

# Kongsberg Defence & Aerospace's contribution to the coming ENVISAT Success



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**With a 30 year leadership in electro-optical missile target seeker technology, Kongsberg Defence & Aerospace (KDA) was well prepared to develop and deliver an important electro-optical subsystem of the MIPAS instrument (Michelson Interferometer for Passive Atmospheric Sounding).**

MIPAS is a high-resolution limb sounding infrared interferometer designed to measure profiles of atmospheric pressure, temperature and many trace gas species.

On the ground, interferograms from MIPAS yield high-resolution spectra from which geophysical parameters are retrieved.

The data gathered will contribute to a better understanding of the global climatology factors, atmospheric dynamics (mixing of tropo/stratospheres) and upper atmosphere gases resulting from human activities.

The MIPAS Optical Path Difference Sensor (ODS) delivered by KDA comprises a temperature stabilised laser, collimator, detector assembly and control electronics. The ODS determines the sampling intervals of the spectrometer output and is responsible for the accuracy of the MIPAS interferograms.

Among the main technical challenges for realisation of the ODS were the laser frequency stabilisation, low-noise laser driver, jitter-free detector electronics, and the temperature range of -103°C to +10°C.

The frequency stabilisation of the ODS laser was achieved through a unique temperature control system that yields a laser frequency stability within  $2 \cdot 10^{-7}$  over 75 seconds.

To complete its MIPAS participation, KDA performed space qualification of laser, collimator, beam splitter, photo detector, fibre cable and connectors. As the first European company, KDA undertook space qualification programmes for components such as laser diodes and photo-detectors.



MIPAS Instrument



MIPAS Optical Difference Sensor



ODS Integration in Class 100 Clean Room



### Ultra-light Composite Structural Panels

KDA also delivered main structural parts of the ENVISAT satellite. The ENVISAT satellite structure is based on a classical design with a central tube, shear walls and payload panels. The structure is made of classical perforated aluminium honeycomb cores with carbon fibre reinforced plastic (CFRP) face skins.

KDA's ENVISAT contribution includes manufacturing of payload panels for the Engineering Model, the Structural Model and the Flight Model, as well as development and manufacture of the Sun Sensor Support Structure for the ENVISAT Service Module.

Moreover, under contract with ESA-ESTEC in Holland KDA performed a validation of all structural insert systems used on ENVISAT. This involved the fabrication and testing of nine different panel configurations, with seven different CRFP skin layout configurations and 17 different test cases.

KDA has been producing advanced composite components for several years to satisfy internal demands (missile structures), and has carried out a number of studies on applications of advanced composite structures since the 1970's.

Today, KDA has a world class manufacturing facility for composite structures and all necessary related facilities to commit itself to a long-term active engagement in the production of full-size complex, load-carrying structures manufactured from advanced composites, to serve the upper quality band.



**Structural Model of the ENVISAT Payload Carrier**

A new manufacturing facility of 4.900m<sup>2</sup> has newly been built, to comply with internal demand as well as customer requirements for high quality, cost effective, aerospace composite component manufacture and assembly. This facility has been in operation since January 2001.

### Kongsberg Defence & Aerospace

As part of the Kongsberg Group of companies, KDA shares its position together with Kongsberg Maritime AS.

KDA is recognised as Norway's leading high-tech enterprise with diversified activities covering several markets and product areas.

KDA's space activities are direct spin-offs from well-established missile programmes and command and weapons control systems. This is one of the company's most prestigious areas of accomplishment - space technology represents one of the most complex areas of human achievements, where years of planning and preparation culminate in one single moment of success or failure.

KDA has supplied advanced structures and mechanisms to Ariane 5 launcher and to satellites since the early 1990's. The company is Norway's largest supplier to the European Space Agency, and is an established supplier to commercial programmes in Europe and in the USA.



**Vacuum Press**



**Blind Insert System**



**Payload Panel for the Ka-Band Antenna**