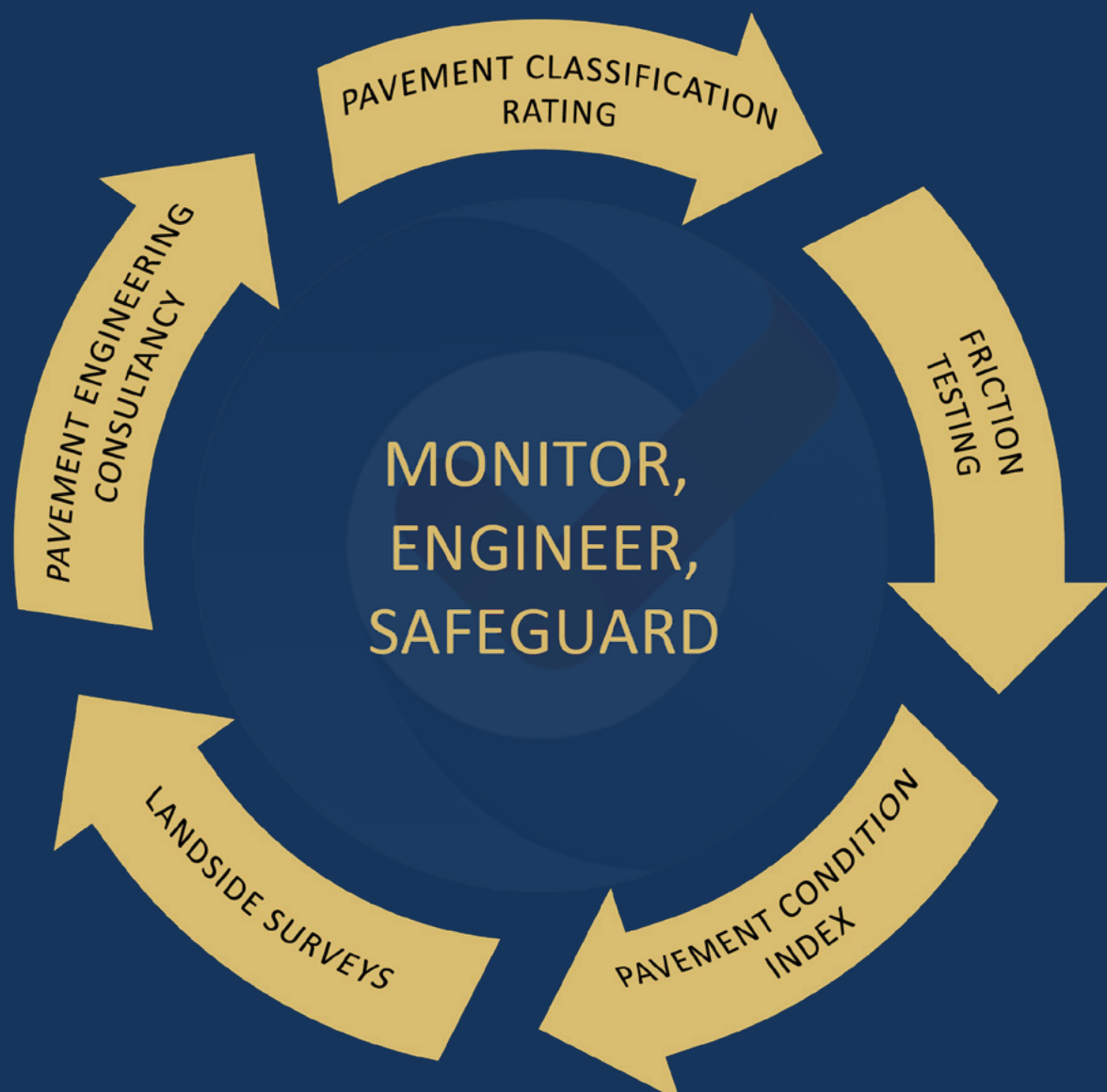


## AIRPORT & AIRFIELD PAVEMENT INVESTIGATIONS

Delivering cutting-edge survey technology and data solutions for supporting smarter, safer airport infrastructure management





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Airport and airfield pavements across the UK and internationally vary significantly, reflecting decades of differing design standards, construction techniques, and maintenance practices. Effective asset management is about keeping airports safe and operational and without a robust condition monitoring regime allied with timely maintenance, pavement condition deteriorates faster, maintenance costs rise, and safety and compliance are compromised.

We are the UK's leading provider of airport and airfield pavement investigations, with extensive experience delivering airfield engineering and survey solutions for major civil and defence aviation infrastructure. Our advanced, industry-compliant survey fleet — supported by a highly experienced team of pavement engineers — enables us to provide robust investigatory solutions focusing on visual and structural condition.

Our surveys are delivered in accordance with ICAO and CAA guidelines although these can be adjusted to suit any aviation authority standard.



As a one-stop-shop for pavement investigation services and through our ability to deploy multiple plant on client projects, we offer significant benefits to our clients including:

- ✓ Better programming to reduce time on site and minimise disruption
- ✓ Opportunities to share best practice to continually improve
- ✓ Identification of leaner ways of working
- ✓ Opportunities to innovate and provide bespoke surveying and testing solutions
- ✓ Provision of industry-leading and innovative survey technology



# PAVEMENT CLASSIFICATION RATING (PCR)

## Assessing pavement structural capacity and performance

The Pavement Classification Rating (PCR) is used to assess the load bearing capacity of the pavement with a defined fleet mix and traffic level. The ICAO adopted the new rating system to replace the existing ACN-PCN system in November 2024. Through a combination of intrusive and non-intrusive survey technologies, PCR surveys form a critical part of infrastructure asset management. Key objectives of PCR surveys include:

- **Structural pavement evaluation** - determine the maximum aircraft weight the pavement can safely support by assessing load-bearing capacity, layer composition, and material properties
- **Ensuring compliance** - airfield operators must publish a PCR so operators can compare against the Aircraft Classification Rating (ACR) of industry aircraft to ensure safe operation of infrastructure. PCR surveys are a requirement under ICAO and UK CAA regulations
- **Supporting operational planning & maintenance** - identify pavements that may require weight restrictions, support overload operations, or identify rehabilitation requirements as part of long-term asset management planning.

PCR surveys utilise heavy weight deflectometer, ground penetrating radar, coring, and unbound material sampling, to form a comprehensive structural evaluation, and we operate a full suite of PCR survey technologies in house to ensure a cost-effective solution can be delivered with minimal disruption.



## Heavy Weight Deflectometer (HWD)

Can we identify the performance of paved assets with respect to structural condition? Can we determine how many years usage we have left or what maintenance interventions and overlays could be used to prolong the life of flexible pavements? Construction monitoring solutions are key, and we operate the largest fleet of accredited Dynatest HWD's in the UK!

Heavy Weight Deflectometer (HWD) is a non-destructive technique used to assess the structural capacity and performance of pavements by measuring their deflection under a load. Data is also vital to determining if the structural capacity of a new pavement is fit for purpose during the design phase. We operate:

- 3 x Heavy Weight Deflectometers – applying a test load in the range of 30 – 240kN
- 1 x Falling Weight Deflectometer – applying a test load in the range of 30 – 120kN
- 1 x Fast Falling Weight Deflectometer – the FastFWD is an accelerated version of the traditional FWD, designed to apply loads up to 5x quicker per drop cycle, enabling real-time simulation of long-term traffic affects. XAIS-PTS operate the only FastFWD in the UK!

HWD benefits and applications include:

- Assess the remaining life of the pavement and assess the impact of increasing traffic volumes, traffic types or load capacities on the future life and quality of the pavement
- Evaluate pavement rehabilitation and overlay requirements
- Report layer moduli (stiffness), deflection, curvature and sub-grade CBR
- Conduct 'whole of life' and economic cost benefit analysis of alternate pavement designs
- Provide quality assurance assessment of recent works against design life criteria
- Complete joint sealing evaluation
- Undertake void detection



## Ground Penetrating Radar (GPR)

Ground Penetrating Radar (GPR) is a non-destructive pavement survey technique for identifying the thickness of the different paving layers, voids, or areas of damage. This method of subsurface profiling uses electromagnetic pulses transmitted into the pavement, and when the pulse encounters a change in material properties (e.g. pavement layer, pipe, reinforcement bar, etc.) the energy bounces off the target and returns to a receiving antenna. This returning signal is recorded as single line scans, colour coded, and stacked to create a detailed subsurface profile.

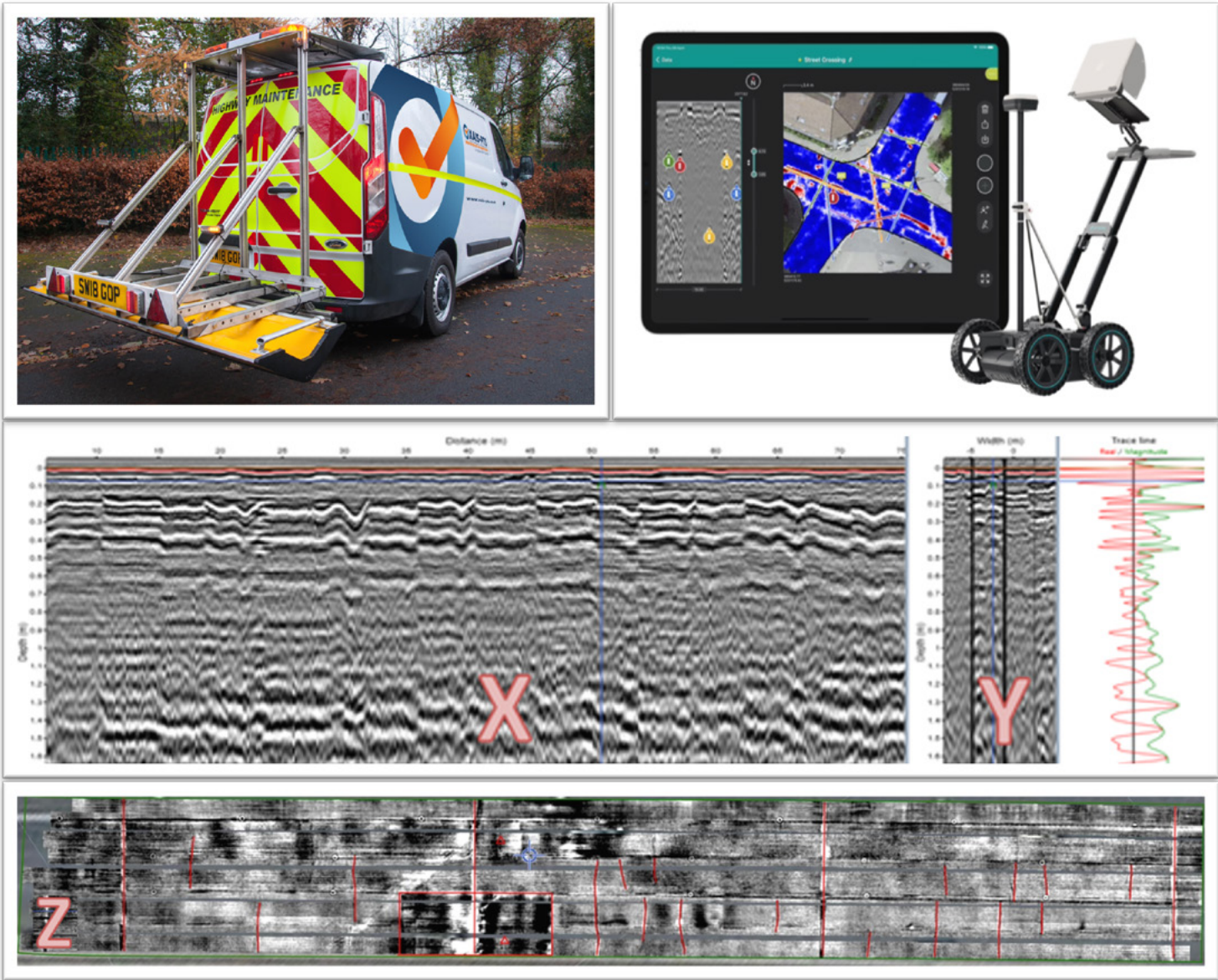
Our 3D GPR multi-channel array, which operates at traffic-speed, overcoming the limitations and expense of more traditional methods, can determine pavement make up, thickness of individual layers, construction changes, services, voids, and high moisture locations.

This survey technique delivers numerous and significant benefits for our clients by providing a greater understanding of the sub-surface make-up and condition of paved network assets, as well as providing a safer and more cost-effective survey methodology. We can support you with your projects from small schemes to full network coverage.

We also utilise the latest Proceq GPR Subsurface GS8000, which provides intuitive real-time visualization in 2D and 3D alongside superior data clarity. The GS8000 is a light weight and easy to use GPR device perfect for providing single line scans in remote locations where traffic-speed surveys are not possible.

GPR applications include:

- Pavement thickness measurement
- Subsurface void detection
- Evaluating pavement integrity
- Detection of reinforcement steel (rebar)
- Assessing subgrade conditions
- Locating underground utilities
- Foundation layer evaluation
- Monitoring pavement deterioration over time
- Layer interface mapping
- Detecting water infiltration
- Feeds directly into mandatory PCR calculations





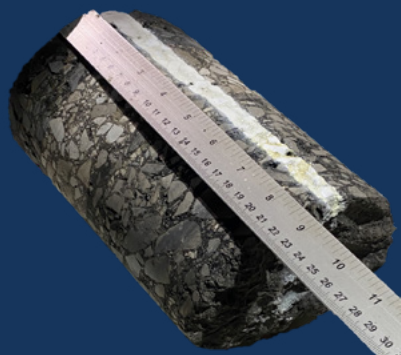
## Pavement Coring

Coring is the process of drilling cylindrical samples (cores) from an existing pavement structure — whether asphalt, concrete, or composite — to examine, test, and evaluate the materials and layer structure of the pavement. It is a standard and essential practice in pavement investigation, quality control, and rehabilitation design, and we drill, reinstate, log, and analyse over 10,000 pavement core samples annually. We work with our clients and other stakeholders to minimise disruption during site works often deploying multiple plant on projects to maximise efficiency.

We are capable of drilling to 1m in depth through bituminous and cementitious layers with core barrel diameters of 100mm, 150mm, 200mm and 300mm. Operatives use tailored mobile data capture systems to record details on site including accurate locational / GPS co-ordinate information and high-quality photographs of the core extraction process.

Ground bearing capacity and the California Bearing Ratio (CBR) can be determined by Dynamic Cone Penetrometer (DCP) testing. We also deliver tar testing in the form of PAK-Marker and PAH testing, which is undertaken in-house to ensure a comprehensive pavement evaluation is undertaken in a timely fashion.

We maximise safety, efficiency and quality of service, fulfilling client needs by providing clarity of performance and responsibility, value for money, and contract control. All the information gathered during on site investigations is analysed in our UKAS accredited materials testing laboratory to provide clients with detailed and accurate pavement reports and asset management insights.



## Unbound Material Sampling (UMS)

Building strong foundations starts with the right materials and Unbound Material Sampling (UMS) is the process of collecting and testing materials not bound by cement, bitumen, or other binding agents — such as gravel, crushed rock, sand, and soil — to assess their suitability for construction. UMS plays a crucial role in ensuring the performance, durability, and safety of roads, pavements, and other civil engineering structures including airport runways, taxiways and aprons. UMS applications include:

- **Quality assurance** – confirming that delivered or placed materials meet the required project specifications
- **Design confidence** – verifying that materials have the strength and stiffness needed for long-term performance
- **Regulatory compliance** – demonstrating adherence to key standards including BS EN 932, BS EN 1097, and ASTM D75 for aggregate sampling.

Our UMS procedures are carried out in accordance with BS 5930:2015 – Code of Practice for Ground Investigations and IAN 73/06, Section 4 – Draft Design Standard HD 25: Pavement Foundations. UMS contributes directly to PCR surveys and is used in conjunction with other testing methods such as GPR.

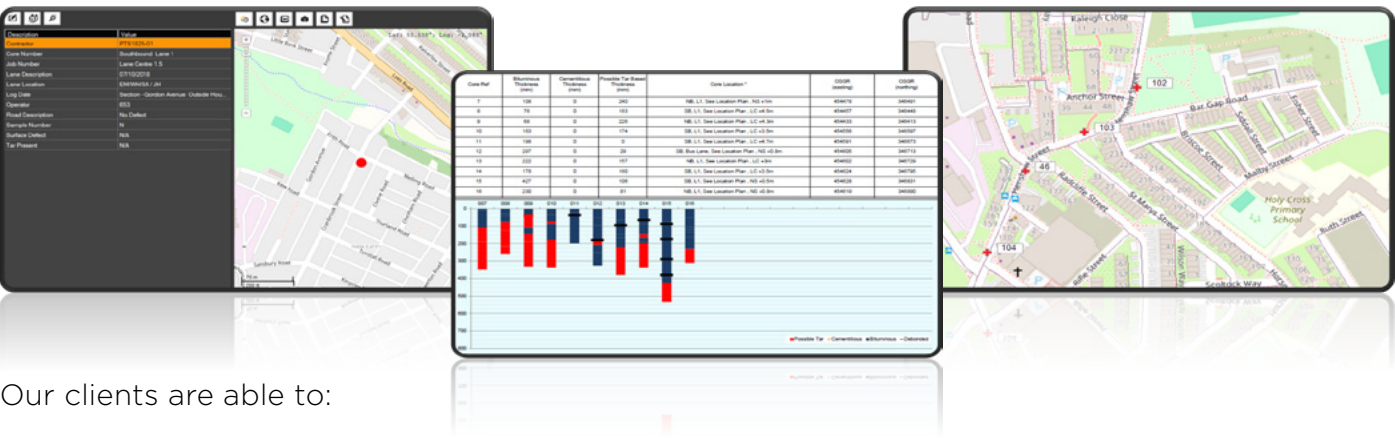




Delivering service enhancements

Core and unbound material sampling allows engineers and contractors to analyse the physical, chemical, and structural properties of tested pavements and subgrade materials, with standard reporting traditionally consisting of site plans, tabular reporting, and photographs.

Through an innovative approach we have implemented an interactive cloud-based system, allowing clients to access data results on any licensed device and in any location. Our XA<sup>®</sup> suite of software is GIS-based, and delivers spatial analysis and mapping of coring and UMS results in as near real-time as possible.



Our clients are able to:

- Visualise sample locations on interactive maps, improving spatial understanding of conditions
- Identify trends and inconsistencies across the network, e.g. if tar-bound material is found in one location, adjacent road sections can be flagged as areas for further investigation
- Integrate sample data with other infrastructure datasets, providing a holistic view of asset conditions
- Export GIS-compatible reports for further analysis, ensuring compatibility with client systems
- Correlate test results with environmental factors such as weather patterns to understand how flooding is affecting the tested locations
- Apply topographical analysis tools to predict asset degradation over time.

FRICTION TESTING

Managing airport and airfield skid risk

Friction and skid resistance are critical safety parameters of airport pavements, particularly on runways, where braking performance directly affects aircraft landing and take-off safety. Friction testing is conducted regularly on runways in accordance with CAP683 – or specifically where areas of contamination have been identified or following rubber removal – to identify low-friction areas where there is a risk of aircraft hydroplaning.

GripTester is a Continuous Friction Measurement Equipment (CFME) device that measures the friction coefficient (Grip Number) of the paved surface. GripTester is a three-wheel trailer with a single measurement wheel braked by 15%. The test is conducted on a 1mm film of water and typically at 65km/hr.

Data from GripTester runs are used to:

- Verify compliance with ICAO Annex 14 and UK CAA CAP683 minimum friction standards
- Support runway condition assessments and maintenance planning

GripTester surveys provide quantitative, repeatable, and comparable friction data, which forms an essential part of proactive airfield pavement safety monitoring and operational decision-making.



# PAVEMENT CONDITION INDEX (PCI)

## Assessing visual condition and maintenance need

PCI surveys undertaken in accordance with relevant guidance (DIO/ASTM/STAC etc), are the industry standard in aviation for visually assessing the condition of pavements. During a PCI evaluation, visible signs of deterioration and defects are characterised in terms of type, severity, and quantity of the distress. This information is then used to develop a composite index (PCI number) that represents the overall condition of the pavement in numerical terms, ranging from 0 (failed) to 100 (good).

| PCI Value | Pavement Condition Terminology | Colour Reference | Maintenance Need                          |
|-----------|--------------------------------|------------------|-------------------------------------------|
| 85 to 100 | Good                           |                  | Do nothing or corrective maintenance only |
| 70 to 85  | Satisfactory                   |                  | Preventative Maintenance                  |
| 55 to 70  | Fair                           |                  | Resurface                                 |
| 40 to 55  | Poor                           |                  | Rehabilitation                            |
| 25 to 40  | Very Poor                      |                  | Reconstruction                            |
| 10 to 25  | Serious                        |                  |                                           |
| 0 to 10   | Failed                         |                  |                                           |

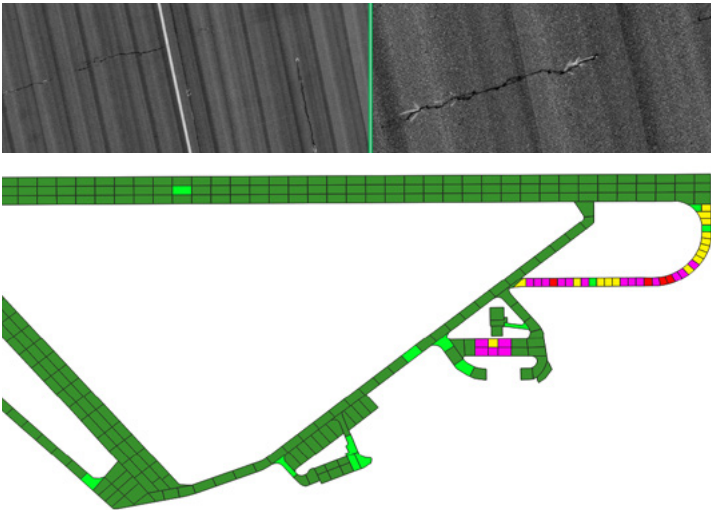
PCI surveys allow airport and airfield operators to:

- **Assess pavement condition** - by identifying and quantifying visible surface distresses such as cracking, raveling, rutting, and patching
- **Support maintenance and rehabilitation planning** - by helping airports prioritise repairs, schedule resurfacing, and allocate budgets efficiently
- **Track pavement deterioration over time** - allowing data-driven decisions and performance monitoring
- **Ensure airfield safety and regulatory compliance** - confirming that surfaces remain suitable for aircraft loading and operations.

## Supporting safety and innovation in PCI survey delivery

We utilise state-of-the-art Multi-Functional Vehicles (MFVs), which bring together the best in GPS, image-capture, AI analysis, and laser scanning technology, to deliver detailed and automated assessments of runways, taxiways, aprons and associated infrastructure.

- 3D data is exactly what we offer, we go beyond simple visual interpretation of surface condition and utilise sensor technology to provide 3-dimensional profiles of the pavement
- We utilise advanced laser profilers delivering accurate ride quality, texture, rutting, and roughness measurements
- We apply Automatic Distress Detection (ADD) technology, which applies sophisticated algorithms to the 3D data and image-based AI system, to deliver precise and repeatable distress measurements.



We also supplement automated PCI surveys with manual surveys where required to ensure 100% survey coverage. These surveys are undertaken by experienced pavement engineers.

Ultimately, a Pavement Condition Index (PCI) survey is designed to provide a quantitative, consistent, and objective measure of pavement surface condition, forming a core component of airport and airfield infrastructure asset management. By automating this process, we are able to provide safer, more efficient, and more cost effective PCI survey solutions.



Visual Condition Surveys (VCS)

CS 229 Visual Condition Surveys (VCS) assess pavement surface condition in line with National Highways standards, providing a consistent, systematic approach to identifying and recording surface defects. These surveys, undertaken in conjunction with other surveys such as GPR, FWD and coring, support effective maintenance planning, performance monitoring, and long-term asset management.

Traditionally, VCS were undertaken on foot, often making surveys time-consuming and costly, with traffic management required to ensure the safety of inspectors. At XAIS-PTS, we deliver VCS using our Multi-Functional Vehicles (MFVs), which are equipped with 2nd generation Laser Crack Measurement Systems (LCMS2) and high-resolution imagery. These advanced sensors capture detailed 2D imagery and 3D pavement surface profiles at traffic-speed, enhancing survey efficiency, accuracy, and safety.

Data is then analysed by pavement engineering specialists, with defects recorded using precise geo-referenced coordinates in accordance with CS 229. Supporting outputs — site sheets, schematic defect drawings, and photographic records — provide a clear, comprehensive view of pavement condition, enabling targeted maintenance and timely repair.

As our VCS are completed through a machine-based method, we can also supplement standard VCS outputs with a variety of added value datasets such as GIS defect layers and geo-referenced web-hosted video.



LANDSIDE SURVEYS

Extending infrastructure asset management to the wider road network

Landside road surveys are essential for maintaining the safety and operational efficiency of connected public infrastructure, including airport access roads, car parks, and service routes. Landside surveys should be undertaken to assess pavement condition as part of proactive asset management and maintenance activities.

Skid Resistance Surveys

According to the Design Manual for Roads & Bridges (DMRB CS 228), skid resistance refers to the frictional properties of the road surface in wet conditions. A lack of grip or a “slippery” road surface can cause road traffic accidents meaning effective monitoring of skid resistance is vital.

SCRIM® surveys measure the wet skidding resistance of a road using the sideways force principle. A freely rotating wheel, mounted in the nearside wheel track and angled at 20° to the vehicle's direction of travel, is applied to the road surface under a controlled vertical load and water flow. Sideways force coefficients are recorded and evaluated against pre-defined investigatory levels. SCRIM® surveys can be utilised to characterise the road surface and assess the need for maintenance.

Beyond survey operations, we deliver bespoke and client focused services aligned with skid policy requirements and industry best practice guidance. Service enhancements include:

- Identification of areas of concern
- Data analysis & visualisation
- Detailed site investigations
- Collision reviews
- Investigatory level reviews
- Skid policy development & review





## SCANNER+

We utilise state-of-the-art and UKPMS accredited SCANNER vehicles, which bring together the best in GPS, image-capture, AI analysis, and laser scanning technology to deliver detailed network-wide assessments of carriageway infrastructure.

- 3D data is exactly what we offer, we go beyond simple visual interpretation of surface condition and utilise sensor technology to provide a 3-dimensional profile of the road surface
- We utilise advanced laser profilers delivering accurate ride quality, texture, rutting, and roughness measurements
- We apply Automatic Distress Detection (ADD) technology, which applies sophisticated and objective algorithms to the 3D data and image-based AI system, to deliver precise and repeatable distress measurements.



Our SCANNER+ services are designed to harness industry-developments with PAS 2161, providing clients with the tools and freedom to drive local asset management practices. Our enhanced services deliver:

- Maintenance scheme identification & prioritisation
- Condition projection modelling
- Data visualisation and embedded video
- Added-value datasets to support maintenance decisions including enhanced cracking, potholes, patching, edge defectiveness, ravelling, line markings and more.

## PAVEMENT ENGINEERING CONSULTANCY

We are much more than just a survey contractor, and our highly qualified pavement engineering team are on hand to provide data analysis, pavement design, and advisory services. Consultancy services are carried out in-house at our Head office in Preston. This covers a variety of services such as core logging, GPR analysis, FWD back analysis and the production of interpretive pavement reports across all our surveying and pavement investigation services.

We have developed an in-house pavement management system (PMS) called XA® to provide an easy, fast, and modern way to store, analyse and present information and data related to pavement structure and condition. All data is spatially referenced and input is possible through all major file types. Once populated, it is possible to undertake advanced analysis to provide asset whole life costing and deterioration modelling. We will work with you to tailor a consultancy package to ensure you get the most value from your data. Consultancy support includes:

- Linear elastic pavement modelling
- Production of SHW specifications
- Design and specification of recycled materials
- Partial inlay designs
- Pavement overload assessments
- Incorporation of isopachyte models into rehabilitation design
- Water inundation assessment





"Accurate condition assessment of airport pavements is essential because it ensures safe aircraft operations, guides cost-effective maintenance planning, and extends the service life of critical airfield infrastructure — especially as rising aircraft weights and traffic volumes place greater stress on pavement systems. At XAIS-PTS, we offer a wide array of pavement assessment technology to support you in managing such critical infrastructure."

MARTYN STONECLIFFE-JONES  
TECHNICAL DIRECTOR

## GET HELP FROM THE EXPERTS

Our airport and airfield pavement investigation services are built on years of operational experience underpinned by experts in survey technology and pavement engineering.

We offer pavement investigation solutions to meet your needs and budgets, and we will work collaboratively with you to identify the optimum solution.

So, if you need help with assessing and managing your infrastructure assets, contact our team today on **01772 792899** or send an email to: **[sales@xais-pts.co.uk](mailto:sales@xais-pts.co.uk)**





To learn more about our wider services, scan the QR codes to download our brochures:



## MATERIALS TESTING & CERTIFICATION



## ASSET MANAGEMENT SURVEYS



## ASSET MANAGEMENT SOFTWARE



## ASSET MANAGEMENT SERVICES



## PROGRAMME DEVELOPMENT, FEASIBILITY & ASSURANCE, DESIGN & DELIVERY



## PAVEMENT INVESTIGATIONS

