

Rovsing A/S

Verification of your software ensuring high availability

Launching satellites requires that a very large amount of different types of software functions perfectly together, not only in the satellite, but also for all ground equipment that supports the satellite. "Our main task", says Managing Director Orla Mayland Olsen, "is to ensure that all these programmes can co-operate without problems. This goes for all types of satellite projects, both commercial and scientific".

The main facilities in Skovlunde, outside Copenhagen



Technicians work with the Electronic Ground Support System, a test system for satellites.



A satellite in orbit uses several types of different software, both for the satellite itself and for the necessary ground installations to manage the satellite. That is often a selection of standard software from different suppliers and software dedicated developed for the project, but common for all, they have to co-operate without any trouble in all

situations. For a large amount of the European scientific or commercial satellite programmes, the Danish company, Rovsing A/S carries out the demanded verification and validation.

Rovsing A/S is a Danish owned company with around 60 employees, where most of them are highly educated software engineers with comprehensive knowledge and expertise in supplying software based systems to the international space industries. The company is well known, has been working within the space-related areas from the beginning of the European space era, and has ESA and most of the large space contractors in Europa at the customer list. Rovsing is a supplier of software solutions for all space-related applications such as

on-board, checkout, ground station, earth observation data processing, ground network, simulation, and evaluation applications. The company also develops and manufactures hardware products applied to ground support equipment. Rovsing is also among the leaders in vibration engineering, vibration signal processing, and vibration damping and provides advanced solutions for vibration analysis and testing of space equipment.

The contractual work is carried out as turn key solutions in the Headquarters in Copenhagen, or as on-site engineering support at the customer's premises, like at Astrium, at ESOC, at ESO and at the ARIANE5 launching base in Kourou, French Guyana.

Managing Director Orla Mayland Olsen provided us with information about the company, and showed us some of the facilities the company has at its disposal.

"Rovsing has through many years and through many large space projects built up an expertise and a renown that the company will be the valuable co-operator for many of the large satellite integrators and research institutions around in Europe. The space business is a highly competitive market and therefore it is necessary to focus on costs, quality, and performance in order to maintain the unique position we have built up. The technology developed from space projects, can give us entry into the non-space industry for our products and services. It is in this field the largest possibilities for profitable business lies", says Managing Director, Mayland Olsen.

Besides developing high quality software for the above mentioned applications Rovsing A/S is prime responsible for performing the Independent Software Verification and Validation of the ATV critical software controlling the important docking-phase. ATV MSU computer manages the correct and precise docking to the International Space Station. The MSU Software is classified as Life Endangering, and detailed and comprehensive verification and validation testing is required accordingly. Specialised team performs the Verification and Validation and test is performed at dedicated facility, both completely independent from the development team and environment.

"Rovsing is also specialised in complete test system for satellites, called EGSE (Electronic Ground System Equipment) where we can test, verify and certify the different instruments and the complete satellite's functionality before the launch",

explains Mayland Olsen. “This has already been carried out for satellites as XMM, Integral and for the ASAR instrument On-Board the Envisat. For the European Galileo system the company is under way with its investigation of several sub-systems connected to the positioning system”. Orla Mayland Olsen continues, “we participated in Galileo from the first development packages were sent out, and we will continue in participating in the further development and construction of the system”.

Participating in the Galileo system

Galileo, will be one of the largest and most advanced European Space programmes ever carried out, involves a large part of the space-related industry and will for this reason be equipped with a several types of software constructed to perfectly fit together with the final products.

The Galileo system comprises the space segment, where the 30 satellites are the main parts, and the ground segment with the Galileo Control System (GCS) and the Galileo Mission System (GMS). The first manages the fleet of orbiting satellites, while the second provides support for the navigation services and other services provided by Galileo.

ROVSING has for the prime been responsible for defining definitions for:

- EGSE-to-ground Segment interfaces, including the interfaces and test requirements for spacecraft integration, pre-launch and the interface between the Satellite Control Facility.
- GMS processing engineering and validation, including the impact on SW development standard and SW development environment and validation tools related to the development of certifiable critical software.
- CGS and GMS processing AIV (Assembly, Integration and Validation) Tools, including tools for test operations, test operations support and test assessment.

Based on the criticality assessments made, Rovsing has evaluated and recommended the methods and tools that should be used for the specification, design, development, and validation of the software development. The evaluation has also considered the impact on the requirements for certification. Rovsing has also been responsible for specifying and definition of the AIV tools to be used for validation of the GMS and GCS facilities during the integration phases.

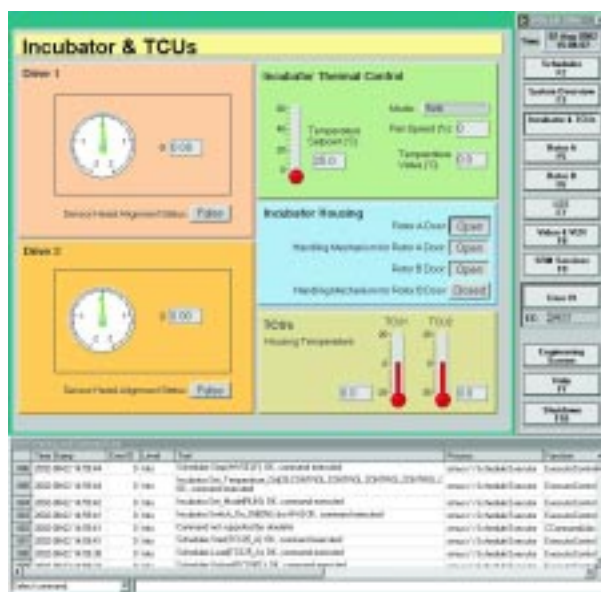
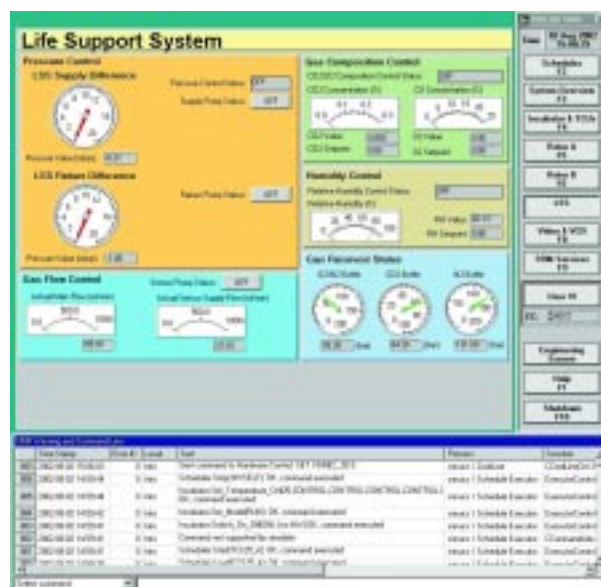
Microgravity equipment on of the main areas

“Another focus area is within microgravity. There is Rovsing supplier of software and facility systems for on-ground preparation of the experiments that are going to be carried out onboard

the International Space Station. The main tasks for this system software is to ensure that all experiments are well prepared and tested by the scientists before release for the real experiments in the expensive environment onboard the Space Station. ROVSING has developed such systems for the BILOAB, as well as for the EMCS projects.

“Optimised man/machine interface (MMI), is important for efficient use of the very limited crew time on board the Space Station”, Olsen goes on. If the astronauts in a manned mission do not have a clear man/machine profile, very valuable time can be wasted and thereby only limited scientific experiments will be performed. To provide the astronauts with a user friendly data-system on board is a very specialised discipline within software development”, Olsen lets us know.

“Our company has, through many years as a software supplier, built up a deep understanding of what the user needs; development processes, tools and technologies for on-board crew operations, Olsen reveals. The last ten years Rovsing has developed and handed over man/machine interfaces for several types of space qualified experiment modules, as for Columbus for ISS, for BIOLAB and for EMCS scientific reference system. In addition, advanced MMI is provided for our automated Health Monitoring system for preventive maintenance for turbine and generators at power plants”, Managing Director Orla Mayland Olsen, concludes.



Examples of user friendly screen displays developed at Rovsing, both for the Biolab equipment.