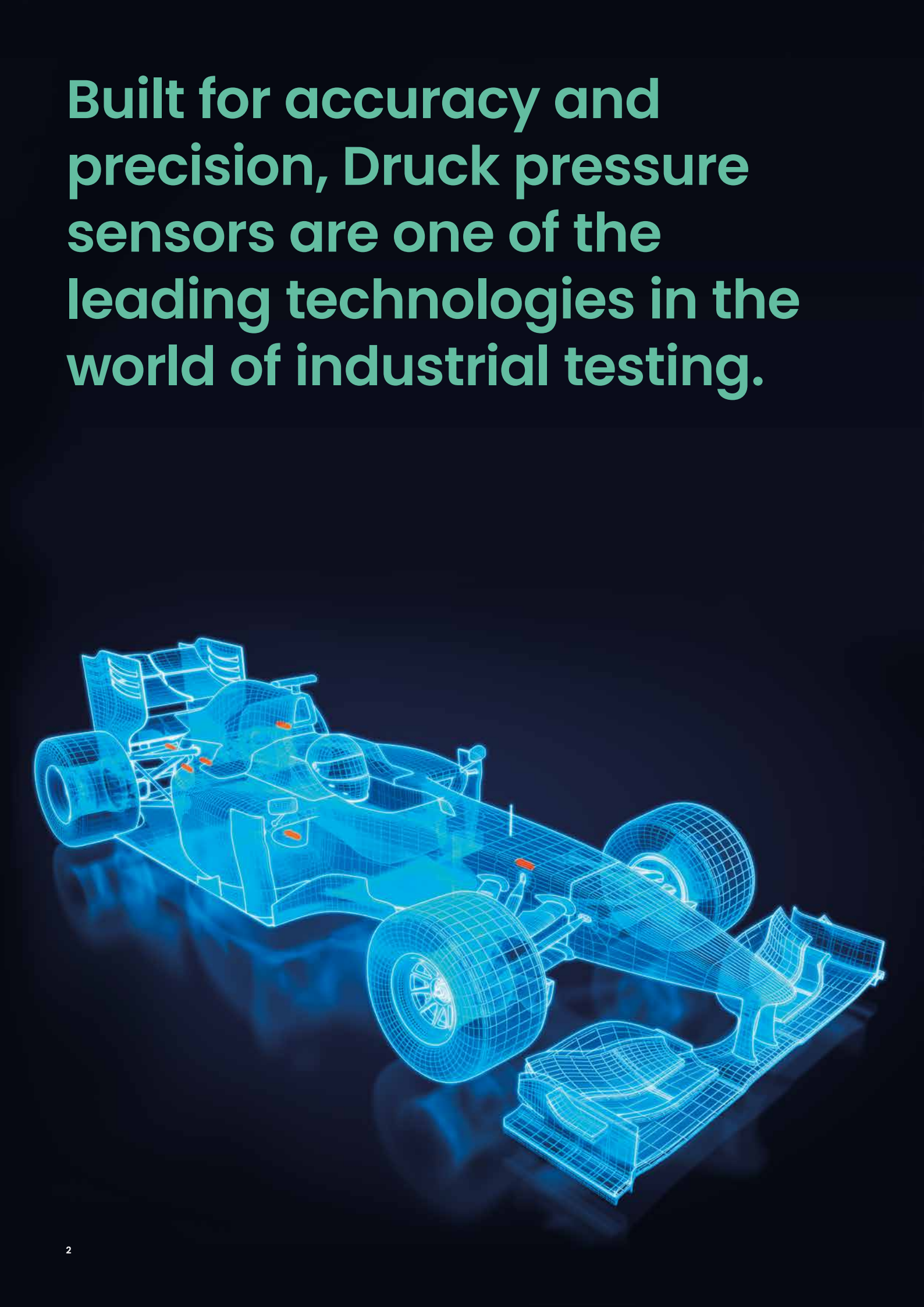
Druck
a Baker Hughes business

Testing to the limits

Built for accuracy and precision, Druck pressure sensors are one of the leading technologies in the world of industrial testing.



[Our pressure sensors are one of the leading technologies in the world of industrial testing]

Pressure is a vital parameter in millions of industrial processes and applications today. When it comes to pressure sensing, the Druck product range embodies over 40 years of experience designing and manufacturing some of the most accurate and reliable pressure measurement solutions on the market. Druck's range of pressure technologies gives you peace of mind that you are getting the reliable data you need, to make the right decisions to keep your business and equipment running safely.

When it comes to data gathering in industrial applications there are three key areas to consider: test applications, on-vehicle test and engine test cells. As a result, our sensor technology has been developed to support some of the most rigorous, challenging and precise applications. Our high accuracy pressure sensors are highly suited for use in these challenging industrial applications:

Test applications

To operate effectively in test applications you need confidence in the reliability of your instrumentation, which is critical to quality data collection. When faced with rapidly changing conditions, potential unit failures and extreme environments, durability and robust design are key.

On-vehicle test

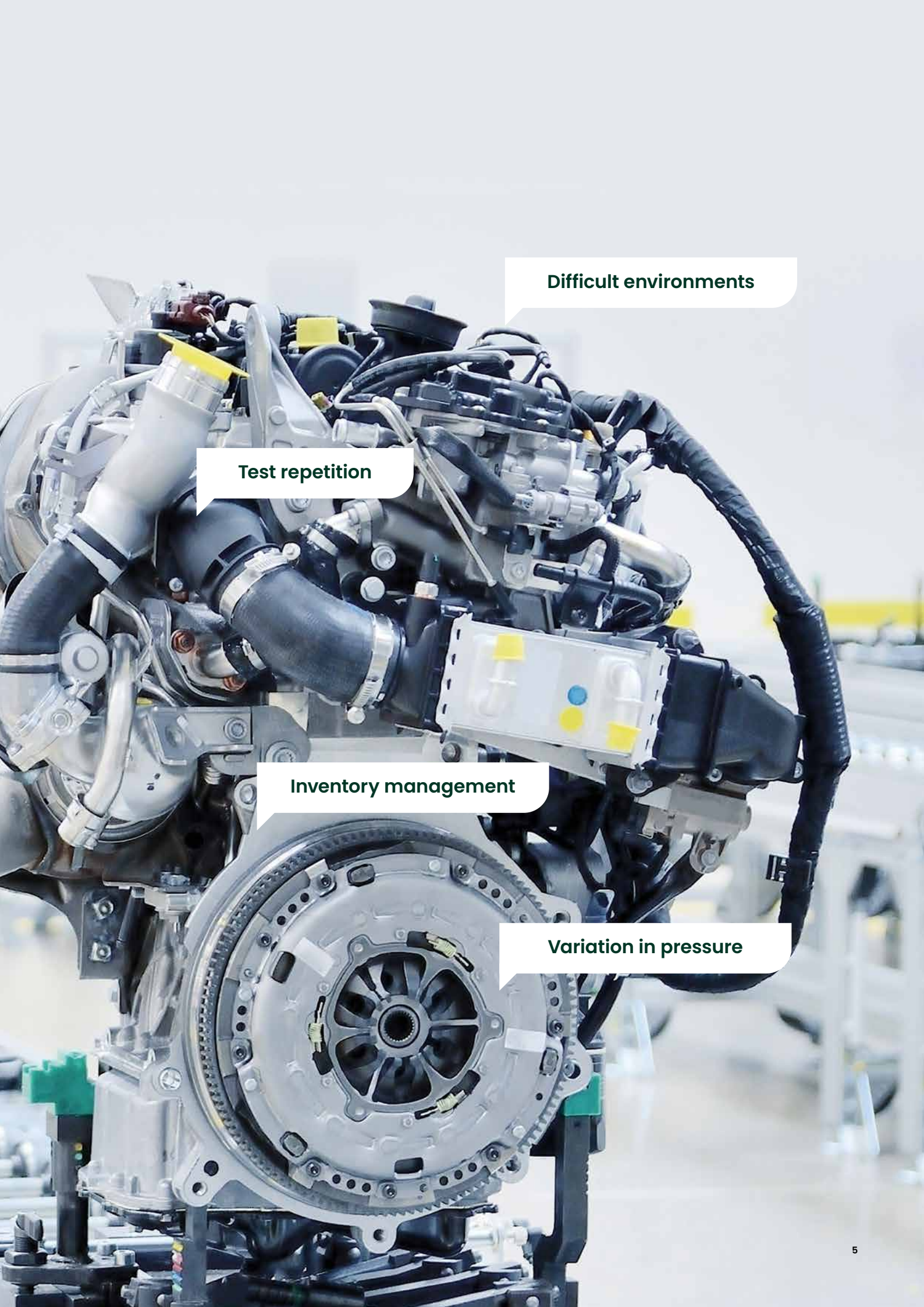
On-vehicle testing means dealing with limited space, rapid changes in temperature and high vibration environments. Managing your instrumentation effectively in such conditions requires speed, precision and accuracy.

Engine test cells

Engine test cells are challenging environments, producing dust, dirt and corrosive chemicals. When faced with an unpredictable operating environment, robust construction is essential to reliable data collection.

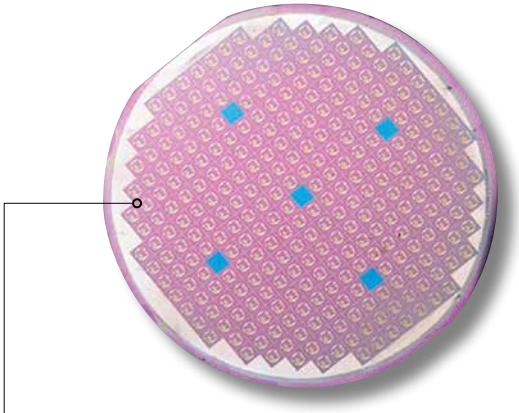
Challenges in test applications

Performance against all odds


Difficult environments
Test repetition
Inventory management
Variation in pressure

Performance against all odds

All of our components are designed and built for stability, no matter what the conditions.



Silicon sensing element
High stability silicon sensing elements in robust packaging ensure accurate and reliable performance over long periods

Difficult environments

Our products are designed to be robust in challenging environments. Features to cope with high shock and vibration environments include:

- Fully welded construction in stiff titanium or tough stainless steel
- Weldings of the electrical cable to the sensor body ensures a high IP rating is maintained, guaranteeing the integrity of the sensors
- Operating temperatures to 175°C
- Industrial EMC protection
- High quality cables made of tough polyurethane or stiff chemically robust high temperature Raychem

Accuracy

At Druck, we understand accurate data is required across all testing conditions. As a result, our range of pressure sensors and transmitters give reliable performance, unbeaten in the field, with excellent stability and high-accuracy measurements better than 0.01% FS.

Cost of ownership

Test applications are often expensive. Consequently you need instrumentation which is efficient, reliable and cost effective. Our sensors use proven Druck technology to offer fast response times to changing pressures (approximately 1 ms), designed to help you reduce downtime and optimize processes. This combination of a high technology sensor, together with advanced signal conditioning and packaging techniques, provides an ideal long term solution for reliable, accurate and economical measurements.

Process optimization

CANBus communications with less wiring requirements reduces the time it takes to set-up for testing and increases the speed data is transferred to your computer systems, reducing downtime and streamlining processes.

Variation in pressure

Testing can be on all types of pressure applications. You need equipment that is made to withstand variations in pressure. Analogue circuitry provides faster response times (<1 ms), allowing rapid changes in pressure to be recorded quickly and accurately. Our products offer:

- High pressure measurements up to 700 bar
- Low pressure measurements with full scales of 70 mbar
- Gauge, absolute and differential references

A wide selection of pressure connectors allows for simple, secure and safe connections to the pressure media in a style that suits your environment.

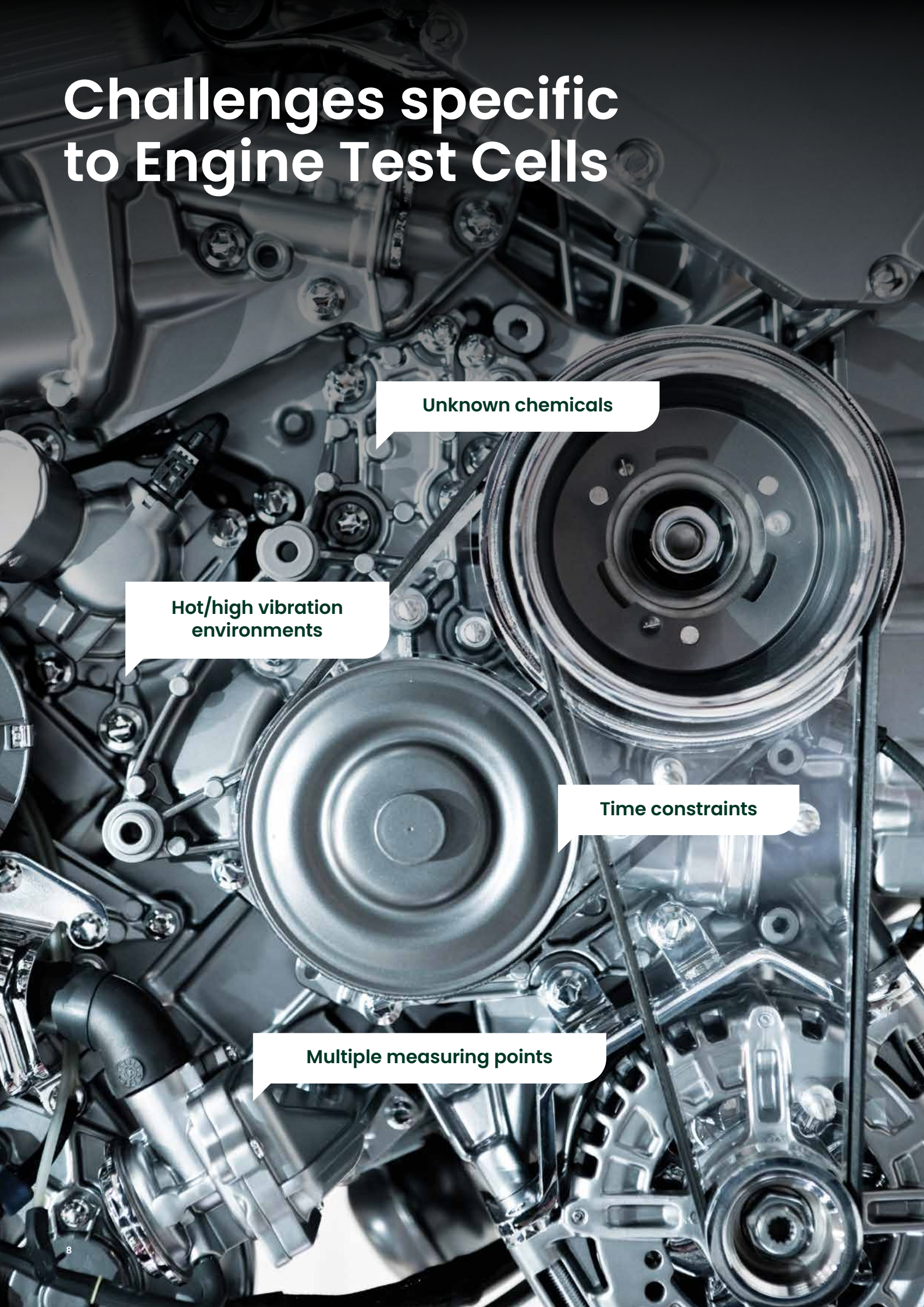
Test repetition

In this application, tests are often performed repeatedly, rhythmically and quickly. Our sensors offer a long operating life, designed to withstand frequent use. Our silicon sensors can withstand millions of pressure cycles without any degradation of performance. You can have confidence in your instrumentation, which will serve you for many years and reduce your cost of ownership.

Inventory management

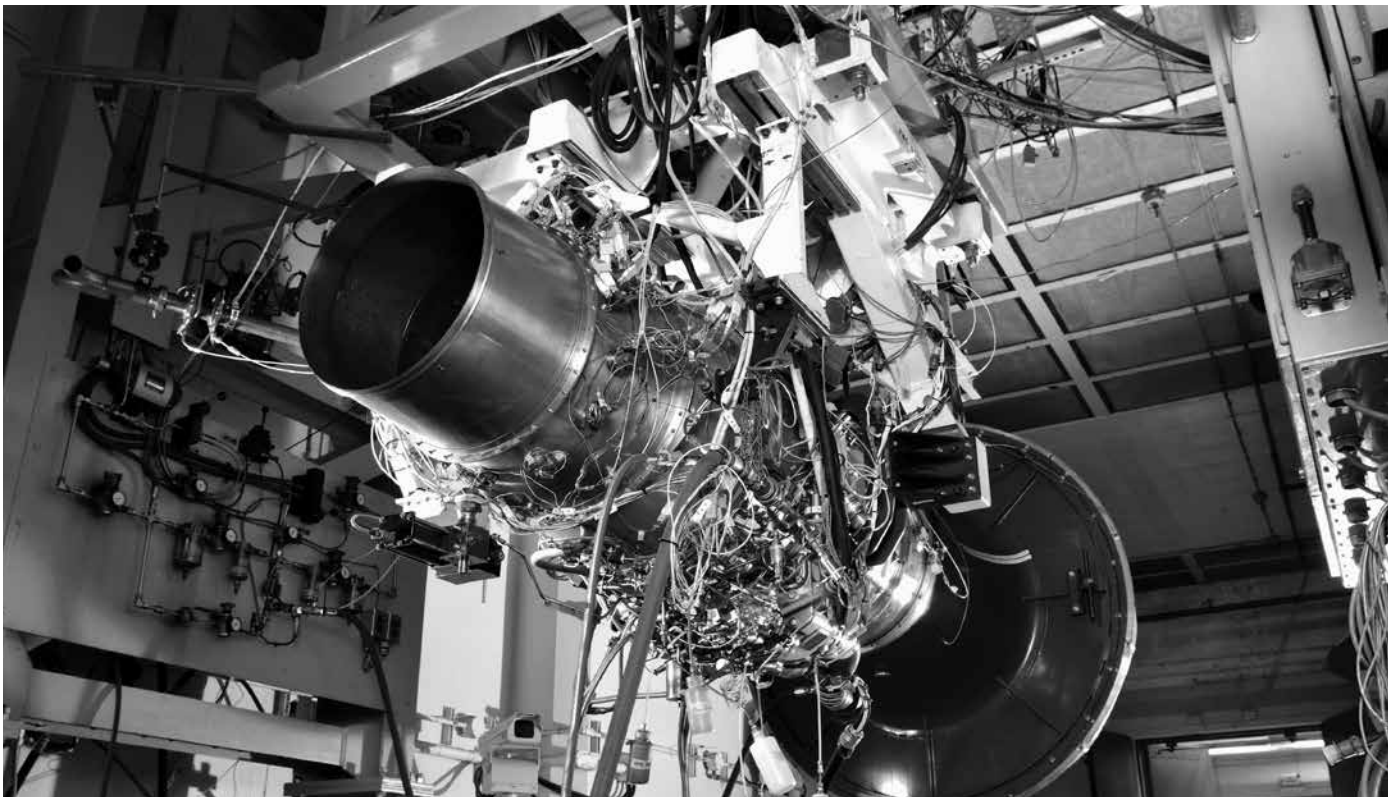
When working with large amounts of equipment, managing and tracking your inventory can prove a challenging task. The integration of our Calibration and Asset Management Software 4Sight2 into your operations can help manage complex schedules, provide consistent documentation and deliver valuable insights into the use and wear of your equipment. With software solutions, like 4Sight2, you can access real time insights into the status of your inventory and calibration history, making operations more efficient and audits easier.

Challenges specific to Engine Test Cells



Pin point precision

Each one of our components is designed and built for reliability at every stage of the cycle.



Hot/high vibration environments

Small size, fully welded construction, high grade electronics with digital signal processing and high quality electrical connections mean our products give reliable operation in hot high vibration environments, giving you reliability, accuracy and stability when you need it most.

Multiple measuring points

By integrating proven Druck technology, we offer CANBus protocol with up to 127 sensors on a single Bus. Such features reduce installation time as well as infrastructure costs, reducing your cost of ownership and streamlining processes.

High Performance

Digital compensation gets great accuracy even when the temperature is changing. And being able to mount the sensor close to the measuring point means you see those fast changes.

Unknown chemicals

Titanium or stainless steel metal work with appropriate cable can be chosen to reduce the risk of chemical corrosion damaging sensors. This translates to a pressure module that provides:

- Great media compatibility with corrosive chemicals
- Gauge, negative gauge, absolute and differential references that allow you to measure in the way that suits you.

Time constraints

To ensure the excellent speed, efficiency, and reliability of your automated pressure control infrastructure, high speed modular pressure control systems are critical to your operations, particularly when time is a factor. Because of this, we designed our PACE product range with process optimization in mind. Features, such as an interchangeable control module translate to virtually zero downtime, helping you to save time and increase productivity.

Challenges specific to On Engine Test

Reliability when you need it most

All of our components are designed and built to perform in the most hostile of environments.

Limited space

With a sensor diameter as small as 12.5 mm, units can be deployed in narrow or confined spaces. Use of the highest quality alloys allows small body construction without compromising performance or stability. Package sizes that are small (25 mm, 17.5 mm, 12.5 mm) and light enough to be located on machines for testing eradicate the need for additional expense and delayed readings associated with piping out pressure. In addition, our high quality screened cable and amplified or digital signals are mechanically robust and immune from electro-magnetic interference.

Extreme temperatures

Digital compensation allows for overall accuracy of 0.1% that can be maintained over wide temperature ranges. The use of high quality electronic components give you a range of options to accurately measure temperature ranges from -40°C to +175°C, while on-chip thermal compensation ensures accurate data in the face of extreme conditions and rapid changes in temperature to 0.01% full scale.

High vibration environments

Fully welded construction in high quality materials, potted electronics and high quality cable sheathing ensure both the highest IP rating and reduce the risk of damage, giving high shock and vibration protection, in addition to Industrial EMC protection to electrical noise, providing many years of service in environments with high levels of:

- Vibration
- Shock
- Humidity
- Electrical noise
- Temperature variation

Our products

UNIK5000 Series

- Ranges from 70 mbar (1 psi) to 700 bar (10000 psi)
- Accuracy to ±0.04% Full Scale (FS) Best Straight Line (BSL)
- Operating temperature ranges from -55°C to 125°C (-67°F to 257°F)
- Stainless steel construction
- Frequency response to 3.5 kHz
- High over pressure capability
- Hazardous Area certifications
- mV, mA, voltage and configurable voltage outputs
- Multiple electrical & pressure connector options

DPS8000 (TERPS)

- Ranges from 1 bar (15 psi) up to 70 bar (1000 psi)
- High Precision, ±0.01% FS over compensated temperature range
- Temperature range from -55°C to +125°C (-67 to 257°F)
- High Stability, ±50 ppm FS/year (typical)
- Multiple Output configurations, RS232, RS485, USB 2.0, CANBus, Frequency & Diode (TTL)
- Wide selection of pressure and electrical connections to suit specific requirements

DPS5000 CANBus

- Ranges from 350 mbar to 700 bar
- Total accuracy to ±0.1% FS (over temperature)
- Stainless steel construction
- 5V to 32V Supply Voltage
- CANopen V2.0b
- Excellent long-term stability
- PDO's retained through a power cycle
- 1 ms update rate
- Range of filters available

DPS5000

- Ranges from 70 mbar to 100 bar
- Total accuracy to ±0.1 % FS
- Stainless steel construction
- 3V supply voltage
- Low power
- I2C digital output
- Sleep mode
- Hazardous area certifications
- Excellent long-term stability

4300/4400 Series

- Ranges from 1.6 bar to 600 bar
- Accuracy to 0.1%
- 17.5 or 12.5 mm stainless steel package
- Operating temperature to 175°C
- Frequency response to 3.5 kHz
- mV or voltage outputs

ADROIT6000

- Total accuracy to 0.1% FS
- Ranges from 70 mbar to 700 bar
- Gauge Absolute and Differential versions
- 19mm 316L stainless steel construction
- Operating temperatures -40°C to 125°C
- 1 ms update rates
- Voltage or mA outputs

Test applications

Features	UNIK5000	TERPS	CANBus	DPS5000	4300	4400	ADROIT
Accuracy		★	✔	✔			✔
Low cost of ownership	✔	✔	★	✔	✔	✔	✔
Process optimization		✔	★	✔			
Difficult environments	✔	✔	✔	✔	★	★	✔
Test repetition	✔	✔	✔	✔	✔	✔	✔
Variation in pressure	★		★	★			★

Engine test Cells

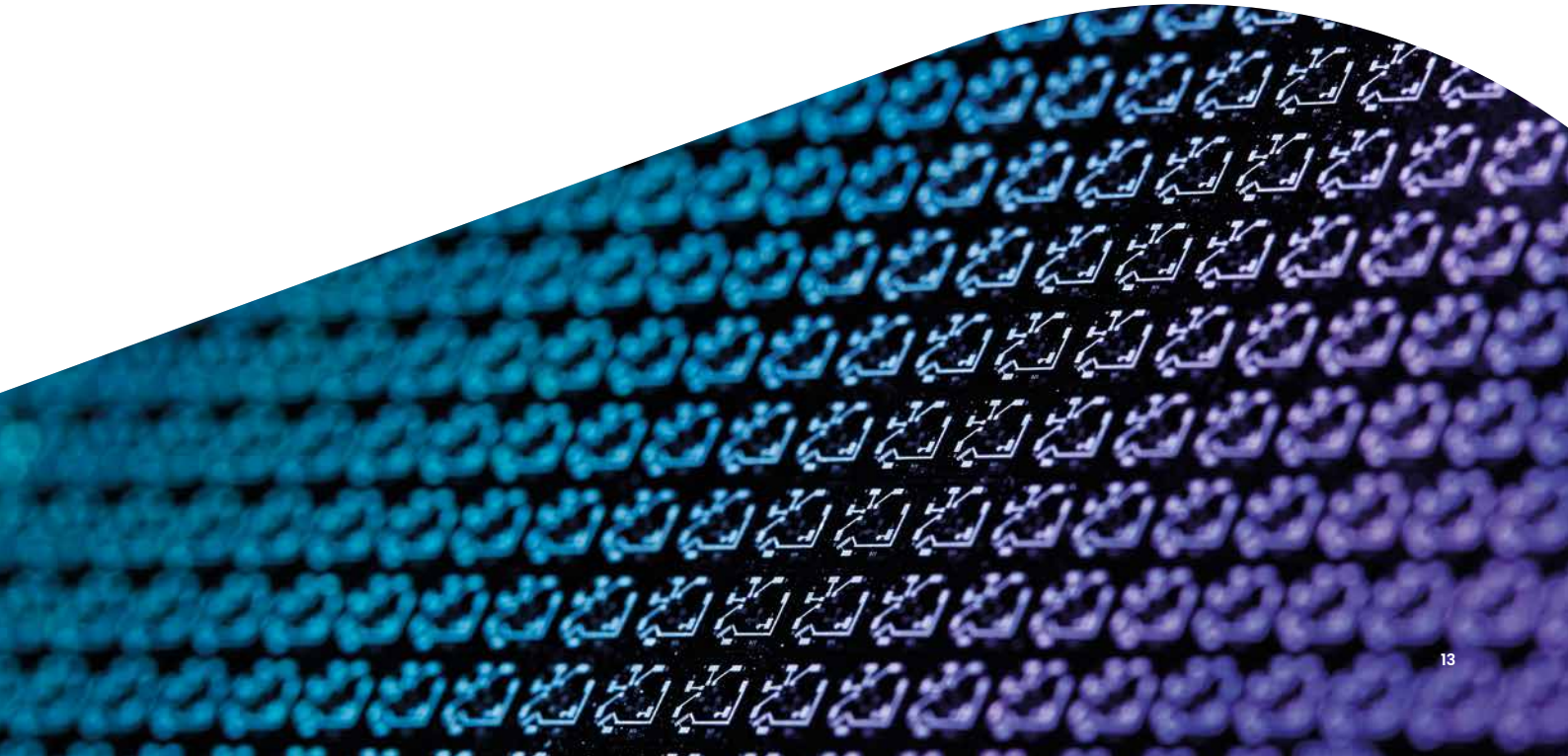
Features	UNIK5000	TERPS	CANBus	DPS5000	4300	4400	ADROIT
Unknown chemicals	✔	✔	✔	✔	✔	✔	✔
Hot/high vibration environments	✔	✔	✔	✔	★	★	★
Minimize installation time		✔	★	✔			✔
Multiple measuring points		★	★	✔			

On engine test

Features	UNIK5000	TERPS	CANBus	DPS5000	4300	4400	ADROIT
Limited space			✔	✔	★	★	★
Extreme temperatures	✔	✔	✔	✔	★	★	★
High vibration environments	✔	✔	✔	✔	✔	✔	★

✔ Options are available to address this challenge

★ This product has a feature specifically designed to address this challenge



PACE

Fast and flexible pressure control solutions.

Druck's PACE product line is a modular pressure control system that brings together the latest pressure control and measurement technologies to offer an elegant, fast, flexible, and economical solution to pressure calibration, verification, and control.

Within an automotive testing environment speed, efficiency and reliability is key. Providing all of that is the PACE pressure controller from Druck. Our pressure controllers interchangeable control module translates to virtually zero downtime, as a replacement control module can be quickly fitted to allow pressure range change, calibration or service. Through the implementation of PACE into an automotive company's production line, our customer has been able to reduce calibration time from 90 seconds, to 17 seconds. This equates to over 121,000 hours being saved over the course of a year, resulting in huge efficiency and productivity gains.

PACE employs full digital control to provide high control stability and high slew rate, while its digitally characterized pressure sensor offers the quality, stability, higher bandwidth and precision associated with this latest generation of piezo-resistive devices suited for your automotive testing environment.

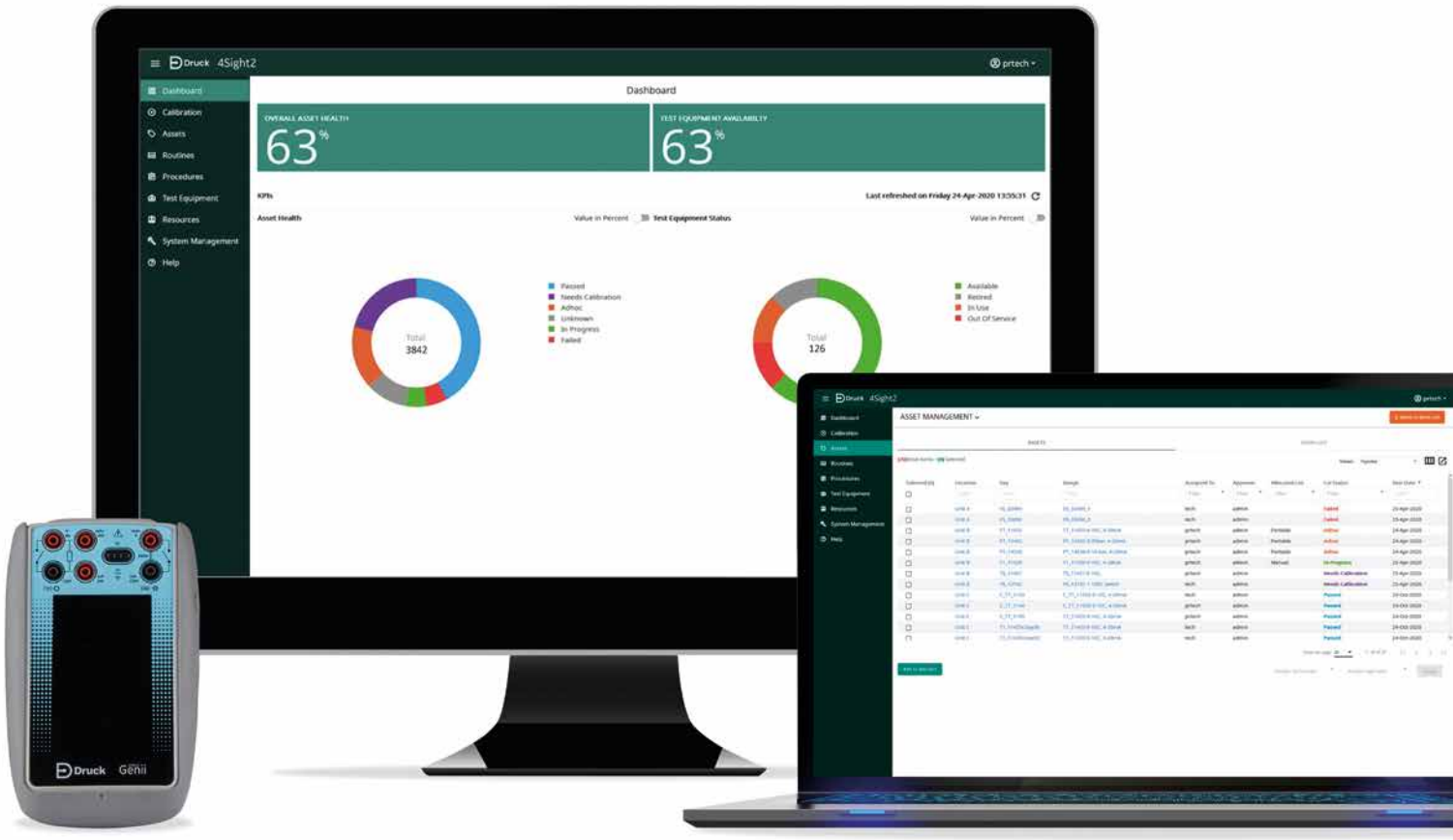
Druck's pressure control system combines the fastest pressure controllers with the most accurate control module - CM3. Due to the implementation of Druck established TERPS® (Trench Etched Resonant Pressure Sensor) technology at its core, our PACE CM3 delivers unprecedented metrological characteristics and resultant levels of performance.

4Sight2

Your next generation solution for Calibration and Asset Management.

4Sight2 is the new calibration and asset management software from Druck.

Typically implemented to improve safety and increase operational efficiencies. 4Sight2 is designed to empower your organization to operate simply and securely, connecting your people to their instruments, data and enhanced analytics. It is equally effective for single use or global multi-site operations. Purpose-built with customer usage at its heart, 4Sight2 is designed to deliver actionable intelligence and transformative insights. It can improve process optimization and keep your assets running efficiently and reliably.



Applications

Our sensor technology has been developed to support some of the most rigorous,challenging and precise applications.

Accuracy

For over 20 years, Druck sensors have been trusted by the World's global airline manufacturers to measure pressure in critical on-aircraft applications such as landing gear and hydraulics measurement, engine control and fuel-management. These sensors operate in demanding environments, which see extreme temperature, humidity and pressure changes and enable the aircraft to perform efficiently and safely.

Reliability

Whether deep on the seabed in the Gulf of Mexico measuring hydrocarbon pressures and temperatures flowing through the subsea trees and manifolds or mounted on surface production equipment on an offshore-platform in the middle of the North Sea, it is in these restrictive operating conditions and harsh environments that our sensors continue to provide reliable and trusted measurement year after year.

Quality

Leading motorsport teams, including those in Formula 1, Moto GP and Indycar, have used Druck's pressure sensors for many years due to the performance and reliability which our sensors provide, which is of paramount importance in the motorsport arena. We are able to provide sensors which meet the demands of the size, weight and material constraints required by the teams for a variety of applications and fluids including fuels, oils, coolant and hydraulic system pressures, in demanding environments with high temperatures and vibration levels.

[Operating in harsh conditions and environments, Druck sensors continue to provide reliable and trusted measurement year after year]

This same technology and expertise goes into the products we make for hundreds of other applications such as...

- Hydrology
- Meteorology
- Oil and gas
- Aerospace
- Ground flight test
- Industrial process
- Transportation
- Depth and level
- Marine
- Power generation
- Silicon processing

Global manufacturing excellence

Our pressure solutions are manufactured in the UK, Norway and China to enable us to get closer to our customers. Each facility is ISO9001 accredited and AS9100 for our aerospace business and operates under Druck's strict quality-control procedures. We continue to invest in advanced manufacturing techniques and processes that keep us at the forefront of product quality and efficiency.

Measurement & sensing

What started as a small business in Leicester, UK in 1972 has now grown into a global pressure-measurement business that is recognised as a world leader in manufacturing high-quality and high-accuracy piezo-resistive pressure sensors. We serve a wide range of applications from Aerospace, Subsea, Test and Calibration and Industrial Applications with customers in over 70 countries. This is due to the fact we process the raw silicon right through to the final product. Over the past 40+ years we have developed world-class expertise in producing high-performance, high-stability, fast-responding and high-quality pressure sensors.

Brilliant factory

We are proud that our Leicester facility has been named as a Baker Hughes Brilliant Factory, linking data-sources across the factory to enable us to continually improve and control our manufacturing processes.

State-of-the-art silicon clean room

The heart of all of our pressure sensing solutions is the sensing element, which is manufactured from silicon wafers in our state-of-the-art clean room facility in Leicester, UK. It was completely refurbished in 2015 and is now able to process over 260 versions of silicon 24/7. Advanced robotics have more than tripled the efficiency of the silicon processing, leading to better quality and higher yields. Our Global Research facility in Niskayuna, NY, USA operates as a second source of silicon, both ensuring that we have capacity to fully meet the demands of our customers and provide a strong reliable supply chain.

Innovation

Druck are leading innovators in pressure sensing and calibration. We are constantly pushing new frontiers and setting new benchmarks in performance. Through our expertise in silicon processing we have developed our Trench Etched Resonant Pressure Sensor (TERPS) technology which delivers unprecedented accuracy and stability. Our customer-focused approach to product development, ensures that we drive to make your life easier and more productive.

We are a global technology company that designs, develops and manufactures the highest quality, most accurate and reliable customized pressure sensing devices and instruments, software and services. We leverage innovation, continuous improvement and unprecedented quality, to enable our Customers to successfully operate, produce systems, monitor and/or control mission-critical assets in tough environments across the world's most challenging applications.

We delight customers with tailored solutions that address their challenges; embodying our deep domain knowledge of customers' applications, the most innovative and high performance connected pressure sensing devices, instruments, software and services; produced with the highest standards of safety, quality and delivery.

We are Druck. We provide peace of mind in the toughest environments.

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Contact us

For more information please contact your local Druck representative, or visit:

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