CZECH SPACE SECTOR

Volume 1

Czech Republic
Ministry of Transport

CZECH SPACE ALLIANCE

2014

EUROPEAN UNION
EUROPEAN REGIONAL DEVELOPMENT FUND
INVESTMENT IN YOUR FUTURE

OPERATIONAL PROGRAMME
ENTERPRISE
AND INNOVATION

MINISTRY OF
INDUSTRY AND TRADE

CzechTrade

CzechTrade prepared for you a new catalogue mapping the Czech Space Sector. In this first volume you will find details of the member companies of the Czech Space Alliance.

Contents

Czech Trade Promotion Agency / CzechTrade

CzechTrade is a trade promotion organization, founded by the Ministry of Industry and Trade of the Czech Republic. Our main goal is to develop international trade and cooperation between Czech, foreign companies and other entities.

CzechTrade offers free and confidential services aimed at helping foreign companies find qualified Czech-based suppliers. The agency's support is recognized as an efficient way of building business relationships.

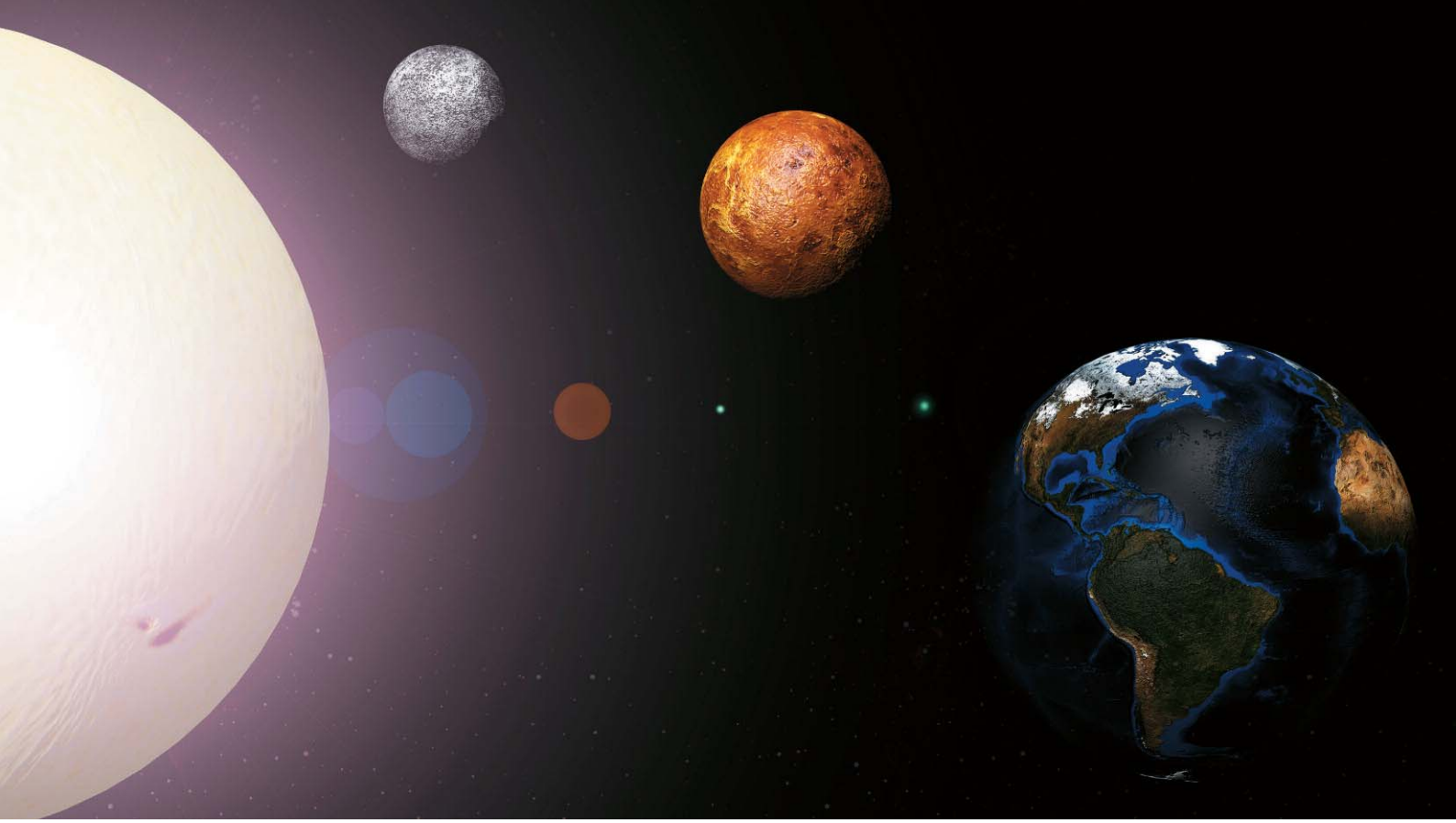
CzechTrade operates worldwide via foreign representatives of the Ministry of Industry and Trade of the Czech Republic. They can assist you in researching purchasing opportunities, identifying business partners and liaising with Czech suppliers of goods and services.

CzechTrade provides a wide range of business support and networking services including:

- Introduction to proven Czech suppliers;
- Setting up business meetings with potential partners;
- Assistance with local outsourcing;
- Presentation of Czech companies at foreign trade shows;
- Information about doing business in the Czech Republic;
- Comprehensive services for investors – full information assistance, handling of investment incentives, business property identification, location of Czech suppliers and aftercare services.

MINISTRY OF INDUSTRY AND TRADE

CzechTrade



Czech Space Alliance (CSA)

CSA is an association of 14 companies, established in 2006. Its members are vying for space business, especially through ESA. It is an SME association, with larger companies being associate members and sharing all the benefits and duties except for voting rights.

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. Our member Frentech has scored the 1st Czech win in a large commercial space tender for 1.8 M € – to design and develop 84 solar deployment mechanisms for Iridium NEXT.

CSA commercial space experience goes back to the 1990's

The founding members of CSA, namely BBT, CSRC, and Iguassu Software Systems have been participating in ESA and other space projects since the early 1990's. 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

Broader scope of opportunities for industry arose, when the Czech Republic entered the ESA Programme for European Co-operating States (PECS) in 2005. However, the programme was administered by the Czech side in such a way, that it discouraged participation of industry. This is clear from the fact, that practically only those with previous space experience and existing ESA contacts were able to negotiate contracts. The initial group of experienced 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 work at that time, the good results of the determined industry and the interest of the government in bringing the GSA HQ to Prague, combined to shorten the initially envisaged 5 year PECS period to less than 4 years.

The Czech Republic's accession to the ESA Convention in 2008. CSA won 24 out of 36 industry contracts in the Czech Industry Incentive Scheme tenders, and some 36 (presumably all) contracts in ESA's international tenders and direct negotiations.

Realistic opportunities for new companies to join in the ESA programmes only opened with the full membership and, more importantly, the 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, 4 years of ESA membership attracted ten. 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 win in the protracted EU negotiations to place the GSA HQ in Prague, meant that the important political decision makers started to take greater interest in space technologies, the opportunities they bring to the economy, and the way they advance 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 a place for assembly lines, but rather 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 further reflected in the budget allocation to the next ESA contribution period, to be presented in the ESA Ministerial Council in 2014.

The European GNSS Agency seat awarded to Prague in December 2010

This excellent result of our politicians and of the government commissioner for Galileo, now deputy Minister of Transport, 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/GNSS technologies, since 2005. The first

CEE EGNOS monitoring station was established in Prague in April 2005. For instance most of the EGNOS learning tools on www.navipedia.net/index.php/GNSS:Tools have been developed or upgraded by Czech industry. Czech software subsystem is now running in TAS-F EGNOS simulator SPEED. Czech industry also designed and developed software for the GNSS interference monitoring system, in live operation in ESTEC and other RIMS stations.

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. Hitherto 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 the Coordination Council for Space Activities of the Minister 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. The Czech Space Alliance was invited to contribute its practical experience in ESA work and its expectations and needs, to increase its participation and generate good results for the Czech Republic.
The National Space Plan sets itself mid-term objectives and measurable goals for the year 2016, most of which are already achieved in 2013! The Czech Space Alliance welcomed the plan, not least because it took on board most of the industry suggestions and comments.
The preparation of an update of the space plan has started, again with the participation of our alliance.

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

Unlike in PECS, where projects were awarded in a hazy ad-hoc process of direct negotiations, the full membership brought in clear written rules and practical procedures, established and honed by ESA over decades. Therefore the feared challenge of the stricter bidding process was in fact the opposite of what some feared – the easing of barriers. The strict rules in fact did away with the uncertainties of the local interference in the PECS procedures, administered by the Czech Space Office (a private non-profit company, with private business interests). 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.
This scheme proved to be an excellent boost to the newcomers to the space scene. 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
AO6647 in 2010 with the increased budget of over 4 M € – awarding 16 contracts of which 12 to industry
AO7397 in 2013, awarding 13 contracts, all to industry
These figures also indicate that we are moving towards the goal of having the same industry/science balance as other established ESA states. We are awaiting the Task Force decision whether a fourth and final call under the incentive scheme will be issued in 2014 or not.
This "fiesta" is going to end in 2014, 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 them with more experienced partners. Many CSA members already have such partners. Particularly encouraging is the increase in the rate of growth of successful international bids in the last year.

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

The international promotion activities of CSA

The alliance is very active in communicating to foreign partners the know-how and growing space experience of its members, be at international conferences, ESA and GSA 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. Examples of such events are – 2011 May, CSA presentations to the Japanese associations JASPA, SJAC and SPAC – 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, supported by Czechinvest – 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. In 2013 the Ministry of Industry agency Czechinvest organised for us the Technology Mission to Brazil, where we met top leaders of the Brazilian Space Agency and INPE, as well as ran an industry seminar attended by 50(!) Brazilian space companies. We returned to Brazil two months later, with the Czech senate chairman delegation, to meet the key players and prepare a return Brazilian space mission to Prague.
We already have joint projects with companies in Germany, Italy, Spain, Austria and France and we are 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). Our negotiations with JAXA over the last years led to a high level meeting in May 2013 between the Japanese Cabinet Office for Space Policy and the Czech Ministry of Transport. MOU draft is about to be presented to Japan for comments.

Next steps

Should you 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 that you are looking for 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, including us in your consortia will give you the advantage of our still relatively cost effective skills as well as 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 be coming back for more even without the above bonuses.
Czech us out!

Petr Bares, President of the Czech Space Alliance, January 2014

CZECH SPACE ALLIANCE

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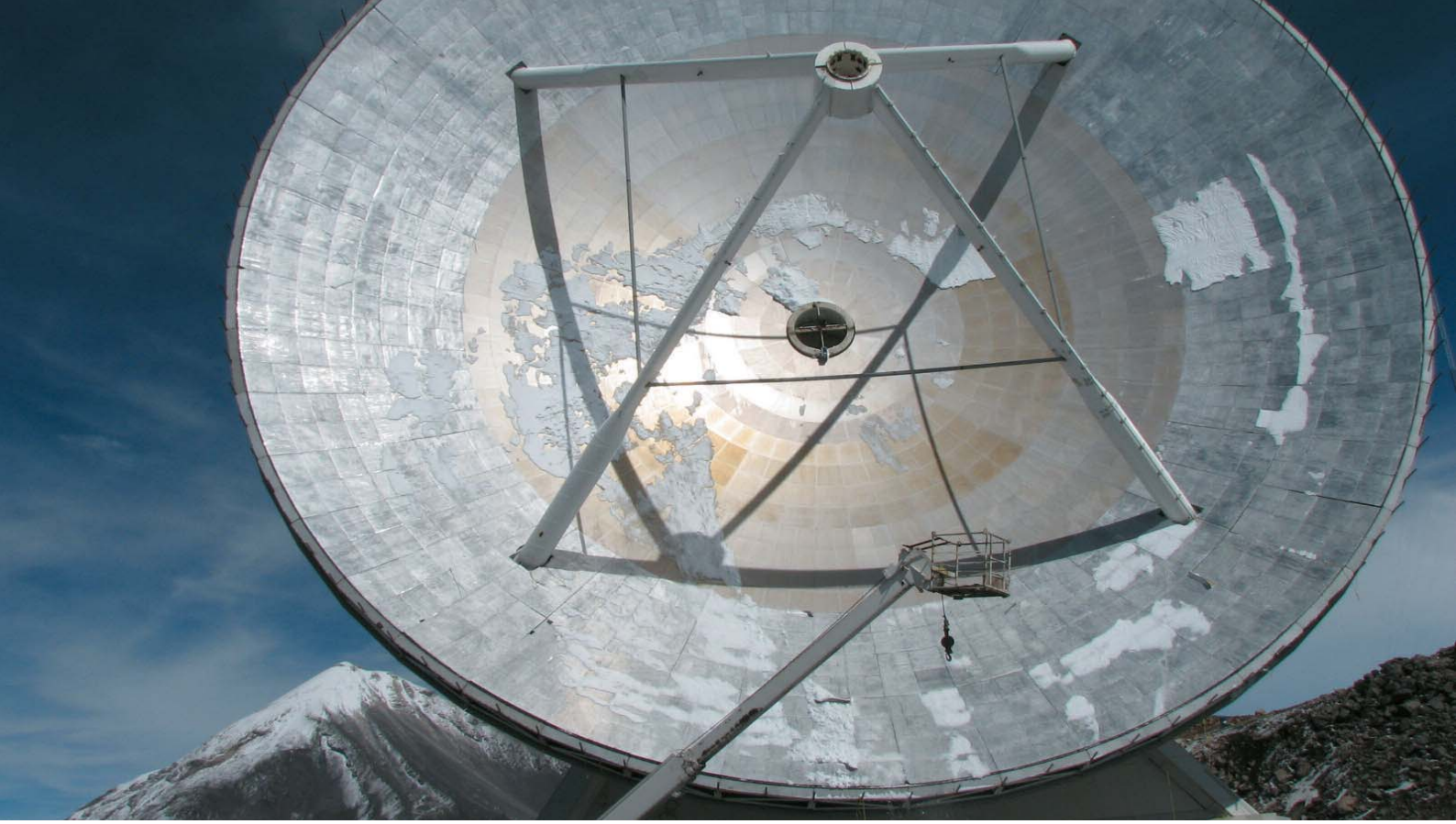

Radiotelescope mirror made by 5M precise sandwich panels

5M

Company profile

The 5M s.r.o. company operates in the area of the development and manufacture of composite and sandwich materials. We specialise in demanding applications and special products. Our customers are companies from ground vehicle transportation and aircraft industry but also electronic parts or certificated sport equipment producers. We have our own R&D, in which we invest about 8% of the annual turnover. We have been awarded as the Company of the Year of 2010 in the Czech Republic.

Fields of expertise

Production and development of structural composite parts, pultruded profiles, structural epoxy adhesives, sandwiches, epoxy resins, aluminium honeycombs, foil adhesives, pre-impregnated fabrics (prepregs, semipregs), precise sandwich surfaces for optics, etc. Our materials fulfill ECSS standards (e.g. outgassing etc.).

ESA Projects

Programme: PECS
Name: 5M composite technology evaluation
Prime contractor: Thales Alenia Space
Duration: 2013-2014

Programme: CZECH INDUSTRY INCENTIVE SCHEME
Name: Generic adhesive for Space application
Prime contractor: 5M s.r.o.
Duration: 2013-2015

Programme: CZECH INDUSTRY INCENTIVE SCHEME
Name: Technology development of Flexible Tape Spring Boom for large appendages deployment
Prime contractor: 5M s.r.o.
Duration: 2013-2014

Programme: FLPP
Name: Adhesive Bonding of Thermoplastic Composites
Prime contractor: 5M s.r.o.
Duration: 2013–2015

Further space projects, products, services

- Composite Materials with Low Volatile Content and Radiation Resistance for Astrophysics and Space Applications (Ministry of Industry and Trade of the Czech Republic)
- In orbit demonstration of products and technologies at the nanosatellite VZLUSAT-1
- Large-sized Composite Structures for Active and Adaptive Optics (Technology Agency of the Czech Republic)
- High Precision Sandwich Panels for Optics (commercially based)
- Materials for Structures of Small Satellites (commercially based)

5M production capacities (5000 m²)

Composite radome covers

Carbon prepregs acc. to ECSS standards (e.g. outgassing)

ESA Bidder Code: 58082

5M s.r.o.
Na Záhonech 1177, 686 04 Kunovice, Czech Republic
Phone: +420 572 433 711, Fax: +420 572 433 700
E-mail: 5M@5M.cz
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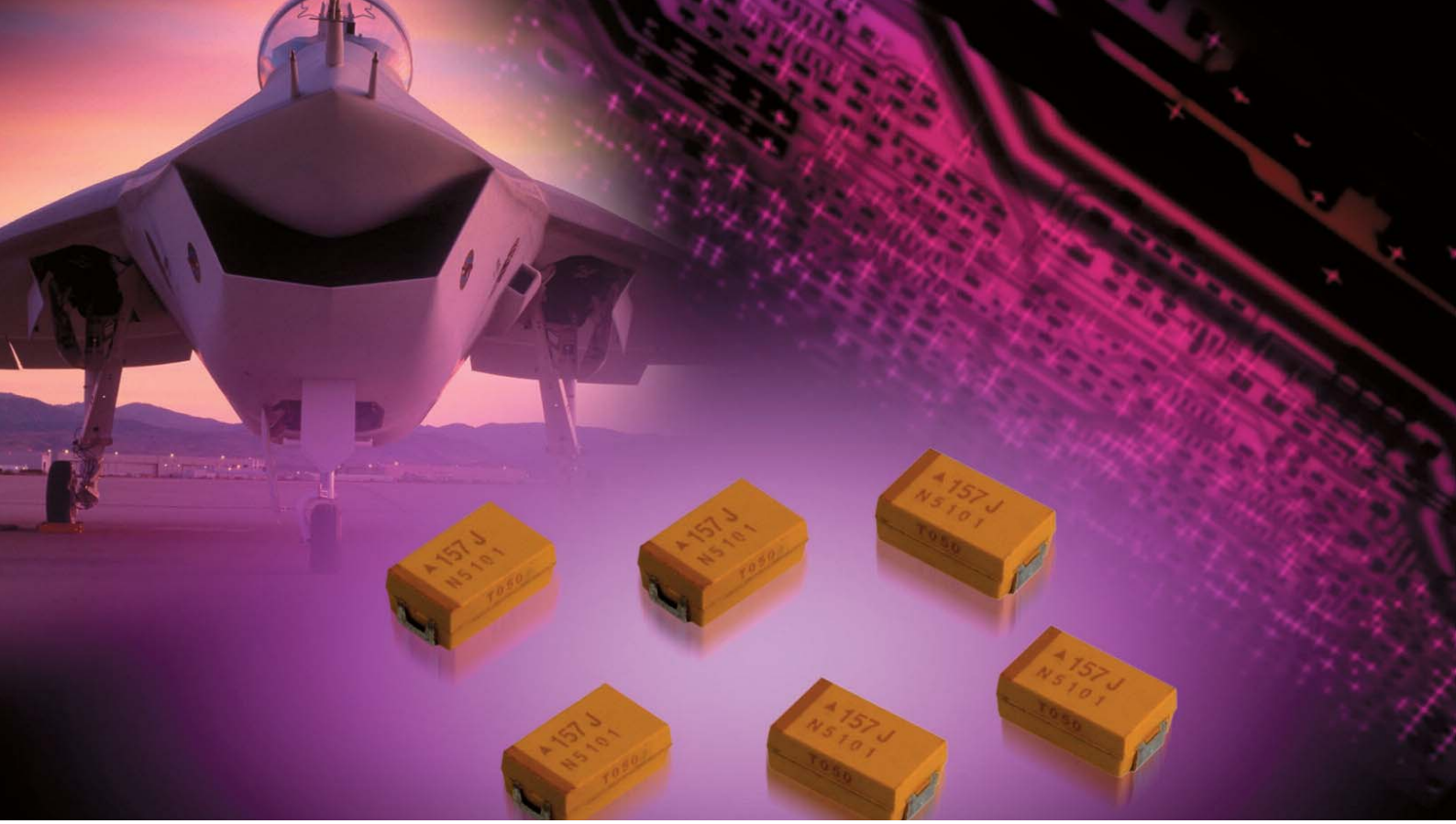


AVX High Reliability MIL PRF 55365
Qualified Tantalum Capacitors

AVX CZECH REPUBLIC

Company profile

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 Lanskroun 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.

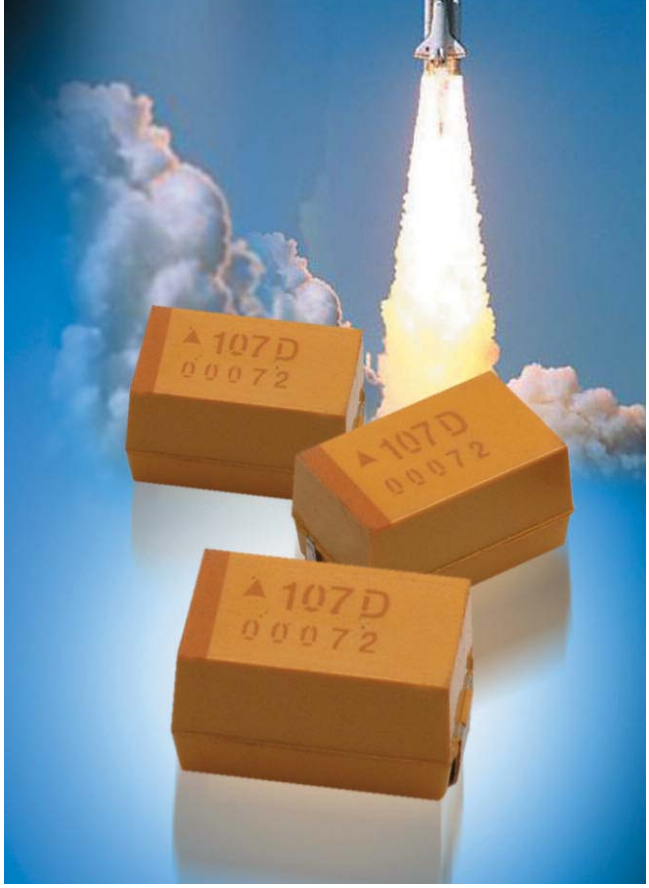
Currently employing 1900 staff, the Lanskroun plant now provides technical, customer and logistic support services to AVX customers worldwide. The first co-operation on development projects at Lanskroun was begun in 1998 covering high-temperature (150degC) tantalum capacitors for automotive electronics, 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). Further aerospace capacitor development projects on high volumetric efficiency and low ESR tantalum capacitors have been successfully completed in 2013 by introduction of new QPL ESCC 3012/004 tantalum capacitor range. This development is bringing significant payload reduction potential for the next generation of flight hardware electronics.

Business activities

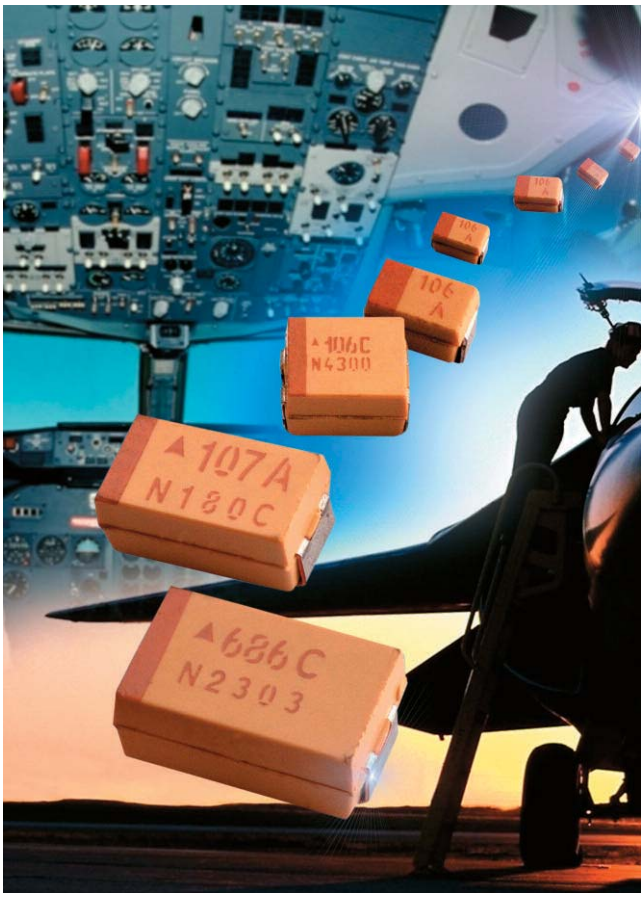
AVX, a recognized leader in the global passive electronic component and interconnect products industry, is at the forefront of technology, design, manufacturing and supply.
AVX enjoys significant competitive advantages including the benefit of global manufacturing and distribution provided by 20 manufacturing 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, 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

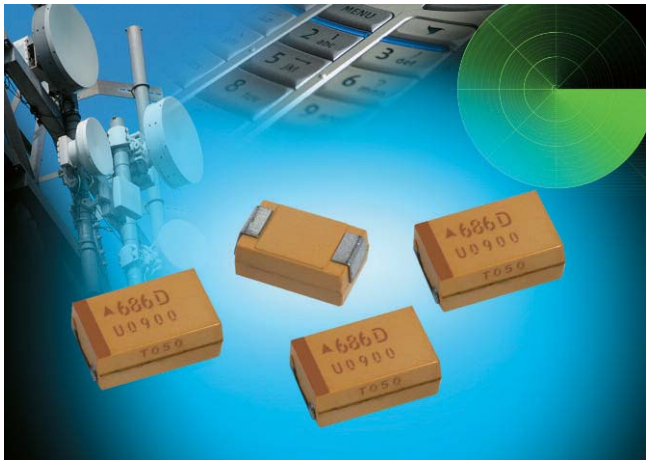
- CECC-ECQAC – granting the right to use the mark or certificate of conformity
- IECQ-CECC – incorporating the requirements of ISO 9001:2000
- ISO 9001:2000 – Quality Management System
- ISO / TS 16949 – Quality Management System (meeting the requirements of the automotive industry)
- ISO 14001:2004 – 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
- ESCC 3012/004



AVX Tantalum Aerospace Capacitors ESCC 3012 Qualified



Low ESR, High Power AVX Tantalum Multianode Capacitors



ESA Bidder Code: 58042

A KYOCERA GROUP COMPANY

AVX Czech Republic s.r.o.
Dvořákova 328, 563 01 Lanškroun, Czech Republic
Phone: +420 465 358 111, Fax: + 420 465 323 010
E-mail: company@avx.cz, tomas.zednicek@eur.avx.com
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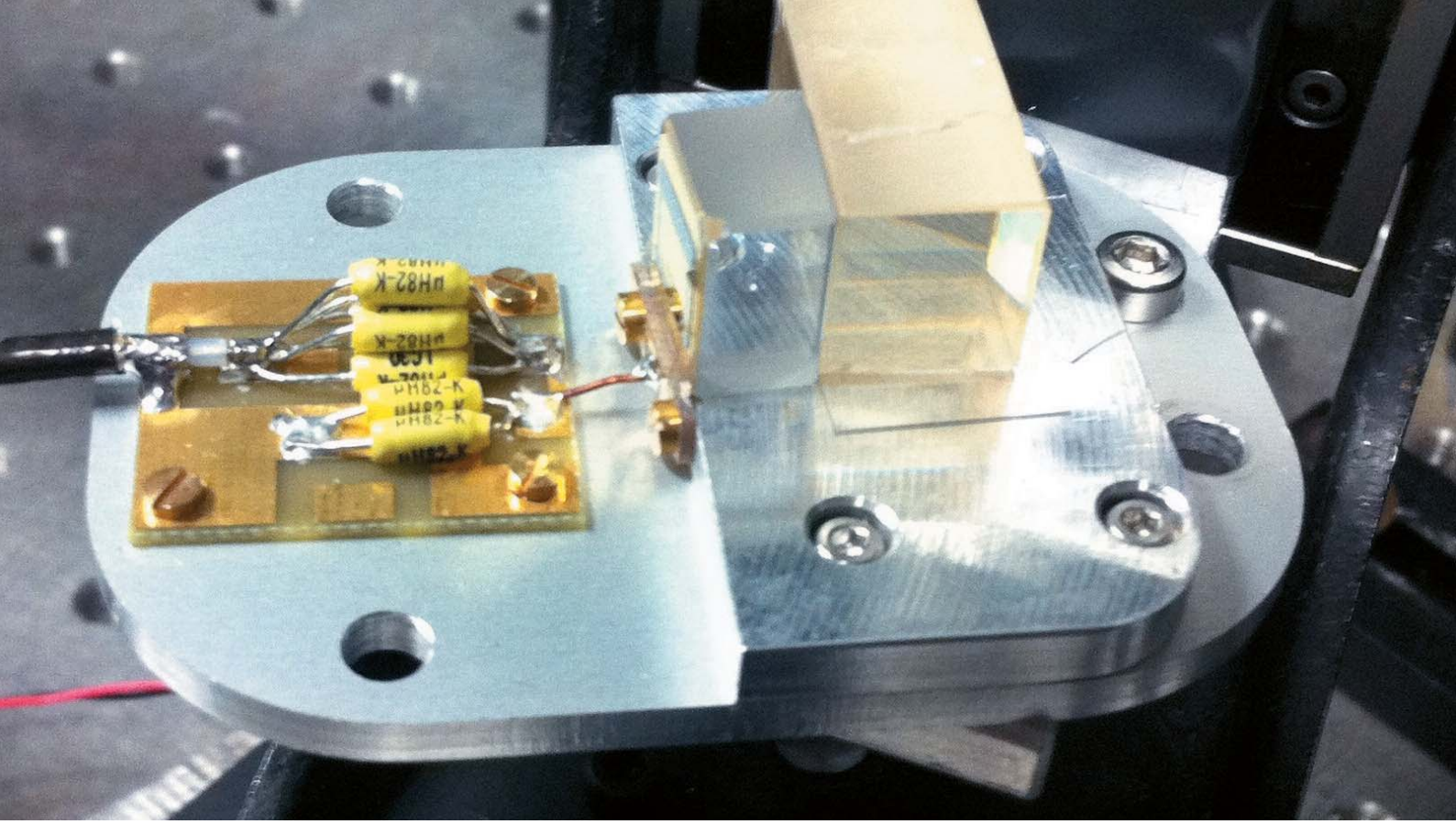


Prototype of Calomel based acousto-optical tuneable filter (AOTF) for hyperspectral infrared imager.

BBT – MATERIALS PROCESSING

Company profile

BBT Materials Processing, sro., Prague (BBT)
Founded 1991

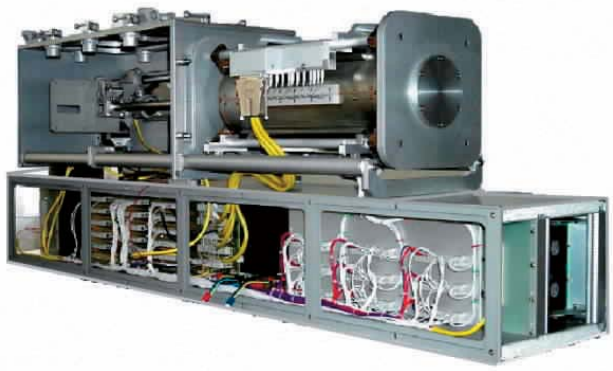
Main Fields of Activities:

- Crystal chemistry, study of crystal growth and solidification processes, growth of crystals for technical applications (optics, acousto-optics, polarisers, 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 our selected products and achievements

CSK-1A, -1B and 1C: The programmable space furnaces and crystallizers for MIR-type and FOTON-type orbital laboratories for material research in microgravity.
TITUS/CSK-4: The 2nd generation programmable space furnace for the Euromir 95 (ESA) and MIR 99 – PERSEUS (CNES) missions (in co-operation with DLR, ESA, DARA, Humboldt Univ., RKK Energija).
Fast optical processors for Space applications (ESA) – BBT in co-operation with STIL, Ireland.
Mercurous halides, sapphire and ruby crystals and their applications (acousto-optics, polarizers, IR-optics, microwaves, laser technologies, electronics etc.).
Non-equilibrium multi-component alloys: Realisation and scientific evaluation of the ground-based, space and post-flight experiments. R&D and manufacturing of the related apparatuses, devices, software, etc.
Assistance in the training of astronauts to operate the research apparatuses made in BBT.
Equipment for material experiments both in long-term micro-gravity and in a short weightlessness using a drop tower and in higher gravity fields using centrifuges.
Advanced TITUS: The 3rd generation facility designed for the material experiments in microgravity. (In co-operation with DLR-MUSC, Humboldt Univ., RKK Energia/MIR).
TITUS MPP (Multi-Purpose Platform with the Advanced Tubular Furnace with Integrated Thermal Analysis Under Space Conditions) – 4th generation facility designed as a tool for the materials sciences experiments on Board the International Space Station (ISS). (In co-operation with DLR, Humboldt Univ., RKK Energia and with a financial supports of the Ministry of Education of the Czech Republic and ESA-PRODEX).
Passive Damping Platform: Damping of vibrations and other disturbing accelerations for a material research in microgravity.
Thermographic probe with 10 thermocouples was used for determination of the temperature profiles in space furnaces.
DTA (differential thermal analysis) probe with six chambers was used for both the study of phase transitions in materials and an accurate calibration of absolute temperature scale. The theoretical models of kinetic phase diagrams have been developed.



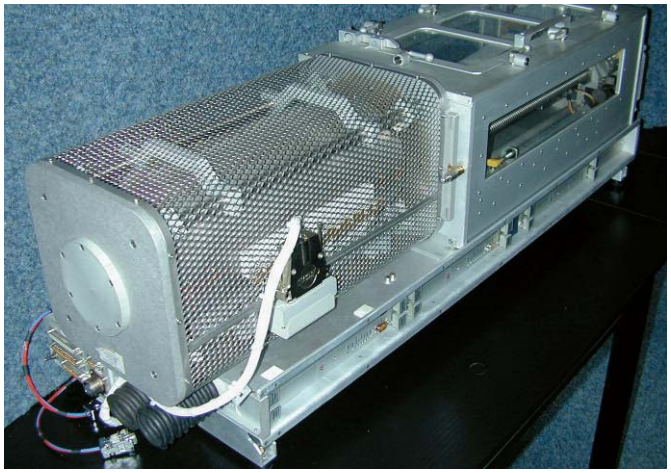
TITUS Multi-Purpose Platform (material science laboratory) developed for the ISS.

Participation in selected programmes and projects

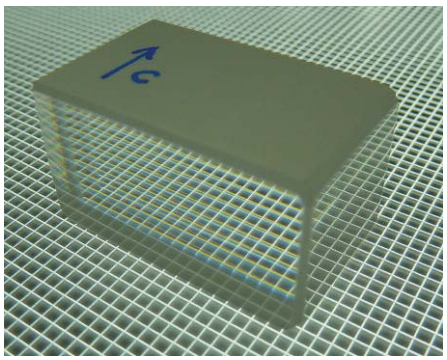
INTERKOSMOS – MORAVA I (1976-80, Salyut 6-Sojuz), **Morava II** (1986-88, MIR), **Morava III** (1990-97, MIR), **CSK-3** (1989-90) and **CSK-1** (1984-2001): Preparation, realisation and analysis of the international projects in material sciences.
International Users Support Centre for Interkosmos projects 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 co-operation of Germany (DLR), Czechoslovakia and Russia).
TES and **TEST-TES**: Participation in the German (DLR) **TES** and **TEST-TES** 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 co-operation with ZARM-University in Bremen, Germany).
MIR'92 (1992-3): Set of material experiments on board MIR using the CSK-1 furnace (ESA, DARA, DLR-MUSC, BBT, RKK Energija).
EuroMIR'94 (1994-5): Set of material experiments on board MIR using the CSK-1C furnace (ESA, DARA, DLR-MUSC, BBT, RKK Energija).
EuroMIR'95 (1995-6): Set of material experiments on board MIR using the TITUS/CSK-4 furnace (ESA, DARA, DLR-MUSC, BBT, RSC Energija, Humboldt Univ., Kayser-Threde).
GermanMIR 97 (1997): German prgramme (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.

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

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



EUROSTARS: Innovative acoustooptic systems in the mid-infrared.
ESA-GSTP: New acousto-optic device based on calomel for hyperspectral imaging in space applications.
ESA-GSTP: Development of quality evaluation methods for calomel optical elements.
EU-FP7: Mid- to near infrared spectroscopy for improved medical diagnostics.
ESA-TRP: Infrared Advanced Polarizer for Space Applications.
(For additional information visit: http://bbt.calomel.cz)



Calomel element for infrared optics, acousto-optics and laser applications

Growing calomel crystal

ESA Bidder Code: 58014

BBT-MATERIALS PROCESSING s.r.o.
Doubicka 11, 184 00 Prague 8, Czech Republic
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Example of diagnostic system for cardio-metabolic risk factors

CHIPINVEST

Company profile

Chipinvest is a joint stock company founded in 2005 with the aim to develop and market portable diagnostic devices and systems mainly for medical applications. The core competence of the team is covers the following main areas:

- Embedded systems
- Image processing, data mining and Expert systems
- Integrated circuit design

More detailed information on the indicated areas is provided below

Embedded systems

The product was developed with the aim to enable screening and preventive diagnostics of cardio-metabolic risk factors in the place of need (point-of-care). In this way the platform is convenient not only for the current application in cardiovascular diseases, like atherosclerosis, but also to avoid consequences of diabetes mellitus like the diabetic foot.

The systems combine the following main functionalities:

- Measuring of selected parameters, e.g. pulse wave, arterial compliance, venous function and other indicators related to cardio-metabolic risk factors
- portable ultrasound
- screening lab for detection of selected markers

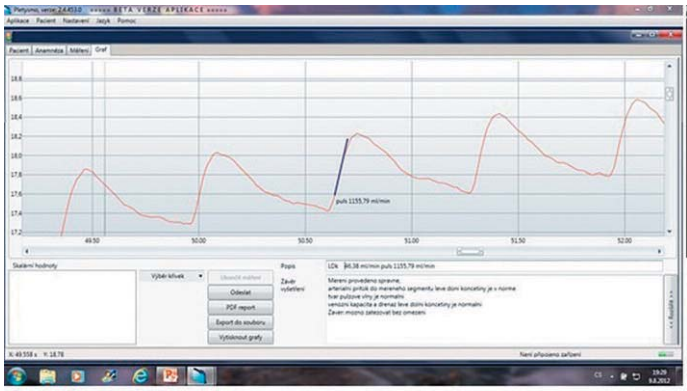
Expert systems

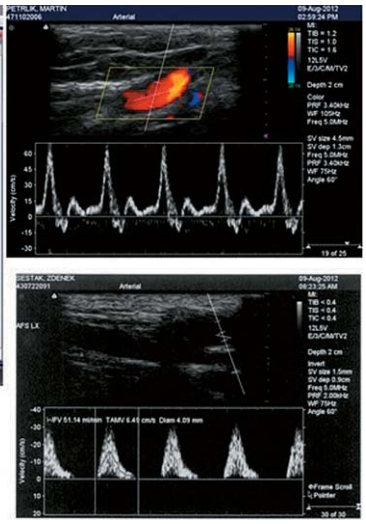
We were invited to provide a diagnostic solution for new selected new forming technologies. The project resulted in patented expert systems.

Integrated circuits

Our focus is on low power mixed signal, examples of IP blocks provided for customers are given below:

- Linear timer: Digital circuit which controls the stimulus pulse timing and blanks all other sensitive blocks as Z-sensor, Accelerometer and input amplifiers. It provides control signals for charging pumps and DSP
- Output Stage: This analog circuit creates from the timing coming from Linear timer actual stimulus pulse. The stimulus amplitude and duration is fully programmable. Part of the Output stage are charging and discharging pumps for holding capacitors.
- Clock generator: Mixed analog/digital circuit which creates from basic X-tall oscillator all internal free running and gated clocks. It also provides master clock for the external CPU and controls the handshaking mechanisms.
- Service request controller: Digital block collecting all internal interrupts and service requests from the L289, prioritising them and generating interrupts for the external microprocessor.
- IEGM: Digital sensing technology allowed to collect and save measured data. Due to limited memory size it was necessary to compress them. IEGM compression block was designed to compress 2 channels internal cardiogram data and send the data stream thru DMA channel to the memory.
- DSP: Programmable multi-channel digital filter used to determine QRS and T-wave in the internal EGM signal. Our engineers were responsible for the functional and production test.
- Watchdog: An obligatory block on every IC. Running on independent oscillator clock serves as security policy for cases when the system froze, for the cases when the supply voltage drops down and does the start-up reset sequence (different for analog and digital part of the L289).
- Digital trims: This block provides the hardware necessary to control the rate limit oscillator, the bias current generator, the band gap and selection of various reference signals to the analog test buses.
- Supplies & References: LDO 2V regulator supplying separately digital and analog circuits and external CPU. The Reference circuits includes a digitally trimmed ibias current generator, digitally trimmed band gap voltage reference and power on reset trigger function.
- Telemetry B: The Transceiver-receiver block performs the physical transmission and reception of telemetry which is defined in the Telemetry B Physical Layer Specification. The hardware supports two sensitivity modes: a high sensitivity mode and a low sensitivity mode.
- Test points: This block provide test access to different digital and analog signals around the pacer chip and brings them to the test pads. This is necessary for production testing.
- DMA controller: Design of 24 bits DMA controller used on D488 microprocessor.
- Clock doubler: A mixed mode design, where analogue circuit is made in digital technology. This block is used to double the internal master clock frequency of the D488 CPU core whenever firmware needs





Perfusion diagnostics

Our focus – Integrated application programme

Thanks to our existing relations to physicians, private clinics and representatives of rural regions we focus our attention to integrated application programme with the aim to extend the current projects to new areas. Partners active in Satellite communication, Telecom or other diagnostic devices are welcome. Currently we have active programmes both in Europe and in Brazil.

Rural Application in Brazil – Rio Grande do Sul

Rural Application in Brazil – co-operating team

ESA Bidder Code: 58024

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Cleanroom 100.000-Class

CSRC

Company 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.

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 µA 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.

Satellites PROBA V, SATRAM (launched)
Space Application of TimePix-based Universal Radiation Monitor, the objective is to launch technology demonstrator flight hardware based on a detector from TimePix family on the Proba-V satellite.

ISS/ACES/ELT INSTRUMENT
European Laser Timing for ACES, complex FM design & manufacturing of the atomic clock synchronization module for the ISS.

Evaluation of Supercapacitors and Impacts at System Level
The Bank of Supercapacitors as the final EM product shall be capable to demonstrate the added value of the use of supercapacitors in telecom spacecrafts. The main issues are overall platform cost & mass savings.

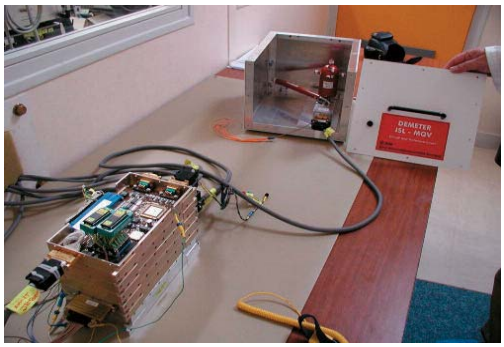
CSRC in ESA Tenders

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

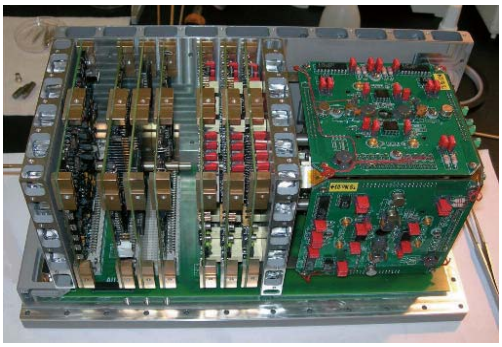
Other Projects Participation
ACES ELT, XMM Satellite – EPIC Experiment, TARANIS Satellite, AGILE, MALST, SMART FUEL, METOP, SATELCOM, NODE 3, GOME 2, CLUSTER II, PCDF-CCD HEAD, MONSTER and others…

Satellite SMART-1, EPDP Project

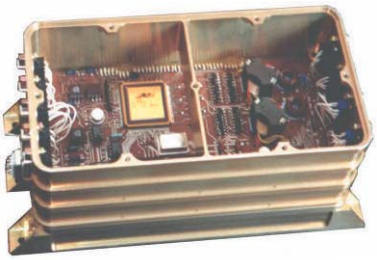
Satellite PROBA 2, DSLP&TPMU Project



Atellite DEMETER, I/V Converter



Satellites SWARM/TEASER, Microaccelerometer



Satellite INTEGRAL, PSAC Project

ESA Bidder Code: 58019

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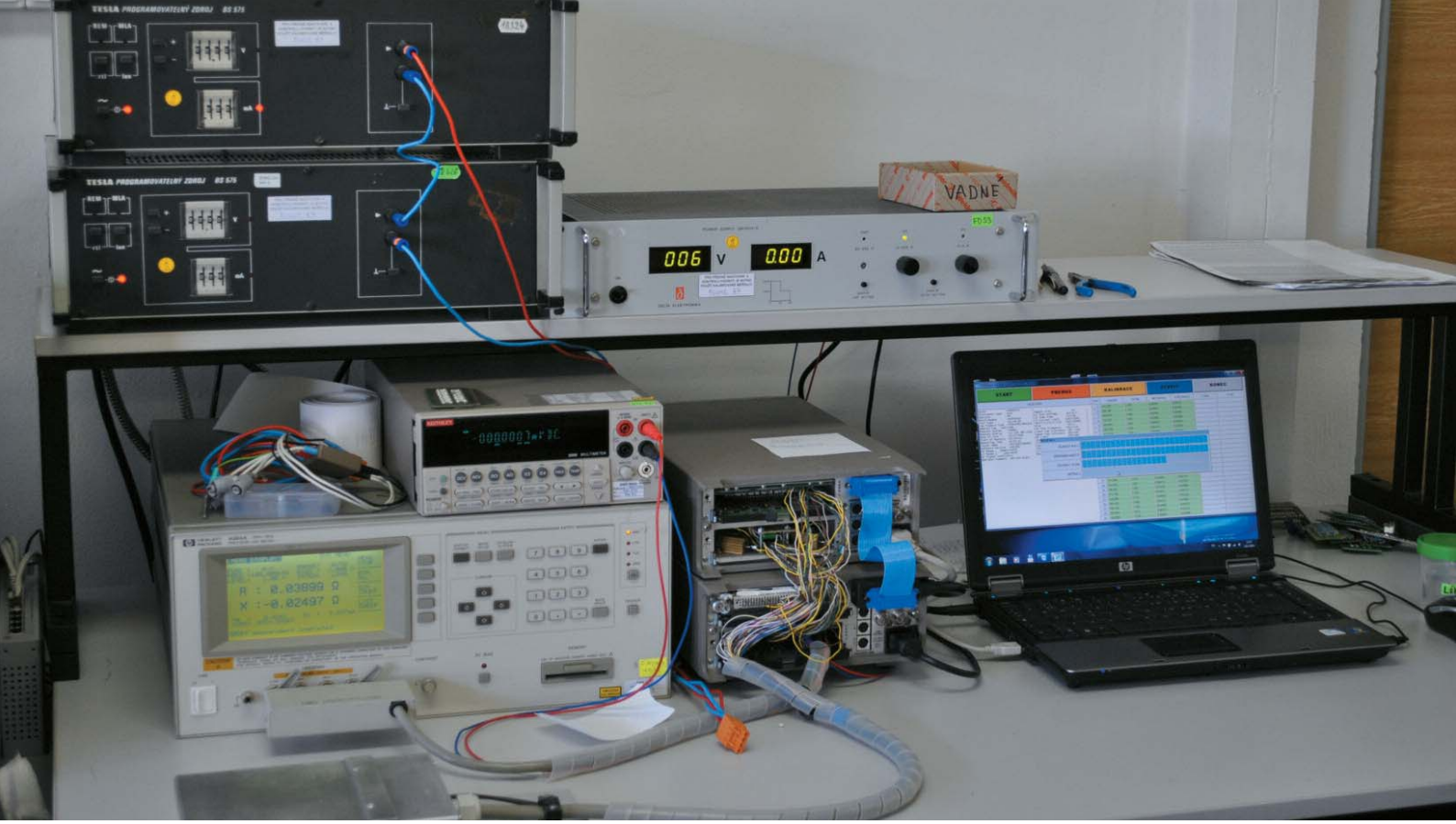

EGGO SPACE

Company profile

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 hzbrid integrated circuits and their applications.

The main range of Test Laboratorys 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.

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.

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, Subcontractor: 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
4) Contract No. 4000105661/12/NL/NR ARTES 5.1 Evaluation of Supercapacitors and Impacts at system level. Contractor: EGGO Space s.r.o

Further 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

ESA Bidder Code: 58065

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MTG – The first MTG-I Imaging Satellite is expected in 2017. Its Flexible Combined Imager (FCI) will offer advanced imaging capabilities — and ensure continuity with the current Meteosat Second Generation satellites. © ESA–P. Carril

EVOLVING SYSTEMS CONSULTING

Company profile

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 experienced also in other areas like custom embedded systems for industrial automation, PLC technology, data transmission and microwave high frequency applications.

Products and activities

Flight software for various satellite on-board instruments:

Meteosat Third Generation (MTG)
ESC will participate on payload modeling for *Data Collection System & GEO Search and Rescue (DCS & GEOSAR)*, and on analysis of its behavior.
The simulation of payload models will be implemented in MATLAB/Simulink basic blocks.

Flight Software for Solar Orbiter's STIX Instrument
ESC is conducting the engineering support during the project phase B, C/D for the Flight software (StartUp SW – Mission critical SW & Application SW) for the STIX (Spectrometer Telescope for Imaging X rays) on-board instrument. 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.

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 packages 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. Launched on November 22, 2013.

ESA GSTP projects

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

AO6488 OBCP-BB: Requirements and I/F definition for future OBCP Building Block
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 COrDeT and Domeng.

GSE (Ground Support Equipment) software

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

Data Processing Software

Performance Assessment Tool for the Sentinel 4 UVN Instrument Quality Tool
ESC is developing the Sentinel 4 UVN commissioning software, PAT. The Performance Assessment Tool (PAT) is to be used during the commissioning phase to prove that Sentinel 4 UVN Mission fulfils its goals. The software generates Quality Reports of the Sentinel 4 UVN Data Products (geometric, radiometric, and spectral processing and performance analysis functions). Sentinel-4 is a payload that will be embarked upon a Meteosat Third Generation-Sounder (MTG-S) satellite in geostationary orbit scheduled to be launched in 2019

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 the 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 the 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 telemetry 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 is participating in two independent workpackages of the IRIS programme.

ATM Repeater Verification Testbed

ESC is a member of the team which defines the architecture of a simulator for 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.

TC Results 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 RPAS/UAS production lines (HAES 90, 400, HAES JET 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.
- CK Detectors – ESC is a member of a consortium for R&D of ionizing radiation detection systems for applications in medical diagnostics, radiotherapy, radiation dosimetry, defectoscopy and other fields.
- UZ Detectors – ESC was selected as a software developer for custom ultrasonic testing software by an important player on the world market of ultrasonic and non-destructive testing.
- Nuclear industry: ESC has delivered software for chilling water in the secondary circuit of a nuclear power plant. The software complies to the safety standards IEC 61508, IEC 62138 and RCC-E. A PLC test-bed was also delivered to support verification and validation of the software.
- EDA (The European Defence Agency) – Czech MOD Authorized and Contracted Expert for EDA UAS working group
- RWE Rhein-Ruhr: ESC has implemented 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 a team of highly 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 already collected over 100 man years in space engineering work. Besides 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 • RPAS/UAS • Software quality • Embedded Software • Real-time Software • Control Systems • Navigation • Software Architecture • Hardware Design • HW/SW Development • EGSE/SCOE • Embedded microcontrollers • Data transmission • Microwave high frequency applications

Software quality

ESC applies the following 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
including other specific standards.

"Space" objectives for next years

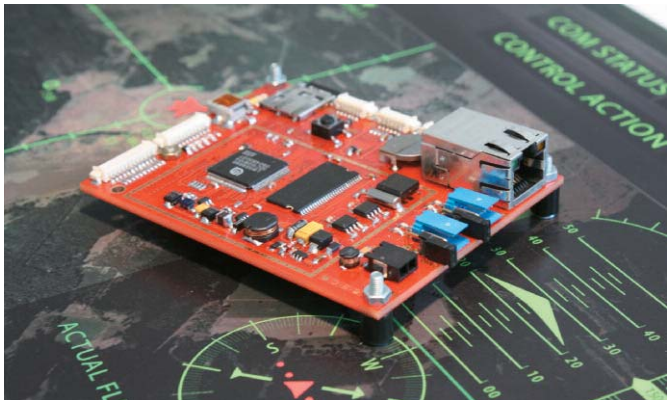
ESC is positioned to be one of the best players on a field of embedded systems development specialists for: scientific; commercial; military; satellite on-board systems in Europe.

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 new ESA ITTs.

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

ESCUCS Control Unit on a design of UAV GSE, © ESC, 2010



ESA Bidder Code: 58020

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FRENTECH AEROSPACE

Company profile

Frentech Aerospace s.r.o. focuses on production and delivery of mechanical parts, assembled modules and subsystems mostly for aircraft and space industry. Frentech Aerospace s.r.o. also delivers for demanding markets in the field of instrumental technique, microelectronics, nanotechnology, radar technique, production of special machines, medicine and vacuum technique.

Frentech Aerospace s.r.o. is mature technological company equipped with modern productive CNC machines, assembly premises, „Clean Room" per ISO7 (10 000) and clean zone per ISO5 (100). CMM MITUTOYO and testing thermal chamber ANGELANTONI 1 m^3 for thermal cycling test performance in range of +200°C / -180°C also in vacuum (0,2 m^3) is placed within clean room per ISO7.

Frentech Aerospace s.r.o. has 21 CNC machines available for production of complex parts. Five machines have five driven axes and one is equipped with 9 driven axes. Two HSC five axes Fehlmann machines are installed for productive production of parts with high level of automation with robot EROWA and magazines with 140 pallets. These machines operates in unmanned mode.

Inspection department is equipped with CMM's MITUTOYO. Frentech Aerospace s.r.o. is sophisticated company with system for real time production management CPC (Mazak). Planning module, Tool Management System and Machine Monitoring System is actively used within this system. Three workstations with Solid Works and Solid Cam (CAD/CAM) are used for programming.

All materials are machined (Aluminum, Titanium, Stainless steels, Inconel, Monel, PTFE and more). Material is purchased form certified resources from Europe and USA. Surface treatments are performed at subcontractors with NADCAP certification.

Frentech Aerospace s.r.o. is certified per ISO9001, AS9100-C, ISO14001 and QSF-A and is qualified by Thales Alenia Space for performance of special processes (CQT 448).

During past years the company acquired necessary know-how for production of aircraft and space technique. All employees – technicians and operators – are very skilled and motivated in order to achieve the best technical and economical results of the company.

Frentech Aerospace is offset partner for SAAB and Airbus s.a. Frentech Aerospace is a member of Czech Space Alliance.

Projects

Since Czech Republic became a member of ESA Frentech Aerospace s.r.o. focuses on development, construction and production of satellite subsystems for „Space". In the scope of these activities Frentech Aerospace s.r.o. acquired projects – some were already realized and some are being realized in these days:

- Project „ALMA" Chile (ESO) – production and delivery of 70 pcs Mirror Assembly. Gold plated assemblies working in range of 115 GHz were delivered.
- Project „Production of precision parts" for space. Within this project Frentech Aerospace s.r.o. delivers parts for TESAT Spacecom, RUAG, DLR. Thousands of parts are delivered each year (commercial projects).
- Project „Solar Array Deployment Mechanism Industrialization" (ESA /TAS). This project was focused on production of mechanisms prototype which proved ability of Frentech Aerospace s.r.o. to produce and test space mechanisms in requested quality.
- Project „Solar Array Deployment Mechanism IRIDIUM NEXT" (TAS-F) – this is the largest commercial space project in Czech Republic where 500 pcs. of mechanisms for 81 pcs. of satellites will be produced.
- Project „Cryostat Structure" (ESA – AO10164) – within this project the structures for FCI and IRS cryostats for MTG satellite system will be produced and tested. This project is very significant for Frentech Aerospace s.r.o. since the company cooperates with TAS-F in design activities.
- Project „New Generation Multimedia Antenna Deployment and Pointing Mechanism development" (ESA / TAS AO6647) – The subject of this project is design and production of mechanism prototype.
- Project „New Generation Hinge For Large Appendices Development" (ESA – AO7739) The subject of this project is design and production of mechanism prototype.
- Project „Cryo Cooler Asembly" (TAS/ESA) – mechanisms for MTG satellite system will be produced within this project.

Reference

Airbus, Premium Aerotec, EATON Germany, MT-Aerospace, TESAT SpaceCom, EMERSON, Thales Alenia Space, Nord-Micro, DLR, MBDA, BOSCH, SAGEM.

Termal testing chamber

Clean room

Vacuum testing in Thermal chambre

Assembly in Clean room

Assembly in Clean room

ESA Bidder Code: 58052

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Frentech Aerospace
member of Czech Aerospace Systems

SSA systems will detect hazards that could threaten critical space and ground infrastructure © ESA-P.Carril

IGUASSU SOFTWARE SYSTEMS

Company profile

- **The first Czech company to succeed in a tender for Galileo** (2005, with INDRA Spain, to develop the Search & Rescue system for GJU)
- **The first Czech contract through ESA international tender** (2007 with ACS italy) **and**
- **The largest number of wins (8) in international ESA and Galileo tenders of any purely Czech company**.

Focus of experience in the European Space Agency (ESA)

GNSS – Experience developed in four EGNOS, and two Galileo projects during 2005-2008, led us to being given the responsibility by Astrium Gmbh to design and develop the software for the "Interference Monitoring System for GNSS Reference Stations" (ESA call for tender AO6149). This is now operating in ESTEC and other RIMS stations. Further two GNSS contracts enabled us to deepen our experience, namely "Real-Time GNSS Performance Monitoring Tool" (AO6052) RTPMT, and the "Multi-Constellation Long-Term GNSS Assessment" (AO6647). We recently upgraded RTPMT to run at multiple of real-time speed and integrated it in the TAS-F EGNOS SPEED simulator and are currently developing further functionality

EO technologies – ISS also worked in ESA/ESRIN on GRID technologies applications, the good results of which were applied in the ACS Italy bid "Image Information Mining in Time Series" (AO5119) – **the first contract through ESA international tender for the Czech Republic.** We continued our research into low level technologies for data mining, e.g. GPU utilisation for grids computing. Currently we are developing an open source highly scalable catalogue for ESRIN.

GSTP – successfully delivered our contribution to the "Open-standard On-line Observation Services" (AO6143). We are currently working with ISDEFE on the robotic telescope test bed (AO6767)

Principal business areas and clients/partners

Software design, development and consultancy in GNSS and in EO data processing. ISS skills also include development of real-time systems, embedded systems, and studies.

We are also participating in the **FP7 project** Ashley, in a consortium led by Thales. Furthermore we had a small **commercial** contract with TAS-F in GNSS.

Principal space clients are

- ESA (ESOC, ESRIN, ESTEC, Toulouse), Eumetsat, GJU/Indra, ACS, CAM GmbH, RACAL (Iridium sub.), SciSys plc UK, Integral France, TriPolus UK, Astrium Germany, TAS France

and principal non-space technology clients

- Thales France, HP Germany/US, Agilent Germany, KNAPP Austria, Ingersoll Rand US, SciSys plc, CAM GmbH, HTS UK, ABB Germany, the Argentine Transport Ministry and the Inter-American Development Bank

Projects successfully concluded in UK, Germany, Spain, France, Italy, Austria, Argentina, Brazil, and the USA. We are also developing business relations outside of Europe, principally in Brazil and Japan.

Space experience heritage

Iguassu Software Systems participates in ESA projects since 1994, when it was founded as a Czech subsidiary of SciSys. After the Management Buy Out in 1999, ISS continued as a Czech SME to subcontract to ESA suppliers, thanks to contacts of its Managing Director (ESA staff member for 12 years and in space business since 1975). The ESA survey of Czech industry in 2002 gave Iguassu top marks, and highlighted its **Firm Fixed Price project for Eumetsat, design & development of test tools for MSG CF system validation**, as one of two outstanding examples of Czech successes in international space projects.
Direct contracts with ESA started after 2004, when the Czech Republic joined the ESA Programme for European Co-operating State (PECS).
ISS was the most successful Czech company during the PECS period 2005–2008, winning 6 out of 12 CZ industrial contracts. Since the full ESA membership of the Czech Republic, ISS won 5 contracts under the industry incentive scheme, and it won 9 contracts in international ESA tenders.

ESA tenders won since 2008

Currently ongoing

SSA / GSTP (AO6767) – we are members of the ISDEFE led consortium developing the robotic telescope test bed

EUCLID SVM electric simulator (AO7613) – together with CSRC we succeeded in our bid for this "door opener" to the EUCLID project, with consultancy support from TAS-I

GNSS (AO7397) – development of additional functionality of our Real-Time Performance Monitoring Tool and the qualification of the software in cooperation with TAS-F.
EO (AO6647) – Scalable open source EO catalogue
SatCom / Artes10 **–** IRIS/ANTARES, satellite communication for civilian air-traffic (subcontracts to Thales Alenia Space Italy and Indra Spain)

Successfully concluded ESA projects (2009-2013)

- 2013 Multi-constellation Long-Term GNSS Assessment, AO6647 (ISS prime)
- 2012 Interference Monitor System for GNSS Reference Stations, AO6149 (Astrium Gmbh prime)
- 2012 Open-standard On-line Observation Services (O3S), AO6143 (EOX Austria prime)
- 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)

Successfully concluded ESA PECS and Galileo projects (2005-2008)

- Image Information Mining in Time Series – ISS contributed its GRID experience (ACS prime)
- EGNOS – tools, SISNeT, the 1st Central European receiving station to monitori the integrity of EGNOS data etc
- Galileo Search & Rescue subsystem and ALGINT co-development
- Study of SME needs in ESA – encompassing CEE/PECS countries (SME4space/AIPAS prime)
- porting of SAR algorithms to GRID technologies and co-development of "Grid of Demand"

Previous (1994-2004) space software development (> 45 man years)

- Meteosat TP Main Control Centre CF
- Satellite Control System SCOS 2000 and Ground segment systems and user support for 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, by current Iguassu MD (then Anite Systems Spain MD)
- Consultancy in UNEP/Mercure 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
- Leading the industry association 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), prepared bi-lateral cooperation agreement with JAXA and the Japanese Cabinet Space Office

Iguassu Software Systems in a nutshell

- has over 120 man years of worldwide space experience
- has staff working with ESA since 1975
- developed successful business partnership with renowned ESA suppliers in Austria, Italy, Germany, France, Spain and the United Kingdom
- one of the most successful Czech companies in ESA tenders

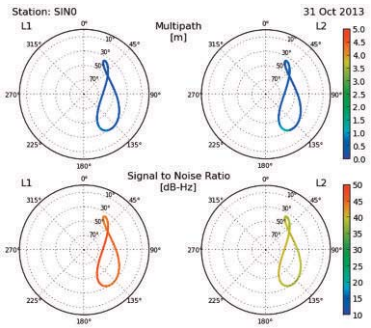
ISS is your ideal Czech software partner for future ESA, or other space, bids

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

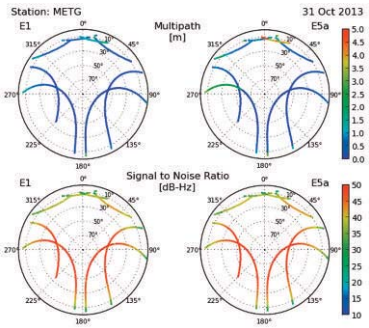
ISS history milestones

- 1994 established by Science Systems plc – work started on ESA projects
- 2000 Management-Buy-Out, becomes a Czech SME
- 2002 highlighted in the ESA's Czech survey as one of two Czech international space successes
- 2005 1st Galileo contract
- 2007 1st ESA contract for the Czech Republic through international tender
- 2010-2013 concluded for the Czech Republic two bilateral co-operation agreements (Japan & Brazil)
- 2009-2013 won more industry contracts than any other Czech company in the ESA incentive scheme
- 2009-2013 won more known industry contract in international ESA contracts than any other Czech company

Day graph of pseudo-range multipath and signal to noise ratio from the "Multi--Constellation Long Term GNSS Assessment" monitoring tool



Day graph of the Japanese QZSS from Nanyang TU station in Singapore. Signal L1 and L2



Day graph of the initial Galileo constellation from Metsahovi station in Finland. Signal E1 and E5a

ESA Bidder Code: 58008

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Fax (e-mail forward): +44 7092 034415
www.iguassu.eu
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Miroslav Houdek, deputy, E-mail: miroslav.houdek@iguassu.eu

SWARM spacecraft © ESA – P. Carril

L.K. ENGINEERING

Company profile

LK 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.

Capabilities

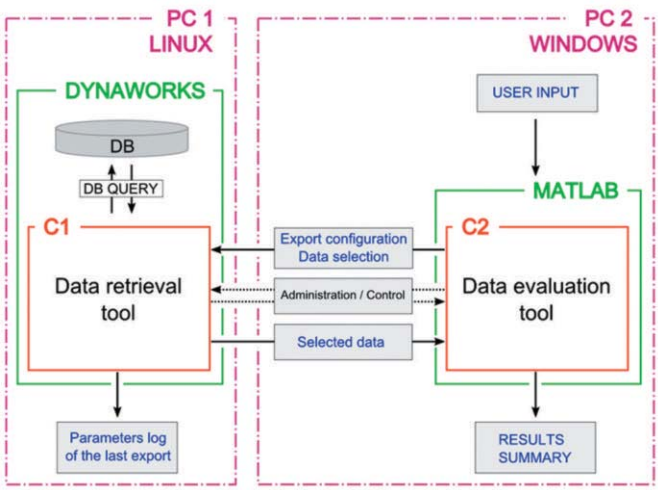
- Stress, thermal and fluid dynamic calculations
- Fatigue life and fracture mechanics evaluation
- Design of highly loaded components and optimization
- Numerical computation involving complex physical effects
- Product qualification acc. to specified code
- Expertise, reviews and consultation
- Development 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, aeroelasticity, acoustics
- Additive Layer Manufacturing

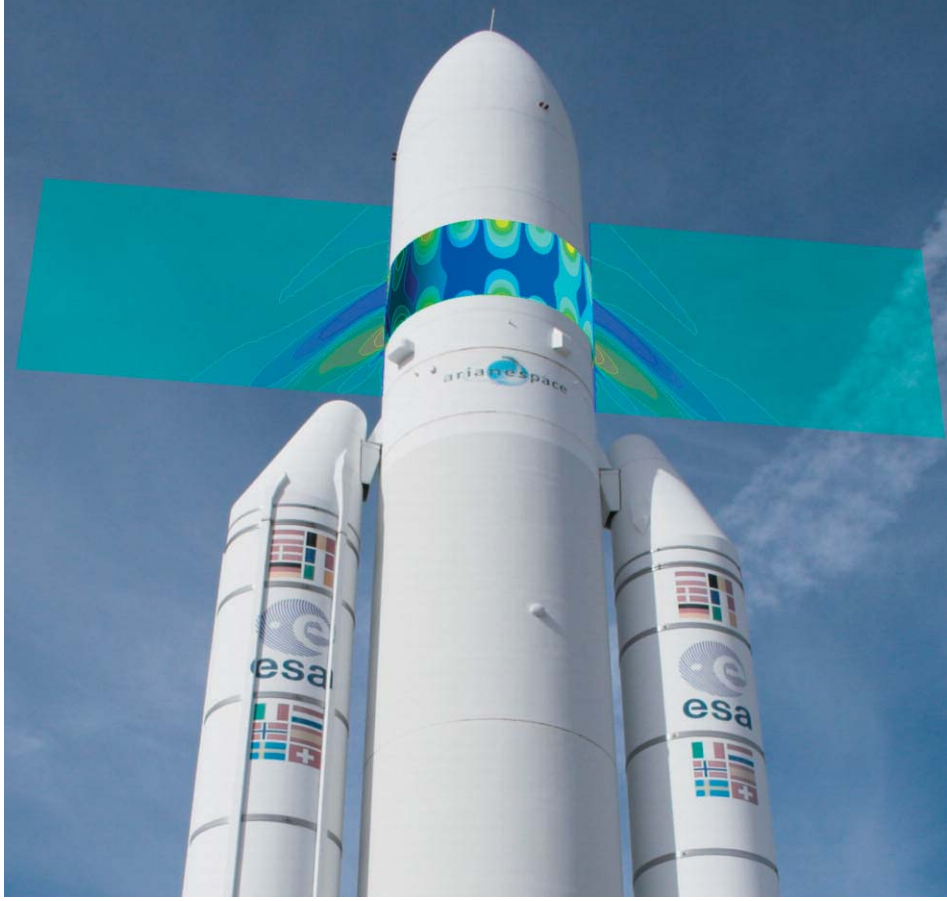
Projects

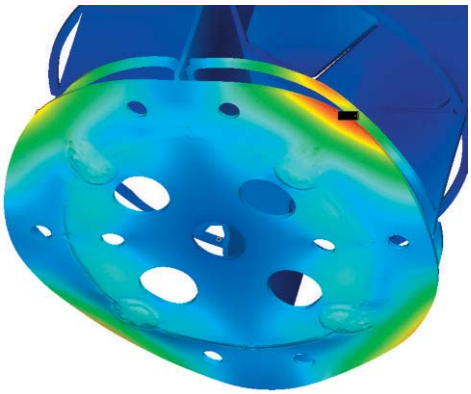
- Thermal and thermo-elastic analysis of micro-accelerometer unit 2006–2007
- Thermal analysis of European Extremely Large Telescope enclosure 2009–2010
- Temporal Extrapolation Methods in Thermal Testing 2010
- Thermal and structural analysis of ACES/ELT unit 2011
- Simulation of flutter response on launcher VTI panel 2011
- Structural optimization and thermo-elastic analysis of Lunar Lander spacecraft structure 2012
- Design of Spacecraft Components for Additive Manufacturing 2013



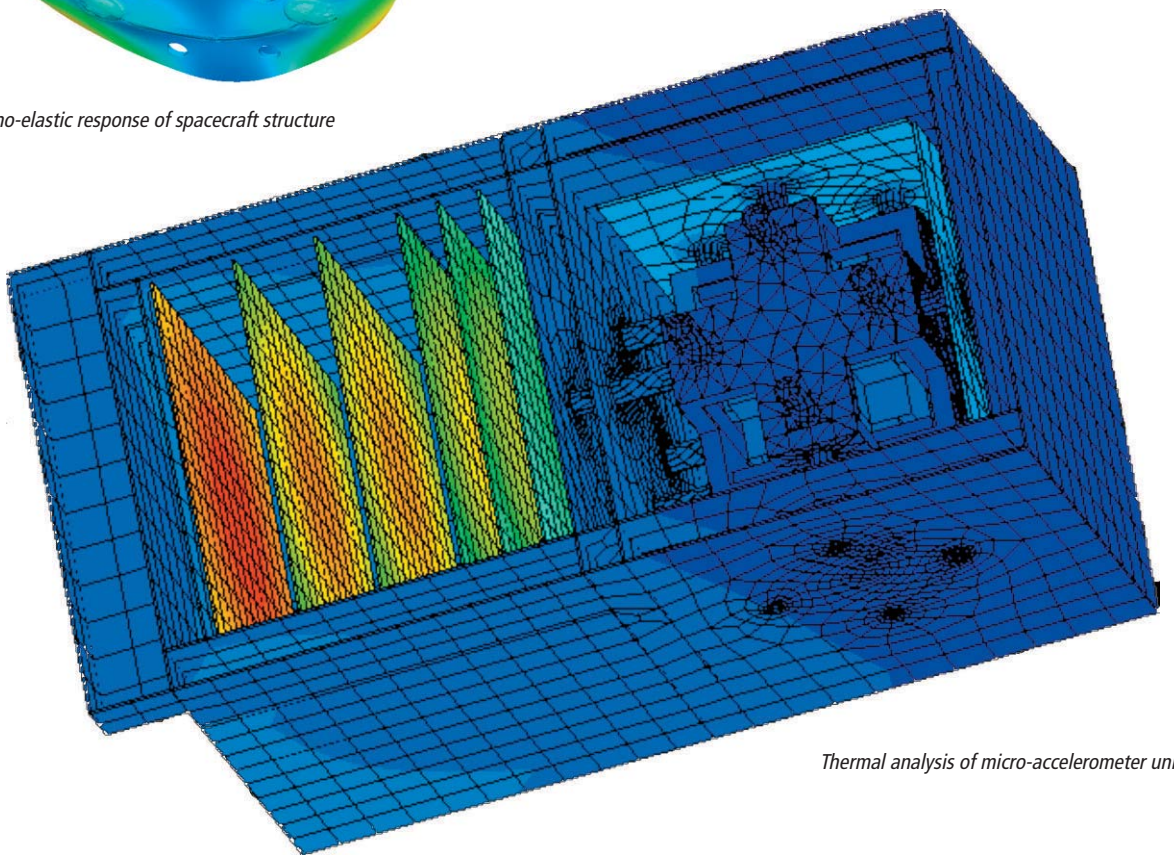
Real time temporal extrapolation tool for spacecraft thermal testing

Flutter response of insulation panel during launcher ascent





Termo-elastic response of spacecraft structure



Thermal analysis of micro-accelerometer unit

ESA Bidder Code: 58023

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Phone: +420 543 215 681, Fax: +420 543 215 683
E-mail: lke@lke.cz
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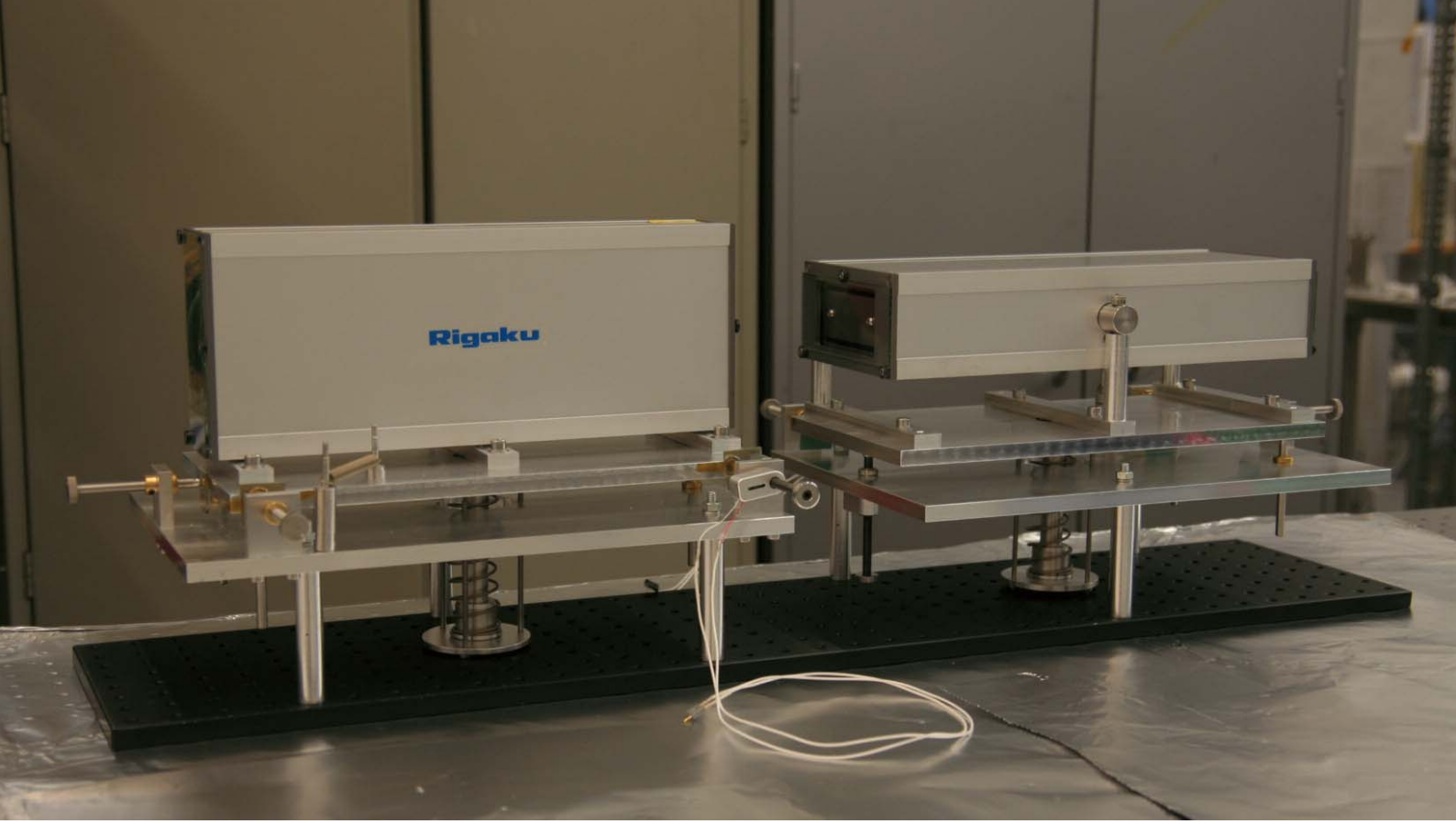


Multi-Foil elliptical X-ray optics.

RIGAKU INNOVATIVE TECHNOLOGIES EUROPE

Company profile

Rigaku Innovative Technologies Europe s.r.o. (RITE) belongs to the Rigaku Corporation group (Tokyo, Japan). RITE was established in 2008 as European center of excellence for the design, development and manufacturing of X-ray optics, X-ray detectors and X-ray sources, as well as other related scientific products for industry and research. RITE completes a triad of Rigaku X-ray equipment research and development (R&D) laboratories, now spanning the globe, with facilities in Japan, the United States and Europe.

Expertise and Experience

RITE expertise and experience focuses on various optical technologies (especially replicated and Multi-Foil X-ray Optics), X-ray imaging and X-ray sources. The test facilities and measurement devices include optical and X-ray imaging and image analyses (including X-ray enclosure), scanning electron microscope (SEM), atomic force microscope (AFM), contact profilometer (Taylor – Hobson). RITE and its specialists can, due their long experience, offer consultations and expertise in these fields. Half of the employees hold Ph.D.s in physics and all have backgrounds in either physics or chemistry.

X-ray Optics

RITE has outstanding capabilities in the ray-tracing, designing, manufacturing and testing of super smooth X-ray optics for radiation from hard X-rays to EUV. Optical group is based on historical background and includes leading researchers in the field of advanced X-ray optics in the Czech Republic. This group has developed various technologies for manufacturing of optics and many more innovations in this field. The company currently uses electroplating technologies, electroless deposition of metals, ion milling and shaped technologies for manufacturing of optics. Particularly, replication technologies of metal (Au, Ni, Pt...) and/or multilayer coated surfaces and Multi-Foil Optic (MFO) technologies are applied. Combination of extremely smooth optical surfaces and other processes/technologies is one of the key Rigaku technologies.

X-ray Cameras

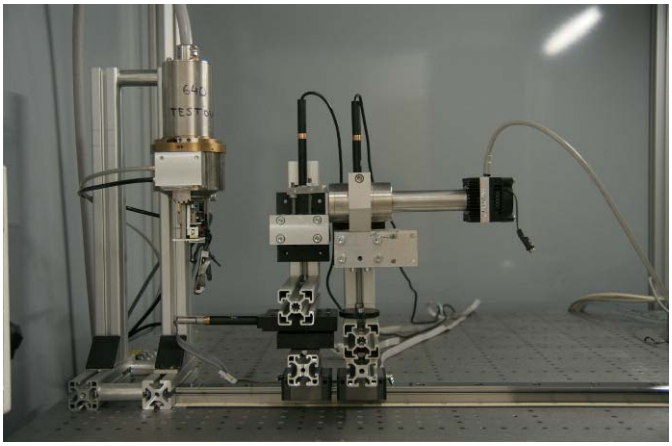
The other important field of RITE R&D activities is X-ray detectors and cameras. Especially, scientific imaging with X-ray BI CCD detectors is on superior level. Currently RITE manufactures (produces) four types of cameras – soft X-ray digital CCD camera, two types of fast readout X-ray cameras (40 Mpixels/s) and X-ray camera with spatial resolution around (below) one micrometer.

Design of Complex Opto-Mechanical Systems

X-ray optics or detectors are key components of any X-ray instruments. Moreover RITE has capability to design and provide manufacturing of complex Opto-Mechanical system using these components. The design of parts and mechanical systems is realized using CAD system NX/Unigraphics. Mechanical manufacturing is partly outsourced through specialized facilities.

Applications

RITE super smooth X-ray mirrors and X-ray detectors are used in laboratories and companies. Grazing incidence X-ray mirrors and X-ray cameras from RITE have applications in semiconductor industry, astrophysics, EUV lithography, material research, biology and hot plasma research.



X-ray experimental facility including X-ray source (8 keV)

Cooperation and References

RITE cooperates with Czech academic institutes (Charles University, the Academy of Sciences of the Czech Republic, Czech Technical University, Institute of Chemistry in Prague, etc.) as well as with international institutes (ESTEC ESA, University of Colorado, Institute of Optoelectronics, Military University of Technology). The scientific standard of RITE is demonstrated by several successful international projects:

Elliptical optics for EUV

- Academy of Sciences of the Czech Republic – 2008
- Institute of Optoelectronics, Military University of Technology – 2009, 2010, 2011
- Czech Technical University in Prague, Faculty of biomedical Engineering – 2010

CCD cameras

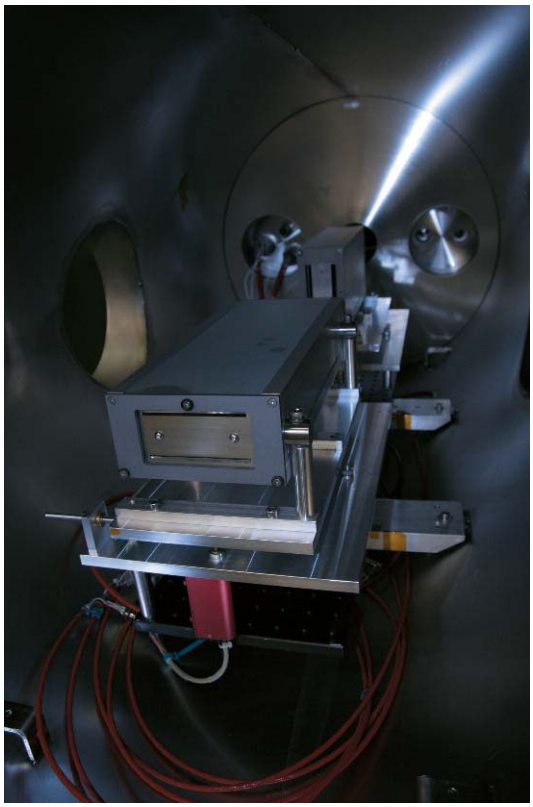
- Bhabha Atomic Research Center, Mumbay, India – 2009, 2011
- Rigaku Corporation, Tokyo – 2009, 2011
- Czech Technical University in Prague – 2010
- Czech University of Life Sciences, Prague – 2010

Helmholtz-Zentrum Berlin für Materialien und Energie – Wilhelm Conrad Röntgen Campus – synchrotron radiation source BESSY, Berlin – 2011

International projects

- Novel X-ray Optics Technologies for ESA X-ray Astrophysics Missions – ESA PECS project (end 06/2011)
- Applications of Kirkpatrick Baez Imaging Systems in Space – co-operation with Colorado (Prof. Webster Cash) and Iowa University (Prof. Randall L. McEntaffer) – Ministry of Education, Youth and Sports (end 2012)

Multi-Foil elliptical X-ray optics



X-ray experiments with Multi-Foil elliptical optics in Colorado University

EUV elliptical optics for laboratory experiment

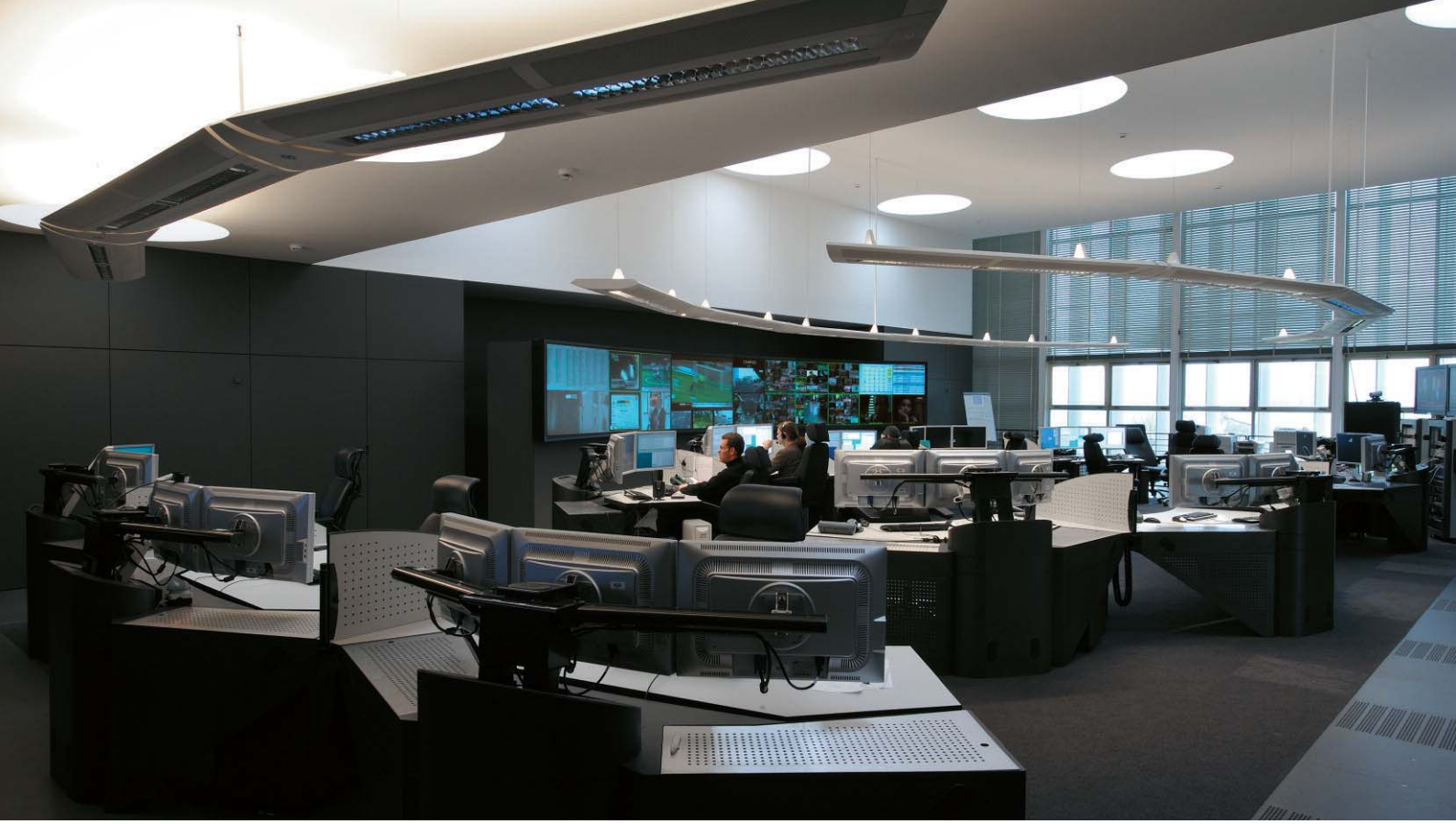
XSight Micron high resolution X-ray camera

EUV elliptical optics for plasma research experiment

Multi-Foil elliptical X-ray optic

ESA Bidder code: 58005

Rigaku Innovative Technologies Europe, s.r.o.
Novodvorská 994, 142 21 Prague 4-Braník, Czech Republic



SIECAMS control room

SIEMENS CONVERGENCE CREATORS

Company profile

Siemens Convergence Creators, s.r.o. was established in October 2012 by means of transfer of the Siemens Communication, Media and Technology (CMT) division from the former company ANF DATA spol. s r. o.

The company head office is in Prague with a branch office in Brno. The company currently employs over 130 people; the majority are highly qualified analysts and software developers and hardware engineers with university degrees.

The Space department in the Czech Republic was established in 1998. It is now part of the Industry organizational unit within the global Siemens Convergence Creators company. Since its inception the Czech Space department group has cooperated with the Siemens Aerospace department in Austria on the development of various software and hardware solutions for ESA, German National Space Agency (DLR), and leading satellite operators.

Our main expertise is in the fields of

- Development of Electrical Ground Support Equipment (EGSE)
- Software development for the ESA Ground Station and Mission Control System
- Software development for the Earth Observation Services Infrastructure
- Development, evolution, customisation, and maintenance of the Siemens Carrier Monitoring System – SIECAMS

Egse Development, Integration, Tests, Verification & Validation

Software development, integration, tests, verification & validation:

- **Sentinel-4 UVN Data Evaluation EGSE**
  Detailed design, implementation & testing of all S4 UDEE application software
- **Meteosat Third Generation Data Handling SCOE**
  Design, implementation & testing of all MTG specific software
- **Advanced Integration and Test Services**
  Development of the EGSE software building blocks led by Astrium
- **Solar Orbiter Power SCOE**
  Power SCOE software development and hardware procurement
- **European Ground System Common Core Technologies Proof of Concept**
  Evaluation of preselected technologies for EGS-CC and development of related prototypes; performed with CS France as prime
- **Galileo Payload Test System**
  Definition & implementation of test procedures, automatic tests, system validation, pre-customer acceptance tests and on-site support

Hardware manufacturing, assembly, integration & testing

- **Meteosat Third Generation Payload Data Distribution SCOE**
  Procurement, manufacturing, assembly, tests & integration of the RF-Switching & Matching unit
- **Galileo FOC and Galileo IOV TT&C SCOE**
  Contribution to Siemens Austria in manufacturing, assembly, tests & integration of the SCOE systems

Mission Control Systems and Ground Station Software Development

Development for SCOS-2000 based Mission Control Systems

- **DLR SCOS-2000 MCS maintenance**
  Long term contribution to the Siemens Austria maintenance and evolution of SCOS-2000 MCS for DLR
- **Study of SCOS-2000 deployment over WAN for a concept of CMCP**
  Optimization of client-server communication over WAN in Telemetry Desktop, Event Logger, and MATIS
- **Advanced Monitoring for a Modern Generic Mission Control System**
  - CORBA based Packet Distribution & Reception Prototype
  - Command Supervisor – integrated into to S2K 5.x and DLR MCS
  - EGOS Data Transfer Library – transfer of structured data between end points in a word size neutral (32/64) and platform independent way
  - EGOS Data Management Library – management of Telecommand SCOS-2000 packets data
- **The DTL/DML based MCS Demonstrator**
  Implementation of the live Telemetry distribution chain in S2K by means of the EGOS DTL

Ground Station software development and technology studies:

- **Ground Station Automation and Off-line Operations**
  Investigation of ground station automation and offline operation issues in the different phases of space missions in order to specify a draft commanding service for ground stations, and to prototype and demonstrate selected automation concepts.
- **Transient Objects for M&C in GSSC/GMMI**
  Design and implementation of improvements of the monitoring and control of transient objects in the subsystem controllers deployed on ESA Ground Stations
- **Monitoring and Control Module for ESTRACK Ground Stations**
  Support to Siemens Austria in the development of the MCM4 system responsible for monitoring and control of TCP and GPIB equipment (with IEEE 488 interface) installed on the ground stations

Performance and data analysis:

- **Parallel computing for fast Telemetry processing during short passes**
  Preparatory activity for the Fast Analysis of Spacecraft Telemetry (FAST) project, which aims for processing of telemetry data at a significantly higher speed than the current SCOS-2000 Telemetry model
- **Operational Data Off-line Analysis Correlation and Reporting System (ARES)**
  Development of Analysis and Reporting System on top of the EGOS Data Dissemination System (EDDS) and with reuse of the EGOS User Desktop (EUD), planned to be deployed for the GAIA mission.
- **Galileo Space Craft Control Facility (SCCF) – Performance Evaluation and Analysis (PEA)**
  Development of the Client/Server interface and Database handler for the PEA system

Earth Observation Software Development

- **Decision Support and Real Time EO Data Management system**
  Development of technologies for controlled Web-based access to geospatial data archives and for invoking processing capabilities, in the context of real-world use cases originating from European Union Satellite Center (EUSC) and European Maritime Safety Agency (EMSA).
- **Open Standard Online Service**
  Implementation and validation of the recent Open Geospatial Consortium (OGC) standards mainly relating to Web Coverage Service (WCS 2.0) with its related EO application profile (EO-WCS).
- **Spatial Observation Services and Infrastructure in Czech Republic**
  Development and validation of a network of cooperating Land Cover / Land Use data WEB servers for distributed EO data access

Siemens Carrier Monitoring System – Siecams

The Siemens SIECAMS family is a highly sophisticated automated RF and content monitoring platform for the continuous monitoring of satellite signals and for ensuring high quality standards in uplink procedures and satellite transmission links. SIECAMS is installed on many ground stations distributed all over the world and monitors the downlink traffic of 28 satellites. Main features:

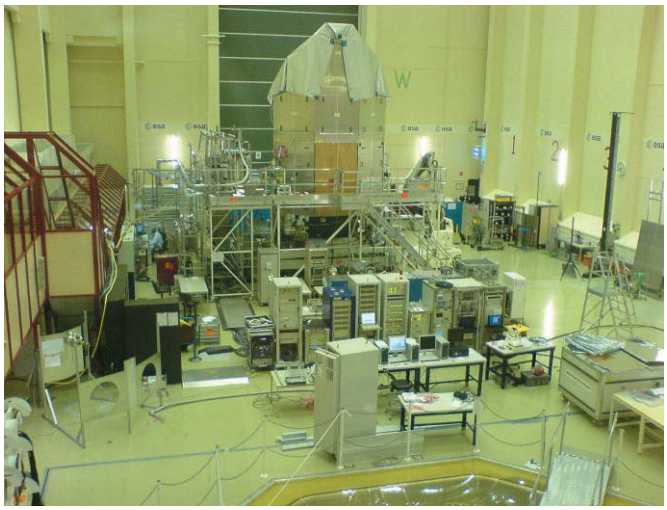
- **Carrier Monitoring & Signal Analysis**
  - Adjacent Satellite Interference measurements
  - Transponder Performance measurements
  - Hidden Interference detection
  - Ka-Band Monitoring
- **Interference Localization**

The interference localization system is seamlessly integrated into SIECAMS. This integrated system provides not only geo-location 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.



Maintenance mission of SCOE, ESTEC

Electrical Ground Support Equipment

ESA Bidder Code: 58007

SIEMENS

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www.convergencecreators.cz
Space Department: Helena Kalenská, Phone: +420 244 091 122,
E-mail: helena.kalenska@siemens.com

SYNPO

Company profile

SYNPO a. s. is a research and manufacturing company with more than 60 years tradition in R&D of polymeric materials. Several research teams are working on synthesis of polyesters, polyurethanes, epoxies and acrylates and on formulation of paints, composites and adhesives. One of our major research areas is development of nanostructured and hybrid polymers and polymers based on recyclable and renewable raw materials. Analysis, evaluation and testing are carried out in accredited laboratories. SYNPO has extensive experience in technology transfer; from laboratory through pilot plant to a full commercial scale manufacturing. Synpo complies with ISO 9001:2008.

SYNPO closely collaborates with Czech industry and companies in the European Union, USA, and Japan.

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)

Recent projects for customers

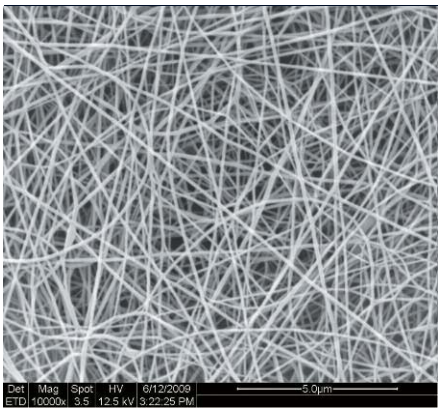
- Cryogenic thermal insulation foams (fuel tanks of space vehicles)
- Antiradar coatings
- High temperature resistance coatings (over 300 °C)
- High refractive index polymeric systems
- Coatings with high abrasion resistance and resistance against aggressive liquids
- Rubbers with low gas/liquids permeability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

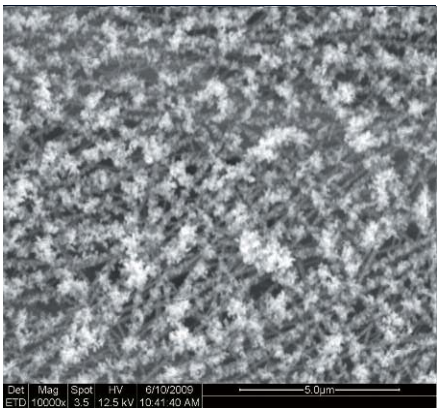
Projects supported by ESA

- Liners material study
- Epoxy Core Development

Technology areas of SYNPO, of interest to the aerospace industry

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





ESA Bidder Code: 58041

SYNPO a. s.
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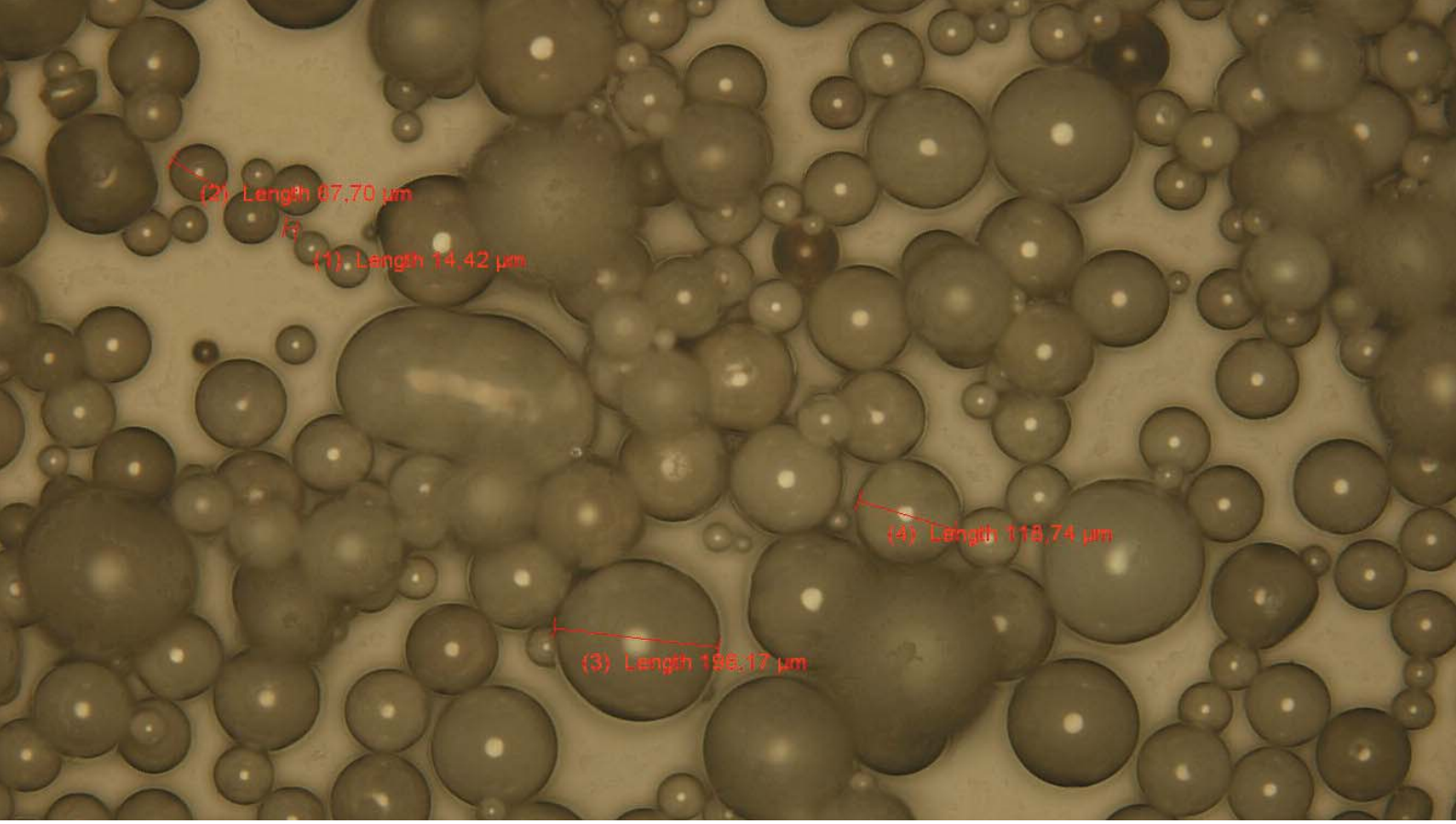


Encapsulation of reactive agents for self-healing.

TOSEDA

Company Profile

TOSEDA s.r.o. is an SME that was established as a business company in 2010. Two year later the company expanded and changed the main activity to contract research and development and small scale production of specialty polymeric systems. The leading R&D areas are nanotechnologies and environmentally friendly technologies. The R&D Center located in TechnoPark Pardubice occupies area of 130 m^2.
The main activity of TOSEDA is design of novel polymeric materials for hi-tech applications and development of environmentally friendly procedures for production of green polymeric materials. The R&D activities and scale-up of the custom designed polymeric systems are supported by analytical and testing laboratories. TOSEDA also provides consultation services.

- Nanotechnologies
- Environmentally Friendly Technologies
- Small Scale Production
- Analytical and Testing Services
- Consultation Services

Three roll mill dispersion unit – Exact

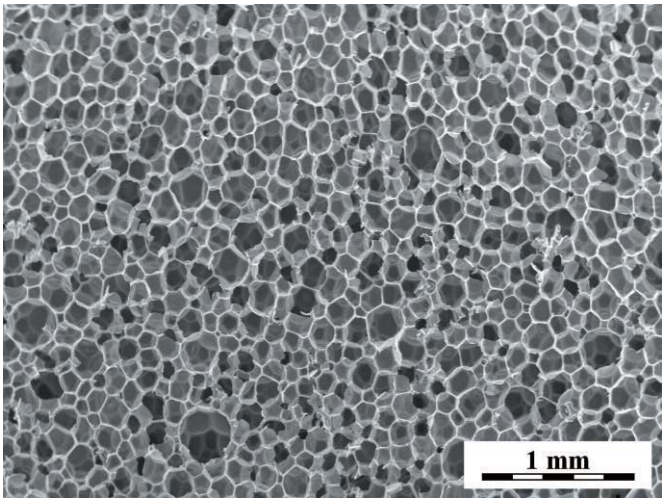
The team of TOSEDA has reach experiences with participation on and coordination of many domestic and international projects supported by individual customers, Czech Government, European Commission and European Space Agency. TOSEDA closely collaborates on domestic and international scene with number of universities, research organizations and recognized chemical companies.

R&D Activities

- Synthesis, formulation and preparation of specialty monomers and polymeric materials (coatings, adhesives, casting resins, composites…)
- Synthesis of nanostructures (organic and inorganic nanoparticles)
- Tailored surface modification of nanoparticles
- Dispersion of nanostructures in various environment
- Encapsulation

Small Scale Production Activities

- Additive masterbatches (dispersions of nanostructures)
- Polymeric premixes
- Pre-pregs



Thermoinsulation polyurethane foam

Atomic Force Microscopy – ICON

Discovery hybrid rheometer – TA Instruments

Applications Areas

- Space
- Aerospace
- Automotive
- Construction
- Electronic
- Military
- Medicine

Activities foreseen in space industry

- Thermally and Electically Conductive Polymeric Systems
- Polymeric Structured Foams (High Strength and Low Weight Materials)
- Composite Tanks for Liquid Propellants (Lightweight CFRP and Polymeric Barrier Layers)
- Thermally Protective System (Reflection, Absorption, Emitting)
- Cryogenic Materials (Polymeric Foams and Polymeric Aerogels)
- Hybrid Composite Materials (High Strength and Resistance Aggressive Environment, Low Internal Stress)
- Elastomers (Low Gas Permeability and Excellent Thermo-mechanical Properties)
- High Temperature Resistant Coatings (Over 300 °C)
- Stress Sensitive Coatings (Pressure and Deformation Sensors)
- Adhesives (High Shear and Peel Strength, Encapsulated Chemical Compounds)
- Polymeric Binders for Solid propellants

R&D Center of TOSEDA s.r.o. located in TechnoPark Pardubice

ESA Bidder Code: 58110

toseda
technology · science · development

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5M s.r.o. is manufacturing company with own R&D department who specializes in composite production and bonded sandwich structures. 5M develops and produces epoxy adhesives for extra high strength bonds, epoxy resins for lamination, pultruded composite profiles and sandwich panels. 5M is strong focused at innovative process and new products. Certified ISO 9001:2001, 120 employees and 3000 m² production area included new hall for pultrusion technology.

AVX Czech Republic s.r.o. 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%.

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

ChipInvest a.s. provides solutions and access to funding to early stage technology companies seeking to improve their market position. The major interest is focused on IC design, EDA and embedded systems or other technology development opportunities closely linked to the semiconductor industry. ChipInvest actively seeks companies interested in growing their business in the Czech Republic taking advantage of the intellectual potential of central and eastern Europe.

Czech Space Research Centre s.r.o. The activities of CSRC are: Design of electronic and programmable systems, software development, including all necessary ESA documentation, test procedures and simulations (e.g., PSA, FMECA, DML, DPL, DCL), clean-room assembling. Mechanical design and manufacturing including all necessary testing and simulation, as requested by ESA testing procedures. Performing all necessary tests (TVT, EMC, vibration ... etc.) for quality assurance and system specification conformance.

EGGO Space s.r.o. 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 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.

Evolving Systems Consulting s.r.o. is a software producer & hardware assembler, which provides flight software development for various satellite on-board instruments as well as data processing ground segment software. Delivers innovative technologies and comprehensive know-how to benefit customers in several countries. Company is active in the areas of Information, Communications, Control and Automation.

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

Iguassu Software Systems a.s. is a software development and consultancy company with extensive international experience and well over 100 man years in space projects, including in ESA, Eumetsat and Galileo. It focuses on satellite navigation (mostly EGNOS related), processing of EO data (e.g. developing a new catalogue for ESRIN), and recently started work on SSA (robotic telescope test bed) and EGSE (SVM electric simulator study for Euclid).

L.K. Engineering s.r.o. (LKE) focuses on design and detailed analysis services in area of industrial engineering. LKE provides services to diverse groups of clients including developers, owners, and design companies. By means of advanced computational technologies, deep knowledge, and own experience, LKE helps to increase competitiveness and reliability of customer's products while reducing development costs.

Rigaku Innovative Technologies Europe s.r.o. (former Reflex) offers expertise, R&D, and manufacturing of precise X-ray optic, and precise X-ray cameras for industry and scientific research. It also provides other services, including metrology, numerical simulations, data processing and visualisation, mechanical design and manufacturing.

Siemens Convergence Creators provides innovative software and hardware solutions for the Electrical Ground Support Equipment, Mission Control Systems, Ground Station Systems and Satellite communications.

Synpo a.s. research institute is a Joint Stock Company with more than 60 years tradition in R&D of polymeric materials. Four research teams specialize in synthesis of polyesters, polyurethanes, epoxies and acrylates and formulation of paints, composites, adhesives and foams. Application fields include construction, electronic, automotive, aviation and space industry. One of major research areas is development of nanostructured and hybrid polymers. Analysis, evaluation and testing are carried out in accredited laboratories. SYNPO is currently fully in conformance with standard ISO 9001:2008. SYNPO exclusively 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 closely collaborates with the Czech industry and companies in the European Union, USA, and Japan.

TOSEDA s.r.o. is an SME providing contract research and development, small scale production of specialties and consultation services in the field of nanotechnologies and environmentally friendly technologies. The main activity includes custom design of novel polymeric materials for hi-tech applications in space and aerospace industries.

ESA and Galileo Projects won by CSA in international tenders or in direct negotiations

Examples of project won in international competitive tenders	Tender reference	Establishment	Award year	Prime	Subcontractor
GISAR Galileo Search and Rescue	GJU	GJU	2005	INDRA	Iguassu Software Systems
Image Information Mining in Time Series	ESA AO5119	ESA ESRIN	2007	ACS	Iguassu Software Systems
IRIS/ANTARES – Artes B1, BP, B2	ESA AO6050 – Direct n.	ESA ESTEC	2008	TAS-I	ESC Aerospace
IRIS/ANTARES – Artes B2	ESA Direct negotiations	ESA ESTEC	2008	TAS-I	Iguassu Software Systems
IRIS/ANTARES – Artes B2	ESA Direct negotiations	ESA ESTEC	2008	INDRA	Iguassu Software Systems
Low ESR Tantalum Capacitor Evaluation and Qualification	ESA Direct negotiations	ESA GSTP	2010	AVX	
Interference Monitoring for the GNSS Reference Stations	ESA AO6149	ESA ESTEC	2010	Astrium D	Iguassu Software Systems
O3S – Open-standard Online Observation Service	ESA AO6143	ESA ESRIN	2010	EOX	Iguassu Software Systems
O3S – Open-standard Online Observation Service	ESA AO6143	ESA ESRIN	2010	EOX	Siemens Convergence Creators, s.r.o.
Operational Data Off-Line Analysis, Correlation and Reporting System (ARES)	ESA AO6287	ESA ESOC	2010	Siemens Convergence Creators GmbH	Siemens Convergence Creators, s.r.o.
On-Board Software Reference Architecture Consolidation	ESA AO6452	ESA ESTEC	2011	SSF	esc Aerospace
Requirements and I/F Definition for future OBCP Building Block	ESA AO6488	ESA ESTEC	2011	GMV	esc Aerospace
Solar Orbiter STIX B	ESA Direct negotiations	ESA ESTEC	2011	esc Aerospace	
VTI Flutter Design & Analysis Engineering Activities	ESA Direct negotiations	ESA Launchers	2011	Astrium D	LKE
Development of Quality Evaluation Methods for Calomel Optical Elements	ESA Direct negotiations		2011	BBT	CTU
MTG DCS & GEOSAR	AO10125	ESA ESTEC	2012	TAS	esc Aerospace
Advanced Integration and Test Services (AITS)	ESA Direct negotiations	ESA ESTEC	2012	Astrium GmbH	Siemens Convergence Creators, s.r.o.
Decision Support and Real Time EO Data Management (DREAM)	ESA AO6809	ESA ESRIN	2012	Spacebel SA/NV	Siemens Convergence Creators, s.r.o.
Solar Orbiter Power Spacecraft Check Out Equipment	ESA AO70154	Astrium LTD	2012	Siemens Convergence Creators GmbH	Siemens Convergence Creators, s.r.o.
Robotic telescope test bed	ESA AO6767	ESA ESOC	2012	ISDEFE Spain	Iguassu Software Systems
Design and Analysis of Thruster Platform of the Lunar Lander	ESA Restricted	ESA ESTEC	2012	Astrium D	LKE
Euclid Power SCOE	ESA AO7612	ESA ESTEC	2013	Siemens Convergence Creators, s.r.o.	TAS-I, Siemens Convergence Creators GmbH
Euclid SVM Electrical Simulator	ESA AO7613	ESA ESTEC	2013	CSRC	Iguassu Software Systems, TAS-I
5M composite technology evaluation	ESA Direct negotiations	ESA ESTEC	2013	TAS-F	5M s.r.o.
Adhesive Bonding of Thermoplastic Composites	ESA Direct negotiations	ESA ESTEC	2013	EireComposites	5M s.r.o.
Sentinel-4 UVN Data Evaluation EGSE (S4 UDEE)	ESA Direct negotiations	Astrium GmbH	2013	Siemens Convergence Creators GmbH	Siemens Convergence Creators, s.r.o.
Meteosat Third Generation Data Handling SCOE (MTG DHS SCOE)	MTG-ITT 16-3	OHB System AG	2013	Siemens Convergence Creators GmbH	Siemens Convergence Creators, s.r.o.
European Ground System Common Core Technologies Proof of Concept	ESA AO7273	ESA ESTEC	2013	CS Systemes D'Information	Siemens Convergence Creators, s.r.o.
Meteosat Third Generation Payload Data Distribution SCOE (MTG PDD SCOE)	MTG-ITT 16-5	OHB System AG	2013	Siemens Convergence Creators GmbH	Siemens Convergence Creators, s.r.o.
Ground Station Automation and Off-line Operations (GSAO)	AO7024	ESA ESOC	2013	Siemens Convergence Creators GmbH	Siemens Convergence Creators, s.r.o.
Parallel computing for fast Telemetry processing during short passes (FAST)	AO7113	ESA ESOC	2013	Siemens Convergence Creators GmbH	Siemens Convergence Creators, s.r.o.
Solar Orbiter STIX C,D	ESA Direct negotiations	ESA ESTEC	2013	esc Aerospace	esc Aerospace
SEN-4 Performance Assessment Tool	GSU.ASG.UVN.RFQ.00003	ESA ESTEC	2013	Astrium GmbH	esc Aerospace
Development of Quality Evaluation Methods for Calomel Optical Elements	ESA Direct negotiations	ESA		BBT	CTU
Design of the CCSD Mission Operations Specification Graphical Editor	ESA AO7634	ESA ESOC	2014	Iguassu Software Systems	
Infrared Advanced Polarizer for Space Applications	ESA TRP	ESA	2014	BBT	

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