



## Micro-Electro-Mechanical Systems (MEMS) Rate Sensor

SEA was awarded a major technology contract from the European Space Agency (ESA) to develop an innovative solid-state rate sensor for spacecraft.

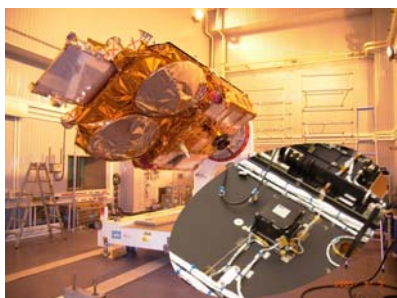
The development was undertaken in collaboration with SELEX GALILEO and Atlantic Inertial Systems and aimed to produce a higher performance sensor well adapted to the needs of space – high accuracy, low drift and tolerant of the radiation environment. The sensor is set a significant technological enhancement for all future space missions from communications satellites to advanced rovers for the exploration of planets.



The MEMS (Micro-Electro-Mechanical Systems) technology has many advantages for space missions requiring low mass or power and being inherently robust. With the cost of launching a single kilogramme into space being as much as \$50,000, a MEMS sensor pack weighing less than 0.5 kg has clear advantages compared with devices weighing ten times more.

The development is needed because existing MEMS rate sensing devices have relatively modest performance compared to alternative technologies; a key objective of the development will be to produce devices of sufficient performance to be used in most space applications.

The FExp unit was integrated onto the ESA Cryosat-2 spacecraft and passed all the acceptance tests. In order to meet the Cryosat deadline a fast track approach has been taken with the unit being developed, built and tested in less than 12 months from Preliminary Design Review to successful Flight Model integration.



The FExp provides independent 3-axis rate measurements to the Cryosat operation centre during early operations phase immediately after launcher separation.

After initial operations the low power consumption of the unit ensures that the FExp will remain switched on and the MRS team will be able to acquire extensive in-flight data, to support the SiREUS product development through qualification and to provide increasing confidence to the increasing number of potential users.

A demonstrated performance of a better than 10 deg/hr rate sensor with very low power (less than 6 W for pre-production models and less than 4 W for production FMs) and mass (less than 0.75 kg) is provoking significant interest in Europe with the product lead (SELEX) responding to RFPs for a number of near term applications.