

# Vlaamse Ruimtevaart Industriëlen Flemish Space Companies

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## EDITORIAL

VRI/FSC is worried about the evolution in the ESA-programme. The Flemish space industry and the Flemish space research need ESA's continuing support for technology development. However, we are afraid that rather than expanding ESA plans to reduce it. On ESA's drawing tables are large new programmes but specific technology development programmes receive less interest.

We accept the need of these large programmes, but we are even more convinced of the necessity of devoted technology development programmes for the European industry. Only such programmes can guarantee that small companies combined with technology research continue to play their indispensable part in European space.

VRI/FSC has sufficient examples to prove that our thesis is well founded. Our yearlong policy of developing technology niches, has made the Flemish companies world leaders in these niche, both existing companies as newly established ones. Our members that are a Flemish research institutes' spin-offs deliver the strongest arguments. The additional value created by those companies is impressive especially compared to ESA's investment. Our Belgian delegation at ESA supports our vision and will try to have it accepted in the on-going discussions.

We will not limit ourselves to Flanders.

VRI/FSC is organizing an international conference where we will present this position to our colleagues from Europe and to governments. We will further define our position with the conclusion of this forum and of the case studies presented there.

A lot is at stake and not only the case for the Flemish companies. ■

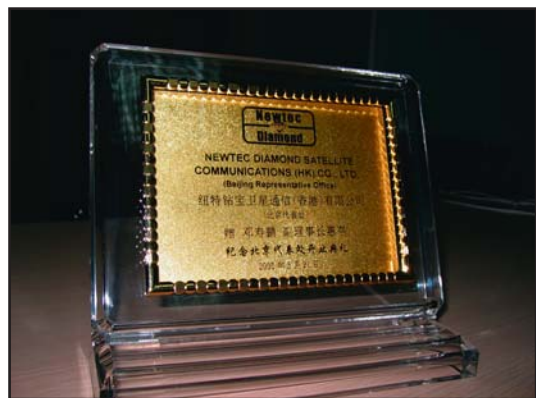
Hans Bracquené



# NEWTEC: A WORLDWIDE RECOGNITION AS INNOVATIVE SATCOM MANUFACTURER

Since its creation in 1985, Newtec is not only celebrating its 20 years of existence but is also proudly looking back to a period where it was a small company making the first DVB (Digital Video Broadcasting standard) modulators available for the broadcast market.

Since then, Newtec evolved to a 220-employee design and manufacturing company with a worldwide solid and respected reputation.



Besides the Newtec sales offices in Stamford USA and Singapore, a Joint venture with a Chinese satellite manufacturing company has recently been inaugurated in Beijing. The local staff of 8 persons have been so enthusiast in getting acquainted with Newtec and its satellite market that the JV, called Newtec-Diamond, already booked its first major order for the delivery of DVB-S modulators to the most important satellite operator in mainland China.

Although Newtec products were already present in China via various OEM manufacturers, this trigger confirmed the acceptance of our products in a market where satellite communications are in full liberalization process.



Many significant evolutions in satellite communications not only have changed our daily multi-media environment and behavior, but also accelerated the globalization of multi-media to a higher pace. As a first consequence,

people need more information, at any time, anywhere, and at a higher speed. This is even more amplified by the emergence of the HDTV channels, which are now popping up like mushrooms.

In order to keep this growing traffic handling within financial and practical boundaries, the need for a better bandwidth efficiency became obvious. Next to better compression schemes (MPEG4 and WM9), it was also important to fit more or less the same number of (TV)-channels into the existing satellite transponder bandwidths. To this end, Newtec has once again been one of the pioneers in developing the technology while it played a major role in the ETSI standardization committee: the DVB-S2 modulation standard.

Although a rather slow migration from DVB-S to DVB-S2 was forecast, both distribution (Direct to home) and contribution (broadcast and IP exchange) markets were very keen to adopt this new modulation scheme.



Major organizations like Multichoice, Eutelsat, Satservice and EBU (Eurovision) have already adopted this bandwidth-efficient and, above all, flexible modulation scheme: indeed, next to the CCM mode (Continuous Coding and Modulation) the DVB-S2 also offers operating modes for transportation of multiple data streams into one carrier, each having its own data rate, FEC and modulation scheme. This mode is standardized as VCM (Variable Coding and Modulation), and yields a gain of up to 80% when compared with DVB-S.

If the customer's appetite is still not satisfied, a third operation mode is defined as ACM (Adaptive Coding and Modulation). Using feedback information from a demodulator (receive-side) over a return channel, this mode allows variable modulation schemes and FEC's per data stream on the modulator (transmit-side). Weather conditions are the major factor determining these transmission variables. Ideally suited for point-to-point satellite links, this mode yields a saving of up to 135%!

From the creation of Newtec, its engineers played a major role in various standardization committees and this Newtec watermark is even more actual today. New network applications such as DVB-RCS (wideband bi-directional IP access network over satellite) and SATMODE (interactive TV over satellite) are products where Newtec played a leading development and standardization role.

As a private and independent Belgian company, Newtec's major aim is to actively further develop a worldwide multi-media satellite environment where technology is an easy means of communication and not a burden. ■

# ESA - TELECOMMUNICATIONS - THALYS TRAIN TO PILOT HIGH-SPEED INTERNET ACCESS TO PASSENGERS

## SIEMENS

**Siemens COM Belgium is technology partner for the world's first wireless broadband internet on a high-speed train**

Thanks to the support of the European Space Agency (ESA), broadband Internet access via satellite is being offered to passengers on the Thalys train running between Brussels and Paris.



A stable Wi-Fi broadband internet connection was successfully tested on the high-speed Thalys train running between Brussels and Paris. The technology allows passengers aboard one of the trains on the Brussels-Paris line to connect to the Internet with Wi-Fi-enabled laptops.

The system developed by the UK based company 21Net in cooperation with Siemens COM Belgium, ensures that all passengers on each carriage receive equal access to the data flow and can in fact work as if they are in their own office while the Thalys dashes across Europe.



The Internet connection is made through a tracking antenna fixed to the roof of one of the carriages. The innovative satellite-tracking antenna design includes specially developed software that maintains a continuous two-way link with the host satellite. The connection is continuous even though the satellite is at an altitude of 36 000 km and the train is travelling at 300 km/h, an impressive technological achievement. The system is also potentially able to offer onboard video servers, news and weather reports and even films; all streamed straight to passenger laptops.

"Everyone is eager to begin accessing the Internet onboard trains," Siemens' technology is certainly making this become a reality.

In the Network Management Center (situated in Herentals), Siemens Belgium manages the authentication of users for 21Net and collects the time-based billing data. To this end

Siemens collaborates with Garderos, a German company that makes WLAN infrastructure software for operational support systems. What is more, the center manages all components on the train remotely. The first-line helpdesk for users is operated by 21Net. Siemens staffs the system helpdesk that intervenes at network level.

An additional benefit to 21Net was the railway expertise of the Siemens "Energy Industry Transport" department that designed the special racks for the servers and configuration components. The racks meet specific requirements imposed by the relevant railway networks, are vibration proof and are protected against electrical overvoltage. Ergonomically, they occupy only the smallest space.

"Siemens' knowledge of the railway sector combined with proven know-how of mobile data transmission was decisive in this project. Siemens Belgium has hereby reconfirmed its role as network integrator as well as its local role as competence center for mobile data.

This growing demand to access the Internet while on the move requires flexible solutions. This project demonstrates ESA's mission in Telecommunications to support European industry in innovative projects corresponding to users' needs.

Having access to email or Web-browsing at both reasonable speeds and costs enormously improves what is called 'the travel experience', benefiting industry, service providers, train operators and passengers. ■

## EXGSE DELIVERED AT B.USOC AND ERASMUS USOC



The European Drawer Rack (EDR) on board of Columbus (the European lab module that is going to be part of the International Space Station) has been designed to provide scientific experiments with a series of standard services, such as power supply, data communication, cooling .... This standard approach should allow quicker and cheaper experiments on board Columbus.

To take advantage of the EDR services it is necessary that the experiment

module is equipped with the appropriate interfaces. To simplify this Space Applications Services in cooperation with FSC partner Verhaert and Spacebel developed the ExGSE, which stands for "Experiment Ground Support Equipment". ExGSE has been worked out as part of the GSTP 3 programme. The ExGSE development belongs to the outfitting of B.USOC (Uccle) and Erasmus USOC (Noordwijk-The Netherlands) as USOCs (User Support and Operations Centre) for both EDR payloads and EDR proper.

Developers can make use of the ExGSE to test their experiment interfaces during the development phase. ExGSE can even be the base for GSE (Ground Support

Equipment) and STE (Special Test Equipment) which are part of the normal development deliveries of every payload.

ExGSE can also be used for controlling and monitoring an EDR payload. This opens up new perspectives in the field of training, mission preparation, experiment validation, etc...

The first two ExGSE were delivered in October 2004. B.USOC will use ExGSE for housing the Engineering Model of PCDF (Protein Crystallisation and Diagnostics Facility), an EDR payload, and possibly for Engineering Models of future EDR payloads.

Erasmus USOC envisages the validation of payloads before starting the integration and final validation in the EDR Engineering Model.

Further examination of the possibilities of ExGSE, as well as its use for concrete future EDR payloads, is being investigated in cooperation with ESA and other potential clients. ■

## OPTICAL SENSORS FOR DEBRIS DETECTION (OSDT)

### OIP Sensor Systems

OIP, in cooperation with RHEA systems, have performed a study concerning "Optical Sensors for small size Debris Tracking" (OSDT), under ESA contract. This OSDT instrument is intended to be integrated on the ISS.

The aim of this study project was to improve the current catalogue knowledge for debris particles up to 50cm by means of a space-borne passive optical sensor. This study especially focuses on the investigation of the 1 cm to 10 cm debris population, which cannot be shielded for, nor be tracked and catalogued with the existing ground-based detection systems. It is this portion of the debris population that needs to be considered, since an impact from any debris object larger than 1 cm may lead to a catastrophic failure of the ISS and would consequently endanger the safety of the ISS crew.

The proposed OSDT instrument is a space-borne passive optical sensor, which performs Line Of Sight (LOS) measurements and carries out orbit determination calculations, providing the distance range, size and speed

of the debris particles. The obtained information will then be added and/or compared to the current debris catalogue knowledge. Every "new" found debris particle will contribute to the safety of the ISS, since its orbit can be predicted with acceptable accuracy, which allows the ISS crew and/or flight control teams to gather collision information to a level that is accurate enough to enable collision avoidance manoeuvres of the ISS if necessary.

The OSDT sensor is based on a linear array of 4 infrared detectors with cold stop, and has a FOV of  $6^\circ \times 1,5^\circ$ . The correlation of the low light intensity (i.e. small particles, low emissivity, inferior light conditions, etc) and high velocities of the debris particles (up to 15km/s) with the process speed of the implemented algorithms (orbit calculation, tracking algorithms, pan-tilt unit driver, etc.) was the main challenge of this study.

The OSDT instrument will provide a significant improvement in the detection of debris particles in the ISS orbit, compared to ground-based detection instruments, since it can perform "in-situ" detection of a debris population (i.e. 1 cm to 10 cm) against which no shielding can be applied on the ISS. ■



*3D concept of the OSDT instrument with an additional scanning mirror to allow the detection / tracking of very fast debris particles (up to 15km/s).*

## SOPEMEA IMPLEMENTS MULTIPLE LMS TEST.LAB SYSTEMS FOR VIBRATION QUALIFICATION TESTING TESTS

### LMS<sup>®</sup> ENGINEERING INNOVATION

Sopemea, one of the leading engineering and testing services companies in France, recently implemented LMS Test.Lab as its new standard solution to perform vibration qualification testing. The LMS Test.Lab software combined with the LMS SCADAS III data acquisition front-end enables Sopemea to accurately and efficiently test, analyze and optimize the structural integrity and the vibration resistance of complex mechanical designs. Sopemea is currently involved as the major contractor for qualification testing on the Falcon 7X business jet from Dassault Aviation, the Eurocopter NH90 helicopter and the Airbus

A380. To maximize the return on the enormous investment in testing facilities, Sopemea is constantly challenged to push the efficiency limits of its operations. In addition, Sopemea's customers are pressured to accelerate their development and testing processes. In view of these stringent requirements, Sopemea selected LMS Test.Lab for its proven efficiency in executing a wide portfolio of vibration testing assignments, its superior ease of use, and the flexibility of its data acquisition platform. ■

