

Sensoror looks to higher value markets

Cut loose from Infineon and independent again, Sensoror is hitting the ground running with a new line of high performance gyroscopes clusters targeting applications now served by fiber optic gyros, and a line of thermal imaging products to be introduced early next year.

“Two or three years ago the idea started to grow that we could commercialize more of our imbedded IP as an independent company,” says Horntvedt. “Our strategy is to move away from automotive commodity products to the higher end by commercializing more of our existing technologies and some new ones.” And while other of the automotive MEMS suppliers may be eyeing the fast growing volumes of the consumer market, Sensoror sees little potential there for a European company. “In our part of the world where cost level is not the lowest, commodity products are not an appealing market,” he notes.

Instead, the Horten, Norway, company is moving into higher end markets. To attract investors for the management buyout, and to start bringing in new revenues as soon as possible, the company is attempting a quick changeover from focused single product manufacturing to fast-paced multi-product development. Since the closing of the sale in March, Horntvedt reports the company has come up with 40-50 new MEMS products based on its existing technology, for a menu of gyros, gyro sensor clusters, and rugged pressure sensors across a range of performance and price points.

The company has contracts in place with pilot customers and has made some deliveries already of its first 3 DOF gyro cluster offering bias stability of 1° - 2° /hour, which aims to replace more expensive fiber optic gyros in platform stability, tracking and navigation applications. In some of these government and defense markets, Horntvedt notes, “quite a few customers would like a local European supplier.”

It’s also in the final industrialization stages for a thermal imaging device, slated for release next year. Sensoror

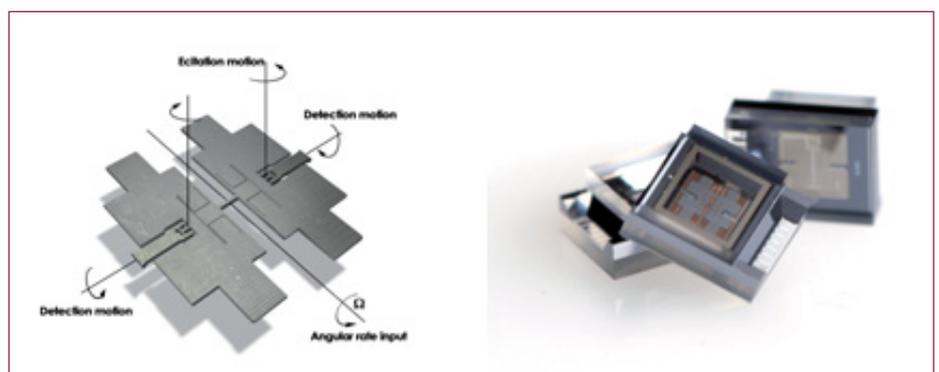


SIMU202 is a cluster of 1, 2 or 3 ultra high accuracy gyros

is developing the device in partnership with the Swedish contract research lab Acreo, which does a lot of work in infrared imaging. “We think we have good manufacturing technology for controlled vacuum in the cavity surrounding the pixels,” says Horntvedt. “Thermal imaging is all about thermal time constants and absolute vacuums.” The company is targeting a scalable solution, so it can offer a wide range of options for different cost and performance demands. The uncooled bolometer focal plane arrays will be aimed at high precision applications,

using a unique Si/SiGe mono-crystalline quantum well structure for the temperature-sensing membrane of the pixels, which the company says offers better temperature sensitivity and lower noise. Sensoror and Acreo are both involved in EU funded development programs for this technology.

The company is also offering a range of high-stability digital absolute pressure sensors for harsh environments that embed the piezoresistors in the bulk crystalline



SAR10 motion chart

SW510

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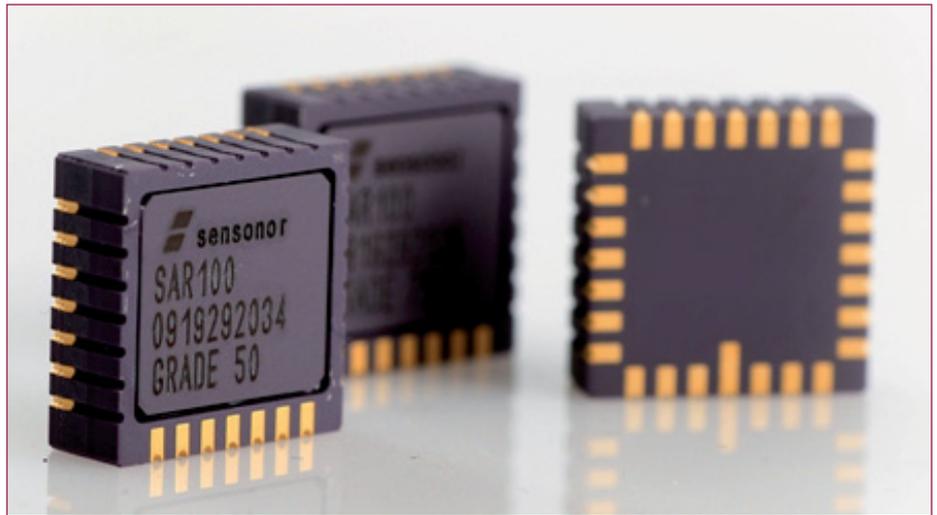
pressure diaphragm protecting them from contact with the air or liquid being measured. Electrical contacts are buried under an epitaxial layer.

It's offering a multi-axis gyroscope unit it reports has in-run bias stability of 1.2°/hr and angular random walk of 0.2°/√hr, as well as a range of gyros with in-run bias stability of 50-100°/hr and angular random walk of 1.0-1.6°/√hr. Imego designed the ASIC for the multi-axis gyro.

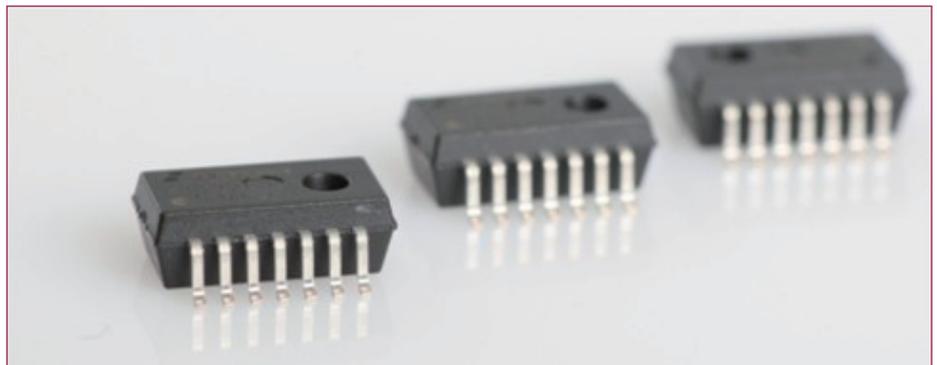
Sensoror started out in high end defense and medical MEMS markets back in 1985, before it moved into the automotive market and became for a time the largest supplier of airbag sensors, before other accelerometer makers pushed ahead with next generation products. It went public in 1992, and then was acquired by Infineon in 2003 when the TPMS market took off. As Infineon's TPMS supplier, Sensoror concentrated on ramping production and bringing down costs for that one product, churning out 1 million units a week. Along the way, the company notes, it generated IP with potential in other applications as well.

To improve the accuracy of its MEMS gyros for more demanding applications, the company went back and tried to take into account everything that influenced functionality. It aims to make standard, modular products that can be put together in different combinations to match performance demands with appropriate size and cost.

All the new products will use the



SensoNor gyro products



SensoNor pressure products

company's existing manufacturing capabilities, including its sealed-cavity glass-silicon-glass wafer stack, and its 3D and TSV wafer-level packaging. The complete production flow (front end, back end and testing) will remain in house, based on its 150mm wafer fab.

Hornrtvedt argues that being an independent company again is not really that big a change in practice, but primarily a change in thinking. "The

biggest change is it requires a different mindset to take the best from the heritage of Infineon and the past and to start to decide how best to capitalize on the IP and turn around quickly," he explains. It helps that the same core management team remains from when the company was independent six years ago. And the new Norwegian investor group, long term investors who have held some investments for 30-40 years, makes decisions quickly.



**Sverre Hornrtvedt
President & CEO**

Mr. Hornrtvedt received his Master's degree in electronics from the Technical University of Norway in 1976. In parallel with his studies he worked at SINTEF as a scientific assistant within the field of bio-cybernetics.

After being employed as a researcher by AME in 1977 he became project manager for a transceiver system to be supplied to the Norwegian Army. He became the R&D manager for MEMS sensor development at the end of 1979. In 1980 he became the manager of the sensor division of AME, a position he kept until he co-founded Sensoror in 1985.

From 1985 to 2000 he headed Sensoror as President, taking the company from an R&D entity of 25 people up to 400 people serving mainly the automotive industry.

In the period 2000 to 2003 Mr. Hornrtvedt held the position of Executive VP with responsibilities for strategic issues.

During the period 2004 to 2009 he headed R&D of MEMS as well as MEMS Innovation worldwide, reporting to Infineon Technologies in Munich. He has served several board positions in Norwegian and international high tech companies, among them four years at the board of SINTEF ECY.

Mr. Hornrtvedt is a Co-founder of Sensoror Technologies AS.