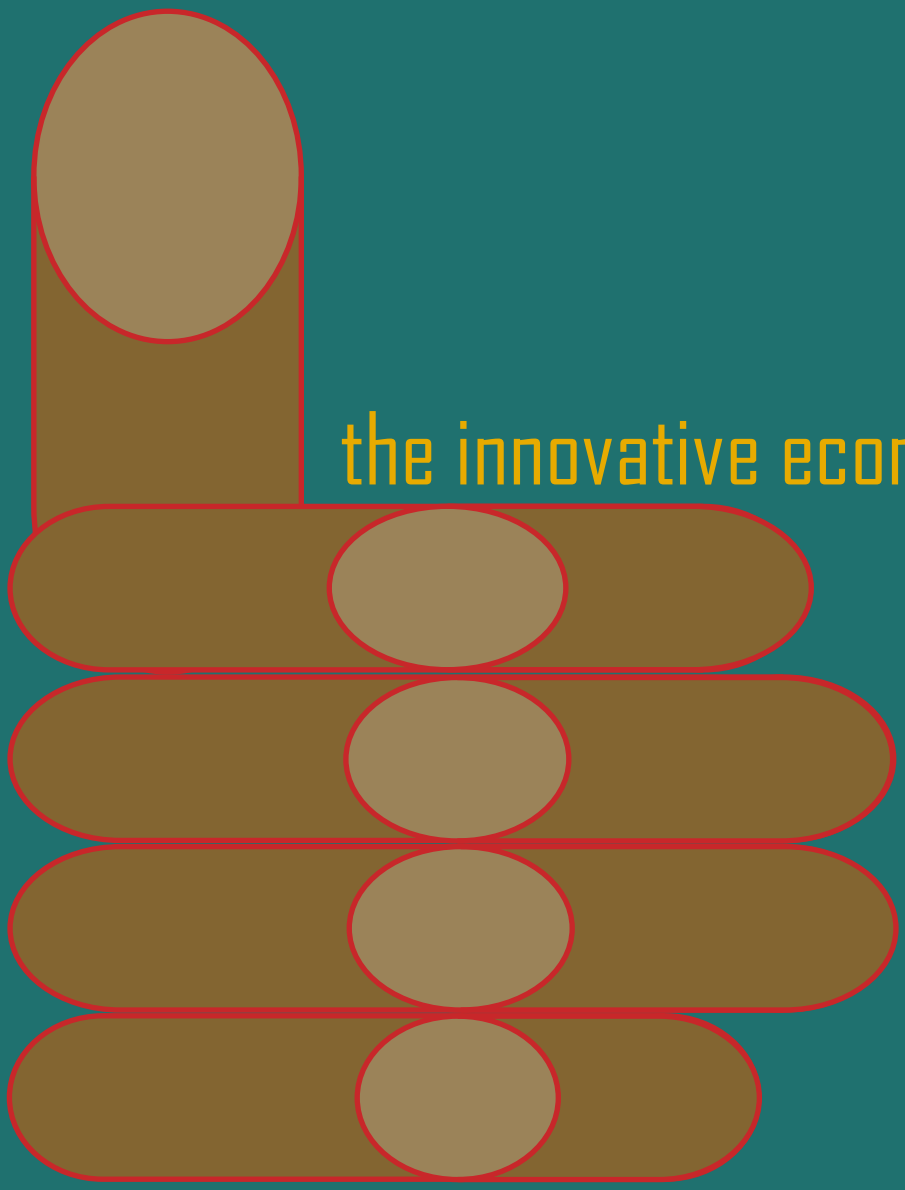
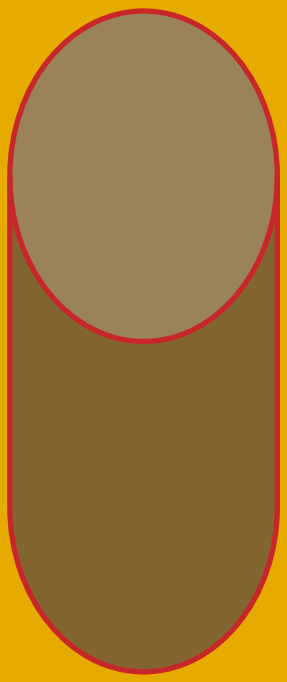
amchamCZ



the innovative economy

amcham 2021-22 membership report



What is the difference between an economy that improves incrementally each year and an innovative economy?

You need look no further than your hand.

Spread it before you.

Start with your pinkie. Moderately useful for gripping things. (and help you display status when you drink tea).

Your next finger can do the same things better.

Your middle finger can do the same things even better. (and express anger universally)

Your pointer finger is the most useful of the four, but differs in what it can do only by degree.

Then you get to the thumb. It is a finger, but a whole other type of finger that lets you do so many more things. It is the finger that turns a talon into a hand. Now that is innovation.

(and thumbs up expresses universal positivity created by innovation!).

amchamCZ

the innovative report.

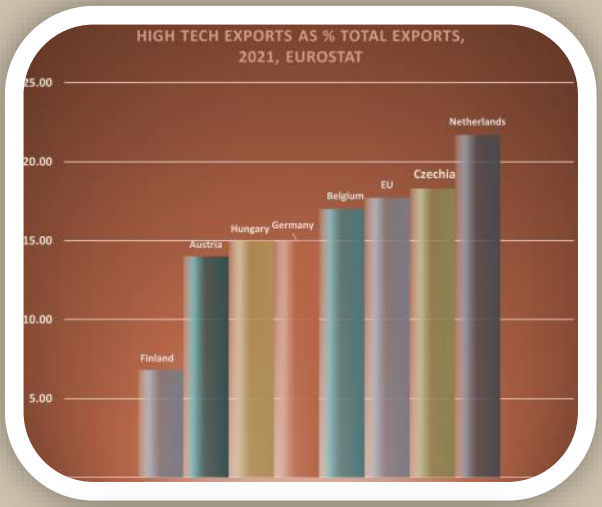
Why we want innovation.

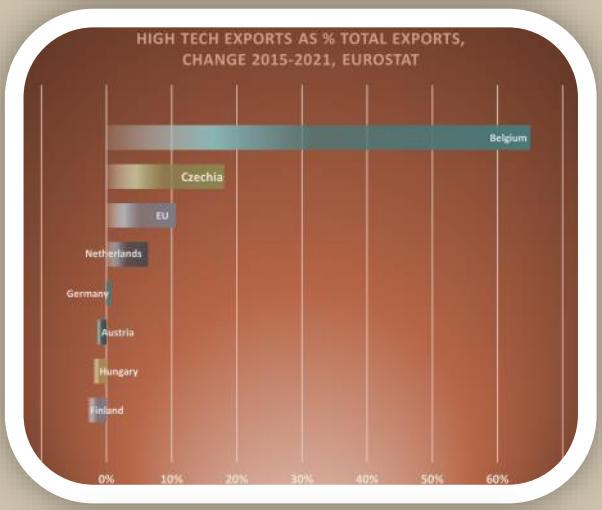
Countries do not exist to innovate. They innovate to increase the prosperity and security of their citizens. That is why it is important to remember the ultimate goal of innovation should be measured by how it contributes to the growth of the national economy.

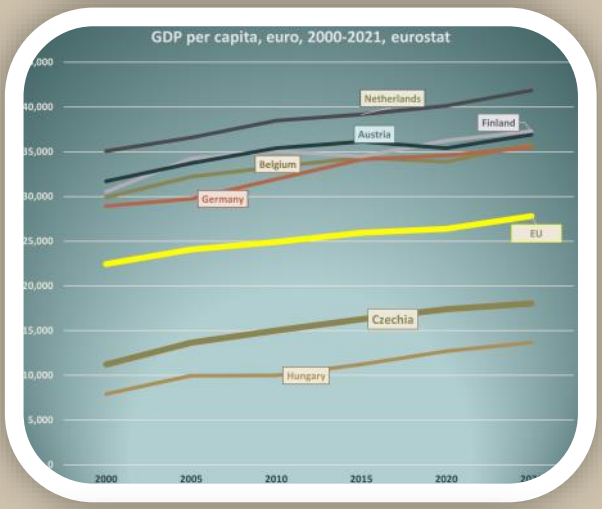
Two indicators give us an estimate of how innovation impacts economic well-being. First, innovation should contribute to the increase in GDP generated by each citizen. Second, high tech exports should increase as a proxy for the national wealth generated by Czech products abroad.

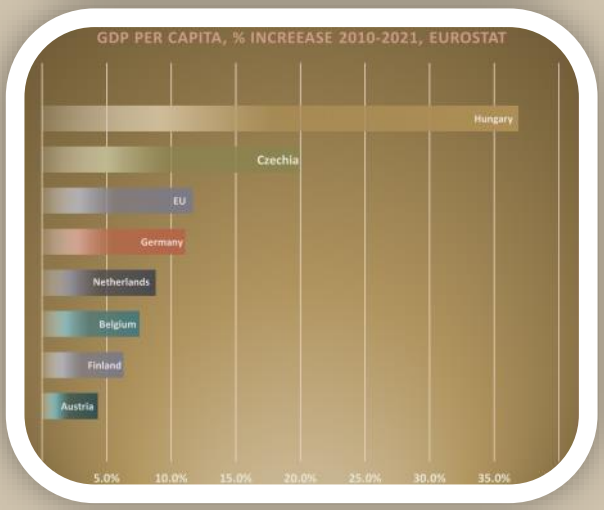
We should aim to join the club of countries achieving a GDP per capita comfortably above the EU average (see chart 3). Our increase since 2015 shows that we are on the way (chart 4), but we might aim to achieve an even greater growth rate (2.5 times the EU average) in the next five years.

High tech exports represent a good portion of our total exports (chart 1), but we might aim to accelerate our growth (chart 2) even more to surpass 20%.









amcham CZ

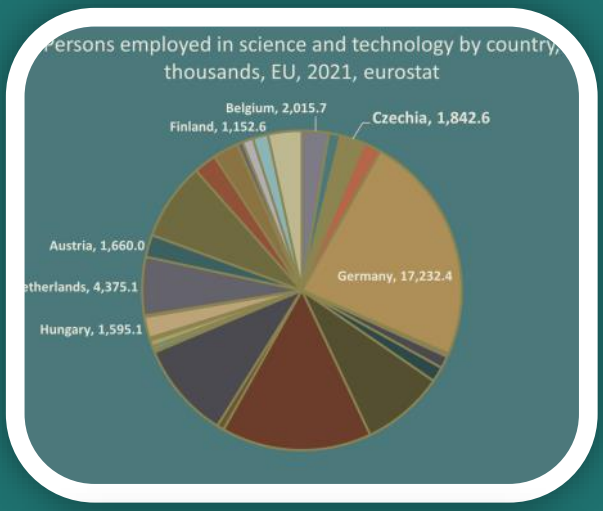
Who does our innovation.

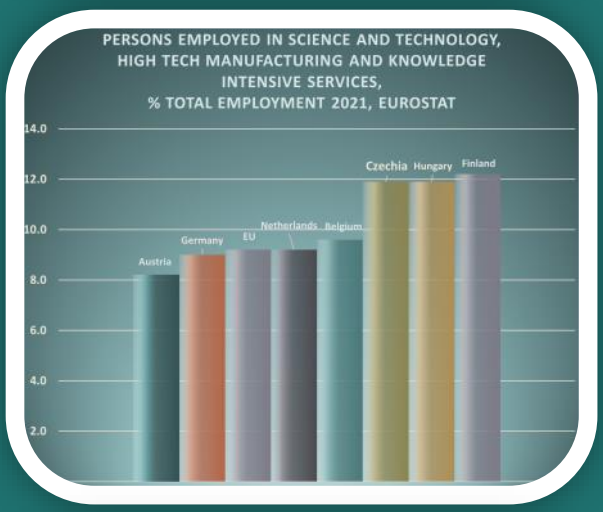
People are the primary resource in innovative economies. Those educated in science and engineering, and those working in science and technology are the most likely to turn original ideas into innovative products and services.

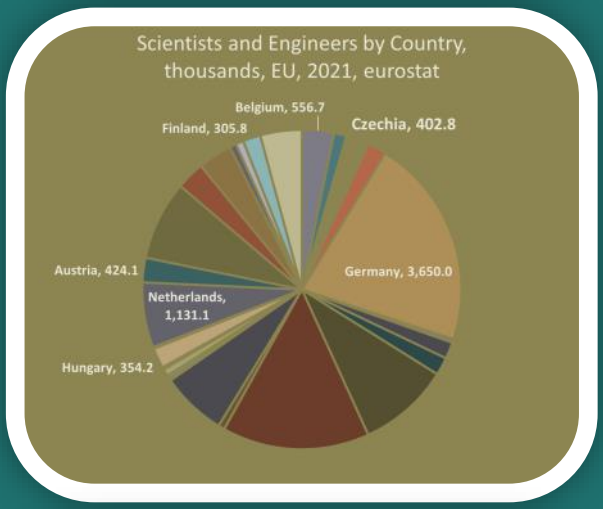
Czechia has the tenth highest number of people working in science and technology in the EU (graph 1) and accounts for 2% of the EU total. The proportion of those people working in high tech manufacturing or knowledge-intensive services is higher than the EU average (graph 2).

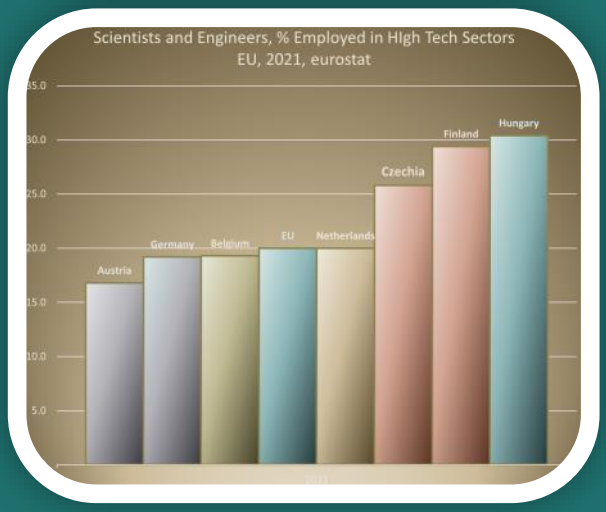
The number of scientists and engineers working in Czechia has increased by 25% since 2015. (graph 3) That is a faster pace than Germany (20%), but behind Austria (42%), Holland (62%), and Hungary (48%). The country now accounts for 2% of all scientists and engineers working in the EU.

The proportion of working scientists and engineers employed in high tech sectors is significantly higher than the EU average, and has risen by 8% since 2015. (graph 4)









Who are our future innovators.

The reputation of Czech engineers are one of the primary factors why the country has attracted so much technology investment. The challenge for universities is to maintain that reputation in an increasingly globalized setting for technical education and scientific research. The challenge is both to increase the proportion of the workforce with STEM degrees while simultaneously increasing the quality of their output .

The two main Czech technical universities (CVUT and VUTB) educate approximately 35,000 students annually, and graduate 8,000. Vienna's primary technical university educates 26,000 and graduates 3,000 (the University of Vienna has another 16,500 STEM students).

Czech universities ranked 260 (Charles University), 342 (University of Chemistry and Technology), 432 (CVUT), 532 (Masaryk) and 651 (VUTB) in the 2021 QS global rankings.

Prague (figures for foreigners include Slovaks)	enrolled studies 2021/2022	graduated (including multiple degrees) 2021	*Ratio graduated / enrolled*	*Study failure rate in 1st year of studies (%)*
ČVUT total	17550	3836	*21.86%*	*30.60%*
of which foreigners	3152	581	18.43%	
Informatics (FIT)	2293	385	*16.79%*	*41.90%*
of which foreigners	654	89	13.61%	
Electrical Engineering (FEL)	2834	602	*21.24%*	*29.20%*
of which foreigners	674	135	20.03%	
Mechanical Engineering (FS)	2263	661	*29.21%*	*26.30%*
of which foreigners	293	81	27.65%	
Biomedical Engineering	1913	372	*19.45%*	*26.00%*
of which foreigners	136	23	16.91%	
Charles University	50918	8041	*15.79%*	*24.90%*
of which foreigners	10811	1499	*13.87%*	
Mathematics, Physics and Informatics (MFF)	2920	491	*16.82%*	*34.40%*
of which foreigners	1013	145	*14.31%*	
Natural Sciences (PrF)	5222	868	*16.62%*	*32.10%*
of which foreigners	1259	159	*12.63%*	

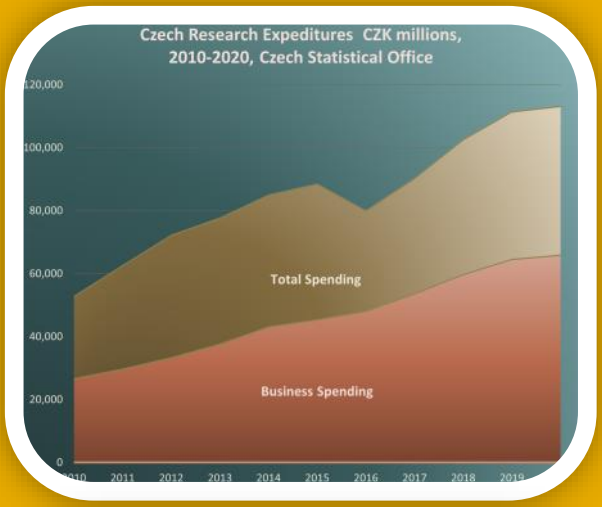
Brno (figures for foreigners include Slovaks)	enrolled studies, including multiple enrollments 2021/2022	graduated (including multiple degrees) 2021	*Ratio graduated / enrolled*	*Study failure rate in 1st year of studies (%)*
VUT total	18137	4213	*23.23%*	*29.72%*
of which foreigners	4490	911	*20.29%*	
Informatics (FIT)	2638	433	*16.41%*	*33.06%*
of which foreigners	1143	175	*15.31%*	
Elctrical Engineering (FEKT)	3133	638	*20.36%*	*26.92%*
of which foreigners	827	164	*19.83%*	
Mechanical Engineering (FSI)	3963	989	*24.96%*	*29.95%*
of which foreigners	688	169	*24.56%*	
Chemistry, Technology (VUT FCH)	882	311	*35.26%*	*39.91%*
of which foreigners	268	83	*30.97%*	
MUNI total	32786	6844	*20.87%*	*24.30%*
of which foreigners	4197	1449	*34.52%*	
Informatics (FI)	2144	372	*17.35%*	*35.10%*
of which foreigners	211	220	*104.27%*	
Natural Sciences, Maths, Physics (PrF)	2936	742	*25.27%*	*31.20%*
of which foreigners (incl. non-STEM study fields)	571	214	*37.48%*	

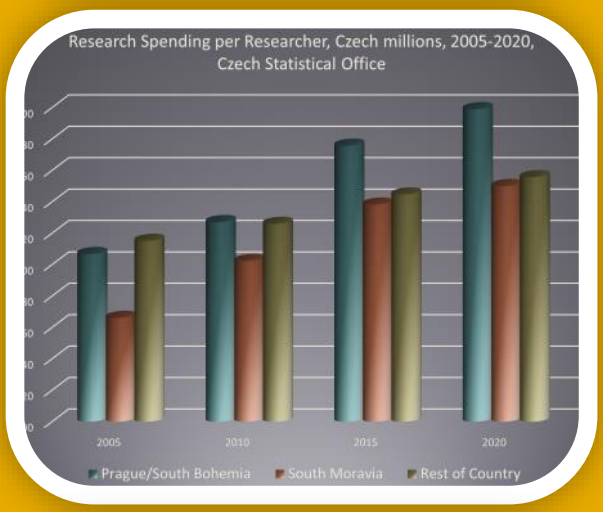
How is innovation financed?

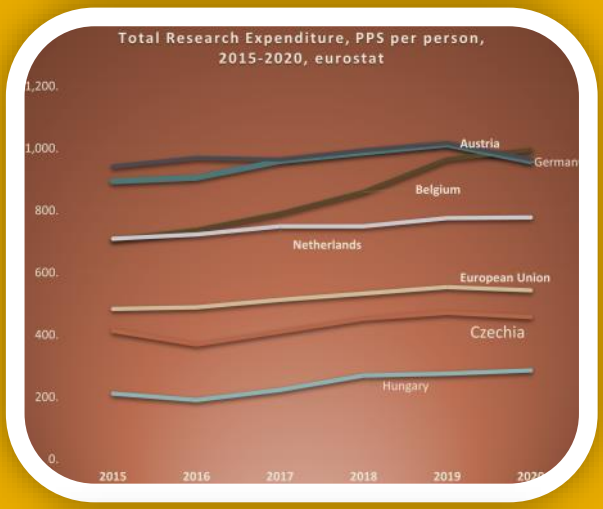
The finance of research is rising rapidly in Czechia. Prague leads the regions of the country both in total spending (with 38% of the total) and spending per researcher, and South Moravia, led by Brno, and Central Bohemia also growing quickly.

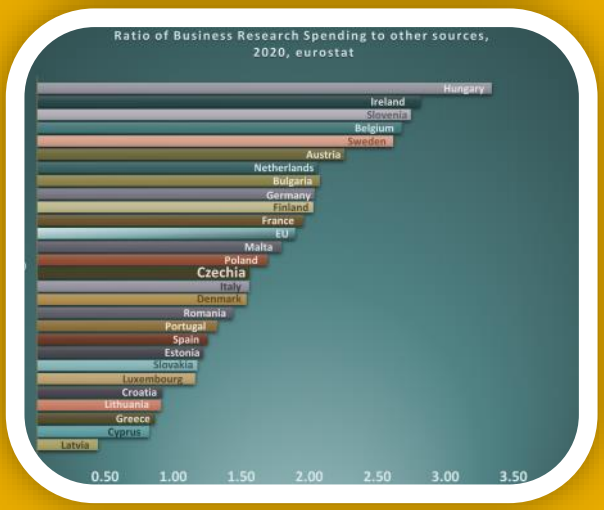
Czechia accounted for 2% of all EU research spending in 2020. Research spending per researcher is rising slightly faster than the EU average, but still remains below that average.

The country's ratio of business research spending to public spending (including universities) is 1.56, which is below the EU average. Business research expenditures in the country has increased 147% since 2010, which is faster than other sources of funding.









Investment case studies.

Alliance Laundry Systems

investment case studies

Alliance Laundry CE

R&D: Invent / design new laundry machines for our global network of distributors: > 250 mil. CZK

Maintain / enlarge the production capacity of the facility: 360 mil. CZK

key takeaways

Innovation: Alliance has his European R&D center located in the Czech Republic

Support Czech export as more than 95% of the output is exported and 70% of our suppliers are Czech

Strong job growth throughout the years with a high number of higher skilled people

the background

Alliance Laundry systems is the world leader in professional laundry solutions. We invent, design, produce and market premium solutions for commercial laundries serving almost every need.

The Czech operation invents, designs and produces 37 unique products that are shipped to 130 countries worldwide. The majority of the parts used in the assembly are produced in house or locally.

the investment

R&D investments to develop new, improved products. Operation investments to introduce new production techniques or maintain or extend the existing production capacity.

Without investments our products will be outdated and lose market share. Alliance invests in the Czech, Asian and North-American facilities based on the ROI, competitive business climate, risk and taxation.

Alliance invests heavily in new products to maintain the global leadership in laundry equipment. As the Czech plant is the European R&D center and only European production facility, investments in the Czech plant are very important to keep our top 3 position in Europe and to support the growth.

the result

Alliance developed 2 totally new products the last 2 years what resulted in incremental sales. One product for the Asian market, one for the European market. We also updated our products to meet new standards and improved connectivity. The Alliance R&D team works intensively with the Ostrava university and Brno labs to develop our new products. 70% of our suppliers are Czech. The jobs in our Czech plant has increased with 7% last year: assembly workers but also R&D engineers and software developers.

investment
case
studies

Garrett
ADVANCING MOTION

Garrett Motion Czech Republic

Differentiated Automotive Technologies

key takeaways

1. **Czech-based teams are critical to both company strategy and the transportation industry developing innovative technologies for the future.**
2. **The high-added-value knowledge base, innovations and experience have global impact and remain in the country.**
3. **Win-win cooperation with universities cultivates interest in technology fields and offers attractive carriers in local and global scale**

the background

Garrett Motion is a U.S. company headquartered in Switzerland. Our innovative technologies, used by nearly every major global auto maker, span products for passenger and commercial powertrains including internal combustion engine, hybrid, and hydrogen fuel cell vehicles.

Supported by state-of-the-art local testing capabilities, the Brno and Prague R&D centers are vital global engineering hubs for turbocharger innovation, advanced vehicle software and electrification technologies that our customers need. Also, based in Brno is the global Garrett Motorsport engineering team which supports high-profile OEM racing organizations for Formula 1 and other world-renowned races.

the investment

Purpose: Continue to grow our R&D teams in CZ to develop advanced technologies in turbo, fuel cell and vehicle electrification to enable cleaner vehicles; planned in-house capabilities expansion by adding more cutting-edge testing technologies.

Key factors: Ability to attract engineering students, graduates and experienced professionals to CZ (Brno and Prague). Local universities are also aligned to industry needs in both curricula and quality; availability of effective R&D incentives and predictability on government economic policy.

the state of CZ US business 2022
amcham cz

Garrett Motion Czech Republic

Differentiated Automotive Technologies

"These investments are critical for our Brno and Prague sites to remain at the top of technology innovation and for the continued development of world-class engineers. Along with Garrett's boosting technologies, the Czech-based teams continue to be critical to our ongoing progress in developing and launching new, cutting-edge solutions for the transportation industry. With their strong support, we are now aggressively pursuing emerging opportunities in electric boosting, hydrogen fuel cell vehicles, and automotive software solutions. Our success in these strategic areas is critical not only for the future of our company, but also for the entire automotive sector as we know the industry greatly benefits from Garrett's differentiated offerings."

Craig Balis, Garrett Senior Vice President and Chief Technology Officer

the result

Since the start of our Czech operations in 2008, we have invested over $30 million into our automotive R&D and engineering centers, growing them with more than 400 highly skilled engineers. Every year, Garrett invests in new technical capabilities and knowledge base of our engineers, enabling new technology development. Our Czech teams have been producing very exciting breakthrough technologies adopted by major global car makers in core turbo technology, electrification and software, including many patents. Today, we are opening dozens of new positions, investing into new technology vectors, and expanding our well-established collaboration with top universities, which also benefit from our experts' lectures including advanced thesis topics, sponsorships, technical cooperation and much more.

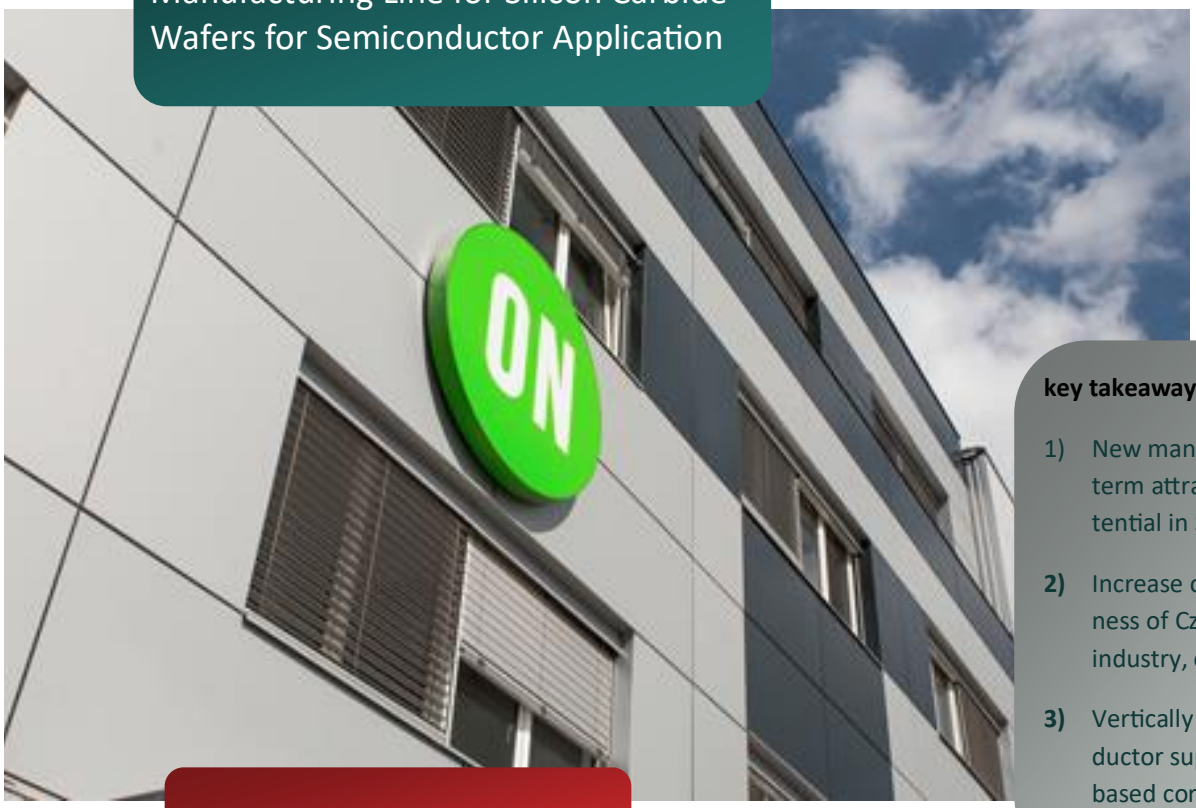
the future

"Garrett's Czech-based engineering teams and capabilities will continue supporting automakers to address tighter emissions regulations across regions with advanced technologies. Fifteen years of our R&D activities have proven the positive synergies with academia and Czech-based businesses, as we work closely with dozens of Czech companies. Garrett plans to continue and build on those synergies: Expand our win-win cooperation with universities to cultivate interest in technology fields; offer high-added-value carriers and opportunities to develop new skills and capabilities in local and global scale. The knowledge base, innovations and experience built through Garrett's product and technology development is of high-added-value, which remains in the country. Lastly and very importantly, we want to continue the legacy of Czech engineering creativity." *Libor Urbanec, Managing Director of Garrett Motion Czech Republic.*

investment
case
studies

onsemi

Manufacturing Line for Silicon Carbide Wafers for Semiconductor Application



key takeaways

1) New manufacturing line, long term attractive business potential in SiC
2) Increase of global competitiveness of Czech semiconductor industry, export, R&D&I.
3) Vertically integrated semiconductor supply chain for US based corporation

the background

onsemi creates intelligent power and sensing technologies that solve the world's most complex challenges and leads the way in creating a safer, cleaner, and smarter world.

onsemi operations in the Czech Republic cover R&D and manufacturing of semiconductor material and devices and new product development.

the investment

onsemi investment to R&D and manufacturing of SiC polished and epitaxial wafers in Roznov exceeds $300 mil. for Y20-23.

Key factors: onsemi utilized proven expert capability of Roznov R&D team in unique synergy with manufacturing line for semiconductor wafers and devices. policy.

the state of CZUS business 2022
amcham cz

onsemi

Manufacturing Line for Silicon Carbide Wafers for Semiconductor Application

"The trend towards SiC is mainly driven by the question: Can I solve something better by using SiC than with classic silicon components? Can I achieve better system performance by using SiC? In the field of electromobility, I see a logical chain of SiC use from renewable energies to energy conversion in electric vehicles to fast charging with a Level 3 charger, which would not be feasible in this form without SiC! By the middle of this decade, onsemi should undoubtedly be among the top 3 in SiC. Given the investments and efforts involved, our goal is quite clearly to be number 1 in this ranking."

Hassane El-Khoury, CEO onsemi: "I'm betting on victory, not place", Interview with Engelbert Hopf, October 2021

the result

New SiC technology in Roznov brings more than 30 qualified engineering positions and more than 100 operators (2022) with next perspectives to multiply production, revenues and employment in Y2023-25. New technology has been developed by Roznov R&D and Operations teams in international cooperation with other onsemi locations to build effective SiC supply chain. Scientific cooperation with Masaryk University and Brno University of Technology have been supported by Technology Agency of the Czech Republic and Ministry of Industry and trade of the Czech Republic. onsemi systematically supports STEM education on high schools and universities to secure needed qualified workforce for next growth.

the future

"The manufacturing line represents a fundamental competitive advantage for onsemi in the production of SiC based devices with application potential mainly for electro mobility. Other perspective applications are represented by inverters for photovoltaic and wind power plants or 5G networks."

Aleš Cáb, Vice President, Roznov Manufacturing

Thermo Fisher SCIENTIFIC

investment case studies

Thermo Fisher Scientific Brno

CMD development center

key takeaways

1. New scientific products with high-added value are being developed in Brno/Czech Republic
2. Thermo Fisher is creating 80-100 new job openings for highly educated professionals with backgrounds in SW development, electronics, mechanical constructions, physics, chemics etc.
3. Cooperation with local universities and research centers on mass spectrometers development and talent attraction

the background

Thermo Fisher Scientific is a world leader in science products and services. The company employs more than 100,000 people globally and has a turnover of over USD 40 billion. We supply our customers with an extensive portfolio of science products – from basic laboratory equipment to state-of-the-art analytical devices, thereby helping to make the world healthier, cleaner, and safer.

The Brno Technology Center is one of the largest branches of Thermo Fisher. We focus on developing and producing state-of-the-art scientific devices – electron microscopes and spectrometers. Among our customers are world-famous universities, leading electronics producers, pharmaceutical companies, and development centers in the space, semi-conductor, mining, automotive, and aviation industries. The site has grown from about 600 employees in 2016 to today's cca 1700, multiplying 3x revenue during that period.

the investment

The investment was used to build new research and development center for Thermo Fisher's CMD division, which focuses on mass spectrometry and chromatography. Mass spectrometer instruments allow scientists to perform the most advanced chemical analysis, as they can ascertain the chemical composition of samples at the atomic or molecular level, and help explain their structure.

Key factors: The key success/decision factors, in this case, were the previous success, growth and competencies of the Brno site, both in R&D and manufacturing; the ability to design and realize complex internal infrastructure; the existing talent pool, and connections between our Brno site and local universities/academia.

Thermo Fisher Scientific Brno

CMD development center

the result

A new development center was opened this year with the first 25 scientists and engineers hired. The majority of them came outside of the company, but there were also some internal transitions thanks to the technical synergies between mass spectroscopes and electron microscopes, which are being developed in Brno for more than 70 years.

Now, the team is going through an accelerated learning curve with the participation and help of the USA and German sites on the first projects. University cooperation is still to come.

the future

For Thermo Fisher, Brno site remains one of the key R&D centers in Europe and worldwide. We will continue to support its growth, including the development and transition of new technologies from multiple divisions of our very broad portfolio. Our plan is the be the number one R&D investor in the Brno region and develop products, that have a chance to raise the local economy and business environment. We also want to continue in our cooperation with local universities and together with them push the limits of technology and support new talent development and attraction of talents to STEM studies, which is critical for the success of our company and Czech Republic as well.