

CZECH INDUSTRY  
SUCCESSFUL IN ESA TENDERS

# CATALOGUE 2011



Credits: ESA - P. Carril, 2009

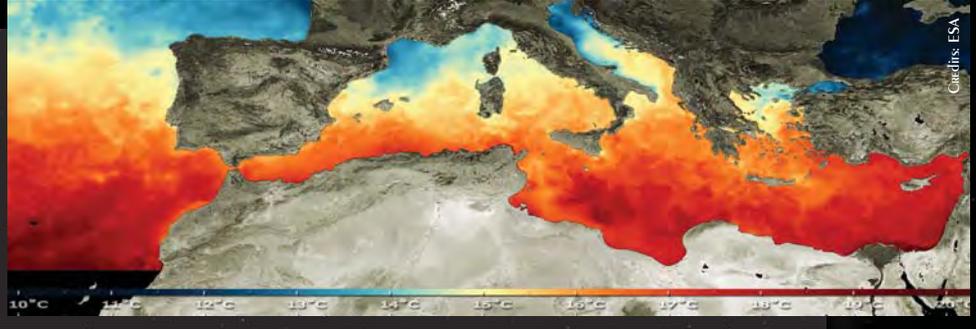


Ministerstvo dopravy





Credits: ESA - P. Carnil



Credits: ESA



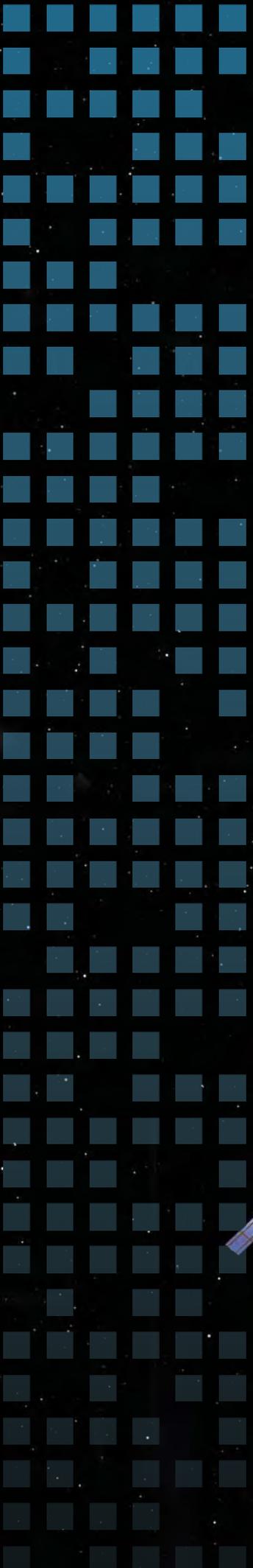
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Credits: ESA - P. Carnil





# Introductory Word of the Vice-Minister of Transport



**Jiří Žák**  
Vice-Minister  
of Transport



Space-related activities can be seen as a unique tool to influence economic development by creating virtuous examples and best-practices to be used in other sectors of the economy. The economic impact considered as a “return-on-investment” in space activities is in the order of a factor of 4.5 as estimated by OECD in Norway and Denmark, similar or even higher values have been previously reported elsewhere. The need to retain and absorb the intellectual capital that is created in its academia and industry is, as well, an essential requirement to ensure the “return-on-investment” of public funds.

Space exploration must not be considered as an end in itself but as an economic instrument for development and innovation. Space activities are generally characterised by their high technological content, multi-disciplinarity, complexity, extreme visibility and often high cost. At this stage it is not conceivable for the Czech Republic to have an independent space programme with all its requirements; as this would entail substantial investments with dubious sustainability.

For this reason the main tool for the Czech Republic to influence, develop and participate in space must be through its membership of ESA where all European-wide space-related research and developments are carried out leading to systems that are then commercialised and exploited by other European organisations (examples of this are EUMETSAT, Arianespace, Eutelsat, EGNOS or the future Galileo operator).

Czech membership in ESA also represents the main opportunity for the Czech industry and academia for participating in large international space projects and cooperating with large multinational corporations.

The Czech Ministry of Transport, the only governmental body in the Czech Republic directly responsible for ESA, supports Czech industry and academia in their engagement in ESA activities. Together with other public authorities, the Czech Ministry of Transport stresses the necessity to create a suitable environment to extend the number of industrial firms involved in ESA and enhance their competitiveness and the competitiveness of the Czech economy.

On the occasion of the third anniversary since the Czech Republic acceded to ESA, all Czech private companies, with a proven track record in space activities through contracts with the ESA, were invited to contribute to this catalogue. The catalogue was sponsored by the Czech Ministry of Transport and the Czech Space Alliance collected and organised its publication. It should be noted that the companies invited to contribute transcend the membership of the Czech Space Alliance.

I strongly believe that the number of Czech companies which take part in ESA projects will successfully keep growing in the next years and that the Czech Republic will be able to meet the goals defined in its National Space Plan.



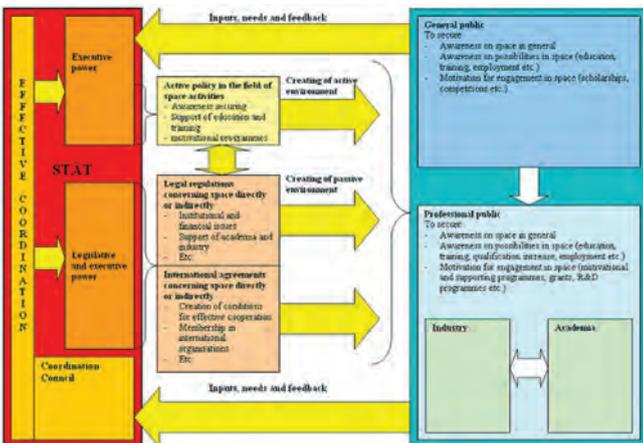
# Czech Ministry of Transport and space activities

Following a Government decision in April 2011, the Ministry of Transport became the coordinator of all space activities in the Czech Republic. For this purpose, the Czech Ministry of Transport established a Coordination Council under its leadership. The Coordination Council consists of high level representatives of the Ministry of Transport, Ministry of Industry and Trade, Ministry of Education, Youth and Sport, Ministry of the Environment, Ministry of Foreign Affairs, Ministry of Defence and Office of the Government. The Coordination Council has established three cross-sectional expert working groups - "Industry and Applications", "Science Activities" and "Security and International Relations" that involve industry and academia.

The Czech Ministry of Transport has been responsible for elaborating and delivering the National Space Plan to the Czech Government. It was prepared in cooperation with other Czech ministries and approved by the Czech Government in May 2010. The National Space Plan represents a basis for decision-making on further Czech involvement in space, support of industry and academia and participation in European and international projects and programmes. Since the National Space Plan does not comprise a detailed implementation plan, the Czech Ministry of Transport prepared a National Space Implementation Plan. The Czech Government approved the document in August 2011.

The Ministry of Transport has also been responsible for the negotiations for the establishment of the seat of the Galileo Supervisory Authority (GSA) in Prague. The Czech Republic acceded to European space Agency (ESA) Convention in November 2008 and gained the GSA agency seat in December 2010.

Besides the coordination role, the Ministry of Transport is also directly responsible for ESA, EU matters concerning space, satellite navigation and space applications.



Scheme of National Space Implementation Plan

# The Ministry of Transport and ESA

The Ministry of Transport is the Czech interface with ESA and represents the Czech Republic in the ESA Council and Delegate Bodies (committees and programme boards).

Rather than an international organization on research and development, ESA is an implementing space agency ensuring the implementation of space missions and assets. It serves as an important tool for strengthening scientific and industrial European space capabilities and intensifying the cooperation among ESA Member States and between ESA and other states.

The Ministry of Transport considers ESA mandatory activities and optional programmes as a great opportunity for Czech industry and academia.

The core elements of ESA's Mandatory activities are the Science Programme, the Technology Research Programme, the General Studies Programme and ESA's technical and operational infrastructure. The development of applications is provided via ESA's optional programmes, to which Participating States participate with a voluntary subscription.

In ESA mandatory activities and in each of its programmes ESA ensures that at least 84% of the Member State contribution, minus ESA's internal costs, will be returned to the State in the form of contracts covering ESA activities. ESA further ensures that, when all mandatory activities and optional programmes are taken into account, 94% of the contribution will be returned, in the form of contracts, to the contributing State. In ESA terms, this principle is called the industrial return or geo-return (juste retour). For the Czech Republic geo-return is especially important as it guarantees the return on Czech contributions made to ESA back to the Czech Republic – even when Czech industry may be less competitive vis-à-vis the rest of Europe.

In the Agreement between ESA and the Czech Republic concerning the accession to the ESA Convention, 45% of the Czech mandatory contribution (amounting to €2.3 million at the economic conditions of 2009) was allocated to a special transitional ESA programme entitled Czech Industry Incentive Scheme.

The aim of this transitional programme is, in accordance to the ESA's rules and procedures, to adapt the Czech Republic's industry, operators, scientific community and other actors to the ESA's requirements preparing the Czech actors to become competitive and thereby achieving maximum return of the contributions (industrial return), as well as to efficiently engage in appropriate optional programmes of ESA.

To advise ESA's Director General on the implementation of transitional measures under this programme a Czech-ESA Task Force was established with a membership nominated by both ESA and the Government of the Czech Republic. The mandate of the Task Force is for 6 years and terminates at the end of the transition period (2009-2014).

Two calls for Outline Proposals under the Czech Republic's Industry Incentive Scheme have already taken place and most of the contracts have been placed (in the 1st Call an amount of 2.3 million € was committed and in the 2nd Call an amount of 4 million €). Both Calls were focused on projects proposals which would be in line with interests discussed in the Czech National Space Plan, which could lead to cross-sectional products/services relevant to different types of satellite missions that are used in several types of satellite platforms, especially those relevant to Space Science and which that have the potential to bring long-term benefits to Czech industry and to the Czech Republic in its participation in space activities. Intellectual Property Rights (IPR) of what is being pursued with the activity must have been also considered and explicitly addressed in the proposal.

## Czech Industry Incentive Scheme

First Call for Outline Proposals (AO 6052)

| Project Title   | Principal Investigator                            | Duration  |
|---|---|-----------|
| Control and tracking system for ground station antennae   | Projectsoft HK <sup>1</sup>                       | 2010      |
| Hermetically Sealed Low ESR Tantalum Capacitor  | AVX Czech Republic                                | 2010–2012 |
| Highly Miniaturized and Sensitive Thermal Neutron Sensor  | Institute of Experimental and Applied Physics CTU | 2010–2012 |
| Laboratory Wide Dynamic Range Gamma-Ray Calibration Facility  | Institute of Experimental and Applied Physics CTU | 2010–2011 |
| Langmuir probe experiment   | Astronomical Institute AS CR                      | 2010      |
| Neutron Facilities in the Czech Republic for Calibration and Testing of ESA-Compliant Neutron-Sensitive Devices | Institute of Experimental and Applied Physics CTU | 2010–2012 |
| New acousto-optic device based on Calomel for hyper-spectral imaging in space applications NAOMI                | BBT-Materials processing                          | 2010–2012 |
| PalDMC  | Iguassu Software Systems                          | 2010–2011 |
| Preparatory Activities for MTG Participation  | CSRC  | 2010      |
| Preparatory study of digital plasma wave analyzer technology for Cosmic Vision spacecraft                       | Institute of Atmospheric Physics AS CR            | 2010–2012 |
| Real-time Extrapolation Methods for Thermal Testing   | L.K. Engineering                                  | 2010–2011 |
| Real-time Performance Monitoring Tool   | Iguassu Software Systems                          | 2010–2011 |
| Solar Array Deployment Mechanism Industrialization  | Frentech  | 2011      |
| Study of SCOS-2000 deployment over WAN for a concept of CMCP  | ANF Data  | 2010      |
| UrbanAtlas+   | Gisat   | 2010–2012 |

<sup>1</sup> ProjektSoft HK was invited to contribute to this brochure however it has decided to publish independently its own brochure.

Second Call for Outline Proposals (May 2011, AO 6647)

| Project Title  | Principal Investigator                            | Duration (months) |
|--|---|-------------------|
| Transient Objects for M&C in GSSC/GMMI   | ANF Data  | 13                |
| DSLPO Operations on board PROBA 2 - raw data processing and archiving  | Astronomical Institute AS CR                      | 12                |
| Earth-space path propagation characteristic in the climatic conditions of the CR from Aphasat Ka/Q Band experiment | Czech Meteorology Institute                       | 24                |
| SMT Assembly Verification Programme according to ECSS-Q-ST-38  | CSRC  | 9                 |
| Space Application of Timepix-based Universal Radiation Monitor (SATURM)  | CSRC  | 37                |
| Portable calibration gamma-ray source  | Institute of Experimental and Applied Physics CTU | 12                |
| Development of Test Facility dedicated to Passive Components   | EGGO Space  | 9                 |
| Qualification of the system of pyro-neutralisation cutting for Ariane 5 launcher                                   | Explosia  | 31                |
| New Generation Multimedia Antenna Deployment and pointing Mechanism  | Frentech  | 20                |
| Integrated snow monitoring with uncertainty analysis (ISTAS)   | Gisat   | 18                |
| Distributed Raster Processing Framework (DRPF)   | Iguassu Software Systems                          | 20                |
| Multi-Constellation Long-term GNSS assessment (MCLTGA)   | Iguassu Software Systems                          | 16                |
| Study of alternative technologies for gyroscopes   | Honeywell International                           | 6                 |
| User Autonomous Integrity Monitoring   | Honeywell International                           | 16                |
| Calibration System for the transportable laser communication terminal  | Projectsoft HK                                    | 12                |
| EPOXY Core Development   | SYNPO   | 24                |
| Contribution to SPIICS coronagraph on board Proba 3 mission of ESA   | VZLU  | 36                |

### The Czech Republic financially participates in the following optional programmes:

| Name  | Goal   | Duration     | Contribution (million €) |
|---|--|--------------|--------------------------|
| <b>MTG</b><br>(Meteosat Third Generation)   | Development of a new generation of geostationary meteorological satellites   | 2009–2020    | <b>2,24</b>              |
| <b>FLPP Period 2 Step 2</b><br>(Future Launchers Preparatory Programme)   | To propose concepts for new generation launchers, experiments with sample return vehicle, solid and liquid propulsion experiments  | 2009–2012    | <b>0,5</b>               |
| <b>ELIPS Period 3</b> (European Programme for Life and Physical Sciences and Applications in Space)   | Utilization of microgravity environment for life and physical sciences and applied research and development.   | 2008–2012    | <b>2,77</b>              |
| <b>ISS Development</b> (European transportation and Human Exploration) (European Transportation and Human Exploration Preparatory Activities Programme) | Development of transportation means for human spaceflights; in the first stage namely for the International Space Stations (ISS).  | 2009–2012    | <b>0,19</b>              |
| <b>ARTES 1 Phase V: Preliminary Studies and Investigation</b><br>(Advanced Research in Telecommunication Systems)                                       | To define strategic directions for satellite telecommunication involving marketing surveys and technology analyses, feasibility studies, standardization, and alike.   | 2009–2013    | <b>0,12</b>              |
| <b>ARTES 3-4 Phase I: ESA Telecom – Products</b><br>(Advanced Research in Telecommunication Systems)  | To prepare products established on the basis of satellite telecommunication for commercial purposes.   | 2009–2013    | <b>0,70</b>              |
| <b>ARTES 5 Sub-element 5.1: Competitive Workplan Activities</b><br>(Advanced Research in Telecommunication Systems)                                     | To support the early steps up to and including the step where the subject of the development has been built into a configuration representative of the final product and critical performances have been verified by test. | 2012–2014    | <b>1,00</b>              |
| <b>ARTES 10 Phase II-1 – Iris:Satellite Communication for Air Traffic Management</b><br>(Advanced Research in Telecommunication Systems)                | To develop a unified European safety and air traffic management system   | 2009–2011    | <b>4,14</b>              |
| <b>ARTES 20 – IAP Phase I: Integrated Applications Promotion</b><br>(Advanced Research in Telecommunication Systems)                                    | Development of innovative solutions (applications) combining several technologies such as navigation, telecommunication and Earth observations   | 2009–2013    | <b>0,17</b>              |
| <b>European GNSS Evolution</b> (European Global Navigation Satellite System Evolution Programme)  | To maintain and further improve the technology so far acquired through the EGNOS and Galileo projects  | 2009–2011    | <b>0,48</b>              |
| <b>GMES Space Component Segment 2</b><br>(Global Monitoring and Environment and Security Space Components Programme)                                    | To launch the satellite series for Earth's observation Sentinel-1B, 2B, 3B, the preparatory phase of the Sentinel-4, Sentinel-5 satellites and the construction of the Sentinel-5 Precursor satellite.                     | 2009–2018    | <b>1,76</b>              |
| <b>GSTP Phase 5</b><br>(General Support Technology Programme)   | To mature various needed technologies, test their feasibility, turn it into products or readily available technology, or verification under conditions of a spaceflight  | 2009–2013    | <b>3,23</b>              |
| <b>EOEP Period 3</b><br>(Earth Observation Envelope Programme)  | Prepare future Earth observation missions  | 2009–2013    | <b>2,61</b>              |
| <b>PRODEX</b><br>(Scientific Experiment Development Programme)  | Support of design and development of scientific experiment   | 2009–2015    | <b>2,75</b>              |
|   |  | <b>TOTAL</b> | <b>22,59</b>             |

# The Czech Space Alliance (CSA) and the European Space Agency



CSA is an industry association established in 2006 under the auspices of the export promotion agency of the Ministry of Industry and Trade, CzechTrade. It is an association of SMEs, with larger companies being associate members and sharing all the benefits and duties except for voting rights. It is symbolic that the Czech Republic became the 18th the European Space Agency (ESA) member state in 2008, and the association has grown to 18 companies.

**CSA members are winning the great majority of ESA's industrial contracts in the Czech Republic and all the contracts that had been won in international tenders.**

## CSA commercial space experience goes back to the 1990's

The founding members of CSA have been participating in ESA and other space projects since the early 1990's, some of them through an ESA Member State parent company. Hence when ESA carried out the 1st survey of the industrial capabilities in 2002, it was surprised to find companies which had already successfully implemented important international space projects, such as space qualified electronics for the Demetrius project or the MSG CF checkout software tools for Eumetsat.

## Programme for European Cooperating States, PECS,

### 2005-2008 - CSA members won 9 out of 12 industrial contracts

A broader scope of opportunities for industry in principle arose when the Czech Republic entered the ESA Programme for European Co-operating States (PECS) in 2005. However, the programme was administered in such a way, that it did not encourage the participation of new companies. This is clear from the fact, that practically only those with previous space experience and existing ESA contacts were able to negotiate contracts. In other words, the initial group of enthusiasts which existed before PECS barely increased by the end of the PECS period, while PECS was intended to prepare an industry base for full Czech membership. Thus it was no surprise that out of the 12 industry contracts during the PECS period, 11 went to companies with previous space experience - 9 to the CSA members.

Notwithstanding the unfavourable circumstances for commercial space activity, the good results of the previously existing industry and the interest of the government in bringing the GSA (now European GNSS Agency) office of to Prague, combined to shorten the initially envisaged 5 year period to less than 4 years.

### The Czech Republic's accession to the ESA Convention in November 2008 – CSA won 16 out of 23 industry contracts in the Czech Industry Incentive Scheme tenders, and 3 out of 3 contracts in international tenders

Realistic opportunities for new companies to join in the ESA programmes only opened with the full membership, and enforcement of standard ESA rules and procedures. Clear conditions and selection rules were what industry needed, as again shown by the results. Whereas the 4 years of PECS attracted one or two new companies, 2 years of ESA membership attracted eight. The limiting factor was the budget rather than the existing capabilities and industrial interest.

This so far brief period with immediate project results, as well as the psychologically highly important and notable win in the protracted EU negotiations to place the seat of the GSA in Prague, meant that the important political decision makers started to take greater interest in space technologies, the opportunities it brings to the economy and the way it advances the prestige of the country. Not least since ESA successes very aptly support one of the key governmental objectives, namely to demonstrate that the Czech Republic is not just a place with good factories, but a technologically highly developed country.

What better way to prove it, than by giving industry the opportunity to shine in the field of space technologies. We hope that this realisation will be reflected in the budget allocation to the new ESA contribution period, to be presented in the ESA Ministerial Council in 2012.

### The European GNSS Agency seat awarded to Prague in December 2010

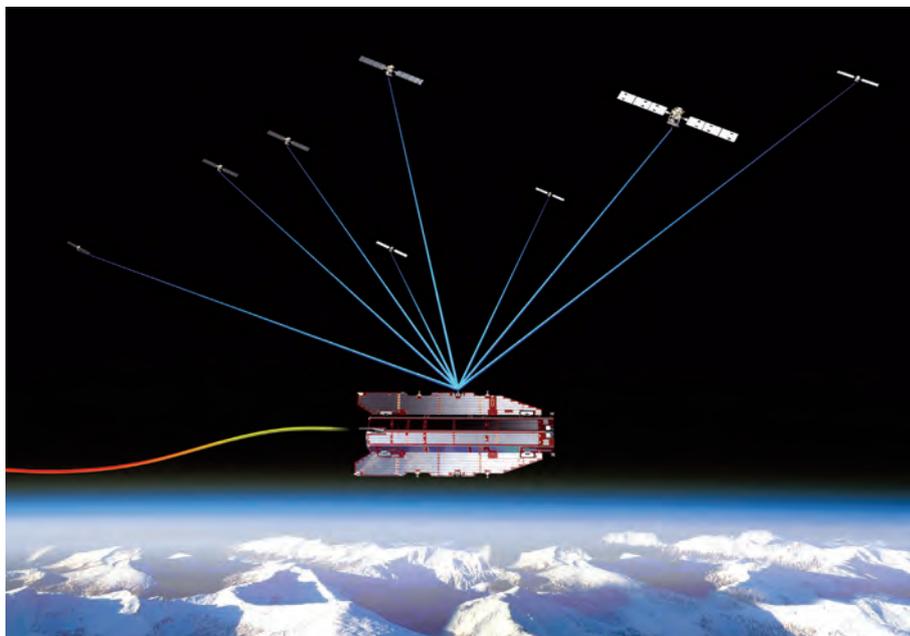
This excellent result of our politicians and of the government commissioner for the placement of the Galileo office in Prague, Karel Dobeš, created

another boost to the interest of the stakeholders and industry in space technologies. Czech industry has been contributing to the Galileo development through the participation in international consortia since 2005, and developing EGNOS technologies in the PECS projects and since full ESA membership. The first CEE EGNOS monitoring station was established in Prague in April 2005. For instance most of the EGNOS learning and educational tools on [www.egnos-pro.esa.int](http://www.egnos-pro.esa.int) have been developed or upgraded by Czech industry. Czech industry is now also responsible for developing software for the GNSS interference monitoring system.

The growing interest of the stakeholders in space has also led to broader realisation that space work is not just about studying the universe but rather, in ESA projects, it is predominantly industrial R&D. This realisation led the government to tasking the Ministry of Transport with the elaboration of the National Space Plan.

### National Space Plan, approved by the Czech government in May 2010, and the Space Coordination Board, approved in April 2011

Already the process of preparation of the Plan had created a breakthrough on several fronts. Competing ministries sat down to discuss and agree a common plan and ways to divide responsibilities according to relevant



competences. The result was the creation of a steering/coordination board led by the Ministry of Transport, with Ministries of Education Youth and Sports, Industry and Trade, and Foreign Affairs taking the lead of the coordination subgroups for scientific, industrial, and international affairs respectively.

Hitherto largely shunned space industry, represented by the Czech Space Alliance, was invited to the table to contribute its practical experience in ESA work and its expectations and needs to increase its participation and good results.

The National Space Plan is based on the analysis of the existing experience of industry and academia from which it makes recommendations for future direction. It sets itself mid-term objectives and measurable goals for the year 2016. The Czech Space Alliance welcomes the result, not least because it took on board many of the industry suggestions and comments.

### And the bad news?

Nothing is perfect, and the main weakness of the Czech space industry is currently that it does not have the same network of partners in other ESA member states as our counterparts in the "old member states". This is where the CSA has to focus its work, now that the most difficult part of the other (internal) goal, namely removing obstacles to the industrial activities including giving undue preference to pure research, has been largely achieved. However, we not only aim to broaden our working relationship

with ESA member states industry and organisations, but also look for the same with our universities, which also have excellent know-how.

**ESA-Czech Task Force and ESA's Czech Industry Incentive Scheme system for New Member States (2008-2014)**

Whereas in PECS, projects were identified and awarded in a hazy and ad-hoc process of direct negotiations, the full membership brought in clear written rules and practical procedures established and honed by ESA over decades. The feared challenge of the bidding process was in fact the opposite - the easing of barriers. The strict rules in fact did away with the uncertainties of the newly developed PECS approach, mostly administered by the, inexperienced with ESA, Czech Board for Space Activities (a council appointed by the Ministry of Education, which included two CSA members) and the Czech Space Office (a private non-profit company). Further counterweight to the challenges of international bidding is the Czech Industry Incentive Scheme, which allocates 45% of the mandatory contributions to the Task Force, to develop the competitiveness of Czech Industry.

The tenders of the Czech Industry Incentive Scheme were

- AO6052 in 2009, with the available budget of 2.4 M € - awarding 15 contracts of which 10 to industry
- and AO6647 in 2010 with the increased budget of over 4 M € - awarding 16 contracts of which 12 to industry

**Czech Industry Incentive Scheme AO6052 (2008)**

| Project Title  | Prime contractor         |
|--|--------------------------|
| Hermetically Sealed Low ESR Tantalum Capacitor                 | AVX Czech Republic       |
| Calomel for hyper-spectral imaging in space applications NAOMI | BBT-Materials processing |
| Parallel Data Mining Components                                | Iguassu software         |
| Preparatory Activities for MTG                                 | CSRC                     |
| Real-time Extrapolation Methods for Thermal Testing            | L.K. Engineering         |
| Real-time Performance Monitoring Tool                          | Iguassu Software         |
| Solar panel deployment ....                                    | Frentech                 |
| Study of SCOS-2000 deployment over WAN for a concept of CMCP   | ANF Data                 |

**Czech Industry Incentive Scheme AO6647 (2011)**

| Project Title   | Prime contractor |
|---|------------------|
| Transient Objects for M&C in GSSC/GMMI                                  | ANF Data         |
| SMT Assembly Verification according to ECSS-Q-ST-38                     | CSRC             |
| Space Application of Timepix-based Universal Radiation Monitor (SATURM) | CSRC             |
| Development of Test Facility dedicated to Passive Components            | EGGO Space       |
| Multimedia Antenna Deployment & pointing Mechanism                      | Frentech         |
| Distributed Raster Processing Framework                                 | Iguassu Software |
| Multi-Constellation Long-term GNSS assessment                           | Iguassu Software |
| EPOXY Core Development  | SYNPO            |

These basic figures also indicate that we are moving towards the goal of having the same industry/science balance as other established ESA states.

This "fiesta" is going to end in 2016, and so we must work hard on developing the partnership with other countries' industry, since the most resource effective way to gain experience in standard ESA international tenders is to participate in tenders with more experienced partners. Many CSA members already have such partners, and three ESA contracts have been awarded as a result of international tenders led by these partners.

**This is an opportunity for you, dear reader, to take advantage of the enthusiastic and technically very capable and innovative Czech companies, gain a long term partner and, last but not least, improve the geographical distribution in ESA activities.**

**The international promotion activities of CSA**

The alliance is very active in informing foreign partners of the know-how and growing space experience of its members, be at international conferences, ESA and Galileo industry days or in bi-lateral meetings with companies and space agencies or associations. In Prague we organise events either under the auspices of the Ministry of Transport, or Czech Trade at the Ministry of Industry and Trade. Examples of such events are:

- 2011 May CSA presentations to the Japanese associations JASPA, SJAC and SPAC in Tokyo
- 2011 Feb. Solar Orbiter workshop with EADS Astrium UK at the Ministry of Transport, Prague
- 2010 Nov. Czech-Brazilian Space Technology Days, Brasilia, Sao Jose dos Campos, Alcantara launch base
- 2010 Oct. Czech-Japan Space Seminar, Jaxa president and chairman of the Space Activities Commission, Prague
- 2010 Oct. Czech-Dutch Bilateral Space Industry Roundtable, Netherland Embassy and Ministry of Transport, Prague

We already have joint projects with companies in Germany, Italy, Spain, Austria and France and we are one of the founding members of the pan-European association of national space SME association Space4SME. We prepared and negotiated cooperation LOI with the Brazilian Space Agency AEB (signed by the Czech Minister of Transport) and an MOU with the Japanese aerospace SME association JASPA (signed by our alliance)

**Next steps**

**Should your organisation like to learn more about what we can offer, please do not hesitate to contact us. We can arrange a meeting or seminar in Prague or at your location. If the company is not our member, we will help you to establish the contact.**

We are actively seeking partners to participate with them in coming bids. Among other things considering us for your consortia can give you the advantage of our still relatively cost effective skills and a chance to improve the geographical distribution of your bid. Once you have worked with us and tested our abilities, we are sure that you will come back for more even without the above bonuses.

Czech us out!

Petr Bares, President of the Czech Space Alliance

September 2011

**Contact**

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# ANF DATA

a Siemens Company



Maintenance mission  
of SCOE, ESTEC

## ANF DATA A SIEMENS COMPANY



ESA's deep-space antenna  
at Cebreros, Spain

### Company profile

ANF DATA spol. s r.o., established in 1992, is a daughter company of Siemens AG Austria.

ANF DATA offers complex IT services – development of software solutions, system integration, system support, HW deliveries, consulting and training. It provides solutions both on the local and international market in various fields, e.g. industry, energy, communications, ground segment of the space industry, and inventory management.

The ANF DATA Space department was established in 1998 and since that time has cooperated with Siemens Austria on development of various software solutions for the European Space Agency (ESA), German Space Agency (DLR), European navigation system Galileo, and for leading satellite operators. The Space department staff has extensive experience in large international projects for leading technological companies.

### Ground segment solutions

Focused on development of software solutions for:

- Satellite Control & Checkout Systems
- Ground Station Monitoring and Control Systems
- Earth Observation Infrastructure
- Performance Evaluation and Analysis

**ANF DATA is an ESA-qualified partner** under the "Ground System Software Related Activities" (GFC8), for IT Domains.

### Significant projects for ESA:

- SCOS-2000 Advanced Monitoring
  - CORBA based Data Distribution Prototype
  - SCOS-2000 Command Supervisor
  - EGOS Data Transfer & Data Management Libraries (DTL/DML)
- EGOS DTL/DML based Mission Control System Demonstrator
- Spatial Observation Services & Infrastructure (SOSI-CZ)
- Study of SCOS-2000 deployment over WAN for a concept of CMCP (SWAN)
- Open-standard Online Observation Service (O3S)
- Operational Data Off-line Analysis, Correlations, and Reporting System (ARES)

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ESA Bidder Code  
58007



Member of the  
Czech Space Alliance



**SIECAMS installation**

#### **Projects in support to Siemens Austria:**

- Galileo Payload Test System (PTS) – definition & implementation of test procedures, automatic tests, system validation, pre-customer acceptance tests, post-delivery on-site support
- Galileo Satellite Constellation Control Facility (SCCF) - Performance Evaluation and Analysis (PEA)
- SCOS-2000 DLR MCS maintenance and evolution (2004 – 2011)
- Monitoring and Control Module for ESTRACK Ground Stations (MCM4)

#### **Satellite communication solutions**

Responsible for customization and on-going evolution and maintenance of the Siemens Multi-Site and Multi-Satellite Control and Monitoring System (SIECAMS)

#### **SIECAMS (Siemens Carrier Monitoring System)**

SIECAMS is a highly sophisticated automated RF traffic monitoring system for the continuous monitoring of satellite signals and for ensuring high quality standards in uplink procedures. SIECAMS includes:

##### **Carrier Monitoring & Signal Analysis**

- Adjacent Satellite Interference measurements
- Transponder Performance measurements
- Hidden Interference detection
- Ka-Band Monitoring

##### **Interference Localization**

The interference localization system is seamlessly integrated in SIECAMS. Therefore, the system provides not only geolocation but also advanced interference detection and classification functionality.

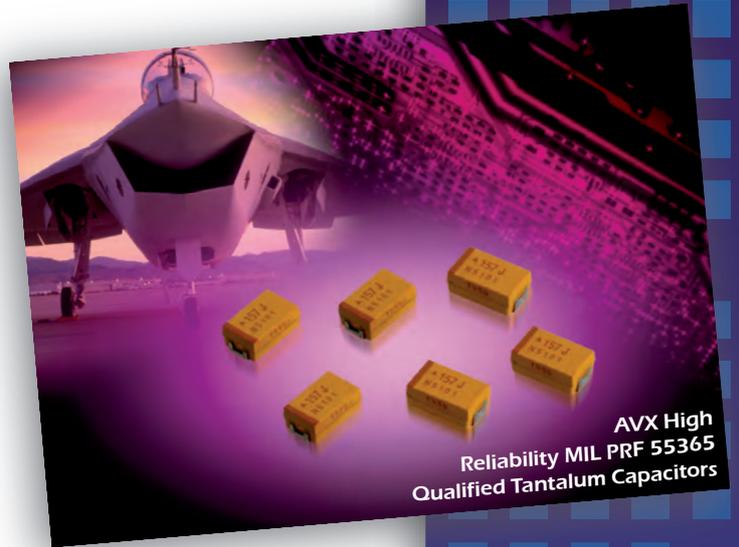
##### **Easy Line Up (ELU)**

- The VSAT Commissioning tool is a method and system for supporting earth station antenna alignment for low-cost two-way satellite communication terminals
- The VSAT Monitoring system allows the measurement of RF quality parameters without interruption of operational services.

SIECAMS is installed on many ground stations distributed all over the world and monitors the downlink traffic of 28 satellites.



A KYOCERA GROUP COMPANY



AVX High Reliability MIL PRF 55365 Qualified Tantalum Capacitors

# AVX CZECH REPUBLIC SRO

A KYOCERA GROUP COMPANY



AVX Tantalum Aerospace Capacitors ESCC 3012 Qualified

AVX is a multinational company based in the U.S.A. and a part of the Japanese industrial group KYOCERA, a leading global manufacturer of passive electronic components. The company offers a wide range of products for various electronic applications from mobile phones, laptops and MP3 players, through the automotive industry to high-reliability aerospace and medical devices.

AVX is the world's number one tantalum and niobium capacitor manufacturer with a market share of over 20%.

### History

AVX has operated in the Czech Republic since 1992. Growing global market opportunities combined with AVX's high volume manufacturing experience and its established technology leadership led to the successful opening of a new plant in Lanskrone in 1994 for the assembly of tantalum SMD chip capacitors. Production grew significantly and a second plant for anode manufacturing was opened in 1998, realising a total start-to-finish solid electrolytic capacitor production facility.

Currently employing 1700 staff, the Lanskrone plant now provides technical, customer and logistic support services to AVX customers worldwide. The first co-operation on development projects at Lanskrone was begun in 1998 covering high-temperature (150degC) tantalum capacitors for automotive electronics, and further development activities at the plant have grown significantly since that time. In 2002, AVX introduced a new, revolutionary, solid electrolytic capacitor based on a niobium oxide anode, initiating a new era in the history of the capacitor.

AVX is an established supplier of tantalum capacitors for the European Space Agency (ESCC - 3012), and further aerospace capacitor development projects have been introduced in 2009.

### Business activities

AVX, a recognized leader in the global passive electronic component and interconnect products industry, is at the forefront of technology, design, manufacturing and supply.

AVX enjoys significant competitive advantages including the benefit of global manufacturing and distribution provided by 20 manufacturing facilities in 11 countries. This assures customers of the most efficient balance of demand and production capability in response to their just-in-time inventory requirements. With research and development centres in five locations around the world - United States, Northern Ireland, England,



AVX offers the widest range of tantalum and NbO capacitors

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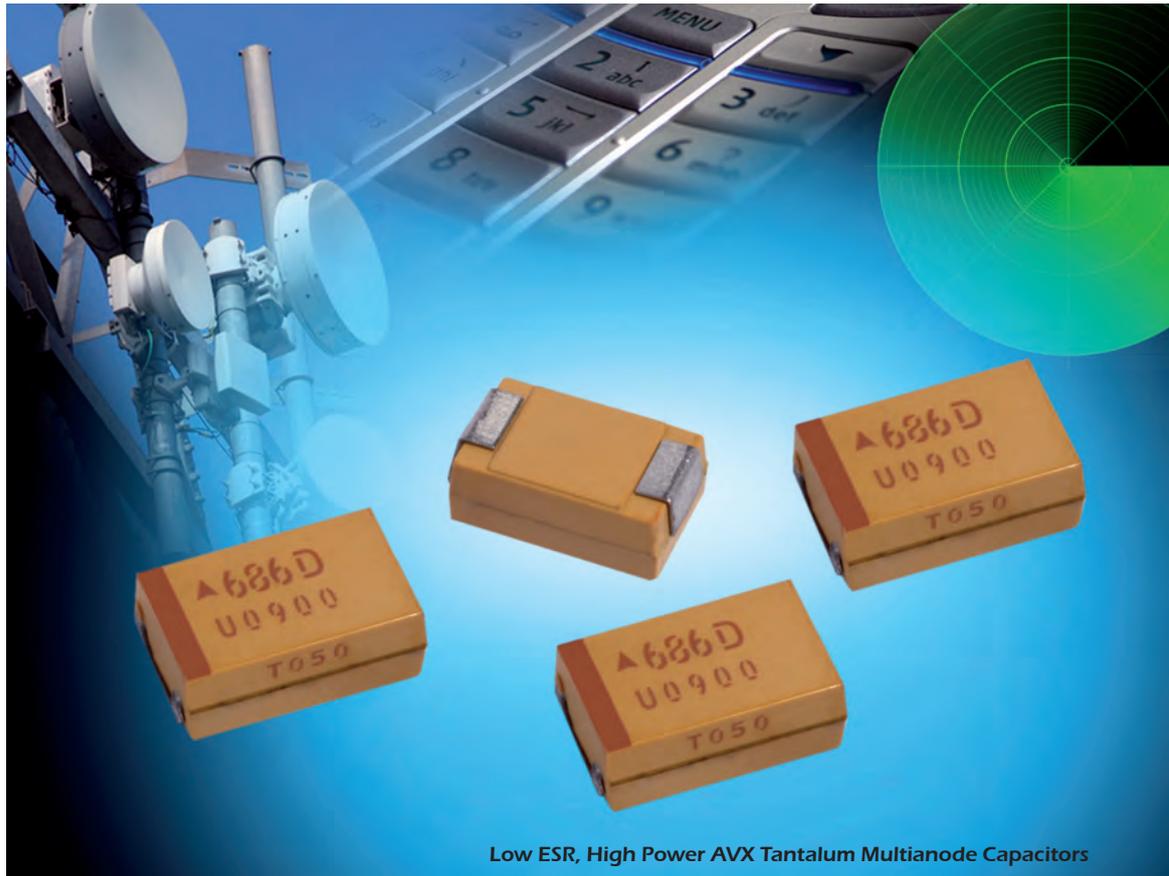
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www.avx.com

ESA Bidder Code  
58042



Member of the Czech Space Alliance



Low ESR, High Power AVX Tantalum Multianode Capacitors

France and Israel - AVX has fostered customer relationships involving the design of new and advanced products to fulfil their specific product requirements.

AVX continues to invest heavily in R&D. The company is set apart from the competition by its broad array of specialty product offerings including ceramic and tantalum capacitors, connectors, thick and thin film capacitors, resistors and integrated passive components. AVX also benefits from its partnership with Kyocera Corporation and the wide breadth of products and technologies that its Japanese parent company offers. AVX enjoys a balance between high volume commodity products and its increasingly-innovative Advanced and Hi-Rel Products offerings.

### Acquired Certifications:

**CECC-ECOAC** – granting the right to use the mark or certificate of conformity

**IECQ-CECC** – incorporating the requirements of ISO 9001:2000

**ISO 9001:2000** – Quality Management System

**ISO / TS 16949** – Quality Management System (meeting the requirements of the automotive industry)

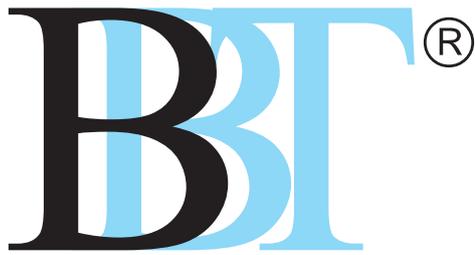
**ISO 14001:2004** – Environmental Management System environment

**SONY GREEN PARTNER AWARD** – granted to companies meeting the requirements of SONY environmental protection.

**ISO 9001** – Quality Management System

**AS 9100** – Quality Management System

**ESCC 3012/001** – SMD Solid Tantalum Capacitors for Space Applications



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

# BBT – MATERIALS PROCESSING, SRO. PRAGUE, BBT



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



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

## Main Fields of Activities

- Crystal chemistry, study of crystal growth and solidification processes, growth of crystals for technical applications (optics, acousto-optics, laser applications, 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 of 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 (1991–2001).

**TITUS/CSK-4:** The 2<sup>nd</sup> generation programmable space furnace for the Euromir '95 (ESA) and MIR '99 - PERSEUS (CNES) missions (BBT in co-operation with ESA, DLR-MUSC, DARA, Humboldt Univ., Kayser-Threde, RKK Energija) (1992–2000).

**Fast optical processors** for Space applications (ESA) - BBT in co-operation with STIL, Ireland (1991–1993).

**Mercurous halides, sapphire and ruby crystals** and their applications (acousto-optics, polarizers, IR-optics, microwaves, laser technologies, electronics etc.) (since 1970).

**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. (since 1980)

**Assistance in the training of astronauts** to operate the research apparatuses made in BBT (1993–1999).

**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 (1988–1992).

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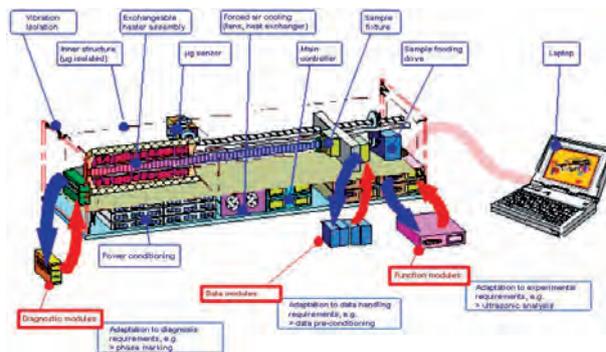
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ESA Bidder Code  
58014



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**Advanced TITUS:** The 3rd generation facility designed for the material experiments in microgravity. (In cooperation with DLR-MUSC, Humboldt Univ., RKK Energia/MIR) (1995–2001).

**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) (1998–2006).

**Passive Damping Platform:** Damping of vibrations and other disturbing accelerations for a material research in microgravity (KONTAKT 1999–2002).

**Thermographic probe** with 10 thermocouples was used for determination of the temperature profiles in space furnaces (KONTAKT 1996–1999).

**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 (KONTAKT 1996–1999).

### 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 recalescence of Ag-Ge alloys on board MIR using the CSK-1 furnace (three-lateral cooperation of Germany (DLR), Czechoslovakia and Russia) (1984–1994).

**TES and G-TES/TEST:** Participation in the German (DLR) **TES** (1990–1995) and **G-TES/TEST** (1986–1998) experiments of a recalescence of alloys (realised on board MIR orbital laboratory using CSK-1 furnace).

**Drop-tower Bremen:** Non-equilibrium solidification experiments performed under conditions of a short-term free fall (in cooperation with ZARM-University in Bremen, Germany) (1990–1994).

**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: Several projects** - Sets of material space experiments.

**PRODEX:** Study of non-equilibrium solidification of multi-component alloys, DTA measurements (2000–2004).

**EUROSTARS:** Innovative acoustooptic systems in the Mid infrared (2008–2011).

**ESA Czech Industry Incentive Scheme:** Acoustooptic device for hyperspectral imaging in space applications etc. (2010–2012)



TITUS MPP for the ISS





Cleanroom 100.000-Class

# CZECH SPACE RESEARCH CENTRE



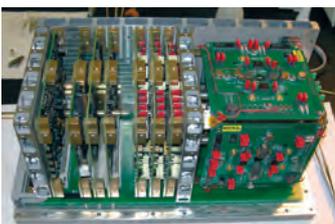
Satellite SMART-1,  
EPDP Project



Satellite INTEGRAL,  
PSAC Project



Satellite DEMETER, I/V  
Converter Project



Satellites SWARM/TEASER,  
Microaccelerometer

## Profile, History and Mission

CSRC is a privately owned Ltd. company situated in Brno and founded in 1994 to develop space technology and standards in the Czech Republic.

CSRC main domain of activity is the complex realization of space electronics projects based on electronics design, embedded software and cleanroom manufacturing.

CSRC main power consists in the long-lasting practice and high technical level of the designers of electronic systems for space purposes proven by a series of successfully operating instruments in many satellites.

CSRC scientific and research partner is the Faculty of Electrical Engineering and Communication, Brno University of Technology, with its broad technical background proven by long-term collaborations in many international research projects.

CSRC has implemented the ESA ECSS standards related to the electronics design and cleanroom manufacturing activities including the certified system of quality assurance corresponding to ISO 9001:2000 standard.

CSRC, has been audited by ESA and is an attractive business partner for the aerospace industry.

## Complex Realization of Space Electronics Projects

### Hardware Design

Standard digital circuits and single-chip microcontrollers, digital circuits with signal processors, FPGA and CPLD design using VHDL, behavioral simulation of the design, test at multi-layer PCB design, electronic circuits for PCI bus including control software development, analog circuit design, behavioral simulation.

### Software Development

Software development is focused on the control and data processing for aerospace, communications or process control including efficient man-machine interface, signal processor and single-chip microcontrollers programming in C language and assembler, development of user specific applications for PC.

### Mechanical Design and Manufacturing

Design of the mechanical parts and/or entire systems based on the CAD/CAM systems with electronic data formats exchange. Mechanical manufacturing is outsourced in qualified facilities having certification in the field of aeronautics and space production, applied technologies including CNC machining, alodine, anodisation, electron beam welding, glass feed-through manufacturing, thin layer sputtering, alodine in aerospace quality, laser-beam cutting.

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### Manufacturing Centre

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ESA Bidder Code  
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Member of the  
Czech Space Alliance

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### Design Verification

Design output in all space projects is submitted to a complex verification using mechanical and thermal analysis based on finite elements method. Parameters are verified to allow safe operation in the space conditions taking into an account especially the space temperature range in the satellite and the vibrations during the launch phase. Testing procedures for thermal vacuum and mechanical vibrations tests are considered as a standard part of the design verification process.

### Project Management

Main design process phases, steps and processes are namely the 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.

### Cleanroom Manufacturing

Space hi-rel manufacturing activities are performed by ESA certified operators in the 100.000-class cleanroom, producing Flight Model & EM PCBs respecting the ESA ECSS manufacturing procedures. Manufacturing flow covers, for example, incoming inspection, components preparation, thermal pre-soldering processes like de-golding and pre-tinning component lead, soldering of through-hole components, soldering of SMD components, fine pitch soldering, fine mechanical operations like frame & fasteners installation, riveting, treatment, cleaning, nitrogen drying, polymerization, mechanical pre-soldering processes like pre-forming, bending, cutting of component leads, packaging and expedition procedures and other cleanroom activities.

### Prominent Space Projects

#### Satellite INTEGRAL, PSAC Project (launched)

Plastic Scintillator Anti-Coincidence (PSAC) Flight unit for photomultiplier high-voltage control, an experiment for the INTEGRAL (International Gamma Ray Astrophysics Laboratory) satellite for processing of the light emission caused by X ray particles covers development, design, analyses, manufacturing, testing, delivery and support in integration. The PSAC sub-systems are the High voltage power supply, the Low voltage power supply and the Electronic control box with the radiation hardened Actel 1280 FPGA.

#### Satellite SMART-1, EPDP Project (launched)

First European mission to the Moon covers the design and development of the flight hardware and software for SMART1 satellite, implementation of CAN bus including analyses, manufacturing, testing, delivery and support in integration.

#### Satellite DEMETER, I/V Converter Project (launched)

Interface system for the Langmuir probe is an intelligent interface between the Langmuir probe and the ground system for scientific data acquisition when converting low-current of pA to  $\mu$ A range to voltage. Interface board operation is controlled by the software application with graphical user interface. The activities cover the development, design, analyses, manufacture, testing, delivery and support in integration.

#### Satellite PROBA 2, DSLP&TPMU Project (launched)

PROBA 2 represented a complete delivery of the electrical and mechanical design including FPGA design, power supply design and all ESA requested tests, simulations and documentations. Two SLP probes (Segmented Langmuir Probe) are dedicated to the measurement of the plasma surrounding the satellite using TPMU (Thermal Plasma Measurement Unit) process sensors.

#### Satellites SWARM/TEASER, Microaccelerometer (launch in preparation)

Manufacturing one engineering model and three flight models for three satellites, the SWARM project being supported by ESA.

### CSRC in ESA Tenders

#### ESA Bidder Code: 58019

AO6052 = Preparatory Activities for MTG Participation / Study

AO6647 = Space Application of Timepix-Based Universal Radiation Monitor / Flight HW

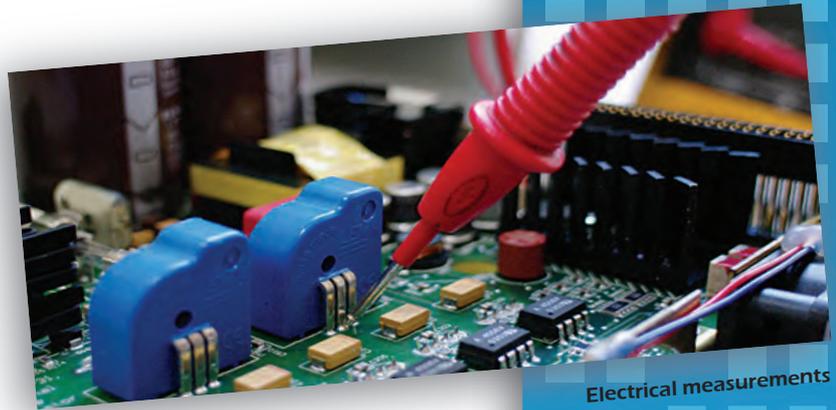
AO6647 = SMT Assembly Verification Programme According to ECSS-Q-ST-70-38 / Study

### Other Projects Participation

ACES ELT, XMM Satellite - EPIC Experiment, TARANIS Satellite, AGILE, MALST, SMART FUEL, METOP, SATELCOM, NODE 3, GOME 2, CLUSTER II, PCDF-CCD HEAD, MONSTER and others...

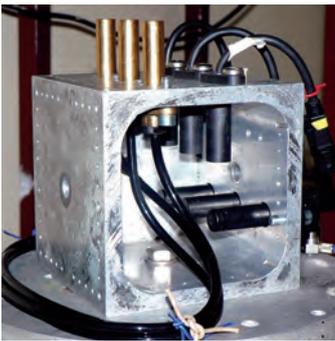


PROBA 2,  
DSLP&TPMU Project



Electrical measurements

# EGGO SPACE S.R.O.



Vibration test

## General description

EGGO Space offers a wide range of services and expertise including testing of EEE components, Industrial Screen-printing & Recycling of contaminated substances.

EGGO Test House benefits from a vast experience in testing electrical, mechanical and life properties of electronic components as well as hybrid integrated circuits and their applications.

The main range of Test Laboratory's activities consists of climatic, mechanical and life-time testing of components, parts and materials as well as interpretation and processing of results and defect analyses for electrical engineering and related industries. These tests serve customers from various industries including electrical, automotive and aerospace.

The organization and Test Laboratory procedures comply with the provisions of the European Standard ČSN EN ISO/IEC 17 025. The Test Laboratory was awarded the statute of a certified subcontractor for Electrotechnical Testing Institute, Prague.

One of the main activities of EGGO Test House is to provide support services in development or qualification for space devices or components as defined in fields of activity of the Czech National Space Plan, chapter 5.5. – Devices and Components and Flight Hardware.

EGGO became a member of the Czech Space Alliance at the start of 2011.



Electrical characterization of components

## EGGO Test House - fields of expertise / capabilities

- Reliability testing
- Failure analysis
- Temperature/humidity stress
- Mechanical stress, solderability
- Non-linearity measurements
- Corrosion test
- Evaluation testing of passive components (Supercapacitors, Tantalum capacitors, Resistors, Relays) as per ESCC standards (ESCC 2263000)
- Designing and manufacturing of electronic devices for special purpose machinery & test measuring equipment



Change of temperature test

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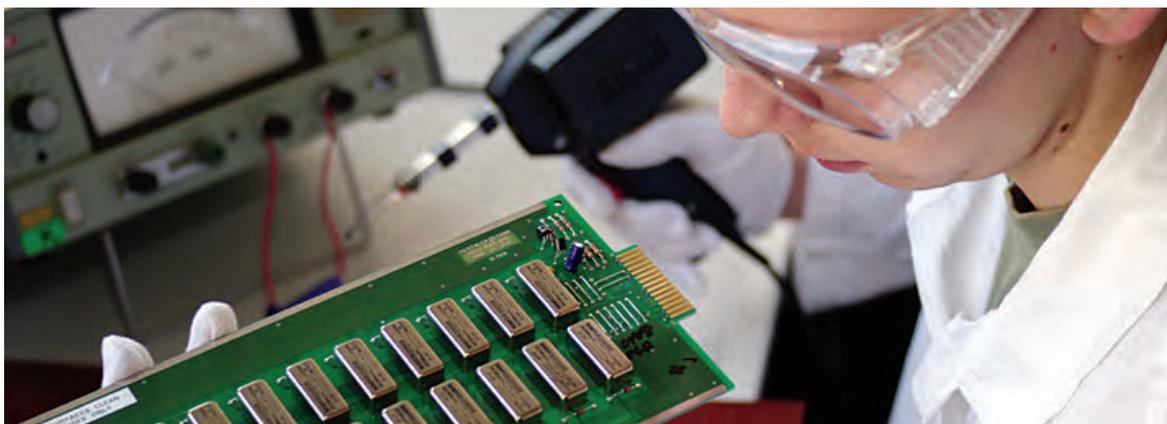
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Mrs. Petra Štěpánková  
[stepankovap@eggo.cz](mailto:stepankovap@eggo.cz)

ESA Bidder Code  
58065



Sample preparation for testing

### Space projects, products & services

- 1) Reliability Testing of AVX low ESR Tantalum capacitors types TPS and TPM for AVX / CNES project.
- 2) Contract no.: 400010504/10/NL/PA – Low ESR Tantalum Capacitor Evaluation and Qualification  
Contractor: AVX Corporation – Tantalum division;  
Sub-contractor: EGGO Space s.r.o. – responsible for the Evaluation of Tantalum Capacitors phase
- 3) Contract no.: 4000103977/11/NL/CBi – Development of Test Facility Dedicated to Passives Components (The project was selected under the CZ industry incentive scheme by ESA & CZ government).  
Contractor: EGGO Space s.r.o.

### Futher projects:

- Measure maximum rating of components (physical limit)
- Identify limit of current technology and evaluate new technology for high vibration and shock
- Determine derating of components

### Certification:

ISO 9001:2009

ISO 14001:2005



ESCUS Control Unit  
 on a design of UAV GCS,  
 © ESC, 2010

# EVOLVING SYSTEMS CONSULTING S.R.O.

## AN ESC HOLDING COMPANY



HAES 400, UAV Aerial Target,  
 produced in HAES CCUAS LABS  
 - The Hacker Model Prod. and  
 Evolving Systems' Competence  
 Center for Unmanned Aerial  
 Systems.



The SWARM satellite develop-  
 ment phase is in progress with  
 EM2 testing with OBC bread-  
 board in Astrium clean room.  
 ESC delivers flight software for  
 one of the SWARM instruments,  
 the Microaccelerometer MAC-04.

From the left: ACC EM2 in the  
 SWARM OBC testbed, SWARM  
 electrical system engineer  
 (EADS), SWARM SW system  
 engineer (EADS), ACC electrical  
 engineer (VZLU), ACC SW engi-  
 neer (ESC), © EADS + © ESC.

### General information

- ESC is a leader in the field of on-board software in the Czech Republic and it is one of the leading Czech SMEs in the field of innovative R&D projects with a focus on aerospace projects.
- ESC is also experienced in other areas like custom embedded systems for industrial automation, PLC technology, data transmission and microwave high frequency applications.

### Products and activities

#### Flight software programming for various satellite on-board instruments:

- **Flight Software for ESA's SWARM Micro-Accelerometer MAC04**  
 ESC has delivered the Flight software (Startup SW & Application SW) and GSE software (Test Equipment SW) for an Micro-Accelerometer Instrument MAC04 for the Earth's Magnetic field and environment Explorer SWARM. ESC has been responsible for the complete software package in all phases (requirements and architecture design phase, detailed design and implementation phase, delivery and acceptance phase). Prime: Astrium GmbH, Integrator of the Micro-Accelerometer system in the Czech Republic: VZLÚ a.s.  
 The ESA SWARM mission will provide the best ever survey of the geomagnetic field and its temporal evolution, in order to gain new insights into the Earth System by improving our understanding of the Earth's interior and physical climate. The launch is mentioned for mid 2012.

- **Flight Software for Solar Orbiter's STIX Instrument**

ESC is conducting the engineering support during the project phase B for the Flight software (StartUp SW - Mission critical SW & Application SW) for STIX (Spectrometer Telescope for Imaging X rays).

The Solar Orbiter is one of the Cosmic Vision M-Class ESA missions. The mission goal is to understand (and even predict) how the Sun creates and controls the Heliosphere. STIX is one of the Solar Orbiter's on-board remote sensing instruments. STIX provides imaging spectroscopy of solar thermal and non-thermal X-ray emissions from approx. 4 to 150 keV, with unprecedented sensitivity and spatial resolution (near perihelion), and good spectral resolution. Launch is scheduled to 2017.

#### ESA GSTP projects:

ESA's General Support Technology Programme (GSTP) exists to convert promising engineering concepts into a broad spectrum of mature products. ESC is working on two GSTP projects:

- **AO6488 OBCP-BB: Requirements and I/F definition for future OBCP Building Block**

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**ESA Bidder Code  
 58020**



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 Czech Space Alliance

Spacecraft on-board autonomy is becoming more and more important, in particular for deep space missions with long propagation delays and low telemetry bandwidths. One method by which the Spacecraft is able to maintain this autonomy is through the use of On-Board Control Procedures. This GSTP activity makes an assessment of the ECSS-E-ST-70-01C standard, a review the existing OBCP technologies and determines requirements for its future implementation as a building block prototype. As a part of the activity, a prototype OBCP Building Block implementation is produced.

• **AO6452 OSRAc: On-board Software Reference Architecture consolidation**

Study on the future modular reusable/reference for on-board software architecture with a goal to reuse the On-board software in a systematic manner. This GSTP study is following activities CoDeT and Domeng.

**GSE (Ground Support Equipment) software programming:**

ESC has delivered the Ground Support Equipment (GSE Test Equipment Software) Software for the MAC04 instrument.

**Data Processing software:**

• **Data processing ground segment software for SphinX - a fast Soft X-ray Spectrophotometer for the Russian Satellite CORONAS**

ESC has developed data processing ground segment software for SphinX - a fast Soft X-ray Spectrophotometer for the Russian CORONAS Solar Mission in cooperation with Astronomical Institute, Academy of Sciences of the Czech Republic. The end customer is the Space Research Center of the Polish Academy of Sciences.

The purpose of software is to analyze and process incoming data dumps, downloaded from the spacecraft operational center. The inputs for the processing are SphinX spectrometer science (X-ray) data and auxiliary data - housekeeping/technological data and spacecraft position/orientation data. Processed data will be accessible locally using the interactive visualization tool and remotely using a web server (data catalogue and visualization). Launched on January 30, 2009.

**AO6050 IRIS System Design Phase B:**

ESC participates in two independent workpackages of the IRIS programme.

• **ATM Repeater Verification Testbed**

ESC is member of team which defines the architecture of a simulator of the telecommunication payload to be carried on the satellite and implements the simulator and its sub-components. This includes simulation of the ATM repeater and the ground to satellite KU-band and aircraft to satellite L-band radio links.

• **GUI for TC processor**

Objective of another ESC task is to develop a common data processing and graphical library for the TC Results Processor, to be used to support the test reports generation and further to design and develop the TC GUI module, TC Test manager and TC test processor interface. The development follows the ECSS standardization as applicable for the ground support equipment. The ESC delivery consists of the Software module, the host platform HW and the appropriate documentation.

**Non Space:**

• ESC is developing 4 UAV production lines (HAES 90, 400, 700 and HAES Scanner). ESC's R&D development in Unmanned Control Systems (ESCUCS) includes S&A Collision Avoidance System; UAS Ground Segment modules compliant with STANAG 4586 w/ C2 integration; long-term aims also include UGV and even UUV.

• RWE Rhein-Ruhr: implementation of the system Optimization of Energy Flows for the RWE collection centre in Ruhr Area. RWE Graphic modeling of the network of gauging points of the energy flows and their statistic evaluation; integration of customers and trade partners through the Internet.

**Technical know-how**

ESC has in a team qualified software and hardware engineers, who have made several flight software packages as well as ground segment hardware and software for various satellite instruments and unmanned flying vehicles. The personnel is competent in real-time and embedded systems programming and has collected already over 40 man years in space engineering work. Besides of that ESC employs software architects, database engineers and test & configuration engineers. ESC's space engineers are familiar with ECSS standards.

**Field of specialization**

Space qualified on-board software • Software quality • Embedded Software • Real-time Software • Control Systems • Navigation • Software Architecture • Hardware Design • Development • EGSE/SCOE • Embedded microcontrollers • Data transmission • Microwave high frequency applications

**Software quality**

ESC applies the ECSS standards:

- ECSS-E-ST-40C Space Engineering – Software
- ECSS-E-ST-70C Ground systems and operations
- ECSS-E-70-41A Ground systems and operations – TM/TC packet utilization
- ECSS-M-ST-40C Rev. 1 Space Engineering – Configuration management
- ECSS-M-ST-80C Risk management
- ECSS-Q-ST-20C Quality Assurance
- ECSS-Q-ST-80C SW Product Assurance
- and other standards.

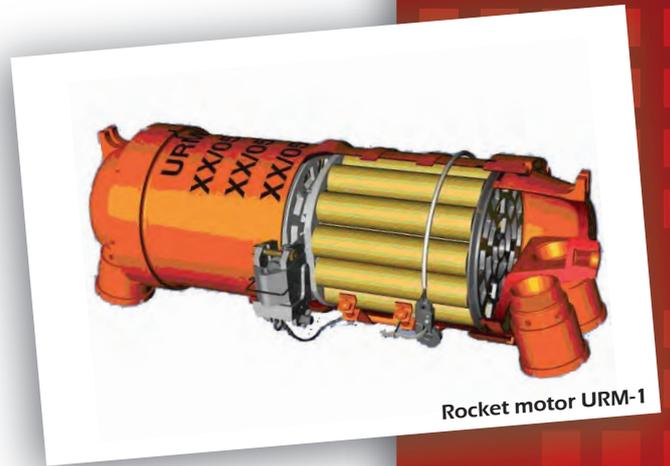
**“Space” objectives for next years**

ESC would like to be one of the best players on a field of embedded systems development for scientific, commercial and military satellite on-board systems in Europe.

ESC is very interested in ESA projects in downstream services, telecommunications, ground segment data processing software, Earth observation and satellite navigation.

**ESC is ready to succeed in ESA ITTs.**





# EXPLOSION A.S.



New generation of pyroelements for injection seat VS-2



Triple base smokeless powder D380



Smokeless powder D380 in bi-modular system XF (Bi-MCS design)



Detonating Cord Startline 12

Our first ESA contract in AO6647 is "Qualification of the Ariane 5 launcher pyro-neutralisation cutting system"

## History

There is a series of events in more than eighty years history of Explosia that affected considerably further development of the firm. The very decision of the Czechoslovak Government from 1920 to establish the factory for production of explosives in Semtín not far from Pardubice belongs, of course, among such events. In Czechoslovakia, the "Czechoslovak Joint-Stock Factory for Explosive Materials", which was the official denomination, represented an important enterprise from the viewpoint of securing the defence of the newly established state. Denomination EXPLOSION was adopted as late as in the 1930s.

Since the establishing, however, EXPLOSION produced explosives not only for requirements of the Army but also a wide assortment of smokeless powders and explosives designed for commercial use. The building up of EXPLOSION went on till the beginning of the World War II.

After the end of the World War II EXPLOSION stopped existing as an independent firm being incorporated, together with other chemical works near to Pardubice, into the "East Bohemian Chemical Works - SYNTHESIA".

In 1954, the Research Institute of Industrial Chemistry was established that participated significantly both in the development of the new products and implementation of new technologies. Important modernization of production occurred in the 1970s and 1980s. Gradually, the assortment was extended of the explosives and smokeless powders produced as well.

In 1990, the use of denomination EXPLOSION was resumed. Political and economic changes leading to partition of Czechoslovakia resulted also in considerable limitation of armament production. Extensive changes took place in the structure of chemical industry within the 1990s. Organizational changes occurred in the EXPLOSION too, of course. From 1998 EXPLOSION was a part of ALIACHEM a.s.

Important step aiming at stabilisation of EXPLOSION was establishing the "Business Unit EXPLOSION" in 1999. Research and production of explosives merged together with the Sales Group into one unit. Within the framework of ongoing restructuring of ALIACHEM a.s., the main shareholders decided in 2001 to transform Business Unit EXPLOSION to the subsidiary firm EXPLOSION a.s. that was, within the ongoing changes in the proprietary structure, offered to the State.

On January 23, 2002 the decision was made by the Government of the Czech Republic on property participation of the State in EXPLOSION a.s. with the aim to secure strategic interests of defence of the State in the field of research and production of explosives in the Czech Republic. After more than eighty years a new chapter in the history of EXPLOSION starts to be written.

## Contact:

Explosia a.s.  
Semtín 107, 530 50  
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ladislav.velehradsky@  
explosia.cz

www.explosia.cz

ESA Bidder Code  
58085

## Research Institute of Industrial Chemistry (VÚPCH)

The Research Institute of Industrial Chemistry is a part of EXPLOSIA a.s., which is one of largest chemical companies in the Czech Republic. The Institute has the leading position in the research and development of explosives in our country.

The Research Institute of Industrial Chemistry was founded in 1954 as an institution for solving the problems connected with the production and use of explosives and propellants primarily in military techniques.

The concentration of specialist, not only in the field of explosives and propellants, but also in designing and engineering, analytical chemistry and safety engineering forms an unique theoretical and practical background for the research and development activities.

The close connection with production units of EXPLOSIA gives the excellent possibility of the quick transfer of research results in the practice.

The research and development in the field of military technics continues to be an important part of activities but the VUPCH has at present much more opportunities to offer and apply the knowledge, skills and experience also in the civil area.

The broad spectrum of activities has been accomplished in four research departments which are oriented in smokeless powders, rocket propellants, military and civil explosives, analytical chemistry, mechanical engineering.

Important task is to extend our participation in the international collaboration in the research and development of explosives and ammunition.

In the future the VUPCH will focus its aim on the research of explosives and ammunition, safety aspects of these systems including LOVA explosives and IM munitions, civil exploitation of explosives and on further creative activities in favour of our customers and general growth of the EXPLOSIA a.s.

### Scope of activities

- **Single** base and double base powders, ball powders, and rocket propellants both for military and civil use.
- **Rocket** motors and ammunition.
- **Combustible** cartridges, modular combustible cartridge cases.
- **Military** explosives and charges for ammunition.
- **Plastic** and elastic explosives.
- **Low** vulnerability explosives and IM munitions.
- **Civil** explosives for blasting technologies.
- **Filing** of explosives and assembly of explosive systems.
- **Safety** engineering in explosives and chemical processes.
- **Explosive** working of metals.
- **Fire-fighting** and explosion suppression systems.
- **Chemical** processes including designing of equipment for the production of energetic materials.
- **Detonation** microcords.
- **Marking** agents and detection of explosives.
- **Ecology** in explosives and chemical production.
- **Demilitarisation** of ammunition and explosives.
- **Special** analytical methods.
- **Disposal** of harmful substances and toxic wastes.
- **Small** scale production of new energetic materials.

### Location

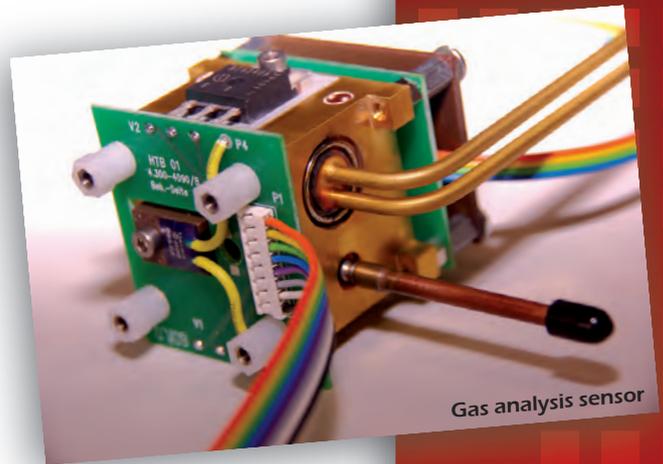
The Explosia extends at northwest outskirts of the city Pardubice.

### Quality assurance

#### ISO 9002 and 9001

Explosia was awarded with a certificate of the quality assurance management according a standard ISN EN ISO 9002 issued on the basis of audits carried out by the company Lloyd's Register Quality Assurance, namely for the main production commodities. For some products these certificates were issued on the basis of follow-up audits. In addition to that, Explosia was awarded with such a certificate for all central sections of the company. The Research Institute of Industrial Chemistry, which is a part of the division, owns a certificate CSN EN ISO 9001.

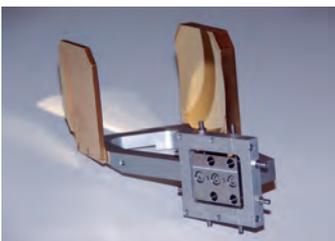




# FRENTECH AEROSPACE S.R.O. SUPPLIER FOR AEROSPACE



Precision tooled  
element for  
a telecomms satellite



Mirror assembly for ESO  
(Project ALMA)



Assambly

## General information

**Established:** 1994

**Total number of employees:** 82

**Export:** 100%

**Main activity:** Production and delivery of parts and modules for aircraft and space industry (70% of turnover), production of precision mechanics for other lines of business (30% of turnover).

**Another activities:** Design and development of subsystems for reactive propulsion systems of satellites, participation in ESA (European Space Agency) and ESO (European Organization for Astronomical Research in the Southern Hemisphere) projects.

**Production premises:** New production premises (2009), production area 2400 m<sup>2</sup>, assembly premises 400 m<sup>2</sup> (clean room 80 m<sup>2</sup> class 100 000 will be available by February 2012), new offices.

**Reference:** Airbus, Premium Aerotec, Thales Alenia Space, EATON Fluid Systems, MT-Aerospace, TESAT SpaceCom, EMERSON, Nord Micro, Thales, EADS Astrium, MBDA, SAGEM, BOSCH, Flextronics, Oxford Instruments.

**Communication:** English, German.

**Contact:** Pavel Sobotka (managing director)

## Description of the company:

Frentech Aerospace s.r.o. is a state-of-the-art company, very well equipped with modern and productive CNC machines, quality assembly premises which can be quickly adapted into clean room facility and air-conditioned inspection room with two CMM by Mitutoyo. Frentech Aerospace presents itself as a sophisticated company with installed system for real time production control CPC (by Mazak). In scope of this system we actively use software for Planning, Tool Management System and Machine Monitoring System. For programming we have three installations of Solid Works a Solid Cam (CAD/CAM).

Frentech Aerospace s.r.o. is certified according to ISO9001, AS9100, ISO14001, QSF-A (Airbus).

The company is focused on production and delivery of parts and assembled modules mostly for aircraft and space industry. Beside this line of business also delivers its products for demanding fields such as instrument

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Jarní 48  
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Tel.:  
+420 545 425 711

Fax:  
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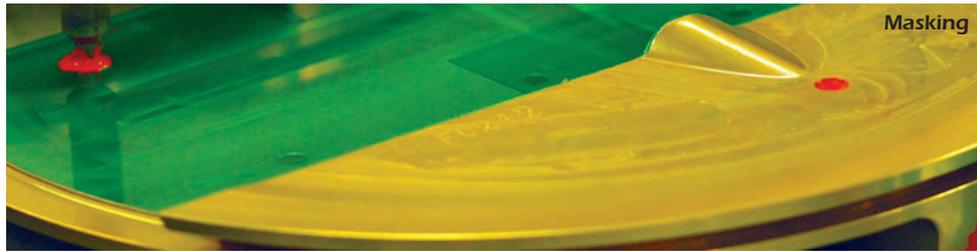
E-mail:  
mailbox@frentech.eu

www.frentech.eu

ESA Bidder Code  
58052



Member of the  
Czech Space Alliance



technology, microelectronics, nanotechnology, radar technique, production of special machines, medicine and vacuum technique.

There are 20 CNC machines available for production of complex parts including five machines with 5 driven axes and also one machine with 9 driven axes. For productive production of the parts we have two HSC five-axes Fehlmann machines equipped with high level of automation with EROWA robot and stock for 140 pallets. These machines can operate in unmanned mode.

Any type of material is machined (Aluminium, Titanium, Stainless steel, Inconel, Monel etc.). The material is purchased from certified resources in Europe and USA. Surface treatments are performed by our subcontractors who are certified according to NADCAP.

In newly built clean room we will place a test chamber (approx.. 1 m<sup>3</sup>) for temperature range from -180°C to +150°C including another equipment for space assembly.

Recently development is focused on design, development and construction of subsystem prototypes for reactive propulsion units for satellites and other subsystems for space. In this field the company cooperates with Thales Alenia Space and EADS Astrium. Another very prestigious project is production of special mirrors for ESO (project ALMA in Chile). Based on this experience the company increases its design and development activities for which it cooperates with the technical university in Brno.

During last years the company obtained necessary know-how for production of aircraft and space techniques. All employees such as technicians and operators are very skilled and highly motivated in order to achieve the best possible technical and economical results of the company.

We are also member of the Czech Space Alliance and the Moravian Aerospace Cluster.

In the scope of the ESA tender AO6647, "NEW GENERATION MULTIMEDIA ANTENNA DEPLOYMENT AND POITING MECHANISM" project was chosen from Frentech Aerospace s.r.o for the amount of 1 mil EUR. For telecommunication satellites our company delivers more than 9 thousand precision parts per year.



Certificate QSF-A



Certificate AS9100



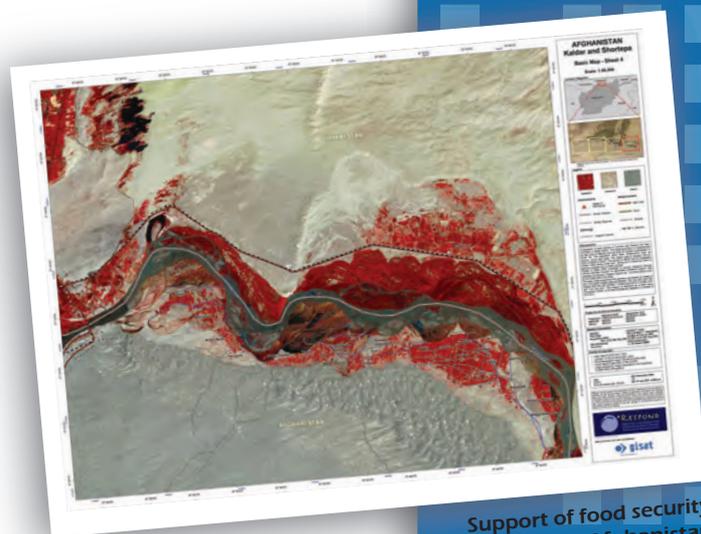
Certificate ISO 14001



Certificate ISO9001



Frenotech Aerospace  
company offices

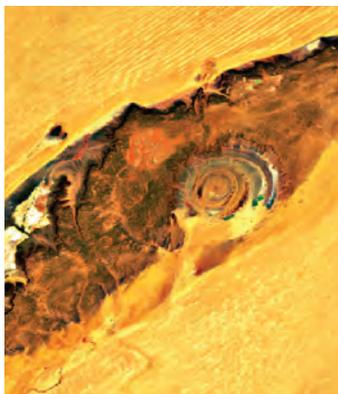


Support of food security mission in Afghanistan for 'People In Need (PIN)' [RESPOND project]

# GISAT S.R.O.



ENVISAT / MERIS image (300 m resolution, 17.7.2011), Barents Sea, Copyright © 2011 ESA



ENVISAT / MERIS image (300 m resolution, 01.11.2010), Mauritania, Copyright © 2010 ESA

## Company profile

Gisat was established in 1990 as the first remote sensing and geoinformation service company in the Czech Republic. The mission of the company is to provide its clients with wide range of value added, complete, high quality and 'state-of-the-art' geoinformation services based on the Earth Observation technology. Thanks to the long-term presence on the European geospatial market and extensive experience from the past projects Gisat has established sustainable and reliable partnerships with its domestic and international clients and partners. The service portfolio extends from satellite data and geomatics software distribution, through specialized image & GIS data processing and analysis, up to advanced geoinformation products and services.

Gisat is a SME sized company comprised of small core team of 15 permanent staff and extensive network of supporting multidisciplinary experts for specifically oriented tasks. The background and expertise of the Gisat team is mainly in agriculture, cartography, geography and natural sciences, land management, surveying and informatics. All of the staff members hold MSc degree or equivalent. The company is ISO 9001 & ISO 14001 certified to guarantee the quality of provided services and to reflect the responsibility in environmental impacts of its activities.

## Products and Services

The majority of the company activities is related to the use of remote sensing imagery. Gisat is dedicated to provide its partners and clients with a broad range of products and services. They include **data acquisition** (based on the long-term partnerships with most of existing world-wide satellite data providers Gisat represents the centre point for all clients interested in satellite imagery), **data processing** (standard data processing services, such as airborne and satellite data orthorectification & mosaicking, DEM generation, vector extraction, ...), **data analysis** (topographic & thematic mapping using optical & radar satellite imagery, map updating, landscape change mapping & analysis, ...), **GIS development & modeling** (GIS database creation & integration, raster & vector modeling, spatial analysis, suitability analysis, topographic analysis, ...) and **geoinformation assessment** (environmental accounting, environmental & agricultural indicators development, water & urban management support, environmental & agricultural monitoring, ...).

**Satellite data mapping** represents the key service of the company. Thus the **operational processing chains** for the main application areas are internally set-up and further developed. They include data preparation & rectification, image classification & interpretation, post-processing routines, quality control & validation procedures.

## Contact:

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www.gisat.cz

ESA Bidder Code  
58001

## Thematic areas

Gisat's activities cover an impressive range of thematic areas. Environmental, agricultural and urban mapping applications represent the key thematic service areas.

- **Environment** Land cover/land use mapping and change analyses, soil erosion modeling, air&water pollution...
- **Agriculture** Crop monitoring, crop acreage estimation, agro-meteorological modeling, crop yield forecasting, subsidy control, precision farming...
- **Urban studies/spatial planning** Urban mapping, baseline maps, multi-criteria based optimisation, resource-demand tasks...
- **Defence, security, hazards** Map update, terrain analysis, flood monitoring, multi-criteria risk analysis...
- **Earth exploration** Oil and gas exploration, water resource detection, geological mapping...
- **Forestry** Forest mapping and inventories, change detection, damage analyses...
- **Infrastructure** GIS based management and planning, transport corridors mapping and monitoring...
- **Other** Tailored geo-services/products for specific clients.

## References

### European Environment Agency (EEA)

Gisat experts have been involved for more than a decade in European land cover mapping. Since 1997 Gisat has long-term partnership with European Environment Agency being the partner of several ETC consortia focusing on land monitoring. Gisat is also a member of the European technical team implementing CLC2000 and CLC2006 mapping campaigns.

### Global Monitoring for Environment and Security (GMES)

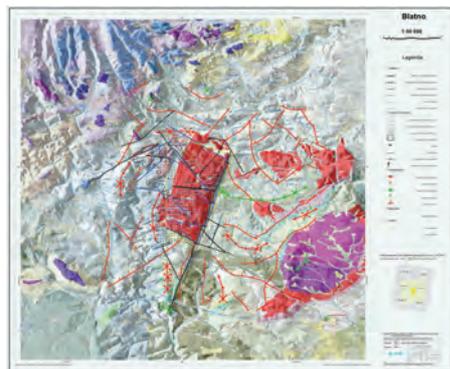
GMES is the principal European initiative (supported by the European Commission and the European Space Agency) to boost up European EO related business answering growing demand for various geo-spatial data and services from European and regional users. Gisat is following the GMES related activities since its early beginning as the mission of the company is in the best harmony with GMES principles and goals. The company is ranked among the main European service providers in the two of three priority thematic domains: Land Monitoring and Emergency Response.

### European Space Agency (ESA)

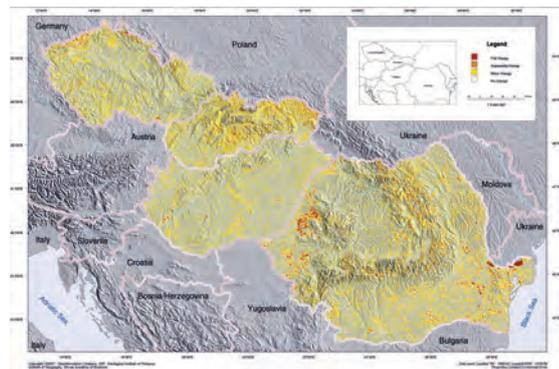
The cooperation with ESA has started in 1998 when Gisat applied for the first AO / Category-1 project. Since this time Gisat has successfully concluded a dozen of projects mostly related to research and applications in the domain of Earth Observation technology.

## Recent projects

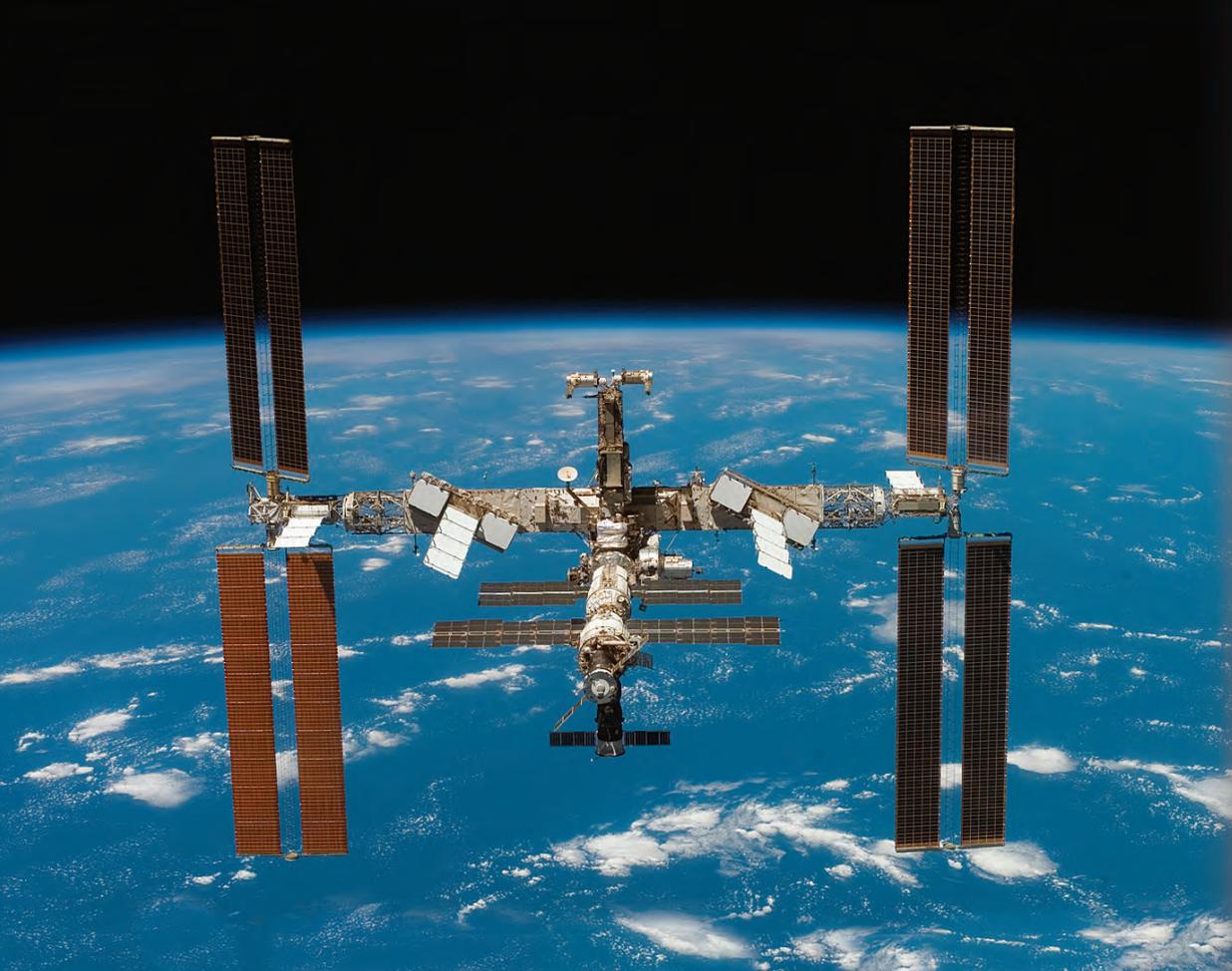
- MARSOP3 - Operational activities for MARS Crop Yield Forecasting System, 2008 – 2013, Joint Research Centre (DG JRC)
- HLANDATA - Creation of value-added services based on Harmonized Land Use and Land Cover Datasets, 2010 – 2013, EC FP7
- CwRS - Remote sensing control of agricultural area-based subsidies, 2004 – 2012, State Agricultural Intervention Fund (Czech Republic)
- EOWORLD - Earth observation services for WorldBank, 2011 – 2012, European Space Agency (ESA)
- geoland2 - GMES Land Monitoring services, 2008 – 2012, EC FP7
- SAFER - GMES Emergency response and development support, 2009 – 2012, EC FP7
- G-MOSAIC - GMES Support to security applications, 2009 – 2012, EC FP7
- Operational snow monitoring in the Czech Republic, 2010 – 2011, Czech Hydrometeorological Institute
- UrbanAtlas+ Demonstration of use of UrbanAtlas data, 2010 – 2011, European Space Agency (ESA)
- CORINE Land Cover data 2000/2006 analysis, 2009 – 2010, European Environment Agency (EEA)



Morfotectonic map for a proposed DGR site for nuclear waste in the Czech Republic [GeoBariera project]



Synthesis map showing spatial land cover change intensity in 20 years (1970's – 1990's) in selected CEE countries [PTL LC project]



# Honeywell

## **HONEYWELL** INTERNATIONAL S.R.O.

Honeywell is a leading global provider of integrated avionics, engines, systems and service solutions for aircraft manufacturers, airlines, business and general aviation, military, space and airport operations and has a long and proud heritage in the Czech Republic since its first office opened in 1962 in Prague. Honeywell Aerospace now operates from three locations across the Czech Republic, Prague, Olomouc and Brno. Each of these sites offers a range of skills, capabilities and technologies to the Honeywell Aerospace portfolio.

In the Space sector Honeywell provides a wide range of high quality, innovative products that have contributed to the mission success of many different and varied space platforms. We offer our customers our commitment to excellence and complete solutions for space applications. Our heritage of providing best value avionics, controls and semi-conductor solutions for the productive use of space demonstrates both our world-class capability and our long-term commitment to space programmes.

Leveraging its Industrial and Research capability across the Czech Republic, Honeywell serves the European Space Agency with advanced studies and state of the art research and technology capability on the IRIS as well as the Czech Industry Incentive Scheme programs. Honeywell's Aerospace footprint in the Czech Republic builds upon a history of excellence in serving the European Space industry and Primes such as Thales Alenia Space, EADS Astrium or OHB, in the following areas:

### **Contact:**

Honeywell  
International s.r.o.  
V Parku 2325/16  
148 00  
Prague - Chodov,  
Czech Republic

[www.honeywell.com](http://www.honeywell.com)

ESA Bidder Code  
58021

## **Environmental Control and Life Support Systems**

Honeywell is a leader in environmental control and life support systems with over 500 million aircraft flight hours logged

## **Guidance and Navigation**

Honeywell's Space group has more than 40 years experience producing first-rate guidance, navigation and control products for various space platforms

## **Integrated Systems Data Processing**

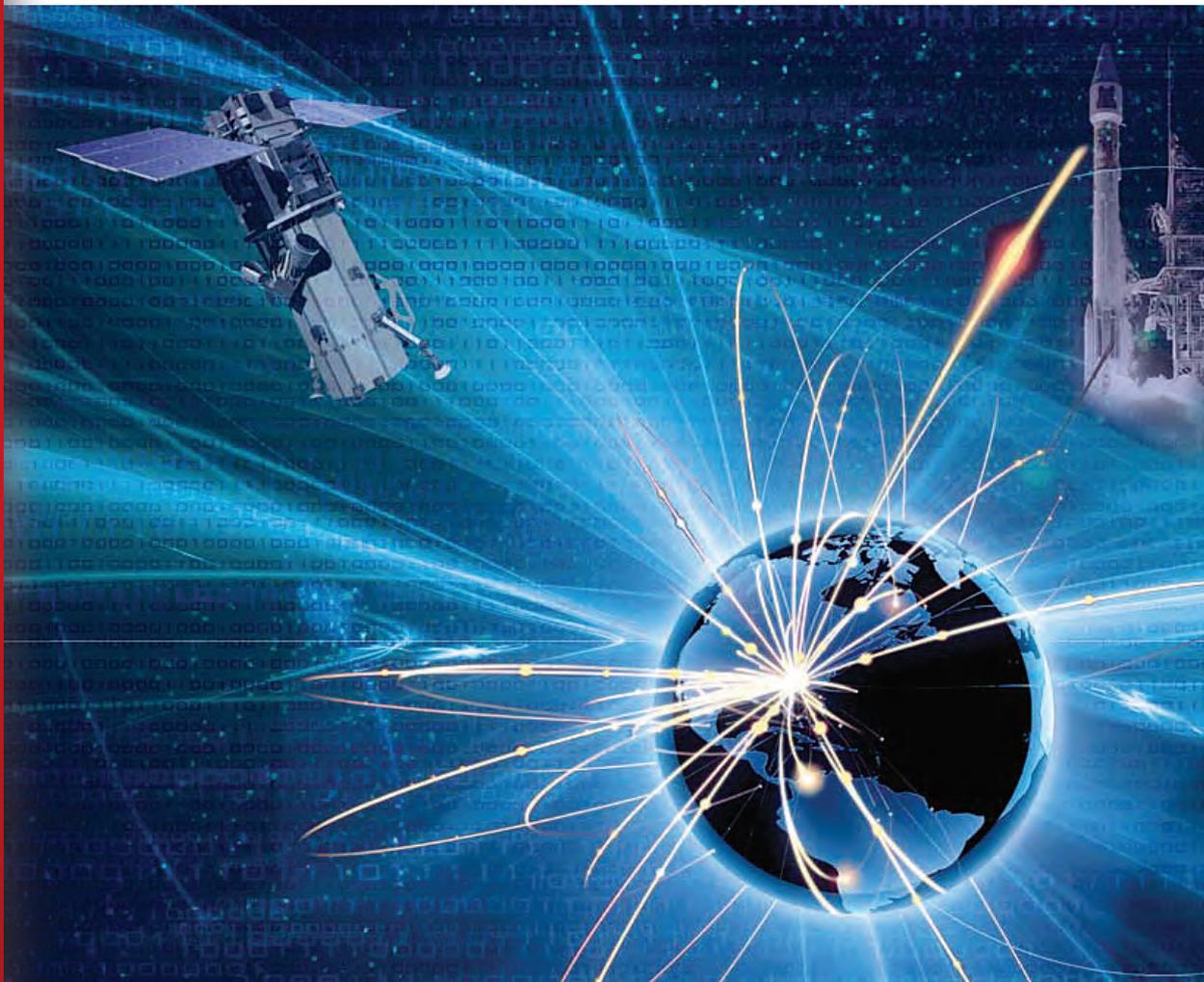
We provide a family of high performance processors to meet the demanding space environment

## **Microelectronics**

Honeywell's radiation hardened electronics and radiation technology provide military aerospace system designers a strategically hardened family of products to reduce risks in space and ensure mission success

## **Vehicle Positioning Attitude Controls**

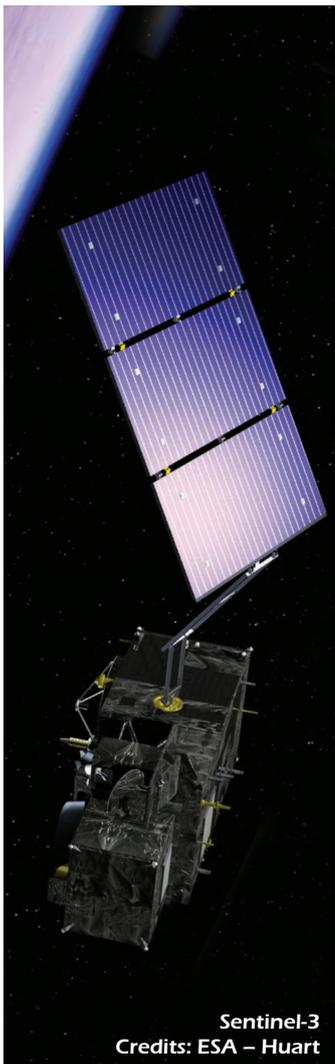
Honeywell has both the commitment and the capability to provide control moment gyroscope-based momentum exchange systems, pointing and structural controls, and wheel assemblies required for today's commercial and government satellites





## IGUASSU SOFTWARE SYSTEMS A.S. (ISS)

THE ONLY CZECH COMPANY TO PARTICIPATE  
IN 3 WINNING ESA INTERNATIONAL BIDS



### Focus of the most recent experience in ESA projects

**GNSS** – Experience developed in four EGNOS and SISNeT projects (under PECS), and in two Galileo projects (for GISAR Indra & ALGINT Scisys) during 2005-2008, led us to being given the responsibility by Astrium GmbH to design and develop the complete software subsystem for the “Interference Monitor System for GNSS Reference Stations” (AO6149).

Further two successful bids in the Czech open calls enabled us to deepen our experience in “Real-time GNSS Performance Monitoring Tool” (AO6052), completed recently, and now to embark on “Multi-constellation Long-Term GNSS Assessment” (AO6647)

**EO technologies** – During PECS, ISS worked in ESA/ESRIN on GRID technologies applications, the good results of which were applied in the successful ACS bid “Image Information Mining in Time Series” (AO5119) – the first contract through ESA international tender for Iguassu and for the Czech Republic.

We continue our research into low level technologies for data mining, investigation of GPU networks and also work together with our prime EOX Austria on “Open-standard On-line Observation Services (O3S)” (AO6143).

### Principal business areas and clients:

Software design, development and consultancy. Apart from the space experience summarised above, ISS skills include development of real-time systems, embedded systems, and studies.

#### Principal space clients are

- ESA (ESOC, ESRIN, ESTEC, GNSS Toulouse), Eumetsat, GJU/Indra, ACS, CAM GmbH, SciSys plc, Integral France, TriPolus UK, Astrium D

#### and principal non-space technology clients

- HP Germany/US, Agilent Germany, KNAPP Austria, Ingersoll Rand US, SciSys plc, CAM GmbH, RACAL (Iridium sub.), Czech Academy of Sciences, HTS UK, ABB Germany, the Argentine Transport Ministry and the Inter-American Development Bank...

Iguassu has extensive and in-depth experience in multi-national teams and consortia, as well as in long-term assignments in Europe and the Americas. It has participated in 4 successful international competitive space bids (one to GJU, three to ESA).

All staff speak fluent English, some also German, Spanish, and limited “Brasileiro”. Japanese skills are being developed (see our Japanese website). Projects successfully concluded in UK, Germany, Spain, France, Italy, Austria, Argentina, Brazil, and the USA.

### Contact:

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Systems a.s.

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Tel.: (English)  
+420 23535 1000

(English, Spanish, German)  
Petr Bares

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+44 7092 034415

Petr Bares  
Managing Director  
petr@iguassu.eu  
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ESA Bidder Code  
58008



Member of the  
Czech Space Alliance

## ISS history milestones

**1994** established by Science Systems plc – work started on ESA projects

**2000** Management-Buy-Out, SciSys CZ subsidiary  
⇒ Czech SME

**2002** highlighted in the 1st ESA's Czech survey for one of two successful international space projects in the Czech Republic

**2005** won more industry contracts in PECS than any other Czech company

**2005** 1st Galileo contract as member of INDRA Spain GISAR consortium

**2006** founded the industry space association "Czech Space Alliance" with the other space companies BBT and CSRC

**2007** 1st ESA contract for the Czech Republic through international tender

**2009** won more industry contracts than any other Czech company in ESA AO6052 tender for the Czech Republic

**2010** contributed the industry section of the governmental Czech National Space Plan

**2010** concluded for the Czech Republic two bilateral co-operation agreements (Japan & Brazil)

**2011** again won the maximum of industry contracts in ESA AO6647 tender for the Czech Republic

## Iguassu Software Systems

- has well over 100 man years of worldwide space experience
- has staff working with ESA since up to 1975
- developed successful business partnership with renowned ESA suppliers in Austria, Italy, Germany, Spain and the United Kingdom
- has won more ESA projects than any other Czech company
- ISS is your ideal Czech software partner for future ESA, or other space, bids

Why don't you try us and see for yourself?

## European Space Agency (ESA) experience (1994 – 2005)

Iguassu Software Systems (ISS) participates in ESA projects since 1994, when it was founded as a Czech subsidiary of SciSys. After the Management Buy Out in 1999, henceforth as a Czech SME, ISS continued to subcontract to ESA suppliers (helped by the know-how and experience of its Managing Director, who was ESOC staff member for 12 years and is in the space business since 1975). The ESA survey of Czech industry in 2002 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 one of two outstanding examples of successful Czech co-operation in international space projects. In the ESA audit of 2007, Iguassu was again one of the successfully audited companies.

Direct contracts with ESA started after 2004, when the Czech Republic became a ESA European Co-operating State (PECS). ISS was the only Czech company to win several projects when PECS started and it was the most successful Czech company during the whole PECS period 2005-2008, winning 6 out of 12 industrial contracts. During that time it was the first Czech company to participate successfully in ESA's international competitive bid, with ACS as prime.

As soon as the Czech Republic joined ESA, ISS was again the only Czech company to win more than one project in the first open call AO6052.

## ESA Projects

### recently awarded

- In EO technologies – Distributed Raster Processing Framework, AO6647 (ISS prime, ACS sub.)
- In GNSS - Multi-constellation Long-Term GNSS Assessment, AO6647 (ISS prime, university sub.)
- In SatCom - IRIS/Artes 10, satellite communication for civilian air-traffic (subcontract to Indra)

### currently on-going – won in international competitive bids AO6149 and AO6143

- Interference Monitor System for GNSS Reference Stations, AO6149 (Astrium GmbH prime)
- Open-standard On-line Observation Services (O3S), AO6143 (EOX Austria prime)

### 2009-2011 successfully concluded since the Czech membership in ESA

- 2011 Real-time Performance Monitoring Tool for EGNOS, AO6052 (ISS prime)
- 2011 Parallel Data Mining Components, AO6052 (ISS prime)
- 2010 Design and development of EGNOS education tools, based on experience gained in SISNeT (continuation of a PECS project, partially carried out on-site in ESA Toulouse), PECS (ISS prime)
- Continued operation of an EGNOS monitoring station, linked into the PERFECT international network (continuation of a PECS project, ISS prime)

### 2005-2008 successfully concluded ESA PECS and Galileo projects

- Image Information Mining in Time Series - ISS contributed its GRID experience to the development of EO information mining in time-series (ACS prime)
- EGNOS SISNeT II including complete design & development of a new generation SISNeT server (ISS prime)
- Galileo Search & Rescue subsystem co-development - subcontract to the Indra consortium, including Thales, Alcatel Space, CNES...
- Galileo ALGINT co-development (subcontract to SciSys)
- Study of SME needs in ESA – encompassing CEE/PECS countries (SME4space/AIPAS prime)
- EGNOS SISNeT development, conceived in co-operation with GMV, including mobile applications
- porting of SAR algorithms to GRID technologies and co-development of "Grid of Demand", conceived in co-operation with Indra Madrid, on-site in ESA/ESRIN
- setting up of the 1st Central European EGNOS receiving station, monitoring the integrity of EGNOS satellite navigation data, linked in real-time into ESA central database

## Previous (1994-2004) space work participation (> 45 man years)

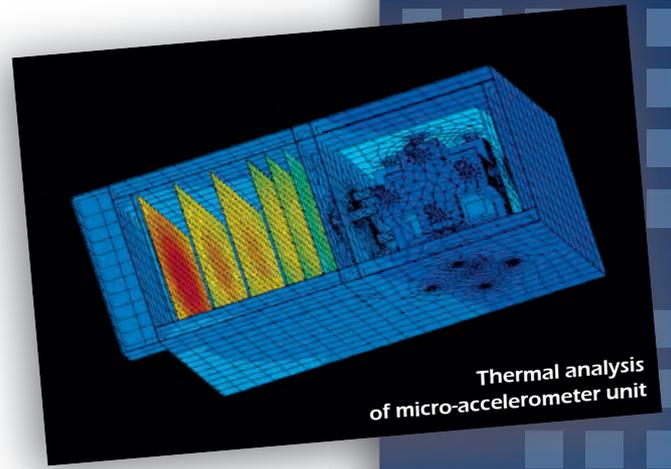
- Meteosat TP Main Control Centre CF
- Satellite Control System SCOS 2000 for ESA/ESOC
- Ground segment systems and user support (ESA/ESOC)
- Envisat payload processing (ESA/ESRIN),
- IRIDIUM terminal test software (Racal, UK)
- MSG, MCF (UK, Eumetsat, and Prague) and Primary Ground Station (Gilching,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

## Marketing and consultancy track record

- marketing win WEU Satellite Centre (EU SC) Spain, 2.4 M US\$ satellite station for CONAE Argentina, Iguassu MD for Anite Systems
- consultancy in UNEP/Mercury satellite communications project, Iguassu MD for Anite Systems
- bid support of INPE Brazil 9.4 M US\$ bid for CBERS system, Iguassu MD for Anite Systems
- Market intelligence & bid support in Brazilian aerospace for Vega and SciSys
- Czech defence market consultancy for Inmarsat (subcontract to TriPolus)
- Latin-American and Czech aerospace marketing consultancy for Shreeveport (UK), ESA External Services, Integral Systems (F), Ministry of Interior (CZ)

## Non revenue earning space activities

- Contributed the industry section of the National Space Plan, compiled by the Ministry of Transport and approved by the Czech government in 2010
- ISS Managing Director leads the Czech Space Alliance since its foundation in 2006
- formulated and negotiated bi-lateral co-operation agreements with the Japanese aerospace industry association JASPA (signed by the Czech Space Alliance, May 2011) and with the Brazilian space agency AEB (signed by the Minister of Transport, Nov. 2011)



Thermal analysis of micro-accelerometer unit

# L.K. ENGINEERING, S.R.O.



Swarm spacecraft with micro-accelerometer unit

## About

L.K. Engineering (LKE) provides engineering services in all mechanical areas. The core activities are focused on design and analysis using advanced engineering computations. LKE can offer a solution to companies with product R&D activities in each part of the design process such as innovative design proposal, conceptual study and detailed design evaluation.

We use the most advanced computational techniques, technologies and knowledge available to satisfy challenging requirements of today's products. These techniques and our experience help to reduce the cost and time during the development period and contribute to product competitiveness.

LKE provides services to a diverse group of clients and the team of LKE experts has successfully accomplished projects for various areas of industry such as power generation, aerospace, transportation, architecture, etc.

## History

L.K. Engineering was established in 2001 after a previous successful experience of its founders in the area of technical calculation for the power generation industry. At first the company was oriented to international OEM in the US market, later the company activities expanded also to Europe and to regional customers.

## Contact:

L.K. Engineering, s.r.o.

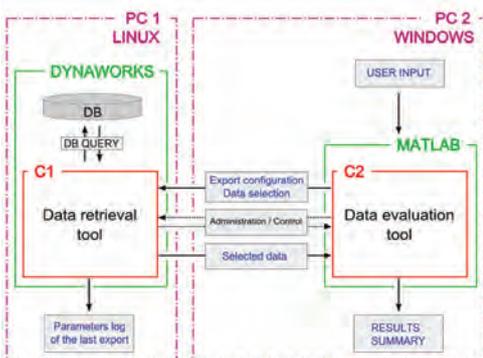
Videnska 55  
639 00 Brno  
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US phone:  
+1 412 212 1308

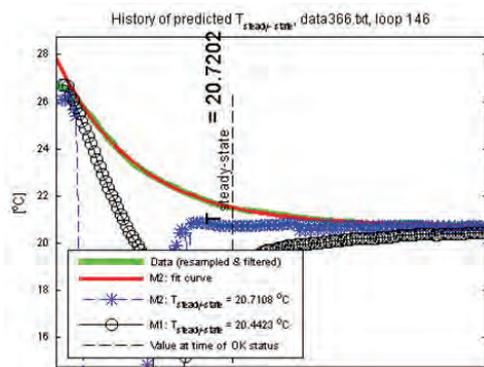
CZ phone:  
+420 543 215 681

fax: +420 543 215 683  
email: lke@lke.cz

ESA Bidder Code  
58023



Real time temporal extrapolation tool for spacecraft thermal testing



Prediction of temperature response during TV/TB test with SW tool

### Capabilities:

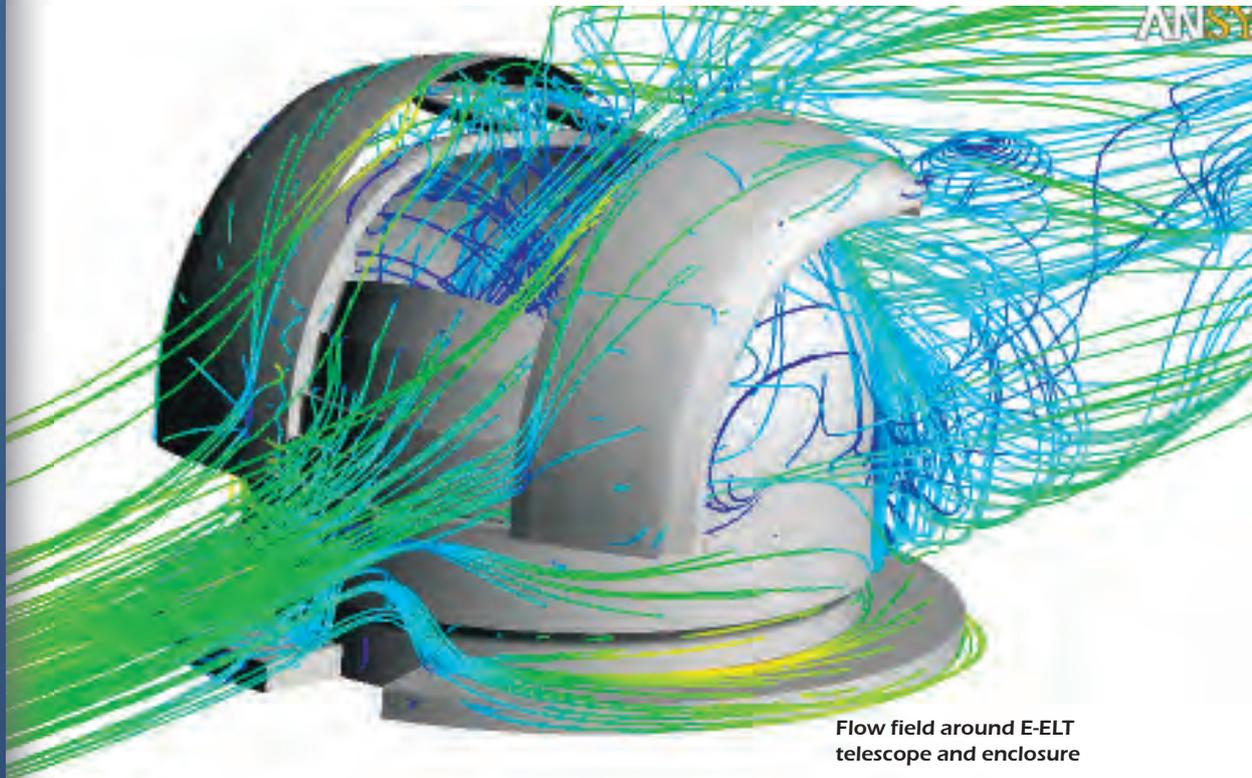
- Stress, thermal and fluid dynamic calculations
- Fatigue life and fracture mechanics evaluation
- Design of highly loaded components and optimization
- Numerical computation involving complex physical effects
- Product qualification acc. to specified code
- Expertise, reviews and consultation
- Development of unique computational software
- Technical documentation
- Project management

### Space core activities:

- Thermal design and analysis of the spacecraft subsystems
- Structural evaluation of spacecraft components
- Launcher aerodynamics/aeroacoustics

### Projects

- Thermal and thermo-elastic analysis of micro-accelerometer unit 2006-2007
- Thermal analysis of European Extremely Large Telescope enclosure 2009-2010
- Temporal Extrapolation Methods in Thermal Testing 2010
- Thermal and structural analysis of ACES/ELT unit 2011



Flow field around E-ELT telescope and enclosure



Nanomill for Lab and Pilot Scale Production of Nanoparticles Dispersions

# SYNPO, AKCIOVÁ SPOLEČNOST



Basket Mill – Dispergation Unit (300 L)

## Company profile

SYNPO research institute is a Joint Stock Company with more than 60 years tradition in R&D of polymeric materials. Four research teams are specialized in synthesis of polyesters, polyurethanes, epoxies and acrylates and in the formulation of paints, composites and adhesives. One of our major research areas is the development of nanostructured and hybrid polymers and polymers based on recyclable and renewable materials. Analysis, evaluation and testing are carried out in accredited laboratories. SYNPO provides also transfer of production technologies of developed polymer products from laboratory to production scale. Synpo opened a new Centre of Nano Polymers and Polymers from Renewable Resources in 2009. SYNPO is currently fully in conformance with standard ISO 9001:2008. The SYNPO system has been approved by Lloyd's Register Quality Assurance. SYNPO closely collaborates with Czech industry and companies in the European Union, USA, and Japan, SYNPO provides a technology transfer and commercial introduction of many new products.

## R&D areas

- Epoxy resins
- Nanostructured polymers
- Alkyds, polyesters and polyurethanes
- Emulsion and solution polymers and acrylic dispersions
- Polymers based on renewable raw materials
- Product testing and certification in accredited testing laboratories
- Supporting advanced analytical services in polymer and physical sciences
- Small-scale manufacturing of specialty resins, curing agents and adhesives in a pilot plant

## Applications

- Binders
- Composites (construction, electronic, automotive, aviation and space)
- Laminating resins
- Casting and sealing compounds
- Adhesives, sealants and putties
- Paints and coatings
- Foams (construction, electronic, automotive, aviation and space industry)

## Contact:

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ESA Bidder Code  
58041



Member of the  
Czech Space Alliance



**Atomic Force Microscopy**

### **Selected projects for customers**

- Cryogenic thermal insulation foams (fuel tanks of space vehicles)
- Antiradar coatings
- High temperature resistance coatings (over 300 °C)
- High refractive index polymeric systems
- Coatings with high abrasion resistance and resistance against aggressive liquids
- Rubbers with low gas/liquids permeability (military applications)

### **Space projects, products & services**

- Liners material study
- Epoxy Core Development

### **Technology areas of SYNPO interest related to the aerospace industry**

- Liquid propulsion
  - o Composite propellant tanks
- Thermal
  - o Thermal Protection System
  - o Cryogenic materials
- Materials and Manufacturing Process for:
  - o Composite materials
  - o Elastomers
  - o Paints & coatings
  - o Joining (adhesives) of parts/structures made of different materials