

AUSSEN WIRTSCHAFT BRANCHENREPORT TSCHECHIEN

SMART FACTORY

CZECH COMPANIES AND INDUSTRY 4.0
ECOSYSTEM
OPPORTUNITIES
WAYS TO THE CUSTOMER
RESOURCES AND CONTACTS

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1. EXECUTIVE SUMMARY

The machinery industry is one of the most important and dynamically growing business sectors in Czech Republic. Deeply imbedded in the country's history it comprises of around 5,200 companies with more than 128,000 employees that generate a turnover of EUR 14 bn. According to Eurostat, the Czech Republic is the most industrialized country in the EU, as manufacturing accounts for more than 27% of the industry while the industry generates nearly 40% of the GDP.

85% of the Czech manufactured products are being exported – mainly to EU countries, above all Germany. In order to be competitive in these demanding markets Czech machines and equipment are produced in the highest quality. This also boasts great opportunities for Austrian suppliers, which are known for their high standards.

Small and medium-sized Czech companies often lack a comprehensive digital transformation plan or the ability to fulfill it. However in recent years, due to rising labor costs, the need to increase production efficiency and to digitally better connect to international value chains, significant investments have been made. This also shows a survey conducted by the Confederation of Industry of the Czech Republic, according to which 66% of Czech companies have developed or are currently developing a digital transformation strategy or are even in one of the stages of its implementation.

The survey further states that 66.7% of the companies voluntarily started the transformation towards Industry 4.0. Furthermore 48% of the companies want to increase investment in the implementation of Industry 4.0.

Main areas for Smart Factory solutions are:

- fully automated production facilities
- technologies for staff-to-machine, machine-to-machine and product-to-machine communication
- cloud technologies
- virtual imaging
- robotization

This report analyses success factors and highlights current developments and future prospects in the Czech business sectors relevant to Smart Factory and Industry 4.0 solutions. Furthermore it presents concrete areas for business opportunities and supports the reader with practical tips for approaching customers in this sector.

This report was written in cooperation with the INDUSTRY CLUSTER 4.0 Brno.

2. CURRENT STATUS OF INDUSTRY 4.0 IN THE CZECH REPUBLIC

According to a survey of the World Economic Forum about the potential yield from Industry 4.0, the Czech Republic is **ranked 6th worldwide**. The Czech Republic is **one of the 25 leading countries in the field of robotics**. (out of 100 countries and economies evaluated).

The industry sector, mainly engineering and electrical engineering, has a long tradition in the Czech Republic. Key sectors include the **automotive industry, electronics manufacturing, electrical engineering and mechanical engineering**, which account for more than half (**55%**) of **total exports**, and also drive a number of other industries with their demand. At the same time, these are fields that include the largest number of Czech employers, and in which a large part of the country's research and development capacities are concentrated. Intensive export ties of companies operating in these fields to foreign markets and connections to the global economy, not only in the field of production, but also engineering services and research and development, predispose them to meet the requirements for implementing changes related with the Fourth Industrial Revolution. Thus, also businesses in other industries will be influenced by these developments. Here their onset may be slower and may not often be forced on customers from abroad.

The year 2020 saw a large drop in sales of Czech manufacturing companies, which averaged -8.4%. In addition, almost a quarter of companies (23%) said they would most likely report a loss in 2020.

The second half of 2020 brought new orders to the industry again, hence, manufacturing **companies are looking forward to renewed sales growth in 2021**. On average, they expect their companies' sales to increase by 2.6% compared to 2020. The management of large companies is particularly optimistic, predicting to grow their sales by two percentage points higher than the directors of small and medium-sized companies - 3.6% vs 1.7%. Small and medium-sized enterprises dealt with the crises worse than large corporations.

The number of domestic companies that have recently **invested in their digitization** has doubled in the last five years. After a short drop during the pandemic, investment activities of manufacturing companies will revive again in 2021, a quarter of them (26.8%) plan to invest more this year.

2.1 Digitization of Small and Medium Enterprises in the Czech Republic

Especially small and medium-sized enterprises (SMEs), as the most important players on the Czech market, and are moving at a fast pace of digitization. This is also because they are supported by a number of subsidy programs from European Union funds, and national programs by the Ministry of Industry and Trade, the Ministry of Foreign Affairs, the Ministry of Education, Youth and Sports, and the Ministry of Regional Development.

The **share of small and medium-sized enterprises** in the total number of active business entities in 2017 was **99.8%** (99.83% in 2018, stable share throughout the decade). The share of the value added by small and medium-sized enterprises in 2017 was 54.6% and the share of employees in small and medium-sized enterprises in the total number of employees in the industry sector in Czech Republic in 2017 was 58%. Investment (tangible and intangible, including land) of SMEs in the industry sector increased by 4.9% compared to 2016 and in construction increased by 1.6% compared to 2016.

2.2 Digital Economy and Society Index (DESI)

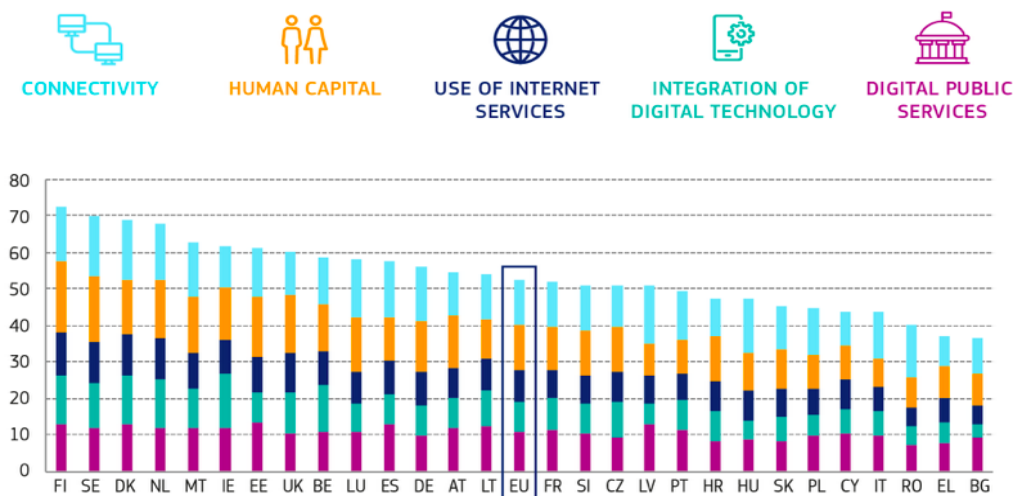
The Digital Economy and Society Index (DESI) is a composite index that summarizes relevant indicators of Europe's digital performance and monitors developments in the digital competitiveness of EU Member States.

Figure 1 shows aggregated data of the society and its levels of digitalization. It covers the areas: connectivity, human capital, use of internet services, integration of the digital technology and digital public services. The following analysis focuses mainly on the industry and its relative sectors.

The average level of digitalization in the Czech Republic has two main drivers: Its role as an industry oriented country (being also seen as a manufacturing hot spot in CEE) and its average level of labor costs. When labor costs will be increasing the digitalization and automation will be speeding up.

As an industry oriented country, Czech Republic currently puts its emphasis on the digitization of manufacturing processes. Germany, in comparison, has taken a step further and focusses also on the automation of pre-manufacturing phases.

Figure 1: Level of digitization according to the Digital Economy and Society Index (DESI 2020)

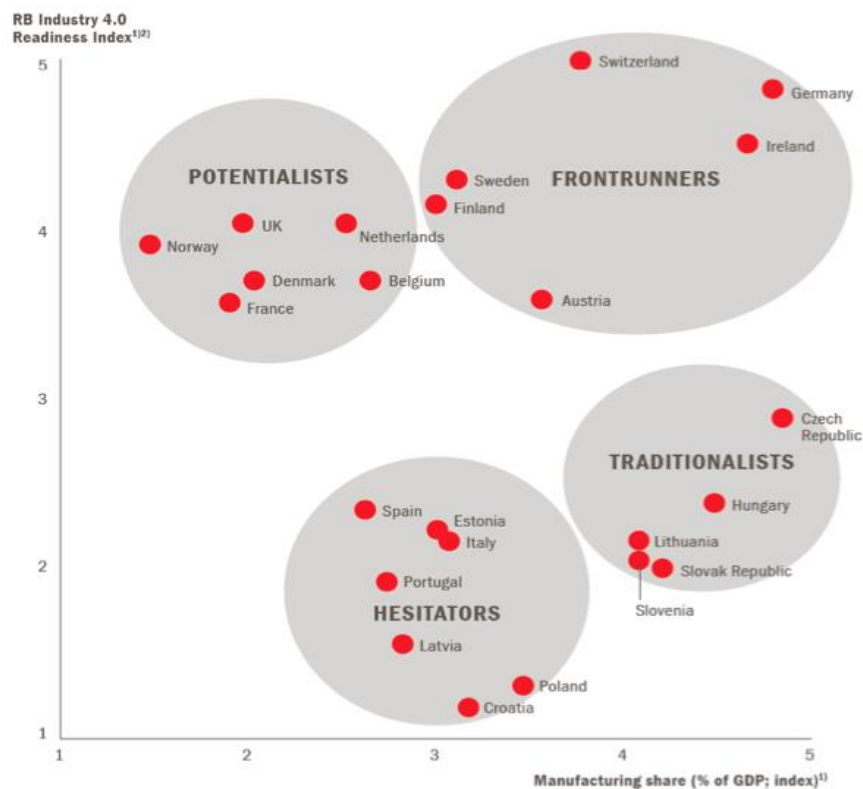


2.3 Industry Readiness Index 4.0

In terms of readiness for Industry 4.0 in relation to the share of industrial production, the Czech Republic is ranked according to a study by Roland Berger in the "**traditionalists**" sector (with the largest share of industrial production with high added value in GDP.)

In the right side of the chart there are industrial countries with high tradition in manufacturing. Czech Republic in the past had lower labor costs and, thus, was not pushed into digital innovation as intensively as Germany or Austria were. In the past progressive technologies were less demanded in Czech Republic and even more expensive than in other more developed countries in the EU. Hence, it is not ranked under the "**frontrunner**" section yet but is now aiming towards it.

Figure 2: Division of European countries into categories according to the Industry Readiness Index 4.0



2.4 Crucial Factors for Czechia's Industry 4.0

In a study by the Czech Statistical Office the technical readiness of Czech companies for digitization and their innovative activities using Industry 4.0 technologies was evaluated. The following components were considered as crucial success factors for the Czech Smart Factory: ICT devices, big data, robotics and 3D printing.

The section of **ICT devices** monitors the technical and infrastructural readiness of Czech companies for the implementation of elements of Industry 4.0.

The **big data** area monitors the use of software technologies for data analysis to optimize business and production processes.

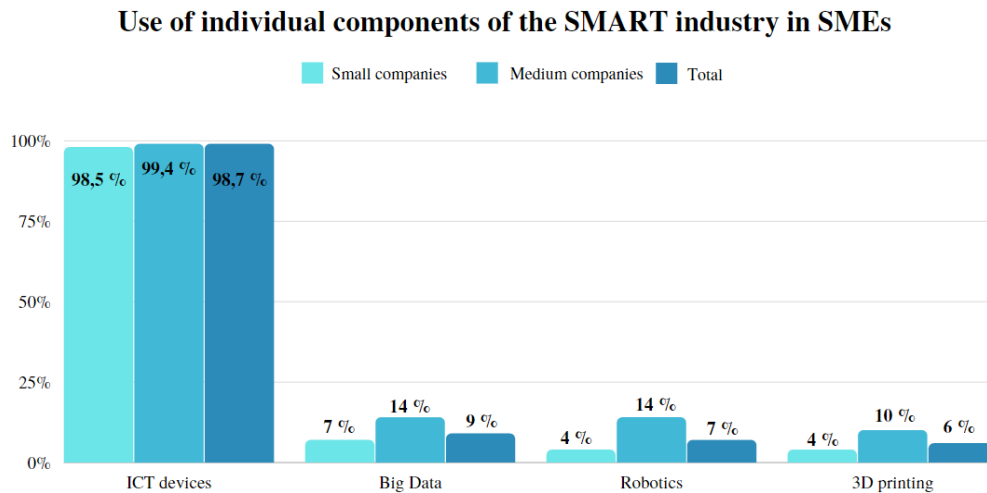
The field of **cloud computing** focuses on the level of the use of advanced computing technologies for the evaluation of big data. Cloud technologies require high computing power and often integrate advanced data optimization tools.

Robotization in Czech Republic is most advanced in the automotive and aerospace industry. The trend of robotics has been very evident in the recent years, also with regard to the increasing cost of human labor.

The concept of Industry 4.0 is also linked to the use of modern production technologies such as **additive production technologies or 3D printing**. Their use has been very sporadic in the recent past. However, over the last years, as these technologies have become more affordable, their use has been booming.

The following figure shows the level of implementation of the before mentioned components of the Smart industry factory among SMEs. As the table shows, the most dominant component are ICT devices.

Figure 3: Use of individual components of the SMART industry in SMEs



Source: Czech Statistical Office, 2020

Another crucial success factor identified by the authors is the level of **cyber security** in the country.

2.4.1 ICT Devices and Digital Infrastructure

Unsurprisingly, the vast majority of companies in the Czech Republic make use ICT devices - in 2020, 99%.

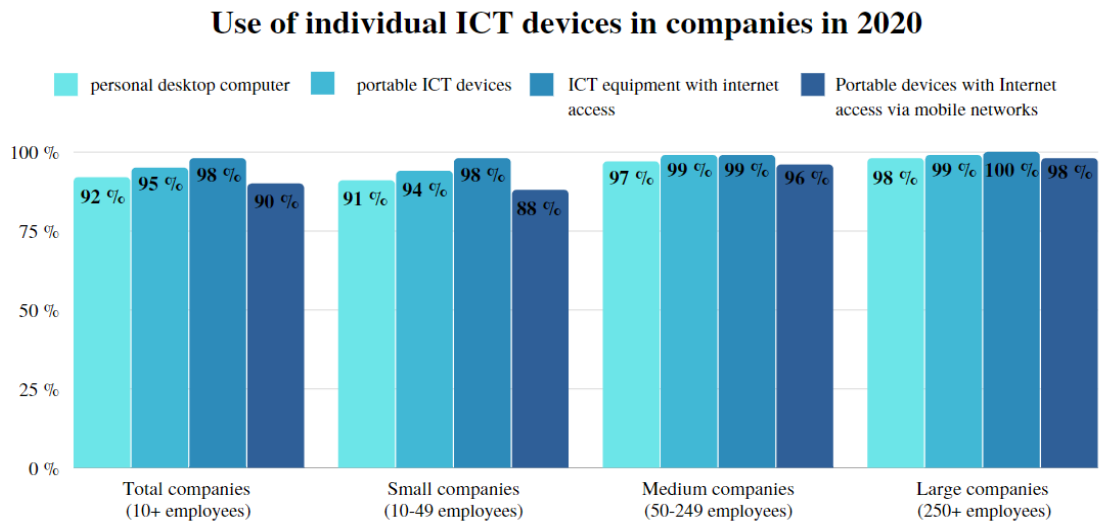
The most commonly implemented type of ICT device are personal desktop computers, which are used by 92% of entities with 10 or more employees. Desktops are used by 98% of large companies and 91% of small entities. In the manufacturing industry, in construction and in retail personal computers are used more frequently than portable devices.

More than 90% of the companies use smartphones. Smartphones are used even more often than desktop computers. In 2020, more than 87% of companies with 10 or more employees used tablets or laptops.

In 2020 portable devices with mobile network access were used in 9 out of 10 companies. In 2019, it was "only" 83%.

The following figure shows which individual devices within ICT are used in companies, relative to their size.

Figure 4: Use of individual ICT devices in companies in 2020



Source: Czech Statistical Office, 2020

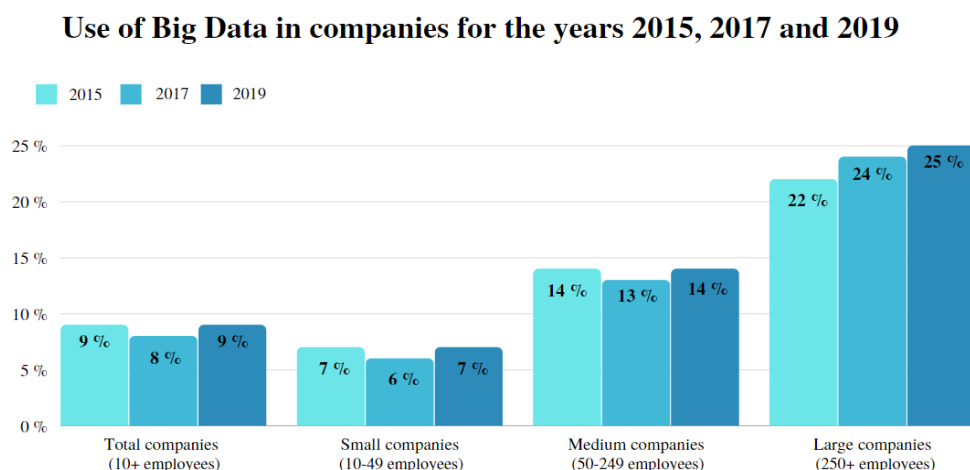
2.4.2 Big Data and Data Analysis

In 2019, only less than a tenth of companies in the Czech Republic with 10 or more employees performed big data analysis. It is applied rather by large companies (with more than 250 employees), respectively by 25% of the large companies.

More than half of the Czech companies that work with big data, analyze location data, for example from GPS devices. The second most common data source where big data analysis is performed on are databases, such as customer databases. Other frequently conducted big data analysis include image information analyses, predictive analyses or various web analyses.

Figure 4 shows the use of big data in companies for the years 2015, 2017 and 2019. The overall, the use of big data does not change much. A slight increase of 1% can be seen at large companies.

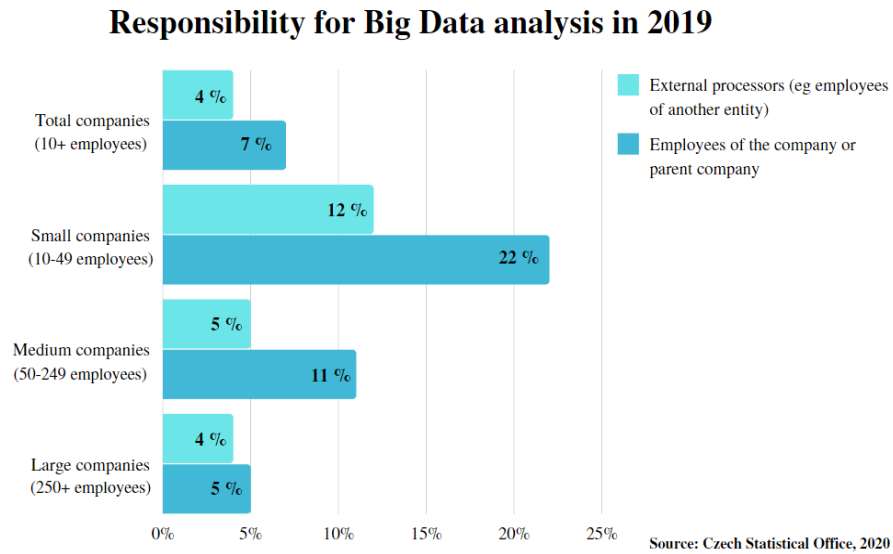
Figure 5: Use of big data in companies for the years 2015, 2017 and 2019



Source: Czech Statistical Office, 2020

Figure 5 shows who analyzes big data for companies. The majority of companies prefer appointing their own employees for big data analysis rather than hiring external specialists.

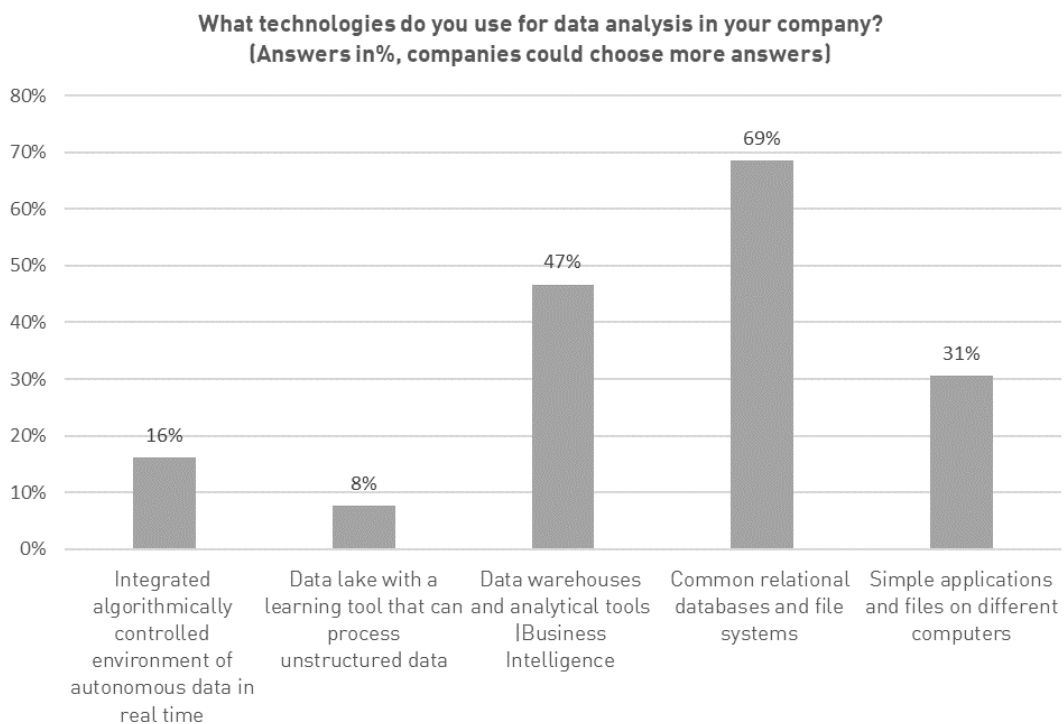
Figure 6: Responsibility for big data analysis in 2019



The Use of Cloud Computing for Data Analysis

A total of 28.8% of companies used paid Cloud computing services in 2020. The percentage in small companies (10-49 employees) was 25.7%. Medium-sized companies (50-249 employees) used these services in 36.9% of cases. It was mostly used in the field of information and communication activities, professional, scientific and technical activities or in wholesale and retail.

Figure 7: What technologies do you use for data analysis in your company?

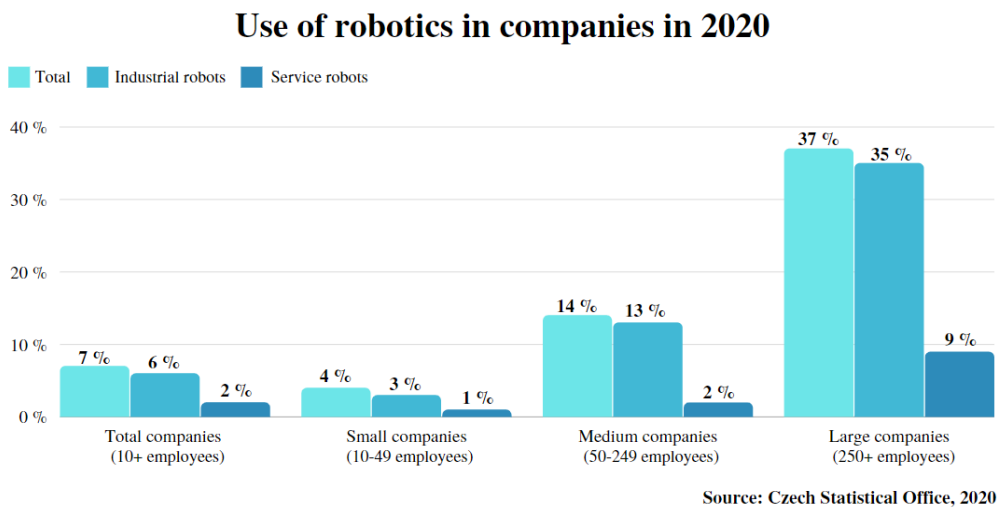


2.4.3 Advanced Automation and Robotics

In large Czech companies, robots occur in a third of cases, mostly in automated production activities. In 2020, 7% of the companies with 10 or more employees had industrial or service robots. Robotics is more characteristic for large companies, i.e. those with more than 250 employees, where it was used by 37% of large companies. If we combine the industry with the size of the company, robots mostly occur in large manufacturing companies, where it is used by 60% of companies.

Figure 6 shows the use of robotics in companies in 2020. It can be seen that the use of industrial robots dominates over the use of service robots.

Figure 8: Use of robotics in companies in 2020



Industrial Robots

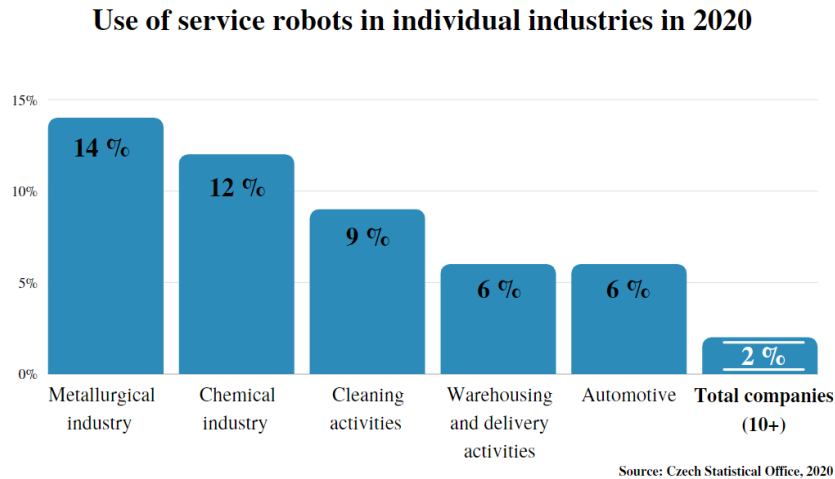
Industrial robots or industrial manipulators, which function as robotic arms with a fixed base, are one of the most popular types in the Czech business environment. In 2020, a total of 6% of companies used industrial robots, of which a third were large companies. In the manufacturing industry, 18% of companies use them.

According to the 2020 statistics, robotic manipulators are most often used in the **metallurgical** and **automotive industries**. The percentage of their use in these industries was more than 54%.

Service Robots

Service robots, which can be understood as robots that can move without a fixed base and can independently perform a work task, were used by only 2% of all companies and by a tenth of large companies. They are most often used in the **metallurgical, chemical** or **automotive industries**. The following figure shows the use of service robots in the dominant industries.

Figure 9: Use of service robots in individual industries in 2020



2.4.4 New Production Technologies (Additive Production, 3D Printing)

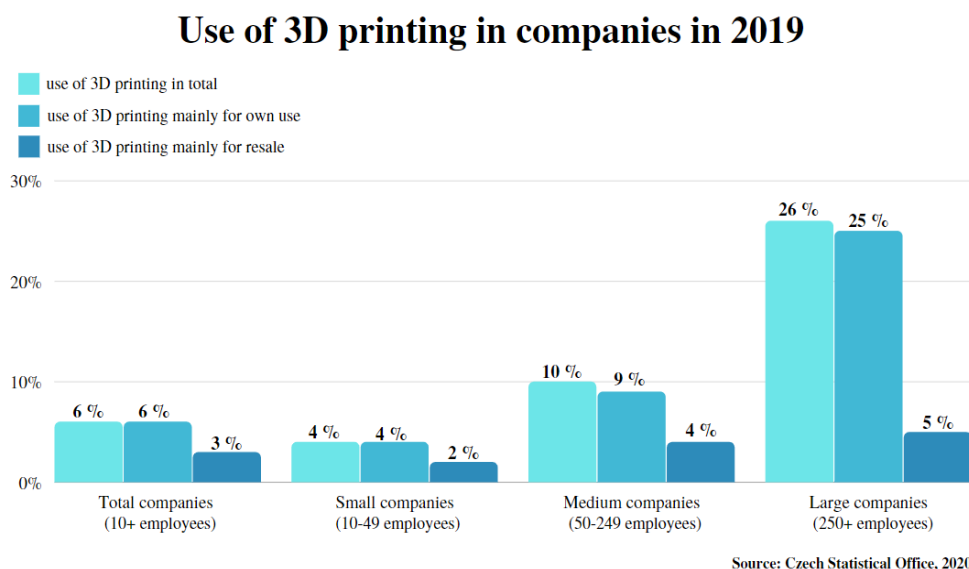
In 2019, only 6 out of 100 companies used 3D printing in the Czech Republic. It mainly can be found in large companies (250+ employees), where a quarter of companies use it. Among large companies 3D printing mainly occurs in the **manufacturing industry** (38%), where it is specifically used in the production of computers, of electronic and optical instruments and of equipment, and in the **automotive industry** (28%). In addition to this industry, it is quite often used in research and development (27%).

Most companies use 3D printing to produce prototypes or models, i.e. in 87% of the companies that apply 3D printing. In 2019, 4% of companies also used this printing in the production of semi-finished products, components, tools and other products.

All types of products that come from 3D printers are dominated by the fact that these products are designed for the company's own needs. When we focus on 3D printing for sale, it was not very widespread in the Czech Republic. In 2019, only 2.6% of companies used it.

The following figure shows the use of 3D printing in companies. It can be seen that most companies use 3D printing mainly for their own use.

Figure 10: Use of 3D printing in companies



2.4.5 Cyber Security

Cyber security is a predominant topic in the Czech Republic. Today's reality shows that cyber threats are evolving at an accelerated pace, becoming more sophisticated, better organized and transnational.

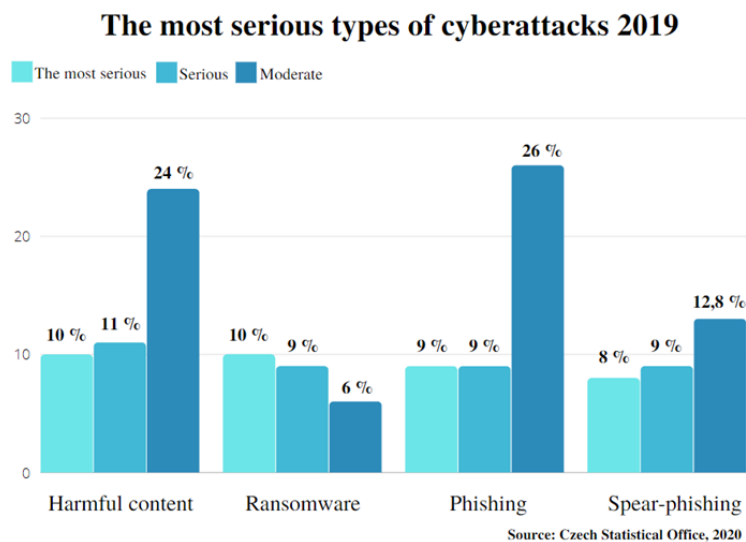
The Czech Republic is recognized in the EU as strong country for cyber security R&D. Activities in this field are also supported by the [Cybersecurity Innovation Hub in Brno](#).

However, cyber security is still not extensively implemented in many Czech companies. Most of the SMEs have a rather basic security infrastructure, such as antivirus systems or access control systems, but complex monitoring systems are not widely used.

Cyber security is no longer a matter for IT managers and CSOs (security managers), it is also commonly addressed by the top management. There have been more companies investing in security solutions and staff training. The main reason is that a number of CEOs and business owners in our country have already felt first-hand what it means to be attacked.

According to a report issued by the National Office for Cyber and Information Security (NÚKIB), the most serious types of cyberattacks are harmful content (virus, worm, Trojan, etc.), ransomware, phishing and spear-phishing.

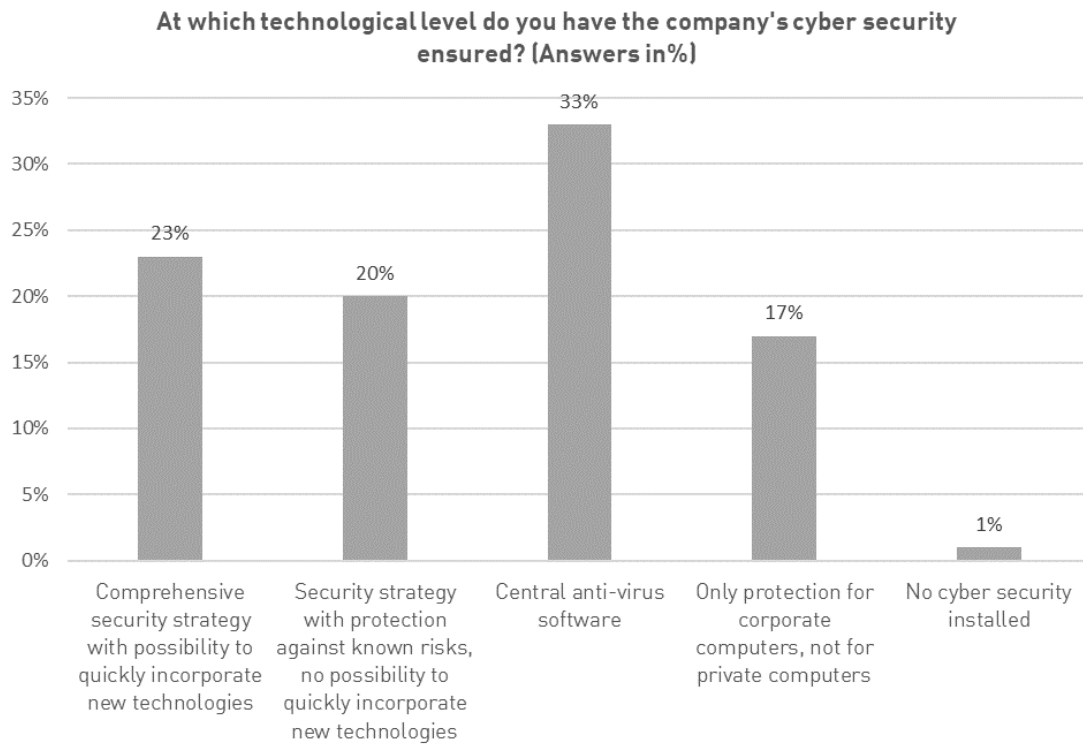
Figure 11: The most serious types of cyberattacks 2019



According to the Czech Statistical Office, two-fifths of large companies in the Czech Republic encountered a cyber-attack in 2018. More than a fifth of companies in the Czech Republic encountered at least one security incident during 2018, 39% of large companies.

According to statistics, the most common measures to ensure ICT security at the beginning of 2019 were regular software updates, the use of a strong password and the backup of company data. Recognition and authentication by biometric methods is not yet very widespread in the Czech business environment. In 2019, this measure was used by 11% of companies in total, the most often by large entities (28%).

Figure 12: At what technological level do you have the company's cyber security ensured?



3. CZECH COMPANIES AND INDUSTRY 4.0

The level and the ability of the Czech companies to implement the key elements of digitization and Industry 4.0 differ significantly. Large multinational companies linked to the automotive and aerospace industries are forced to be on a similar level to foreign companies, especially German companies.

For small and medium-sized companies, this situation is a bit more complicated. These companies often lack a comprehensive digital transformation plan or the ability to fulfill it. However in the recent years, under the influence of rising labor costs and the need to increase production efficiency, significant investments have been made. This also shows a survey conducted by the Confederation of Industry of the Czech Republic, according to which **66% of Czech companies have developed or are currently developing a digital transformation strategy** or are even in one of the stages of its implementation.

The survey further states that 66.7% of the companies voluntarily started the transformation towards Industry 4.0, whereas 8.2% of companies were forced by their parent company or customers. Furthermore 48% of the companies want to increase investment in the implementation of Industry 4.0.

In the following subchapters, we will go into more detail about the current trends in the most relevant sectors of the manufacturing industry: the automotive industry, the chemical industry, the food / beverage industry and mechanical engineering and metallurgy and foundry

3.1 Automotive Industry

The most important sector in the Czech manufacturing industry is the automotive industry, which generates about 9% of the GDP and represents 25% share in exports. It also acts as a driving force for the development of other related industries. An essential part of the automotive industry is the production of car parts and accessories, which are an important export item. With its long tradition and great interconnection of supplier networks, the automotive sector is also the largest employer in the industry. The three largest car plants in the Czech Republic are **Škoda Auto** in Mladá Boleslav, **Hyundai Motor Manufacturing Czech (HMMC)** in Nošovice and **Toyota Motor Manufacturing Czech Republic** in Kolín. Most of the OEM (original equipment manufacturers) and TIER 1 suppliers are owned by foreign parent companies.

Being equipped with advanced robot systems, the automotive industry is considered to be the **leader in Industry 4.0** implementation and is very advanced in comparison to the rest of the Czech industry.

OEM (original equipment manufacturers) have a higher level of Industry 4.0 adoption than TIER 1. However TIER 1 suppliers invest increasingly in new solutions related to Industry 4.0.

Tip: With TIER 1 suppliers market entry barriers seem to be lower than with OEMs. This also applies to TIER 2 suppliers, whose Industry 4.0 readiness reflects usually a mixture of TIER 1 and the general level of the Czech industry.

The most common Industry 4.0 solutions in the automotive industry are solutions for automated data collection and analysis or for robotization (including cobots).

3.2 Chemical Industry

Industry 4.0 solutions are also applied in the chemical industry. In the past, the chemical industry was one of the first to introduce large-scale digital technologies and reap their benefits.

The Czech chemical industry mainly comprises of crude oil refineries, gas processing companies as well as phosphate and fertilizer producing companies. These companies mainly look for solutions to improve efficiency of pipeline technologies, of safety and of maintenance time.

Another technology that has potential in the Czech chemical industry is robotization: The production process in the chemical industry often requires the handling of hazardous or toxic substances. Robotization is suitable for these operations, also in combination with the application of collaborative robots. New production technologies such as 3D printing and other additive technologies are used in the chemical industry as well.

Also data collection and evaluation are key for the chemical industry. The use of big data, their mutual exchange and availability in real time enable the interconnection of all phases of the life cycle of a production plant. The operation can be planned, implemented and managed so that it is completely efficient, safe and flexible. Further, digital twins to simulate production processes are increasingly applied.

The chemical industry is supposed to be a part of critical infrastructure and that is why cyber security solutions are highly required.

3.3 Food & Beverage Industry

The food & beverage industry is characteristic for its mass production. The Czech food & beverage industry is strongly globalized and absorbed huge investments in modern production technologies, especially in the field of advanced automation. Strong emphasis is placed on batching and the traceability of production batches, for example in case of withdrawals from sale.

The production is influenced by the demand from retail chains and end customers as well as sales forecasts. The supply planning requires efficient information systems taking into account existing stocks, work in progress and raw materials as well as materials en route. The rough plan must then be specified in the plan of production lines and technologies for batch production. The planning process should result in the concrete purchasing and production requirements as well as a time frame for in-time-production. Furthermore, processes like shipping and invoicing are optimized.

A critical factor that significantly complicates full automation is batching. Taking into account the expiration of the raw materials a number of checks need to be executed, such as the release of received stocks after the execution, storage, laboratory tests during production, batching of mixtures, batching of the packaged products on lines, environmental parameters (purity, humidity, temperature) or HACCP compliance. All this must be supported by a fully integrated corporate information system.

The Czech food & beverage industry is currently facing a technological shift. There is a demand for information systems for production management and their connection with other phases of the business process, especially logistics.

Modern automatic production lines generate big data. The key for Czech companies is the collection of relevant data, the integration with information systems and the correct interpretation with the help of optimization algorithms. There will also be potential for the use of digital twins for the expansion or reconfiguration of production lines. There will also be a demand for flexible logistics planning based on current customer needs and its time and cost optimization.

3.4 Mechanical Engineering

The Mechanical engineering in the Czech Republic is divided in three industry groups: heavy engineering, light engineering and mass production (especially for the automotive industry).

The heavy engineering often follows the metallurgical industry, producing items with high weight and dimensions, for example parts of ships or large aircrafts. The heavy engineering is represented by Czech companies like **Vítkovice Heavy Machinery**, **TOS KURIM** or **ČKD**.

Due to a single piece flow, only a few elements of the Industry 4.0 are implemented in heavy engineering, such as digital twins, preventive maintenance, remote machine monitoring and condition monitoring.

Light engineering deals with the production of machine tools, vehicles such as cars and smaller ships and many other smaller machines (for example for the textile industry). The light engineering is usually represented by SMEs. The development levels of these companies strongly differ and are often dependent on whether they belong to a foreign investor group.

Some of the brownfield companies still operate on a basic level. They currently deal with tasks such as the implementation of bar code readers or other identification technologies (QR codes, RFID, NFC). This allows them to collect relevant data in order to reconfigure production processes.

According to the nature of their production the projects are mostly focused on the integration of manufacturing information systems (MES system), sensors for data collection, intelligent storage systems, performance monitoring systems of machines, operators and order processes as well as their visualization.

In companies that also create their own designs, virtual reality technologies are also beginning to gain ground. Similarly, augmented reality technologies (using 3D glasses or tablets) are used for remote customer service.

Tip: The Czech subsidiaries of international companies often operate as location for innovation projects. Hence there is a culture of openness towards new technologies, which facilitates market entry for suppliers in the field of Industry 4.0.

Mass production is dominant especially in the automotive industry, which was described in chapter 3.1.

3.5 Metallurgy and Foundry

The metallurgy and foundry sector comprises of companies that produce iron and steel products, especially in the Ostrava and Kladno regions, notable are **Arcelor Mittal Ostrava** and **Třinecké železářny**.

Modernization in the context of Industry 4.0 is a challenge for this rather traditional industry. However, large Czech foundry companies, which are among the global players, do not hesitate to invest heavily in relevant technologies and transform brownfield companies into modern smart productions. For the metallurgical and foundry sector, the relevant technologies are mainly associated with advanced automation and robotics and some partial technologies in the field of digitization of the production control.

An example of the successful implementation of an Industry 4.0 technology is the so called **Casting cell 4.0**, whose innovation lies in the precise interaction between robots, presses and a foundry rotary table. The device adapts to the production rhythm. The robot and the pressing cycle as a complete device are automatically time-optimized in one cell. This allows the robot to alternate its speed and thus adapting it according to the production process. The results are shorter waiting times and the reduction of machine wear due to an even flow.

Another topic is the digitization of the production management by **ERP** and **MES systems**. An example for that is the Czech owned foundry company **BENEŠ a LÁT**, which belongs to the Czech leaders in the sector and is very successful in the field of digitization. The company invested in an ERP system that, in addition to common agendas such as trade, finance and warehouses, also integrates the agenda of production planning and management. The ERP system monitors the performance of the staff and the machine efficiency. Thanks to this, they are able to predict scenarios based on the monitored data. In addition to the usual evaluations with an impact on the KPIs, the goal is to prevent failures, - so suddenly it is not just about an improvement of production processes, but also for example about **predictive maintenance** and the evaluation of qualification requirements for further production batches.

Tip: Smaller Czech foundry companies are often suppliers for TIER 2 automotive companies or for producers of particular machinery parts. The implementation of the Industry 4.0 concept there is still on a basic level. In this segment lies great potential to make the very first steps towards a Smart Factory, such as the integration of system elements in the area of operator, machine or workplace, for example the introduction of a **barcode / QR code readers**. This will allow basic data collection for performance monitoring, the **integration in the ERP system** and a subsequent optimization.

4. ECOSYSTEM

4.1 Governmental Strategy Towards Industry 4.0

Most EU countries have presented national strategies and action plans to support the transition to Industry 4.0. In the Czech Republic it is the **Industry 4.0 Initiative**. Which was approved on 24th August 2016 (prepared by the Ministry of Industry and Trade).

The main points of the initiative are sustainability and competitiveness. The aim of the Industry 4.0 Initiative is to show possible directions of development and outline measures that could not only support the economy and industrial base of the Czech Republic, but also help prepare the whole society to absorb this technological change. The initiative contains basic information on the need for urgent changes caused by the onset of the 4th Industrial Revolution and outlines measures to support investment, applied research and standardization, and addresses issues related to cyber security, logistics and legislation.

The Action Plan for the Development of the Digital Market is linked to the Industry 4.0 Initiative. It lists key priority areas such as: Infrastructure development, Development of digital competencies and computer thinking in a long term perspective.

4.2 Subsidy Options

In the Czech Republic, with the support of the Ministry of Industry and Trade, there are a large number of subsidy programs. Entrepreneurs can obtain the necessary information on the pages of the Information Portal on Subsidies for Entrepreneurs [DotaceEU.cz](https://dotaceEU.cz), the umbrella portal of the European Structural and Investment Funds in the Czech Republic.

An example is the current program "XIII. TECHNOLOGY", announced by the Ministry of Industry and Trade on October 1, 2020. It is aimed at supporting the growth and strengthening of the competitiveness of small and medium-sized enterprises through digital transformation. The support program is set at EUR 21.5 mill. (CZK 550 mill.)¹.

It is necessary to take into account that the subsidies are usually intended as a support for the Czech applicants (mostly end-users, e.g. production and service companies) and not for the (Austrian) suppliers. On the other hand, there is no hurdle for foreign suppliers to take part in tenders related to subsidized projects.

The subsidies, especially the ones co-financed by the EU, have different conditions that have to be met. For the applicants in programs that support the financing of hardware (e.g. new machines and other technical equipment for the production) usually a company registration in the Czech Republic is required. Some programs do not require a company registration in Czech Republic but do recommend a previous registration in a list of potential suppliers in order to participate in a tender. We recommend to discuss the eventuality of EU project financing with your potential customer and check the conditions of the particular program.

The [AußenwirtschaftsCenter Prag and its office in Brno](#) can provide you with further support and information about subsidies and tenders in Czech Republic.

¹ Exchange rate EUR 1 = CZK 25,44 (May 2021)

4.3 Supporting Entities

In the Czech Republic, there is a large number of entities that work to support digitization at various levels from national to local.

4.3.1 National Level

The **National Centre for Industry 4.0** is an open academic-industrial platform that connects more than 50 innovation leaders, universities, companies and trade unions, whose goal it is to jointly contribute to the development of Industry 4.0 in the Czech Republic. The center is trying to contribute to the implementation of Industry 4.0 principles in the Czech Republic with focus on small and medium sized companies. Educating about the Industry 4.0 and Society 4.0 concepts and providing information about technological solutions is also a task of the center. More info <https://www.ncp40.eu/>

In addition to that, a new national network of **European Digital Innovation Hubs (eDIH)** is currently being formed. It is planned to play a crucial role in the promotion and implementation of digitization activities throughout Czech Republic. The candidates for the European Centers for Digital Innovation (eDIH) from the Czech Republic comprise of the following:

BRAIN FOR INDUSTRY

BRAIN FOR INDUSTRY (B4I) was created as a support tool to enhance the competitiveness of business through the introduction of digitization, new technologies, and artificial intelligence in business. B4I services target mostly small- and medium-sized enterprises. They provide their clients with institutional, knowledge-based, and infrastructural support. More info <https://www.brain4industry.cz/en/>

CYBERSECURITY INNOVATION HUB

The Cybersecurity innovation hub is a non-profit network organization which creates a multidisciplinary ecosystem of research institutions, governmental bodies, clusters and private companies focused on the cooperation, information sharing, research and implementation of cutting-edge technologies in cybersecurity. More info <https://www.cybersecuritydih.cz/>

EDIH NORTHERN AND EASTERN BOHEMIA

This DIH enables SMEs to access key knowledge, software, technology platforms, prototype solutions and test systems, in order to improve their business processes and to enable the production of high value-added products, while supporting the development of a knowledge-based economy. More info <http://www.jvtp.cz/en/about-us/our-projects/south-bohemian-digi-hub.html>

EDIH CTU (Czech Technical University in Prague)

The EDIH CTU (Czech Technical University in Prague) specializes in the use of artificial intelligence (AI). In this area, the best institutes at CTU have joined forces to provide its services to both small and medium-sized enterprises and companies engaged in AI development. More info <https://www.ciirc.cvut.cz/>

EDIH DIGIMAT

This hub develops and implements digital technologies in manufacturing companies and coordinates educational activities. In addition, it also connects Czech manufacturers with experts and helps create new projects in the implementation of digital technologies. More info <https://www.dih-digimat.cz/en/>

EDIH OSTRAVA

The National Supercomputing Center, a research institute of VSB (Technical University of Ostrava), together with the Moravian-Silesian Innovation Centre share their know-how through the "Digital Innovation Hub Ostrava". The specific expertise of the hub consists in the use of high-performance computing, big data analysis and artificial intelligence. More info <https://www.it4i.cz/en/industry-cooperation/digital-innovation-hub-ostrava>

4.3.2 Regional Level

At the regional level, there is also a number clusters, regional chambers of commerce, innovation centres and associations that give support for the implementation of Industry 4.0 technologies.

INDUSTRY CLUSTER 4.0

The INDUSTRY CLUSTER 4.0, z.s. is a cluster of engineering and IT companies associated in order to strengthen its competitiveness and innovation activities in Industry 4.0. Its activities are divided into the areas of advisory, consultancy, education, business development and networking.

Every year, the cluster organizes an international conference, which presents successful examples and global trends in Industry 4.0 as well as B2B networking. More info <https://ic40.cz/?lang=en#section=cluster>

NETWORK SECURITY MONITORING CLUSTER

The Network Security Monitoring Cluster (NSM Cluster) is a cooperative industry group focused on computer network security and ICT security. The NSM Cluster has 21 members together with Masaryk University in Brno. More info <https://www.nsmcluster.com>

BRNO REGIONAL CHAMBER OF COMMERCE

A significant player at the regional level is the Regional Chamber of Commerce Brno, which works closely with INDUSTRY CLUSTER 4.0 and focusses its activities mainly on Industry 4.0., cyber security and sustainable business. More info www.rhkbrno.cz

SOUTH BOHEMIAN CHAMBER OF COMMERCE

Also the South Bohemian Chamber of Commerce offers multiple supports options. More info <https://www.jhk.cz/>

JIC – SOUTH MORAVIAN INNOVATION CENTRE BRNO

JIC aims at coordinating and supporting businesspeople in the South Moravian region. It runs two daughter companies with 70 employees. More info www.jic.cz

MORAVIAN-SILESIA INNOVATION CENTRE OSTRAVA

MSiC plays three key roles in the Moravian-Silesian Innovation Ecosystem:

- coordination of the Regional Innovation Strategy and implementation of its programmes and activities;
- individual business support services for start-ups and SMEs;
- administration and development of the technology park.

More info <https://www.ms-ic.cz>

CENTRAL BOHEMIAN INNOVATION CENTER (CBIC)

CBIC supports research, development and innovation in Central Bohemia and establishes partnerships and collaborations between businesses and academia.

CBIC contributes to the growth and development of innovative, mainly small and medium-sized businesses, and strengthens the competitiveness of Central Bohemia within the Czech and global economy. More info <https://s-ic.cz/en/o-sic/>

CZECHINNO

The goal of CzechInno is the development and support of innovative processes in companies as well as providing information in the field of science, research and innovation and related services. More info <https://czechinno.cz/>

4.3.3 Universities and R&D Institutions

Czech Institute of Informatics, Robotics and Cybernetics (CIIRC)

The Czech Institute of Informatics, Robotics and Cybernetics (CIIRC CTU) is a university institute of the Czech Technical University in Prague (CTU).

The CIIRC CTU became the center of support for Industry 4.0 and the headquarters of the National Center for Industry 4.0. Within this center, the first extensive testbed for Industry 4.0 is being developed primarily for the advanced development and transfer of technologies for Czech small and medium-sized companies. More info <https://www.ciirc.cvut.cz/>

Research and Innovation Centre on Advanced Industrial Production (RICAIP)

RICAIP is based on a strategic partnership of the leading Czech and German research institutions. It is a newly established international research center of excellence hosted as a new unit at CIIRC CTU. RICAIP focuses on research areas related to Industry 4.0. The center will connect testbeds in Prague, Brno and Saarbruecken. More info <http://ricaip.eu/home/research-and-innovation-centre/>

Faculty of Mechanical Engineering of CTU Prague

Education and research within the faculty are provided mainly by the Department of Mechanics, Biomechanics and Mechatronics and the Department of Production Machines and Equipment. These departments also boast a specialized study program in Industry 4.0. More info <https://www.fs.cvut.cz/en/home/>

Faculty of Mechanical Engineering of BUT (FME BUT)

The most relevant department of Brno University of Technology (BUT) in the field of Industry 4.0 is The Institute of Automation and Computer Science. This department is also the guarantor of education in the Industry 4.0 program. More info and contact <https://www.fme.vutbr.cz/en/fakulta/struktura/pracoviste/uai>

4.3.4 Networks, Agencies, Databases

Enterprise Europe Network

Enterprise Europe Network provides specialized services aimed raising competitiveness mainly of small and medium-sized enterprises.

The Network activities include expert counselling for entrepreneurs and information on the Single Market, assistance with transnational technology transfer and matching of partners for international co-operation in research and development. The Network also offers advice for protecting intellectual property.

The Czech Republic is represented by a consortium of six partners coordinated by the Technology Centre CAS and is funded by the European Union (Program for the Competitiveness of enterprises and SMEs -COSME) and the Ministry of Industry and Trade of the Czech Republic. More info <https://www.enterprise-europe-network.cz/en/>

CzechInvest

The agency's unique combination of regional, central and international operations ensures the integrity of services and the ability to connect global trends with regional conditions in the Czech Republic.

Its **Supplier Database** offers an efficient tool for finding Czech suppliers and potential partners. It contains standardized profiles of more than 3,400 Czech manufacturing and ICT companies. Suppliers are classified into ten key sectors and further sorted into subcategories. More info <https://www.czechinvest.org/en>

dodavatel.cz

The search engine [dodavatel.cz](https://www.dodavatel.cz) is an effective tool for those who are looking for new suppliers of products and services for their company. From year 1995, under the name WLW, it extended its position as one of the leading B2B search engines on the Czech and Slovak market. More info <https://www.dodavatel.cz/?Lang=en>

Tenders, Public Procurement

Comprehensive information on public tenders can be found on the Public Procurement Portal at www.portal-vz.cz. There, the Information System on Public Contracts offers a list of approved economic operators, a list of systems of certified economic operators and statistical outputs on public contracts.

It order to successfully take part in tenders it can be helpful to get included in these lists. The [AußenwirtschaftsCenter Prag](#) can help you with the process.

Qualification, Certificates

Foreign suppliers are recommended to use the e-Certis information system for better orientation in the documents required to take part in tenders awarded in the territory of the EU. With the help of this system, the supplier can find out what documents and certificates the contracting authority requires. More info <https://ec.europa.eu/tools/ecertis/#/homePage>

5. OPPORTUNITIES

5.1 ICT Devices and Infrastructure

The development of **next-generation Mobile Networks (NGN)** is currently one of the main priorities of the Czech government. To successfully build a digital infrastructure that meets the technology requirements for Industry 4.0, harmonization and standardization in an international context will be necessary. Parallel to building a 5G network there is a long-term strategic plan set up to build a widespread high-speed internet connection. Significant EU funds have been allocated for the construction. In the near future, therefore, there will be a great opportunity to participate in building this infrastructure.

For Czech companies themselves it is currently crucial to build their **internal digital infrastructure for data collection**. Important for the development of **predictive maintenance** methods is the use of intelligent sensor networks and intelligent use of sensor data in SCADA systems. **Sensor technologies** required are:

- **sensors for sensing and measuring shapes and dimensional quantities** using light and optical methods
- **sensors for machine and robotic vision** - optical and optoelectronic image acquisition in 3D and subsequent processing and recognition of image information
- **fiber optic sensors**
- **biosensors** (biochemical methods) applied in the field of chemical composition analysis
- **autonomous sensors** for predictive diagnostics and maintenance of machines

Another highly requested infrastructure is technology for the **identification and localization** of system elements. Among those **automatic identification systems (QR codes, RFID, NFC)** for monitoring stocks, movement of parts and products in the production phases of the life cycle have great potential to be extensively implemented in Czech companies. RFID technologies are now increasingly applied at progressive SMEs, especially at suppliers for the automotive industry. SMEs from other sectors are now focusing mainly on the implementation of QR code identification methods.

Also **RTLS (real-time locating systems)** are being implemented on a broader scale in Czech companies. These systems are designed to digitize movement in the field of intralogistics. However, they are also used in retail, sports, entertainment or agriculture. There are now several companies providing RTLS at very competitive prices on the Czech market, such as **SEWIO** or **EPRIN**.

5.2 Big Data and Data Analysis

In the future, we can expect a great development in the expansion of data storage and cloud computing, both in terms of capacity and in terms of functionality offered. With the development of Industry 4.0, the use of the cloud by autonomous devices (IoT) will increase. Already today there is a great demand for services in the field of **cloud computing and big data processing**.

Different types of cloud services are requested by Czech SMEs: **software as a service (SaaS)**, **platform as a service (PaaS)** and **infrastructure as a service (IaaS)**

Software as a Service (SaaS) using modern cloud sets is applied for all kinds business requirements, such as in project portfolio management, supply chain or general corporate planning

Platform as a Service (PaaS) enables companies to incorporate new features into their applications, including innovative technologies such as artificial intelligence (AI), chat robots, blockchain and the Internet of Things (IoT).

Infrastructure as a Service (IaaS) is used by manufacturing companies in need for more computing storage and network capacity.

Big data and cloud technologies are gradually being used in various segments of the Czech manufacturing industry. There are great opportunities these days especially in the **chemical and foundry industry**, where there lies big potential in **big data mining and analysis** and in **cloud or in-house analytical tools** (using **artificial intelligence algorithms**) for the collected data.

5.3 Advanced Automation and Robotics

The current trend in the field of advanced automation is the equipment of production machines with manipulators, robots and other related technologies, such as 3D measurement equipment or complex, replicable production cells. Whereas production cells were mainly implemented and developed in academic projects in the past they are now also used for daily production purposes. There are several Czech technological companies providing standard production cells.

The company **ACAM Solution** developed a **universal robotic cell** (HXG) that is able to flexibly integrate relevant production technologies (such as machining, measuring, pressing, drilling or welding). It is obvious that this versatility and flexibility (using the **OPC UA standard**) will be a big trend among medium-sized Czech companies, also because it is a standardized, relatively cheap and quickly implementable solution.

Another way how to expand robotics is the business model "**Robot-as-a-Service**" (RaaS). This model allows to share robots, including software, between companies. The connection of robots to the cloud facilitates program sharing, remote simulation and testing of new procedures. Leasing reduces the initial investment requirements and experts needed to implement robots and increases the availability of robots across all industry segments.

The robot-as-a-service business model is emerging in start-ups developing automated last-mile delivery technologies. Large companies that can invest and develop their own technologies do not expect to use these services, but **logistics companies and retailers** with no experience with robotics are likely to be.

Automated production lines for mass production are also undergoing major modernization, technologies for their digital (virtual) and real interconnection and their integration with **collaborative robots (cobots)** are being implemented.

Another opportunity is the application of automation in logistics and warehousing. **Automated trolleys** and **intelligent warehouses** are no longer just the domain of large multinational companies from the automotive industry, but are also beginning to be used in Czech SMEs, also with the help of national subsidy programs.

5.4 New Production Technologies (Additive Production, 3D Printing)

Statistics show that additive technologies account for only 0.7% of total industrial production, but there are five sectors where this share reached already 10-20%: **engineering, aerospace and automotive, consumer goods (especially electronics)** and **medical devices** (implants, hearing aids or prostheses).

A few years ago, the use of 3D printing was a rather exotic matter applied mainly in academic and research or in prototyping. Today, however, 3D printing and additive manufacturing are currently used in a wide range of industries and production phases.

3D printing for hobby purposes is experiencing a **big boom** in the Czech Republic, mainly thanks to the Czech company **PRUSA**, which is one of the fastest growing companies in Europe. This company has made this technology very popular among the Czech society. This trend is slowly seeping into the professional use of 3D printing and it is possible to assume a wide application of these additive technologies in the Czech industry. Analyses show that current customers still make up only a tenth of the total potential of the desktop 3D printer market.

The method of **metal 3D printing** finds application in small series productions of components with complex shapes or in the immediate and flexible production of tools, jigs and fixtures. This can significantly shorten production times by a fraction of investment costs compared to traditional production methods.

3D plastic printing is used mainly in development and construction.

A significant trend is the implementation of **hybrid production machines**, which combine the principle of machining (**subtractive**) and **additive technologies** and are thus able to produce very complex components without complex inter-operational procedures.

Augmented, virtual or mixed reality technologies are experiencing dynamic growth in demand, especially in the areas of service and diagnostics. The COVID-19 pandemic period and the need for remote assistance in machine service or quality management accelerated the use of **smart glasses** or **tablets** in this area.

5.5 Cyber Security

The issue of cyber security will continue to grow in importance, as the number of attempts to steal and misuse data will increase while cloud services expand. Cybersecurity has so far been addressed in the Czech Republic rather unsystematically and only within critical infrastructure, such as energy, health or defense infrastructure. However, with the growing digitization and data vulnerability, now comes the **great need to secure the Czech industry**. Czech companies will be gradually pushed technologically and legislatively to address cybersecurity in a comprehensive manner and to implement Information **Security Management Systems**.

A cyber security polygon **KYPO4INDUSTRY** is now being built in the Czech Republic: It is a testbed for teaching and testing cybersecurity in industrial control systems. In addition, a new legislation is emerging, which will ensure the certification of industrial technologies with regard to cybersecurity. It is anticipated that in the future all technologies will need to meet this certifications at national or European level.

CyberSOC (Security Operation Center) services are currently implemented, allowing companies to easily connect their internal or outsourced infrastructure to professional security monitoring. This service is offered on the Czech market, for example, by the company **AXENTA**.

Another great opportunity will be the application of network traffic monitoring technologies based on IP flows. This technology, which analyzes data flows, is called **Network Behavior Analysis** and, unlike signature-based systems such as anti-virus programs, it is able to detect new or yet unknown threats and attacks. The company **Flowmon Networks**, for example, has developed this technology on the Czech market and is now implementing it worldwide.

An innovating source in the field of cyber security is the **Cybersecurity Innovation Hub** in the Czech Republic. More information www.cybersecuritydih.cz

6. WAYS TO THE CUSTOMER

The Czech market is a very open market with no significant obstacles for entry, especially for companies from the EU countries. The market is very international. Particularly in the main sectors such as automotive there are many companies with a foreign background (e.g. Germany, Austria, Netherlands).

For newcomers there are multiple ways how to get to the customers.

6.1 Czech Market Specifics

When entering the Czech (B2B) market, three main specifics should be taken into account.

Language Specifics

One might assume that in technically specialized sectors English is a widely established language. However this is not always the case in Czech Republic. Especially in the first steps of market acquisition experience has shown that communicating in Czech is a critical success factor and can lower the market entry barrier significantly. Hence, including resources for communication planning and translation is hugely beneficial. Once a business relation has been established, communication on the operational level can usually take place in English or German.

Local Agents

For the companies with no previous experience on the Czech market a cooperation with local partners could be worth considering. The local partner has the market knowledge as well as the necessary contacts to end users. Moreover, an insider could easier know the future investment plans of potential customers. Also in the course of the implementation of the products as well in the after sales service a local partner can play an important role.

If you intend to hire a local person as a commercial agent, please note that there is no such database or organisation of commercial agents in the Czech Republic (like in Austria or Germany). Moreover, many locals would rather prefer permanent employment than working on commission.

Resource Planning

The development of a new market is a long run process, which can bear fruit only if the steps are consistent and persistent. Personal contact within a business relationship is considered to be very important in Czech Republic, which takes time and resources. Newcomers tend to underestimate the small Czech market which can however, given its structure and culture, be rather demanding. Even if sales structures or local partners are already established it is worth to reconsider and allocate enough resources and time.

6.2 Events

The International Engineering Fair – MSV Brno

The International Engineering Fair – MSV Brno is the most important industrial fair in Central Europe, exceeding 1,600 exhibitors and 80,000 visitors every year. More than 50% of the exhibitors and 16% of the visitors come from abroad.

The majority of visitors are professionals. Nearly 80% of those in attendance exert influence on business investment, and one-third form part of the top management of their firms.

All key fields of machinery and electrical engineering industry are represented, with primary focus on machining and forming. MSV's spotlight is the **Industry 4.0** and the **Digital Factory**. Another highlighted topic is the circular economy.

More info <https://www.bvv.cz/en/msv/>

The next MSV Brno: **8.-12.11.2021**

The **AußenwirtschaftsCenter Prague** offers Austrian companies the opportunity to participate at the official Austrian pavilion at MSV 2021. For details, please check our offer - **Maschinenbaumesse MSV 2021**

AMPER Brno

The AMPER Trade Fair is the biggest trade fair in Czech Republic and in Slovakia in the field of electrotechnics, energetics, automation, communication, lighting and security technologies. More than 600 exhibitors regularly attend the fair. More than 40,000 experts, technicians, designers, management of production companies and local government representatives visit the fair.

More info <http://www.amper.cz/en.html>

The next AMPER Brno: **17.-20.5.2022**

The **AußenwirtschaftsCenter Prague** offers Austrian companies the opportunity to participate at the official Austrian pavilion at AMPER 2022. For details, please check our offer - **AMPER 2022 Brunn**

BRNO INDUSTRY 4.0

The international B2B conference about production digitalization and smart technologies for industry is one of the most important B2B events and a unique networking opportunity in the field of Industry 4.0 and Smart Factory.

The event takes place annually at the beginning of the year. More than 400 companies participated in the last year. More information at www.konference.ic40.cz

The **AußenwirtschaftsCenter Prague** offers Austrian companies the opportunity to participate in the form of an Austria Showcase, present their products and services and find new business partner during B2B meetings. For more details, please contact **AußenwirtschaftsBüro Brno**.

On our website you can find [a general overview of our events in the Czech Republic](#).

6.3 Our Service to You

Finding the right customers or distributors in the Czech Republic is a very individual process that depends on many factors. Our offices **AußenwirtschaftsCenter Prague** and **AußenwirtschaftsBüro Brno** will assist you in

- setting up a marketing or sales strategy,
- carrying out market research and
- finding relevant partners.

Do not hesitate to contact us with any question.

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