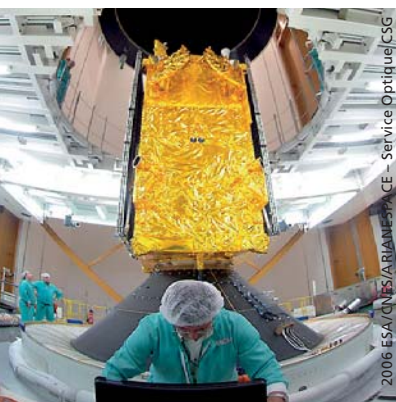


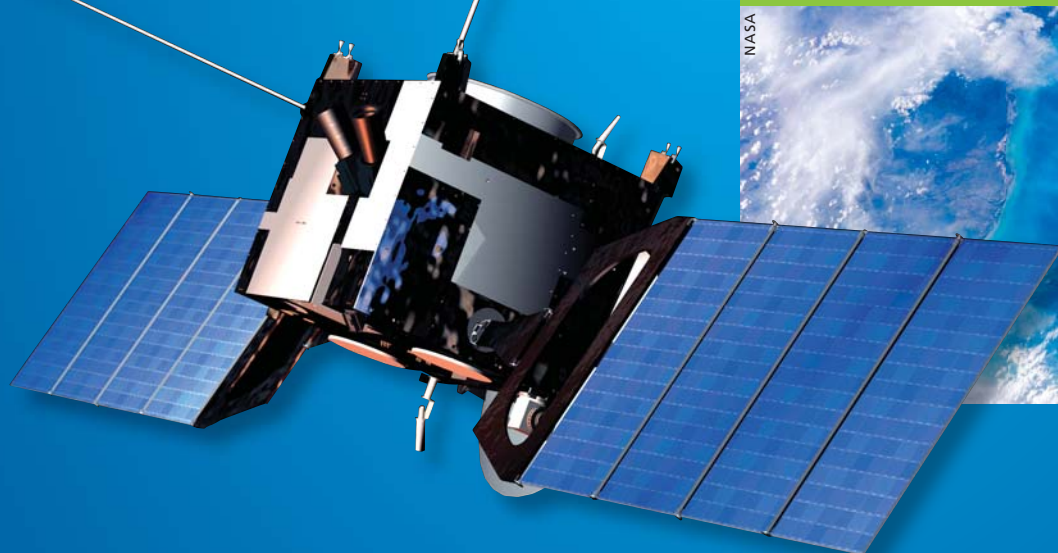
CZECH TRADE PROMOTION AGENCY

World,
Business
& You

CZECH SPACE ALLIANCE



2006 ESA/CNES/ARIANESPACE - Service Optique/CSG
ESA - S. Corvaja



NASA

Illustration by Medialab, ESA 2001

World,
Business
& You

Your Business Partner in the Czech Republic



CZECHTRADE PROVIDES A WIDE RANGE OF BUSINESS SUPPORT AND PARTNERING SERVICES INCLUDING:

- Introduction to quality Czech suppliers
- Assistance with local outsourcing
- Organisation of buyer's visits and meetings with Czech companies
- Trade fair participation support
- Information about doing business in the Czech Republic

CzechTrade delivers free and confidential services to help your company find Czech suppliers and business partners. CzechTrade services represent a reliable and time-saving way of building your business relationships. Our professional staff overseas will assist you in researching purchasing opportunities, identifying business partners and doing business with Czech suppliers of goods and services.

CZECHTRADE WORLDWIDE OFFICES

CzechTrade has a network of offices all over the world. The current list of contact details can be found at www.czechtradeoffices.com.

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Introduction

The mission of the National Trade Promotion Agency - CzechTrade is to contribute to the growth of exports of our clients through professional services. The success of each of our customers in demanding foreign markets is therefore for us not only an important feedback, but also an impulse for further activities and permanent improvement of the quality of our services.

Acknowledgments, which Czech firms achieve in such a demanding and prestigious field such as technologies connected with space exploration, are appreciated by us even more. The success of the Czech Space Alliance within the international projects of the European Space Agency and in the Galileo project is the best example of Czech companies not having to fear even space exploration, though the production programmes of some of them seemingly do not have much in common with it. That is to say even the manufacture of very technologically sophisticated equipment such as rockets, satellites or satellite systems requires also fairly mundane components as long as they are of high quality, and even the most complicated projects need support in the form of common services. Thus space opportunities are not limited only to our high tech companies but rather offer a wider spectrum of applications. The greatest benefit of the establishment of export alliances, which CzechTrade supports, is that small companies, which would individually have a hard time fighting to succeed on the international level, unite to combine their marketing resources and skills. As an alliance they are stronger and can offer a wider range of products, services and know-how as a whole for these international projects. As such their chances of success are much greater.

Please allow me to congratulate the Czech Space Alliance on its achievements, thank it for the existing very good co-operation and wish it lots of luck in future space exploration.



Ivan Jukl
Managing Director of CzechTrade

Czechs in space, ESA PECS and the Czech Space Alliance

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The Czechs have always been members of the space club

Some ancient Bohemian history

The lands on which the Czech Republic is situated are not new to astronomy, space science and space technology. Rather, astronomy and astrology started to thrive here in the middle ages and developed during the Soviet era into a broad spectrum of technologies and scientific disciplines which were in the forefront of space exploration, even if largely unknown in the west.

For example, in the 16th century, Kepler and Tycho Brahe were among a list of scientific personalities who found in Prague the right environment and in the Czech kings good benefactors to support their groundbreaking work. Two of the Kepler's laws were conceived here.

In the 17th century, the physicist and mathematician Jan Marek used pendulum for time measurements, studied light and its decomposition into different wavelengths, mechanics and astronomy. A moon crater is named after him. First quarter of 18th century saw the inauguration of the Klementinum observatory. Its unbroken record of meteorological measurements is one of the oldest in the world. In the 19th century Christian Doppler taught and worked at the Prague Technical University. In 1842 he presented to the Royal Czech Learned Society the results of his investigation into what is now known as the Doppler effect. 70 years later, Albert Einstein was putting the final touches on the theory of relativity in Prague.

20th century history in the Czechoslovak Republic

Start of the 20th century saw inauguration of several astronomical observatories. In the 1950's, work under the leadership of Dr. Cepelach in interplanetary mass movements resulted in the first calculation of the interplanetary orbit of a meteor and the discovery of the Luhy/Přibram meteorite. Important contribution to stellar astronomy was the construction of the 2m telescope in Ondřejov in the 1960's (incidentally, the control system of this telescope was modernised and automated in the 90's by one of the alliance members, Iguassu Software Systems).

Already in the 20's, the Czechs showed passion for developing launcher technology. In 1929 Pešek registered a patent for a rocket engine, which accelerated aerial bombs. Another inventor, Očenášek, constructed a number of solid fuel rockets and tested them in 1931 near Prague. His two stage rocket reached 1500m. He later tried out reaction propulsion on riverboats, and even envisaged rocket launches from aircraft – the principle used now, half a century later, by the Pegasus launcher.

In the 50's Růžička and Svoboda led sounding rocket development in the Military Academy in Brno. The development peaked in 1968, when the team tested a series of solid fuel prototypes. The goal was to build a cost effective 2-stage launcher kit, capable of reaching 40 km altitude. The project was stopped following the invasion of the Czechoslovak Republic by the Warsaw Pact in 1968. In the following decades the rocket motors were used for various dynamic tests such as simulations of side-wind burst effect on cars, bridges or television masts - another example of early transfer of space technology into practical applications. In the 40's Frank J. Malina, Czech living in California, co-founded JPL, together with Theodor von Karman, and participated in development of the first US rockets Private and Corporal.

The communist regime fell in 1989 and with it both the opportunities and interest in the Soviet space programme.

And 20th century in the Czech Republic

The Czech Republic was founded after the velvet divorce from Slovakia in 1992. In 1999 it joined NATO, in 2004 the European Union. The national satellite program Magion continued with launches of spin stabilised Magion 4 and 5 in 1995 and 1996 respectively. The latest national satellite Mimosa, was launched in 2003 by Rockot and carried a micro-accelerometer mission.

For a more extensive coverage of the Czech space history, you can download a contribution from the IAF conference in Rio on <http://www.iguassu.cz/?section=9&Lang=gb>.

Czechs in PECS

And where are we now? At the break of the century, ESA started to contemplate the most practical way to bring some of the eligible new democracies into ESA. The PECS, the "Program for ESA Co-operating States" was born. PECS was foreseen to enable the Czech Republic, Poland, Hungary and Romania, to get involved in ESA activities in a gradual process. Rather than contributing for full membership, which for the Czechs would be around 9 million Eur, co-operating states can start off with 1 million per annum, committed for a period of 5 years. It is expected that during this period the contributions will gradually rise until reaching the full membership level and the country accedes to the ESA convention. This process is not only helpful in avoiding a financial challenge, but also to give



- 1 MIMOSA - Czech national satellite with a micro-accelerometer mission, launched by Rockot in 2003. Similar experiment flew on the STS-79 mission of the Shuttle Atlantis. Satellite platform built by Space Devices

the local industry time to develop procedural and bidding skills and relationships with ESA member states and thus be able to make good use of the contribution in form of industrial contracts.

In view of previous experience with other countries, ESA cautiously commissioned a survey of Czech technological skills to assure itself and the Czech government, that the country is ready and able to absorb the PECS funds well. The results of the survey, carried out in 2002 by the French NODAL Consultancy, were highly positive. (see the full presentation by NODAL at <http://www.iguassu.eu/?section=1&Lang=gb#20021008>). It found high level of technical skills, education, language abilities and companies providing high standard products and services. Some companies (including two Czech Space Alliance members) already had experience in space, and even ESA, projects, some were technically ready to start, and many needed little to reach the expectations. NODAL found a volume of existing space projects to the tune of 2 million Eur. Despite of that, the Czech Republic decided to start on the minimum contribution. The PECS programme was put in action in January 2005.

In the initial round of PECS, Czechs were awarded 9 projects by ESA – 4 from industry, 5 from academia. They included satellite navigation, earth observation and satellite control. The Czech government states that it has no problem increasing the contributions as long as it will be effectively used by quality projects.

What does PECS mean for ESA member state industry

It means that Czech industry can now participate in all ESA programmes, even if CR is not listed on EMITS as an eligible country. The basic distinction in including a Czech company in your consortium and in an ESA bid is, that the work packages to be carried out by the PECS company has to be budgeted separately from the rest, as the funds come from the PECS budget, rather than the standard ESA budget allocations.

This is your opportunity to develop relationship with a new, and as such particularly enthusiastic, player in ESA, get familiar with the high skills of its engineers. and even increase the cost-effectiveness of your bid into the bargain. The Czech cost base remains lower (but the Czech crown steadily appreciates against the Euro!) and your proposal/project effectively draws on an additional fund, the PECS budget.

The Czech Space Alliance (CSA)

CSA is an association of Czech SMEs with proven skills and track record in aerospace business – some in space, some in aircraft industry. The alliance was established in 2006 under the auspices of CzechTrade, the export promotion agency of the **Ministry of Industry and Trade**. It joins a number of existing export oriented alliances under the CzechTrade programme, and as such enjoys institutional, political and limited financial support from the Ministry.

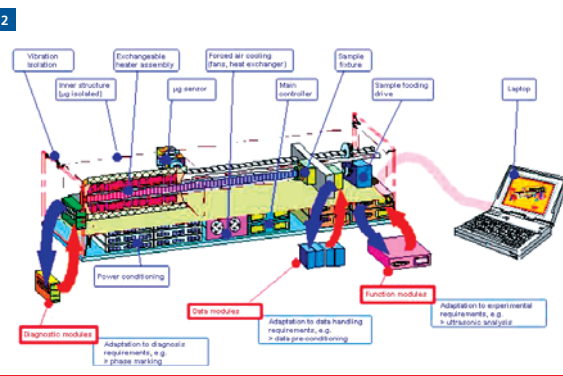
The inspiration came from existing industrial space alliances in ESA member countries, and the recognition that whereas the Czech industry is highly skilled in a number of relevant technologies, it is largely unaware that these can be applied to space projects without being familiar with the theory of cosmology or calculation of comet orbits. Also that too little attention had been paid to its needs in this context over the last decade.

The Czech relationship with ESA is the responsibility of the department for international scientific co-operation of the Ministry of Education. This ministry, supported by the **Czech Board for Space Activities** and the **private non-profit company Czech Space Office** (CSO, formed by directors of three aerospace oriented companies and academia), had made good progress in getting the PECS programme agreed and started. However, it views and publicly presents space largely as a highbrow scientific research endeavour, in which industry and commercial activity is not given the importance that belongs to it. The practical needs and problems of industry are either not fully appreciated or not given sufficient priority in the context of limited human and financial resources. CSA intends to help by contributing the resources of its members, and to ensure that the voice and the needs of the industry are heard and respected by the relevant decision makers. The alliance is under the auspices of CzechTrade, and hence the Ministry of Industry, which does have the necessary understanding of companies' needs, has the required resources and know-how, and for which the promotion of industrial activity is already its principal goal and task. Thanks to years of effort by the CSA members, CzechTrade and the Ministry of Industry is now well aware of the strategic importance of participation in space technology programmes. Space also fits well into its medium term strategy to re-build our image as that of a highly industrial and technologically advanced country, which had existed before Czechoslovakia was integrated into the Soviet block.

Your next step?

Contact any of the alliance members, some of which already participate in ESA and Galileo projects, for further information. The leader of the alliance had been ESA staff member for 12 years, so you will easily find common language. Apart from offering our technical skills, we can help find the relevant partner for you even in technologies that our alliance members do not yet cover.

We look forward to developing good working relationship with further international partners and space alliances.



Cestmir Barta, BBT Materials Processing, Crystal Science & Technology Institute, Prague (BBT)

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Main Fields of Activities

- Crystal chemistry, study of crystal growth and solidification processes, growth of crystals for technical applications (optics, acousto-optics, etc.).
- Material sciences and technology in Space (Salyut 6-Sojuz, MIR, ISS) and on Earth.
- Development and manufacturing of apparatuses, devices and software according to customer's requirements for Space and on-ground applications, incl. mechanics and electronics.
- Digital Image Analysis (sample microstructures, etc.).

The BBT team is proud to be associated with many scientific and technological programmes and projects. Our products (scientific facilities and devices) were operational on board Salyut 6 - Sojuz and MIR orbital laboratories for 17 years ! - non-stop from 1984 up to 2001 (to 1990 within the Czech. Acad. Sci., from 1991 within BBT).

Some our selected products and achievements

CSK-1A, -1B and -1C: The programmable space furnaces and crystallizers for MIR-type and FOTON-type orbital laboratories for material research in microgravity.

TITUS/CSK-4: The 2nd generation programmable space furnace for the Euromir'95 (ESA) and MIR'99 - PERSEUS (CNES) missions (in co-operation with DLR, ESA, DARA, Humboldt Univ., RKK Energija).

Fast optical processors for Space applications (ESA) - BBT in co-operation with STIL, Ireland.

Mercurous halides, sapphire and ruby crystals and their applications (acousto-optics, polarizers, IR-optics, microwaves, laser technologies, electronics etc.).

Non-equilibrium multi-component alloys: Realisation and scientific evaluation of the ground-based, space and post-flight experiments. R&D and manufacturing of the related apparatuses, devices, software, etc.

Assistance in the training of astronauts to operate the research apparatuses made in BBT.

Equipment for material experiments both in long-term micro-gravity and in a short weightlessness using a drop tower and in higher gravity fields using centrifuges.

Advanced TITUS: The 3rd generation facility designed for the material experiments in microgravity. (In co-operation with DLR-MUSC, Humboldt Univ., RKK Energia/MIR).

TITUS MPP (Multi-Purpose Platform with the Advanced Tubular Furnace with Integrated Thermal Analysis Under Space Conditions) – 4th generation facility designed as a tool for the materials sciences experiments on board the International Space Station (ISS). (In co-operation with DLR, Humboldt Univ., RKK Energia and with a financial supports of the Ministry of Education of the Czech Republic and ESA-PRODEX).

Passive Damping Platform: Damping of vibrations and other disturbing accelerations for a material research in microgravity.

Thermographic probe with 10 thermocouples was used for determination of the temperature profiles in space furnaces.

DTA (differential thermal analysis) probe with six chambers was used for both the study of phase transitions in materials and an accurate calibration of absolute temperature scale. The theoretical models of kinetic phase diagrams have been developed.

Participation in selected programmes and projects

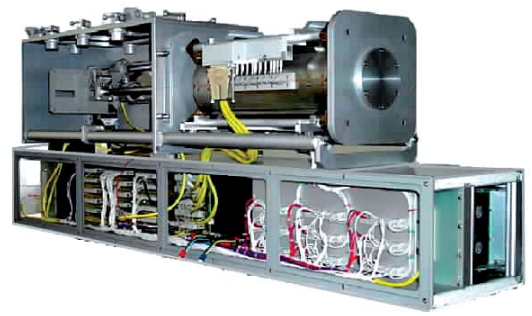
INTERKOSMOS - MORAVA I (1976-80, Salyut 6-Sojuz), **Morava II** (1986-88, MIR), **Morava III** (1990-97, MIR), **CSK-3** (1989-90) and **CSK-1** (1984-2001): Preparation, realisation and analysis of the international projects in material sciences.

International Users Support Centre for Interkosmos projects in material science which also served for German experiment TES in 1993-4 (laboratory for the ground-based preparation, realisation and scientific evaluation of space experiments) (within CSAV).

RIM-MIR: Experiments of a recalcence of Ag-Ge alloys on board MIR using the CSK-1 furnace (three-lateral co-operation of Germany (DLR), Czechoslovakia and Russia).

TES and TEST-TES: Participation in the German (DLR) **TES** and **TEST-TES** experiments of a recalcence of alloys (realised on board MIR orbital laboratory using CSK-1 furnace).





1 CSK1-1C space furnace with the astronauts Pedro Duque (Spain) and Ulf Merbold (Germany) – ESA Programme EuroMIR'94.
Photo DLR, Germany

2 TITUS MPP Multi-Purpose Platform - artist's view.

3 TITUS space facility on board the MIR space station with the French astronaut Jean-Pierre Haigneré (Project MIR'99 – PERSEUS)
Photo CNES, France

4 TITUS MPP - Bread-board model BM-1.

5 TITUS and CSK-1C space facilities on board the MIR space station. (Project MIR'99 – PERSEUS).
Photo CNES, France

Drop-tower Bremen: Non-equilibrium solidification experiments performed under conditions of a **short-term free fall** (in co-operation with ZARM-University in Bremen, Germany).

MIR'92 (1992-3): Set of material experiments on board MIR using the CSK-1 furnace (ESA, DARA, DLR-MUSC, BBT, RKK Energija).

EuroMIR'94 (1994-5): Set of material experiments on board MIR using the CSK-1C furnace (ESA, DARA, DLR-MUSC, BBT, RKK Energija).

EuroMIR'95 (1995-6): Set of material experiments on board MIR using the TITUS/CSK-4 furnace (ESA, DARA, DLR-MUSC, BBT, RSC Energija, Humboldt Univ., Kayser-Threde).

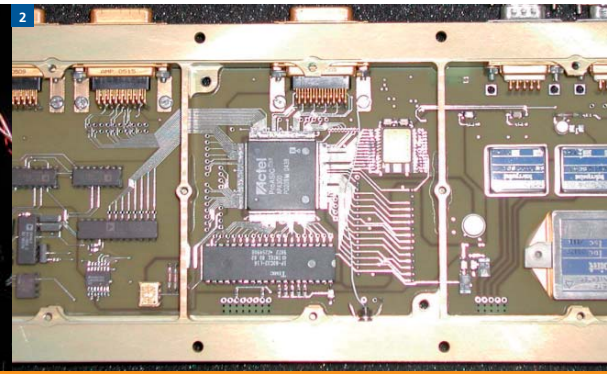
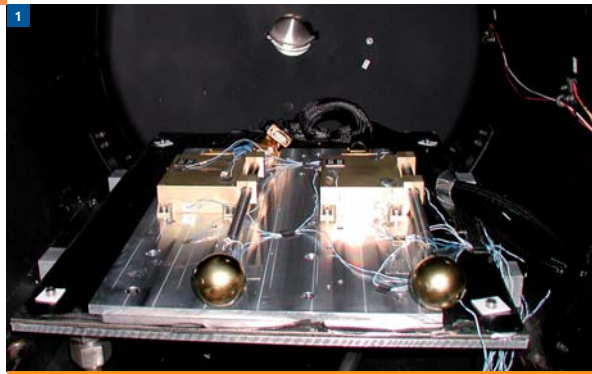
GermanMIR'97 (1997): German programme (DLR) - set of material experiments on board MIR using the BBT furnace CSK-4 (TITUS).

MIR'99 - PERSEUS (1999): Set of material experiments on board MIR using the BBT furnace CSK-4 (TITUS) - RSC ENERGIJA (Russia) and CNES (France).

KONTAKT: Set of material space experiments.

PRODEX: Study of non-equilibrium solidification of multi-component alloys, DTA measurements.





Czech Space Research Centre Ltd.

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Profile, History and Mission

CSRC - Czech Space Research Centre, Brno, a privately owned Ltd. company, was founded in 1994 to transfer the space technology and standards to the Czech industry.

CSRC was settled to be the focal point for the Czech industry, accessing space activities in Europe and worldwide.

CSRC cooperates with the Brno University Of Technology in the frame of the European programs for technology exchanges and development, especially programs, associated with the space and other demanding fields of activities.

CSRC can provide extensive cooperation and links with partners in the top technology field.

CSRC has introduced certified system of quality assurance corresponding to ISO 9001:2000 standard.

Profile, History

Electronics Design

Design of electronic and programmable systems is based on the following components:

Standard digital circuits and single-chip microcontrollers (C51 family, Microchip etc.), digital circuits with signal processors - FPGA and CPLD design using VHDL, behavioral simulation of the design, testing - a multi-layer PCB design, electronic circuits for the PCI bus, including control software development - analog circuits design, behavioral simulation.

Software Development

The design of software is focused on control and data processing for aerospace, communications or process control, including efficient man-machine interface.

The software development team provides: Single-chip microcontrollers programming in C language and assembler, signal processor programming in C language and assembler, development of user specific applications for PC.

Mechanical Design & Manufacturing

The design of the parts and/or entire mechanical systems is realized using CAD/CAM systems with electronic data formats exchange.

Mechanical manufacture is outsourced in facilities, qualified and certified in the field of aeronautics and space production.

Available technologies:

CNC machining, alodine, anodisation, electron beam welding, glass feed-through manufacturing, thin layer sputtering, alodine in aerospace quality, laser-beam cutting.

Design Verification

The design is in all projects submitted to verification using mechanical and thermal analysis based on finite elements method.

Parameters are verified to allow safe operation in the space conditions, according to temperature range in the satellite in space, vibrations during the launch phase.

Testing procedures for thermal vacuum and mechanical vibrations tests is a standard.

High-reliable Assembly in a Clean-room

CSRC clean-room facility class D 100 000 meets the needs for manufacturing of high-reliable electronic and mechanical systems requiring high level of cleanness. The facility is certified according to ESA standards.

The operators are trained in Italian and German space industry for more than one-year period, they are certified according to ESA standards in PCB assembly, treatments and related technologies.



- 1 Segmented Langmuir probes from project DSLP on scientific project PROBA2, in TVT chamber.
- 2 Data processing unit of project DSLP on scientific project PROBA2.
- 3 Mechanical box of PSAC experiment on scientific project INTEGRAL.
- 4 Example of documentation describing simulation of mechanical behavior of electronic components on integrated circuit board.
- 5 Measurement unit of experiment EPDP on scientific project SMART1.

Available technologies: Thermal pre-soldering processes, degolding and pretinning component lead, soldering of through-hole components, soldering of SMD components, fine pitch soldering, fine mechanical operations - frame, fasteners installation, riveting, treatment, cleaning, nitrogen drying, polymerization, mechanical pre-soldering processes - preforming, bending, cutting of component leads.

Project Management

The design process covers the following phases, steps and processes: User requirements analysis, preliminary design, prototyping and design verification, final design, analyses and simulations, components and material procurement, control software with graphical user interface, user and service documentation, test equipment design and manufacture, delivery and integration support, quality assurance.

References

Satellite INTEGRAL, PSAC (launched)

The Plastic Scintillator Anti-Coincidence unit: flight unit for photomultiplier high-voltage control; development, design, analyses, manufacture, testing, delivery, support in integration.

Satellite SMART-1, EPDP unit (launched)

reconstruction from RS-232 to CAN bus; development, design, analyses, manufacture, testing, delivery, support in integration.

Satellite DEMETER, IVC (launched)

Design of the I/V converter for Langmuir probe, hardware converting low-current of pA to μ A range to voltage; development, design, analyses, manufacture, testing, delivery, support in integration.

Satellite PROBA 2 (in progress)

Design of the I/V converter for Langmuir probe, hardware converting low-current of pA to μ A range to voltage, data processing unit, providing communication with the system; development, design, analyses, manufacture, testing, delivery, support in integration.

Satellite XMM, EPIC

Design and development of a test equipment for XMM Satellite, simulating the spacecraft services and supporting the calibration of the major experiment on board consisting of a large CCD-array sensitive to X-ray, the acquisition of the image and the scientific analysis of data.

AGILE DFE

(Minicalorimeter Digital Front-End) test equipment has been designed for the AGILE project (gamma rays research) of the Italian Space Agency (ASI). The test equipment (TE) will test functions of the minicalorimeter interface to the scientific console - transmission of measured data and receipt of control commands. In addition to, the TE includes stabilized power supplies.

MALST

The green turtles carry a compact device designed in CSRC on their shells. This device monitors and records speed and direction of the moving turtle, submergence status and depth. Recorded data are transmitted to the ARGOS satellites. These data can be read and evaluated by the involved scientists.





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Description of the company

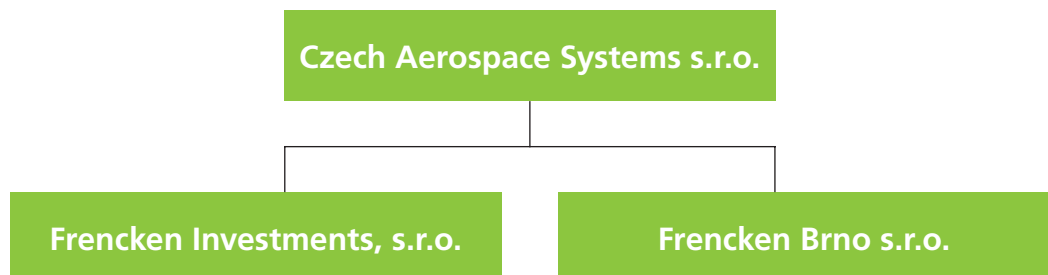
History and description of the company Czech Aerospace Systems s.r.o.

Czech Aerospace Systems s.r.o. was established in May, 2006 as a private holding company 100% owned by Czech management.

The main purpose of its establishment was assuring the further development of all holding companies in order to fulfill customer's demand based on increasing of production capacities with effective using of company's potencial. The final effect should be assuring the deliveries into aerospace industry, increasing of company's competitive strength and also increasing of Czech mechanical engineering basis focused on aerospace production. Related to core business of Czech Aerospace Systems s.r.o. the company is going to increase its activities not only in aircraft industry, but also in space industry. The company has also in its strategy plans not only deliveries of precision mechanical parts, but also deliveries of complete modules on which the company is going to take part in their design and development.

The company also aims to cooperate with institutions such as Czech Space Office and ESA. Czech Aerospace Systems s.r.o., as a 100% exporter, who is able to deliver products with very high added value (up to 80%), is going to reach its demanding targets with using of own know-how for production of precision parts for aerospace industry (i.e. Airbus A380 and telecommunication satellites).

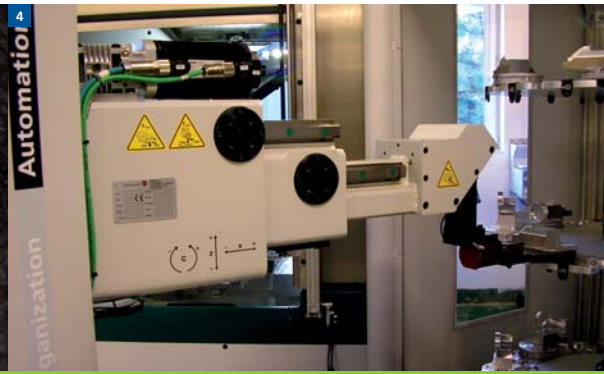
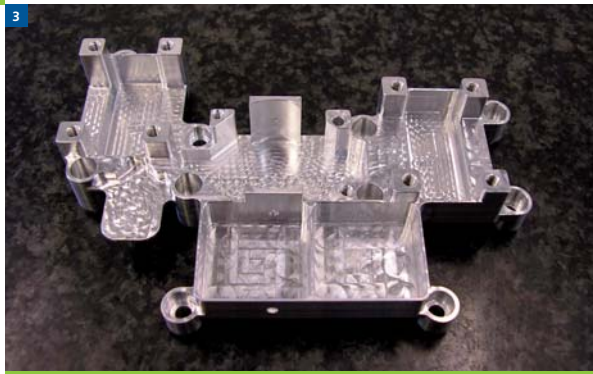
Organization structure of the company



History and description of the company Frencken Brno s.r.o.

Frencken Brno s.r.o. was established in 1994. Frencken Brno s.r.o. is from its beginning focused on production of precision mechanical parts mainly for foreign customers. The company has continuously developed into the position of supplier of precision mechanical parts and components (parts, modules) for aircraft, space, medical, electrotechnical, optical, etc. devices for significant European and worldwide producers. Frencken Brno s.r.o. has delivered and still delivers components for production of Airbus planes -for all types- including A380 and A400M and for these planes also assures big amount of spare parts. Another part of production is focused on production of precision components for telecommunication satellites (for example ECS EUTELSAT), production of special machines and high tech devices (machines for dosing and packing medicaments, packing machines, gas analyzers, etc.), Frencken Brno s.r.o. is a direct offset partner in program which is connected to hiring of fighting aircrafts JAS 39 Gripen by Czech Republic. The whole production of the company is aimed for export. The target countries are Germany, Great Britain, Canada, Switzerland, Netherlands, USA and France.

Nowadays, the company has 75 employees, up-to-date machinery located on approx. 1450m² (1000m² in own facility, 450m² in rented facility) with corresponding setting, quality and logistic departments. Production flow is managed with using of CPC software. The company has developed quality management system certified according to ČSN EN ISO 9001:2001 and is also certified by Airbus according to standard QSF-A as a supplier for



- 1 Titanium hinge for A380
- 2 Aluminium box for satellite electronics
- 3 Aluminium part for high frequency satellite technology
- 4 Robotized 5-axis milling centre
- 5 Titanium clamp for Airbus

German aircraft and space industry and by Honeywell according to ČSN EN 9100:2003.

The current level of Frencken Brno s.r.o. was reached in complicated competitive market formed mostly with foreign companies and also with pressure from customers on high quality of products, with flexibility, quickness and fulfilling of delivery schedules. This market is very demanding regarding to qualification of the employees, technical equipment and technological background of the company on all departments and all its levels. Management of the company is focused on maintaining of the competitive strength, which has resulted in finding solutions in optimization of the production with using of automatization techniques and also in using of up-to-date technologies in its development and production realization.

Frencken Brno s.r.o. is now part of the holding Czech Aerospace Systems s.r.o.

History and description of the company Frencken Investments s.r.o.

Frencken Investments s.r.o. was established in 1994.

Frencken Investments s.r.o. is the owner of the real property (building, parcels), which are used for activities connected to business of Frencken Brno s.r.o. and assures all services related to using of these real properties, for example maintenance, revisions, repairs, safety, assurance, etc.

In connection with further development the company is going to build new production plant. Frencken Investments s.r.o. is now part of the holding Czech Aerospace Systems s.r.o.





Iguassu Software Systems a.s.

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ESA bidders code : ESABD 58008

Main activities and clients

Software design & development and consultancy for clients in space

■ ESA, Eumetsat, GJU.... (Europe)

and other technologies

■ HP (Germany & US), Agilent (Germany), KNAPP (Austria), Ingersoll Rand (US)

including real-time systems, satellite navigation, GRID technologies in EO processing, embedded systems. Services are provided both on a time & material and fixed price projects basis, from Prague offices, or worldwide on site. Iguassu has extensive and in-depth experience in multi-national teams and consortia, and in long term assignments in Europe and the Americas.

Iguassu also provides consultancy to West European companies in Latin-American and Czech aerospace markets. All staff speak fluent English, some also German, Spanish, and limited Russian and Brazilian. Even Japanese skills are being developed in-house (see our Japanese website).

The company is very active in the ESA PECS programme, with 1st project successfully concluded and two more on-going.

ISS is also active in promoting space capabilities of the Czech Space Alliance, and the Czech Republic as a whole, in international space events.

Historical background

Established in 1994 as a subsidiary of the UK software house Science Systems, Iguassu was already then involved in space work. In 1997 the parent company appointed the current manager, who had been ESA staff member for 12 years, and has further 18 years aerospace experience in UK, Spain and Latin America. After the January 2000 management buy out, Iguassu became an independent Czech SME. It continues to focus on technology applications including space and embedded s/w for automotive industry. Since 2001 ISS was represented on the „Czech Board for co-operation with ESA“ and since 2005 it is on the „Czech Board for Space Activities“. In 2006 it instigated the creation of the Czech Space Alliance and became its leader.

Services and Projects

Current projects for ESA and Galileo

On the Czech entry into the ESA PECS, Iguassu won three ESA projects and, due to budget limitations, was awarded two – more than any other Czech company. The EGNOS SISNeT (Signal in Space through Internet) project was successfully completed and owing to good results and quality, is now followed by a more extensive SISNeT project. Currently on-going are

- EGNOS SISNeT Phase II, incl. complete development of a new generation SISNeT server; led by ESA GNSS team, Toulouse and in co-operation with GMV Spain.
- applying GRID technologies to Earth Observation processes (focus on SAR) and co-development of “Grid of Demand” in ESRIN; this project was conceived in co-operation with Indra Madrid.
- operation of the 1st Central European EGNOS receiving station, monitoring the integrity of EGNOS satellite navigation data (IMAGE Project), linked in real-time into ESA central database
- participation in the development of the Galileo Search & Rescue subsystem as member of the international consortium led by INDRA Barcelona, and including Thales, Alcatel Space, CNES...

Past space projects participation (over 45 man years) include

- Meteosat TP Main Control Centre CF
- Satellite Control System SCOS 2000 for ESOC
- Ground segment systems support (ESOC)
- Envisat payload processing (ESRIN),
- IRIDIUM terminal test software (Racal, UK)
- MSG, MCF (UK, Eumetsat, and Prague)
- MSG Primary Ground Station (Gilching, D)
- telescope auto-tracking system (turnkey system Czech R.)
- systems maintenance and user support for ESOC computer network



1 Galileo will improve safety and accuracy of navigation. Iguassu Software is participating in development of Galileo Search & Rescue capability as well as in EGNOS SISNeT development for ESA
Image: ESA-J. Huart

2 A view of Earth from the STS-116 Space Shuttle Mission
Photo: NASA

3 First colour image by MSG-2 satellite. Iguassu Software developed the test tools for the check out of the MSG Central Facility under a Fixed Price Contract to SciSys plc
Image: EUMETSAT 2006

Marketing and consultancy track record of Iguassu staff

- WEU Satellite Centre in Spain, for Anite Systems
- CONAE Argentina, 2.4 M US\$ satellite station, for Anite Systems
- United Nations (UNEP), Mercure satellite communications project, for Anite Systems
- Latin American satellite station report for ESA external services
- INPE Brazil 9.4 M US\$ bid for CBERS system, for Anite Systems
- Market intelligence and bid support in Brazilian aerospace for Vega and SciSys
- Latin-American aerospace market report for Shreeveport
- Czech defence market for Inmarsat (subcontract to TriPolus)

Examples of non-space projects

- 5 years' intensive work for HP in Germany and California
- Embedded software design & development for ThermoKing

Other activities

Leadership of the Czech Space Alliance and co-operation with space associations in other ESA countries.

Second time running won in the competition to participate in the "EU Gateway to Japan" programme for SMEs, with EU sponsored trade exhibition and individual business meetings in Japan.

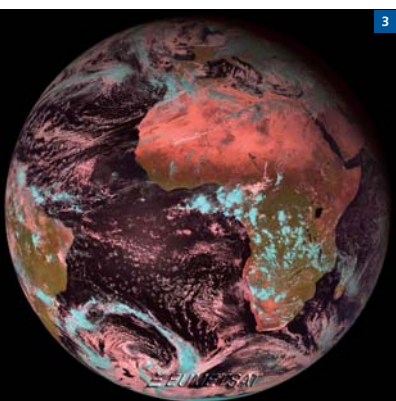
Promotion of the Czech Republic space skills on the international market, from Rio de Janeiro (IAF/IAC), through Prague (keynote speech in the int'l. conference on ICT technologies in space, DASIA) to Bangalore (as delegate of the Czech President's diplomatic mission to India, and in representation of the Czech Space Office).

European Space Agency (ESA) Survey

ESA survey of Czech industry (see introductory article) by NODAL consultants gave Iguassu top marks in most evaluation criteria, and highlighted its FFP project for Eumetsat, design & development of test tools for MSG CF system validation, as an outstanding example of successful Czech international space co-operation.

References - locations & clients

- **locations** - UK, Germany, Spain, France, Italy, Austria, Argentina, USA and the Czech Republic; Iguassu staff also have experience in other countries, such as Brazil, Mexico or Portugal and in working with supra-national or national organisations such as UNEP, EU Satellite Centre (formerly WEU SC) in Spain, INPE and the Brazilian Space Agency AEB, the Argentina space agency CONAE, BNSC in UK, CDTI in Spain etc.
- **software solutions clients** - apart from those mentioned above, customers for software development and consultancy include SciSys plc, CAM GmbH, Astronomical Institute of the Czech Academy of Sciences, HTS UK, ABB, Ingersoll Rand US, KNAPP Systems Austria, the Inter-American development Bank and (indirectly) the Argentine Ministry of Transport, Thermoking, Iridium (subcontract)
- **aerospace marketing consultancy** - SciSys plc, Vega GmbH, ESA External Services, TriPolus UK, Integral Systems France, Shreeveport UK





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ESA bidders code: 58012

General information

TL elektronik Inc. is a joint-stock company with basic capital USD 1,5 milion. It is located at the airport in Hradec Králové, about 100 km to the east from Prague. TL elektronik was founded in 1995. Within more than 10 years of its activity, the company has developed more than 40 instruments or units determined entirely for aircrafts. TL elektronik is a world leader in the development and manufacturing of aerospace instruments and aircraft equipment.

For continuous enhancement of quality of products TL elektronik has implemented a system of quality management according to ISO9001:2001. Moreover, has gained approvals for Design and Production of General Aviation and Military Aviation products, furthermore, an approval for Verification and Testing of aviation appliances and also is authorized to handle with confidential information. TL elektronik is fully approved within scope of European Space Agency (ESA) programmes such as ESA SME, EMITS and ESID.

TL elektronik's major customers include e.g. the company BRP-ROTAX (Bombardier), the greatest manufacturer of aircraft engines in Europe, and also the Aerospace Department of the Czech Technical University in Prague. TL elektronik participates significantly in the aircraft research and is one of the main partners of the Czech Aerospace Research Centre of the Czech Republic.

Products

TL elektronik sells its products through the distributors in more than 30 countries. The foreign sales represent 98% of the company's overall production. TL elektronik is a very flexible and reputable company. The chief priorities include using the most advanced technologies and keeping the delivery dates of orders. 100% support is given to all customers for already-realized projects. The company TL elektronik also deals with the development of its own sophisticated instruments. In 2004 one of its units was nominated for the most prestigious Czech national award in the category of "The most significant new technology or product developed in the Czech Republic".

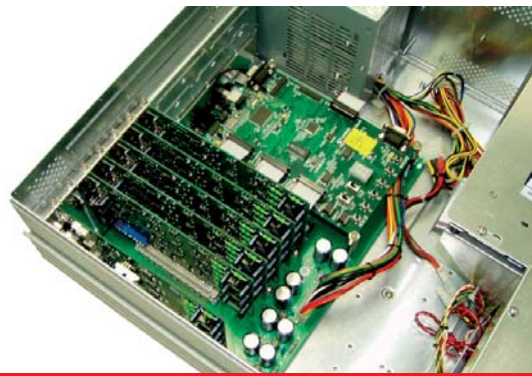
Other activities and future

TL elektronik plays an important role in the Association of Sports Aircraft Manufacturers in the Czech Republic, Czech Space Alliance and the Unmanned Systems Manufacturers Association. TL elektronik is also a permanent member of the Sub-committee for Science, Research, Aviation and Cosmonautics of the Chamber of Deputies in the Czech Republic. In the coming years, TL elektronik intends to keep expanding particularly in the Sportplane, Experimental and General Aviation categories. Among other activities, there are military projects and cosmic research projects for the organization ESA.

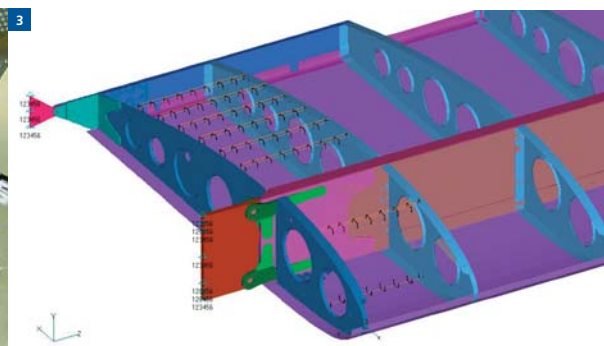
Approvals and Certificates

- Quality management certificate ISO9001:2001 (Granted by Bureau Veritas Certification - BVQI)
Number of certificate: 6001491
- Approval for production of general aviation products according to Part 21 (Granted by Civil Aviation Authority Czech Republic - CAA)
Number of Approval: CZ.21G.0046
- Approval for alternative procedures of design of general aviation products according to Part 21 (Granted by European Aviation Safety Agency - EASA)
Number of Approval: AP168
- Approval for production of military aviation products (Granted by Ministry of Defence Czech Republic - OVL MO)
Number of Approval: MAA075
- Approval for testing of general aviation products (Granted by Civil Aviation Authority Czech Republic - CAA)
Number of Approval: L-3-076

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1 Artist's view of the COROT satellite
Photo: ESA

2 View into a logger Dynamic test equipment for assessment of flutters – developed exclusively for the Czech Centre for Aeronautical and Cosmic Research

3 MKP wing model with 34968 elements linearly modelled in the Nastran program, type CQUAD4 with PSHELL features

4 View of a Structural Life Monitoring Unit, which was in 2004 nominated for the most prestigious Czech national award "Czech Heads" in the category of "The most significant new technology or product developed in the Czech Republic"

References

- Dynamic test equipment for assessment of flutters - developed exclusively for the Czech Centre for Aeronautical and Cosmic Research
- New Flydat - developed exclusively for the Rotax-Bombardier GmbH, the largest manufacturer of aircraft engines in Europe
- Structural Life Monitoring Unit for determination of remaining lifetime of aircraft - developed in co-operation with the Ministry of Trade and Industry of the Czech Republic, the Czech Technical University and the aeronautical computer centre VANESSA AIR Ltd
- Engine control unit for release engines in motorised gliders - developed exclusively for Martin Wezel - Flugzeugtechnik, Germany

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BBT Materials Processing is a research, development and production company with extensive international experience in material sciences and technology in space (Salyut 6-Sojuz, MIR, ISS), including in ESA and Energija. It focuses on high-tech applications in space, including development and manufacturing of apparatuses, devices, control systems and software.



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CompoTech Plus offers expertise, design consultancy, R&D, and manufacturing in structural composite tubes. We help our customers to develop market opportunities and work with them to enhance their products and maximise their cost benefits. This is achieved by optimizing the composite tube, its production technology, and the use of high-tech materials.



CSRC, spol. s r. o.

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www.csrc.cz

Design of electronic and programmable systems, software development, including all necessary ESA requested documentation, test procedures and simulations (e.g. PSA, FMECA, DML, DPL, DCL), clean-room assembling. Mechanical Design & Manufacturing, including all necessary testing and simulation, as requested by ESA testing procedures. Performing all necessary tests (TVT, EMC, Vibration ...) for quality assurance and system specification conformance.



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Czech Aerospace Systems s.r.o. is a supplier of precision mechanical components and modules for aircraft and space industry. Company is equipped with up-to-date technology and software for performed business.



Hacker Model Production a.s.

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www.hacker-model.com

Is a full service, high capacity provider of Rapid Prototyping and rapid production services. Using the latest technologies - 3D scanning, E-manufacturing (3D printing) we produce top quality functional prototypes, presentation models, casting patterns and production parts in plastic, elastomeric and metal materials directly from 3D data.



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Iguassu Software Systems is a software development and consultancy company with extensive international experience and over 45 man years in space projects, including in ESA, Eumetsat and Galileo. It focuses on high tech applications in space and automotive industry, including control systems, embedded software and satellite navigation.



Reflex s.r.o.

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Reflex offers expertise, R&D, and manufacturing of precise X-ray optic, and precise X-ray cameras for industry and scientific research. It also provides other services, including metrology, numerical simulations, data processing and visualisation, mechanical design and manufacturing.



Space Devices spol. s r. o.

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Czech small private company SPACE DEVICES Ltd. is ready for design, development, construction and manufacturing of instruments for space research, mainly scientific ones, including their software.



TL elektronik Inc

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www.tl-elektronik.com

TL elektronik is a world leader in development and production of digital aerospace instruments and aircraft equipment based on wide-range know-how. Using the latest technologies and cooperation with technical universities TL elektronik offers the best solutions and services to its customers.

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