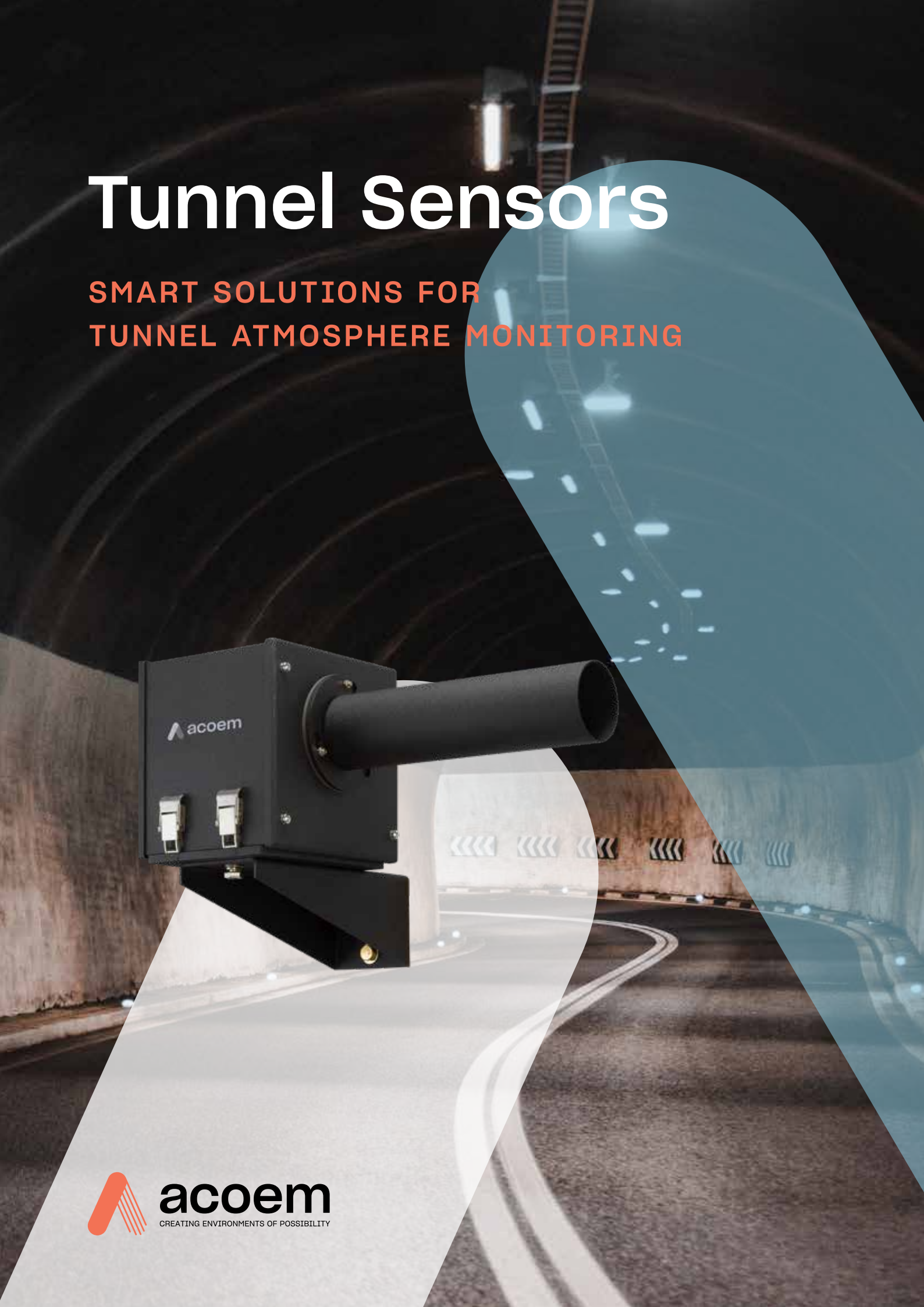
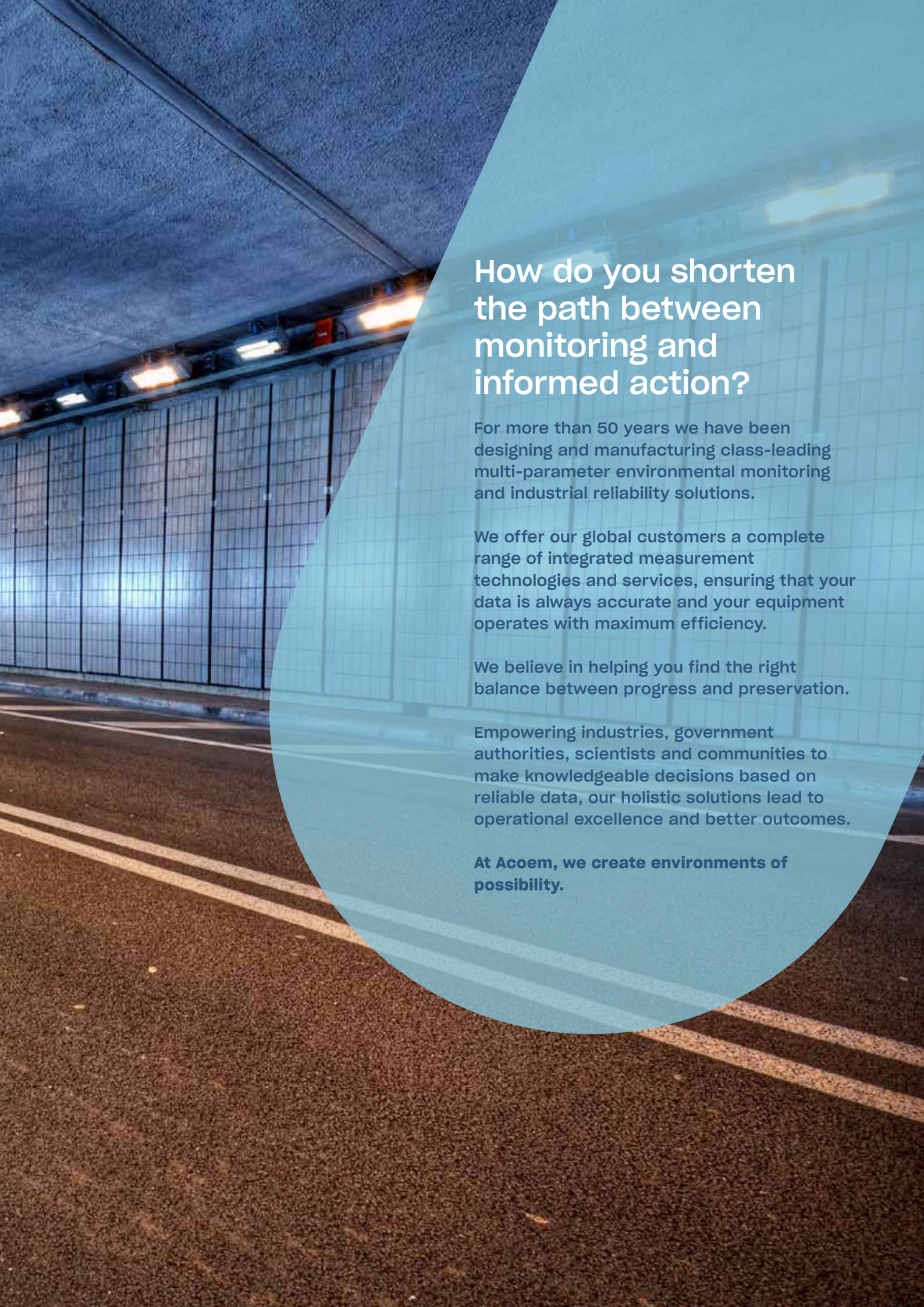
Tunnel Sensors

SMART SOLUTIONS FOR TUNNEL ATMOSPHERE MONITORING



acoem
CREATING ENVIRONMENTS OF POSSIBILITY



How do you shorten the path between monitoring and informed action?

For more than 50 years we have been designing and manufacturing class-leading multi-parameter environmental monitoring and industrial reliability solutions.

We offer our global customers a complete range of integrated measurement technologies and services, ensuring that your data is always accurate and your equipment operates with maximum efficiency.

We believe in helping you find the right balance between progress and preservation.

Empowering industries, government authorities, scientists and communities to make knowledgeable decisions based on reliable data, our holistic solutions lead to operational excellence and better outcomes.

At Acoem, we create environments of possibility.

Who We Are

Our business was established in 1985 in Northamptonshire, UK as an independent electronics design house. With the growth of environmental engineering and the demand for innovative monitoring solutions, the company, known as Dynoptic Systems evolved in the mid-1980s to become a leading designer and manufacturer of cost-effective continuous emission monitoring equipment.

In 2005 we expanded our operations further and launched the Tunnel Sensors arm of the business, building on our extensive environmental foundation to specialise in underground monitoring technology and meet the changing infrastructure needs of road tunnel operators around the world.

In 2019, we solidified our market position and became part of the ACOEM Group, an international company dedicated to reducing environmental impact and empowering communities through smart monitoring, design and defence activities.

Worldwide coverage

Tunnel Sensors has installed its customised monitoring systems – including VICONOX, AIRFLOW, CROSSFLOW, ILLIOS, and LUMIOS sensors – in hundreds of new build and existing road tunnels around the world.

- Argentina
- Australia
- Belgium
- China
- Canada
- Colombia
- Egypt
- Equador
- France
- Iceland
- Ireland
- India
- Israel
- Italy
- Malaysia
- Norway
- Qatar
- Saudi Arabia
- Serbia
- Spain
- South Korea
- Taiwan
- Turkey
- UAE
- UK
- USA
- Vietnam

As a service engineer who has spent years installing and maintaining tunnel monitoring products, I must say that Tunnel Sensors instruments are bullet proof."

Tunnel ventilation contractor (Australia)

Acoem Tunnel Sensors

Smart solutions for tunnel atmosphere monitoring

As global populations grow and existing road infrastructure becomes more congested, urban planners are increasingly turning to underground road tunnel networks to support smart city and regional expansion.

Accurate and efficient monitoring of atmospheric conditions in tunnels is critical to ensuring the safety, health and wellbeing of those who use them. It is mandatory for regulatory compliance and integral to maintaining the longevity of the asset for road owners / operators.

New Build Tunnels

We work collaboratively with ventilation contractors to ensure we commission the best possible equipment to meet each project's specifications, whether that is a fully integrated measurement system, a network of instruments or a single sensor or component. We offer flexible solutions that allow for the nuances of each project.

Applications

Tunnel refurbishment

As tunnel infrastructure ages, structural components and auxiliary systems need to be upgraded.

Every 10 years, tunnels generally undergo major refurbishments, including replacing electronics, lighting, controls, fire alarms and measurements systems.

Our team of specialists works closely with tunnel operators and their contractors to ensure that all replacement sensors and integrated systems are tailored to meet individual requirements and offer the most advanced technology available – providing accuracy and ongoing efficiency.

Our Tailored Product Range – Designed To Meet Your Needs

We design, manufacture, commission and maintain a wide range of tunnel atmosphere monitoring sensors for measuring visibility; toxic gas emissions; air speed and direction; as well as tunnel luminance and illuminance.

Our instruments communicate with tunnel ventilation systems, automatically instructing them when to turn on critical jet fans due to changes in internal atmospheric conditions.

Integrated Monitoring Systems

VICONOX

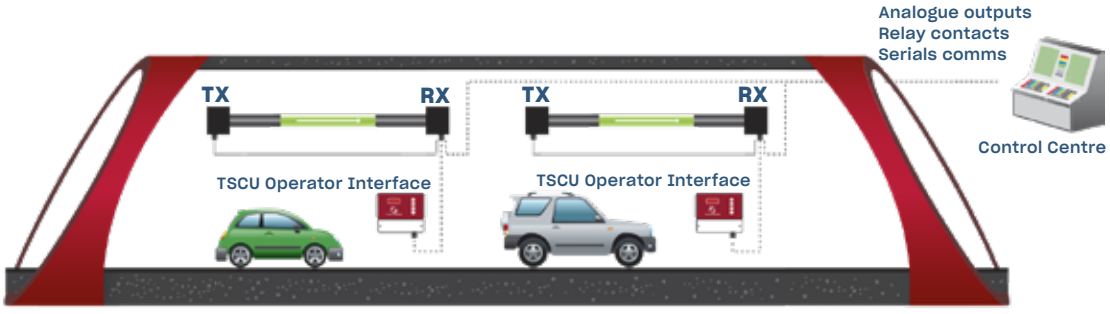
Combined CO, NO, NO_2 and visibility tunnel monitor

A self contained solution for measuring toxic gases, visibility and temperature within harsh road/rail tunnels and confined environments.

Measurement data can be used as part of a ventilation control air quality management system and/or secondary smoke detection.

Benefits of VICONOX

- Measures up to 6 parameters, minimising capital cost, cabling, installation & commissioning
- Pre-aligned quick release TX & RX heads for easy installation & maintenance
- Temperature & humidity compensated measurements for stable readings across all conditions
- Rugged, anti-corrosive design & 316 stainless steel construction for long service life
- High quality, IP67-rated external enclosure with quick release dust protection tubes
- Intelligent heads with RS485 (Modbus RTU), digital relays & analogue outputs as standard
- Connects to PLC / SCADA system.



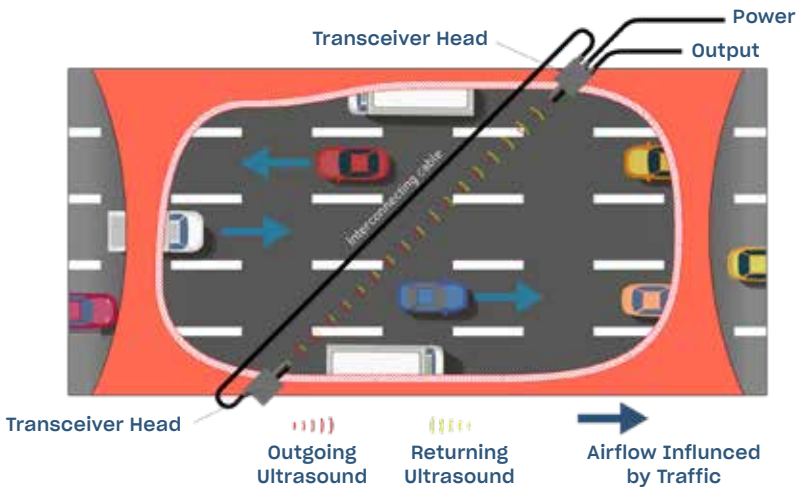
CROSSFLOW

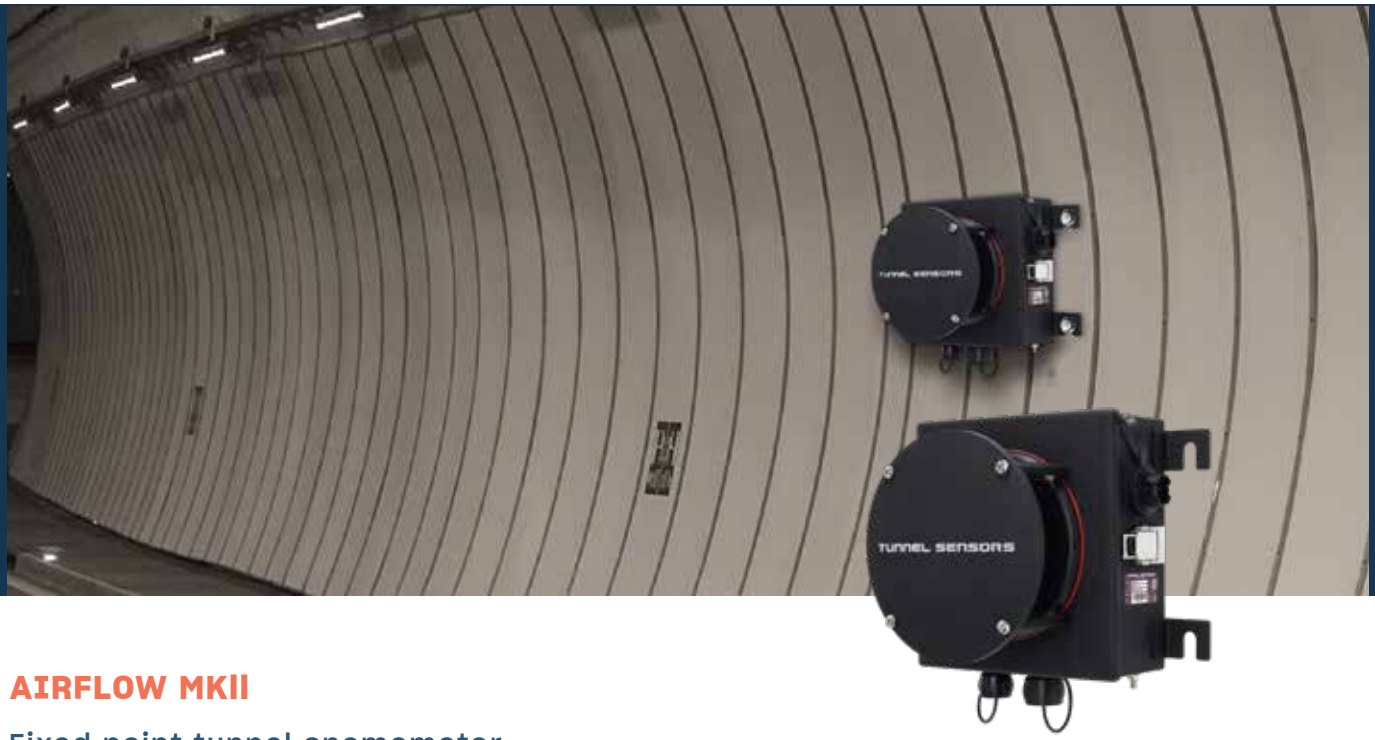
Multi-lane, bidirectional tunnel anemometer

A smart, open-path, cross bore solution for measuring tunnel air velocity and direction. The system consists of a pair of self-contained transceivers mounted on either side of the tunnel that relay intelligent and reliable ultrasonic transit time measurements.

Benefits of CROSSFLOW

- Wall-mounted alignment bracketry
- Quick lock cable plugs for easy installation & commission
- No moving parts
- Simple maintenance – only requires annual check & clean
- SCADA / PLC interface options:
  - Current outputs
  - Digital relays
  - RS485 (Modbus RTU)





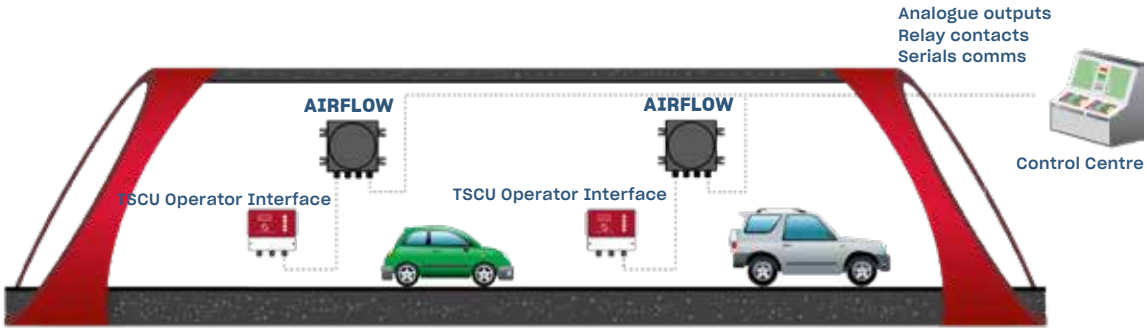
AIRFLOW MKII

Fixed point tunnel anemometer

A robust, self-contained airflow monitor designed to measure air velocity (and temperature when specified) in confined underground spaces. Using short-path ultrasound measurement technology with time of flight differential, it provides consistent and accurate measurements. Data forms part of a ventilation control air quality management system. Suitable for tunnel, rail and cable tunnels, as well as mining applications.

Benefits of AIRFLOW MKII

- No alignment or interconnection required
- Plug and socket connectors to simplify installation
- Accurate readings unaffected by temperature, pressure or humidity
- No regular service required – fit & forget
- IP67 rated & designed specifically for use in harsh tunnel environments
- SCADA / PLC interface options:
  - Current outputs
  - Digital relays
  - RS485 (Modbus RTU)



Single Parameter Gas Sensors

ECOM

CARBON MONOXIDE (CO) MONITOR

ENOX

NITROGEN DIOXIDE (NO_2) MONITOR

ENOM

NITRIC OXIDE (NO) MONITOR

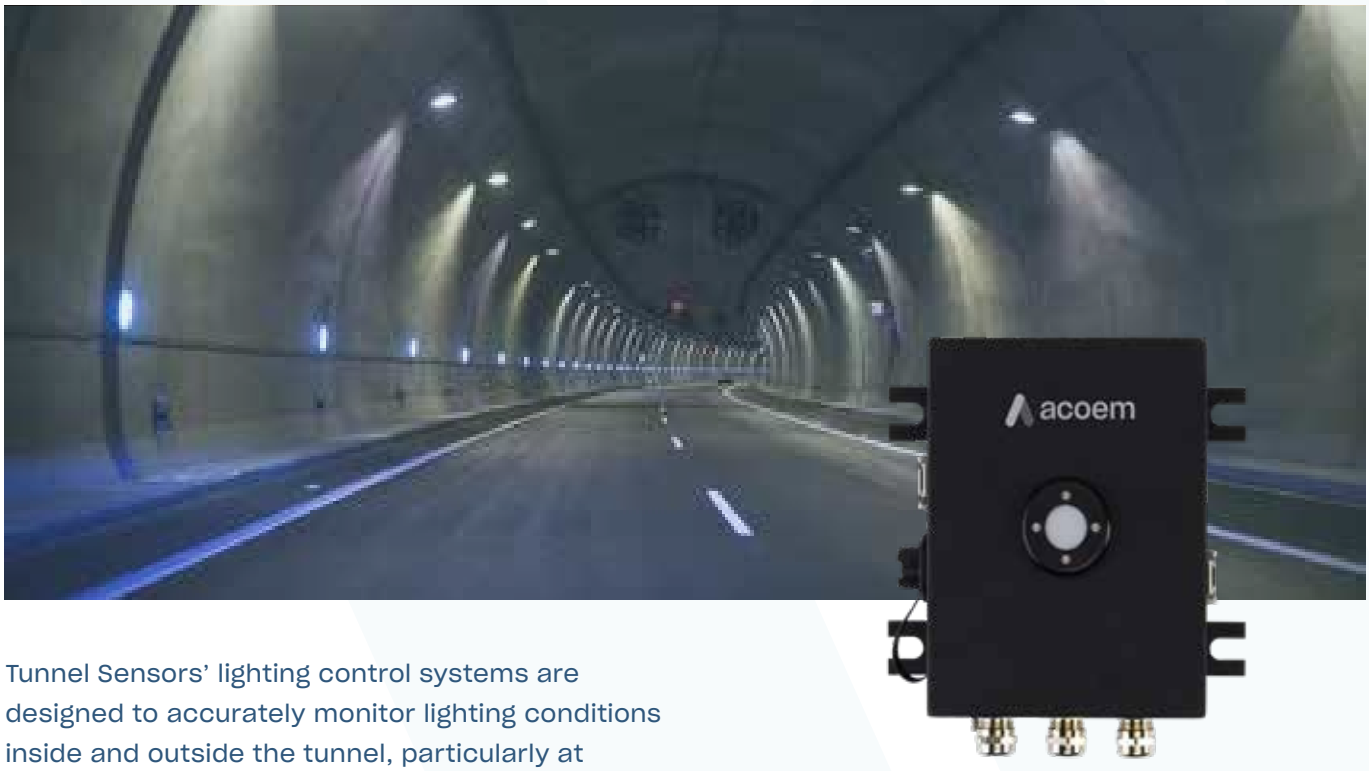
Our smart fixed sensors use electrochemical cells to accurately measure the concentration of carbon monoxide (CO), Nitric Oxide (NO) or Nitrogen Dioxide (NO_2) in ambient environments, including road and rail tunnels, and industrial applications.

A sender unit and 'plug-in' sensor module are mounted together on the tunnel wall. The pre-calibrated sensor module stores type identification, sensing range and specific calibration data which is automatically recognised by the sender unit when plugged in. Measurements can be used as part of a ventilation control air quality management system.

Benefits of ECOM, ENOM & ENOX

- Cost effective, single sensor solutions
- Rugged & reliable, with IP65 ingress protection
- Easy to install, commission & operate
- Plug-in sensor modules for fast & simple replacement
- Compatible with BS EN 50545-1:2011.

Light Monitoring



Tunnel Sensors' lighting control systems are designed to accurately monitor lighting conditions inside and outside the tunnel, particularly at the entrance and exit portals, so lighting can be adjusted appropriately.

Monitoring the luminance (the intensity of light reflected from the area around the portal) at the tunnel entrance determines the light level perceived by the approaching driver. Measuring the illuminance (the intensity of light emitted by the tunnel lighting) within the tunnel regulates the driver's light level experience.

ILLIOS

Illuminance analyser

A self-contained intelligent analyser that measures the level of illuminance within the tunnel bore to help ensure interior illumination levels are continuously maintained and lighting conditions are safe for drivers.
ILLIOS features a silicon photo diode, with filtered V to provide a spectral response close to that of the average human eye.

Benefits of ILLIOS

- Stainless steel, IP65 / NEMA 4X rated external enclosure
- Anti-corrosive design for harsh tunnel environments
- Measures over a standard range of 0-20,000 Lux, scaled to meet the user's environment
- Direct connection to host controller
- Onboard SCADA / PLC interface options:
  - Current outputs
  - Digital relays
  - RS485 (Modbus RTU)

LUMIOS MKIII

Luminance analyser

A self-contained intelligent analyser that measures the level of brightness or luminance created by natural light around tunnel portals. When integrated with a managed tunnel lighting system, its measurements ensure that drivers' visual perception is maintained day and night, avoiding sudden variations and potential "black hole effects" when entering and exiting a tunnel.

Benefits of LUMIOS MKIII

- CIE approved measurement of L20
- Viewing angle can be specified 10°- 40°
- Rugged 316 stainless steel design to withstand extreme weather conditions
- Simple installation & mounting
- Optional wash-wipe facility to minimise maintenance requirements
- Direct connection to host controller
- Onboard SCADA / PLC interface options:
  - Current outputs
  - Digital relays
  - RS485 (Modbus RTU)

"Tunnel Sensors' technical support has been invaluable. When we had questions about connectivity, they guided us through the process and gave us all the information we needed. Our Tunnel Sensors monitors and TSCU-R work perfectly."

Customer (Qatar)

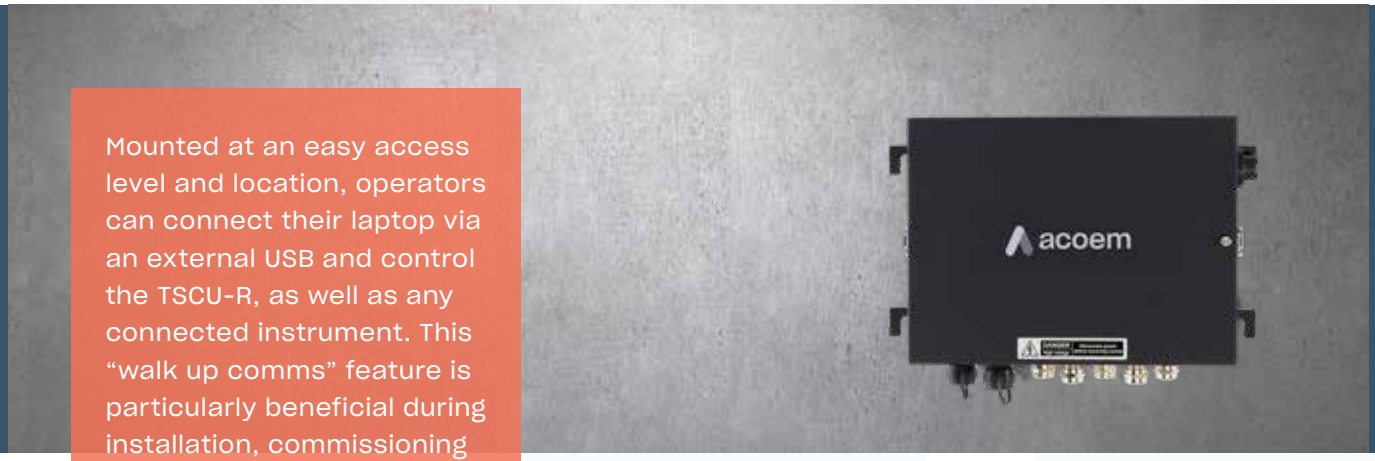
Centralised control, communication and power options

Flexible system configurations to suit individual applications

TSCU-R

It is often difficult and potentially dangerous to access individual monitoring units, especially when tunnels are in continuous use, and closures are costly and impractical.

To combat these issues, we designed the Tunnel Sensors Control Unit-Rugged (TSCU-R) allowing multiple instruments to interface with the tunnel through a common control unit. The TSCU-R connects and communicates with up to eight compatible instruments, transmitting gathered data to the tunnel SCADA or ventilation system.



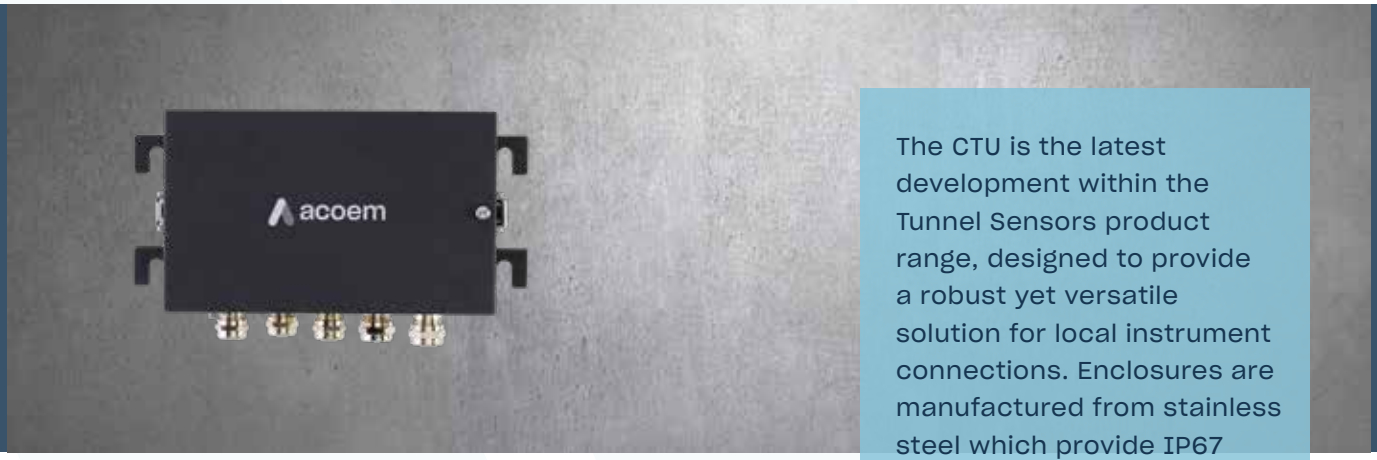
Mounted at an easy access level and location, operators can connect their laptop via an external USB and control the TSCU-R, as well as any connected instrument. This “walk up comms” feature is particularly beneficial during installation, commissioning and servicing.

Benefits of TSCU-R

- Compatible with the range of Tunnel Sensors monitors
- Multi-heading capability can control up to 8 separate instruments (via RS485)
- Wall-mounted unit suitable for local or remote connection
- Ground level access for operators to monitor & control instruments high on the tunnel wall
- Clear instrument readings, fault warning or alarm conditions
- IP65 rated external enclosure
- Choice of interface options with configurable relays and outputs.

CTU

This wall-mounted Combined Terminal Unit (CTU) has a modular design philosophy that meets diverse tunnel power and communication requirements. It can be installed alongside compatible Tunnel Sensors instruments and we offer separate enclosure and terminal packs, so you can specify and purchase the precise configuration for your application.



The CTU is the latest development within the Tunnel Sensors product range, designed to provide a robust yet versatile solution for local instrument connections. Enclosures are manufactured from stainless steel which provide IP67 rated ingress protection.

Benefits of CTU

- Fully customisable with wide range of terminal packs including OVP modules
- Din rail ready to accept terminals
- Optional power supply can provide 24Vdc for up to 2 compatible monitors
- Stainless steel with IP67 rated ingress protection
- Quick release catches and security lock screw to prevent unauthorised access
- A rugged junction box / power supply that can be installed locally at each measurement point.

Accessories

We offer an extensive range of accessories that complements our monitoring systems, sensors and equipment.
Additional items include:

- Calibration accessories
- Optical filters
- Reference gas cells
- Cables
- Installation accessories
- Mounting brackets
- Advanced control units
- In-tunnel communication
- Utility software
- PSU and termination units

Advantages of Tunnel Sensors

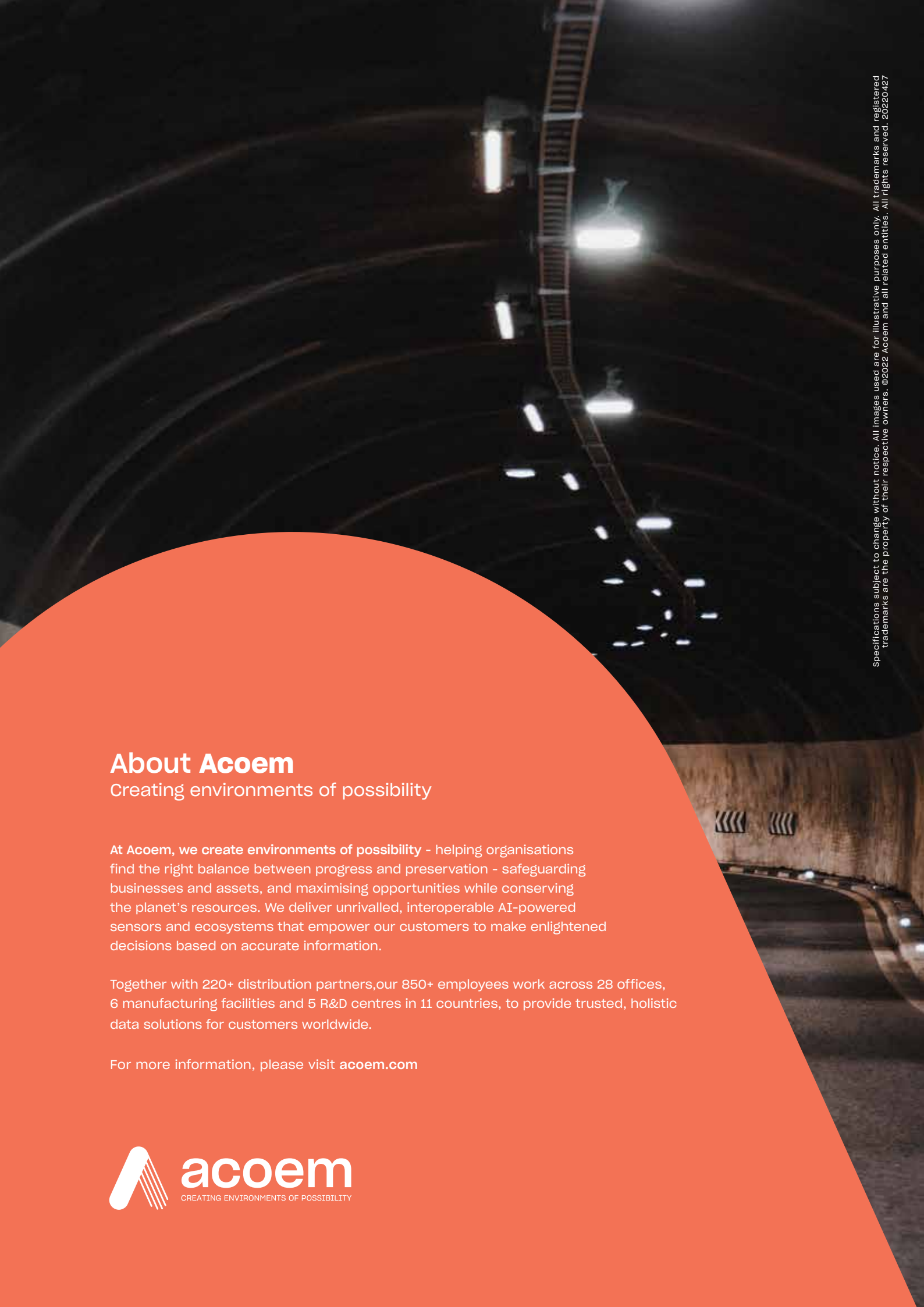
- Worldwide expertise with 100s of underground monitoring projects successfully commissioned
- Fully customisable systems & solutions
- All systems are designed & manufactured in the UK
- Compliance with international standards for atmospheric measurement
- Customised service and technical support
- Long term maintenance and cost effective refurbishment options
- 35+ years' experience
- Part of the global ACOEM Group.

Excellence in customer service & support

We know that investing in a new monitoring system is a big commitment, and we understand the importance of offering clear, unbiased advice from the beginning of the process so you can select the best solution to meet your needs.

We are with you every step of the way, from your initial enquiry through to routine service and beyond – not just providing the highest standard of service – but building a relationship with you and our customers around the world.
We also have a dedicated network of international distributors in 20+ countries. All our distributors are knowledgeable and technically trained to offer helpful information and guidance on the entire Tunnel Sensors range.

Together, we can assist you with preliminary enquiries, customisation of solutions, commissioning and routine maintenance/service.



About **Acoem**

Creating environments of possibility

At Acoem, we create environments of possibility - helping organisations find the right balance between progress and preservation - safeguarding businesses and assets, and maximising opportunities while conserving the planet's resources. We deliver unrivalled, interoperable AI-powered sensors and ecosystems that empower our customers to make enlightened decisions based on accurate information.

Together with 220+ distribution partners,our 850+ employees work across 28 offices, 6 manufacturing facilities and 5 R&D centres in 11 countries, to provide trusted, holistic data solutions for customers worldwide.

For more information, please visit **acoem.com**

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