

R.E. Hans Bracquené
Bondgenotenlaan 93/5
3000 Leuven
E-mail: vri@newtec.be

Year 12
Number 3
december 2007
website: www.vrind.be

België - Belgique
P.B. - P.P.
9100 Sint-Niklaas
BC 13235



NEWSLETTER

- 2 THE ROYAL MILITARY SCHOOL AND SPACE EXPLORATION
- 2 AEROGO EUROPE, AN INTRODUCTION
- 3 THE INTERDISCIPLINARY CENTRE FOR SPACE STUDIES (ICSS) OF K.U.LEUVEN
- 4 FOOD SECURITY AND CROP MONITORING IN GMES

Members

EPAS - EUROSENSE BELFOTOP - FLAG - GIM - IMEC - NEWTEC CY
OIP SENSOR SYSTEMS - SABCA LIMBURG
SPACE APPLICATIONS SERVICES - THALES ALENIA SPACE
UMICORE ELECTRO OPTIC MATERIALS - VERHAERT SPACE - VITO

Associated members

AEROGO EUROPE - BRACQUENE CONSULTING
CANBERRA SEMICONDUCTOR - ES TOOLING - FOS&S
KHBO AEROSP@CE DEPARTEMENT - KONINKLIJKE MILITAIRE SCHOOL
KU LEUVEN - LMS INTERNATIONAL - NEXANS HARNESSSES
PEDEO TECHNIEK - SEPTENTRIO - SIEMENS - SPACECHECKER
VON KARMAN INSTITUTE - XENICS

EDITORIAAL

VRI prepares the new ESA minister conference

VRI is preparing for the minister conference end 2008. A number of important decisions will be presented to the competent ministers of the ESA member states and for the Flemish industries it will be again a crucial moment. Similar to the previous minister conferences we want to address ourselves towards the government with an overview of all the needs of the Flemish industries. To begin with we have to analyse the ESA propositions that are now on the table. Since long VRI argues in favour of extension of this ESA role. Through options made to initiate a closer collaboration with the European Union, it might be possible that the own ESA task was a bit lost of sight. ESA has to work out realistic but nevertheless ambitious programmes for the European space. This is ESA's core role and we notice that ESA intends again to pay more attention to this. Areas, which ESA up to now completely ignored like e.g. moon exploration, are again filled in. We are pleased to notice that the Belgian government shares the same view. ESA remains the most important partner for VRI. The programmes which ESA works out, still offer the most important possibilities to realise own technology development. Therefore we will ask that Belgium continues to support these technology development programmes. The VRI members, companies as well as research institutes, have proved that the investments in this area are good spending. We provide an important return on these government investments and these are even getting larger if we include also the spin offs, created beyond our own members. The decisions that will have to be made, will have to take into account that these important government investments are still not sufficiently flowing towards Flanders. A cautious estimation learns that Flanders gets up to twenty million too less. Certainly the last years this situation has been approved, but the deficit still remains and has to be further reduced. This also VRI will keep in mind, but as usual this will be done by a founded scientific and industrial file. ■

Dirk Breynaert,
President

Realisation with the support of:



Vlaams Innovatienetwerk
met steun van IWT



THE ROYAL MILITARY SCHOOL AND SPACE EXPLORATION

The Royal Military School (RMS) in Brussels is a military institution for university education, charged with the academic, military and sports training of prospective officers of the Armed Forces. Education is geared to the needs of the MoD and per year about 30 students graduate with a Master's degree in Engineering Sciences and some 100 others with a degree of Master in Social and Military Sciences.

In line with all other universities, the RMS also has a (limited) research capacity, and one of the fields the RMS invests in is space exploration.

With the SIC (Signal and Image Centre), the RMS has accumulated a lot of experience in remote sensing and hyperspectral image processing.

This remote sensing is mainly deployed to improve processing tools for the NGI (National Geographic Institute) and the MoD itself. In this way, collaboration with the NGI in the ETATS project led to the updating of maps via the search for changes in satellite images.

Hyperspectral image processing implies the discovery and identification of polluting gases as well as the characterisation of soil material on the basis of images via images acquired by means of various techniques (polarimetric, interferometric, multispectral and hyperspectral).

Amongst others, a bio-geochemical analysis was carried out of the estuary of the river Scheldt by means of hyperspectral images in the framework of the STEREO programme and in the framework of the ASTRO+ project the development of algorithms to combine hyperspectral and polarimetric SAR (Synthetic Aperture Radar) data was successfully concluded.

On the basis of this experience, the RMS is capable of participating in the GMES (Global Monitoring for Environment and Security) of the European Union.

The RMS also has the disposal of a laboratory, established for experimental analysis of the effects of explosions on constructions. A specific application is the pyrotechnic shock that occurs when boosters are shed from rockets via explosive bolts: satellite equipment as well as the components of the rocket must be able to withstand this burst. For that reason such components are subjected to pyrotechnic shock tests during their design phase. The RMS lab possesses a BELAC certificate for this standardised test (according to NASA requirements). Moreover, the RMS also has the means to numerically analyse shock stress on structures and there is also a lab for materials analysis with ESEM capacity. It is also equipped to execute numerical and experimental modal analyses in situ, such as recently performed in the design phase of part of the skirt of the VEGA rocket.

At the moment work is under way on the development of a combustion chamber for micro gas turbines. Optimisation of the design is done both via numerical simulations as through experiments.

To conclude, it must be mentioned that the RMS has also done research in the field of human behaviour, more specifically into cognitive performance of personnel (pilots) in operational (fight) circumstances. ■



AEROGO EUROPE, AN INTRODUCTION

AeroGo Europe NV is since 1972 one of the world leaders for the engineering and manufacturing of innovative solutions for the transport and handling of large, heavy and delicate loads for the aerospace industries, the shipping industries and the plastics and metal industries.

One of the assets of the company is that all devices are completely designed in-house and that they are custom built, ranging from manually activated systems till completely independent fully automated guided vehicles. Besides the conventional wheel and rail carriers we also



integrate the air cushion system Aero-Caster®. This is used for easy and high precision positioning and docking of heavy loads from minimum 500 kg on. The carrying capacity of the products is unlimited.

AeroGo is market leader in terms of air cushion technology and is pride of many years of unsurpassed engineering know how and design expertise. AeroGo has a long history and a large international distribution. The technology, initially developed by General Motors in the fifties, was brought to perfection by Boeing and applied in the assembly of the B-747. AeroGo became a supplier.

The product line of AeroGo offers a large variety of possibilities to optimize existing product applications or to develop new product applications in different market segments. This is done in a practical, high-grade and cost efficient way. Through the innovative and efficient

design of solutions, which answer the specific needs of the customer, the company remains the leader in the field of material handling technology.

AeroGo supplies among others transport systems for NASA, ESA and various automotive manufacturers. For more information about our references we like you to have a look at <http://www.aerogo.be/en/references/index.html>

The core business of the company: internal, industrial transport systems based on air cushions.

Lifting or transporting loads costs a lot of energy. Moving a heavy load on wheels already asks less energy, but moving it on an air cushion (or in some cases on a water layer) needs nearly nothing: 1 to 2 kilograms per ton for a lateral movement. In principle AeroGo can move everything. Basic condition is that the floor is flat and has closed structure. Though we even have a back-up solution: HDRE foil e.g. (high density polyethylene), but normal tape over the grooves can do miracles as well.

The basic principle is great in its simplicity: it is about the difference between a point or line load and a surface load. To move a 5 tons load you need a fork-lift truck, which also weighs minimum 5 tons and needs at least twice as much space. Air cushions on the contrary are immediately placed underneath the load and are furthermore omni directional, even in small spaces.

The pressure of the load and the fork-lift truck is situated mainly around the front wheels. Most of the warehouse floors can not resist such a point load. AeroGo spreads out the pressure of a load over a large surface. At the moment the record amounts to 5200 tons.

The air cushion, over which the load is transported, is created by means of an inflatable circular band in neoprene. Through little holes at the inner side of the band, a local overpressure is created, which will form the air cushion. This system does not have moving parts, needs only an extreme low construction height and can also be used in clean rooms without problems. Furthermore thanks to the air layer there are no signs of wear: while being moved the neoprene is not in contact with the floor.

This technology can be used for moving loads in production environments, as well as to be applied 'ad hoc' or at project basis. The cooperation with the engineering department of the customer is essential for this. In practice AeroGo works often for space industries, for automotive and aircraft industries, for casting and press installations, where moulds have to be moved often, or at shipyards to move ships segments or to position, at mm precision,

propellers underneath the hull, out of the reach of cranes. In short: everywhere heavy and delicate loads have to be moved over relatively short distances.

AeroGo Europe NV has 28 employees (10 workers, 4 engineers, 3 designers, and for the rest employees in marketing and administration). ■



A 130 ton "Aero-Pallet" transporter of AeroGo moves moulds of fuel tanks for the Ariane rocket between the different work stations. The transporter is extensible from 8.4 up to 12 meter.



AeroGo delivered an ACV, with a length of 16 meter, on air bags supporting and moving airplane structures, up to 40 tons, between different work stations.



THE INTERDISCIPLINARY CENTRE FOR SPACE STUDIES (ICSS) OF K.U.LEUVEN

The Katholieke Universiteit Leuven, founded in 1425, is one of the oldest universities of Europe. Over almost 6 centuries the K.U.Leuven developed into a general university, with 14 faculties in 3 groups: Science and Technology, Human Sciences and Biomedical Sciences.

The K.U.Leuven conducts fundamental and applied research in almost all segments of science. Space research and space in general are recognisable parts of these themes. Astronomy is the oldest domain in the area of the exact sciences and at the K.U.Leuven this is still a very important research area. The Institute of Astronomy is very active in the Prodex program and the university is often PI (Prime Investigator) in several large projects. The institute was and is involved in extensive scientific missions such as ISO, Herschel, COROT, JWST. An important research instrument is also the Mercator telescope, which is built at La Palma (see picture).

Because of the developments in earth observation, space has become an essential technology for the research in land and forest management. The Geomatics and Forest Engineering division has developed new flat steerable antennas in cooperation with the research group Telecommunication (ESAT).

Also in other engineering disciplines space is applied in the K.U.Leuven. The Mechanical



The Mercator telescope at La Palma.

Engineering department has already successfully implemented its expertise in structural dynamic analysis, in robotics, in precision mechanics and modern production technologies in several projects. A recent example of advanced analysis technology of modern satellites is the finite element model of the baffle of the COROT satellite.

In the field of materials engineering the special environment of microgravity is used by researchers in the MTM department for the development of new metal alloys. Also for the biomedical sciences space is a specific research area. Especially at the departments endocrinology and cardiology of the K.U.Leuven important research projects are performed in which several European, Russian and Chinese astronauts cooperated.

In the field of human sciences the Institute of International Law has been active in the organisation of the European

Space Policy Workshops, that have taken place in Leuven during the last couple of years. Next to this the K.U.Leuven has a natural link with IMEC which is located at the same campus.

The university is the core of the Association K.U.Leuven, to which no less than 12 high schools are connected and in which the KHBO is an active player in the field of space. The K.U.Leuven offers various educational programs in space and space research: Master in Astronomy, Master in Earth Observation and Master in Mechanical Engineering: Aeronautics and Aerospace Engineering. In these training programmes the students not only learn about pure science, but through project tasks and/or the master thesis they also get the opportunity to obtain initial professional experience. On the other hand these programmes give the Flemish industries a possibility to get in touch with the future professionals.

The Interdisciplinary Centre for Space Studies (ICSS) associates all the research groups, active in space, within the K.U.Leuven, Through the ICSS K.U.Leuven, recent member of VRI, intends to offer an added value as centre of knowledge and development in about all the fields related to space and space research. ■

FOOD SECURITY AND CROP MONITORING IN GMES



The Global Monitoring for Environment and Security (GMES) is a joint initiative from the European Space Agency (ESA) and the European Commission. The Global Monitoring for Food Security project (GMFS) is a GMES Services Element financed by ESA.

GMFS provides earth observation based services to monitor crops and overall environmental conditions affecting crop health in Africa and hence contributes to Global Food Security. VITO NV leads an international partnership of 12 companies, universities and research institutes from 6 different European countries who are all committed to jointly provide services in support of Food Security Early warning Systems. Belgium is strongly represented in the partnership through the participation of

GIM NV, the University of Liège (ULG), TRASYS NV and AVIA-GIS. Each of the partners have different roles, combining the best possible expertise.

GMFS is strongly user oriented and works closely together with organizations at national, regional and international level. These include the Food and Agricultural Organization of the United Nations (FAO), the World Food Program. (WFP) and the European Commission Joint Research centre (EC-JRC). Agreements with each of the organizations are signed. Recently, the agreements with the Ministry of Agriculture and Food Security in Malawi and the Southern African Development Community (SADC) were renewed and an agreement between VITO and the Federal Ministry of Agriculture and Forests in Sudan was signed. GMFS is currently active in East, West and southern Africa through regional organizations and has specific activities in Senegal, Malawi, Ethiopia, Sudan, Zimbabwe and Mozambique. Services provided to these users include overall early warning of adverse climate and environmental conditions, mapping of cultivated area and yield forecasting as well as special support to FAO and WFP in support of their Crop and Food Supply Assessment Missions. Besides the overall management, VITO is responsible for the processing and analyzing of MERIS, MODIS and SPOT-VEGETATION imagery. These services are continuously discussed and improved through an extensive user consultation process. VITO has organized and hosted the fourth User board meeting, gathering experts from ESA, Africa, the UN and the EC in Mol, Belgium in June 2007. Resulting from this meeting it was decided to deploy a food security analysis system, in part based on satellite images, for the WFP reporting needs, to be implemented Africa-wide in the future.

Some examples of successful GMFS operations:

- in 2005-2006 the developing crisis in the horn of Africa and in parts in 2007 was clearly visible from the satellite image based maps
- the historically low food production in southern Africa (Zimbabwe and specifically Swaziland) was mapped through analysis of satellite imagery and provided to FAO and WFP
- in 2007 GMFS, FAO, WFP and the government of Ethiopia jointly embarked on a 2-year program to improve the widely diverging crop statistics in Ethiopia, a country with a known history of food insecurity. This program is jointly funded by ESA and the EC. The above are just some of the examples and achievement of GMFS.

An in depth overview can be found at <http://www.gmfs.info> ■



Conclusion of the agreement between the Federal Ministry of Agriculture and Forests in Sudan and GMFS (July 2007).