ASSOCIATION OF THE AEROSPACE MANUFACTURERS OF THE CZECH REPUBLIC
(Selected member companies focusing on space activities)
CzechTrade prepared for you a series of catalogues mapping the Czech Space Sector. In this second volume you will find information about member companies of the Association of the Aerospace Manufacturers of the Czech Republic which focus on space activities. All of these companies have great experience in the field of space technologies and most of them have already realized ESA and Galileo projects.

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Cooperation
- Aerostructures – assemblies (airframes, airframe sections, tail units, control surfaces, wings and wing parts) and subassemblies (metal as well as composite);
- Precision casting;
- Precision machining.

The main activities of member companies
- development and production of various types of aircraft;
- development and production of jet, turboprop and small piston engines;
- development and production of equipment for aircraft and engines;
- development and production of propellers;
- development and production of airport radiolocation equipment;
- development and production of simulators and training systems;
- development and production of space qualified parts and systems;
- aircraft maintenance and repairs;
- aerospace research and tests;
- air traffic management;
- aerospace publishing.
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HONEYWELL INTERNATIONAL

General description
Honeywell is a leading global provider of integrated avionics, engines, systems and service solutions for aircraft manufacturers, airlines, business and general aviation, military, space and airport customers and has a long and proud heritage in the Czech Republic. Since opening its first office in 1962, Aerospace has expanded to operate from three locations in the Czech Republic: Prague, Olomouc and Brno. Each of these sites offers a range of skills, capabilities and technologies to the Honeywell Aerospace portfolio. In the space sector, Honeywell provides a wide range of high quality, innovative products that have contributed to the mission success of many different and varied space platforms. We offer customers our commitment to excellence and complete solutions for space applications. Honeywell has provided thousands of systems required for accurate momentum control, pointing, vibration isolation, guidance and navigation, semi-conductors, data control and other satellite, launch vehicle, missile and interceptor products.

Heritage
Our heritage of providing best value avionics, controls and semi-conductor solutions for the productive use of space demonstrates both our world-class capability and our long-term commitment to space programmes. Leveraging our industrial and research capability across the Czech Republic, Honeywell serves the European Space Agency with advanced studies and state of the art research and technology capability on the IBIS programme, as well as the Czech Industry Incentive Scheme programs. Honeywell Aerospace footprint in the Czech Republic builds upon a history of excellence in serving the European space industry and our customers also include worldwide space industry and our customers also include worldwide space programs. Honeywell Aerospace footprint in the Czech Republic programme, as well as the Czech Industry Incentive Scheme serves the European Space Agency with advanced studies and other satellite, launch vehicle, missile and interceptor products.

Projects
Honeywell Aerospace has participated in a range of R&D projects including:
- ESA – ARTEMIS 5.1
- ESA – ARTES 5.1
- ESA – ARTES 10
- Iris-ANTARES (AeronauticAI Resources Satellite based)

Products include:
- Honeywell provides a variety of process controllers for varied space applications including the International Space Station and Satellites.
- Satellite Guidance & Attitude Control
- Honeywell’s space business has more than 40 years of experience producing first-rate guidance, navigation and control products for various space platforms.
- Products include:
  - Miniature Inertial Measurement Unit (MIMU)
  - High Performance Fiber optic Gyro-Based Inertial Reference System
  - Micro Electro-Mechanical Systems (MEMS)

Capabilities
- Our technologies include:
  - Process Controllers
  - Honeywell provides a variety of process controllers for varied space applications including the International Space Station and Satellites.
  - Satellite Guidance & Attitude Control
  - Honeywell’s space business has more than 40 years of experience producing first-rate guidance, navigation and control products for various space platforms.
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  - Micro Electro-Mechanical Systems (MEMS)

- Integrated Space Vehicle Health Management
  - Honeywell’s cutting-edge Integrated Vehicle Health Management (IVHM) system captures and integrates the intelligence and expertise of engineers who design and build systems and subsystems for spacecraft. Not only will IVHM house a comprehensive database, it also will function as a “brain” that can analyze total-vehicle data, diagnose problems, recommend corrective actions, and verify return-to-health data. It’s like having rocket scientists on hand around the clock to ensure spacecraft stay healthy and achieve mission success.
- Control Moment Gyros
  - Honeywell is the world’s largest supplier of control moment gyroscopes (CMGs). Our CMGs, with both single and double-gimbal configurations available, are reliable solutions for a variety of momentum control applications. Their high output torque provides satellites with rapid, precision, pointing and tracking maneuvers.
- Reaction and Momentum Wheels
  - Honeywell’s reaction wheel assemblies (RWA) and momentum wheel assemblies (MWA) are reliable, lightweight solutions to a variety of momentum control needs, providing stability and attitude-control for small to very large, heavy spacecraft. Earth-pointing satellites and multiple-satellite communication networks are examples of applications that require the fine attitude control that Honeywell RWAs provide.
- Vibration Isolation
  - Spacecraft structures are unlike any other. They demand complex solutions to reduce the launch loads and on-orbit-induced vibration, thus improving system performance. Honeywell has extensive experience in isolating complete satellites from launch vibration, and in reducing on-orbit disturbances from the bus, the payload, and the momentum control system. Utilizing this experience and a dedicated development laboratory, Honeywell has the expertise to support satellite designs with structural control, leading to a high probability of mission success, regardless of the spacecraft challenge presented.
- Microelectronics & Platform Systems
  - Honeywell’s radiation hardened electronics and radiation technology provide military aerospace system designers a strategically hardened family of products to reduce risks in space and ensure mission success.
General Description
Established in 1994 as a member of MESIT group (history since 1952)
NSA:SECRET

Capabilities
Development and manufacturing of:
- Aircraft instruments for measurement of physical variables
- Radiocommunication equipment and intercoms
- Instruments for the control of APU
- Inverters and test equipment

Products
Two-band airborne communication transceivers, intercoms for military applications, antennas for ground ATC, thermocouples, temperature sensors and switches, fuel quantity and consumption measurement set, digital – analogue indicators, landing gear controls, flaps controls, static three-phase voltage inverters, lengthwise and crosswise trimming, units for starting and controlling the operation of aircraft engines and Auxiliary Power Unit (APU), instrumentation for deicing of the aircraft frame, basic test equipment for most aircraft instruments etc.

References
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**General description**

SERENUM's mission is to provide customers with comprehensive solutions in the area of electronics and mechanics design and development. The focus is on inertial and measurement systems as well as time and frequency control and mechanical design and processing of parts or subsystems (cases, mechanisms, locking devices, fixtures) including theoretical and numerical analysis. Due to our company know-how, we can serve our partners with customized turn-key solutions also for other application segments. The aim is to supply top products and services with superior reliability and quality which are at the forefront of the corresponding technical domain. We treat our customer requirements with maximum consideration and helpfulness. Highly versatile solutions are offered to address customer needs.

**Heritage**

The SERENUM is a subsidiary of Aerospace Research and Test Establishment, Inc. (VZLU), Prague, Czech Republic in order to implement and commercially exploit its space and terrestrial activities, especially leading to a final product.

**Capabilities**

- Measurement and control design
- Special equipment manufacturing, motion analysis and control in robotics, transport, navigation, stabilization
- Localization systems based on inertial-, camera- and beacon-based measurements, optional fusion with satellite navigation; own robust estimation algorithms tailored to specifics of 3D motion properties

- Analysis, calculation and implementation of controllers and estimators; implementation of measurement and control in real-time as well as offline processing
- Industrial robot control (serial kinematic chains), manipulators, inverse kinematics, interpolation, multi-axis trajectory generation
- Digital signal processing, algorithm implementation or stand-alone hardware solutions; experience in healthcare, software-defined radio, acoustics, and image processing

- Time and Clock Management
- Delay compensation and adjustment for use in telecommunications, satellite technology, and navigation
- Precision time metrology, custom built equipment, event time, interval and phase measurement (10^-11...10^-14 s RMS single-shot jitter), accurate frequency/phase synthesis; optimal estimation of time and phase of the measurement system clocks (clock ensembling), distribution and synchronization of time in the industrial and computer networks, electro-optical devices calibration
- Measurement, generation and distribution of precise time and timestamps, systems based on radiation-tolerant FPGA
- Numerical simulation of timing and photonic devices
- Custom design and development of electronics
- Digital signal processing, data acquisition systems, universal data processing unit based on on SPARC LEON3FT processor, Gaisler GR712RC SPARC LEON3 FT development board, and real-time process control
- FPGA (Field Programmable Gate Array) design, IP core development, high-throughput real-time data processing, on-the-fly re-programmability, using RTL (VHDL) synthesis with optimal low-level EDIF netlist generation, including alternative industrial and aerospace versions (e.g. Actel/Microsemi & Xilinx)
- Custom design and development of mechanics
- Complex design and processing of mechanical parts or subsystems (cases, mechanisms, locking devices, fixtures etc.) including production documentation

- Selection of appropriate material
- Assessment of stiffness, strength, modal, thermal and durability characteristics of systems after applying various types of load
- Numerical analysis of issues in physics using finite element method including supporting static, dynamic, fatigue and thermal calculations
- Tests
- Thermovacuum chamber in clean room class 100 000 (1m³, vacuum better than 10^-4 Pa, variable temperature from -60 to +120 °C)
- Vibration testing (53 kN, 35 kN, 22 kN)
- Centrifuge (max 25g, max 100 kg)
- Design and manufacture of testing appliances for measured devices
- Measurement and testing of electronic or electromechanical devices
- Consultancy for space projects
- Electronic and electromechanical system audit and optimization
- Administration of space contracts
- Project management
- Product assurance

**Projects**

- **NTSC III-TX (2014-now) — Serenum is currently developing a digital version, both transmit and receive, of TimeTech’s modem for ranging and time transfer.**
- **PROBA3 (2012-now) — Front door assembly design of Optical Objective Assembly for ASPHICS coronagraph.**
- **FLUTTER (2011-2012) — Flutter calculations and wind tunnel experiments on aeroelastic models an correlation with flutter calculations on full scale part.**
- **SWARM (2009-2011) — Three flight units of capacitive microaccelerometer (see pictures below) including ground segment equipment were developed and delivered for three satellites of SWARM mission.**
- **TEASER (2004-2009) — Flight verification of microaccelerometer during orbit operation, launched on Russia satellite TATIANA 2.**
- **MIMOSA (2003-2004) — Development and testing of the selected mechanical parts Vibration qualification testing including.**

**Single-photon lidar**

**Time-to-digital converter**

**Locking mechanisms located on the cube sensor**

**Capacitive microaccelerometer**
Projects
- **MIMOSA**: Vibration qualification testing of the Czech microsatellite, including development of selected mechanical parts.
- **SWARM**: Delivery of three flight models of microaccelerometer for SWARM mission. The key responsibility was design, development, manufacturing, integration and verification of flight units including embedded software.
- **TEASER**: Flight verification of micro-accelerometer during orbit operation on Russian satellite TATIANA 2.
- **CUSA**: The first phase of development of the satellite type 1U CubeSat. Work consists of the design of mechanical parts and the preparation of the SW.
- **PROBA**: ESA technology project. Contribution to ASPIICS Coronograph on Board Probe 3 Mission of ESA.

Capabilities
- Aerodynamics
- Strength and durability of structure
- Accredited testing
- Composite structures
- RTD services for space – CFD computations, CFD input for flutter investigation, flutter assessment, modal analyses, heat transfer simulations, FEM, mechanical and vacuum testing, nanosatellites integration (e.g. cubsats)
- Development of scientific instruments for the use in space (Serenum, a.s.)
- Production of models and composite structures (VZLU Technologies, a.s.)
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 47 foreign representations. 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;

YOUR CONTACT POINT FOR

FINAL PRODUCTS
• Commuter aeroplanes (EV-55, L-418);
• Utility aircraft (EuroStar, Harmony, FS - 28 Cruiser, SkyLeader family), various UAVs;
• Jet and turboprop engines, APU;
• Variable pitch propellers (with composite blades);

PARTS
• Landing gears;
• Fuel systems and parts;
• Air condition systems;
• Hydraulic systems and parts;
• Electronic systems (ECU/FADEC, Structural monitoring systems, Multifunction displays, special software);
• On-board instruments and systems;
• Space qualified parts (with embedded SW);
• Flight recorders etc...

COOPERATION
• Aerostructures - assemblies (airframes, airframe sections, tail units, control surfaces, wings and wing parts) and subassemblies (metal as well as composite);
• Precision casting;
• Precision machining;

MEMBERS

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COOP...