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EDITORIAL

MUSIS: a new market for Flemish companies

MUSIS (Multinational Space-based Imaging System) is a European initiative whereby which some countries want to join their capacities in Earth Observation for military and security applications. Belgium wants to participate in and minister Laruelle, responsible for Belgium's space policy, has foreseen 50 million € in the long term space budget. A considerable amount and VRI wants to congratulate the Minister. This decision makes the participation of the Belgian industry in this important field be possible.

Minister Laruelle also promised that 50 percent of these financial resources will be reserved for Flemish companies. This promise was part of the global political agreement on the distribution of the Belgian space budgets in the long term space plan.

Resources to support the Belgian participation in MUSIS are also looked for in the budget of the Ministry of Defense. Here an amount of 90 million € would be involved.

Of course VRI asks that the responsible authorities for the defense budgets and for the economical return (minister De Crem and minister Van Quickenborne) will consider the Flemish industrial possibilities for this program. We were surprised to learn that in the preparatory phase resources had been mobilized by defense to support the Belgian industry. Not a single Flemish company was informed, let alone invited, and not a single Flemish company has therefore been able to call upon this preparatory budget. The Flemish companies therefore start with a severe handicap.

Still we believe that with a good cooperation with all the policy makers, the Flemish industry will get the opportunity to contribute to this program. We welcome that minister Laruelle showed the right way: providing the necessary financial resources and ensuring that all companies can start on an equal footing.

Dirk Breyngaert, president

COMPACT "VEGETATION INSTRUMENT" FOR THE PROBA-V MISSION

This year the B phase of the ESA PROBA-V mission started. The feasibility study of the PROBA-V instrument was finished last year. 2 Pilot projects were started up to enable the instrument's development on very short notice, as PROBA-V has to be ready for launch in 2011.

The PROBA-V mission has to ensure the continuity of observation data of the current earth observation vegetation missions (SPOT 4 and 5 programs) until Sentinel 3 will be operational. As a compact PROBA satellite will be used for the mission, the instrument itself has to be very compact as well.

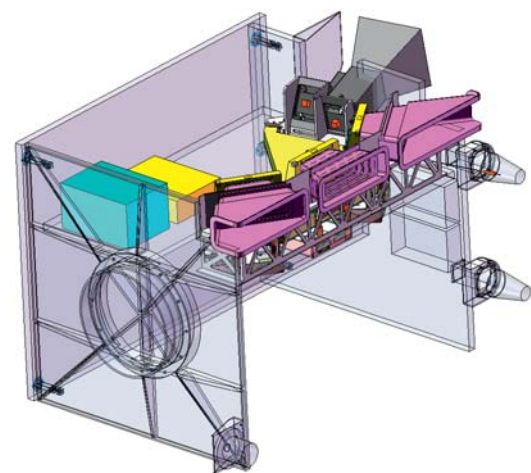


Figure: The Vegetation Instrument on the PROBA-V satellite.

VITO is PI of this mission supported by the Belgian Science Policy, and Verhaert Space is mission prime. OIP is the industrial prime contractor for the development of the Vegetation Instrument, together with AMOS and Xenics as most important sub-contractors. AMOS manufactures the mirrors for the telescope and Xenics will develop the focal plane array for the short wave infrared (SWIR) channel.

The Vegetation Instrument is a multi-spectral spectrometer with the same spectral characteristics as those of the current Vegetation missions. The spectrometer has 4 spectral bands, 3 in the visual and 1 in the SWIR spectrum.

The swath of this instrument is very large: 2250 km perpendicular to the satellite's direction of movement. This large swath is necessary to cover daily the complete earth's surface. Moreover the resolution of the instrument must be at least 1000 meter.

The most important challenges of this project are the very short development time and the implementation on the small PROBA satellite. In addition to the narrow available surface, the instrument has to be able to work with very limited electrical power.

Recent developments in detector technology and in the manufacture of aspheric mirrors allow to develop a very compact instrument with both a large field of view and a high resolution. The instrument will be constructed with 3 spectral imagers with each a very compact TMA telescope. The resolution of the instrument will be at least 1000 m for the whole swath. In the visual spectrum a resolution of even 100 m will be reached in nadir.

The concept and the implementation of the instrument on the PROBA satellite is shown in the figure. The 3 spectral imagers together with the 2 star trackers are on a common base plate, which will be mounted on the satellite.

www.oip.be

BELGIAN NUCLEAR RESEARCH CENTRE - SCK•CEN



The Belgian Nuclear Research Centre is one of the largest federal research centres in Belgium with laboratories in Mol and registered office in Brussels. More than 600 employees advance the peaceful industrial and medical applications of nuclear science. The purpose: to maintain and expand a centre of excellence for nuclear research. In particular the research focuses on the safety of nuclear installations, safe treatment and disposal of radioactive waste, protection of man and environment against ionising radiation, the control of fissile and other strategic materials.

The acquired knowledge is spread through education and communication. SCK•CEN considers up the social implications of its research in pursuit of sustainable development. It uses its know-how and infrastructure for services to the government, industrial and medical sector. Beside SCK•CEN is a partner in several international research programs.

SPACE RESEARCH

In space weightlessness and high cosmic radiation can influence the health of astronauts and the environment in which they live. SCK•CEN plays an important role in the field of microbiology, human biology and dosimetry in space.

1. Microbiology

For some years already, scientists are searching a solution for problems that arise during long space missions. Hence SCK•CEN participates in the development of the MELISSA project. This is a group interconnected biological reactors with 4 compartments for the purification and recycling of air and water and for the production of food, using bacteria's and plants. SCK•CEN is doing research through experiments on earth and through space flight experiments. Hereby the well functioning of the bacteria's in the bioreactors in space conditions, inclusive the higher cosmic radiation and the weightlessness is studied. This is extremely important to be able to guarantee the liability of the system and thus the safety of the astronauts who have to rely on it.

Micro organisms can cause also in space infections and diseases and can damage structural materials, even destroy or corrode. Therefore SCK•CEN works together with European, Russian and American scientists to map at first the amount and the type of bacteria's and fungi, being present in closed space capsules, in order to develop in the future new prevention, detection and remediation methods.

2. Radiobiology

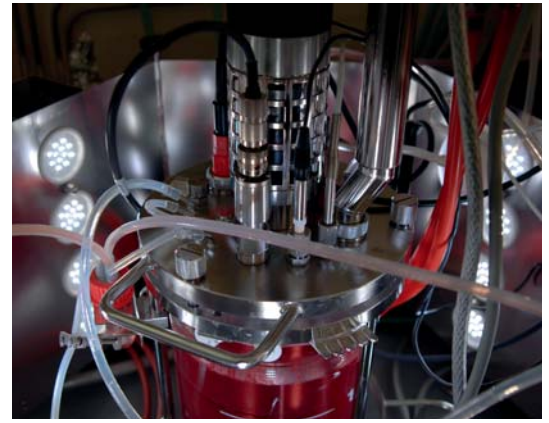
Scientists know that a stay in space has an influence on the human body. Next to cosmic radiation and weightlessness, stress factors like living in a closed environment, work load and disturbed sleep and eat patterns, can cause problems. A space journey affects amongst others the immune system of the astronauts. Where does this come from and which mechanisms play a role, needs further examination. In cooperation with European, American and Russian space agencies, SCK•CEN measures, through the astronauts blood, the influence of a long stay in space.

Can astronauts get pregnant in space and can the embryo develop normally? To be able to answer this question, a team of ESA will study the development biology of vertebrate organisms in space conditions. 33 laboratories are involved in this project. They will all investigate in their specific domain the physiology, molecular biology, biochemistry and behaviour, in all development stages of the embryo. SCK•CEN contributes with its extensive experience in the field of radiobiology, embryology and molecular biology. The mouse is a good model for research in human embryology and is frequently used in molecular, biochemical and pathological studies.

3. Dosimetry – one of the research projects:

SCK•CEN sends regularly dosimeters to the ISS with the Space Shuttle and the Soyuz capsules. These dosimeters stay there for a couple of days up to a couple of months and are afterwards analyzed on earth. This way dosimeters are attached at the outside of the ISS already more than one year. The study is done in cooperation with other international laboratories. Measuring the radiation field outside a space station is unique. In the meantime several radiation sensors and techniques are tested to improve the measurement of cosmic radiation.

More information on www.sckcen.be
Contact: info@sckcen.be



MELISSA project.



Radiobiological research.

voxdale® PRESENTED

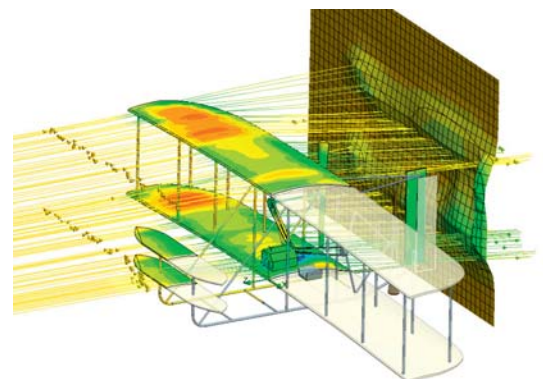
Virtual test pilots

October 3rd 1900. The Wright brothers make their first manned glider flight. A couple of years later, in 1910, they are convinced of the liability of their product. After years of testing, they want to commercialize their airplanes. They appoint and train a team of nine demo pilots. Six don't survive crashes in the following years

Obviously, we are talking about pioneering in the purest sense of the word. Where progress was based on empirical research and where daredevils, willing to risk their lives for science, were needed. Fortunately, thanks to the enormous technological evolution that was materialised in the previous century, things go quite differently these days. Dirk Frimout as well as Frank De Winne will fully agree. Modern technology is the backbone for new developments: 'The same old problems' are identified sooner and new issues are recognized and tackled, at a much lower 'price' ...

One of the challenges at the development of space systems, is to imitate the extreme conditions during launch to and stay in space. How do you properly simulate forces and accelerations during launch and trip to space? How can you imitate the extreme temperature fluctuations of systems in orbit?

These are just a few examples of situations in which the use of virtual simulation tools can prove very valuable. Over the years, Belgian design and engineering firm Voxdale has build a huge expertise in virtual simulation tools, for a very broad range of industries, and very specifically the space industry. So in a way... they actively help avoiding crashing test pilots wearing aviator glasses and bomber jackets.

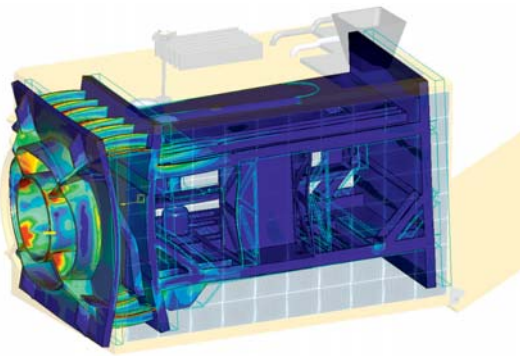


CFD Simulation of "Wright Flyer 3", 100 years later.

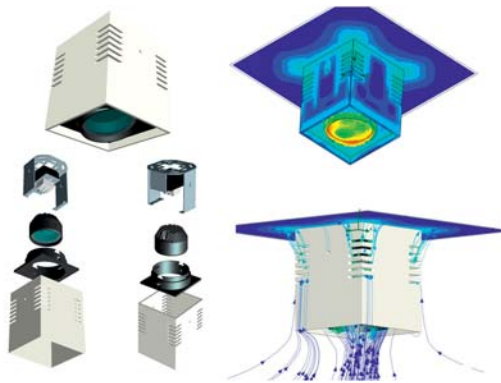
As of this year, Voxdale is an active member of VRI (Flemish Space Industries).

Design & Engineering

Voxdale works in three domains. As a design office it guides and steers projects from idea to production. Whether it is a coffee maker or a P1 Power boat, a good product starts with an idea, that has to be rendered into a feasible concept. In support of these engineering activities, Voxdale has developed an expertise in virtual simulations.



FEA visualizations of stress concentrations in a satellite during launch.



Design and mechanical development of a LED lamp, and virtual simulation of the thermal management.

Virtual simulation

Gradually, these virtual simulations skills became an independent unit. Structural analysis, stress mapping, deformations, displacements, resonance and shock analyses, thermal management, flow simulations, aerodynamics, etcetera. Simulation has evolved to 'virtual prototyping'. Sometimes because physical testing is (almost) impossible (see certain space applications), and often to reduce the number of prototypes and to accelerate the time-to-market.

Thanks to CFD (Computational Fluid Dynamics), FEA (Finite Element Analysis) and DEM (Discrete Element Modeling), the aerodynamics of a product are improved, the thermal management is optimized, the use of material limited, the energy consumption reduced, the liability increased, the development time significantly shortened and the amount of prototypes reduced.

Prototyping

Is this the end of prototypes as we know them? No, quite the contrary. Prototypes evolve into functional validation models and are, just like simulations, an essential step in the product development process. For prototyping, Voxdale cooperates with different partners for sintering, machining, sheetmetal, etcetera. Additionally, Voxdale is exclusive Benelux agent for Temponik. This Danish company is specialized in functional prototypes in Aluminium, Magnesium and Zinc, with a lead time of 5 days. This technique is, besides prototyping, also very suited for small production series up to 1000 pieces.

For more information visit www.voxdale.be

XENICS DEVELOPS "HIGH SPEED" INFRARED CAMERA



Xenics, located in Leuven, is a Belgian company specialized in the development and manufacture of infrared sensors and cameras.

One of Xenics' most recent developments is the "Cheetah-640CL", a "high speed" camera for use in the near infrared area (900 to 1700 nm).

The Cheetah is based on a 2D InGaAs sensor with 640 x 512 pixels and is with a reaction time of 1730 images per second the world's fastest infrared camera. Besides Cheetah reacts very well on laser beams with a wavelength of 1064 or 1550 nm.

Lasers with these wavelengths are used in space for "free space" communication between satellites. Laser communication between satellites themselves, or between the earth and a satellite, is disturbed by wave front deviations and atmospheric turbulences. By the high detection rate of the Cheetah, which reaches in a limited window of 100 x 100 pixels even 10 000 images per second, this camera can be used to correct optical systems in space and astronomy for atmospheric deviations and turbulences.

For this the Cheetah camera is combined with a Shack-Hartmann sensor. Through a feedback of the signal of this sensor to a deformable telescope mirror the laser beam can be corrected for wave front deviations and atmospheric turbulences. This way an undisturbed optical path can be created, and can be communicated at full speed with the satellites through "free space".

To perform experiments for satellite communication with deformable telescope systems, a Cheetah-640CL camera was developed and delivered to ESA.



ESA' optical ground station at Canary Islands; used for applied optical experiments.



Cheetah-640CL.

www.xenics.com