MEMS technology reaches for the sky

Innovative sensor technology for altimetry and engine control applications

HISVESTA is a specific targeted research project running under EU's 7th Framework Programme, theme 7 Transport, including Aeronautics. The project has developed and is about to demonstrate a new generation of altimetry module, suitable for fixed wing and rotary wing applications, which will give altitude accuracy capabilities significantly improved over those currently available today. A new Air Data Computer has also been developed, significantly smaller, lighter and with better performance than existing products to a lower cost.

HISVESTA's goals contribute to the promotion of real breakthroughs, based on scientific and technical excellence, long term innovation and new knowledge related to:

- On board technologies for prevention of controlled flight into terrain
- Technologies to enable a full and permanent automatic approach and landing in all weather
- On board technologies for in-flight and on-ground collision avoidance novel concepts
- Techniques enabling the development of improved aviation safety metrics.

A significant additional result from the project will be a prototype high temperature pressure transducer unit utilizing new technology and methods for thermal compensation, linearization and long term stability prediction. The developments in this project will bring the SME-company Memscap in the forefront of the avionic transducer suppliers, and the technology and the results will boost the possibilities for getting a significant market share of aerospace pressure products to Europe in FADECs (Full Authority Digital Engine Control Unit), cabin pressure control systems and other segments. A first generation of the new Pressure Transducer concept will be tested in next generation FADECs, incorporating higher temperature resistance, and pressure detection closer to the compressor stages in the engine. This should be able to demonstrate lower emission of CO_2 and NO_x and less fuel consumption when introduced on the jet engine. The project has developed a prototype pressure transducer for temperatures up to 170°C, and a range of relevant pressure regimes.

Another major contribution from HISVESTA is the development of a RVSM compatible digital Air Data Computer based on the new Memscap silicon pressure transducer. This will allow for a long term stability improvement of minimum 50 % in altitude, which is absolutely essential in critical applications as rescue squad operations, police helicopter operations, medical evacuation and off-shore operations in windy and low-visibility conditions. This will meet the objectives of operations in low-visibility conditions, and reduce the risk of accidents in in-flight operations. In addition the accuracy of altitude control including both manual and auto pilot systems in the full range of 0-45.000 ft will be significantly improved. Studies and Height Monitoring activities performed by EuroControl and FAA prove that a certain percentage of the current RVSM approved aircraft fleet is operating outside the RVSM altitude tolerance limits.

The project will also perform volcanic ash testing of transducer and ADU modules and study effects of this in parallel with a large altimetry lab test evaluation program at the end of the project.

SINTEF (Norway) coordinates the project with the SME-company Memscap AS (Norway) as the Technical coordinator, while Microelectronica SA (Romania), Curtiss-Wright Controls Ltd (Penny & Giles Aerospace Ltd) (United Kingdom) and Ceramica Ingenua SRL (Romania) are project partners.

Contact details:

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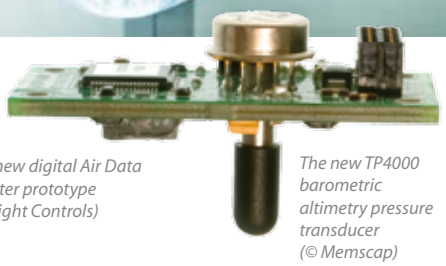
MEMS wafer with sensor dies from the HISVESTA project (© SINTEF)

The new digital Air Data Computer prototype (© Curtiss-Wright Controls)



The new TP4000 barometric altimetry pressure transducer (© Memscap)

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