



## SAW Torque Sensors for Automotive Applications Help to Improve Fuel Efficiency



**SCHOTT has developed a unique new hermetic sensor housing for Transense's SAW technology, assisting tomorrow's automobiles to go greener**

Please visit us at the Sensor Exhibiton in Nuremberg in hall 12, booth Nr. 337 from May 26th to May 28<sup>th</sup>, 2009.

*Landshut/Germany, 20. Mai 2009* - Automotive manufacturers have been waiting for these for some time: torque sensors that allow for exact metering of driving power, shifting operations, and steering movements that increase driving comfort and reduce fuel consumption, as a result. However, to date, no sensor has ever been able to meet the demands with respect to performing exact measurements and remaining hermetic over its operating life – typically at least a quarter of a million kilometres. In working together with the British sensor technology company Transense Technologies plc, SCHOTT Electronic Packaging has now developed a completely new three-part housing for an SAW sensor that meets all these demands. Serial manufacturing of the new housing will commence soon.

Automatic transmissions are becoming progressively smoother. But despite the duplex clutch, passengers still feel a noticeable jolt while shifting gears and reaccelerating. New transmissions attempt to reduce this by using a clever electronic control system, however erratic changes in torque can still occur during shifting especially as the vehicle and transmission ages so that the original calibration becomes less and less accurate.

The reason is that there have never been any production viable sensors that have been able to directly measure the torque inside the drivetrain. Attempts made by various manufactures to produce torque sensors from two housing parts have failed because in order to perform exact measurements, this housing must be both elastic, as well as completely hermetic.



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Now, Transense's and SCHOTT's solution provides a unique housing that combines a metal with high elastic limit for transmitting the torque to the sensor with an annealed metal suitable for hermetic glass-fritted electrical feedthroughs. Unlike conventional housings, this consists of three parts:

- Base: The round steel disk consists of a stainless steel that is not hardened by heat treatment, but rather by mechanical processing. In this way, the metal remains elastic, even when subjected to high stresses, resulting in linear strain transfer to the torque sensor bonded to its inner surface.
- Ring: This annealed stainless steel component contains openings for the two connector pins that are hermetically sealed by glass fritting inside an oven. The ring is welded to the base before the sensor is added.
- Cover: After the sensor has been added, the housing is covered with a stainless steel cover and welded closed.

The heart of the torque sensor is a so-called SAW sensor. SAW stands for Surface Acoustic Wave and refers to the principle by which highly frequency mechanical vibrations can exist on a solid surface – analogous to waves on the sea. The Transense sensor consists of a piezo-electric quartz die on which up to 3 resonators are deposited using well established photo-lithographic technology. In response to a nominal 433MHz interrogation signal, this passive sensor returns signals at the natural frequencies of the resonators which are directly related to the mechanical and thermal strains on the quartz die from which torque and temperature can be derived. Transense is also taking a new route with respect to data transmission, since for the sensor to measure torque accurately, it must be welded or bonded directly to gear shafts or disk components and therefore exposed to oil at high temperature. Sliding electrical contacts are unreliable in this environment so Transense are successfully exploiting non-



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contacting signal transmission using radio frequency (RF) couplers.

Cooperation between Transense Technologies and SCHOTT Electronic Packaging has been ongoing since 2002. When SCHOTT and Transense decided to develop a three-part housing, joint work began in 2004 on a torque sensor that is now ready for mass production. Transense is already negotiating with automobile manufacturers and Tier 1 and 2 suppliers and is confident that vehicles can soon be equipped with up to ten torque sensors. This would not only allow for smooth and gas-saving shifting of gears, but also engine monitoring, increased traction by torque vectoring and improved control of electrical power assisted steering (EPAS).

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*As a business unit of SCHOTT, Electronic Packaging (EP) is a leading manufacturer of housings and other components for the reliable, long-term protection for sensitive electronics. The core technologies are glass-to-metal and ceramic-to-metal sealing, thermal sensing components as well as a variety of cutting edge specialty glass competences. With 1,500 employees at four production locations and several competence centers around the world, local customer support and co-developments for individual packaging solutions are at the heart of the business, serving the world's leading manufacturers in the automotive, data- and telecommunication, sensors and semiconductors, consumer electronics, dental care, home appliances, laser as well as security and tracking industries.*

*SCHOTT is an international technology group that sees its core purpose as the lasting improvement of living and working conditions. To this end, the company has been developing special materials, components and systems for 125 years. The main areas of focus are the household appliances industry, pharmaceuticals, solar energy, electronics, optics and the automotive industry. The SCHOTT Group is present in close proximity to its customers with production and sales companies in all its major markets. The Group's approximately 17,300 employees generated worldwide sales of approximately 2.2 billion Euros in the fiscal year 2007/2008. The company's*



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## PRESS INFORMATION

# SCHOTT

*technological and economic expertise is closely linked with its social and ecological responsibility. The SCHOTT AG is an affiliate of the Carl-Zeiss-Stiftung (Foundation).*

*Transense Technologies is a technology transfer company located near Oxford, UK, that develops Surface Acoustic Wave (SAW), wireless, batteryless, sensor systems for the automotive industry. Current applications include Tyre Pressure Monitoring Systems (TPMS) and torque systems for Electrical Power Assisted Steering (EPAS) and driveline management. Transense is listed on the Alternative Investment Market of the London Stock Exchange (TRT).*

Download-link to ZIP-file containing the picture in printable quality:  
<http://tinyurl.com/SCHOTT-Sensorgehaeuse>



Picture: SCHOTT has developed a unique new hermetic sensor housing for Transense's SAW technology, assisting tomorrow's automobiles to go greener.

More press pictures can be downloaded at:  
[www.schott-pictures.net](http://www.schott-pictures.net)

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**Please visit us at the  
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Nuremberg in hall 12,  
booth Nr. 337 from May  
26th to May 28th.**



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