Honeywell

THE POWER OF **CONNECTED**

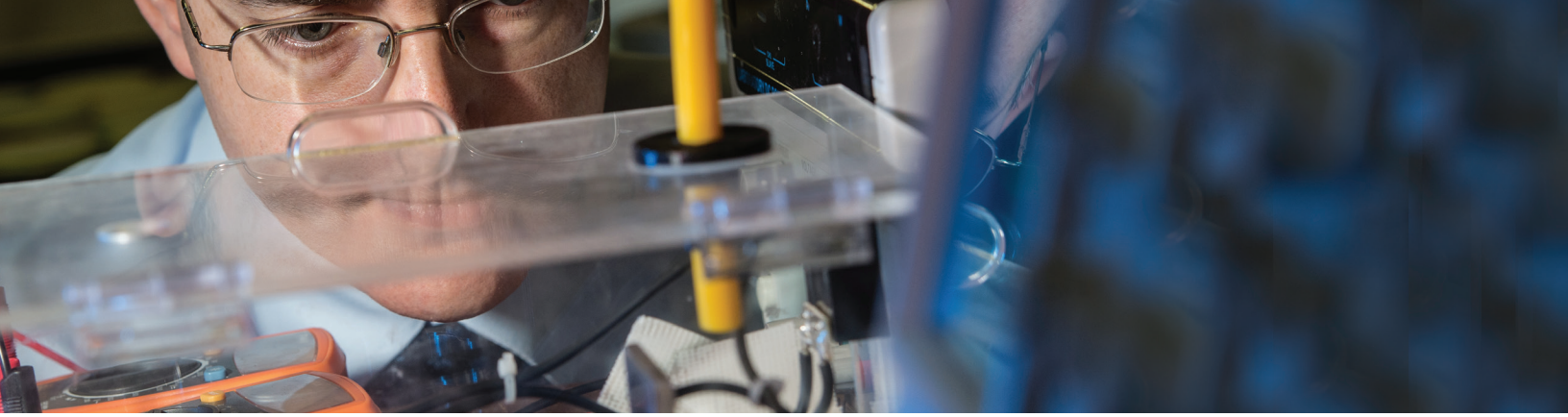
CUTTING-EDGE TECHNOLOGY COMPANY RELIES ON HONEYWELL TRUSTABILITY PRESSURE SENSORS

Surrey Sensors Ltd. provides high-precision pressure measurement solutions, from developmental research to the commercial marketplace

"We needed very small and accurate board mount pressure sensors. The competitor products we examined couldn't come close to TruStability, especially in performance, size, and cost."

Dr. David M. Birch, Director of Research
Surrey Sensors Ltd.; Guildford, Surrey, United Kingdom

Case Study



When Surrey Sensors Ltd. needed more accurate, smaller, and cost-competitive pressure sensors for use in their pressure measuring systems, they found that the Honeywell TruStability™ RSC Series and HSC Series Digital Board Mount Pressure Sensors were the only solution that met their list of strict requirements, especially at ultra-low pressures.

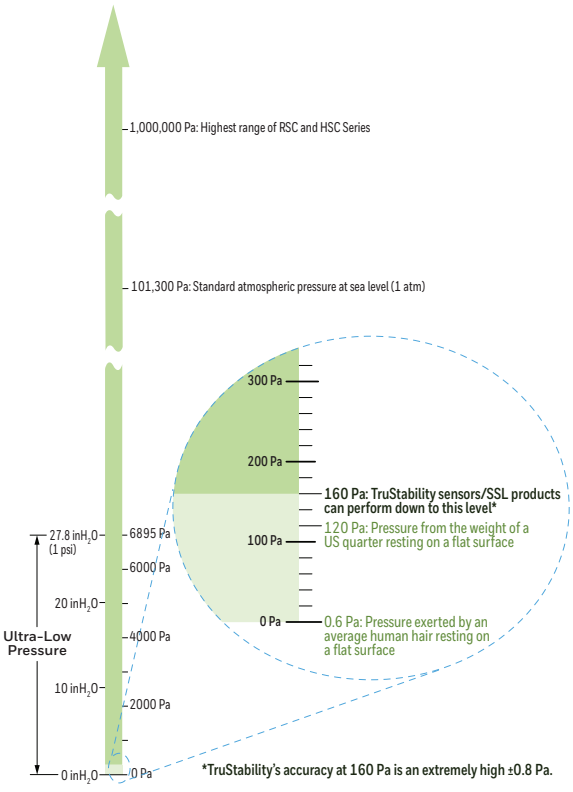
Pressure Sensor Needs

Extreme accuracy and sensitivity, especially at the lowest end of the ultra-low pressure range

Precalibration and temperature compensation

Very small package size

Lowest cost



SSL needed pressure sensors that function more accurately at the bottom of the ultra-low pressure range, as well as at much higher pressures – TruStability does both.

The Business Situation

Surrey Sensors Ltd. (SSL) was formed in 2015 as a partnership between private venture and the University of Surrey. SSL's specific goal was to commercialize the novel and innovative technologies emerging from the university's experimental laboratories in its Centre for Aerodynamics and Environmental Flow (CAEF), one of the leading experimental fluids research facilities in Europe. SSL's group of academics, technical and research staff works on current problems and conducts advanced research in the field of experimental and computational fluid dynamics. They draw on decades of experience in designing and managing fully-automated experimental measurement systems for the National Centre for Atmospheric Science EnFlo (Environmental Flow) national laboratory, which includes two medium-scale wind tunnels and an atmospheric boundary layer tunnel.

As capability in the integration of digital systems with measurement technology expanded, the demand for products and services outgrew the available infrastructure. Measurement technology and services were assigned to SSL in 2016.

SSL now applies their cutting-edge technologies to the design and manufacture of bespoke, cost-effective measurement products for a wide range of sectors including Formula 1/motorsport, avionics, UAVs (unmanned air vehicles), healthcare, commercial agriculture, and elite sport in the CAEF's rapid manufacturing, PCB fabrication, precision machining, and advanced prototyping facilities. SSL now has the capability to take a measurement problem, identify a solution, develop requirements, create product concepts, and conduct short-run production, all inhouse.

Several SSL products address specific measurement needs at ultra-low pressures (less than 6985 Pa [1 psi/27.8 inH_2O]). Working in this particular band of the pressure continuum requires pressure sensors that must meet a set of performance factors that are generally difficult to achieve in the same sensor. They must be more accurate and sensitive to smaller pressure changes; more stable, and have a higher threshold of burst and over pressures.

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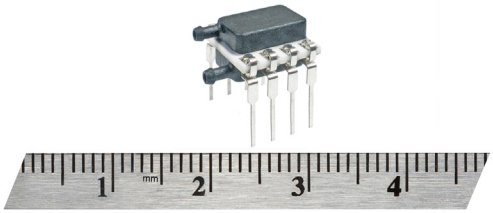
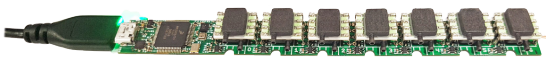
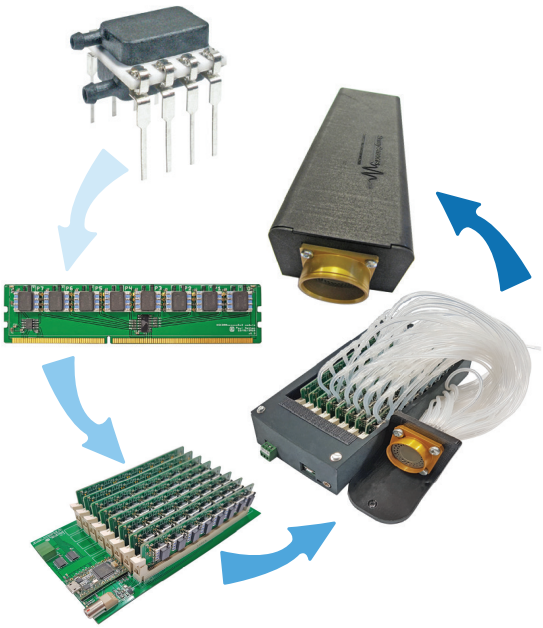


RSC Series—*High Resolution, High Accuracy, Compensated*
±1.6 mbar to ±10 bar | ±160 Pa to ±1 MPa | ±0.5 inH_2O to ±150 psi
±0.1% accuracy
24-bit digital output

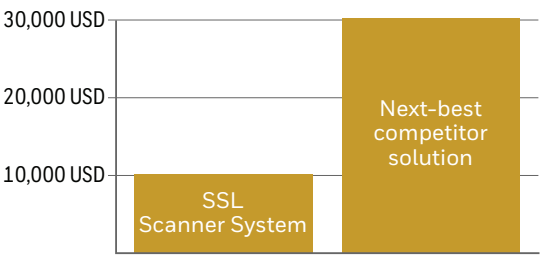
HSC Series—*High Resolution, High Accuracy, Compensated*
±1.6 mbar to ±10 bar | ±160 Pa to ±1 MPa | ±0.5 inH_2O to ±150 psi
±0.25% accuracy
14-bit digital/analog output



HSC or RSC Series, DIP package, dual ported pressure sensors on a Pressure Sensor Interface Card.



As many as 64 separate HSC Series, DIP package, dual ported pressure sensors may be found in the Scanner System. Each sensor is connected via tubing or 3D-printed manifolds to the housing's common inlet.



SSL also needed precalibrated and temperature-compensated pressure sensors, which eliminated costs associated with in-house amplification, signal conditioning, increased design and production time, and extra materials. Precalibrated sensors would also free up PCB board space which, in turn, would directly contribute to reducing the final product size, an important consideration.

The Results

SSL products use the Honeywell TruStability RSC and HSC Series board mount pressure sensors as the core pressure sensing components in the following flagship products. Each of these three examples highlights TruStability's performance, small size, and low cost.

Pressure Sensor Interface Card: Provides a simple, low-cost, and easy-to-use interface with RSC or HSC Series sensors for use in pressure prototyping, validation, and simple acquisition systems

These cards, designed around the RSC and HSC Series pressure sensors, include all the power, signal conditioning and digital systems required to drive these high-precision, digital pressure sensors.

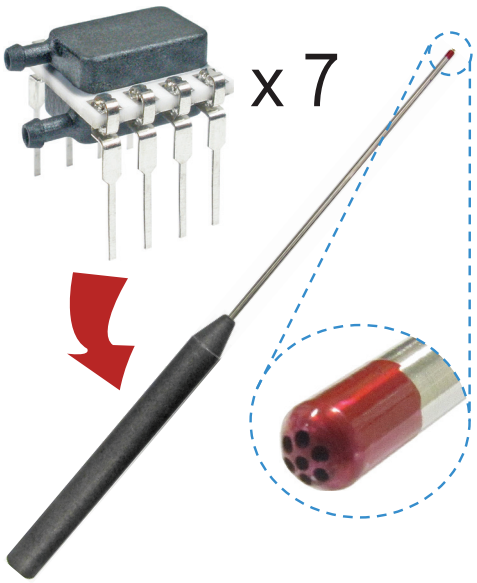
The RSC Series uses a higher accuracy, 24-bit, analog-to-digital converter, an important consideration in an age when modern digital pressure sensors no longer provide simple analog-proportional outputs. This feature allows sophisticated digital sensors to talk directly to legacy systems such as analog data acquisition systems, providing access to digital functionality. "We found the TruStability sensors more accurate than the calibration equipment we use in the lab," adds Dr. Birch.

The TruStability sensors also provide data streams in actual SI engineering units, instead of voltages, an unforeseen benefit that allows for simpler integration, which SSL only discovered after starting work with these sensors.

64-Channel Modular Pressure Scanner System: Provides multi-channel pressure measurement for rapidly changing requirements such as those found in surface pressure measurement and process control applications

Eight HSC Series pressure sensors, with ranges down to ±160 Pa full scale, are mounted in a row on an interchangeable, modular card. The cards, which contain their own on-board memory and are factory-loaded with calibration data, are then mounted in banks of up to eight in an enclosure. The scanner system also includes sensors for temperature, density and humidity corrections, as well as a remote fluid temperature sensor.

"What we provide is basically a convenient carrying case for the HSC sensors. We can provide this system in a variety of enclosures, or as an OEM unit," says Joe Braitch, CEO, Surrey Sensors Ltd. "The TruStability sensor pricing, combined with the Surrey software/microcontroller, allows us to offer these scanners at a price that no one else can approach. In fact, the next-best competitor solution costs more than 30,000 US dollars, three times more than our Scanner System."



The sensor assembly is small (<18 mm in diameter x 150 mm length) and light (only 54 g).

Digital Seven Hole Probe System shown mounted on an NCAS FAAM BAe146 atmospheric measurement aircraft as part of its air data calibration system. This system is also the smallest UAV (Unmanned Aerial Vehicle) air data system currently available.

Digital Seven-Hole Probe System: Uses pressure as a proxy to measure air velocity (speed and direction) in a very small and accurate package for use in wind-tunnel testing, motorsport, and UAVs

Each of the seven holes located in the tip of the cylindrical probe's sting is connected to its own RSC Series sensor physically located in the probe body. The RSC Series provides differential measurement directly against local static pressure around the sting's tip. Other sensors located in the probe body provide additional measurement parameters such as humidity and temperature.

Although seven hole probes are not new, they can be very cumbersome. "In the recent past, the best you could manage was a large array of sensors, with wires, hoses and a substantial external infrastructure. These worked well, but were very expensive to buy and difficult to build," Dr. Birch relates. "More recently, we have developed this sort of system into a compact, self-contained unit, and the RSC Series digital pressure sensors have been a big part of our success. Our probes are now demonstrably the most powerful on the market, as well as the most sensitive and arguably the most advanced in terms of capability."

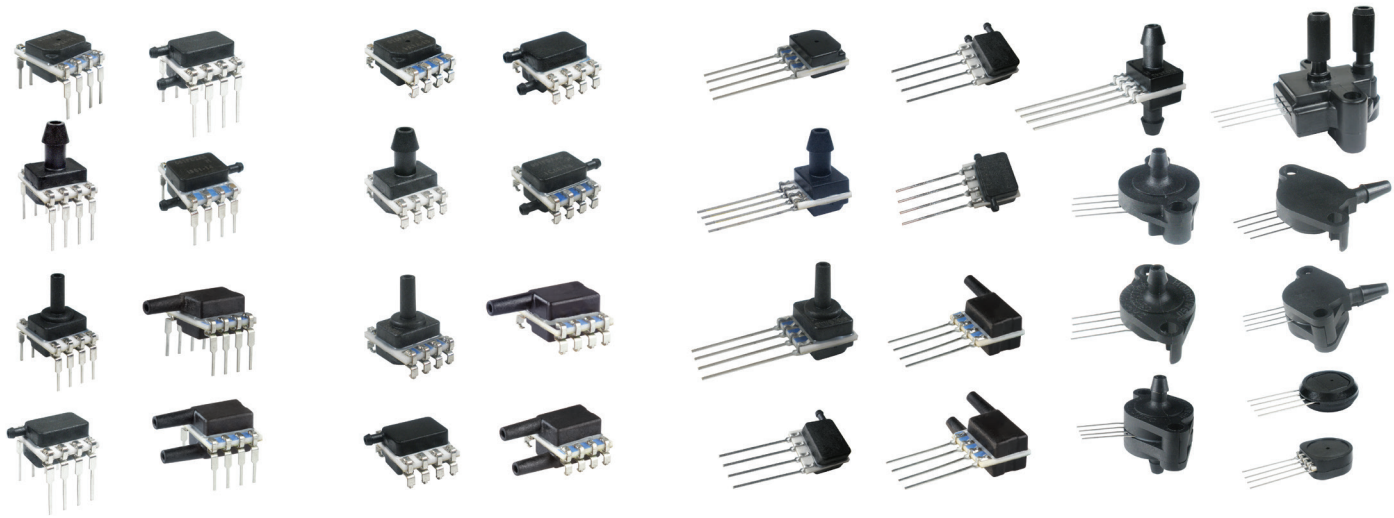
Other Benefits

- **Credibility.** "Using these pressure sensors brings the credibility of Honeywell to our technology and thence to our customers. Because of Honeywell's reputation, we can compete with larger customers quite openly," says Joe Braitch. "It allows us to better compete in the marketplace, which is very important for a young company like ours. We are very open about using Honeywell pressure sensors. Our web product pages even link directly to the TruStability datasheets on the Honeywell SIOT website."
- **Customer support.** "Collaboration between Surrey Sensors Ltd. and Honeywell has been close and flexible, qualities that helped us create and provide SSL with fully bespoke part numbers in a short time," says Garry Blake, Senior Honeywell Account Manager for Surrey Sensors Ltd.
- **Springboard for new product development.** SSL envisions using the TruStability line in future projects, especially those in the aerospace, automation, and medical sectors. "We understand these sensors and how to use them. We are developing a history with using the TruStability sensors and we hope to take advantage of it," says Dr. Birch.

SSL has presented its upcoming technologies at this year's Farnborough International Air Show and also is working with King's College Hospital to develop technology that can be used in the non-intrusive diagnosis of a variety of chronic and acute respiratory conditions.

SurreySensors

www. surreysensors.com



The versatile TruStability family of board mount pressure sensors provides a wide variety of ports, ranges, packages, reference types, and outputs,

ADDITIONAL INFORMATION

The following TruStability literature is available at sensing.honeywell.com:

- Product datasheets
- Product installation instructions
- Product line guide
- Product range guide
- Application information
- CAD models
- Product images

For more information

Honeywell Sensing and Internet of Things services its customers through a worldwide network of sales offices and distributors. For application assistance, current specifications, pricing or the nearest Authorized Distributor, visit sensing.honeywell.com or call:

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