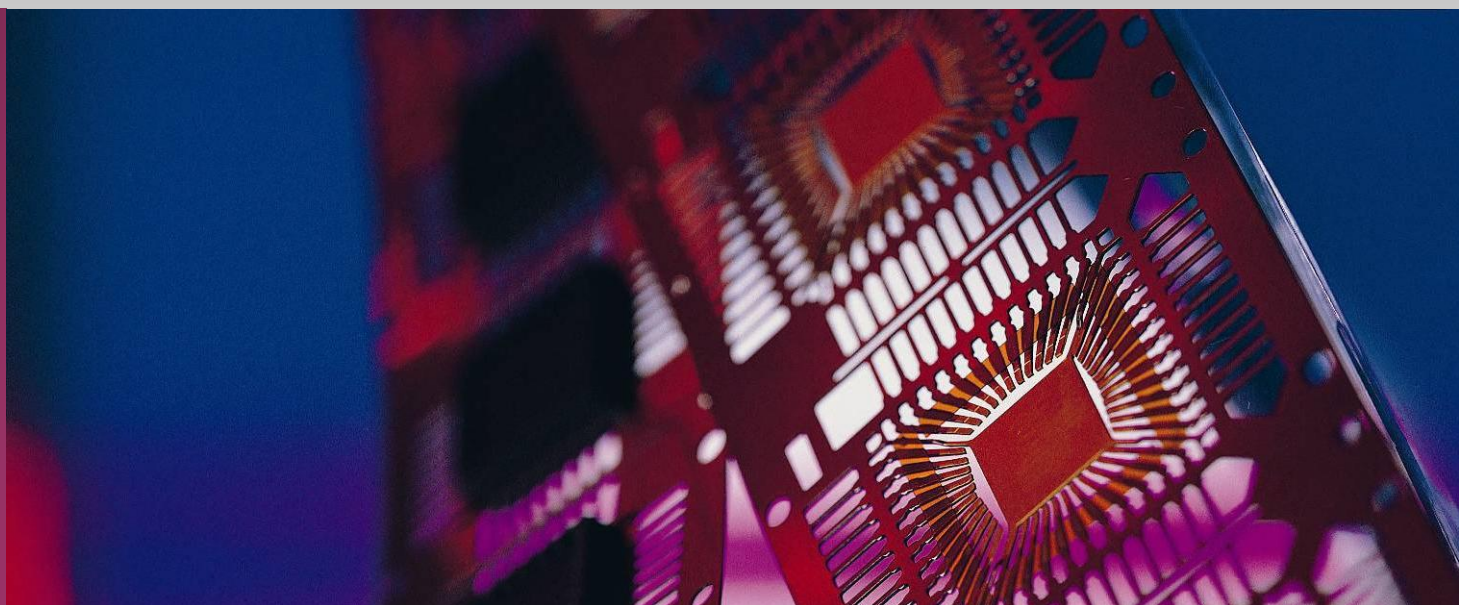


ELECTRICAL ENGINEERING INDUSTRY



S A R I O

Slovak Investment
and Trade Development Agency

GENERAL INFORMATION

Industry Character

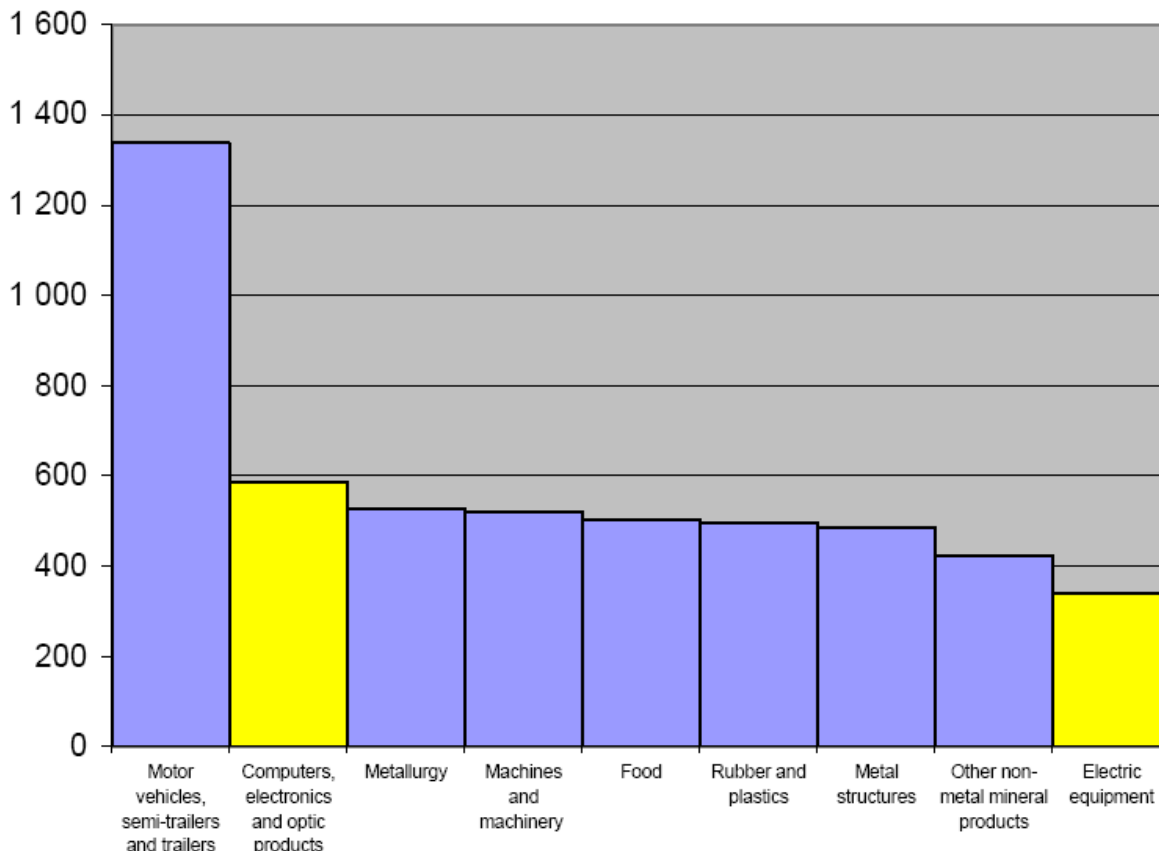
Starting in the nineties of the previous century, Slovak industry has been experiencing a structural change. In the recent years, it accelerated, also due to the economic crises. The most extensive qualitative and quantitative changes are especially visible in the electrotechnical industry (ETI). This industry, representing one of the important pillars of industry and the entire Slovak economy, experiences a period of extensive growth, with the onset of modern companies and decline of production in many outdated operations. These are especially operations that were hardly keeping afloat after the deep recession of electrotechnical industry in the first half of nineties, when the domestic production lag behind the international trends was manifested. Since then, thanks to the large plants of cable bundles and especially TV technology manufacturers, the industry results have been growing steadily. And by more than in any other Slovak industry. Prior to the crises, the fast growing quantitative parameters of electrotechnics outran the development in efficiency, profitability and overall industry importance. However, last year represented a breakpoint in this respect, even though only in parts of ETI. The industry fell slightly, however, profitability and added value shot to new levels. This was negatively reflected in employment rates recording a 15 percent decline. It is a development contrary to what electrotechnics was used to, when revenues were growing sevenfold and added value generation above fourfold in the last ten years in the Slovak electrotechnical industry. The number of workers was growing too. In 2008, even faster than revenues, added value or profitability.

Since 2008, statistic monitoring categorisation of industry changed, including electrotechnics. The classification change resulted in a change of structure and allocation of companies into sub - industries. Through the re - classification, electrotechnics lost 39 of its 221 companies in 2008, which represented 14% of its revenues. The full - time equivalent of workers dropped by 27 thousand workers (over one third). The lower percentage loss of revenues and higher loss of workers was caused by the re - classification of cable bundles manufacturers into the category of motor vehicles and accessories. In 2008, a new phase of industry development monitoring starts. Therefore, this analysis only slightly suggests the development of figures prior to 2008. The industry structure differs and a comparison of quantitative, qualitative or ratio parameters would be impossible.

According to new data of the SR Statistics Office, 182 companies employing over 20 employees were active in the electrotechnical industry in 2008. In 2009, there were 188, which only confirm the growing tendencies (not only as a result of new investor's arrival, but also the growth of small companies already considered in statistic data collection. Most of the new companies belong to foreign investors. Several companies only have activities in machinery industry or in the manufacturing of metals and structures. By total revenues, ETI ranks second behind machinery industry, more precisely, second behind car manufacturing. With over 43 thousand employees, electrotechnics is even one of the largest employers in industry. It employs 12 percent of all industry workers. There is a total of 373 thousand people employed in industry. Further, it is the second most important exporter (behind machinery industry), with a quarter share in the Slovak industrial export. Last year, Samsung Electronics Slovakia was the historically first electrotechnical company to reach the status of the largest Slovak exporter. However, the very high scope of imported inputs should be noted, since it significantly decreases the net positive industry contribution to the SR trade balance.

Along with employment rates, the real industry importance for the national economy is best demonstrated by the added value generation, or the generation of added value per employee. Its development lagged behind revenues and export for many years. Added value is namely lower than, for example in pharmaceutical, paper, or chemical industries. After a longer period, year 2009 represented a positive development in the growth of ETI work productivity, which exceeded the growth of revenues. Before crises, industry profitability had a declining tendency and the economic slowdown of its development was to drive it even lower. Despite the declining tendencies in most electrotechnical sub - industries, especially the manufacturing of consumer electronics caused the exact opposite - an increase of profitability, which pulled the entire branch to positive figures.

The Largest Industries (Ranked by year 2009 Added Value, EUR mil.)



SOURCE: Statistics Office of the SR, 2010

Basic indicators

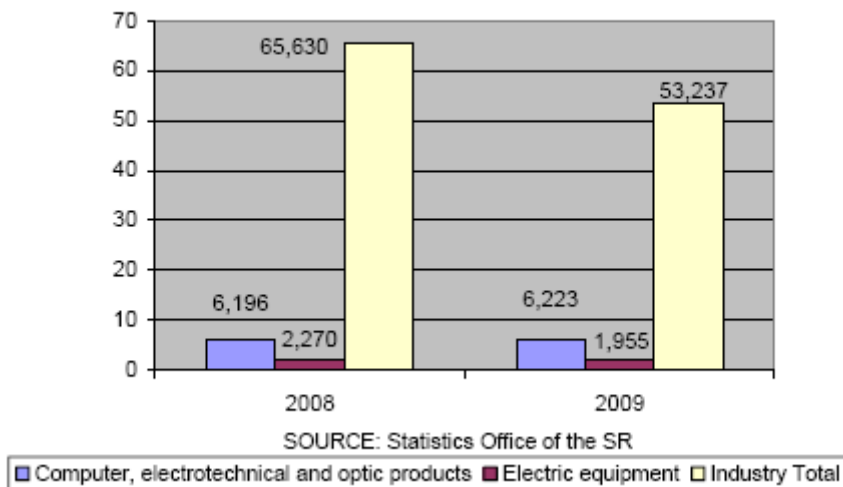
Revenues

In this decade, total revenues of ETI companies kept growing with double digit dynamics. This was especially thanks to the largest Slovak exporter and the largest industry player– Samsung Electronics Slovakia in Galanta. In 2009, with revenues of Euro 3.17 billion, this company ranked first among all industrial companies. It beat the traditionally dominant car manufacturers. Annual increases of electrotechnics were reaching 40 percent since year 2007. The overall industry growth was especially driven by the expansion of finalisation plants (TV sets, DVD recorders, players), but also facilities linked to the automotive industry (electric engines, speakers, lights, bulbs, cable bundles manufacturers, etc.).

The twenty three percent annual growth of 2007 suggested saturation and upcoming occurrence of manufacturing limits. In 2008, already in the crises impact towards the end of the year, it went down to six percent only. Of the total revenues of Eur 8 465 of the year 2008, almost 89 percent were already formed by export. Year 2009, with revenues of Eur 8,18 billion, this share dropped to 83 percent. However, the manufacturing of LC panels and LCD TV sets can still be expected to generate interesting growth of both revenues and export that certainly more than compensate the end of its life and loses price competitiveness.

Finalisation facilities, especially in the manufacturing of LCD TV sets and monitors, as well as the facilities for LC modules, forming more than a half of ETI revenues, but over 90 percent of the resulting production value, make input purchases (mostly from abroad). Therefore, the development of revenues does not express a realistic view of the industry performance and its contribution to the growth of Slovak GDP.

Revenues in Slovak Electrotechnical Industry and Industry Total
(in EUR billion)



Added Value

Despite the revenues being the most monitored economic parameters, a more realistic picture of the electrotechnical industry performance is provided by data on the generated added value. ETI has a 15 percent share in the total revenues of industrial companies employing over 20 people and even fifth in export. However, electrotechnical industry only generates 9 percent of the entire industry added value.

In year 2003 to 2007, added value in ETI increased the most of all industries in SR- it more than doubled. The growth of added value was interrupted in 2008, when it dropped by about four percent (just like the average for the entire industry). Especially as a result of a fast decrease of LCD TV sets price, that significantly reduced the margins of LCD TVs manufacturers. In 2009, the crises and saving measures across all industry companies resulted in increased overall added value by 20 percent. It reached Euro 923 million. Since 2008, the weaker growth of added value compared to revenues was caused by expansion of manufacturing at the end of the manufacturing chain. These work with high revenues, but only a small part is formed by value added by the final manufacturer. Since 2004, added value represented over 20 percent of total revenues in the industry. In 2007, it was only 13, 5 percent and 9, 5 percent the following year. In 2009, it reached over 11 percent of total revenues. The trend of growing added value share in revenues should continue in 2010, since the rationalisation measures and collective redundancies were completed this year. Further, LC panel facilities are, or will be under development. Their added value exceeds the ETI average. In 2008, Samsung opened such facility in Voderady near Trnava. In 2010, it is already to reach its planned capacity of 10 million displays per year. It should be followed by a similar plant of the Taiwanese AU Optronics in Trenčín with construction initiated in spring 2010. Production is planned to start in 2011. However, even LC panel plants purchase a decisive part of inputs, most of which are imported. Their expansion shall most probably result in increased revenues and limited growth of added value (in LC panels manufacturing, it represents about one quarter of revenues) of the domestic electrotechnical industry. Further expansion of final products manufacturers and gradual attenuation of simpler operations with high added value shall continue to push down the share of added value in long-term perspective.

Electrotechnical Industry			
	2008	2009	2009/08 (%)
Total revenues (EUR mil.)	8 465	8 178	-3,4
Revenues for own products and services (EUR mil.)	8 092	7 733	-4,4
Added Value (EUR mil.)	800	923	15,0
Profit/Loss (before tax, EUR mil.)	84	299	356
Number of staff (full time equivalent)	50 391	43 284	-14,1
Average monthly wage (as an average of wages for two branches according to NACE, EUR)	680	720	5,9
<i>Comment: Data collected from annual reports of companies with over 20 employees</i>			
<i>SOURCE: Statistics Office of the SR, TREND Analyses</i>			

Employment

Added value is closely interlinked with employment. Until 2008, it grew faster than ETI added value. In 2007 and 2008, 15% new jobs were created in the industry. In 2008, over two hundred companies with more than 20 employees employed a total of over 50 thousand people. Last year, the crises in electrotechnics erased over seven thousand jobs.

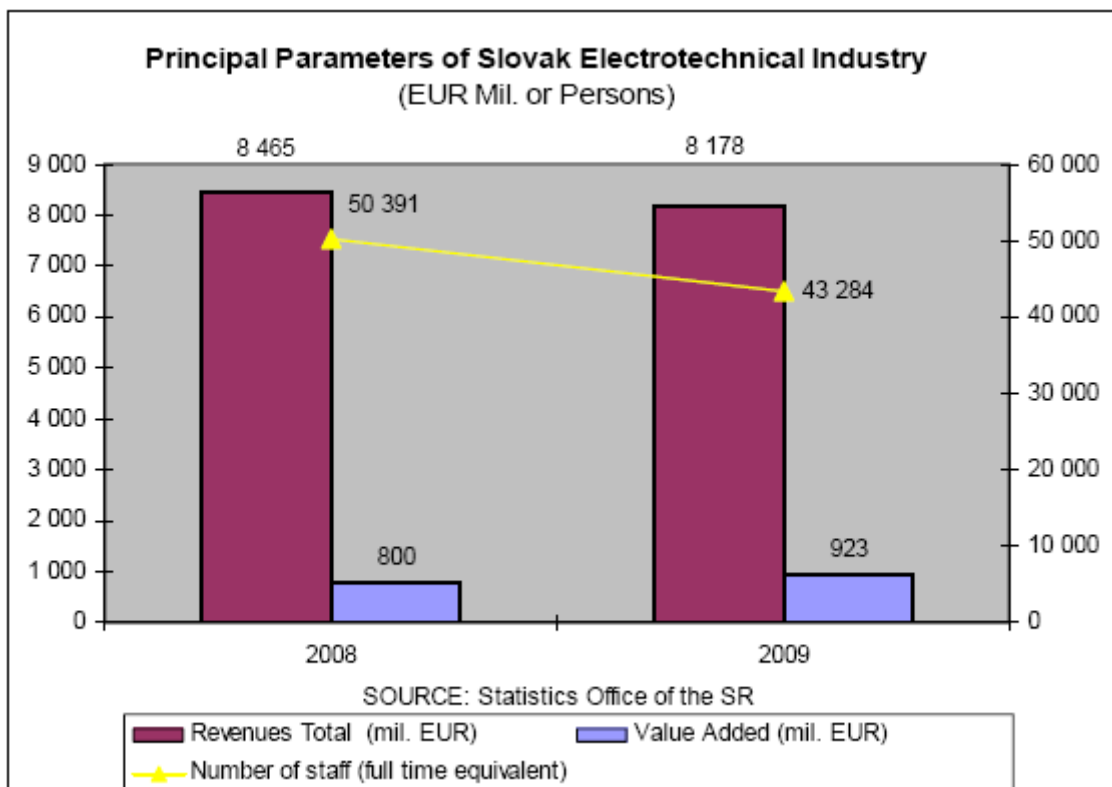
Despite crises, average salary in electrotechnics increased by almost 6 percent, to Euro 720 (the figure is calculated as a weighted average of salaries for two electrotechnical industry branches according to NACE categorisation). This growth was recorded in electrotechnics in 2008. However, that year salaries truly increased in reaction to the lack of qualified workforce around large plants. In 2009, it is only a statistical improvement of the wage parameter.

People in the lowest payment categories lost their jobs. Cable bundles manufacturers experienced collective redundancies. There, salaries are some of the lowest in national economy – approaching minimum wage. Therefore, real growth of wages in electrotechnics did not take place. It is only the effect of people with the lowest wages being omitted from the statistics. However, wages are still below the industry average. Slovak industry average wage represented EUR 815 in 2009. In mid-term, it will be possible to catch up with the industry average faster as a result of cheaper operations departure and attenuation, where less qualified – ergo cheap workforce was used, and on the other hand, the opening of high tech plants.

The rapid economic downturn experienced towards the end of year did not have an effect of year 2008 employment rate. Partially due to the initial belief of managers in early change of orders development and partially due to the notice periods still running. By December 2008, average number of staff dropped slightly only with sub-industries including the largest employers in electrotechnics – cable bundles manufacturers. These use especially cheap manual work and continue to rank among the largest industry employers in the SR, providing a total of about 20 thousand jobs. According to the new NACE classification, most cable bundles plants were included in the statistics of motor vehicles and parts manufactures.

On the other hand, in 2008 and 2009, employment increased in new factories (Magneti Marelli in Kechnec, Samsung in Voderady) and already established, but still expanding plants mainly involved in the manufacturing of consumer electronics (Sony, Universal Media Corporation), but also some cable bundles manufacturers (Yura – former Sewon).

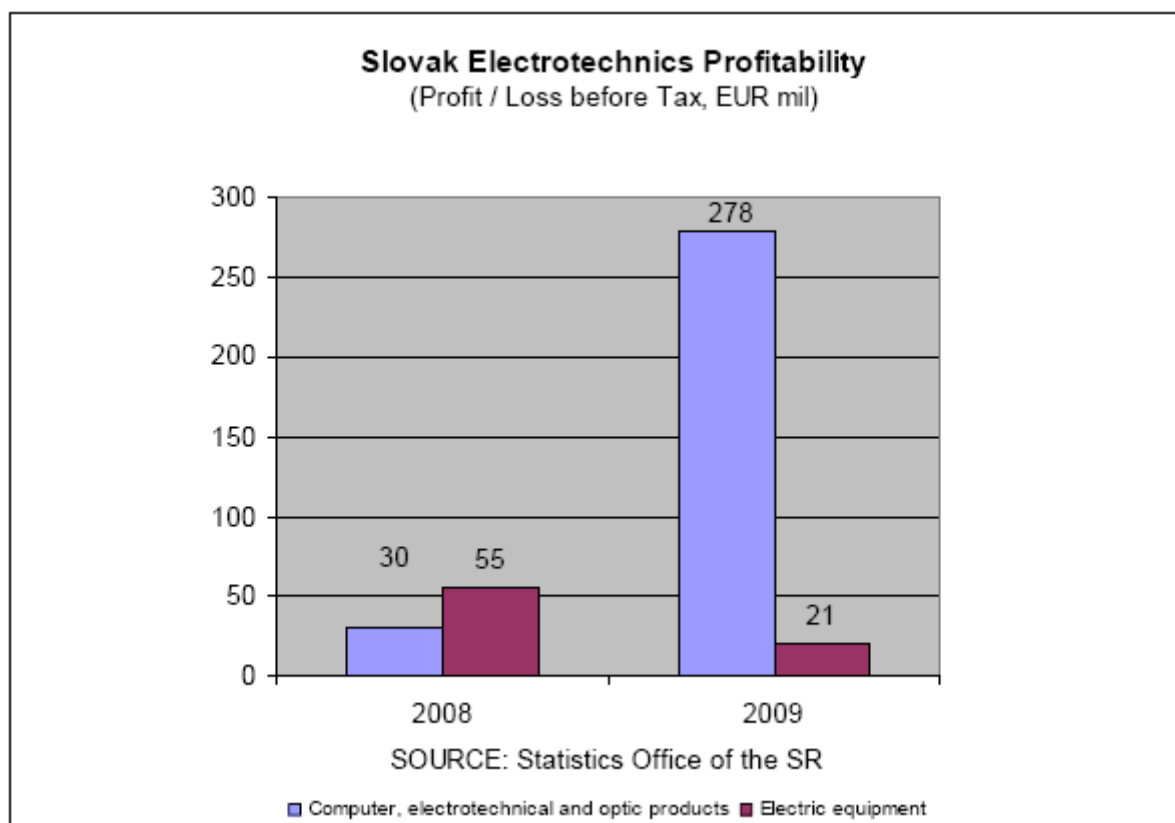
Crises and the quite strong conversion exchange rate only sped up the expected development towards gradual relocation of simple manual production from Slovakia to still cheaper countries. Most of the expanding and new plants in the national ETI already represent production with higher work productivity (added value per employee). It is especially the case of electronics, electric engines, chips and power supply units. Such operations require more people with secondary level education and technical engineers. However, since most of the inputs of such operations are sub deliveries from companies outside the electrotechnical industry (chemistry, machinery and other), they do not greatly contribute to the aggregated added value of ETI. Their positive impact on economy and employment is also partially hidden in the results of other industries.



Profitability

In terms of profitability, year 2009 represented a pleasant change. Until 2008, ETI was used to growth of revenues and employment. However, profitability of this industry recorded less convincing development and was decreasing since 2006. Electrotechnical industry had a 13 percent share in the total industry revenues in 2008. Of the total profit, it only had a little above two percent. Aggregate profit of industry companies before tax dropped from EUR 200 million in 2007 to about one half. In the year of 2009, ETI increased its share in total industry revenues to 15 percent. ETI share in the entire industry profit moved up to 13.5 percent. The profit of EUR 278 million represented a profit increase of over 350 percent in the crises year 2009. This unprecedented result was especially generated by consumer electronics manufacturers. TREND Analyses identified that over two thirds of this result may be attributed to the Galanta based Samsung plant that successfully reorganised its production. By the relief of agency staff and further automatisation, it dramatically increased work productivity. Further, key investments were made in 2008. Year 2009 was poorer in investments, which decreased cumulative costs. On the contrary, profit dropped in other large plants – Sony and both Panasonic daughter companies.

Since 2009, one of the reasons for declining profits was the continuing obsolescence of electronic products coupled with dropping prices and thinning operating margins. However, year 2009 also showed positive crises effects in the dramatic increase of efficiency and productivity of electrotechnical industry parts. Profitability or loss of respective plants in Slovakia may be partially slightly misinterpreted, since they are mostly only manufacturing plants of multinational concerns. Several local daughter companies only reporting symbolic profits or even losses belong in reality to the most efficient ones within the entire concern. An existing example is the Poprad based Whirlpool included by the new statistic classification in machinery industry. For several years, it generated an accumulated loss of EUR 30 million. Internal concern price setting usually only calculates with minimum profit margin of manufacturing plants, even those, which are in fact still efficient for their concerns.



The Largest Electrotechnical Companies in the SR

(by total revenues, EUR mil.)

No.	Company	2009	2008
1	Samsung Electronics Slovakia, s.r.o., Galanta	3 168	3 392
2	Foxconn Slovakia, s.r.o., Nitra	1 238	1 225
3	Samsung Electronics LCD Slovakia, s.r.o., Voderady	407	228
4	Hansol LCD Slovakia, s.r.o., Voderady	217	87
5	Emerson, a.s., Nové Mesto nad Váhom	180	189
6	BSH Drives and Pumps, s.r.o., Michalovce	172	178
7	Panasonic AVC Networks Slovakia, s.r.o., Krompachy	167	184
8	Universal Media Corporation (Slovakia), s.r.o., Nové Mesto nad Váhom	125	89
9	Leoni Autokabel Slovakia, s.r.o., Trenčín	107	134
10	Osram Slovakia, a.s., Nové Zámky	102	126
11	SE Bordnetze - Slovakia, s.r.o., Nitra	91	165
12	Panasonic Electronic Devices Slovakia, s.r.o., Trstená	90	112
13	Delta Electronics (Slovakia), s.r.o., Dubnica nad Váhom	79	104
14	TRW Steering Systems Slovakia, s.r.o., Nové Mesto nad Váhom	78	76
15	Askoll Slovakia, s.r.o., Nové Mesto nad Váhom	78	118
16	Elster, s.r.o., Stará Turá	77	88
17	Yazaki Wiring Technologies Slovakia, s.r.o., Michalovce	55	65
18	PPA Controll, a.s., Bratislava	54	71
19	ABB, s.r.o., Bratislava	54	54
20	Leoni Slovakia, s.r.o., Nová Dubnica	38	55

Source: TREND Analyses

Sub industries

To see Slovak ETI development in detail, it is necessary to look at its structure. This is made possible by the NACE classification of economic activities. It has been mapping industry since 2008. Until then, the OKEČ classification as applied. The classification change resulted in a change of structure and allocation of companies into sub-industries. Through the re-classification, electrotechnics lost 39 of its 221 companies in 2008, which represented 14% of its revenues. The fulltime equivalent of workers dropped by 27 thousand workers (over one third). In 2008, a new phase of industry development monitoring starts.

Classification of sub-industries according to NACE:

26 Manufacturing of computer, electronic and optic products

- 261 Manufacturing of electronic components and boards
 - 2611 Manufacturing of electronic components
 - 2612 Manufacturing of mounted electronic boards
- 262 Manufacturing of computer and periphery equipment
- 263 Manufacturing of communication equipment
- 264 Manufacturing of consumer electronics
- 265 Manufacturing of tools and equipment for measuring, testing and navigation, clocks and watches
- 266 Manufacturing of apparatus for irradiation, electro-medical and electro-therapeutical apparatus

27 Manufacturing of electric equipment

- 271 Manufacturing of electric engines, generators, transformers and electric distribution and control equipment
 - 2711 Manufacturing of electric engines, generators and transformers
 - 2712 Manufacturing of electric distribution and control equipment
- 273 Manufacturing of wires and electric installation equipment
 - 2731 Manufacturing of optic cables
 - 2732 Manufacturing of other electronic and electric wires and cables
 - 2733 Manufacturing of electric installation materials
- 274 Manufacturing of electric lights
- 275 Manufacturing of household appliances
 - 2751 Manufacturing of electric household appliances
 - 2752 Manufacturing of non-electric household appliances
- 279 Manufacturing of other electric equipment

According to the NACE categorisation, electrotechnics is registered in two groups. Manufacturing of computer, electronic and optic products represents over three quarters of the industry, regarded by revenues. In terms of jobs, it represents a little over one half of ETI jobs. In terms of profitability, or added value, it highly exceeds the second group of electrotechnical appliances manufacturing. Manufacturing of electric components and boards grew by over 30 percent in 2009 and reached almost EUR one billion. However, the profit of EUR 3.5 million remained almost unchanged from the year before, which represents a very low profitability. This sub - industry also includes the still beginning Samsung Electronics LCD Slovakia plants and the neighbouring Hansol, but also established plants SEZ Krompachy, Semikron in Vrbové and CRT Electronics and Avex in Orava.

Only five companies are involved in manufacturing of computer and periphery equipment. The best known one is the Žilina based Emtest supplying system solutions (e.g. attendance systems, chip cards, transport systems, etc.) also internationally. The sub-industry has a solid 20 percent share in added value and revenues. However, the six million profit is nothing remarkable in light of almost 80 million in revenues.

Only seven companies are involved in the Manufacturing of communication equipment and some of them are no longer involved in electrotechnical production – OTF Orava is a company without manufacturing linked to Avex Production in Dolný Kubín, which manufactures electronic boards, or modules for Samsung

and German electronics manufacturers. Tesla Stropkov made up for its unsuccessful production through blacksmith and locksmith services. Today, its telecommunication range generates a little over one half of its revenues. In this sub-industry, revenues increased by one half in 2009. It is especially the contribution of relatively new operations of Norwegian daughter companies – Eltek Valere and Nera Networks in Liptovský Hrádok. Overall, this sub-industry changed from the eight million profit in 2008, to a loss of almost Euro one million. And all this is due to one loss generating company – Nera Networks producing wireless telecommunication signal transmission equipment in Liptovský Hrádok. However, the loss is the result of accounting transfers sides the mother company, not of manufacturing operations.

Consumer electronics manufacturing is the largest sub-industry generating almost two thirds of ETI revenues. It includes the most important companies, e.g. Galanta based Samsung Electronics Slovakia, both daughters of Panasonic in Slovakia, Nitra based Sony (presently Foxconn), or Universal Media Corporation /Slovakia/ in Nové Mesto nad Váhom. In 2009, the over five billion in revenues dropped by 4 percent to 4.9 billion. However, this sub-industry was most effected by rationalisation measures – added value increased by 65 percent to EUR 372 million. And this despite the fact that all companies are at the end of the production chain and crises⁰ forced them to decrease their prices. However, they were faster in the decrease of their costs. This enabled them to improve their profitability – in 2008, this sub- industry was in slight loss; Euro 257 million generated last year document more realistic results presentation by mother companies, but also the success of rationalisation measures in some of the largest electrotechnical companies in Slovakia.

In manufacturing of tools and equipment for measuring, testing and navigation, clocks and watches, there are companies involved with unique manufacturing programs within ETI. These are especially the Stará Turá gas meters (Elster) and pressure gauges (Prematlak) manufacturers, or sensor manufacturer – GE Sensing and Inspection Technologies from Nové Mesto nad Váhom and Prešov based Křížík GBI manufacturing electric meters. However, this sub-industry shows no figures for year 2009. With respect to the increased stability of their production (they work with longterm contracts with international energy companies), we can only assume that the revenues of EUR 160 million remained identical and the added value and profitability did not suffer considerably.

Sub industry of Irradiation, electro-medical and electro-therapeutical apparatus manufacturing is represented by one company – Vagnerplast Slovensko from Partizánske, a branch of Czech Vagnerplast. However, the Statistics Office does not provide any data on the manufacturer of bathtubs, shower cabinets and massage systems.

Further statistical branch is the manufacturing of electric equipment. It generates one quarter of industry revenues and does not have results as positive as Manufacturing of computer, electronic and optic products. For many companies, recovery from crises was much slower and permanent fall of some productions in this branch is visible. This branch is caught up in its "army " of 23 thousand workers, which is reflected in the suffering added value and profitability ratio. In 2008, there were almost 30 thousand. Loss of orders and production erased especially the low qualification jobs.

Manufacturing of electric engines, generators, transformers and electric distribution and control equipment lost over a tenth of its revenues in 2009. However, with three quarters of a billion, it remains the largest sub-industry in electric equipment manufacturing. Added value dropped by over 10 percent in companies like the Žilina based generators and other technology manufacturer Elteco, Power One-manufacturer of power supply units from Dubnica, Michalovce based electric engines manufacturer BSH Drives and Pumps, or Nové Mesto manufacturer of power steering TRW Steering Systems, Emerson and Askoll – electric engines manufacturers from Nové Mesto nad Váhom. However, their profits improved slightly. Of the 35 companies, ten ended year 2009 with red figures.

In the manufacturing of wires and electric installation equipment, a half of the 27 companies generated loss. In 2009, revenues dropped by 13 percent to EUR 216, which reduced employment by almost 40 percent to a little above 4,300 people. Added value dropped by 30 percent to EUR 50 million, but redundancies reduced the sub-industry cumulative loss from EUR 6 million to 4 million. Cables manufacturers like Seidel (former Tecwings) from Liptovský Hrádok, Bratislava based VUKI, or Elkond HHK and Leoni Cable Slovakia from Trstená did not experience existential problems yet, since they manufacture special cables for telecommunication and medical devices. Their production is sustainable despite limited profitability.

Different situation is in the manufacturing of vehicle cables. There, the competitive environment is much fiercer. Those remaining in electrotechnics statistics (most were reclassified into the manufacturing of motor vehicles and accessories) are almost definitely responsible for the sub-industry loss. Dubnica based Leoni Slovakia has stable orders, but it is forced to improve its competitiveness through an

increased level of automation. Yazaki Slovakia even closed its Prievidza plant in spring 2010. This sub-industry is likely to continue diminishing, since loss generating companies will leave Slovakia for countries with lower labour costs.

Electric lights manufacturing, with large plants of Nové Zámky Osram, two plants of German Hella, but also the largest Central European manufacturer of office and industrial lights – Senica based OMS, recorded an eight percent drop of production reaching EUR 370 million last year, which also applied for added value. Up to a third of the eighteen companies generate loss, which resulted in the overall profit drop from EUR 14 million to almost EUR half a million.

Revenues in the manufacturing of household appliances dropped by 100 million to 480 million last year. Washing machines manufacturer Whirlpool, water heaters manufacturer Tatramat, as well as other manufacturers of electric household appliances did not experience a recovery of demand in 2009. Further drop of orders, starting back in 2008, took its toll. Statistic misinterpretation is especially caused by Whirlpool that exports its entire profit and thus also added value to its mother company. A more realistic picture of this sub-industry development is therefore provided by the manufacturers of non-electric household appliances, especially the manufacturers of fireplaces and stoves – Lučenec based Lustrój and Numorex and Thorma from Filákovo. Their revenues and profits dropped by 10 percent in 2009.

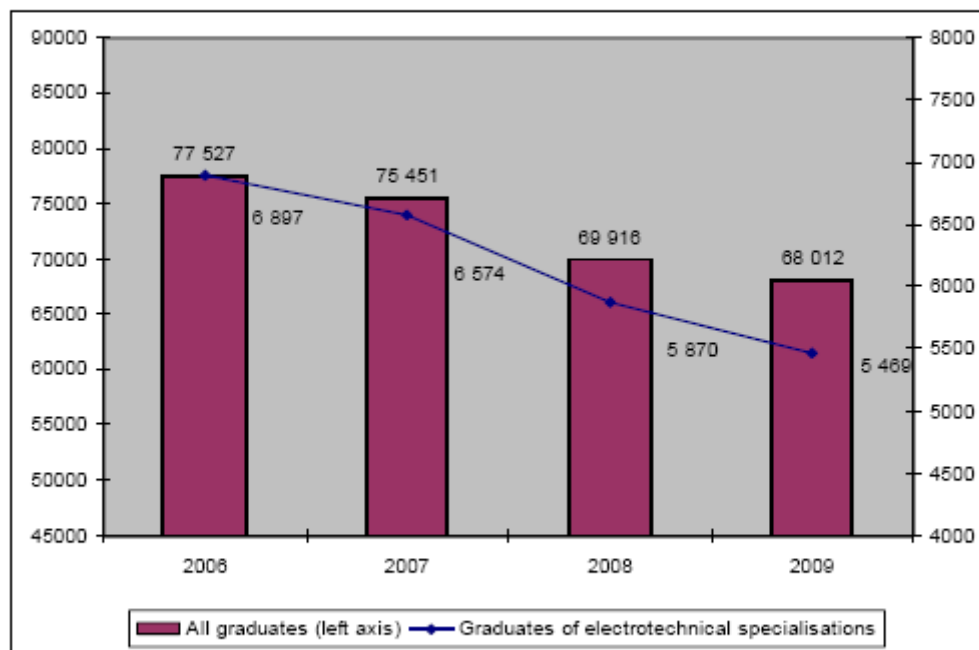
Manufacturing other electric equipment, just like manufacturing of cables, dropped by almost one third to EUR 233 million in 2009. Added value decline was less dramatic – by 20 percent to EUR 54 million. However, the year 2008 profit of over 20 million dropped to a loss of EUR 6 million, since over one third of this sub-industry companies generates loss. However, future statistics shall not be distorted by the loss generating Molex that left the Kechnec industrial park this year. On the other hand, this sub industry still includes perspective manufacturing of hydraulic components in the Tvrdosín Hydac, or Dubnica based manufacturer of power supply units – Delta Electronics.

Workforce in Electrotechnical Industry

ETI is one of the largest employers in Slovak industry, where companies with over 20 people employ over 11 percent of all staff in Slovak industry, i.e. 43 thousand people. When adding the manufacturers of cable bundles (statistically registered in the manufacturing of motor vehicles and accessories), there will be something over 60 thousand.

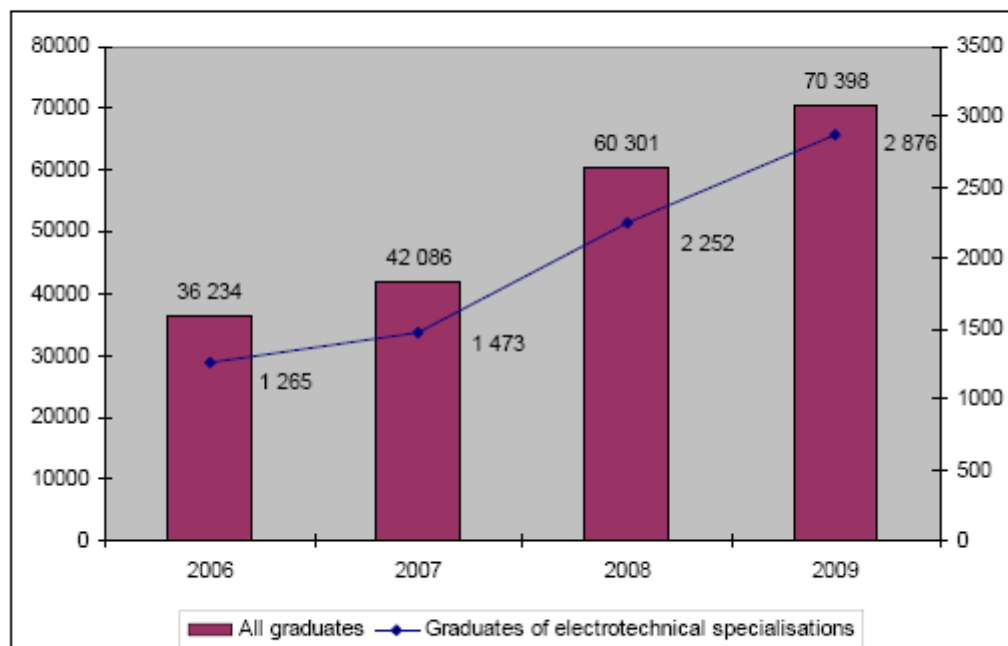
Most workers, just like companies, are concentrated in Western Slovakia and more scattered in Central and Eastern Slovak towns. Most of the other “electrotechnical towns”, like Stropkov Bratislava or Nižná in Orava lost their labels along with the attenuation of local traditional electrotechnical operations. However, new centres or clusters concentrating electrotechnical production of foreign investors spring up gradually. New electrotechnical centres were and are being established mostly in Western Slovakia – Galanta (Samsung Electronics Slovakia), Nitra (Foxconn Slovakia, SE Bordnetze), Trenčín (AU Optronics, VMA Slovakia), but there also are a few places with strong electrotechnical presence in the East of Slovakia: Kechnec (Magnetit Marelli Electronic Systems, IEE Sensing Slovakia), Krompachy (Panasonic AVC Networks), Michalovce (BSH Drives and Pumps, Yazaki Wiring Technologies Slovakia).

Development of Secondary School Graduates (in person)



SOURCE: Institute of Education Information and Prognosis

Development of Secondary School Graduates (Primary and Secondary level, in person)



SOURCE: Institute of Education Information and Prognosis

Cooperation with universities looks better, especially large companies are interested. Siemens, ABB or Alcatel have long term cooperation with the School of Electrotechnics of the Slovak Technical University in Bratislava. Within an incubator, a common research and development project of ON Semiconductor was initiated. After some time, it became independent and today, the development unit of ON Semiconductor is the most valuable asset of the company that remained here after the production end in Piešťany in 2009. The Kechnec Magneti Marelli wishes to cooperate in the development of a research and development centre in Kechnec with the Košice Technical University. In Galanta, with Samsung Electronics Slovakia, the largest electrotechnical company in Slovakia, cooperation between the company, schools and region started in 2008. A so called electrotechnical cluster emerges here. It is to support engineering activities in the company and also prepare future operators of production lines for new technological challenges.

The students of statistics and graduates of electrotechnical schools at universities suggest that electrotechnics is not the most attractive choice for finishing secondary school graduates, but the number of students has a growing tendency.

Secondary education in electrical engineering

There are over 40 secondary and vocational schools with specialisation on electrical engineering in Slovakia.

Number of secondary school student in the field of electrical engineering and related studies:

Name of the school	Region of	Address	No. of students
Electrical engineering SOŠ	Bratislava	Bratislava-Staré Mesto, Vazovova 12	188
Electrical engineering SPŠ	Bratislava	Bratislava-Staré Mesto, Zochova 9	474
Secondary vocational school	Bratislava	Bratislava-Ružinov, Ivanská cesta 21	383
Secondary vocational school	Bratislava	Bratislava-Ružinov, Ružinovská 1	194
Secondary vocational school	Bratislava	Bratislava-Rača, Na pántoch 7	146
Electrical engineering SOŠ	Bratislava	Bratislava-Vajnory, Rybníčná 59	288
Secondary vocational school	Bratislava	Bratislava-Devínska Nová, J. Jonáša 5	212
Electrical engineering SPŠ	Bratislava	Bratislava-Dúbravka, Karola Adlera 5	352
Secondary industrial school	Banska Bystrica	Banská Bystrica, Hurbanova 6	451
Secondary vocational school	Banska Bystrica	Banská Bystrica, Školská 7	185
Technical Secondary vocational school	Banska Bystrica	Žiar nad Hronom, Dr. Janského 10	205
Electrical engineering SPŠ	Košice	Košice-Sever, Komenského 44	635
Railway SOU	Košice	Košice-Staré Mesto, Palackého 14	358
Secondary vocational school	Košice	Košice-Šaca, Učňovská 5	579
Automotive SOŠ	Košice	Košice-Juh, Moldavská cesta 2	686
Technical Secondary vocational school	Košice	Michalovce, Partizánska 1	827
Secondary vocational school	Košice	Rožňava, Hviezdoslavova 5	199
Mechanical engineering SPŠ	Košice	Spišská Nová Ves, Hviezdoslavova 6	134
Engineering SOŠ	Košice	Spišská Nová Ves, Markušovská cesta 4	212
Secondary vocational school	Nitra	Komárno, Bratislavská cesta 10	270
Secondary industrial school	Nitra	Komárno, Petőfiho 2	601
Secondary industrial school	Nitra	Levice, F. Hečku 25	322
Technical SOŠ	Nitra	Tlmače, Kozmálovská cesta 9	194
SOŠ polytechnická	Nitra	Nitra, Dvorčianska 629	210
Secondary industrial school	Nitra	Nitra, Fraňa Kráľa 20	379
Secondary vocational school	Nitra	Vráble, Ul. 1. mája 500	235
SŠ - SPŠE S. A. Jedlika	Nitra	Nové Zámky, Komárňanská 28	1044
Stredná odborná škola	Nitra	Štúrovo, Svätého Štefana 81	147
Technical SOŠ	Nitra	Šurany, Nitrianska 61	285
Secondary industrial school	Nitra	Šaľa, Nivy 2	348
Secondary vocational school	Nitra	Zlaté Moravce, Slov.národ.povstania 2	486
Secondary industrial school	Prešov	Bardejov, Komenského 5	270

Technical SOŠ	Prešov	Humenné, Družstevná 1737	263
Secondary industrial school	Prešov	Poprad, Mnoheľova 828	388
Electrical engineering SOŠ	Prešov	Poprad - Matejovce, Hlavná 1400/1	295
SOŠ of Transport	Prešov	Prešov, Konštantínova 2	221
Electrical engineering SPŠ	Prešov	Prešov, Plzenská 1	542
Secondary vocational school	Prešov	Sabinov, SNP 16	194
Secondary industrial school	Prešov	Snina, Partizánska 1059	364
Technical SOŠ	Prešov	Stará Ľubovňa, Levočská 40	254
Electrical engineering SOŠ	Prešov	Stropkov, Hviezdoslavova 44	206
Secondary vocational school	Trenčín	Bánovce nad Bebravou, Farská 7	284
SOŠ of Juraja Ribaya	Trenčín	Bánovce nad Bebravou, Partizánska 76	246
Secondary industrial school	Trenčín	Dubnica nad Váhom, Obrancov mieru 1	618
Secondary vocational school	Trenčín	Dubnica nad Váhom, Štúrova 1388/23	435
Secondary industrial school	Trenčín	Myjava, SNP 413/8	408
Secondary vocational school	Trenčín	Nové Mesto nad Váhom, Bzinská 11	436
Secondary vocational school	Trenčín	Stará Turá, Športová 675	300
SOŠ of Engineering	Trenčín	Považská Bystrica, Športovcov 341/2	561
Secondary vocational school	Trenčín	Handlová, Lipová 8	466
Secondary vocational school	Trenčín	Prievidza, M. Falešníka 6	398
Secondary vocational school	Trenčín	Púchov, Terézie Vansovej 1054/45	304
Secondary vocational school	Trenčín	Trenčín, Pod Sokolice 14	289
S Electrical engineering SPŠ	Trnava	Piešťany, Nám. SNP 8	502
Technical SOŠ	Trnava	Piešťany, Nová 5245/9	165
Electrical engineering SOŠ	Trnava	Gbely, Učňovská 700/6	171
Secondary industrial school	Trnava	Trnava, Komenského 1	408
Electrical engineering SOŠ	Trnava	Trnava, Sibirská 1	732
Technical SOŠ	Žilina	Čadca, Okružná 693	245
Spojená škola-SPŠ	Žilina	Kysucké Nové Mesto, Nábrežná 1325	329
SOŠ of Engineering	Žilina	Kysucké Nové Mesto, Športová 1326	270
Electrical engineering SOŠ	Žilina	Liptovský Hrádok, Celiny 536	441
Spojená škola-SOŠ stroj	Žilina	Martin, Červenej armády 25	328
Secondary industrial school	Žilina	Martin, L. Novomeského 5/24	233
SOŠ of Transport	Žilina	Martin-Priekopa, Zelená 2	258
Spojená škola-SOŠ tech.	Žilina	Nižná, Hattalova 471	470
Spojená škola-SPŠ	Žilina	Tvrdošín, Sídl. Medvedzie I. 133/1	250
Electrical engineering SOŠ	Žilina	Žilina, Komenského 50	662
Transportation Academy	Žilina	Žilina, Rosinská cesta 2	317
Summary for Slovak Republic			24 752

Source: Institute of Education Information and Prognosis, July 2011

Abbreviations: SŠ- secondary school, SOŠ- Secondary vocational school, SPŠ- Secondary industrial school

Higher education in electrical engineering

For several decades, the educational system oriented towards electronics and electrical engineering industry has been raising erudite workers, who can find work within Europe and the whole world, as well. Apart from vocational secondary schools of electrical engineering and secondary industrial schools of electrical engineering, the educational system in this sector is oriented towards bachelor, engineer or master (I. and II. degree) and doctoral (III. degree) studies.

From the point of view of utilization of qualified labour force for foreign companies, it is important to put particular emphasis on interconnection of secondary education with the production sphere and interconnection of higher education with research and development centres of foreign companies.

Number of graduates of electrotechnical and similar specializations

Faculty/ University	Graduates	Students of I and II degree	Students of doctoral studies
Faculty of Informatics and Information Technologies STU	361	996	62
Faculty of Mechanical Engineering STU	472	1997	200
Faculty of Material Sciences and Technology STU	1736	3852	297
Faculty of Electrical Engineering and Information Technology STU	880	2512	335
Slovak University of Technology in Bratislava (STU)	3449	9357	894
Faculty of Manufacturing Technologies TU	499	1597	60
Faculty of Mechanical Engineering TU	1133	2906	229
Faculty of Electrical Engineering and Informatics TU	898	3323	179
Faculty of Aeronautics TU	560	1448	49
Technical University of Košice (TU)	3090	9274	517
Faculty of Mechanical Engineering ŽU	411	1341	203
Faculty of Electrical Engineering ŽU	500	1614	92
Faculty of Management Science and Informatics ŽU	355	1301	69
Faculty of Special Engineering ŽU	444	1145	77
University of Žilina (ŽU)	1710	5401	441
Faculty of Special Engineering TnUAD	164	637	48
Faculty of Mechatronics TnUAD	336	433	10
Faculty of Industrial Technologies TnUAD	104	523	29
University of Trenčín (TnUAD)	604	1593	87
Summary	8853	25625	1939

Source: Institute of Education Information and Prognosis, July 2011

Most Important Electrotechnical Companies in Slovakia

Samsung Electronics Slovakia has been the largest electrotechnical company in Slovakia for several years. From production commissioning in 2002 until 2007, its revenues were growing sharply to Euro 3.4 billion. In 2009, they dropped slightly to 3.17 billion. However, the plant dramatically improved its profitability and added value.

There are several factors for this dramatic change shaking the entire industry: In 2008, Samsung initiated saving measures peaking in 2009. The factory decreased staff counts and increased automatisations. Further, global Samsung started with new TV sets models – premium with LED backlight. By the end of 2009, sales reached 40 percent of all factory sets. LED LCD TV sets featured higher profit margins and most of the 244 million profit of ETP after tax flows from Samsung. However, manufacturing of plasma TV sets left Galanta in 2009 – it was relocated to Hungary. And in 2010, cheaper types of production leave too. Especially household appliances, representing 15 percent of plant revenues, relocated to cheaper contract factories in the Czech Republic, Hungary and Romania. Only the manufacturing of LCD TV sets remains in Slovakia. The plant continues to employ three thousand own employees.

Whirlpool Slovakia, American washing machines manufacturer has been present in Slovakia for eighteen years. In all those years, the Poprad plant developed to leading European manufacturer of Whirlpool and other affiliated brands of washing machines. In terms of accounting reporting accumulated loss in excess of Euro 32 million and capacity used to two thirds, it does not seem like a electrotechnical leader. However, it is one of the examples of internal company accounting "exporting" profits from the Slovak factory as part of optimisation within the entire concern. Further, under the optimisation measure, it pays large fees to other brands in group for the use of their brands. Currently, the plant capacity represents 2.5 million washing machines per year. In 2008, maximum production was reached with 1.9 million pieces. In 2009, the production declined by 16 percent. Even in the strong year 2008, revenues dropped by seven percent to Euro 351 million. Last year, with the production decrease of one sixth, revenues declined by seven percent. This year, production should increase by five percent. Its impact on revenues will only be known to the American concern accountants.

Foxconn Slovakia is the former plant of Japanese Sony, which left it in 2008 as the largest and most modern group TV sets plant in the world. Previously, Sony was manufacturing TV sets in older warehousing premises of former Jednota in Trnava for over ten years. Until August 2009, digital tuners for LCD TV sets were still produced there and there also was service for PlayStation consoles from a large part of Europe. After the commissioning of the Nitra plant, the company increased manufacturing capacity from 2 to 4 million of manufactured TV sets per year. In 2008 and 2009, it approached this limit. In 2010, the factory plans to slightly increase the production for Sony already under the Taiwan management. In 2008, revenues increased by more than forty percent to Euro 1.2 billion. In 2009, there only was a slight increase of a few thousand Euro. Currently, Foxconn Slovakia employs around 3 thousand people. The land and Sony plans suggested an increase of manufactured LCD sets volumes to 10 million per year and within several years. Similarly, number of jobs should grow too and more than double to up to 7 thousand people. The position of Foxconn, which does not communicate with media, is questionable in terms of plant development.

Samsung Electronics LCD Slovakia started production in early January 2008. Voderady near Trnava became the main place of LC panels production (Liquid Crystal Displays), representing the key component (monitor) of LCD TV sets. Interest in the plant production is that large that it will reach its full capacity of ten million panels per year towards the end of 2010. And not in 2012, as planned in the original project. Samsung invested and still plans to invest into the plant, which is to become the largest of its kind in Europe, a total of Euro 300 million. Currently, it employs 1,300 people. In 2008, the factory generated revenues of 200 million. In 2009, it was over 400 million, of which more than one quarter represents added value. In Voderady, all medium and large screens are produced. The largest part of production heads for the affiliated Samsung in Galanta and Foxconn in Nitra. As of 2009, deliveries for UMC in Nové Mesto nad Váhom were added, as well as international deliveries to Spain and Turkey. In Voderady, it purchased land at the very beginning. This enables it the construction of two additional manufacturing halls to increase the LC panels' production to 20 million per year in the future. Plant infrastructure is laid out for significantly higher than the officially planned capacity and also for the arrival of further subcontractors.

Japanese Panasonic has two daughter companies in Slovakia. Thereby, both hold an important position in the Slovak electrotechnical industry. **Panasonic AVC Networks Slovakia** in Krompachy manufactures DVD players and recorders, Blue-ray and also 3D Blue ray players and Blue-ray recorders as of March

2010. Following the strong growth of revenues in 2007, the revenues of Krompachy Panasonic dropped to 186 million in 2008 and in 2009, they declined again by over one tenth – to Euro 166 million. Presently, Panasonic AVC Networks Slovakia employs 900 people.

The second Slovak daughter of the concern, smaller in terms of revenues, but larger in terms of staff count, is based in Trstená in Orava. **Panasonic Electronic Devices Slovakia** has two manufacturing plants in Trstená and Stará Ľubovňa, where it manufactures control cards, sources, tuners, chargers, remote controls, as well as iPod adapters, switch elements for steering wheels and speakers for cars. As of 2009, it employed 1,100 people on the average. Up to 95 percent of its production is exported, mostly to western markets. Key customers are Panasonic affiliated plants, manufacturers of household appliances, as well as car factories. Deliveries for automotive industry represent one fifth of company revenues and their share gradually increases.

The largest electrotechnical company in Eastern Slovakia is based in Michalovce. **BSH Drives and Pumps** manufactures electric engines for household appliances and is the largest supplier of drives for BSH group including Bosch and Siemens, as well as Gaggenau, Neff, Thermador, Ufesa, Viva and Constructa. Up to 85 percent of its production head for concern factories in Poland, followed by Germany, Spain, Turkey, Italy and USA. In 2007, 7.7 million electric engines were produced in

Michalovce. In 2008, there were 7.5 million. In 2009, the factory recorded a slight increase to 7.6 million despite crises. Practically as of its arrival in Slovakia, BSH also has research and development activities in the factory. It makes technical changes related to electric appliances design changes and it also develops fully new generations of engines. In Michalovce, BSH Drives and Pumps employs over 900 people with 150 agency employees during high season.

For a long time, the American **Emerson** has been active via its two independent daughter companies in Slovakia – Emerson Electric Slovakia, s.r.o., and Emerson, a.s. They are based in the former VUMA (Výskumný ústav mechanizácie a automatizácie) complex in Nové Mesto nad Váhom. Towards the end of 2008, the concern sold Emerson Electric Slovakia production, manufacturing electric engines for white appliances with one thousand employees, to **Askoll**. It acquired one of the largest Central European factories manufacturing electric engines. In 2008, revenues of this company dropped by 15 percent to Euro 118 million. In 2009, the decline continued to below Euro 80 million. Askoll plans to move from the rented Emerson premises into own premises. Emerson will use the free space for the placement of its lines. It could be followed by further relocation of technology from Italy (just as it took place towards the end of 2009), which could improve numbers of the plant.

Emerson, a.s., the larger one of the original two Slovak plants of the concern- is partially engaged in machinery production and partially in electrotechnical industry. This is because manufacturing starts with the processing of metals, it is not only simple assembly. The company covers six manufacturing divisions, or brands and is one of the largest and most important European plants of the concern. In 2008, Slovak Emerson more than doubled its revenues to Euro 189 million following a drop in 2007. However, it was not related to an increase of production. It resulted from changes in internal concern accounting. In 2009, revenues slightly dropped to 180 million and profit before tax declined by two million to Euro 7 million. In total, the Nové Mesto company employs almost 1,350 people.

Useful contacts

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