

R&D in Slovakia



Discover
the Potential



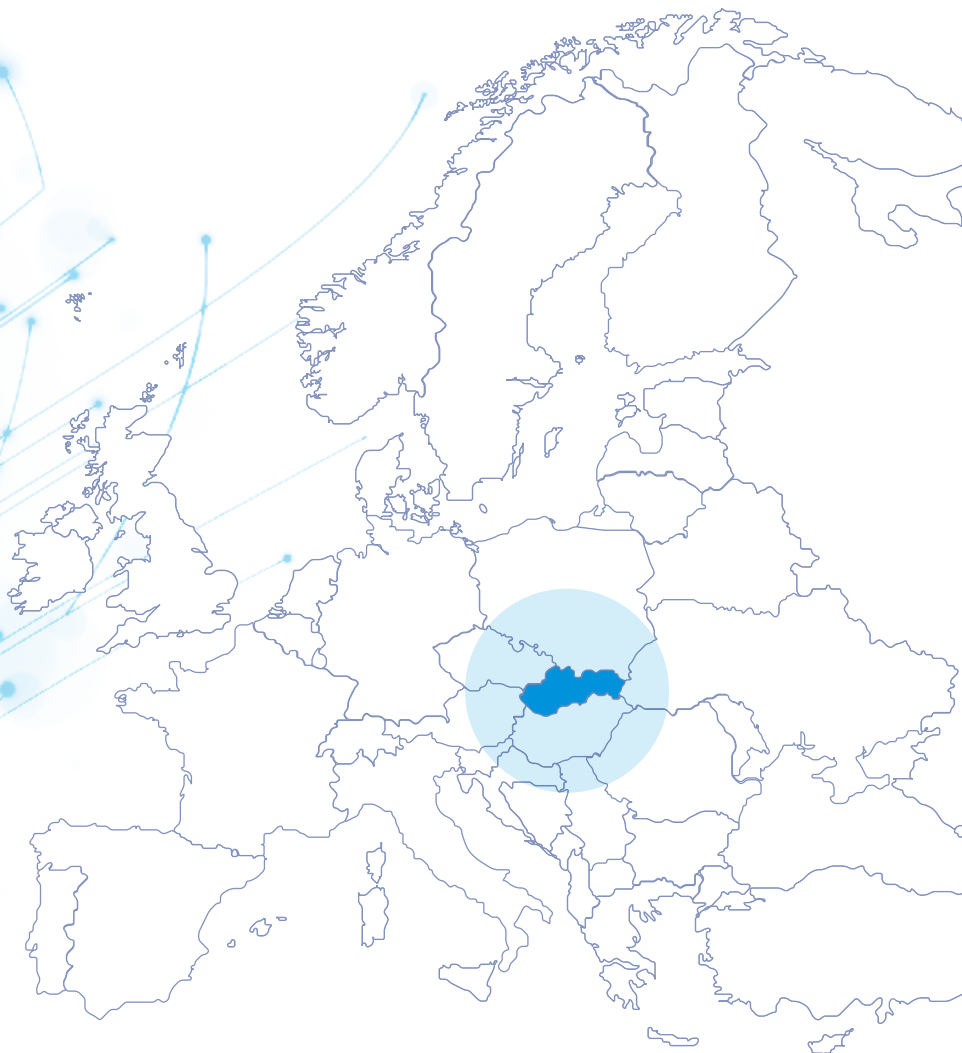
S A R I O

Slovak Investment
and Trade Development Agency

R&D in Slovakia – Discover the Potential

Slovakia is the country at the heart of Europe, positioned right between the Eastern and Western European markets. The government of the Slovak Republic set up as a high priority to attract and support the projects and investments which bring high added value, with special focus on R&D and innovation which are crucial for the development of the knowledge-based economy. We hope this publication will encourage you to consider developing your R&D projects in Slovakia.

Discover the potential of the Slovak research and development environment! Slovak Investment and Trade Development Agency (SARIO) is ready to help you on the way.



Key Facts Why to Consider Slovakia for R&D

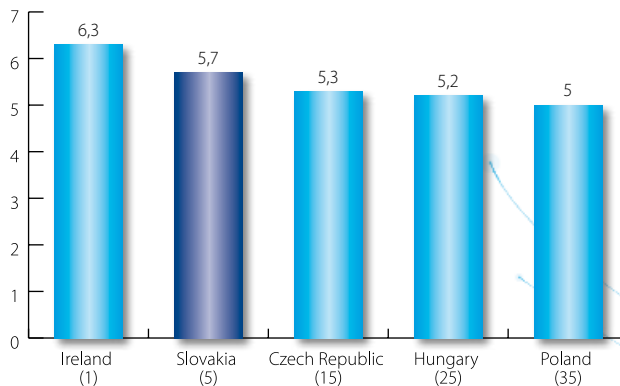
1. Highly qualified human resources at affordable costs
2. Presence of production plant operation in high-tech industries
3. Presence of foreign R&D centres and technology clusters
4. Broad R&D and innovation network
5. Established cooperation between industries and domestic universities
6. R&D incentives

Based on The Global Competitiveness Report 2010-2011 published by the World Economic Forum Slovakia is ranked worldwide as:

- ▶ No. 5 in FDI and Technology Transfer
- ▶ No.10 in Pay and Productivity
- ▶ No.13 in Business Impact of Rules on FDI

Note: Research comparing 139 countries worldwide.

FDI and Technology Transfer



Source: The Global Competitiveness Report 2010-2011, World Economic Forum, 2010
Note: To what extent does foreign direct investment (FDI) bring new technology into your country? (1 = not at all; 7 = FDI is a key source of new technology); 2009-10 weighted average



„The basic requirement for our decision to establish our R&D centre in Slovakia was that we already had a production plant here. We feel 100% confident that research and development needs near and very close contact to production to generate benefits for the products. We assume that the subsidiary gets more power and independence in general with the R&D centre because of its commitment to the location. Together it comes with higher competitive capability due to a lower level of gross salary and R&D investments aid. We found in Slovakia engineers with good German language skills and I have to say in general we have only good experiences with Slovakian engineers.“

Christian Schwaighofer,
Head of Engineering & Development,
ZKW Slovakia s.r.o.

Human Resources – Our Treasure

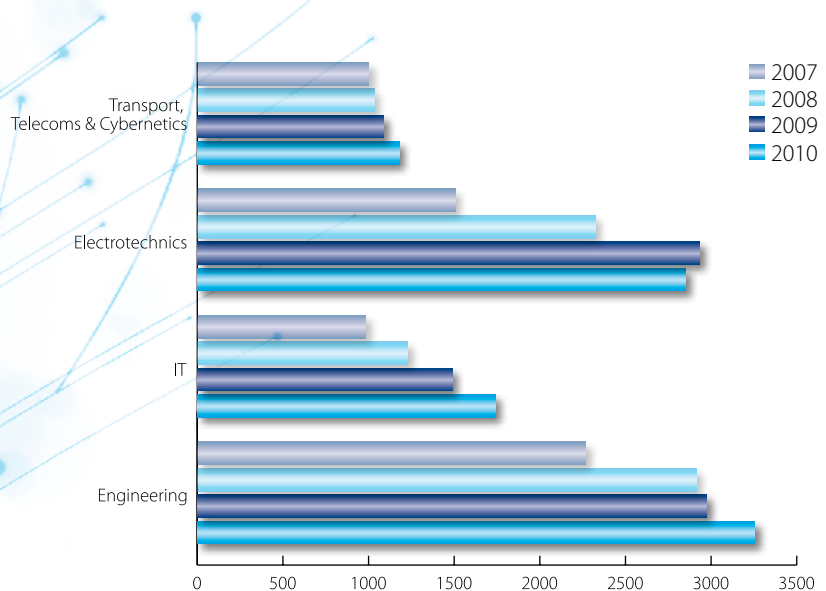


*"You do not have to be afraid to make the decision to establish your R&D in Slovakia. The investors will find here highly **qualified engineers**, with maybe a little bit lower level of mastering foreign languages, but who are willing to get over this handicap. They are flexible, diligent and they are relatively abundant in the labour market. **R&D costs** are still at a lower order than in more developed countries while these people do not have to be used only locally."*

Miloš Kraus, CEO,
Sauer - Danfoss, a.s.

Slovakia's research and development potential lies mainly in **the people**. The number of graduates by science specialization is growing each year mainly in the area of Automotive, Engineering, Electrotechnics and ICT. This growth is caused mainly by reputable foreign investors, e.g. Volkswagen, PSA, KIA, SAMSUNG, AU OPTRONICS, GETRAGFORD, NESS or SIEMENS that create stable and attractive job opportunities in the regions where they operate.

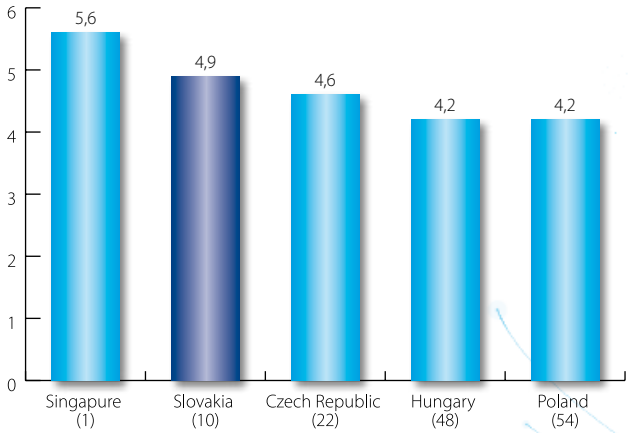
**Graduates (I., II. and III. study level)
Number by Science Specialization in Slovakia, 2007-2010**



Source: Statistical Office of the Slovak Republic, 2011

Aside from qualifications and the education level foreign investors appreciate the interesting ratio of Slovak work performance to labour costs in the area of R&D. This fact is supported also by the latest research of World Economic Forum where 139 countries worldwide were compared to what extent pay in the country relates to productivity. Slovakia was ranked No.10 in the world, clearly beating the neighbouring countries of Czech Republic, Hungary and Poland.

Pay and Productivity



Source: The Global Competitiveness Report 2010-2011, World Economic Forum, 2010
 Note: 1 = not related to worker productivity; 7 = strongly related to worker productivity;
 2009-10 weighted average



*“The most valuable asset of Slovak R&D environment is its **people**, the level of their knowledge and education, diligence, responsibility and flexibility. Moreover they are ready to learn and work with new technologies, improve in languages and communication with foreign partners.*

The main reasons for establishing an R&D centre in Slovakia are the following: interesting ratio of work performance to labour costs; similar technological thinking and cultural similarity which means possible successful international team cooperation in designing and developing new products.

Other aspects are the already built infrastructure and very good level of knowledge and interest of technical universities in working with new technologies.”

Marian Jamrich, Managing Director,
 TECHNODAT, CAE-systemy spol. s r.o.

R&D Network – Your Support Base



“STU is a research-oriented university and a respected partner of the industrial practice in solving unconventional problems that practice cannot solve effectively in the range of its capacities. The innovation network of STRINet STU associates expert workstations of the university and its partners that are able to add to innovation processes. Our Know-How centre STU helps to transfer this knowledge into the economy. The future of the cooperation lies mainly in the joint research of the university and companies and the synergy effect is stressed via the construction of R&D Park.”

Marián Peciar,
*Vice-Rector for External Relations,
Slovak University of Technology in Bratislava*

Slovak R&D network consists of tens of organizations and institutions which are working towards a common goal – to make Slovakia an interesting place on the world map of science and research. Slovak R&D network is continually growing and it can offer potential investors an adequate support base and relevant partners when dealing with all kinds of investments.

An example is the **cooperation between Slovak universities and companies** and partners which results in educational development programs for engineers and researchers. There are currently several projects running, e.g. the common study program - Professional MBA Automotive Industry, from the Slovak University of Technology in Bratislava in cooperation with Vienna University of Technology or the study programs with focus on IT run by the Technical University of Košice in cooperation with cluster IT Valley Košice.

Another good illustration is **Automotive Cluster - West Slovakia** which is currently dealing with several international projects in cooperation with partners from EU countries and neighbouring clusters from Austria (Automotive Cluster Vienna Region), Czech Republic (Moravian Silesian Automotive Cluster) and Hungary (Hungarian Vehicle Engineering Cluster). These initiatives are based on international projects founded by EU programs.

*“One of our biggest achievements is the leadership of the international project “AUTOCLUSTERS” which is creating the first automotive innovation network within the region of South -East Europe. We also aspire to become part of the preparation phase and process launch within the research program EU FP7;” says **Štefan Chudoba**, General Director of this cluster.*

Selected Institutions of R&D Network

Institutions for Support of R&D

- ▶ Slovak Research and Development Agency (APVV)
- ▶ Slovak Innovation and Energy Agency (SIEA)
- ▶ The Agency of the Ministry of Education, Science, Research and Sport of the SR for the Structural Funds of EU (ASFEU)
- ▶ Slovak Investment and Trade Development Agency (SARIO)
- ▶ Plenipotentiary for Knowledge Economy at Government of the SR

Slovak Academy of Sciences (Selected Science Sections)

- ▶ Earth and Space Sciences (5 research institutes)
- ▶ Mathematical and Physical Sciences, and Computer Science (4 research institutes)
- ▶ Engineering Sciences (6 research institutes)
- ▶ Medical Sciences (9 research institutes)
- ▶ Biological and Chemical Sciences (6 research institutes)
- ▶ Institute of Technology (4 competence centres)

Universities

- ▶ Slovak University of Technology in Bratislava
- ▶ Technical University of Košice
- ▶ University of Žilina in Žilina
- ▶ University of P. J. Šafárik in Prešov
- ▶ Comenius University in Bratislava
- ▶ The University of Veterinary Medicine and Pharmacy in Košice
- ▶ Technical University of Zvolen

Science and Technology Parks

- ▶ Science and Technology Park in Žilina
- ▶ CEPIT - Central European Park for Innovative Technologies in Bratislava
- ▶ Industrial and Technological Park of Trnava Town
- ▶ Science and Technology Park TECHNICOM in Košice

R&D Industrial Organizations

- ▶ Electrotechnical Research and Projecting Institute in Nová Dubnica
- ▶ NEPIT - Nuclear Power Plant Research Institute in Trnava
- ▶ The Research Institute of Petroleum and Hydrocarbon Gases – Slovnaft VÚRUP, a.s. in Bratislava
- ▶ Welding Research Institute-Industrial Institute of SR in Bratislava
- ▶ VYVOJ Martin, a.s. (machine engineering) in Martin
- ▶ ZTS VVÚ Košice, a.s. (machine engineering and robotics) in Košice
- ▶ VUSAPL, a.s. (plastics research) in Nitra

Clusters

- ▶ Automotive Cluster West Slovakia in Trnava
- ▶ The 1st Slovak Engineering Cluster in Banská Bystrica
- ▶ BITERAP cluster, Košice
- ▶ Electrotechnics cluster West Slovakia in Trnava
- ▶ Cluster AT+R in Košice
- ▶ IT Valley Košice in Košice
- ▶ Slovak Plastics Cluster in Nitra
- ▶ ICT Cluster Z@ict in Žilina
- ▶ Energetics Cluster West Slovakia in Trnava

Slovak R&D network

Centres of excellence

- ▶ Centre of Information and Communication Technologies for Knowledge Systems
- ▶ Centre of Excellence in Computer Science and Knowledge
- ▶ Centre of Excellence for New Technologies in Electrical Engineering
- ▶ Centre of Excellence in SMART Technologies, Systems and Services
- ▶ Centre of Excellence in 5-axis Machining
- ▶ Centre of Excellence for Intelligent Transport Systems and Services



“Kosice Science-Technology Park TECHNICOM creates the conditions for sustainable progress of R&D with continuous impact on technology transfer and innovation practice on the international and regional levels. Foreign investors are able to develop close interaction with R&D organizations (e.g. Technical University of Kosice) on a mutually advantageous basis.”

Stanislav Kmeť,
Vice-Rector for Science and Research,
Technical University of Košice



“Our company actively cooperates with universities and for our partners we provide, for example, active preparation of students with a focus on knowledge in the field of automotive R&D. If the investor creates good conditions for R&D including top level equipment, in Slovakia he may reach highly qualified personnel for a very competitive price and also lower operational costs than abroad.”

Vojtech Zelina,
Head of CAR Technology, Slovakia

Selected R&D Projects in Slovakia



"Our university offers many fields as a part of all education levels that shall in the future prepare our specialists focusing on electro mobility. By creating a real experimental product as a complex transportation and technological system comprised of the experimental vehicle, and energy system of accumulator stations using renewable energy, we want to deepen the knowledge and increase the level of information in this field."

Ľuboš Kučera,
University of Žilina

Automotive Industry

Out of many research projects run by Slovak universities in the area of e-mobility there are three interesting ones which have attracted expert attention:



Formula Student Electric (FSE) competition

Students from the Slovak University of Technology in Bratislava supported by experts from energy giant E.ON created STUBA Green Team and participated in the FSE competition with their own prototype. www.stuba.sk



Students Project ICAR 2010

Students of the Faculty of Mechanical Engineering from the Technical University of Košice designed a car prototype for the projects focused on design techniques, methodology and prototype manufacturing. www.tuke.sk



Project Edison – Electro mobile

The result of the Project Edison at the University of Žilina should be a new prototype of an experimental electro mobile which thanks to used technology, shall enable the use of different settings, diagnostics, optimization of chassis and gears, programming of driving units, monitoring of components for future data processing as well as the trials of infrastructure of electro mobiles elements, e. g. different chargers, modes of charging, monitoring of the vehicle's movement, service and diagnostics. www.uniza.sk, www.edison.uniza.sk



Aluminium foam – new manufacturing technology

Scientists at the Institute of Materials and Machine Mechanics of Slovak Academy of Sciences have developed an original technology enabling the manufacturing of complex shape structural parts from aluminium foam at a reasonable cost.

In this way, for the first time worldwide, several unique components have been brought into serial applications, e.g. crash boxes for railway carriages (Gleich GmbH Kaltenkirchen), stiffeners for the side rail of Ferraris or bumpers for the separation wall in the Audi Q7 (Alulight GmbH Ranshofen). "Our ability to present research results in real prototypes has led to intense collaboration with industry both in Slovakia and abroad. The successful applications of novel composites in the BMW engine (SAPA Profily a.s., Žiar nad Hronom, SHW GmbH Wasseraalfingen), in sliding power contacts for locomotives (Elektrokarbon Topolčany) or in novel batteries (Efpower Göteborg) have confirmed the importance of the tight relation between research and industry if the added value of the products is to be increased", said **František Šimančík**, Director of the Institute.

Aerospace, Informatics and Telematics Systems

Slovak space research has already been involved in various reputable space-related projects. It is worth mentioning the participation of Slovakia in the future space mission ESA (European Space Agency) Bepi-Colombo which aims to study the planet Mercury, or Slovak involvement in the Europe-wide project Global Monitoring for Environment and Security (GMES).



One of the most active organizations in the area of aerospace is the **Institute for Experimental Physics of Slovak Academy of Sciences** (IEP-SAS) in Košice founded in 1969. Currently it is studying cosmic rays using data from satellites Coronas-F, Interbal, TC-2 and participates in the manufacturing of a new device PICAM (Planetary Ion CAMera) for research of planetary processes during the space mission ESA Bepi-Colombo. It also cooperates with international partners on the telescope JEM-EUSO, which will be installed on the International Space Station. The telescope will detect ultraviolet light coming from the interaction of cosmic rays with Earth's atmosphere.
<http://uef.saske.sk>



*"c2i was started in 2006 and is a 100% Slovak company developing and manufacturing ultra light-weight carbon-fibre structures for the premium automotive, satellite communication, defense and electric car sectors. It combines advanced R&D and engineering capabilities with low-cost manufacturing. One of its R&D activities for new materials and technologies includes the development of a specialized carbon-fiber online training platform with participants from leading automotive and aerospace OEMs such as Airbus, Eurocopter, FACC, Porsche, Audi, BMW, Bentley. This project was supported by the DUO**Stars SK-AT Cross-Border Programme and the Wirtschaftskammer Niederoesterreich."*

Patrick Hessel,
CEO, c2i s.r.o.

New and Lightweight Materials



Institute of Materials and Machine Mechanics of the Slovak Academy of Science in Bratislava is internationally recognized by the development of advanced metallic materials, such as metal matrix composites, intermetallics, metallic foams or nanostructured complex alloys for lightweight structural parts in machinery, automotive, aerospace, energy conversion or medicine. Thanks to unique technologies including gas pressure infiltration, directionally controlled melt solidification, metal foaming, rapid solidification, severe plastic deformation, isostatic compaction, plasma spraying or plasma zone melting it is possible to convert developed materials into complex shape full size prototypes, which can be tested under real loading conditions thus reducing the investment risk for the potential producer. www.umms.sav.sk

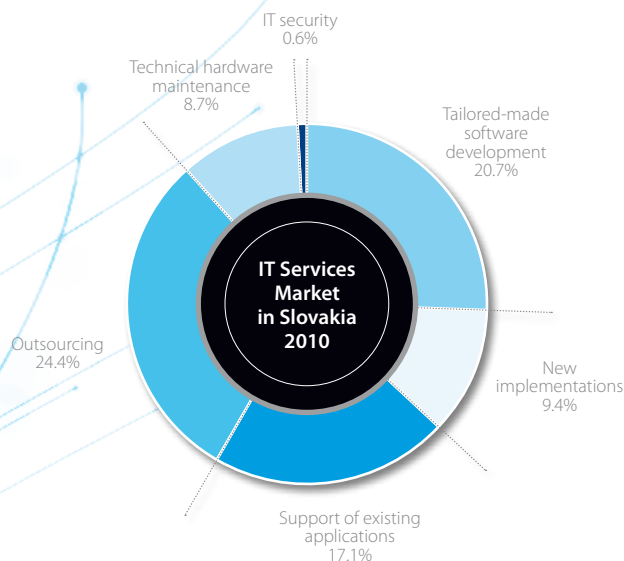
Information and Communication Technologies (ICT)



"At the beginning we were under pressure if we are able to find in Slovakia enough capable and language skilled people. Although it might have seemed unreal in the beginning, we always managed to find enough very qualified people in the market and many times regardless of the project's complexity. My advice to investors would be to come with the kind of business model which will generate lots of innovative ideas but also be able to implement them into projects."

Florián Kevický,
Head of Manufacturing Unit,
Siemens Technology Lab

Slovakia belongs to those countries with a great presence of ICT firms and ICT Development Centres, e.g. IBM, Microsoft, Dell, Ness, HP, Alcatel-Lucent, Siemens, T-Systems or ESET. The IT services market in Slovakia focuses mainly on outsourcing, tailor-made software development and support of existing applications.



Source: Trend Magazine, 2011, Trend TOP v infotechnológiách, www.etrend.sk



Great supporting activities are realized by an organization called IT Valley Košice, which aims to build an ICT Centre of Excellence in the region of Eastern Slovakia and make the social and economic environment more attractive, especially for young people. The organization closely cooperates with universities from the Košice region. www.kosiceitvalley.sk

R&D Success Stories in Slovakia



“Potential investors are welcome in our company, we will be very happy to share our Slovak FDI experience. It would not be the first time, for example Krauss Maffei visited Hydac before their investment decision.”

Jozef Lúška,
CEO, HYDAC Slovakia

“The main reason why we decided to establish R&D in Slovakia is the fact that Slovakia is still considered to be a Best - Cost – Country; secondly, the region of Banská Bystrica we chose offers well educated and qualified young engineers and furthermore our plant in Zvolen is in the closest proximity to the Technical University of Zvolen.”

Gerhard Baucke,
Plant Manager,
Continental Automotive Systems Slovakia

Company	Location	Web page
Johnson Controls Engineering Centre	Trenčín	www.johnsoncontrol.com
Siemens Technology Lab	Žilina	www.siemens.sk/it-solutions
Alcatel-Lucent R&D Centre	Bratislava	www.alcatel-lucent.com
ON Semiconductor Development Centre	Bratislava	www.onsemi.com
Ness Development Centre	Košice	www.ness.com
Muehlbauer R&D Center	Nitra	www.muehlbauer.de
Sauer-Danfoss R&D	Považská Bystrica	www.sauer-danfoss.com
Technodat CAE systems	Trenčín	www.technodat.sk
Continental Automotive Systems Slovakia R&D	Zvolen	www.conti-online.com
Krauss Maffei Engineering Centre	Žilina	www.kraussmaffei.com
Leoni Autokabel Slovakia R&D Centre	Trenčín	www.leoni.com
BASF Polyuretány Systems House	Malacky	www.basf.sk
ZKW Slovakia R&D	Krušovce	www.zkw.sk
Viena International	Martin	www.viena.sk
MatTek	Bratislava	www.mattek.com
Hameln-RDS	Modra	www.hameln-rds.com
Semikron	Vrbové	www.semikron.com
Magneti Marelli	Kechnec	www.magnetimarelli.com
HYDAC Electronic	Tvrdošín	www.hydac.sk
Ixonos Slovakia	Košice	www.ixonos.com
HTS BB	Vlkanová	www.htsbb.eu
Leader Gasket of Slovakia	Bytča	www.leadergasket.sk
Coba Automotive	Terchová	www.cobaautomotive.sk
Delta Electronics (Slovakia)	Dubnica nad Váhom	www.deltaelectronics.sk
HTP Slovakia	Vráble	www.htp-slovakia.sk
Evonik Fermas	Slovenská Ľupča	www.fermas.sk
BSH Drives and Pumps	Michalovce	www.bsh-group.com
EDAG Slovakia	Bratislava	www.edag.de
Thermo/Solar	Žiar nad Hronom	www.thermosolar.sk
C2i	Dunajská Streda	www.c2i.sk
CAR Technology	Bratislava	www.car-t.com
ELCOM	Prešov	www.elcom.sk
Virtual Reality Media	Trenčín	www.vrm.sk

Expert Opinion



Martin Bruncko,
*Plenipotentiary for Knowledge Economy,
Government of the Slovak Republic*

Interview with **Martin Bruncko**, Plenipotentiary for Knowledge Economy, Government of the Slovak Republic

What kind of steps are the government preparing in order for our country to be considered an attractive R&D country?

"Our government is currently preparing a complex strategy for building the knowledge based economy. In this strategy tools shall be included for attracting top notch scientists and researchers, grant programs for basic and applied research, mechanisms for technology transfer support, technology incubators for enterprises and support of company R&D. We also plan to invest into university research parks and national research centres where we will accumulate and make accessible to the wider public the equipment and infrastructure for world class R&D."

Who do you consider to be your main foreign partners in order to increase Slovak R&D potential?

"We plan to start cooperation at several levels:

1. Creating grant schemes enabling academic and research institutions to cooperate with individual top researchers and professors,
2. There already are several renowned foreign institutions interested in cooperation within existing calls in the Operational Program "Research and Development". We plan this cooperation to be a part of the projects focused on research parks and centres and we would like to attract other top companies interested in R&D and technology transfer.
3. We are striving to cooperate directly with top foreign centres in e.g. Finland, Israel as well as research parks e. g. Skolkovo in Russia. And finally, we would like to start cooperation with the California-based technology incubator Plug and Play and open for Slovak companies world-renowned technology incubators."

What do you consider the main advantage of R&D in Slovakia?

"In Slovakia we have high quality R&D in many fields and if suitable conditions and motivation elements for technology transfer would be created, we would confirm our extensive potential for successful applied research and its commercialization. This is our great opportunity for the future. The proof of this potential may be seen in the invention of foam aluminium or the success of the ESET company, author of antivirus software NOD."

Interview with **Jozef Uhrík**, President, Automotive Industry Association of the Slovak Republic

How do you evaluate the ability of Slovakia and its R&D potential to attract research and development to the automotive industry?

"The Slovak Republic became a very interesting element in the development of the European automotive industry by covering a large share of total industrial production by its automotive production. In 2010 it became again the first country in the world in production of cars per 1000 inhabitants. In the last 20 years, Slovakia has significantly restructured its industry and, in cooperation with foreign investors, by its industrial production dynamic growth it has proven the ranking among developed industrial countries. The change of industry structure in favour of the automotive industry is supported also by structural changes in the curricula of Slovak technology universities and therefore it is creating conditions for close cooperation of production organizations with universities and institutions, e.g. Slovak Academy of Sciences and consequently influences potential opportunities for R&D. The results of the previous 5 years confirm it."

What do you consider to be the largest advantage of the Slovak automotive industry from the R&D point of view?

"The largest advantages of the Slovak automotive industry are the quality and flexibility of the work force, quality of education in the technology field and cooperation of production companies with technology universities."



Jozef Uhrík,
President,
Automotive Industry Association
of the Slovak Republic

Minerva 2.0 – Slovakia to the First League



Minerva 2.0 is the key government document which identifies an important set of criteria which are necessary for the implementation and building of the innovation eco-system in Slovakia. The main role of Minerva 2.0 is to ensure coordination between activities of the most important players in the process of building a knowledge economy. The Minerva 2.0 document focuses on the identification of the current issues of developing the Slovak knowledge economy and it offers a set of 26 solutions divided into 7 basic groups:

- Education
- Connection between research, development and education
- Research and development
- Connection between research and development and business support
- Business support
- Connection between business support and education
- System weak spots

For more information about initiative Minerva 2.0 please see
www.vedomostna-ekonomika.gov.sk

Sources of Support to R&D Investment

The support for investment in research and development in Slovakia can be obtained from several sources:

- Act No 561/2007 Coll. on investment aid – for building technology centres in Slovakia
- Act No.185/2009 Coll. on incentives for R&D
- The Seventh Framework Programme of EU for research, technical development
- EU Structural Funds
- National Grants (Slovak Research and Development Agency)
- Other programs and schemes for providing assistance (direct and indirect)

About SARIO

The Slovak Investment and Trade Development Agency (SARIO) is a government-funded agency under the administration of the Ministry of the Economy of the Slovak Republic. SARIO aims to become the preferred partner for companies considering their investment in Central Europe focusing on the transformation of Slovakia into a commercial, technological, innovation and talent centre of Europe. All SARIO services are free of charge.

SARIO services in the area of R&D

- ▶ Professional support with financing opportunities, e.g. R&D grants or incentives
- ▶ Build networking opportunities for production companies and academic sphere
- ▶ Organization of seminars and trainings about R&D facilities
- ▶ Organization of visits to selected R&D capacities in Slovakia
- ▶ Help with creation of business case for parent companies – providing all necessary information, statistics and references
- ▶ Maintaining Slovak R&D Database with information about local R&D services

Our key project – Slovak Start-Up Development Program



One of the current projects started by SARIO is a project focusing on the international system of technology incubators called the Slovak Start-Up Development Program.

The main intent of this project is to create a mechanism of support and development for the innovative and technology oriented firms from Slovakia in order to simplify their future entry to the world market. This aim is in line with the innovation strategy and policy of the SR and it is intended to contribute to the building of the knowledge economy in Slovakia.

Its basic activities include:

- ▶ to enable the support of expansion of innovative ideas and Slovak firms abroad,
- ▶ to enable the transfer of innovative know-how to Slovakia.

The key partner for this project is the American technology incubator Plug and Play Tech Center from California, United States. For the preparation phase will be established an office of the Slovak Training Incubator Center in Bratislava. The project will commence in 2012, at the Slovak Pavilion in the Plug and Play Tech Center in the U.S. In this Pavilion, selected Slovak firms will have the opportunity to establish themselves in the American market.

Our Awards



2011
Global Best to Invest 2010,
Selection Site magazine



2007
'Best European Investment
Agency Award for High-Tech' at
the World Investment Conference
in La Baule (France)

The Great Slovak Inventors

Aurel Stodola was a Slovak engineer, physicist, and inventor. He was a pioneer in the area of technical thermodynamics and its applications. Stodola was a professor of mechanical engineering at the Swiss Polytechnic Institute (now ETH) in Zurich. One of his students was Albert Einstein.



Milan Rastislav Štefánik was a Slovak politician, diplomat, and astronomer in France. Štefánik dealt with astrophysics, solar physics and became well-known for his spectral analysis of the sun's corona. He was involved in perfecting spectrography and has been considered a predecessor of Bernard Lyot.



Jozef Murgaš was a Slovak inventor, architect, botanist, painter, patriot, and Roman Catholic priest. He contributed to wireless telegraphy and helped develop mobile communications and wireless transmission of information and the human voice.



Štefan Banič was the Slovak inventor of the military parachute. He constructed a prototype of a parachute in 1913.



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and Trade Development Agency**

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