> Average data from 1.-3. quarter

Source: Czech Statistical Office, Ministry of Industry and Trade

<sup>3</sup> Organization with more than 20 employees.



Labour market in machinery and transport equipment may be characterized as follows:

- high professional level of labour force,
- low mobility, low willingness to migrate (limited geographical migration even in-between regions within the Czech Republic),
- unsatisfactory knowledge of foreign languages (in comparison to Western Europe),
- some of the production lines suffer from over-employment (specifically those with no foreign capital),
- technical erudition (technically skilled labour),
- strong motivation to work and
- high rate of sick-leave.

## **Labour Demand**

Change in the labour demand is expected after the accession to the EU. In regards to export oriented companies, labour demand will be determined by foreign demand for goods. This accounts mainly for small enterprises, which are more flexible in reacting to demand shocks.

There is no threat of employment decrease as a result of competitiveness *ceteris paribus* in export-oriented companies (newly established by foreign owner) rather contrary to the enterprises owned by domestic entities. This is because enterprises in foreign hands tend to be more effective in regards to work – some of them reach the level of EU - than those owned by domestic owners. As a result of this, foreign owned businesses possess comparative advantage in this regard.

Those domestic businesses, which did not go through a thorough restructuring during the pre-accession period, will face existential problems. This applies mainly for state-owned companies; these are expected to:

undergo restructuring, which will affect even reduction of employees and further privatisation, mergers etc. (the restructuring as such should lead to improvement in effectiveness), or

possible liquidation, which would consequently lead to an increase in unemployment. This scenario is however very unlikely for businesses with state interest.

For both of these scenarios, it is crucial for the state to be prepared for an increase in unemployment and necessary re-qualification programs.

The demand side aspects of employment in regards to individual sectors of machinery and transport equipment are as follows:

### *General engineering*

General engineering belongs to the biggest employers in manufacturing industry. A decrease of number of employees may be expected due to:

- influences of progressive technological development,
- liquidation of production lines unable to compete,
- rationalization of production (outsourcing).

Decrease of employees in the years 2005-2008 is expected to reach only 1.5 % per annum (not such a dramatic decrease as in 1990's). The importance of enterprises with smaller numbers of workers will grow in terms of the entire industry.

### *Office machines*

Although only 0.2 % workers out of the entire manufacturing industry were employed in this sector in 2001, due to the increase in investment activities in this area (namely growth of FDI) this sector exhibits the biggest dynamics as to growth in number of employed (*see table 5-1*). The number of employees will most likely stabilize at several thousand people active in this industry area. The structure of enterprises changes even in connection to the investment activities. It is striking to note that in the year 2000, there were no businesses in this area with more than 1000 workers. This has changed dramatically - since 2002, enterprises of more than 1000 workers employ 80 percent of all workers in this field.

### *Electrical machinery, apparatus and appliances*

Seven percent of workers in the manufacturing industry are employed in electrical machinery, apparatus and appliances. 58 % out of this is employed by enterprises with foreign capital (in 2001). Due to the high number of percentage of workers employed in businesses with foreign capital, it is expected that the labour demand will be stable. This is caused above all by the inflow of investment into this sector.

### *Radio, television and communication appliances*

Only 2.5 % of employees were working in this sector of manufacturing industry. Nevertheless, the growth in the amounts of job opportunities determined by the investment operations in this area is perhaps over. The number of job positions is expected to stay on its current level even after the accession to the EU.

### *Medical, Optical, and Chronometric Apparatus*

This branch does not have a significant share of the total employment rate in the manufacturing industry. The future prognosis assess that while the labour productivity should rise (in the year 1999 it was 40 % of that of Germany) the employment rate will decrease. In the long term though, this sector may experience a dynamic development, similar to the one in EU. This would in turn bring some more job opportunities.

### *Road vehicles*

Relatively low numbers of employees (in 2001 5,4 %) in comparison to the total turnovers (in 2001 13,4 % of turnovers in manufacturing industry) speaks for high productivity of this sector. Based on the recent years' development, the labour demand is likely to rise after the accession to the EU. Whether there will be enough qualified labour for this dynamically rising sector remains a question, however. Although there is a satisfying amount of re-qualification programs, the ability to absorb will most likely continue to rise (investment into a car manufacture TPCA in Kolín, PSA in Trnava - Slovakia).

## *Other transport equipment*

The trend of the recent years suggests that the employment rate in this sector is decreasing. The number of employment opportunities will be after the accession to the EU dependant even on the development of some of the state owned enterprises. Some of the ineffective production lines went out of business already (bicycle manufacturing). The potential in terms of increase of the number of job positions will be for the export-oriented companies determined by the world demand for their products (sport airplanes, training airplanes, locomotives, trams etc.)

## **Labour supply**

As much as 90 % of men and 80 % of women work in the Czech Republic for more than 40 hours per week. An average Czech worker had worked for more than 2150 hours in 2000. This is one of the highest figures of labour time in the industrialized world. In comparison to an average worker in Germany, the Czech figures per capita are by 1000 hours higher.<sup>4</sup>

The Czech statistics show that the total annual level of workers' sick-leave is 5.16 %. This is approximately one half of the Hungarian percentage (10.5 %)<sup>5</sup>.

On the other hand, Czech labour is unwilling to migrate for work - not even to other regions of the country. Thus the fear of the EU citizens, who are worried about the influx of cheap labour from Eastern Europe, is not justified on rational basis. Moreover, the language barrier of the manual workers would not provide them with a good premise of attaining a job abroad (perhaps with the exception of Slovakia).

Labour demand development may be divided into two sub-groups:

- a) employment migration of qualified engineers into EU and
- b) possibility of self-realization within the engineering industry in the Czech Republic

Ad a) the migration of qualified engineers will be possible even with the restrictions on free movement of labour. Demand for these specialists is very likely to occur. Germany, for instance has decided to protect its labour market. Still, the current success rate for the Czech applicants is 94 % and the quota for Czech workers has not yet been fulfilled. Even the inhabitants of the border regions do not have to worry about their jobs as the border pending is no threat in terms of machinery.

Ad b) Czech employees and technical school graduates will have, due to the dynamic growth of mechanical engineering sectors, a possibility for self-realization within the Czech Republic. There will be a threat of qualified labour shortage in some of the sectors, which derives from the low popularity of technical studies in the last decade. It may be expected that low labour demand will lead to increase in salaries, which could consequently initiate the interests in these areas again. This problem may be solved on the local level by inflow of labour from neighbouring countries (if a border region is in question). This strategy is used in Škoda Auto,

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<sup>4</sup> Source: *International Labor Organization in The Economist*, 1999

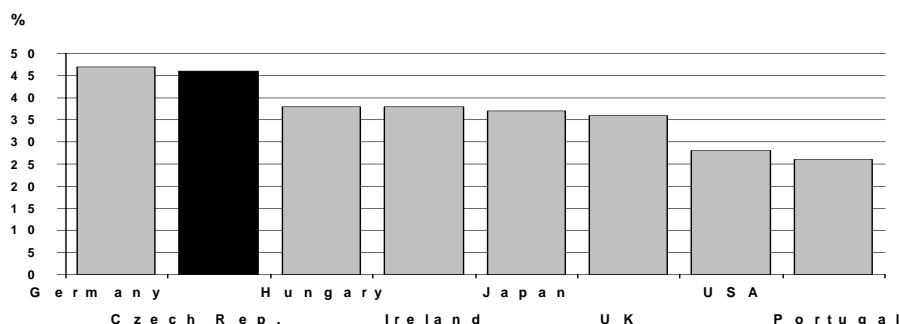
<sup>5</sup> Source: *Key Indicators for HRM – Central and Eastern Europe*, PWC ,1999

a.s. in Kvasiny, Rychnov nad Kneznou District (*production line for Škoda Superb*). These companies have solved their labour shortage by bringing in Polish workers.

## Education

The number of school offering technical education is large and the schools are evenly spread over the Czech Republic (Czech Technical University in Prague (CTU), University of Technology in Brno (UT), University of Western Bohemia in Pilsen, Technical University in Liberec and other technical universities in Ostrava and Pardubice). The following graph demonstrates a significant difference between graduates of scientific majors and engineering professions and other university graduates.

**Graph 5-1 The percentage of scientific and engineering professions in relation to other university graduates in CR in 1995**



Source: Education at a Glance 1997, OECD

However, only 10 % of the students are educated in areas, which are directly connected with the automobile industry - the numbers in the EU are roughly double of the ones in the Czech Republic.

Businesses in development should take part in the process of active education of their prospective employees. Their active cooperation with universities may in the end bring them comparative advantage of better-trained labour. Such cooperation between the schools and the businesses may in the future raise the attractiveness of technical majors for the students.

Quality of education and participation of enterprises play a significant role in regards to rising effectiveness of labour. It is assumed that the more highly qualified labour there is, the more will their added labour value rise.

„Report about World Competitive Capacity“ published by the World Economic Forum in 2000 considers the quality of the Czech public schools (at all three levels - primary, secondary and tertiary) as one of the Czech comparative advantages. The evaluation is based on expert assessments. These experts are in most cases foreign direct investors, their top managers in particular. There is a total of 59 countries on this evaluation list. The Czech Republic is on the 21<sup>st</sup> place between Sweden and Norway. The quality of public school in Hungary has been evaluated as 23<sup>rd</sup>, Polish as 31<sup>st</sup>. The U.S.A. are on the 25<sup>th</sup> and United Kingdom on the 29<sup>th</sup> position.

## **Regulatory framework**

The Czech Republic has come to the stage of „getting ready for the membership“. This applies especially to harmonization of legislation and directives. Such harmonization of legislation does not create significant problems in machinery. Machinery does not have, unlike other sectors of manufacturing industry, bigger problems with environmental legislation of the EU. Czech suppliers have already understood the importance of environmental legislation and incorporated it. Their business partners for instance prefer ecological products with the ISO 14000 certificate.

### **Program on European Conformity Assessment**

Technical harmonization is one of the substantial phenomena of a unified internal trade of the EU. The Program on European Conformity Assessment (PECA) has already had a far-reaching impact on the individual branches of the machinery industry. This allows the Czech products to enter the EU market even before the accession to the EU. Full harmonization and consequently an entirely free movement of goods will be however accomplished only after the accession. Czech results for compliance evaluation are taken for granted, according to PECA, although so far for only limited number of sectors (roughly ten sectors, machinery production and drug production). The Czech Republic does not have to separately apply for compliance documentation with each EU member state, which is very time and money demanding process.

### **Investment Incentives**

Investment incentives offered in the Czech Republic are a form of state aid. Whereas the provision of state aid means a distortion of economic competition, the provision of state aid in EU member states is governed by detailed rules whose compliance in the EU is controlled and enforced by the European Commission - Directorate General Competition. The Czech Republic, along with other candidate countries, undertook the obligation to follow EU rules on state aid in the Europe Agreement that each candidate country concluded with the European Community and its member states. This obligation was then incorporated into the Czech legal order through the act on state aid.

The investment incentives act was consulted in its preparation and still continues to be consulted with representatives of the European Commission-Directorate General Competition. In these consultations no comments from the side of Directorate General Competition representatives were raised towards the investment incentives scheme regarding its compatibility with EU rules for providing state aid.

From the European Union's position in the course of negotiations on the accession of individual candidate countries of Central and Eastern Europe to the EU, it is clear that with regard to the candidate countries' obligations which were accepted by them on the basis of Europe Agreements, after these countries join the EU only state aid provided in current candidate states in accordance with European rules for state aid will be able to continue, and no measures that continue to have effects after accession and that are incompatible will be acceptable.

The Czech Republic, since it respects European rules for state aid in the pre-accession period, can provide investors legal certainty towards state aid based on the investment incentives act, both in the period before and after the Czech Republic's accession to the European Union.

A regulatory impact for the automobile industry may be after the accession to the EU expected. The EU is trying to enforce state subsidy regulation, consequently a decline in comparative advantages as a motive for FDI inflow may be assumed. Investment incentives strategy is likely to occur in the long run.

EU membership will decrease the risk for business by introducing common standards, a common regulatory environment and more political and macroeconomic stability. The improvement of institutional environment will have an indirect effect on the inflow of FDI. The investors are more likely to enter an institutional environment known to them from their regular operations than to an environment ceteris paribus.

Full extend of benefits from the EU structural funds will be for the SMEs definitely a positive contribution.

The following areas are likely to experience improvement:

- public administration,
- employment and working conditions and
- access to research and innovations and better use of patents by SMEs.

Further improvement of the institutional environment is expected to come after entering the European Monetary Union (estimated in 2009). Additional saving on transactional costs after the ratification of euro might help to even the competition conditions for Czech businesses. Such a cost saving will affect not only export firms but also domestic suppliers. Some of the export companies are currently hedging themselves against the discrepancies in currency rates by purchasing production inputs in Euros. However, by doing so they only transfer the currency rate risk to other companies.

On the other side, some of the enterprises will face additional costs connected with compliance to many of the EU regulations (work safety...). Furthermore, transaction costs coming from the search for such regulations will also rise.

**For the many under-resourced local companies, the level playing field is a clear threat. Governments can no longer protect or subsidize local companies so easily.**

## Market Structures

### Position of Machinery within Manufacturing Industry

Machinery sectors make up a considerable part of the manufacturing industry. Their pro-export orientation and output is a proof of improving competitiveness in this segment of manufacturing industry. Dynamic development, which took place in the past years, caused a territorial change in the orientation of the foreign trade (major part of the export was before 1990 oriented towards the former eastern bloc - Council for Mutual Economic Assistance, in 2001 only 14 % of machinery products were exported into European Transition Economies and CIS markets).

Another significant characteristic for the majority of businesses is the course of successful restructuring, which was to reduce ineffective production ways, increase labour productivity, increase employment effectiveness and improve economic results.

The table below shows the basic information regarding the structure of machinery in 2001.

**Table 7-1 Basic production characteristics in machinery, 2001**

In %	Revenues	Value added	Number of employed persons	Value added per employee <sup>1</sup>	Direct export <sup>2</sup>	Export after refining processes
Manufacture of machinery and equipment n.e.c.	7.2	9.6	10.9	295.6	8.4	8.0
Manufacture of electrical and optical equipment	11.7	12.1	12.7	321.9	21.2	46.5
Manufacture of transport equipment	15.9	12.9	7.7	560.5	23.5	11.5
Manufacturing	100.0	100.0	100.0	336.1	100.0	100.0

<sup>1</sup> in thousands CZK

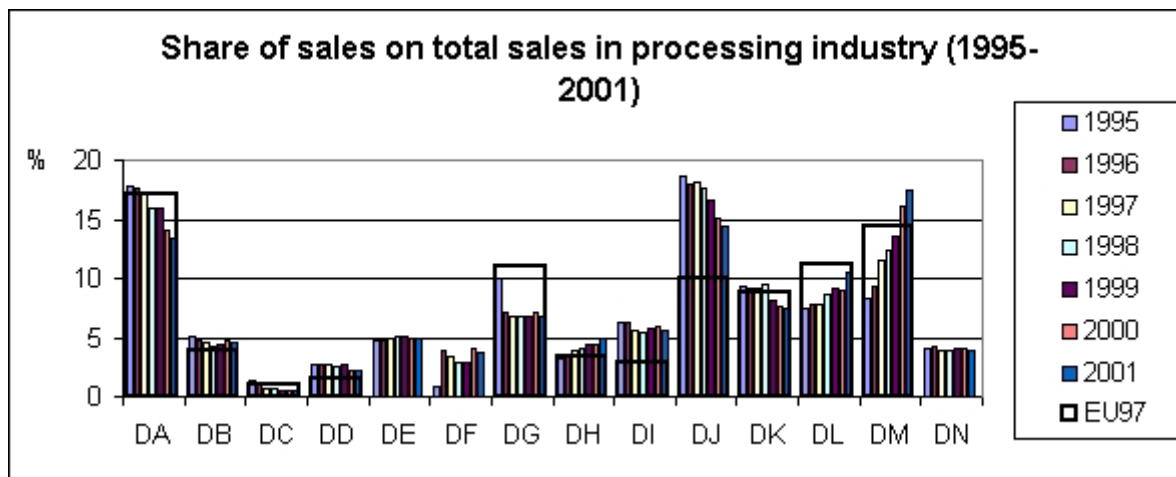
<sup>2</sup> on own account and name of the organization

*Source: Czech Statistical Office, Customs Office - GŘC*

From the table 7-1 we read a good position of machinery within the manufacturing industry. Impressive results are accomplished especially by manufacturing of transport equipment. The position of this segment is determined, apart from other factors, also by timely re-structuralization, privatisation and by its tradition in terms of the entire Czech industry. Manufacturing industry employs 26 % of the total number of workers in the Czech Republic. As is apparent from the table above - machinery employees roughly one third of the workers in manufacturing industry.

Structural changes from the point of view of sales of the manufacturing industry in comparison to the average share of the EU are shown in the graph 7-1.

Graph 7-1 Share of sales an total sales in manufacturing industry, 1995 – 2001



Source: Ministry of Industry and Trade

DA	Manufacture of food products; beverages and tobacco	DH	Manufacture of rubber and plastic products
DB	Manufacture of textiles and textile products	DI	Manufacture of other non-metallic mineral products
DC	Manufacture of leather and leather products	DJ	Manufacture of basic metals and fabricated metal product
DD	Manufacture of wood and wood products	DK	<b>Manufacture of machinery and equipment n.e.c.</b>
DE	Manufacture of pulp, paper and paper products; publishing and printing	DL	<b>Manufacture of electrical and optical equipment</b>
DF	Manufacture of coke, refined petroleum products and nuclear fuel	DM	<b>Manufacture of transport equipment</b>
DG	Manufacture of chemicals, chemical products and man-made fibres	DN	Manufacturing n.e.c.

The structure of the manufacturing industry was approaching the structure of such in the EU (from the viewpoint of sales structures) while it has accomplished a change in orientation from heavy towards light industry. The following changes took place:

- There has been a significant raise of the importance of those fields with perspective prosperity in which foreign capital has entered. Namely the automobile industry, with connection to electro-technical industry, is at the stake. Their share went over the EU average (see graph 6-1 DL, DM).



- There has been a decrease of the share of General engineering (DK), which went below the EU average.

Export structures of the machinery sectors went through a significant change as well. The export of electro-technical and electrical industry increased in 2001 in comparison to 1995 four times (the biggest change took place in office machines and automatic data processing machines segment – almost 8 times of the original amount). Export of the transport industry products increased five times. The structure of the export has been changing in favour of those products with higher level of manufacturing. An increase of these machinery industry products shares in the total export proves their competitiveness.

## Ownership structure

For the majority of businesses the ownership structure is stabilized. The table below shows the quantity of economic entities active in machinery.

**Table 7-2 Number of economic entities active in machinery as of December 2002**

	Private	State owned enterprises	Enterprises with foreign capital	Other <sup>1</sup>	Total
Mechanical Products	9463	47	582	157	10204
Office machinery and automatic data processing machines	1006	1	33	4	1043
Electrical machinery and apparatus n.e.c.	32914	15	476	54	33449
Radio, television, communications equipments	7015	3	136	20	7172
Medical and optical instruments and equipment	4290	15	158	33	4481
Road vehicles	685	3	124	17	828
Other transport equipments	934	10	48	23	1006

<sup>1</sup> Cooperatives, unions, political parties and church

*Source: Czech Statistical Office (2003)*

The Czech industry in general exhibits lower labour productivity compared to EU. This can be explained by the following:

- slow re-structuralization of businesses (under-capitalization),
- low level of organization and governance,
- energy intensive production and
- small innovative dynamics and worse equipment of production lines in regards to modern technologies.

The situation of the individual enterprises differs significantly and the actual labour productivity seems to depend mainly on the presence of foreign ownership. Foreign investors entered mainly into prosperous businesses or they have build companies on green fields.

Apart from the capital, foreign investor also brought know-how and modern ways of company governance and work organization. These companies exhibit higher dynamics of production growth, higher labour productivity, rentability, etc.

On the other side there is a number of big enterprises from the traditional fields of machinery and production of other transport means, which were not bought by a strategic partner and therefore often did not receive capable management. There are also business with foreign owners, that do not behave as standard companies in market economy do. This may be given for instance by the fact that second share holder in these companies is the state (the above mentioned points apply to state owned businesses).

## **Accession to the EU**

The accession to the EU will finalize the process of transition towards market economy. Increase of wealth of Czech citizens may be expected. This will lead to product demand increase. Stronger demand for products will result in import increase and consequently in higher competition for the domestic businesses.

Not only due to the large number of economic entities active in machinery (see table 7-2) but also thanks to the character of the production (specialization) there is no real threat of the market being captured by one big player. Supplier network will be formed around the new big businesses (e.g. automobile factories). It can be therefore assumed that there will be a concentration of territorial clusters around certain productions.

The current insufficient innovative activity and technological weakness of the Czech domestic enterprises will result in more intensive exploiting of the EU structural fund (this applies also to other EU candidate countries). Consequently, it is likely that the differences in labour productivity between foreign and domestic owned businesses will diminish. Foreign owned businesses had 66 % higher level of productivity than domestically owned companies (in 1999). Such difference should be slowly disappearing after the EU accession (the governmental study RASES predicts this difference to be 30-35 % by 2008).

The extremely high share of endangered and loss-making businesses (mostly those with significant state control) will have to undergo severe consolidation in the near future. The solution could be twofold:

- restructuring or re-vitalization of viable businesses and their further privatisation, if they are state owned or
- liquidation of the non-perspective ones.

After the accession to the EU, we do not expect a considerable increase of mergers among large companies (more than 250 employees), however foreign investors will possibly enter state owned enterprises.

Most large companies are already in foreign hands, and these account for two-thirds of exports and around one-third of gross fixed investment. A growing small and medium-sized business sector has grown up around the multinationals and is already integrated into their global supply chains. The competitive impact of accession will encourage local companies (SMEs) to look for international partners. That not only means deeper and more reliable pockets, but also increases the possibility of extending global supply contracts to the new member states.

## **Small and Medium Enterprises**

The position of Small and Medium Enterprises (SMEs) within the manufacturing industry is relatively insignificant - especially compared to the sector of services. SMEs however have a specific role as they represent

the sub-supplier base for large machinery businesses. Due to the expected increase of automobile and electro-technical industry improvement of the SMEs' position is to be expected in the given sectors.

Strong advantage of SMEs is perhaps their better flexibility and innovative creativity. Their current weak side remains above all their limited financial power and consequently worse viability of acquiring bank loans necessary for their development. Positive side after the accession to the EU will definitely be the possibility of drawing from the EU structural funds.

**Table 7-3 Share of SMEs in Machinery**

NACE/ <sup>1</sup> in %	Employment					Revenues				
	No. of employee				Of which SMEs <sup>2</sup>	No. of employee				Of which SMEs <sup>2</sup>
	0-19	20-99	100+	Total		0-19	20-99	100+	Total	
NACE 29	15.40	16.40	68.20	100	50.99	13.28	15.04	71.68	100	46.76
NACE 30	19.88	16.71	63.41	100	46.12	4.99	1.24	93.76	100	6.47
NACE 31	12.34	12.12	65.54	100	53.04	14.11	10.59	75.30	100	44.52
NACE 32	14.92	11.13	73.95	100	34.86	6.04	6.60	87.36	100	17.21
NACE 33	33.59	15.16	51.25	100	63.65	19.19	13.01	67.80	100	45.56
NACE 34	1.37	5.85	92.78	100	15.47	0.33	2.18	97.50	100	7.41
NACE 35	4.14	11.83	84.03	100	26.41	2.53	9.70	87.76	100	21.21
Manufacturing	22.82	16.93	60.25	100	55.15	10.44	12.22	77.34	100	36.79

<sup>1</sup>NACE 29...General engineering; NACE 30...Office machines and automatic data processing machines; NACE 31... Electrical machinery, apparatus and appliances; NACE 32... Radio, television and communications equipments; NACE 33... Instrument, Regulation and Automation Equipment, Medical, Optical, and Chronometric Apparatus; NACE 34...Road vehicles; NACE 35...Other transport equipment  
<sup>2</sup>0-250 employees

*Source: Czech Statistical Office (2002)*

It is apparent from the table that the SMEs sector plays an important role namely in production of Medical and Optical Apparatus (NACE 33). The turnovers of these companies do not however reach majority share. After the finalization of the car plant in Kolin an increase of SMEs share in the employment is expected. This will be connected to the creation of the sub-supplier network.

### **Territorial spread-out of the machinery production**

The machinery production is spread-out evenly over the Czech territory due to the large number of businesses and to the tradition of machinery in the Czech Republic, whereas:

- General engineering has the biggest concentration in South Moravian Region (NACE 29)
- Office machines and automatic data processing machines (NACE 30)– the more than 80 % of the production is concentrated in Central Bohemian Region, Pardubice Region, and South Moravian Region.

- Electrical machinery, apparatus and appliances (NACE 31)– biggest concentration in Prague and Central Bohemian Region
- Radio, television and communications equipments (NACE 32) – concentrated mainly in Prague, Plzeň Region, South Moravian Region, Pardubice Region and Zlin Region.
- Instrument, Regulation and Automation Equipment, Medical, Optical, and Chronometric Apparatus (NACE 33) – concentrated for the most part in Central Bohemian Region
- Road vehicles (NACE 34) – the automobile production is concentrated mainly in Central Bohemian Region. The share on the turnovers in Central Bohemian Region will increase the finalization of the car plant TPCA in Kolín.
- Other transport equipment (NACE 35) has a rather spread concentration especially in bigger cities surrounds

It is assumed that the change of the territorial structure of the machinery production will be determined by several factors. Transport availability is perhaps the most significant; other factors would be sufficient amounts of qualified labour and size of the industrialized zone. The system of investment incentives is trying to direct investors into areas of higher unemployment, i.e. Moravian-Silesian Region and Usti nad Labem Region.

## **Short-term policy measures related to Machinery**

### **Cultivation of conditions for businesses**

There should be a more vivid separation of the state and business life after the accession to the EU. The state should privatise the remaining companies in which it has share. The state should also initiate a thorough restructuring and help them find a strategic partner, if it has not done so yet.

There should be a guarantor of the institutional, environmental and economic environment. It should be solving problems such as how to deal with increasing unemployment; it should support industry and its future using non-interventional politics. One of the political priorities will be to develop conditions which will in turn improve business environment; i.e. to cultivate and stabilize the business environment, support the co-operation of SMEs with large businesses and with scientific and research establishments, assist in the development of industrial and business services in regions.

Cultivation of the business sector inheres apart from other also in the operation of the government, in faster recording in the Commercial register, in improvement of the situation on apartment market (deregulation of rent). All this would fortify labour mobility. The process of approximation with the EU will require the partial steps being taken to be coordinated with the economic and social cohesion policies.

Strengthening of competitiveness of Czech companies will lead to improvement of their position on the EU market. Increase of the competitiveness is determined by many different factors and the government should by creation of certain conditions motivate the businesses to increase such. The increase of the competitiveness will be achieved mainly by:

- Increase of technical and technological level of production and production structure. Enlarging the share of high-tech products in manufacturing and other products with higher value-added. To do this, it is necessary to support science and research, motivate the business sphere to participation with R&D. Support of environment friendly technologies.
- By development of the domestic transport infrastructure in connection the EU infrastructure (accessibility of housing, development of industrial zones, etc).
- SMEs support.
- Development of educational system.

### **How to support SMEs?**

Small and middle enterprises, which are realized almost exclusively in private sector suffers from lack of financial means for development of business activities and from insufficient investment capital. There is a whole set of supporting programs for small and middle enterprises. Nevertheless, SMEs have to face number of negative factors of the business climate: high taxes, complicated and non-transparent legislation, problematic law enforceability etc. This may cause them to have severe cash-flow problems. All of the above mentioned factors may be set to a much friendlier position for the SMEs by the government. Improvement of the law enforceability (including recording into the Commercial register) would be beneficial for the entire business environment. A system with time limitations for the state bureaucracy to make changes would seem as optimal given the situation. Simplification of the legislation would problematic - even small firms will have to comply

with the new directives from the EU, which will result in increase in their transaction costs. Decrease in taxes could lead to development in the SMEs sector and other companies as well. Increase in capital would bring improvement of individual businesses' investment activities. Decrease in taxes would for SMEs solve one more problem that is the common unwillingness of the banks to loan finances. Strategy aimed at strengthening of the SMEs position will eventually lead to their cooperation with big businesses. Increase in the investments into production improvement would help the small firms with their integration into the sub-supplier process.

## **Human resource development**

Development of technical universities will lead to more thorough participation of the graduates in science and development. The state should support cooperation between the technical universities and businesses. Creation of research and development centres within the universities will increase the interest of the businesses in active participation in regards to R&D. For machinery it is crucial that the laid-off workers (as a consequence of re-structuralization) have the possibility of re-qualification in other fields. Re-qualification programs may in short time effectively re-direct labour supply into areas, where such is needed.

Not only development of universities is so crucial for machinery. Specialized technical high school education plays also an important role. Disinterest of students in these study areas may cause an age gap in the labour structure.

## **Motivation of People to Work**

Development of the infrastructure of the new industrialized zone may attract people to work, if only they had a better motivation. The current system of social benefits is due to the minimal wage rather de-motivating in terms of job-seeking and for unemployed advantageous. People's motivation to work may be increased by decreasing the social benefits and by re-qualification. Especially low qualified labour or manufacturing line workers in machinery are in question.

## **How to Keep Foreign Investors?**

The state should attempt to create business conditions so that the foreign investors would not leave the country after the expiration of the period during which they were benefiting from investment incentives. There are several ways how to attain this: to prefer establishment of productions with higher value-added, development centres, to supply them with sufficient amount of qualified labour (development of education), improve institutional environment and motivate them together with domestic businesses using the best treat – low taxes.

## Summary

During the period of economic transition and privatisation Czech industry has undergone extensive changes in ownership relations. This analysis attempts at evaluating the situation of Czech Republic Machinery after EU accession. The major issues of the Machinery analyses are the following:

- Growth effects of the EU accession,
- The effect of accession on foreign trade and evolution of net export,
- The effect of accession on FDI flows,
- Labour market effect of EU accession,
- The effect of EU accession on the regulatory framework,
- The effect of accession on the market structures and
- Short-term policy measures related to the Machinery sector.

Machinery production has had a long tradition in the Czech Republic. Machinery has become the engine of the Czech manufacturing industry.

The following SWOT – table characterize the baseline position of Czech machinery:

<b>Strengths</b>	<b>Weaknesses</b>
Tradition of industrial production	Shortage of investment resources
Favourable location at the heart of Europe	Lacking business infrastructure for the development and transfer of technologies and for the support of innovation and services
Skilled and adaptable workforce	Labour force unwilling to migrate
Low-cost workforce	Over-employment in some enterprises
Technical normalization is fully compatible with the EU	Unwieldy access to information, consultancy services, vocational education, research, and innovation
Export is oriented towards EU countries	

<b>Opportunities</b>	<b>Threats</b>
Higher growth rate of technical and technological development	Liquidation of production lines unable to compete
Development of sectors, which generate a high value-added	Regional lack of skilled workforce
Support of education	The bigger competition from the EU and resulting from market globalisation
Increase of labour productivity	Drawbacks of technical policy (slow advance in replacing outdated technologies, imperfect linkage of production to research and development manifested in the lack of new designs and new technologies where and when needed...)
Use of relatively a high-skilled workforce in locations affected by restructuring	Management drawbacks (conservative attitude toward innovation, inadequate work with /use of/ information, underestimating the importance of operations with financial capital...)

Because of the fact that the conditions of the individual machinery sectors are differentiated, we were describing Machinery according to selected branches. Baseline position differs from sectors to sectors. Transport equipment (above all road vehicles) is the strongest branch of manufacturing industry (according to share of sales). Manufacture of electrical and optical equipment is the most progressive branch of manufacturing industry. Some branches (other transport equipment and general engineering) are in doubtful.

### **Growth effects of the EU accession**

Growth potential of machinery will be dependent on the level and development of competitive ability. The competitive ability depends on the growth of labour productivity, evaluation of export prices and export output and import difficulty and on the share of high value-added in productions. If we compare the present situation with the future, we can realise that no substantial change in demand side is occurred. The following SWOT table characterizes growth potential of EU accession:



<b>Strengths</b>	<b>Weaknesses</b>
Good position of enterprises that are owned by foreign capital (competitiveness reach almost EU level)	Low level of re-structuralisation will decrease the opportunity of competing in Common Market
Many new enterprises, which were established in recent years (with modern production lines...)	Lack of investment resources, which are needed for improvement of production
Skilled workforce	Low labour productivity
Share of companies with foreign participation in exports	Supplies for small and rural communities
<b>Opportunities</b>	<b>Threats</b>
Higher cooperation sophistication	The end of global labour-cost advantage in long run
Label "Made in EU"	Shortage of capital for the development of entrepreneurial activities
Improvement of supply side (quality, services connected with sales,	Low foreign demand
Productivity gains	Bankruptcy of wailing companies
Trade effects will accelerate GDP growth	The bigger competition from the EU
Marketing via Internet	
Creating advantages of scale from increasing export	
Improvement of institutions will have impact on investment	

Many companies will benefit from accession. Largely companies with high level of competitiveness are getting ready for the membership. This area is mainly represented by automobile industry and electrotechnical industry. The level of competitiveness is almost same as in EU and in some companies is higher.

#### **The effect of accession on foreign trade and evolution of net export**

Machinery has been main component of Czech foreign trade. Radical structural changes in foreign trade with machinery took place during 1990s. These led to superiority of the automotive industry oriented on car production. The domestic market has only limited capacity and that is why machinery is export-oriented sector of manufacturing industry. Machinery reflects high dynamics of export. This can be caused by inflow of FDI to machinery, where many new enterprises were established (greenfield, mergers and acquisition...).

The evaluation of foreign trade after EU accession depends on foreign (German) demand. According to development in recent years, when the export has been having the bigger dynamics than import, we can expect that machinery will contribute to decreasing deficit of foreign trade. The territorial division of foreign trade will not be influenced by EU accession. EU is the biggest trade partner of the Czech machinery. Present position of CEFTA members strengthens the export to EU at least by 10 %.

Following SWOT table shows main tendency of accession on foreign trade:

<b>Strengths</b>	<b>Weaknesses</b>
Machinery is export-oriented	Development of the currency rate
EU – main trade partner	Import difficulty in the branch - electrical machinery
Strong position of automobile and electro-technical industry	Low share of high value-added production
Development of investment in recent years (foreign investors invest mainly to fixed assets – new production lines...)	Low level of competitiveness
Dynamic of exports in recent years	
<b>Opportunities</b>	<b>Threats</b>
Improvement of competitiveness ability will have positive effects on export evaluation	Development of the currency rate
Decreasing of share of refining processes and setting up productions with high rate of value-added	Low foreign demand
	Insufficient restructualisation of production

### **The effect of accession on FDI flows**

A considerable part of the FDI has gone into sectors of manufacturing industry, especially into machinery. Foreign direct investments ease the entrance to foreign markets. FDI raise the technical and economic parameters and improve the level of company management. Not only because of Czech favourable location at the heart of Europe we can expect that machinery will benefit from EU enlargement. Candidate countries will remain attractive investment targets owing to favourable ratios of labour cost to productivity.

In regards to successful enterprises, repatriation of investment or its transfer to tax-benevolent countries is expected. Due to the worldwide stagnation of economic growth it is likely that some of the foreign investors will leave the Czech Republic. This applies above all to sectors, where cheap labour is demanded and where the competition of cheap products from Asia threatens the position of Czech producers.

Following SWOT table shows main effect of accession on FDI flows:

<b>Strengths</b>	<b>Weaknesses</b>
Favourable location at the heart of Europe	Low mobility of workforce
Skilled and adaptable workforce	Insufficient infrastructure in some regions
Low-cost workforce	Market of producing car is relatively saturated
Good sub-supporters ground	Bureaucracy
Investment incentives, which are compatible with EU rules	
<b>Opportunities</b>	<b>Threats</b>
Support of investment to sectors with high value-added	Outward of investment where cheap labour is needed
Development of institutional framework	Repatriation of profit to tax-benevolent countries
Support of R&D	

### **Labour market effect of EU accession**

Labour market in machinery can be characterized as high professional level of labour force, which is unwilling to migrate (within Czech Republic!), unsatisfactory knowledge of foreign languages and high rate of sick-leave. There are differences between enterprises under foreign control and domestic or state-owned companies. Foreign controlled companies show better economical result. Their production do not suffer from over-employment and the rate of sick-leave is diminishing.

Demand side of labour market will be crucially influenced by stage of re-structuralisation (some companies will face existential problems, reduction of employees is one way how to save company alive).

We do not expect migration of Czech employees. Possible development of labour market is connected with processes re-qualifications and support or cooperation with educational institution.

Following SWOT table shows main tendency of accession on labour market:

<b>Strengths</b>	<b>Weaknesses</b>
Skilled and adaptable workforce	Low mobility of workforce
Low-cost workforce	Unsatisfactory knowledge of foreign languages
Relatively high level of education of the workforce (in particular secondary education)	Insufficient links between the educational system and the needs of the labour market, low participation of employers and trade unions in the programme, organisation and funding of vocational training
Existing human potential in science and research as a source of innovation	High rate of sick-leave
<b>Opportunities</b>	<b>Threats</b>
<ul style="list-style-type: none"> <li>• development of vocational training reflecting the requirements of the European labour market and employment requirements</li> <li>• implementation of lifetime learning to ensure maximum development of each individual, hand in hand with corresponding changes in the structure, contents, and form of both basic and advanced education</li> <li>• optimisation of the network of schools at the regional level</li> <li>• integration of scientific, educational, and production capacities to increase innovation</li> </ul>	<ul style="list-style-type: none"> <li>• isolation and insufficient co-ordination of the processes involved in the modernisation of the education system, and limited participation of social partners and other players</li> <li>• Low share of GDP channelled to expenditures on education, reflecting a low priority this is being accorded in society</li> <li>• Absence of a human resources development system and of lifetime education and training and care of the human capital</li> </ul>

### **The effect of EU accession on the regulatory framework**

Machinery has fully compatible technical normalization with the EU. The importance of environmental legislation is taken into account; Czech suppliers are forced to use products with the ISO 14000 certificate.

Investment incentives are compatible with the EU rules.

Further improvement of the institutional environment is expected after entering the EMU. The membership in the EMU will decrease transactional costs, which might help export-oriented businesses.

### **The effect of accession n the market structures**

The accession will increase the competition in machinery and slightly change the ownership structure in machinery. Number of businesses under foreign control will increase. Enterprises without strong/strategic partner will be forced to stop their businesses. After the accession to the EU, we do not expect a considerable increase of fusions among large companies (more than 250 employees), however foreign investors will possibly enter state owned enterprises.

The competitive impact of accession will encourage local companies (SMEs) to look for international partners. That not only means deeper and more reliable pockets, but also increases the possibility of extending global supply contracts to the new member states.

Following SWOT analysis summarize the position of SMEs after the EU accession.

<b>Strengths</b>	<b>Weaknesses</b>
creation of conditions conducive to the development and introduction of new technologies	less economic power than large enterprises insufficient legal, economic, technical and management capacities
creation of new jobs at low capital costs	higher sensitiveness to the enforcement of law and administrative problems
quick adaptation to market demand	
facilitation of faster development of municipalities through entrepreneurial activities	insufficient orientation in foreign markets and risk of paying less attention - in contrast to larger enterprises - to the environmental impacts of production
support of the development of structurally affected and weak regions	
<b>Opportunities</b>	<b>Threats</b>
release of the innovative potential as generator of added value	increased competition resulting from market globalisation
setting up of groups and networks of SMEs, including the involvement of SMEs focused on comprehensive industrial services	conservative approach of the management to the implementation of certified management systems, including quality management systems
development of assistance and engineering services	shortage of capital for the development of entrepreneurial activities

### **Short-term policy measures related to the Machinery sector**

We divided this chapter into five parts. In the first we suggest the general task for government – Cultivation of conditions for business. The state should be a guarantor of the institutional, environmental and economic environment. It should be solving problems such as how to deal with increasing unemployment; it should support industry and its future using non-interventional politics.

In the second we try to find solution how to support SMEs. The universal solution is to decrease taxes. It could lead to development in the SMEs sector and other companies as well. Increase in capital would bring improvement of individual businesses' investment activities.

The third part is connected with support of human resource development. Re-qualification programs may in short time effectively re-direct labour supply into areas, where such is needed.

The fourth part tries to explain how to motivate people to work and the fifth part gives instruction how to keep foreign investors.

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