



Structure Monitoring Technology

Digiscan ™

The Digiscan logo icon consists of a central blue dot with several blue arrows of varying lengths radiating outwards in all directions, resembling a sunburst or a scanning pattern.

From Deck to Cloud:
Leak Detection Scanning
for Inverted Roofs

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INTRODUCTION

We are delighted that you are considering SMT for your project. For over 15 years we have been trusted by architects, general contractors, roofers, and building owners to provide fast and reliable Leak Detection Scanning.

Digiscan is an electronic leak detection scanning service for inverted/protected roof assemblies. It enables non-destructive testing of the roof assembly during construction / renovation, as well as targeted scanning during a leak investigation.

Benefits of a Digiscan include:

- Find defects in waterproof membranes with 99% accuracy
- Alert waterproofing professionals to areas that require repair
- Fast - one technician can scan up to 20,000 square ft / day
- Quality Assurance during construction
- Detailed reports that can be referenced in future investigations
- Flexible design allows testing of areas that other tools cannot reach
- Extend the useful life of the roof
- Give tenants peace of mind

This document gives an overview of SMT's Digiscan service, how the technology works, and what Digiscan can do for you.



Above: An SMT Technician performs a Digiscan service on an inverted roof membrane

DIGISCAN SERVICE CHECKLIST

The following check-list outlines the process for performing a Digiscan service on an Inverted Roof Assembly.

1. Design Team / Roofing Contractor submits project plans to SMT.
2. SMT provides a Budget Estimate for the Project.
3. Project goes ahead. SMT provides a Purchase Order for Materials, Labor, and Logistics.
4. Roofing Contractor installs waterproof membrane then prepares roof deck for scanning, coordinating with project site supervisor and SMT operations manager to schedule Digiscan service.
5. SMT technician arrives at the project site, verifies that the deck is ready for scanning and locates a suitable water source.
6. SMT Technician prepares deck area for scanning by placing perimeter cable, locating a ground source, and attaching portable battery.
7. SMT Technician saturates the deck then generates an electrical field across the membrane.
8. SMT Technician uses Digiscan 360 tool to locate membrane breaches and deficiencies - marking each with a visual signifier.
9. SMT Technician clears away equipment and communicates to on-site roofing contact the location of breaches/deficiencies that require attention.
10. Roofing Contractor patches/repairs areas of concern.
11. SMT provides a pdf report of the Digiscan service.
12. In some cases, a second Digiscan is performed to verify the success of repairs prior to the covering of the membrane.

Read on for a more comprehensive overview Digiscan, or contact SMT to discuss how we can assist on your project.

BUDGETING AND PLANNING

Defining the Scope of Work

Our team will advise and educate on Leak Detection in general, and help find the right scope for your project. For designers, SMT offers ready-made specifications for Digiscan services; these can be found on our website and inserted directly into the project specification.

A budget estimate can be produced in short order if SMT is provided with clear drawings, this allows our technical consultants to judge the difficulty of the area and therefore how long will be required. The roof deck will be split into zones based on square footage and topography.

Note: SMT Technicians can also perform leak detection scans on conventional roof decks. Our technical consultants can provide quotes for projects that feature a mixture of roof types.

Who to Call

Technical Consultant - for assistance with design, budget estimates, and quotes. Can provide updated quotes as project specifics change over time.

Operations Manager - for availability of technicians and scheduling your Digiscan service. Also your point of contact for billing and reporting.

Project Manager - SMT's project manager will keep everyone informed on a daily basis of project progress and any needs that may arise.

HOW IT WORKS

The Technology:

Digiscan uses a non-destructive leak detection method called “Electric Field Vector Mapping”. This method creates a positively charged electric field on the top-side of the waterproof membrane, which should feature evenly distributed voltage on an intact membrane. Where the membrane has been penetrated or insufficiently applied, there will be potential for the positively charged electrons to pass through the membrane and into the grounded substrate (i.e. the structural element of the roof). These deficiencies are areas where water may be allowed to enter into the structure and cause rot, mold, and decay. The Digiscan 360 tool is sensitive to such voltage differential, allowing a technician to locate and highlight them for repair before the membrane is covered.

The Process

Step 1

Prepare the area for scanning:

- Visual inspection of area, mark any obvious deficiencies.
- Place cable around area to test. Typical area is 5x5m to 10x10m.
- Make sure there are no grounding points inside the cable area (drains, metal pipes, etc)
- Connect Power Source: positive lead to Guard Cable, Negative lead to Building Ground.(rebar, drain, metal object in contact with building or building itself)

Step 2

Generate Electric Field:

- Gently spray the area inside the cable, wet thoroughly and evenly.
- Activate Power Source

Step 3

Use the DigiScan 360 to locate breach:

- Press the Digiscan 360 head to the membrane surface.
- When bar graph increases to a single bar, follow arrows to breach.
- Voltages < 150mV suggest there are no holes.
- Upon identifying a leak/hole, the bars in the magnitude meter will increase.
- Follow arrows to narrow down the area until the breach is found and marked for repair.
- Consult User Guide for tips and advanced techniques.

SCANNING REQUIREMENTS

Roof Assembly:

DigiScan works with all non-conductive membranes. Conductive membranes such as black EPDM can not be scanned with this device.

Water Access:

Water is required to establish an electric field that will be detectable by the Digiscan 360 tool, with at least 120PSI water pressure being ideal. SMT technicians will have their own hose if required.

Deck Access:

SMT works within the typical construction schedule, communicating with roofers and site supervisors as is necessary to perform an efficient scan. The deck must be clean and dry. Metal debris and any sources of moisture - no matter how small - should be actively looked for and removed. Ideally, SMT technicians will be the only tradespeople present on the roof deck when scanning takes place.

Unique Areas:

The flexible design of the Digiscan 360 tool allows scanning of areas that other leak detection tools cannot reach. SMT's operations manager will coordinate with the General Contractor to ensure any lifts/harnesses/other safety equipment are available and that our technicians are fully trained to operate in the area.



Above Left: SMT Technician uses a harness to scan a high-up ledge.

Above Right: Digiscan Services can be used to check the waterproofing inside tanks and cisterns.

REPORTS

Membrane Integrity Assessment

Digiscan services produce a detailed report known as a Membrane Integrity Assessment. This report can be thought of as a quality assurance statement, valid as a point-in-time reference of the state of the waterproof membrane when SMT performed the scan.

Quality Assurance

This report will feature photographic documentation of all penetrations and deficiencies found on the roof deck during the course of scanning activity, as well as descriptions where necessary. This document can be used as part of a Quality Assurance programme during construction to confirm the installation conditions of the waterproof membrane.

Investigation

The Membrane Integrity Assessment can also be a valuable resource during a leak investigation either during or after construction. The documentation can show construction details that are hidden once the roof has been covered - informing maintenance teams in their search for the source of a leak.

See below for sample reports:



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1-855-209-9677 | info@smtresearch.ca
SMTresearch.ca | DigiScan360.com | BuildingIntelli.com | DryTracker.com

Integrity Certification: *Descriptive Statistics*

Date	12/01/2021
Time	11:00
Handler	Dave Andicoy
Location	349 West Georgia
Project	Vancouver Post
Sales Order	1879
Service	DigiScan Low Voltage Differential Assessment Service

Project Owner/Developer	Central/GreenOak
Project Architect	
General Contractor	
Roofer	
Envelope Consultant	
Site Contact	
Contact Phone#	
Contact Email	HOWPES@HOUWELL-ACCURATE.COM

Deck	South Tower - Southwest & Northeast of Level 20
Sq.Feet	750 SF
Membrane Mfg.	
Membrane Type	SBS Modified Bitumen Rolls - Non-granulated
Assembly	Torch applied
Substrate	Concrete
Drain Type	Cast In Place
Drainage	No Ponding
Weather Conditions	Light Rain

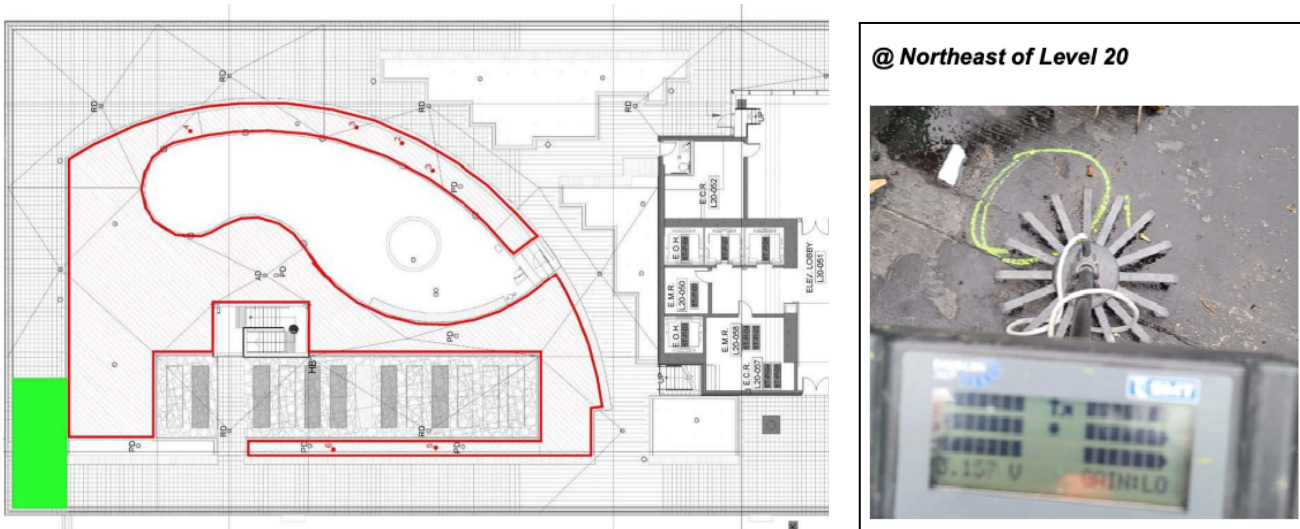
Above: Every Membrane Integrity Assessment includes project details which can be referred to at a later date and contribute towards quality assurance programmes

Unit Calibration	Dry & Intact Control Module, Aligned Head, Linkage Intact Gain was set to low, Free air signature $\leq 100\text{ mV}$ 312 Stainless Steel MDS Tape Used to Propagate 12V DC Charge, 302 Stainless Steel Cable Used to Propagate 12V DC Charge
Transmitter Voltage	12V DC
Transmitter Drawdown	200 mV
DigiScan Voltage	5.9V DC
Water Pressure	20-40 PSI Hose
Transmitter Ground	Metallic Drain Detail
Drain Voltage Return	Voltage Found >4V DC
2nd Test Ground Used	Metal Pipe >2V DC
Proximity To Grounds	Extensive (Workable)

Above: SMT includes calibration details to align with our own quality assurance standards.

Overburden State	Exposed Membrane (SBS Rolls)
Visual Observations	Appears to have had mild trades or sequence related damages.
HSE/OSHA Hazards	Overhead Work
Access Conditions	Mostly Accessible (Some Exclusions)
No. of Deficiencies Found	7
Types of Deficiencies Found	Nail Holes, Form Work Damages, Cuts, Abrasions, Torn Membrane, Physical Punctures
Membrane Repair Status	Waiting for repairs, rescan NOT required, cover when complete.
Followup Action(s) Required	Client notified of findings, all findings clearly marked and numbered / documented. Water supply shut off, site barriers replaced, SMT equipment removed.
Disclaimer	The results found are valid only at the time of testing. Damage can result after our technicians leave site. The scale of damage confers an understanding that the majority of the roof was found in good health
	Ongoing site sequencing and/or 3rd party trades proximity may invite further damage. Weather & UV radiation exposure is also a concern for most membrane treatments. Protection and loading should occur as soon as possible.
Exclusions (IF)	None
Field Hours	<1 Hour
Billings Status	Bill against original scope w/ report

Above: Key membrane integrity details are listed in a clear and easy to understand format



Above: Deficiencies found are plotted on CAD drawings to assist with any further repairs, and as a historical record. Photographs of each deficiency are also included.

LEAK DETECTION SYSTEMS

Digiscan is an invaluable tool for quality assurance during construction and a powerful resource for leak investigations. In addition to leak detection scanning, many developers and building owners are now investing in Leak Detection Systems to give their assets the best possible protection.

SMT has been at the forefront of Leak Detection Systems for over a decade, and has developed two systems for inverted Roof Assemblies:

FutureCast PASSIVE

FutureCast Passive comprises a network of sensors installed on the wet-side of the waterproof membrane during construction. These sensors are left in a passive state and covered by layers of insulation and overburden - accessible via a deck-level junction box. FutureCast Passive can be activated at a later date by an SMT technician visiting the site to take readings using portable electronics.

When activated, FutureCast takes measurements of differential voltage across the top-side of the membrane in order to determine the location of leaks, deficiencies, and grounding events. Clients who opt for FutureCast Passive can either choose a service package for regular activations of their system, or call out SMT as needed for assistance during leak investigations.

FutureCast ACTIVE

The ultimate protection for an inverted roof assembly, FutureCast Active upgrades the passive sensor network with automated monitoring electronics. FutureCast Active offers round-the-clock intelligence on the status of the waterproof membrane, with access to SMT's advanced Analytics platform which uses proprietary algorithms to generate membrane integrity reports at the touch of a button. Additionally, FutureCast Active can be calibrated to trigger alarms when measurements are within a set range - giving advanced warning of conditions that can lead to a roof leak/ structural damage if left unchecked.

To learn more about our Leak Detection Systems (which are also available for conventional roof assemblies, basements, mass timber structures, and more) you can visit our website or reach out to our technical consultants who are happy to assist.

DIGISCAN KITS & TRAINING

The current iteration of our electronic leak detection scanner - the Digiscan 360 - is available for purchase on the products page of our website. SMT offers a host of training and related services so you can start performing your own membrane integrity assessments.

Call SMT or visit digiscan360.com to learn more.



Above: An SMT Technician provides training with a Digiscan 360.

NEXT STEPS

This document has given an overview of what you can expect from a Digiscan Service.

SMT has performed Digiscan services on thousands of roofs, and would be happy to assist with your next project. RFQs and technical enquiries can be directed to: info@smtresearch.ca