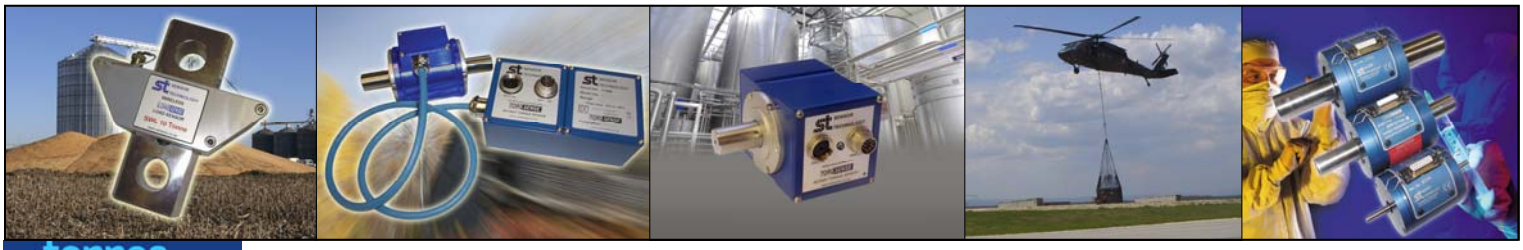


SENSOR TECHNOLOGY

1976 - 2016 CELEBRATING 40 YEARS

For over 40 years Sensor Technology has researched and developed solutions for customers measurement requirements, creating its own unique technologies for the instrumentation, test and OEM markets worldwide and supported by a global network of distributors.
The Industrial Division manufactures the TorqSense and LoadSense ranges of rotary torque and wireless load transducers, offering accurate, affordable, market leading products across the whole range of industrial applications. The Avionics Division manufactures the HeliNav LoadMaster and HeliNav TrackMaster sensors and systems to provide accurate measurement of underslung loads and precision guidance/positioning systems for the helicopter industry.

Non Contact Rotary Torque Measurement

We offer the widest range of torque sensors from 10mNm through to 13000Nm.

The new digital ORT230/240 series optical rotary torque sensors are ideal for applications when the demand is for very low torque and/or high bandwidth, providing precise, dynamic measurement of rotary and static torque from as low as 10mNm and for bandwidths of up to 50kHz. ORT230/240 transducers are available from 10mNm through to 100Nm.
The TorqSense RWT410/420 series, uses non-contact Surface Acoustic Wave technology to deliver a highly compact device which has all the complex electronics placed within the transducer itself. This high level of integration radically reduces the overall size of the sensor. TorqSense transducers are available in sizes from 1Nm through to 13000Nm.

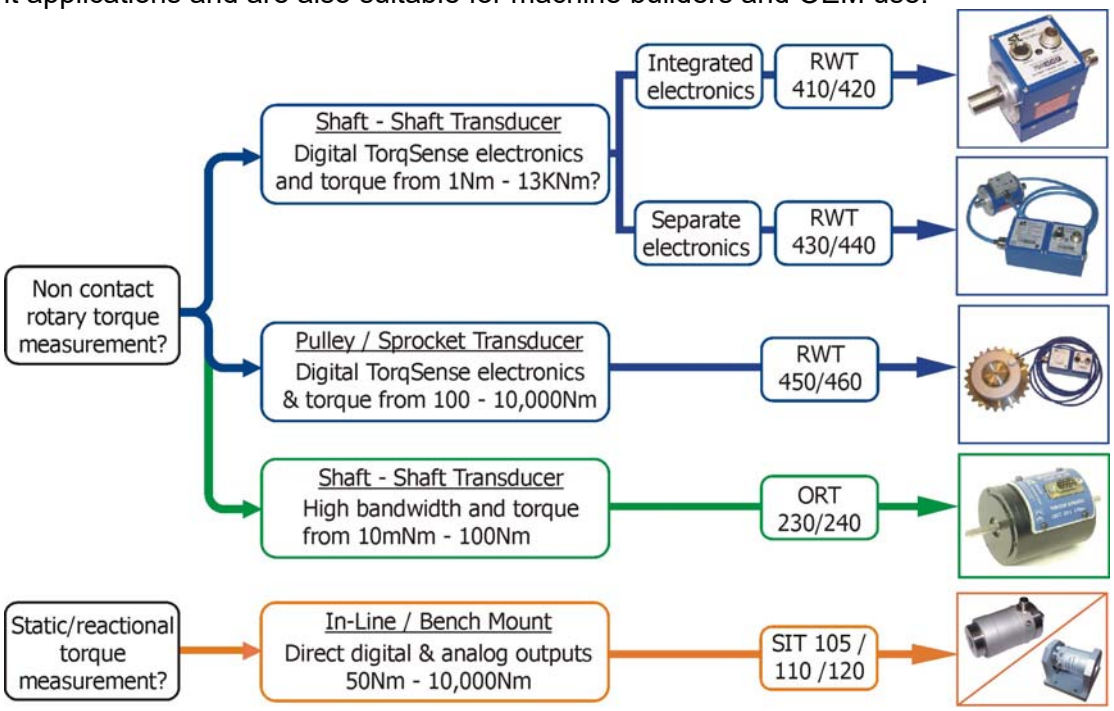
Smart Load Sensor

The new wireless LoadSense load cell provides all the information needed to optimise efficiency and increase profitability of a wide range of industrial operations. The new development allows weighing processes to be fully integrated with handling operations. All live data is captured in real time and can be transferred to a database, stored, totalised and analysed. The load sensor can be integrated with a crane hook, fork lift or other handling device. It has an on-board single-chip computer for recording, analysing and archiving readings, and wireless communications (operating on a harmonized global 2.4 GHz waveband) that can transfer data in real time to a host computer. Internal batteries make LoadSense's operation completely autonomous. As such it can be deployed with minimal disruption to operations, and will automatically begin transmitting data. No special training is required to install or operate the unit. Multi channel operation is standard

Manufacturers of TORQSENSE and LOADSENSE sensors and transducers, HELINAV LOADMASTER and HELINAV TRACKMASTER wireless load monitoring & precision guidance systems

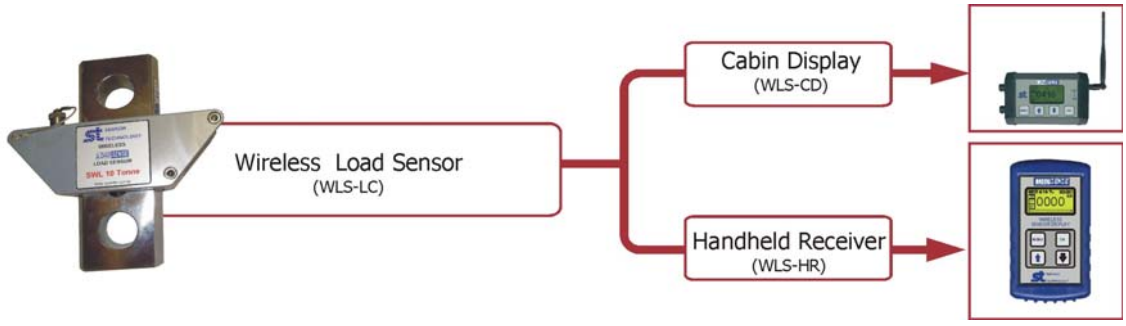
TORQSENSE

TorqSense digital torque sensors and transducers are ideal for a wide range of industrial, test and measurement applications and are also suitable for machine builders and OEM use.



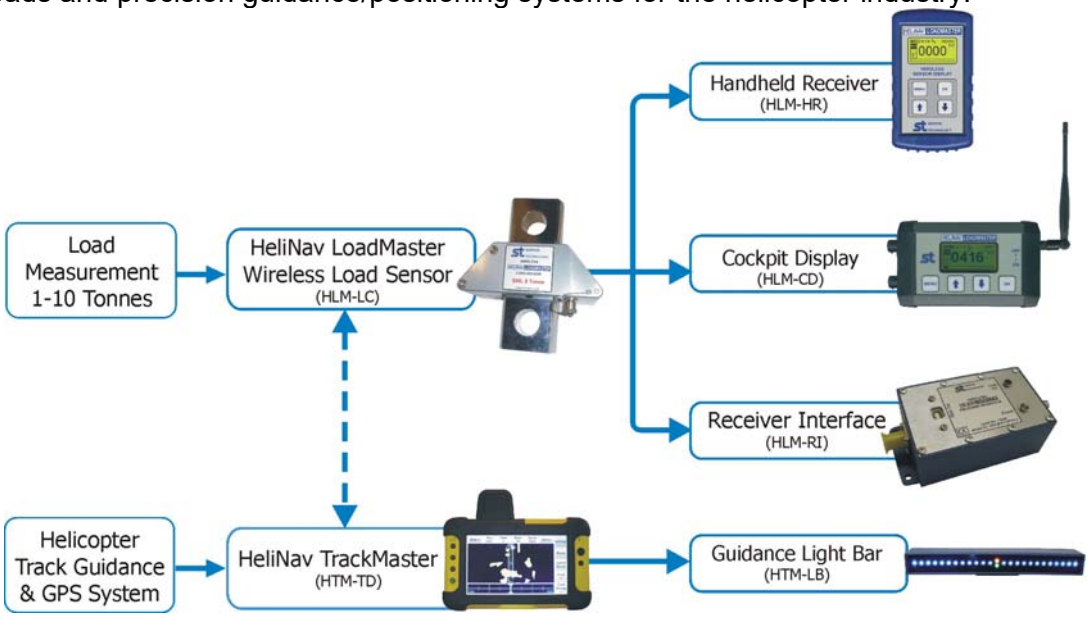
LOADSENSE

LoadSense is a rugged, wireless load measuring transducer for any industrial applications, offering simplicity of set-up and use at a competitive price.



HELINAV LOADMASTER & HELINAV TRACKMASTER

HeliNav LoadMaster and HeliNav TrackMaster sensors and systems to provide accurate measurement of underslung loads and precision guidance/positioning systems for the helicopter industry.



Driving innovations in wireless torque measuring technologies

Sensor Technology Ltd, developer of the innovative TorqSense range of wireless torque transducers, has continued to develop its product range, offering users new options for measuring power in drive shafts and other rotating machine elements.

A technological breakthrough has occurred in the world of sensors that will almost certainly grab the attention of machine designers who are looking to measure power in drive shafts and other rotating machine elements.

Measurement of torque in rotating shafts is a fundamental requirement in a vast number of applications. In production machinery and processes measurement of torque can help to reduce downtime and improve product quality, and is a key measurement in the battle to optimise energy efficiency. In applications such as belt conveyors, measurement of shaft torque provides an efficient means to monitor the power being used to drive the conveyor, which in turn can help to optimise speed.

Accurate torque measurement is also vital in many R&D applications to test system characteristics or evaluate system performance. Direct torque measurement is preferred in such critical applications over remote or indirect methods of calculating torque as it is inherently more accurate and reliable.

Regardless of type, the job of the torque transducer is to convert torque into an electrical signal. On a rotating shaft, this equates to monitoring the minute differences in twisting from one end of the shaft to the other, and turning this into a usable output.

Conventional torque measuring solutions for rotating shafts introduce as many problems as they solve. Strain gauges require connection to the outside world via slip rings, inductive couplings or rotary transformers which can all represent a compromise in terms of factors such as electrical noise, long term reliability, speed range, accuracy, etc. Phase measurement or magnetic measurement techniques are also available, but introduce compromises of their own.

Sensor Technology's solution in the core of its TorqSense products is to use the properties of surface acoustic waves, by measuring the resonant frequency change of surface acoustic wave (SAW) devices in a non-contacting manner when strain is applied to a shaft to which SAWs are fixed. The applied torque causes a deformation of the quartz substrate of the SAW device, which in turn causes a change in its resonant frequency.

Practical torque sensors use two tiny SAWs made of ceramic piezoelectric material containing frequency resonating combs. These are glued onto the drive shaft at 90 degrees to one another. As the torque increases the combs expand or contract proportionally to the torque being applied. In effect the combs act similarly to strain gauges but measure changes in resonant frequency.

The adjacent RF pickup emits radio waves towards the SAWs, which are then reflected back. The change in frequency of the reflected waves identifies the current torque. This arrangement means there is no need to supply power to the SAWs, so the sensor is non-contact and wireless.

Sensor Technology's SAW-based torque sensors produced using this technique are bi-directional, with fast mechanical and electrical responses. There is complete freedom from brushes or complex electronics, and none of the drawbacks of phase measurement or magnetic measurement technologies.

One of Sensor Technology's breakthroughs as it developed the TorqSense range was the ability to deliver a highly compact device yet which had all the complex electronics placed within the transducer itself. The high level of integration was key in allowing the company to radically reduce the overall size of the sensor. This innovation formed the basis of the RWT310/320, a significant development over the previous E300 series.

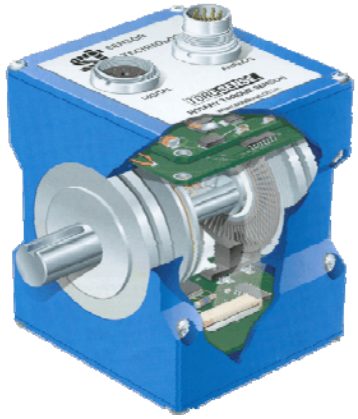
New TorqSense RWT models

Of course the innovation never stops, and Sensor Technology has continued to develop the technology, with new models offering improved performance and suitability for new applications. The RWT310/320 has now been superseded by the TorqSense RWT410/420, with all new integral electronics that have produced significant performance gains in resolution, frequency response, reduced sensor current consumption and faster digital data throughput. Further, transducer overload has also been increased to 300%. The series offers a cost effective, non-contact digital rotary torque measurement solution, suitable for torque monitoring, testing or controlling drive mechanisms.

Recognising that some applications might benefit from having the electronics separate from the sensor unit due to space and/or environmental limitations, Sensor Technology has also developed the RWT430/440, replacing the RWT330/340 series and again featuring all new electronics that have produced significant performance gains in resolution, frequency response, reduced sensor current consumption and faster digital data throughput. Another important feature of the new devices is that Sensor Technology has been able to increase torque ranges from 1Nm to 13,000Nm, with even greater torques available on request.

In addition, the safe mechanical overload limit for the transducers has been increased to 300%.

The increased torque capability means the new models are suitable for monitoring, testing or controlling drive mechanisms in some of the largest and most demanding applications, including marine, agricultural, renewable energy, offshore and materials handling, aerospace and other heavy duty tasks.
A further innovation is the TorqSense RWT450/460 pulley/sprocket torque sensor, again offering performance gains over the previous RWT350/360 range and offering a cost effective option for torque monitoring and process control on any belt/chain driven machinery. The devices offer separate electronics and sensor either with fixed outputs (RWT450 Series) or user selectable outputs (RWT460 Series).



All of the models in these ranges are able to operate both statically and dynamically, in both clockwise and anti-clockwise directions, providing an accuracy to 0.25% and resolution to 0.02%. Features include integrated sensors to monitor shaft temperature for improved compensation and accuracy, and an integrated LED status light and ‘sensor status’ output.
TorqSense transducers have long offered a range of interface options including RS232, CANbus and USB to connect with modern instrumentation and laptops. But a new option is a Bluetooth interface box that introduces a new level of wireless flexibility by enabling the sensor to be used in applications where cabling would be difficult and/or by providing to ability to monitor the sensor on any Bluetooth enabled device. This might include a smartphone running Sensor Technology’s Android app to display the current torque, speed and temperature as well as peak values.

Optical rotary torque sensing
While SAW-based torque sensing provides a highly attractive option for the vast majority of rotary torque measurement applications, there are other tasks that require lower torque ranges than 1Nm, or much higher bandwidth, and these require a different measurement principle.
Here, optical rotary torque sensing is a better option. Optical rotary torque sensors use a pair of gratings attached a short distance apart on a strain-sensitive shaft to modulate a light source. As torque is applied to the shaft, a slight twist results which changes the alignment of the gratings and thus varies the light transmitted through to a detector. The use of this technique results in a transducer which is able to detect torque bi-directionally, and which has a fast mechanical and electrical response, low inertia and complete freedom from brushes or complex electronics.
Sensor Technology has set new benchmark performance standards for optical rotary torque transducers, with the launch of the digital ORT 230/240 series, providing precise, dynamic measurement of rotary and static torque less than 100Nm and for bandwidths of up to 50kHz. The smallest available sensor has a maximum torque of only 10mNm.

The new ORT 230/240 devices replace Sensor Technology’s E200 ORT series, benefiting from all-new electronics that deliver significant gains in resolution, frequency response, reduced sensor current consumption and faster digital data throughput. The high speed capability comes from an inherently low inertia, since the electronics are not fixed the shaft, while non-contact operation ensures a long and reliable life (backed up by Sensor Technology’s lifetime warranty) with high accuracy. The optical operating principle also ensures excellent noise immunity.
Images courtesy of EUREKA magazine

Optical rotary torque sensors suitable for low torque and high bandwidth measurements

Sensor Technology has set new benchmark performance standards for optical rotary torque transducers, with the launch of the digital ORT 230/240 series. These new optical rotary torque sensors are ideal for applications when the demand is for low torque and/or high bandwidth, providing precise, dynamic measurement of rotary and static torque of less than 100Nm and for bandwidths of up to 50kHz.

The new ORT230/240 devices replace Sensor Technology's E200 ORT series, benefiting from all-new electronics that deliver significant gains in resolution, frequency response, reduced sensor current consumption and faster digital data throughput.

The high speed capability comes from an inherently low inertia, since the electronics are not fixed to the shaft, while non-contact operation ensures a long and reliable life (backed up by Sensor Technology's lifetime warranty) with high accuracy. The optical operating principle also ensures excellent noise immunity.

TorqSense ORT230 series sensors provide fixed voltage or current analogue outputs – one for torque and one for either speed or power. The TorqSense ORT 240 provides two user selectable voltage or current analogue outputs – one for torque and the other for either speed, power or peak torque – plus digital outputs including RS232, CANbus and USB for interfacing with modern instrumentation and laptops. The ORT 240 enables users to connect up to 10 transducers via USB, and transducer configuration software for making changes to transducer variables.

Features of both devices include self-diagnostics to report if the transducer's torque, speed ratings or calibration date have been exceeded, while inbuilt sensors monitor shaft temperature for better compensation and accuracy. The device also offers a simple 'sensor status' output.

Complementing these products is Sensor Technology's TorqView software, providing an easy-to-use advanced torque monitoring package for Windows PCs to assist with data display and recording. It offers real time chart plotting, and is compatible with both Matlab and Excel. Further, LabVIEW VIs are available for users to design their own process control applications, and DLLs are available for users who wish to write their own custom software.

These latest optical rotary torque sensors are an important extension to the Sensor Technology torque monitoring range, and offer an alternative solution when low torque or bandwidth requirements preclude the use of the more cost-efficient SAW-based TorqSense products.

Optical rotary torque sensors use a pair of gratings attached a short distance apart on a strain-sensitive shaft to modulate a light source. As torque is applied to the shaft, a slight twist results which changes the alignment of the gratings and thus varies the light transmitted through to a detector. The use of this technique results in a transducer which is able to detect torque bi-directionally, and which has a fast mechanical and electrical response, low inertia and complete freedom from brushes or complex electronics.

The absence of brush gear allows high-speed operation with a continuous rating up to 30,000rpm standard. Further increases in rpm are available depending upon shaft size. The torque shaft is of low compliance ½° maximum torsion deflection on the smaller transducers and ¼° maximum on the larger transducers at full-scale deflection. Any full scale torque can be specified within the range 10mNm to 100Nm.

INSTRUMENTATION/CONTROL

Smart Load Sensor

A smart load sensor developed in the UK by Sensor Technology provides all the information needed to optimise efficiency and increase profitability of a wide range of industrial operations.

A new development to be launched at the Sensing Technologies exhibition at Birmingham's NEC 28-29 Sept, allows weighing processes to be fully integrated with handling operations. All live data is captured in real time and can be transferred to a database, stored, totalised and analysed.

For instance, you may need to know how much material you have transported, or you could be handling two or more materials simultaneously which need to be accounted individually; or if working for multiple customers at the same time you can bill each appropriately.

The development, called LoadSense, is an intelligent load sensor that can be integrated with a crane hook, fork lift or other handling device. It has an on-board single-chip computer for recording, analysing and archiving readings, and wireless communications capability which can transfer data in real time to a host computer.

Designed and manufactured by Banbury-based Sensor Technology, internal batteries make LoadSense's operation completely autonomous. As such it can be deployed with minimal disruption to operations, and will automatically begin transmitting data. No special training is required to install or operate the unit.

LoadSense is built around an intelligent load sensor, a hand-held display and a receiver. The load sensor is based on proven strain gauge technology, and is calibrated as standard in the range 1-5 tonnes, with other ranges available on request.

The transmitter (operating on an unrestricted 2.4 GHz waveband), enables accurate load data to be sent to the display, a full colour, TFT touchscreen computer, running the familiar Windows XP and LabVIEW. The display provides real time measure of the load, while the computer records and processes real-time values.

Sensor Technology's Tony Ingham explains: "Our main markets are materials handling and warehouse operations, where the intelligence will convert raw data into instant stock counts. We have already had enquiries about raising nuclear fuels rods, monitoring window cleaners' cradles on high rise buildings and winching and weighing building materials."

Theatre stage hands could lift and lower scenery from the wings rather than from a remote control room. Using LoadSense with a tractor-mounted winch, you could assess roadside trees' susceptibility to wind speed. For applications involving liquid discharge, a system could be configured to monitor and control flow."

LoadSense could be wirelessly integrated into a SCADA or Manufacturing Enterprise Systems control system, producing instant operating reports and e-mailable customer bills. It also improves operating safety because operators are free to remove themselves from dangerous locations

For more information:
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Enquiry No. 17

The above article has been published with Marver Publishing in a Technical Magazine, describing the LoadSense technology in detail. Thanks to Marver Publishing for giving permission to reproduce the article.

2016 Exhibitions

Engineering Integrity Society
Silverstone, UK
15th March 2016

Hannover Messe
Hannover, Germany
25th – 29th April 2016

Automation India
Mumbai, India
22nd – 25th August 2016

Sensors & Instrumentation
Birmingham, UK
28th – 29th September 2016

LiftEx
Aberdeen, UK
23rd – 24th November 2016

For full details of exhibitions see:
www.sensors.co.uk/exhibitions

Precision guidance system optimises heli-spraying and lifting operations

A new display screen for HeliNav's wireless TrackMaster intelligent load sensor for helicopter operations has been launched by manufacturers Sensor Technology Ltd. TrackMaster constantly weighs a helicopter's underslung load, even if it varies during operations such as crop spraying, and uses this data stream to calculate flight and operational profiles. It is suitable for use in crop spraying, spreading and lifting operations.

The new HeliNav TrackMaster gives pilots an easy to use and accurate system for line guidance. It also automatically records all data for post-flight downloading so that detailed analysis of the flight and operational performance can be completed for accurate billing, maintenance scheduling etc.

The software comes pre-installed on a 7" rugged tablet computer, and integrates into existing GPS and spray control set-ups for immediate use. The computer is sunlight readable, and conforms to MIL-STD-810F and IP67 standards.

The intuitive software interface provides complete customisation of the display. The client provided maps can be imported into the system to provide the base map for the job.
The system is highly intelligent and so can automatically manage details of the operation. For instance if crop spraying in an irregularly-shaped field with a stream, pond and building that must not be sprayed, the TrackMaster will turn the spray on and off to avoid the non-spray areas and also to avoid spraying beyond the field boundaries. Alternatively if the task involves travelling between a number of set points, say for collecting/depositing loads these can be identified on screen and flight-paths optimised for efficiency. For ease of use, TrackMaster is based on a 7inch sunlight readable touchscreen and the read out graphics have been designed for maximum clarity.

It is compatible with Google Maps and other mapping services, and with shape handling software. When used for spraying, during flight a live map of the spraying region is displayed, and tracks are coloured as they are sprayed. Tracks are over-layed on the map to indicate the path required to complete the job. A director bar below the map provides the pilot instant feedback if they deviate from the current track.

Once a job has been completed all the operational data can be exported in a number of different formats, including shape files, as a survey or geographic maps. Additional analysis is also instantly available to provide operational performance data such as position data, area covered, total load lifted, spray usage. Reports can also be generated for billing which provide graphical maps as well as statistical data on the job for billing purposes.

TrackMaster interfaces with the Load Sensor from the HeliNav LoadMaster family, which enables tracking of the load and distance carried. This data can also be included on the report. User customisation is also possible, allowing the importation of logos, graphics, data tables, colours, topographical references grids etc. TrackMaster is fully compatible with HeliNav's LoadMaster and other systems.

1976 - 2016
CELEBRATING
40
YEARS

TORQSENSE®

LOADSENSE

HELINAV LOADMASTER

HELINAV TRACKMASTER

SENSOR TECHNOLOGY

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