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CHEMICAL INDUSTRY – TRADITION, EXPERIENCE AND HIGH-QUALITY STAFF

INVESTMENTS OF PHARMACEUTICAL COMPANIES

IMPACTS OF THE PANDEMIC ON THE CHEMICAL INDUSTRY ARE NOT FATAL

PLASTICS INDUSTRY – INNOVATIVE EU INDUSTRY

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2022

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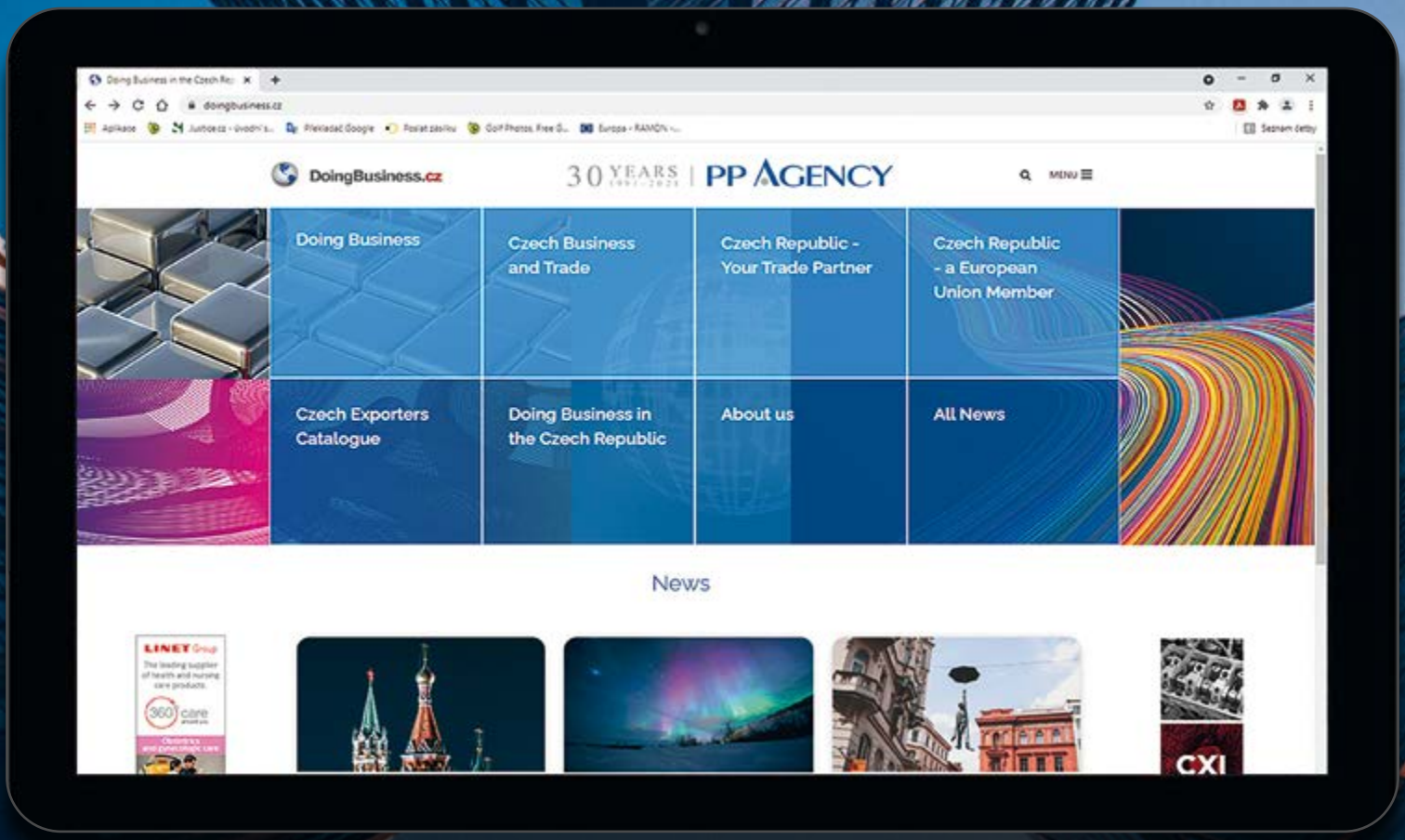

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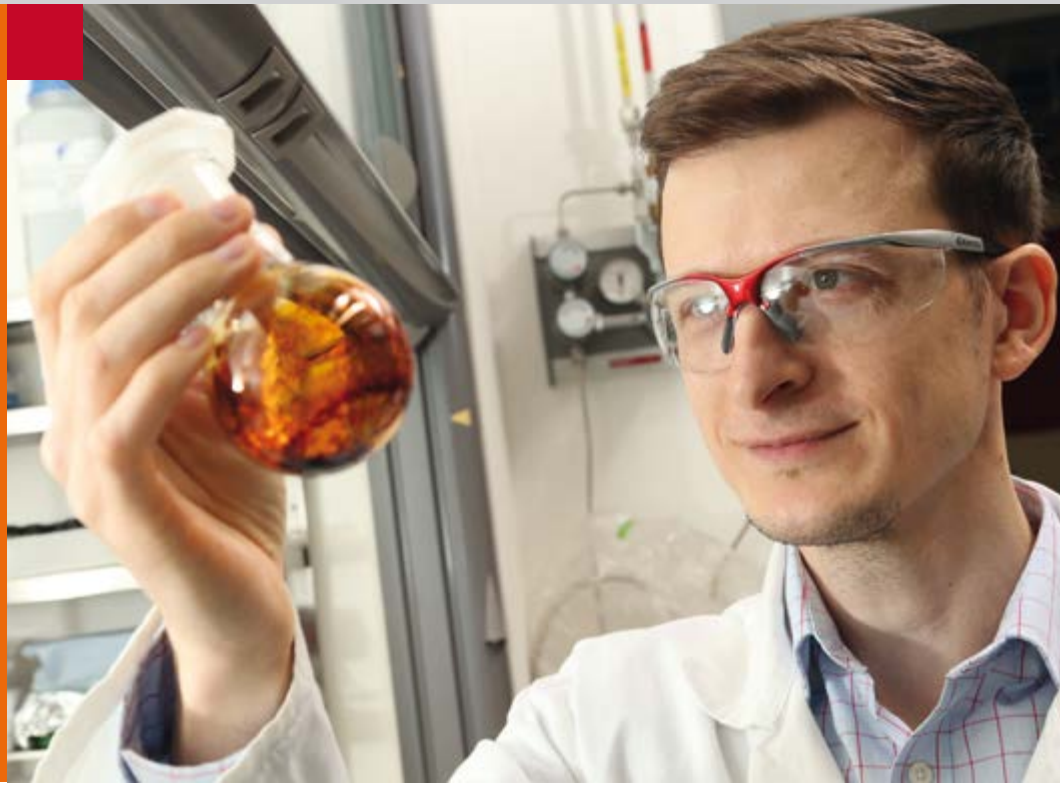
Chemical Industry – Tradition, Experience, and High-Quality Staff

In 2020, the Czech Republic experienced a deeper slump in the chemical industry than it was on the average in the EU. According to the Eurostat, the decline was 5.9 %. "A positive fact is, however, that when comparing November 2019 with November 2020, it can be seen that there was already a recovery by 1.8 % , like in the EU," says Ivan Souček, Director of the Association of Chemical Industry.



In 2020, the performance of the chemical industry, as one of the most important industrial sectors in the Czech Republic, was essentially affected by the COVID-19 pandemic, which had an adverse impact especially on the manufacture of chemicals and chemical products (NACE 20) and the manufacture of rubber and plastic products (NACE 22), due to a significant decline in demand from the downstream sectors and a significant decrease in prices for inputs and for chemical derivatives. What do you see as the current 2021 trends?

The sector is currently experiencing a recovery, with the installed capacities getting back to normal and the market demand renewed up to the usual level. But prices for the materials necessary for realisation of investments and for provision of the development of technologies (steel structures, pipes, building material, machines and devices, assembly works) are going up significantly. In addition, prices for energies of all kinds, no matter whether fossil or "green", are rocketing.

Where do you see the present opportunities or threats in this industrial sector?

Opportunities and threats have rather an individual pattern according to specific products and services. A general factor, which can be perceived both as an opportunity and as a threat, is undoubtedly the "Green Deal". On the one hand, there is the support of "green technologies", aimed at a significant reduction of CO2 emissions and at the achievement of "carbon neutrality" of Europe in 2050. This is undoubtedly an opportunity for the implementation of new technologies and a contribution to the achievement of a real result of the set target. On the other hand, it is necessary to provide competitiveness of the European chemical industry, and not just of the "green technologies", the operating costs of which are still mostly higher than the costs of established technologies. Besides, there is the challenge of emissions' reduction through electrification. But are we going to have sufficient electrical energy? Simultaneously, also other countries of the world are decarbonising and becoming competitors of Europe, while there are countries having significant fossil sources that have built global production capacities and are able to saturate markets worldwide with their products.

What is the biggest drive for the development of this sector on the Czech market?

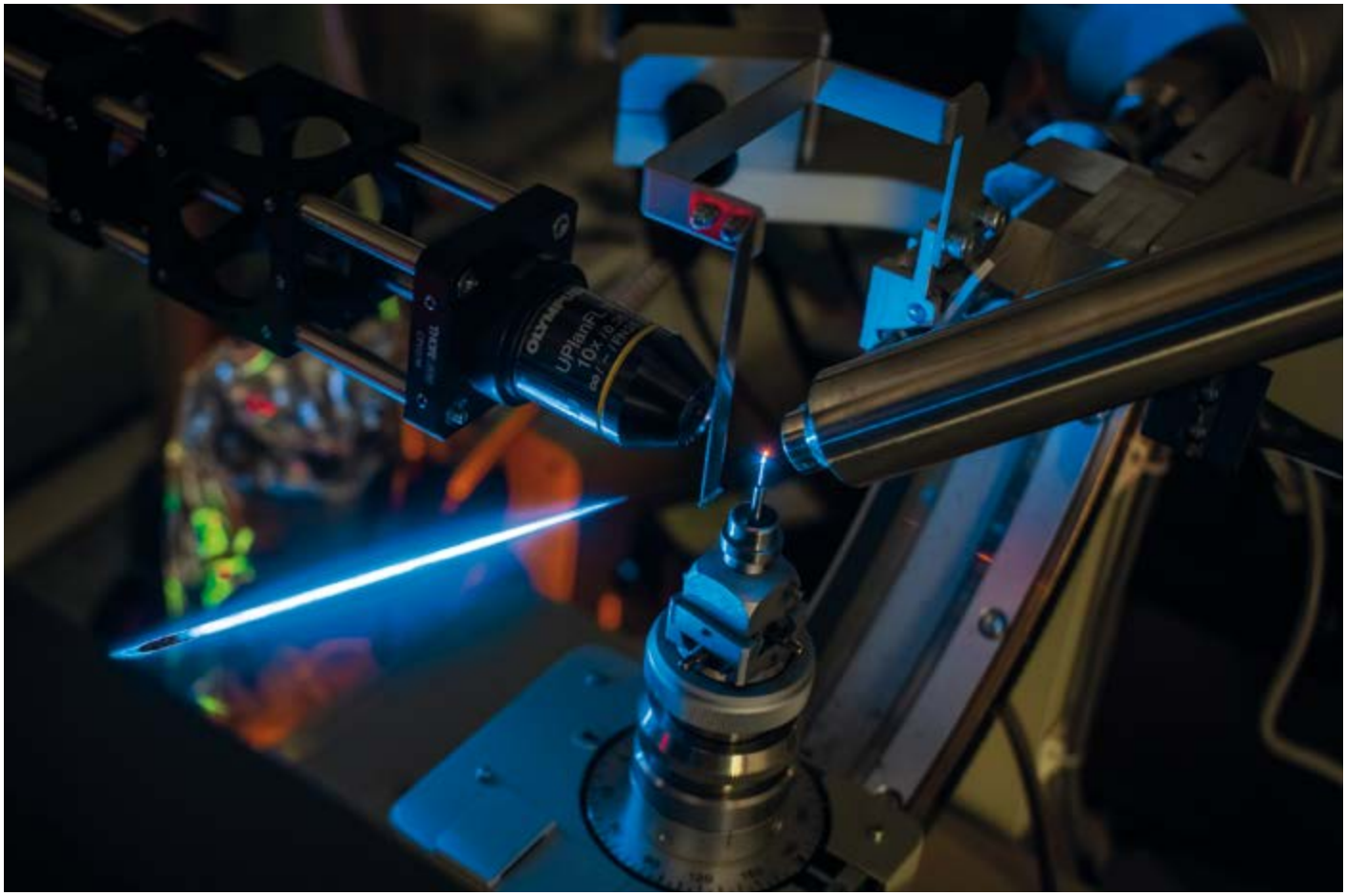
In the Czech Republic, the biggest drives for further development of the sector are undoubtedly the tradition, experience, and high-quality staff needed for the operation of chemical technologies, but in the first place it is the demand (which is true for every industrial sector…). The Czech chemical industry is historically export-oriented, although it still does not have "global production capacities" like "global players", who can afford to build and operate them and allocate them especially in coastal areas.

What other issues are the most topical for the chemical sector?

The "Green Deal" is certainly connected with lots of partial issues, including:

- hydrogen: the chemical industry is a significant producer of hydrogen, but also its most significant consumer (see e.g. the production of ammonia or hydrogenation processes in petrochemical or refining technologies)
- CO2: the trend of decarbonisation is associated especially with a reduction of emissions of greenhouse gases. In parallel, there is the technology of CCU (Carbon Capture and Use). There I can see the biggest opportunity for the chemical industry, so that the emitted CO2 (by the way, emission allowances are currently traded for more than EUR 60 /t) would subsequently be used as

Photo: © ÚOCHB archives, Jakub Stadler



a material substituting (partially) for the fossil sources, with a possibility of the production of derivatives identical to those generated from natural gas or crude oil.

- chemical recycling: waste processing is another opportunity for substitution of fossil sources through the technologies of materials' recycling, including also chemical recycling. This technology, however, also enables the production of alternative motor fuels and energy raw materials with reduced emissions.

In which areas of the chemical industry can you see the biggest potential for exports?

The structure of the Czech chemical industry has been shaped by its strong export-oriented character and the products exported by this industry are precisely the articles connected with the established structure. But the current orientation of the European chemical industry indicates that more attention should be dedicated to specialised chemical products (less-tonnage products with higher value added).

How do you support the engagement of Czech scientists and companies in the research area?

The engagement and collaboration of research institutes, universities and centres of the Czech Academy of Sciences also are traditional. In recent years, state institutions (in our case, this means the Ministry of Industry and Trade and the Technological Agency of the Czech Republic) have significantly extended their potential and created supportive tools for the application of the results of science and research in practice (although some programmes were affected by the COVID pandemic and influenced by promised funds within the framework of the "Green Deal"). What is worth mentioning is the preparation of the next generation of scientists. This year, the Association of Chemical Industry of the Czech Republic is organising the 10th annual contest already, entitled "Looking for the Best Young Chemist in the Czech Republic" for pupils of the 8th and 9th grades in Primary Schools, and the 3rd annual "Let´s Teach Chemistry Attractively" contest for Chemistry teachers. The purpose is to enhance the interest in the study of chemical sciences and, ultimately, to contribute to the cultivation of the tradition of the Czech chemical industry and its further successful development.

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Impacts of the Pandemic on Chemical Industry Are Not Fatal

The Czech Republic is a producer of a wide range of chemical products, including: epoxy resins, PVC, ammonium sulphide, fertilisers, artificial silk, nitrous oxide, caprolactam, ammoniacal gas liquors, commodities and special amines, nitrocellulose, pigments, dyestuffs, sodium hydroxide, and sulfuric acid.

With its considerably large production capacity and R+D programmes, an important role in the Czech economy is also played by the pharmaceutical industry. For example, VUAB Pharma – Antibiotics and Biotransformation Research Institute – focused on the biotechnological production or genetic diagnostics of cancer diseases and on platinum recovery from wastes as an ecology programme within anticancer therapy and Synthon s.r.o., a company engaged in research, development and production of APIs (active pharmaceutical ingredients).
Another strong manufacturing industry in the country is the manufacture of plastic and rubber products. With the car automotive sector being a very important part of the Czech economy, the manufacture of tyres, hoses, V-belts and other rubber and plastic products for passenger and freight vehicles is a key part of the Czech chemical industry.

THE CHEMICAL INDUSTRY INCLUDES THE FOLLOWING THREE AGGREGATIONS:

- manufacture of chemicals and chemical products (CZ NACE 20),
- manufacture of basic pharmaceutical products and pharmaceutical preparations (CZ NACE 21),
- manufacture of rubber products and manufacture of plastic products (CZ NACE 22.1 a NACE 22.2).

In 2020, the sector experienced a year-on-year decrease in the share of its sales in the sales of the whole manufacturing industry from 14.4 % in 2019 to 12.9 % in 2020. A slight growth occurred in the share of its exports, which went up to 10.9 %. Also the share of its employees went up slightly to 11.5 %, but their number in the chemical industry in 2020 dropped, on a year-on-year basis, by 3 114 persons, down to 56 624 persons. Compared to 2019, the share of the added value of the chemical industry in the added value of the whole manufacturing

industry dropped from 14.8 % in 2019 to 13.5 % in 2020.
According to information of the Czech Statistical Office, the 2020 sales dropped significantly - by 19.5 % in the whole chemical industry, by 30.7 % in CZ Nace 20, by 4.8 % in CZ Nace 21, and by 8.8 % in CZ Nace 22. The negative development of sales occurred in the manufacturing industry of the Czech Republic, where the sales dropped by 10.2 % down to CZK 3 080 billion.

FOREIGN TRADE

Compared to 2019, the turnover of the foreign trade in products of the chemical industry in 2020 went up by CZK 151.5 billion, i.e. by 16.4 % up to CZK 1 073.8 billion. In 2020, the foreign

Shares of the aggregations and selected branches of the chemical industry in the selected basic indicators of the chemical industry in the Czech Republic in 2019 and 2020 (in %)

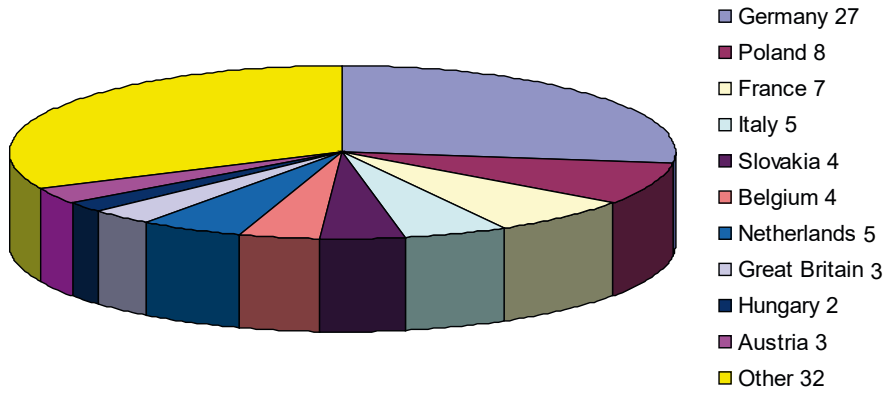
	Sales		Number of employees		Added value		Exports	
Aggregation	2019	2020	2019	2020	2019	2020	2019	2020
Nace 20	50.8	43.7	31.6	31.9	34.9	27.2	41.1	41.5
Nace 21	10.9	12.8	14.5	14.8	17.9	16.7	16.3	17.1
Nace 22	38.3	43.4	53.9	53.3	47.3	56.1	42.5	41.5
In total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Association of Chemical Industry

trade in chemical products developed in accordance with the demand, especially domestic, for chemicals. On a year-on-year basis, export went up by 20.3 %, whereas import rose by 13.7 %, so the negative balance of the foreign trade in chemicals in 2020 dropped by CZK 4.9 billion, i.e. by 3.3 %, compared to the previous year.

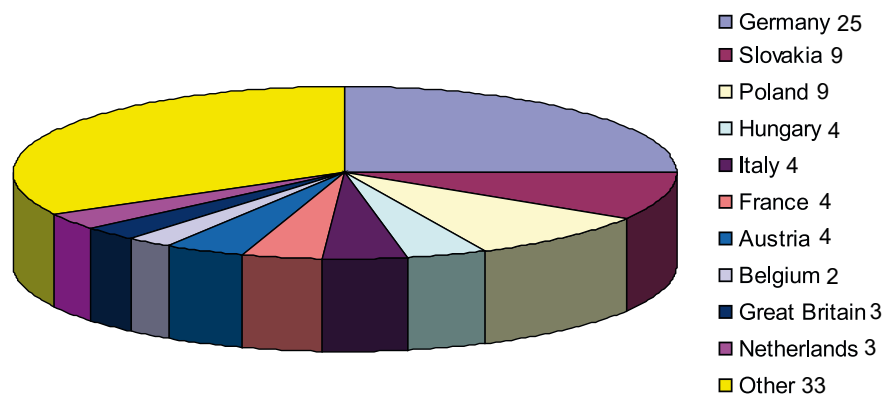
Individual NACE aggregations participated in the total year-on-year export's increase, amounting to CZK 78.2 billion as follows: manufacture of chemicals and chemical products (CZ Nace 20) CZK +33.7 billion, manufacture of basic pharmaceutical products and pharmaceutical preparations (CZ NACE 21) CZK +16.2 billion, manufacture of rubber and plastic products (CZ Nace 22) CZK +28.3 billion. Compared to 2019, imports of chemical products went up by CZK 73.3 billion, with the following participation of all three aggregations: manufacture of chemicals and chemical products CZK +27.2 billion, manufacture of basic pharmaceutical products and pharmaceutical preparations CZK +25.3 billion, manufacture of rubber and plastic products CZK +20.8 billion.

OVERVIEW OF PERCENTAGES OF IMPORTANT COMMERCIAL PARTNERS IN IMPORTS IN 2020



Source: Association of Chemical Industry

OVERVIEW OF PERCENTAGES OF IMPORTANT COMMERCIAL PARTNERS IN EXPORTS IN 2020



Source: Association of Chemical Industry

EXPORT AND IMPORT TERRITORIES

The balance of the foreign trade in products of the chemical industry in 2020 remained still highly negative (CZK -146.4 billion), with the negative balance increased by almost CZK 5 billion compared to 2019.

In 2020, the dominant territory for export and import of products of the chemical industry to the Czech Republic still remained the countries of the EU-28. The share of the EU-28 in the total turnover of the foreign trade in chemicals was very high in 2020, which is a result of the enlargement of the EU by the additional 13 countries in 2004-2013. The EU-28 hold a very strong position in commercial exchanges of chemicals with the Czech Republic. Their share in the total turnover of the foreign trade in products of the chemical industry in 2020 was 80.7 %, with the share of the manufacture of chemicals and chemical products being 80.3 %, the share of the manufacture of basic pharmaceutical products and pharmaceutical preparations being 83.6 %, and the share of

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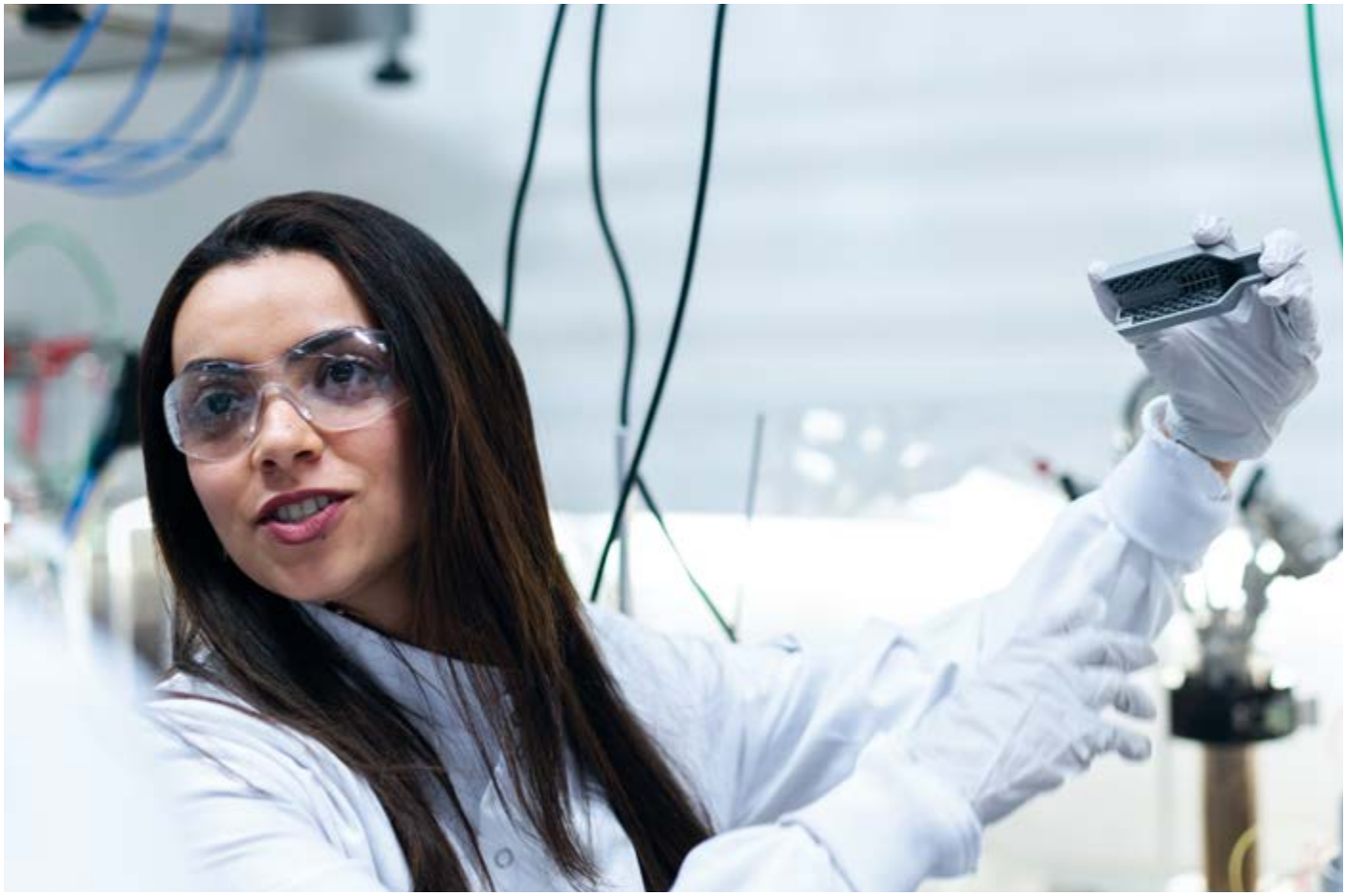


the manufacture of rubber and plastic products being 79.5 %.

MANUFACTURING BASE

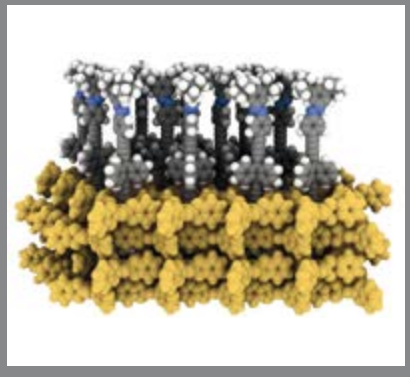
In 2020, the total number of businesses with more than 50 employees in the three aggregations of the chemical industry was 802 entities. Most of them (more than three-quarters) were in the manufacture of chemicals and chemical products (46) and in the manufacture of rubber and plastic products (59). The number of employees was 18 062, with their average monthly wage amounting to CZK 44 128. The rise of average wages in the chemical industry in 2020 copied the development in other sectors of the manufacturing industry, the 20/19 index was 103.8 %.

RESPONSIBLE CARE IN THE CHEMICAL INDUSTRY

Responsible Care (RC) is the oldest voluntary initiative, focused on the care of health, the environment, occupational safety, sustainable growth, and corporate social responsibility (CSR) in the chemical industry. The Association of Chemical Industry of the Czech Republic and its first members committed themselves to the RC principles in 1994, as the 24th national association of the chemical industry. Currently, 65 national associations and more than 200 global chemical corporations are committed to the Responsible Care initiative. In 2018, the Association of Chemical Industry of the Czech Republic received an Honourable Mention at the Responsible Care Cefic Awards, where the main prize in the category of national associations was

Czech Chemical Industry – The Past

An important representative of Czech and European inorganic chemistry was the researcher and pedagogist, Bohuslav Brauner. As a friend of Mendeleev and a supporter of his periodic table of chemical elements and the Periodic Law, he focused especially on noble gases and rare-earth elements. Another Czech chemist, Jaroslav Heyrovský, received the Nobel Prize in 1959 for his work in the area of Polarography and Electroanalytical Chemistry, and Otto Wichterle invented soft contact lenses in the 1960s. In the 1980s, Antonín Holý was a key player in the development of new antiviral drugs, especially those which are most effective against HIV.



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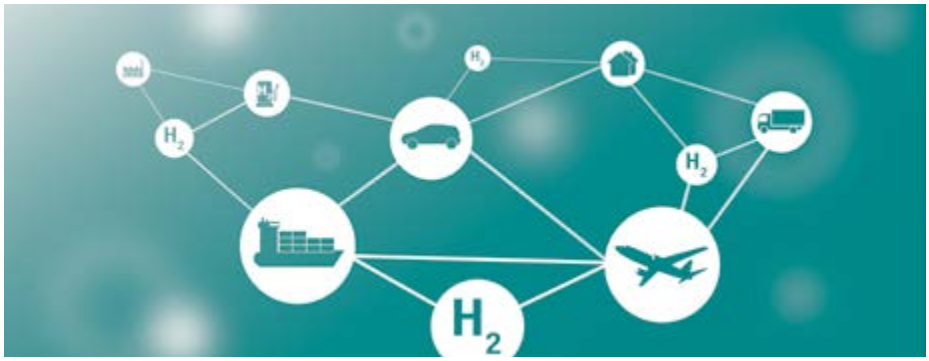

received by the Belgian Esencia, while the Association of Chemical Industry of the Czech Republic, together with the Chemical Association of Great Britain, received an Honourable Mention. At the moment, 90 members of the Association of Chemical Industry of the Czech Republic are committed to the RC principles.
In 2020, this voluntary activity underwent a significant recovery. In the pandemic times, it was not only the fact that the public defences of the right to use the Responsible Care logo had been prepared as planned, but also that an additional 8 entities committed themselves to the RC principles. The Association of Chemical Industry of the Czech Republic became involved in the implementation of the project of the Cefic Responsible Care Rejuvenation and in the testing of the new global tool for self-assessment. Synthomer a.s. and Chemoprojekt a.s. companies were the first to undergo the new procedure of self-assessment in 2019. Last year, another 12 companies underwent the new self-assessment, and now already 18 members of the RC Assessment Panel have obtained their practical experience in this regard. Since 2000, despite increased production, the air pollution has successfully been reduced by 85 %, water contamination has been reduced by 79 %, and the quantity of hazardous wastes intended for disposal has been reduced down to 64 %.

Chemistry Investments

Draslovka Holding is a global leader in chemical specialities on the basis of cyanides and agricultural chemicals, including next-generation fumigants and biocides. Draslovka has gained experience of over 100 years in the production of hydrogen cyanide (HCN) and HCN chemistry, and specialises in the production of fully synthetic and highly purified liquid HCN. Following downstream processing, this is used in multiple industries, notably in mining and agriculture. The company strives to become a leading global player in the production of cyanides for their use in synthesis, mining and industrial and agricultural applications. In summer 2021, it was announced that Draslovka Holding was going to take over the Mining Solutions division of Chemours, an American chemical company, for more than CZK 11 billion. Chemours Mining Solutions operates the largest solid sodium cyanide plant in the world in Memphis, Tennessee, and has a market presence in the USA, Mexico, Canada, and South America. The takeover of Chemours Mining Solutions means the first important investment of Draslovka in the USA and confirms its plans of international expansion. The synergy of Draslovka and Chemours in the area of solutions for mining and chemical specialities, in combination with Draslovka´s recent agreement to buy Sasol's sodium cyanide business in South Africa, gives rise to a supranational enterprise in South Africa. Thanks to this transaction, Draslovka will produce a highly purified liquid hydrogen cyanide (HCN) and special HCN-based chemicals on three continents: Europe, Africa, and America.

Hydrogen cyanide is the key constituent in the product portfolio of Draslovka, so its cheap production significantly enhances the competitiveness of the Group. Customers of Draslovka are, for example, miners of precious metals, rubber manufacturers and manufacturers of chemical specialities. Products of the chemical company can also find use in agriculture – farmers use the newly developed chemicals for the environmentally-friendly treatment of crops and commodities. Every year, Kolín-based Draslovka produces approximately 30 000 tonnes of HCN-based substances, plus approximately 44 000 tonnes of other chemicals. In recent years, its sales have been oscillating around CZK 1.7 billion and the gross operating profit has been exceeding CZK 400 million.

Photo: pixabay.com; ÚOCHB archives

ORLEN Unipetrol is the leading producer of polymers and owns one of the top 5 most integrated petrochemical complexes in Europe. The ORLEN Unipetrol Group is the biggest refinery and petrochemical company in the Czech Republic, where it is also the only crude oil processor. Thanks to this specialization, ORLEN Unipetrol has a unique position on the market and has become an indispensable part of the Czech industry.

It is also the operator of **Benzina ORLEN**, the biggest network of filling stations in Czech Republic. Since its entry onto the Slovakia market in 2019, Benzina ORLEN has been one of the fastest growing chains in Slovakia and currently owns 20 filling stations within its Slovakian network.

Driven by innovation, ORLEN Unipetrol has two of its own unique, state-of-the-art research and development facilities, and ranks among the top 10 biggest companies in the Czech Republic.

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ORLEN Unipetrol

Important Market Players

The Czech chemical industry is historically interwoven. The ORLEN Unipetrol Group is the biggest refining and petrochemical company in Czechia. It is focused on crude-oil processing and on the manufacture, distribution, and sales of fuels and petrochemical products – especially plastic products and fertilisers. In all these areas, it is also among important players on the Central European market. Since 2005, ORLEN Unipetrol has been a part of the Polish group named PKN Orlen, which has been its sole owner since 2018. In 2021, the Group was renamed from Unipetrol to ORLEN Unipetrol. By 2030, the Group wants to invest more than CZK 30 billion in green projects. They include, in particular, decarbonisation, improvement of energy efficiency, emphasis on renewable energy sources, plastic recycling, and the use of advanced biofuels. "We regard our responsibility for the Czech Republic's energy future as one of the pillars of the Czech economy. Although crude oil will be an indispensable raw material for years to come – mainly for the chemical industry – we need to be on the lookout for new, state-of-the-art, and environmentally-friendly solutions now already, to be able to substitute for this dependency gradually," says Tomasz Wiatrak, Chairman of the Board of Directors of the ORLEN Unipetrol Group. As he adds, the Group wants to become absolutely emissions-neutral by 2050.

In the petrochemical segment, the Group is ready to leverage its development potential by producing modern, high-density polyethylene in its new polyethylene unit. Plastic waste recycling will account for up to 15 per cent of the total polymer production.

In the energy segment, ORLEN Unipetrol will continue decarbonising its energy sources. It is gradually replacing the existing coal-fired heating plants with new steam-and-gas facilities and solar sources. Projects of crucial potential include the construction of a new combined steam-and-gas source and a photovoltaic power plant in Záluží near Litvínov.

Production of ethylene, propylene, C4 fraction, aromates and other commodities is used, following downstream processing, in multiple chemical companies throughout the Republic – in Synthos Kralupy, Spolana (also a part of ORLEN Unipetrol), and MCHZ Borsodchem Ostrava. BorsodChem MCHZ is one of two manufacturing facilities of the BorsodChem Group in Central Europe. It supplies a portfolio of products especially of organic, but also inorganic nature. The produced materials find use in the manufacture of polyurethane, rubber, pharmaceutical, agricultural, and food products and water treatment plants. Almost all production is intended for export. They are an important supplier of aniline for the parent company in Hungary. Other products are distributed throughout Europe and beyond, including Asia and both American continents.

What is also worth mentioning is the processing of chlorine and lye and other productions of Spolek pro chemickou a hutní výrobu in Ústí nad Labem. Key players are, however, Synthesia and Explosia, based in Pardubice, and Deza, Precheza Přerov, Lovochemie, and Fatra (these four chemical factories are parts of the Agrofert Group). Agrofert is the second biggest chemical group in the Czech Republic and the biggest producer of nitrogenous mineral fertilisers in Europe.

Photo: ORLEN Unipetrol archives

Global Pressure for Sustainability and Decarbonisation

ORLEN Unipetrol, a petrochemical holding group, has been showing successful results recently. At the same time, the company has been investing a significant portion of the profit in decarbonisation, reduction of energy demands, utilisation of renewable energy sources, plastic recycling, and the use of advanced biofuels. In the next ten years, the company is going to invest CZK 30 billion in similar projects and another CZK 5 billion will be invested in digitalisation, so that the company could become emissions-neutral by 2050 at the latest.

These goals are being achieved with the assistance of ORLEN UniCRE (Unipetrol Centre of Research and Education), which is a modern research centre with top laboratory equipment and erudite researchers. And what is the main idea behind this Centre? To contribute to the better transfer of research results into practice and ultimately to support the development of cutting-edge technologies in the refinery and elsewhere.

KEY ACTIVITIES

The key facilities of ORLEN UniCRE are experimental units, enabling the testing of refinery and petrochemical processes, catalysts, and other processed raw materials. The synergic idea is the direct and organisationally flexible interconnection of research and development activities. Therefore, ORLEN UniCRE works together with numerous research organisations on the solution of important projects. What is also worth mentioning is the very beneficial collaboration with Czech and foreign students in Master´s and Doctoral degree programmes. At present, ORLEN UniCRE is collaborating with universities, e.g. with the Prague University of Chemistry and Technology, Pardubice University and leading institutions of the Academy of Sciences of the Czech Republic, such as with the Institute of Chemical Process Fundamentals. In addition, foreign collaboration in the form of student exchanges has been developing successfully in ORLEN UniCRE.

SPECIFIC PROJECT

In 2021, Orlen Unipetrol together with ORLEN UniCRE put into operation a testing pyrolysis unit for the processing of waste plastics. In the years to come, dedicated teamwill be examining the chemical recycling of plastics and the method of using it in current manufacture. The procedure is intended to help utilise plastic waste more effectively. The ambition of the company is, within the horizon of several years. to recycle waste from the immediate neighbourhood and from the whole of Czechia by a chemical method. This is important, because almost one-half of the plastic waste, the yearly production of which is about 400 000 tons, remains unused due to the high demands of recycling. Pyrolysis – the thermal decomposition of material at high temperatures – is the most interesting plastic waste processing technology, because it provides high yields of liquid products, which can subsequently be processed by applying petrochemical and alternatively also refinery technologies. At the same time, the transformation of plastic waste into a usable material can go hand in hand with the follow-up refining, which will contribute to their higher value. Therefore, the output of the project is the comprehensive design of the technology on an industrial scale, on the basis of pyrolysis for the processing of plastic waste and rubber from tyres, the products of which will be usable in the petrochemical industry for the production of basic chemicals, such as ethylene, propylene, butadiene and benzene. They are used in follow-up processes for the production of the final petrochemical products – polyethylene, polypropylene, polystyrene, etc. In the petroleum-refining industry, the products of pyrolysis will be added to the currently processed materials to increase the production of motor fuels, i.e. petrol and diesel.

ORLEN UniCRE

We are the top research and education centre located in the Ústí region. We carry out applied and basic research in the field of industrial chemistry.

We are focused on:

- efficient and environmentally-friendly production of fuel,
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- sustainable use of renewable raw materials,
- reduction of harmful emissions,
- advanced inorganic materials.

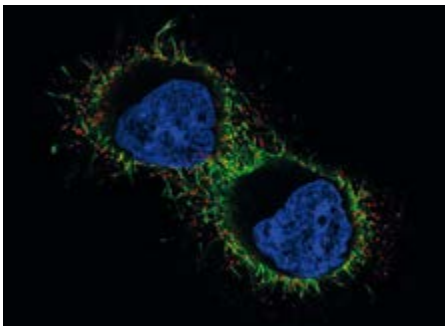
We collaborate with the application sector throughout the Czech Republic. We collaborate with prestigious universities in the Czech Republic and abroad. We educate university students.

Top Chemical Research in the Czech Republic

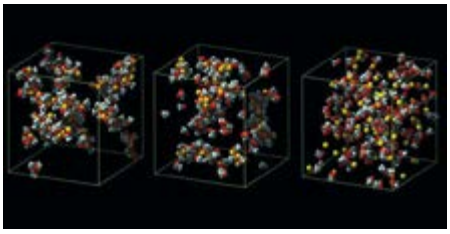
Czech Chemistry, this is not just a traditional production, but it also comprises excellent research carried out across various institutions, companies, research institutes, and universities.

CZECH CHEMIST OF GLOBAL IMPORTANCE

The activities of Martin Pumera, a chemist of global importance, also include the development of chemical nanorobots, which are tiny movable machines performing pre-programmed tasks, such as the implementation of medicaments and the removal of contaminants from the environment. In designing the robots, he draws inspiration from extremely small organisms – bacteria. Although they have no brain, they communicate with each other and can obtain energy for themselves. The robot obtains the fuel for movement through an enzyme able to create carbon dioxide, water and energy from a molecule of sugar; for this purpose, such an enzyme is attached to the body of the robot. But this is not the only way of making the robot move. The robot can also be driven by the photocatalytic decomposition of water on the surface of titanium dioxide, which is normally used as white pigment, or it will start to move due to a slightly acidic substance in the milieu reacting with the "body" of the robot. It always depends on the milieu in which the robot moves and what work task is assigned to it.



To get the right idea about the dimensions of the robot: it is 100 times thinner than a human hair. So, these helpers, invisible to the naked eye, can penetrate even into places where surgeons with normal instruments cannot reach. Martin Pumera is ranked by Stanford University as the 203rd most cited scientist in the world. Besides nanorobots, he is also working on the 3D printing of bacteria and other energy devices.



CHEMISTS HAVE DEVELOPED AN ENVIRONMENTALLY-FRIENDLIER METHOD OF THE FABRICATION OF KEY GRAPHENE

The substance with unique features, important to industry, can be fabricated by Masaryk University researchers much more effectively than usual. Graphene is a carbon form having the height of one atom and an arrangement similar to beehives. The team, headed by Pavel Pazdera from the Chemistry Institute of the Faculty of Natural Sciences at Masaryk University, started this work with graphenoids, thanks to the offer for collaboration with Senergos Company, which was interested in using them in air-conditioning units.

Graphene is manufactured on an industrial scale either by applying the procedure of chemical vapour deposition of carbon on the surface of a copper foil, or, on the contrary, applying the procedure of the thinning of multilayer material to monolayer graphene having the thickness of a single atom. The process leaves behind significantly explosive mixtures and toxic wastes, the disposal of which makes the manufacture very expensive and limits its industrial applicability.

Photo: Ceitec; ÚOCHB archives

Titanium Dioxide PRETIOX

for the best sunscreen

PRECHEZA a.s. is the largest inorganic pigment manufacturer in the Czech Republic. The manufacturing technologies the company uses are based on its own know-how and are compliant with European standards both with regard to environmental protection and application of the best available technology.
PRETIOX titanium dioxide is PRECHEZA's most important product.

UV attenuation products PRETIOX

Provide a high degree of sun protection thanks to its outstanding UV absorption properties combined with low photoactivity in various cosmetic applications.

Are offered in two forms:

PRETIOX NRK

the highly pure, untreated raw material for further customer´s processing.

PRETIOX UVS30

the inorganically surface-treated final product as a direct ingredient for sun protection creams with high SPF and a variety of cosmetic products with additional sun protection function.

PRECHEZA

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Tel: +420 581 252 388 | paints@precheza.cz
www.precheza.cz

PRETIOX NRK / UVS30 products are processed under special technological conditions in order to fulfill the basic principles of the SCCS Opinion 1516/13 - Opinion on Titanium Dioxide (nano form). NRK grades comply with the USP-NF Pharmacopoeia 2021 (UV Attenuation Grade). UVS30 grade is permitted as a UV-filter (Commission Regulation (EU) 2019/1857, Annex VI, reference no. 27) in maximum concentration of 25% and has met both FDA (NDC Package Code: 72681- 583-20) and the HALAL requirements (Halal-ID: C71837). The manufacture of all our products is within the scope of the ISO 9001 certified Quality Management System and ISO 14001 certified Environmental Management System.

In the course of three years, Pazdera´s team have managed to work out and optimise two new procedures of fabrication of the thinnest layer of carbon, with the only waste being water and, possibly, sodium chloride. "One of the procedures is patented by us, but it is not completely environmentally-friendly, because we use acetic acid for it. The other improved procedure is conducted under the auspices of Masaryk University in a non-disclosure mode. This method of graphene fabrication is known to three persons only," said Pazdera. Radoslav Trautmann, Manager of the Centre for Transfer of Technologies at Masaryk University, who is collaborating with the team of Pavel Pazdera in the commercialisation of their work, says that if a company expresses its interest in their know-how, the negotiation with the company is secured through the execution of non-disclosure agreements. "Once we agree upon licence conditions, our know-how can be licensed to the company. And it has another advantage – the patent is valid for only 20 years, but if you protect your know-how cleverly, you can benefit from it for ages."

■ SUCCESS IN APPLIED RESEARCH

Within successful applied research, scientific teams of the Institute of Chemical Process Fundamentals have managed to get more than 20 patents registered. Other patents, utility models and prototypes are continuously being developed within projects of applied research. For an illustration of the successful activities of the Institute of Chemical Process Fundamentals in applied research, several interesting projects are presented below:

Production of helicenes

The Group of Advanced Materials and Organic Chemistry (GAMOS), within a project of the Ministry of Industry and Trade, in collaboration with Lach-Ner s.r.o. as its industrial partner, have solved the technology of the production of various helicenes in multigram quantities. The developed technology was immediately implemented in the production and helicenes are now distributed by Lach-Ner within the Czech Republic and worldwide (http://www.lach-ner.com/heliceny/t-396/).

Recycling of luminofores

Within the research of advanced recycling technologies, a method of the chemical disposal of luminofore wastes from electro-technical devices has been designed. Besides the disposal of toxic components, the process generates precious by-products, yttrium(III) oxide and europium(III) oxide. The design of a production line and its construction in Safina Vestec,a.s. enables the recycling of wastes containing lantanoides. Prospectively, this technology is expected also to be used for recycling of permanent magnets and metal hydride batteries.

Recycling of PET bottle wastes applying microwave technology

The growing production of PET (polyethylene terephthalate) packaging is currently causing problems with the accumulation of discarded PET packaging, especially PET bottles. Most of the unsorted PET bottle wastes are liquidated by incineration in cement factories and similar facilities. For the purpose of the solution of the problem of accumulation especially of PET bottle wastes on landfills, a technology based on the use of microwave energy has been developed. This unique recycling technology has been created within basic research. It uses microwave energy for the depolymerisation of PET materials, such as unsorted PET bottle wastes, as well as of textiles, carpets, and generally any items made of PET materials. An advantage of this technology consists of the fact that it is not necessary to sort PET bottles by colour before processing.
The development of this technology took 6 years and was optimised to 280 l and successfully tested on a 1000 l microwave reactor. This advanced technology is protected

Photo: unsplash.com

by patents, both in the Czech Republic and abroad, e.g. in Germany, France, England, and China, i.e. in the countries where the biggest producers of PET bottles operate.

SUPRAMOLECULAR MATERIALS

Ondřej Jurček from the research group of Professor Radek Marek of CEITEC scientific and research institute at Masaryk University has developed, together with an international team of chemists, advanced and very interesting supramolecular materials which could find use in numerous areas of chemistry. Scientists used bile acid as a basis for the creation of organic building blocks, which can be connected with metal building blocks and together form unique supramolecular metal-organic complexes, which can be further spontaneously organised into even higher systems able to find further use in numerous areas of chemistry.

CUCAM: RESEARCH IN ADVANCED MATERIALS AND EDUCATION OF TOP SCIENTISTS

CUCAM – Centre of Excellence in Advanced Materials specialising in the Design, Synthesis, and Application – was set up at the Faculty of Sciences of Charles University in Prague almost five years ago, due to a generous European project for the support of research excellence. Specifically targeted investment totalling CZK 215 million enabled the establishment of a facility equipped at a top level for the research in advanced materials for practical application. The establishment of CUCAM was based on experimental results in zeolites, which is a very important class of materials for industrial applications.

Other important areas of CUCAM research are materials for optical and photochemical applications. In one part of this research, scientists are searching for crystalline materials, able to convert radiation and to generate new wavelengths that can also be used for laser applications. Apparently most advanced in practical applications is the area of Theoretical Chemistry and Computational Modelling, where CUCAM has a lot to offer to the application area. For the last ten years, Theoretical Chemistry has made enormous progress, which is connected not only with hardware expansion, but mainly with a great breakthrough achieved in the accuracy and effectivity of calculations. In this way, scientists are able to simulate very exactly what is taking place in reality.

ANACOT CAPITAL

www.anacot.cz
www.elfe.cz
www.v-nass.cz
www.triangolo.cz
www.trestles.cz
www.lisatech.cz

Anacot Capital a.s. is a Czech company doing business in the area of acquisitions. At the moment, its portfolio (the portfolio of the ANACOT CAPITAL Group) includes the following manufacturing companies: ELFE, s.r.o., V-NASS, a.s., Triangolo spol. s r.o., Trestles, a.s., and LISA TECH a.s.

The 2020 turnover of all members of the ANACOT CAPITAL Group totalled approximately CZK 2.0 billion (approx. € 79 million) and the consolidated EBITDA was approx. CZK 300 million (approx. € 11.7 million).

Presentation of the Companies within the Concern:

ELFE, s.r.o.

Products of ELFE Firm are used by international suppliers engaged in the areas of oil and mineral extraction (surface mining), gas transport and marine handling and transport equipment. The firm manufactures welded steel structures and engineering units, including final assembly, such as hydraulic components. Drawing documentation and meticulous output control are also part of the process.

Main Facts:

a) business area: welding, CNC working, bending, surface finishing, varnishing
b) foundation year: 1993
c) number of employees: 105
d) share of exports: 98 % (main export destinations: Germany, Norway, the USA, the UK, France)
e) year of incorporation into Anacot Concern: 2016
f) company headquarters: Krnov, Bruntál District, Moravia-Silesia Region, Czech Republic

V-NASS a.s.

V-NASS a.s. is engaged in extra high precision and technologically demanding production of parts of machines for subsea oil extraction, nuclear power plants, and wind power stations.

Main Facts:

a) business area: CNC, NC and conventional machining and milling, TIG welding, heat treatment, grinding, 3D quality control, etc.
b) foundation year: 1917
c) number of employees: 137
d) share of exports: 90 % (main export destinations: the UK, the USA, Malaysia, Brazil, China, Canada, etc.)
e) year of incorporation into the Concern 2016
f) company headquarters: Ostrava-Vítkovice, Moravia-Silesia Region, Czech Republic

Triangolo spol. s r.o.

The company´s core business is customer production and production of small and medium-size production series of forgings. Its product portfolio can be divided into two basic parts: forgings for the engineering industry (manufacturers of building equipment, energy equipment, manufacturing machines, bearings, etc.) and forgings for rail transport (hoops for trams, trains and the underground railway, thrust rings, axles, etc.)

Main Facts:

a) business area: industrial forge (forging, annealing, blasting, refining, machining, etc.)
b) foundation year: 1955
c) number of employees: 110
d) share of exports: 85 % (main export destinations: Germany, Slovenia, Spain, Slovakia)
e) year of incorporation into the Concern: 2017
f) company headquarters: Hulín, Kroměříž District, Zlín Region, Czech Republic

TRESTLES, a.s.

Purely Czech, prospering and globally oriented manufacturing company, whose primary activity is large-series metalworking, mainly the manufacture of screwless racks, handling equipment, construction stands, transport carts, and other specific metal products.

Main Facts:

a) business area: metalworking and surface finishing (manufacturing of shelves, shelving systems and storage systems, trestleses, sack trucks, stands, handling equipment, carts, building vehicles, etc.)
b) foundation year: 1994
c) number of employees: 410
d) share of exports: 95 % (main export destinations: Germany, Austria, Poland, France, Spain, Denmark, the UK, Sweden, the Netherlands, Croatia, Switzerland, Russia, Israel, Canada, and the USA)
e) year of incorporation into the Concern: 2020
f) company headquarters: Dětmarovice, Karviná District, Moravia-Silesia Region, Czech Republic

LISA TECH a.s.

A company engaged in the development, manufacture, and sales of production lines for the manufacture of boards from separated municipal wastes. Thanks to our unique technology, we are able to process the waste products to make functional boards, widely usable in many industrial sectors; due to their features, they can serve as a substitute for plasterboard, chipboard and OSB boards.

Main Facts:

a) development and manufacture of production lines for processing of municipal wastes – manufacture of boards for industrial use
b) foundation year: 2021
c) share of exports: 90 %
d) year of incorporation into the Concern: 2021
e) company headquarters: Ostrava, Ostrava District, Moravia-Silesia Region, Czech Republic

SPOLCHEMIE – Producer of Tailor-made Epoxy Solutions

With its more than 165-year track record, Spolchemie is one of the oldest global producers of chemicals. It is a leading European manufacturer of epoxy resins and special systems, potassium hydroxide and sodium hydroxide, chlorine derivatives, and other chemical products.
The company's long-term success and growth are based on its strong and vertically integrated manufacturing, invetments into innovative technologies, and the capacity for high-quality research and development. Thanks to these strengths, Spolchemie is also the holder of numerous patents and certificates, with more than 80 % of its production being exported to over 60 countries worldwide. "Our unique epoxy systems live up to the highest expectations of customers from all over the world, meeting the strictest norms of chemical legislation, and are sustainable in relation to the environment," says Lukáš Bartek, Director of SBU Speciality Solutions.

The rapid development of the market of special epoxy systems in Europe, in the first place in sectors such as energy production from renewable sources, electrical engineering & electronics, construction and transportation, provides a great opportunity for Spolchemie to penetrate this market. Can you specify what makes your systems so unique?

Since 2020, we have been witnessing the very dynamic development on the market of epoxy resins. Epoxy resins constitute one of the pillars of our manufacturing and commercia activities, with epoxy resins and speciality systems making up two-thirds of the turnover of our company. Besides our top-quality basic epoxy resins, we also supply custom developed special epoxy resins, which have excellent and unique properties and are widely used in numerous applications, ranging from high-voltage transformers, printed circuit boards in electronics, special floors in hospitals, windmill blades, special adhesives in cars, up to ultralight composites in transport vehicles of the future. These systems meet the most demanding criteria of leading global manufacturers for quality, useful life and sustainability.

Your top-quality production is based on your own research and development, technical servicing, human skills and the long-term experience of chemists. In this regard, you can also provide customised solutions….

Yes, Spolchemie is one of the companies having a high share of employees in research and development. Let´s mention our subsidiary company Synpo a.s., which is an accredited institute focusing on testing resins and coatings and, at the same time, is one of the main R&D hubs of Spolchemie. Concentrating an innovation pool, it is engaged in the development of advanced materials and, in collaboration with other research centres and manufacturing units, it brings them into life. This unique symbiosis of research, development and production enables us to offer our customers a holistic solution, i.e. the creation of products according to their individual needs. Moreover, the accredited laboratories of Synpo enable customers to obtain independent certifications and important application data. In this way, the activities of Spolchemie can be directed at those areas that are experiencing rapid growth, are highly specialised and provide a high added value. We offer our clients not only top products, but also testing and consulting; we are the holder of numerous certifications. Moreover the uniqueness of our epoxy resins and their "green" source open up the possibility for the company to gain access to customers whose main priority is sustainability and the protection of the environment. We always try to be a step ahead of the competition with our unique products and holistic solutions, and using our strengths to grow in innovative applications.

You have said that your goals also include the sustainability of your products….

We perceive the sustainability of products as one of the features that already is and in the future will play an increasingly important role in customers' choice. Compared to the conventional epoxy producers, we

do use renewable materials instead of fossil ones. Our epoxy resins, made of glycerine, burden the environment significantly less than conventional epoxides made of crude oil, which has repeatedly been confirmed by life cycle analysis (LCA). Similarly, also for another group of products, alkyd resins, we strive to keep the contents of natural oils high and the contents of volatile organic compounds low. Our environmentally-friendly products help our customers to reduce the carbon footprint of their end products and other impacts on the environment.

What about Spolchemie and foreign markets?

Spolchemie is the second oldest chemical company in the world. Since its foundation in 1856, it has been an important manufacturer, not only in Czech, but also in Central European comparison. Today, it belongs among the most important Czech exporters and, in the field of epoxy resins and special systems, Spolchemie is an important global player. 80 % of our production is exported to more than 60 countries worldwide. Besides traditional Western European markets of speciality epoxy resins (Germany, France, Italy, Spain, Holland), we have also succeeded in growing on the demanding markets of Russia, Turkey, North America and Asia.

How do you see the present situation in your sector?

The market is and, in the near future, will be influenced by the lack of raw materials, by the growth of energy prices, and by increasingly stricter legislation. The European GREEN DEAL initiative will also significantly influence the future trends of the industry and the behaviour of manufacturers within and outside the EU. Decarbonisation, the circular economy, as well as the rollout of electric and hydrogen mobility, the transition to smart communication and housing mean not only a challenge to us, but also an enormous opportunity for growth.

And the future?

After a series of commercially strong years, topped by an extraordinary year 2021, the main priority of the company in the future, too, will be growth on the markets and in innovative applications, effective utilisation of manufacturing capacities, modernisation of the existing manufacturing assets, and investment in advanced innovative technologies both in production and the R&D.

Explosia Has Entered Its Second Century

It celebrated a hundred years of its existence, underwent a stabilisation period and paid record-breaking bonuses to its employees. This is a summary of the year 2020 in Explosia, which is an important commercial company not only inside the Czech Republic, but also within Europe and beyond its borders.

Fully combustible modules belong to the main articles of Explosia.

Semtex is a synonymum for a plastic explosive worldwide.

Portfolio of products of the well-known manufacturer of explosives consists of four basic product groups – explosives, propellants, special products, and modular charges. Just Bi-modular charge system for 155 mm cannons are contributing to the success of the company for the most part. "Of course, we do not want to disclose specific figures, but we can say that the modules accounted for approximately 30 per cent of the turnover of the company," explains Radomír Krejča, Chairman of the Board of Directors of Explosia.

Fully combustible modules, by the using of which the ammunition can be swept away from the canon, were exported in the first place to Slovakia and to Poland. Czech army have already decided to switch to NATO weapon system of canon howitzers and Explosia is prepared to join the project of modernisation of the Czech army. However, other countries of the EU and outside the EU are at play, too.

A significant part of the turnover was attributed to smokeless powders, selling excellently at the moment, which is what Explosia wants to take advantage of. "We expect this boom, especially caused by the increased demand on the American market, to last a year or two, so we are striving to utilise our manufacturing capacities at maximum and to contract such an amount of trades that makes sense to us," adds Radomír Krejča.

An important part of production of Explosia is formed by plastic explosives, including the best-known Semtex, which are popular for example with military or police corps thanks to their quality and reliability.

Photo: Explosia archives



fillamentum

addi(c)tive polymers

Fillamentum Manufacturing Czech is a fast-growing innovative company and number one in production of high-tech 3D printing filaments, worldwide. It is a part of Plastic cluster and proudly cooperates with universities and well-known chemical companies. The company brings trends in 3D printing, it is a part of Industry 4.0 revolution, implements automatization and robotization.

Filaments

Fillamentum	Fillamentum Industrial
ABS	CPE CF112 Carbon
ASA	Fluorodur
CPE HG100	Flexfill PEBA 90A
HIPS	Flexfill TPE 90A
PLA	Flexfill TPE 96A
PLA Crystal Clear	Flexfill TPU 92A
Timberfill	Flexfill TPU 98A
	Nylon AF80 Aramid
	Nylon CF15 Carbon
	Nylon FX256
	PC/ABS
	PP 2320
	Vinyl 303
Fillamentum forNATURE	NonOilen

Services

CAD SERVICES AND SETTINGS

3D PRINTING

CONSULTATION

Guaranteed Quality

Fillamentum has its own R&D department, which makes this brand a guarantee of quality. This is supported by the fact that the company won the prestigious 3D Printing Industry Awards in 2021 in the Material Company of the Year category.

Emphasis on Sustainability

Fillamentum has become a micro-trend setter in sustainability in 2021. This is because in March 2021 it launched NonOilen - the first 100% biodegradable filament for 3D printing. This product has been developed thanks to a long-term collaboration with the research team of prof. Ing. Pavel Alexy, PhD. from the Slovak Technical University in Bratislava. Thanks to this product, the idea of Green Prototyping was also created, which is aimed at socially conscious customers, especially from the engineering and automotive sectors - more about NonOilen can be found at www.fillamentumnonoilen.com

Distribution

The Fillamentum brand distributes its products to more than 62 countries worldwide. This fact made Fillamentum The Best Global Exporter in Export prize DHL Unicredit in 2018. All official distributors can be found at fillamentum.com/distributors.

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www.fillamentum.com

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Innovations in Pharmaceutical Industry Are What We too in the Czech Republic Can Implement

In the Czech Republic, as in most developed economies, the pharmaceutical industry is one of the most dynamic sectors. Its products, manufactured with the application of chemical and biotechnological processes, serve especially human and veterinary medicine. "Every other medicinal product sold in the Czech Republic is a generic drug. Looking at the market as a whole, including OTC medicines, it can be said that 70 % of packs of medical drugs consumed in the Czech Republic are generic drugs. Generic drugs are forcing innovative companies to reinvest in research, to come up with something new, with which they can make themselves outstanding and where they can generate new revenues and profit. That is why I say that innovations are driven by generic drugs," says Filip Vrubel, Managing Director of the Czech Association of Pharmaceutical Companies, about the situation in the Czech pharmaceutical industry.

In 2021, you became the Director of the Czech Association of Pharmaceutical Companies (ČAFF), associating the main manufacturers of generic and biosimilar drugs in the Czech Republic. Your top priorities include the enhancement of the image of the generics industry within the Czech healthcare system, the active support for a stable business environment with the focus on sustainable regulation of drug prices and reimbursements, as well as the smooth implementation of the targets of the Pharmaceutical Strategy for Europe in the Czech Republic.

What else are you going to concentrate on at the Association?

The main topics with which I assumed my office at the ČAFF include the enhancement of the availability of medical drugs for patients in the Czech Republic, the contribution of our national pharmaceutical industry to the European self-sufficiency in drugs, stability of supplies of drugs and sustainability of the system of the public health insurance. It is connected with the set-up of a more predictable regulation of drug prices and reimbursements, so that the manufacturers are motivated to place new drugs on the market and, at the same time, so that the market remains competitive. We simply want to be a strong partner for the state, for the regulators and for health insurance companies, to contribute with expert analyses and data to the best possible potential of the generic and biosimilar drugs and to the provision of long-term financial stability of the healthcare system.

Our aims are to raise awareness about the benefits of generic and biosimilar drugs, both for the patients themselves and for the whole healthcare system, among layman and the expert public as well.

From the viewpoint of the ČAFF, how is the coronavirus pandemic reflected in your sector on the pharmaceutical market? Is Big Pharma benefitting from the coronavirus pandemic?

The pandemic has influenced the pharmaceutical industry essentially, of course. But I would definitely not say that pharmaceutical companies are benefitting from the pandemic. Rather, to the contrary. For example, companies had to implement extremely strict security measures immediately to achieve the optimal prevention of the spread of coronavirus among employees. The strictest measures were especially in manufacturing premises. Otherwise, the operations could have been reduced, which would have had a fatal impact on the provision of supplies of medicaments to the patients depending on them. At the same time, cross-border deliveries of goods in general got very complicated, which affected the distribution of pharmaceuticals, too.

Photo: unsplash.com

Companies reviewed their production plans and tried to be helpful and adaptable in the complicated situation as far as possible. For instance Zentiva, which is one of our member companies, increased its production when the drugs containing paracetamol were missing on the market, and started to make a new medicinal product on its own, to fill the gap. And such examples were numerous. At the same time, hand in hand with restrictions of the movement of citizens, healthcare provision was restricted, and not only in the Czech Republic. Especially the solution of non-acute problems was postponed. Preventive care decreased a lot, too. And all of this naturally had an adverse impact on suppliers of goods and services, including pharmaceutical companies.
Now, fortunately, the healthcare system is starting to get back to normal. But with the delayed operations and undertreatment, it will still take a long time to catch up.

Is the Czech pharmaceutical market rather generic, or does it prefer original drugs? What is the optimum mix?

Every second medicinal product sold in the Czech Republic is a generic drug. Looking at the market as a whole, including OTC drugs, it can be said that 70 % of packs of medical drugs consumed in the Czech Republic are generic drugs. Generic drugs are forcing innovative companies to reinvest in research, to come up with something new, with which they can make themselves outstanding and where they can generate new revenues and profit. That is why I say that innovations are driven by generics. Thanks to generic drugs, healthcare systems have more money left, which can be used for further investment and development. But also for the enhancement of the availability of medicaments. And this is what we want to concentrate on. After the entry of generics and the essential drop in prices, treatments that used to be expensive and, for the sake of the sustainability of the system, available only to patients with a heavy course of the concerned illness, should become available to a wider range of patients, including those who would not have had access to the original expensive treatment due to strict indication conditions.
The use of generic medicaments leads both to a provable drop of costs of treatments, and to a rise in the number of treated and successfully cured patients.
A comparison to countries abroad in terms of the share of generic drugs on the market shows that we are gradually reaching the EU standards. But in terms of the market share of biosimilar drugs, i.e. the biological drugs registered after the lapse of the patent protection of the original biological drugs, we are still lagging behind. In this regard, there is still a big potential for the Czech healthcare system.

The courage of Czech hospitals to open up public procurement to cheaper biological alternatives is somehow lacking.

What do you see as the biggest problem affecting both the Czech Republic and Europe?

A big problem is definitely the permanent, but not always predictable, pressure of the state to set the price as low as possible. This leads to re-exports from countries with a low, regulated price to countries with a high price, which complicates the situation for manufacturers facing a problem of how to cover the demand on the markets from which hundreds or thousands of packs are being sucked away. The unpredictable regulation causes the risk that many medicaments are not available. In the Czech Republic, such adverse impact of re-exports has been relatively strong in recent years. The negatives of the extreme low prices connected with the increased risk of re-exports are not counterbalanced with any positives for patients. With reductions of reimbursements on the part of the health insurance companies, the share of co-participation of patients in the payment of the price for their medicaments is growing. At the same time, the low profitability is limiting the investments and plans to place new products on the market, etc. So it can be said that the patient is not ultimately benefitting from the pressure to set the price as low as possible.

The pressure to set the price as low as possible may even lead to monopolisation of the market. Last but not least, the low price of medicaments causes modern medicaments to reach the Czech market slowly, as compared with the situation abroad. Although patients may be unaware of this fact in most cases, all of this is happening to their detriment, together with their limited access not just to state-of-the-art therapy.

Another important issue is the public procurement of medicinal products for hospitals. Tenders invited by hospitals are essentially influencing the share of specific medicaments on the market. With such tenders, the guarantee of the volume is completely missing and the diversification of contractors and the tools for minimisation of risks of outages are neglected.

Which companies are represented by your Association? The ČAFF associates companies supplying generics, biosimilars, as well as value-added generics …

At the moment, the ČAFF associates almost 20 pharmaceutical companies, employing more than 4 400 people in the Czech Republic and supplying 119 million packs of medical drugs to the market every year. We represent not only foreign suppliers of generic and biosimilar drugs, but also domestic manufacturers who have their manufacturing plants directly in the Czech Republic. Therefore, the health policy is as important to us as the industrial policy. We are trying to establish a dialogue with the state and with key stakeholders, with the aims of develop-

Photo: Zentiva archives

LA CHÈVRE LE CHATON

le chaton

KOSMETIKA CAPRI

Manufacturer of Original Czech Goat´s Milk Cosmetics Brands

Treatment for healthy and beautiful skin with skincare products made of goat milk

Modern skincare products of Le Chaton® brand, made by Kosmetika CAPRI, a Czech company, provide within holistic skincare:

- anti-ageing care, antioxidants
- skin soothing and hydration
- skin microbiome regulation and nourishment
- treatment for healthy look of the skin affected by psoriasis, atopic eczema, acne, seborrhea, dermatitis and vitiligo
- protective skin barrier function

Kosmetika CAPRI s.r.o. www.kosmetikacapri.cz

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ment of the production in the Czech Republic and provision of sustainability of the healthcare system as well.
Generic companies are not just traders with a purchased unpatented commodity. The modern trend is that many generic companies are innovating such unpatented molecules. They are producing them by applying new procedures, and using the latest technologies. They are developing methods for the achievement of even better comfort and effect of the concerned medicament for patients, e.g. by developing combined medicinal products containing several active substances, or new medicament forms, the use of which provides patients with better comfort and adherence to therapy. This is just the case of the value-added generics. And I am proud that in our country, the Czech Republic, we can also implement such innovations.

Due to the COVID-19 pandemic, in 2020 the generic industry struggled with many problems, e.g. the transport of medicaments and the increased demand for certain types of medicinal products. How do you see the situation in 2021?

This was a very complicated situation worldwide, with the biggest exporters of pharmaceuticals, including China and India, restricting exports of some basic raw materials necessary for pharmaceutical production and interrupting even their own production temporarily, too. Despite such problems, the situation fortunately did not escalate thanks to strict internal rules in the pharmaceutical manufacturing industry and thanks to a sufficient level of inventories. Anyway, this was a warning sign, showing the fragility of the system of supplies. Although the pandemic was ultimately handled without significant outages of pharmaceuticals, this situation made it clear that Europe must work on its self-sufficiency in pharmaceuticals and on the resistance of supplier chains. Our Association hopes that the Czech government will also realise the importance of this topic and bear this fact in mind during the Czech Presidency of the Council of the EU, too.

What do you regard as the biggest challenges of the pharmaceutical industry in the months to come?

Not a long time ago, the Parliament (in September 2021) passed a bill on Public Health Insurance. Although this means the biggest change in the drug policy for the last 15 years, it is focused predominantly on the placement of the most modern medicinal products on the market and on the treatment of rare diseases. In the following months, it will be essential how the new rules will be implemented. We are waiting for new decrees with technical details, and new methodologies. This will indicate in which direction the entry of the innovative medicaments will go.
What is also very important to the whole Europe-wide pharmaceutical industry is the current endeavour of the European Commission to analyse the pharmaceutical market in terms of production and distribution. The industry collaborates both with the Commission and with individual Member States and we are trying collectively to identify ways of strengthening it. We expect that next year already, the Commission will come up with a package of legislative changes, which will be subject to consultations and subsequent approval procedures. The importance of the new regulations may be so significant that they will influence the functioning of the pharmaceutical market in Europe for many years to come.
As far as direct impacts of the coronavirus pandemic are concerned, the most serious problem is seen in the neglected prevention and postponement of medical treatment. According to the latest data from health insurance companies, last year, for example, the total number of oncological patients dropped, but not because of an improvement in the health condition of the population, but due to fewer visits to doctors and the postponement

Photo: Zentiva archives; unsplash.com

of specialised medical examinations that would have helped to reveal the disease in time. This problem does not only concern Oncology. An increase in new neglected diagnoses can be expected across all medical specialisations. Together with the Health Ministry and Association of General Practitioners, we are trying to point this problem out actively and to raise awareness among the Czech public about the importance of the active care of one´s own health, including regular visits to doctors for preventive medical examinations. During the pandemic, almost one-half of the Czech population omitted their preventive examinations! In autumn, therefore, we are going to launch an awareness-raising campaign entitled "Before It´s Too Late", which will draw attention to the alarming figures in the attitude of Czech people to the care of their own health. It is intended to bring them to a proactive approach to their own health before it´s too late. For more information, visit https://www.drivnezbudepozde.cz/

About the ČAFF:

Since 2000, the Czech Association of Pharmaceutical Companies (ČAFF) has been associating the main manufacturers of generic and biosimilar drugs in the Czech Republic and is a member of the European association of pharmaceutical companies called Medicines for Europe. Its main objective is to provide the maximum availability of medicaments for patients in the Czech Republic and the sustainability of the healthcare system. Therefore, it concentrates on the support of the development of generic and biosimilar drugs having the same level of safety and efficacy as the original ones. Thanks to their lower price, however, generic and biosimilar drugs reduce the costs of the treatment significantly, making it available to many more patients. Therefore, the ČAFF is trying to establish a constructive dialogue with representatives of the state administration and healthcare system, payers, physicians and patients about relevant system issues concerning the availability of generic and biosimilar drugs in the Czech Republic. For more information, visit www.caff.eu.

ČAFF Members:

- Accord Healthcare
- Adamed Czech Republic
- DESITIN PHARMA
- Egis Praha
- Ewopharma
- Fresenius Kabi
- Gedeon Richter Marketing ČR
- Glenmark Pharmaceuticals
- KRKA ČR
- Medochemie Bohemia
- Mylan / Viatris
- Oncomed manufacturing
- PRO.MED.CS Praha
- Sandoz
- STADA PHARMA CZ
- Teva Pharmaceuticals CR
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Investments in Research in Pharmaceutical Industry in the Czech Republic

The research of new drugs - clinical trials on new drugs – is a prestigious, demanding procedure run in healthcare centres all over the world, including the Czech Republic. According to the analysis carried out by the EY consulting company, investments of companies in local research went up to CZK 1.9 billion just in 2019, which is an increase of CZK 300 million, compared with 2017.

In accordance with the trends of recent years, most clinical trials are carried out in Oncology and Immunology. However, the nature and the type of clinical trials are essentially changing. New clinical trials are demanding projects focused on personalised medicine, including biological and gene therapy. In this connection, the trials are often transferred to specialised hospital centres.
"The State Institute for Drug Control supports clinical trials. As a regulatory authority, we can´t be directly engaged in the research, but we provide consulting, assistance in elaboration of the documentation, and we organise seminars. We are aware of the importance of clinical trials and of their meaning to patients," explains Irena Storová, Director of the State Institute for Drug Control (SÚKL).

RESEARCH OF MODERN DRUGS

The state-of-the-art medicinal research corresponds with the astonishing development of knowledge about the nature and causes of diseases. "Thanks to the research, we are discovering that diseases which used to be regarded as unified, are actually a complex of lots of different diseases with just a similar denominator. So now innovative medicine is going towards personalised, biological, and gene therapy. The new research is shifting from broad therapeutic areas and from blanket screening to highly specific diagnoses," says Jakub Dvořáček, Managing Director of the Association of Innovative Pharmaceutical Industry (AIFP).
"The analysis shows that in 2019 in the Czech Republic, companies associated in the AIFP undertook 389 clinical trials, 55 % of them were in the area of oncological diseases and immunology," adds Dvořáček https://www.aifp.cz/cs/vyzkum-inovativnich-farmaceutickych-spolecnosti-v-/ - _ftn2. Compared with 2015, there was an increase in both areas. Innovative companies in the Czech Republic also carry out clinical trials on nervous system diseases (39), in the area of cardiology and cardiovascular diseases (39), rheumatology (22), lung diseases (16), endocrinology (17), psychiatry (3) and other areas (40). "In 2019, the number of newly started clinical trials increased, although the total number of research projects dropped, compared with 2017," says Mgr. Zdeněk Dušek, Senior Manager of EY company.

INVESTMENTS OF PHARMACEUTICAL COMPANIES: CZK 1.9 BILLION

Clinical trials are often a very prestigious matter for research teams. "Thanks to clinical trials, patients are receiving the most modern, highly innovative medicinal products many years before their registration; medical teams are in touch with the latest technologies and knowledge in the branch, the healthcare provided to the patients is improving and also the transfer of technologies and knowledge is occurring," says MUDr. Jiří

Photo: Zentiva archives

oncomed

member of medac group

www.oncomed.cz

oncomed manufacturing a.s. is a Contract Development and Manufacturing Organization (CDMO) specialized in aseptic processing of oncology injectables in clinical and commercial scales. The company delivers drugs with highly potent and cytotoxic characteristics used to fight cancer. The production focuses both on small molecules (so-called end-to-end solution) and more innovative drugs based on biomolecules (Fill & Finish service), such as ADCs, HPAPI proteins, mAbs and oligonucleotides.

Despite being established in 2010, oncomed builds on the decades long chemical and pharmaceutical industry heritage. The company is located in Brno, where it continues the long tradition of chemical and pharmaceutical production after the original pharmaceutical company Pliva Lachema. It is a medium-sized company, currently with over 200 employees.

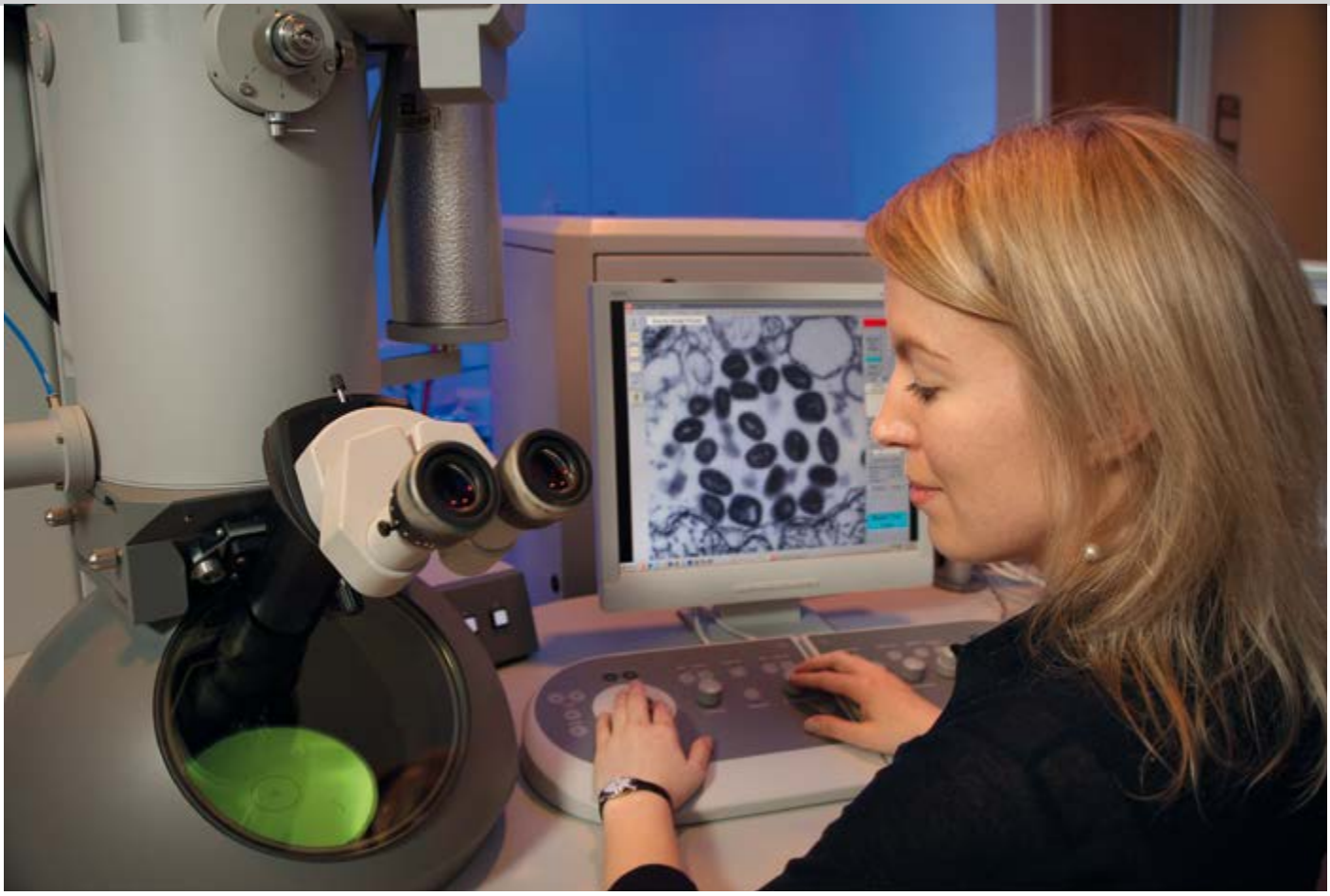
The state-of-the-art technology comprises two production commercial lines dedicated to the manufacture of oncology vial injectables.

Production line 1 uses a conventional clean room concept that allows us to produce batches from 10 to 1,000 liters using a stainless-steel technology. The line features two freeze dryers with shelf area of 17 sqm each. The vial fill volumes range between 1 ml and 200 ml.

Production line 2 uses an isolator concept and allows us to produce batches from 2 to 1,000 liters using a stainless steel or a single-use system technology. The line features one freeze dryer with shelf area of 12 sqm and is equipped with a dual cooling system and a solvent separator to process non-aqueous formulations. The vial fill volumes range between 0.5 ml and 100 ml.

Continuous improvements are an intrinsic part of the company culture and are reflected in our practice. oncomed is keen on fulfilling customers' needs and with regards to that tries to bring new solutions. This approach has resulted into investing in a new line, which will be focused on the production of syringes and cartridges. The line will use a stainless steel or a single-use system technology and its capacity will be more than 100 million syringes/cartridges per year in volumes from 1l up to 500 liters. A dual filling system will feature a time-pressure system and a peristaltic pump with a speed of 600 pcs/min. The syringe/cartridges filling volumes will range between 0.5 ml and 20 ml.

Are you looking for expertise in small molecules end-to-end solution or BIO Fill and Finish? oncomed believes to be your preferable partner for your complex formulations. For additional information about our services, visit our site www.oncomed.cz or contact our Business Development department directly at sales@oncomed.cz.



Škopek, PhD, Head of the Clinical-Pharmacology Unit of Thomayer University Hospital.
Clinical trials require financial funds, of course. Just in 2019, pharmaceutical companies invested about CZK 1.9 billion in clinical trials. From this sum, about 1.6 billion went directly to the healthcare sector, almost 100 million was paid as fees to regulators and ethics committees. In comparison with 2017, this is an increase of approximately CZK 300 million. "In the long run, innovative pharmaceutical companies are among the biggest supporters of clinical research activities in the Czech Republic," says Dušek about the context of the investments.

TRANSFER TO SPECIALISED CENTRES

In the Czech Republic, clinical trials with the engagement of patients can be carried out in healthcare centres only. A big part of the clinical trials is run in the outpatient and small healthcare facilities, according to their therapeutic specialisation. With changes in the nature of the clinical trials, pressure on multidisciplinarity and the increasingly comprehensive and complicated nature of research projects, there is a massive shift to big hospitals and specialised facilities – to the "Centres of Excellence", where highly specialised, concentrated teams, dedicated to clinical trials on a long term basis are set up. Their activities are more efficient, so the total number of research teams is shrinking. Most of the research teams are engaged in clinical trials in Oncology (493), Cardiology (427), and Immunology (415).

CLINICAL TRIALS IN THE PERIOD OF CORONAVIRUS PANDEMIC

Clinical trials in the Czech Republic are considerably heterogeneous – each healthcare centre has different rules, different instructions and the administrative burden on all involved facilities and Project Managers is enormous. Therefore, pharmaceutical companies sometimes approach healthcare centres in other countries, where especially the procedure

before the launch of clinical trials is less complicated and shorter.
In 2022, clinical trials are supposed to undergo a big change – they will be coordinated by Member States within the EU, with the effect of the Regulation (EU) No. 536/2014 of the European Parliament and of the Council of 16 April 2014 on clinical trials on medicinal products for human use. Also this change could bring about a greater interest in the performance of clinical trials in the EU.

Photo: unsplash.com

FAVEA – Stable Czech Company with Unique Technologies

Only a few Czech medium-sized businesses, both in Czechia and worldwide, can be proud of such a wide variety of distinctive qualities. A company that does not make uniform products, and still meets all the quality standards, is a stable, long-term market player, and does not have many competitors. This is FAVEA – the Czech pharmaceutical company, specialising in complete services related to the development, production and registration of health nutrition supplements, skincare products, and food substances.

Since its foundation in 1994 in Silesian Kopřivnice, FAVEA has followed up on the best traditions of the Czech pharmaceutical industry and has taken an enormous step forward. Being ahead in pharmaceutical technologies, it has ambitions to become one of the most important producers of health nutrition supplements in the Czech Republic, as well as in the whole of Europe.
"For 27 years already, we have been following the pathway of innovation, cutting-edge capital investments, and the implementation of revolutionary technologies," says Martina Pavlová, Managing Director of the company.

SECRET OF SUCCESS

Two factories, 100 employees and more than 400 products per year. The production programme of FAVEA includes a wide range of solid or semi-solid dosage forms. The company offers innovative dosage forms, such as double-layer tablets, micro-tablets, pellets, pastilles, functional chewing gums, liquid-filled hard capsules, and probiotics. It is a holder of the GMP certificate, which authorises the company to produce human and veterinary medicinal preparations.
The upswing of FAVEA is an example of entrepreneurial and technological success. In 2003, it launched pelletisation and granulation technologies. In 2007, the company launched the dosage form of double-layer tablets and, two years later, it presented micronisation. Progress has not stopped either during the last four years, when the company launched, step by step, the production of COMBICAPS® – hard capsules filled with a combination of active substances in solid and oily forms.
In the background, there is a large team of leading experts and developers, working on numerous projects in collaboration with prestigious universities.
"To keep us top among competitors, we must manufacture high-quality products, respond to market innovations, and look ahead collectively. The contemporary market of dietary supplements is beginning to diversify and current trends indicate that high quality standards are essential," explains Pavlová.

EMPHASIS ON EXPORT

The company has also started to export pharmaceutical dietary supplements successfully, with customers being partners worldwide. FAVEA successfully exports to markets of the EU, USA, Australia, and Asia. Contractual partners of the company are high-profile pharmaceutical companies, manufacturers of skincare products and food companies. They also receive product adjustment, pharmaceutical formulation development, innovation of the existing product portfolio, and transfers from FAVEA.
"Our long-term wish is that mutual collaboration is always advantageous for both parties. We offer our partners personal approach, flexibility, professionalism, and experience," adds Pavlová.

AND THE FUTURE?

"In the near future, we will concentrate increasingly intensively on personalised medicine, meeting the requirements and demands of individual patients and end customers. Among others, we will place emphasis on the breakthrough of COMBICAPS®– greater awareness of the advantages of this form and ultimately a greater utilisation of the production line's capacity," concludes Pavlová.

VISION
To become a top producer of dietary supplements worldwide.

Emphasis on Ecology and Safety of Chemical Production

ECCOTARP® is a registered trademark of Metal Arsenal s.r.o., which is a limited liability company with a history dating back to 1992. The company develops and manufactures products intended for the ecology and safety of industrial production. The products are highly innovative and based on environmental and technical requirements for industrial production.
What does the company offer? Besides collapsible products serving firefighter teams, it concentrates on the development of products to protect the environment, human health and for money savings in the manufacture, storage and transportation of chemical substances worldwide.

Metal Arsenal s.r.o. – a well-established Czech Family Business

Besides its own R+D, the company has been providing metalworking industrial services already for 30 years, from preliminary design and technological preparation, forming and machining technologies and welding, to powder coating finishing. The main aim of Metal Arsenal s.r.o. has always been the high quality of products and flexibility in the fulfilment of orders. A valuable asset of the company is its staff, who have a great respect for the high quality of their work and the responsibility to customers. Moreover, all members of the staff meet the ISO 9001 requirements and respect all environmental aspects of manufacture.

Intersection of Industrial Application and Integrated Rescue System

In 2010, customer needs inspired the development team of Metal Arsenal to come up with a unique market innovation – ECCOTARP collapsible spill bunds, designed for the capture of hazardous substances that may leak during various accidents. The spill bunds are flexible and come in a variety of sizes. Whereas the collapsible products are designed especially to suit firefighters and for the Integrated Rescue Corps, the customised products are tailor-made for the use, storage and handling of mostly liquid chemical substances in industrial branches such as the petrochemical, manufacturing and food production industries, logistics, the construction industry, agriculture, and other sectors exposed to a risk of contamination of the environment.

Specific Solutions

Metal Arsenal via brand ECCOTARP manufactures large customised spill berms for the capture of substances under storage shelves, foldable drain covers, spill bunds for pallets, sorbent dispenser carts, industrial folding funnels, large-capacity tanks and decontamination spill bunds made of special plastic-coated fabric with a surface finish, and components of steel and stainless steel, designed so as to be resistant to oil, chemicals and acids.
An innovation in the production are electric rollers for fire hoses and the flexible ECCO-Barrier that can be easily assembled on the floor for separation of segments that may contain leaked liquids.
Metal Arsenal continually strives to realise the basic idea of helping to solve problems of the leakages of hazardous substances. Every year, it creates brand new products, which subsequently undergo further enhancements.

Reputation of ECCOTARP Brand

ECCOTARP products are sought after in developing countries, where the trend to protect the environment is on the rise. Thanks to this responsible approach, products of this company are exported to 27 countries, not only in Europe, but also to Asia and the U.S.A. The ECCOTARP brand has already acquired a reputation among the professional public. Products of this company are commonplace in catalogues and websites of the biggest distributors in various countries.

Widening Range of Activities

Thanks to the increasing, continuous demand for ECCOTARP products, Metal Arsenal is widening the range of its manufacturing and commercial activities. In 2021, the company started to build new manufacturing facilities and is also preparing other product innovations, e.g. a collapsible bund for putting out inextinguishable fires in electric cars.

For more information:
Klára Šitavancová
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UCT Prague Relies on Applied Research

The University of Chemistry and Technology, Prague (UCT Prague), as a top study and research centre of chemistry, belongs among the largest educational and research institutions focused on technical chemistry, chemical and biochemical technologies, materials engineering and chemical engineering, the food industry and the environment. "In the long run, the university ranks among 4% of the universities worldwide considered as the best," says Dalibor Vojtěch, Vicerector for Research and Development at UCT Prague.

How are you doing in applied research?
UCT Prague relies on applied research in a wide range of areas, such as the food industry, materials, chemical engineering, water and fuels. Within specific projects, we collaborate with many prestigious institutions, including the Technological Agency of the Czech Republic, the Ministry of Industry and Trade, and the Ministry of Agriculture. Our valuable asset is the fact that we have available accredited labs providing certified analyses. For instance, the Forensic Laboratory of Biologically Active Substances is engaged in the analysis and organic synthesis of various groups of biologically active substances. The Metrology and Testing Laboratory carries out tests and provides consultation and expert opinions in the area of food analysis. Moreover, our Testing Laboratory of the Department of Biochemistry and Microbiology is focused on the microbiological analysis of food and genetically modified microorganisms.

Let´s also mention foreign collaboration…
Yes, for example, UCT Prague is a member of Hydrogen Europe Research and is involved in long-term research projects financed by the Fuel Cells and Hydrogen Joint Undertaking (FCH JU). To explain what this entails specifically: it is a partnership of public and private sectors – among the European Commission, research institutions (Hydrogen Europe Research) and an association of industrial partners (Hydrogen Europe).

And what about the transfer of technologies to UCT Prague?
Our special department for the transfer of technologies is in charge of patents, licences, industrial designs, spinoff and it collaborates with companies from all over the world. We are co-owners of a large number of patents and utility models, registered for protection in the Czech Republic and abroad as well. Worth mentioning are definitely the patents for the Lithium Project, including the method of lithium compounds' extraction and the method of extraction of soluble salts of the rare alkali metals of Li, Rb and Cs from silicate minerals. Methods applied in practice also include the method of preparation of a soluble block copolymer of styrene and olefins and the use thereof, the facilities and procedure for preparation of liquid balls and the production of composites of beta glucan particles, also with incorporated poorly-water-soluble pharmaceutical preparation and the use thereof.

In 2020, UCT Prague managed to improve its position by several ranks in the international 2021 QS Rankings. At the moment, it ranks 342nd in the world and 2nd in the Czech Republic. What are your targets and ambitions for the years to come?
I don't want to exaggerate, but we have the ambition to occupy the 1st position in the world rankings. Nevertheless, in

Photo: UCT Prague archives

the short term, we want to keep our lead among Czech universities, mainly those engaged in research activities within the Association of Research Organizations.

Can you say something about the interesting projects, within the framework of Technopark Kralupy and the University Centre of Litvínov, which enable students to be in extraordinary close contact with the industrial practice of the ORLEN Unipetrol chemical company and the research centre of ORLEN UniCRE?

Let´s mention the CirkTech Centre, which is a part of the Technopark Kralupy you have just mentioned, and which is going to be engaged in the research of advanced mechanical and chemical processes for the circular economy. Its first objective will be to verify its own patented technologies for the extraction of the highly demanded metal of lithium. It has the only high-temperature technology in Europe, also enabling, besides the extraction of metals from waste on slag heaps after hard-rock mining, the production of building materials from waste and the recycling of plastics and electronic waste, including the capture of emissions.
Our collaboration with ORLEN Unipetrol includes participation in a testing pyrolysis unit for the processing of plastic waste. The unit will be used for examination of the chemical method of plastic recycling and the possibility of its implementation in standard production. Its ambition is to recycle the waste, not only from the immediate neighbourhood, but probably from the whole Czech Republic within several years, and possibly also from other locations in Central and Eastern Europe by chemical means. And why is this project so special? Pyrolysis – the thermal decomposition of material at high temperatures – is the most important plastic waste processing technology. It provides high yields of liquid products, which can subsequently be processed by applying petrochemical and, alternatively, also refinery technologies.

What about your collaboration with foreign entities, universities and research organisations?

English is the main language of communication among chemists and this fact makes it possible for us to collaborate with scientists and companies worldwide. Our research in collaboration with concerns abroad, includes, for example, tests for inclination of materials to hydrogen-induced cracking, analytics, ranging from gases to materials, contaminants in food, forensic analysis of drugs, steroids, research of odour traces. What is especially attractive is water recycling, for instance, the removal of heavy metals from water using Ionex technologies, the removal of arsenic using inorganic sorbents and the removal of trace concentrations of organic substances.
Concerning the food industry: safe and nourishing food is the key to a high-quality life and the support of good health, so it is necessary to rapidly accommodate to the food chain that is developing all the time. In collaboration with the European Food Safety Authority (EFSA), we implement numerous projects; we even have our own brewery and technological halls.

It sounds amazing! But that´s not all, is it?

Of course not! UCT Prague is also dedicated to the power sector, and advanced fuels, including hydrogen. We were in at the birth of Pinflow Energy Storage – the technological start-up developing advanced, highly efficient redox flow batteries. The pharmaceutical industry is also not unknown to us. The Parc is a unique research platform, intended for the education of future generations of pharmaceutical scientists and technicians, and it was also created with our collaboration. This very successful initiative has connected growing talents with leading pharmaceutical and academic experts, who work on the acceleration of innovations in the research and development of pharmaceuticals.

Plastics Industry – Innovative EU Industry

The plastics industry is developing rapidly. In Europe alone, it employs more than 1.5 million people. The most widespread technology in this segment is still plastic injection moulding. Innovations are driving production ahead, technologies are being enhanced and the applied materials are also changing. Moreover, plastics' processing, the design of plastic products and their mass production, as well as specialised production, have a long tradition in the Czech Republic.

Photo: BR Group archives

The manufacture of plastics and plastic products is one of the most innovative sectors in the European Union. Changes are influencing all branches, including the healthcare sector. For example, technically clean premises, requiring strict sanitary conditions and antistatic protection, where pharmaceutical products are filled and packed, have switched from the normal white ultra-high-molecular-weight polyethylene to a special material.
The three main segments supplied by the plastics industry are the packaging industry, the healthcare sector and the automotive industry. In a global comparison, the packaging industry is definitely most dominant. In the Czech Republic, plastic injection moulding for the automotive industry ranks as number one. This is because the Czech economy is still strongly tied to Germany, with the related demand for automotive components.

INDUSTRY TRENDS

The present trends of the industry can be seen in three main areas.
The first is the area of polymers. From the environmental viewpoint, plastics are not ideal, but their features, including low density, low energy-demanding manufacture, good insulation and barrier properties, make plastics an excellent material. These facts suggest why the trend has been and definitely will be their recycling. In addition, the applications of biopolymers, nanomaterials, hybrid parts and composite materials with different types of filler will be developed, too.

AUTOMATION OF PLASTICS' MANUFACTURING PROCESS

The second area where the plastics industry is changing are the processes where automation and digitalisation will be extensive. Production of light parts and structures will still be much sought after. Increasingly often, companies will implement zero waste processes and additive manufacturing.
The last area is the area of machinery and equipment, where we currently notice the trend to reduce resources and to integrate intelligent systems of control. At present, customers do not just demand the delivery of the injection moulding machine itself, they want complete manufacturing units. This means that they will order not just the injection

moulding machine, but also the equipment for assembly of the parts.

INDUSTRY 4.0

When several years ago the term "Industry 4.0" started to be heard more often, it was obvious that it would also significantly influence the plastics industry. Several years ago, reverse engineering dominated (deconstruction of an existing product to learn as much as possible about its functionality and assembly), precision components' production was on the rise, and the requirements for electrotechnical components, 3D print or "smart" manufacturing of "smart" products became stricter. In subsequent years, these trends were fully reflected and established in the plastics industry

and they are continuing their further development.

WHAT IS THE FUTURE OF THIS INDUSTRY?

Companies are paying increasing attention to the possibilities of the use of plastic waste as a raw material for plastics' production. For example, pallets and road crash barriers are made from mixed plastics. While, in the past ten years, the development of plastic processing followed two directions: 1) use of materials of better quality and 2) innovations aimed at automation and phasing-out of manual work, now, the main objective is to integrate plastic waste into the manufacturing process. This resource, not yet fully explored, will be the future of plastics' innovations. Actually, each of the global players is trying to work out how to manufacture plastics from the waste. The key question is what exactly to make from it – whether substitutes of synthetic polymers, i.e. bio-polyethylene and bio-polypropylene, or natural polymers, or other substances.

STUDENTS IN THE PLASTICS INDUSTRY

However, without people the plastics industry cannot cope, even with a high level of robotisation and automation. The key to all high-quality staff is, as in any other industry, education. Requirements for education are growing exponentially, with respect to the trends and innovations in the sector. An interest in plastics' processing is also being expressed by universities, e.g. the University of Chemistry and Technology in Prague, Tomáš Baťa University in Zlín, and the Technical University in Liberec, where Plastics' Processing has been incorporated in the curriculum for more than 40 years. The interest of students in this field is still high, e.g. in the accredited study programme named "Technology of Plastics and Composites", covering the theme of plastics' processing comprehensively, from polymers, to technologies and processes, construction of components and forms, machines, additive technologies, to corporate management. Students in Liberec have top-class laboratories available and can participate in research

History of Plastics Industry

■ Mankind already took the first step to plastics in 1870, when the Hyatt brothers in the USA discovered thermoplastic – this was cellulose nitrate dissolved in an alcohol solution of camphor. The injection method naturally also spread to the Czech lands. For example, during the era of the First Republic, the level of the plastics and rubber industries corresponded to the standards in developed European countries. Progress occurred especially in the processing of what were called "reactoplastics", predominantly of phenol formaldehyde moulding compounds, and aminoplastics. The most dominant technology was direct injection moulding, and later, transfer moulding. Manufacturing and processing of thermoplastics were still in their infancy, but they soon became widespread and, after World War II, enjoyed further development.

■ In 1946, the state-owned enterprise, Plastimat in Jablonec nad Nisou, was established, followed by other plastics' producers. Gradually, plastics' injection technology was developed and thermoplastics were also innovated. After 1990, Czech enterprises were catching up with the Western world, with the machinery being modernised and the first contracts acquired for West European customers. Numerous new plastics' businesses were established and built up a global reputation.

projects and engage intensively in industrial practice.

CURRENT SITUATION IN THE CZECH REPUBLIC

In the Czech Republic, there are about 2 500 businesses operating in the area of plastics' processing to final products. About 50 to 60 % of used plastics are recyclable, but only under certain conditions. In the Czech Republic, the pattern of downstream segments for the plastics industry is very similar to the situation in other European countries – in terms of the volume (tonnes) it can be characterised as follows: 40–45 % packaging, 20–25 % construction industry and agriculture, 20–25 % automotive, 5–20 % other (consumer goods, medical, etc.). Proportions of revenues are somewhat different, with respect to the price and value added of the article.

Important Acquisition

The Ostrava BR Group is expanding – it is going to cover almost one-tenth of the Czech plastics market. In 2021, the BR Group bought Montix, a business based in Mohelnice in the Šumperk region, and an important producer of plastic metal-covered parts intended especially for the automotive industry. The acquisition will significantly strengthen the Plastics Division of the BR Group. Montix has almost 550 employees; before the acquisition, the BR Group employed more than 2 200 persons. The BR Group, headquartered in Ostrava, conducts business in the branches of industrial textiles, automotive and light engineering. It incorporates 11 manufacturing companies, including Lanex, Conrop, and Singing Rock, and has branch offices in Slovakia, Poland, and Russia. Members of the Group are also PF Plasty – a plastics' producer from Chuchelná – and IPG Plasty from Milotice nad Bečvou. Last year, the Group generated a turnover of CZK 3.3 billion.

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Explosia offers many types of propellants.

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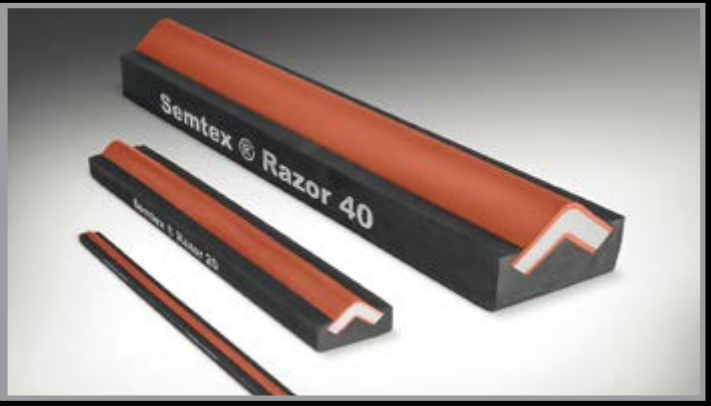

Explosia offers many counter-terrorism products.

The company's offer includes industrial explosives.

Explosia offers many types of propellants.

Bi-modular charge system for 155 mm gun-howitzers.

- Explosia is the traditional and most important Czech manufacturer of explosives with history dating to 1920.
- Explosia offers industrial explosives, explosives for special and military use, black powder, drilling and blasting services, special products for counter-terorism, smokeless powders, etc.
- Explosia is 100% in the ownership of the Czech Republic, it is an independent commercial company with a significant position on the market of industrial explosives.

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