The Power of Foam

ECO FILLFOAM

ecofillfoam.ca

1-844-944-FILL (3455)

Providing Innovative and Environmentally Friendly Solutions to Meet even the Most Challenging Requirements.

ECO FillFoam is a Saskatchewan-based company specializing in innovative void-filling solutions for residential, commercial, industrial, and municipal applications. We provide customized solutions for projects of all sizes, helping clients address challenging void-filling, stabilization, and structural support needs.

Using FillFoam™, a specialized foam product offered by ECO FillFoam, we can infill gaps between structural elements and fill voids, regardless of size or complexity. Our experienced team has a proven track record of delivering practical, cost-effective solutions that help protect and stabilize structures while minimizing disruption to surrounding areas.

Backed by decades of construction and development experience through the Eco Group of Companies, ECO FillFoam is committed to providing reliable service, innovative techniques, and environmentally responsible solutions across Canada.

Our Foam Supplier

HMI'sprocess and material will provide long lasting repair to sunken or moving concrete slabs in need of lifting and/or stabilization. Our repair method has proven to be more cost effective for the customer and saves them time in completing their repairs. Time is of the essence, when considering commercial projects where productivity could be lost replacing slabs as opposed to the HMI process of raising them with polyurethane foam.

HMI has been providing quality concrete raising equipment and material since 1974. Our customers and our own contracting division, have performed hundreds of thousands of projects over the course of 40 years for satisfied customers. These encompass residential, commercial, industrial, and government projects involving small walk way slabs, factory floors, airport runways and highways. Over 40 years of concrete raising experience, gives HMI the insight to develop innovative products assisting those wishing to remedy concrete problems with polyurethane foam and equipment .

Product Capabilites

Why Does Concrete Settle?

The stability of a concrete slab is directly proportional to the quality of the base on which it is poured.

Poor Base Conditions are Caused by:

Poor or improper compaction of the base: Failure to properly compact base materials before pouring can lead to hastened settling. The weight of the slab will further compact the base after curing, and settlement can happen quickly.

Climate: The freeze and thaw cycle experienced in many regions causes the ground underneath the slab to expand when frost is present. This in turn will cause slabs to heave or raise. When the frost melts, the slabs will settle and most often not to their original elevation. Slabs may become uneven resulting in trip spots. Drought often causes soil, such as expansive clays to shrink causing settling issues for concrete slabs. When expansive clay soils encounter wet conditions, they may swell leading to shifting concrete that needs leveling.

Erosion: Many different factors can lead to eroded base materials under concrete. Damaged water lines or sewer lines can lead to washout of base materials causing slabs to settle. Improperly placed downspouts can cause pooling of water, which can lead to erosion. Waves or flow can cause washout on bodies of water, lake & river- seawalls.

Machine/Traffic Vibrations: Concrete slabs may move or settle in industrial/highway settings where movement and heavy loads are present. The vibrations from the machinery and passing traffic can lead to the base compacting and the slabs settling or slab movement.

Slab Curl/Rocking Slabs: Slab curl occurs when a relatively large section of concrete is poured. During the curing process, the top of the slab may cure slightly faster. This leads to slabs that curl and may rock and become unstable. Vibration & heavy traffic may also cause slabs to eventually settle or move.

- **Lift and Level**
- **Support**
- **Fill Voids**
- **Stabilize Soils**

Slabs and structures need a consistent layer of support.
When this is interrupted, HMI and ECO FillFoam have your solution.

Project Samples Commercial - Government - Residential

Highway Repair

Seawall Repair

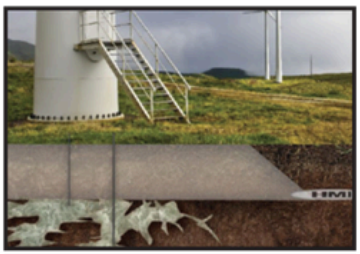
Airport Repair

Mine Fill

Foundation Lift

Grain Bin Stabilization

Wind Turbine Stabilization



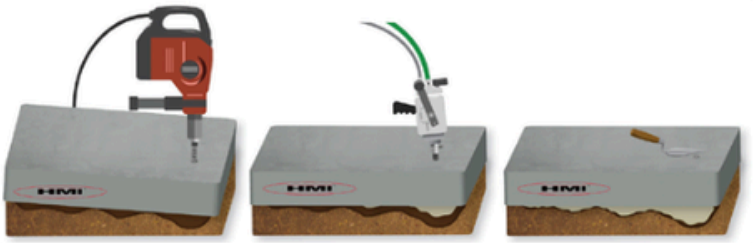
Tunnel Fill

Processes - Concrete Raising and Leveling

Using HMI polyurethane foam, the HMI method for concrete raising utilizes the slab itself as a means of delivering raising, void filling, and stabilizing foam. A 5/8" hole is drilled through the slab into the subgrade. A tapered delivery port is then installed in the 5/8"hole. The injection equipment, which delivers the dual component polyurethane material, is then connected to the port. A two part liquid that expands into foam is then injected through the port and under the slab. Expansion of the material occurs within seconds, compressing loose soils and raising concrete.

Raising concrete with polyurethane foam is done with controlled incremental injections. Foam will fully expand within 10-15 seconds. This allows the applicator to monitor the lift and prevent over raising the slab. HMI suggests using air purged equipment to deliver foam under the slab. This equipment will keep the injection port open between injections, allowing for the installer to wait for foam to fully expand before injecting more material.

Injection Equipment: The HMI EliteONE injection gun has revolutionized concrete raising with foam. This propriety design allows the applicator to install material into a delivery port multiple times. This eliminates the need for excessive hole drilling and saves time. The EliteONE merges mechanical and air purged technology, it is the first ever injection tool specifically for concrete raising designed by HMI.



Drill. **Pump.** **Patch.**

Processes - Deep Foamjection™

When soil settles, the core issue is the inability of the sub-grade to support the slab, or ground above. The job of the sub-grade is to have enough bearing capacity to evenly support the slabs.

Deep Foamjection™ is the process of injecting a two part polyurethane foam into those failed soils. Injected as a liquid, the polyurethane foam expands and pushes out on and into the weak soils. This expansion will take the path of least resistance as it travels. This expansion will follow voids, fissures or weak/loose soils. As it travels, it takes the shape of a tree root. This volume of expanded foam increases the density and strength of the soils that failed as well as adding a solid custom installed volume of foam.

Sample Results Achieved Deep Foamjection:

Soil Layer	Estimated At-rest Pressure P (tsf)		Limit Pressure P (tsf)	Net Ultimate Bearing Pressure(psf)	Net Allowable Bearing Pressure (psf), (Factor of Safety=3)	Percent of Change %
(CL) Fill	0.07	(Existing Fill In-situ)	5.3 5.4	8,368	2,789	1.90
		(After Foam, 173 lbs)		8,528	2,842	
(ML, CL/ML) Outwash	1.31	(Native In-situ)	9.6 10.7	13,264	4,421	13.30
		(After Foam, 496 lbs)		15,024	5,008	
(SP-SM) Outwash	1.75	(Native In-situ)	8.9 >24.0*	11,440	3,813	211
		(After Foam, 552 lbs)		>35,600	>11,866*	

*Complete Engineering Report Available upon Request

The Foam of Choice, for sub grade repair. Deep Foamjection™ Foam is a heavy duty polyurethane foam specifically designed for jobs where water or moisture is present. This foam was designed to set up in the presence of water and to maintain strength in wet environments. Deep Foamjection™ Foam can also be used for foundations, warehouse footings, tracks, bridges, crossings, culverts, posts & anywhere there is weak sub base present.

A slower reaction time makes Deep Foamjection™ Foam great for Deep Foamjection™ allowing the material to spread further before curing. As foam reacts it will follow vein fissures and voids. A custom installed solution to make soil stronger.

Post Hole Job Example:

Processes - Void Filling

Voids can develop for a variety of reasons, erosion, sinkholes or settlement from vibrations. Voids can also be a result of abandonment of mines, tunnels, shafts, pipes or tanks. Voids commonly cause a lack of support that result in settled slabs or structures. If left unattended these voids can result in dangerous conditions, liabilities and even more catastrophic failures.

Filling voids with a lightweight foam is a fast and cost-effective solution to other alternatives.

Common Uses:

- Mines & shafts
- Culverts
- Tunnels
- Tanks
- Wells
- Sink Holes
- Pipes
- Seawalls
- Crawl Spaces
- Foundation Backfill

Benefits Over Alternatives:

- Lighter
- More Cost Effective
- Faster Installation
- Flows Further
- Less transport expense/heavy equipment
- Less labor to install
- Will not crack-inert
- Not affected by water
- Multiple formulas available that can seal or permeate water

Processes - Soil Stabilizer

When stabilizing soils, the material is saturated into the ground through a point. When saturation is achieved, the point is retracted and more material is installed. This produces a solid column amidst loose soils. Points of cured soil binder can offer support to a slab, like legs on a table.

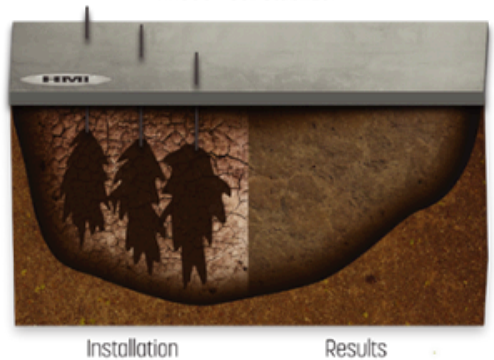
Commonly installed in sandy or swampy environments, installing columns of soil binder can offer additional support to slabs that have been lifted. It can also be installed prior to pouring a slab to prevent settlement. Product can also be applied by spraying on top of various types of material, sand, gravel and top soil etc.

Soil binder is a great option when loose soils need improvement but there is not room for the volume expanding foams produce.

Note: SINGLE COMPONENT & Requires a single component airless paint sprayer and accessories to install.

Applications:

- Stabilize: Peat Moss, Loose Sands, Soil
- Support New Slabs, Foundations, Helical Piers
- Erosion Control: Sea Walls, Sand Bunkers, Retaining Walls, Rail Ways



Stabilizing soils is often done in conjunction with concrete raising and leveling. It is a method to repair the unstable soils that contributed to the settlement.

Products - Polyurethane Foam

HMI is the ONLY company that makes polyurethane foam for concrete raising from recycled material. HMI manufactures an environmentally friendly, dual component polyurethane foam for raising and stabilizing concrete. Our patented materials are made from recycled components, making it the "greenest" polyurethane foam on the market. Available in 2, 4, 5 and 6 lbs. per cubic foot density (free spray). HMI has developed this revolutionary foam that is setting new standards in polyurethane foam quality. Recycled foam provides benefits like fast tack free time and a high compressive strength skin that avoids concrete adhesion and adds strength. Fast and aggressive expansion for lifting concrete, along with a 15 minute final cure time, allows for slab manipulation while adjusting for the perfect lift.

Benefits:

- Repair unstable soils
- Installing a stronger foundation to support the heavy demands of today's industry
- Foam follows the path of least resistance and will fill weak areas
- Fills fissures and ground voids
- Fills voids holding water & displaces collected water
- Increase load bearing capacity of sub grade
- Permanent repair, foam never changes shape or absorbs ground water
- Foam soaks into the weak soils and then expands, binding the soil and making it solid
- Does not leach chemicals into the ground

Signature Foam Line

HMI recycled Foams	Application
RR201	Residential
RR401 & RR401 FAST	Highways/Industrial
RR401G	Wet Conditions
RR501	Undersealing/Stabilizing Joints
RR601	D.O.T-infrastructure repair

HMI Hydrofoam Line

HydrOfoams	Application
hf202 & HF202 fast	small lighter slabs where water IS present
hf402	Highways/Industrial/deep foamjection
hf402 fast	Highways/Industrial/deep foamjection

Polyurethane Foam Characteristics

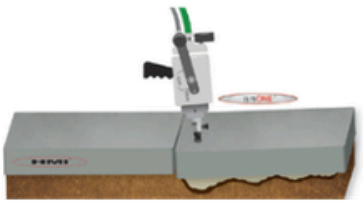
HMI manufactures a variety of foams with different reaction times and strength.
Each designed for your specific application.

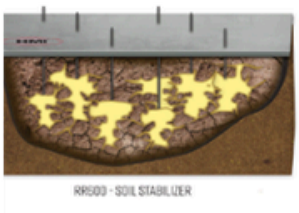
Foam Name	Density ASTM 1622 (lb/ft^3)	Peak Compressive Strength ASTM 1621 (psi)	Tensile Strength ASTM D1623 (psi)	Time at Reaction (min:sec)	Peak Exothermic Temp. (°F)	Time at Peak Exothermic Temp. (min:sec)	Time at Tack Free (min:sec)	Time at Peak Expansion (min:sec)	Best For
RR 201	2.5	32.4	42.4	00:10	247	00:24	00:18	00:32	Small Residential Slabs
RR 40 1	4	121	208	00:14	273	00:26	00:22	00:37	Commercial Projects
RR 401FAS T	4	121	208	00:10	270	00:19	00:16	00:29	
RR 401G	4	121	307	00:12	267	00:21	00:17	00:35	
RR 501	5	112	124	00:53	302	01:26	01:21	01:45	Joint Stabilization
RR 601	6	292	138	00:15	270	00:25	00:23	00:23	D.O.T
HF 202 *	2.5	51.3	77	00:11	220	00:47	00:45	00:58	Small Slabs with water present
HF 202FAST *	2.5	51.3	77	00:06	245	00:25	00:18	00:33	Small Slabs with water present
HF 402*	4	90-100	124	00:10	229	00:37	00:31	00:45	Deep Foamjection
HF 402FAST *	4	90-100	124	00:06	242	00:28	00:23	00:32	Deep Foamjection

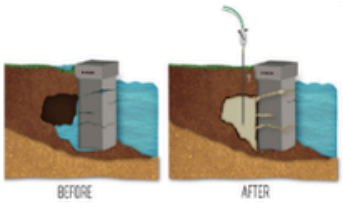
*Foam Technical Data Sheets Available Upon Request

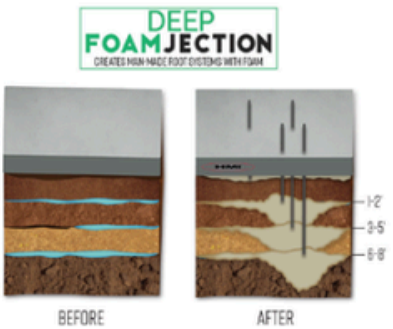
A HMI Foam for Every Application

- Residential
- Factory/Warehouse Highway
- Deep Foamjection
- Soil Stabilization
- Void Fill
- Seawall









Environmental Impact of HMI Polyurethane Foam

HMI Foams are made from recycled and bio-based components, making it the "greenest" polyurethane foam on the market. The American Society for Testing and Materials standards (ASTM) stated this recycled material is the best foam available for raising concrete and stabilizing soils.

Saves our Natural Resource
- Made with Bio-based and/or Recycled Material
- Lasts a Lifetime

Non-Toxic and Non-Hazardous

Major toxic chemicals, often associated with some types of polyurethanes, such as toluene, and VOC's are NOT USED IN HMI FOAMS! Most of what is warned against on the internet pertains to these chemicals/polyurethane.
- Cured Foam is Fully Inert
- Does Not Leach into Groundwater

UsesEnvironmentallyFriendly Blowing Agents
- VOC Exempt
- US EPA SNAP Listed
    - Non-Ozone Depleting
    - Low GWP

Cured Polyurethane Safety Summary

Health Effects:

- Polyurethane foam consists of fully reacted polymers and are considered non-hazardous per OSHA 29 CFR1910.1200
- The primary adverse health effects of cured polyurethane are related to dust generated by sanding, grinding or cutting the cured foam. Similar to saw dust, or other fine powders, dust from polyurethane foam may irritate respiratory organs, eyes, and skin. Protective gloves, eye protection, and a dust mask should be worn when fabricating or cutting polyurethane foam.
- Not listed as a carcinogen (NTA, IARC, OSHA)

Ecological Information:

- Not a marine pollutant
- Does not bio-accumulate
- No mobility within soil

Disposal:

- Can be disposed of as ordinary industrial waste in compliance with local, provincial and federal regulations

Products - FillFoam™

FillFoam™ is a pre-expanded open/closed resin blown cell foam formula with ideal characteristics for any void filling applications. Pumped at full volume, FillFoam™ does not lose volume when pumped in confinement.

Benefits:

- No Heat is created during installation
- Safe to install at any rate or quantity
- Can absorb water from overburdened soils
- Immune to seasonal changes
- Hydro-Insensitive / UV-Insensitive
- Variable Densities of 10-50 PSI on site/same material
- 12 - 60 Cubic yards per hour depending on equipment
- Highly Flowable over 500 ft
- Lightweight & Strong
- FillFoam™ can be re-excavated if necessary

Density:

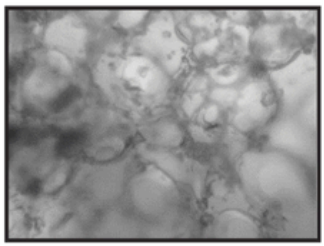
Averagelbs/ft^3	4-15 lbs/ft^3

Proportional Stress (PSI):

PSI	10 - 50 PSI

GelTime:

Minutes	15-60 Minutes



Environmental Impact of FillFoam™

What is FillFoam™ Made Of?

FillFoam™ is an organic material that is resin blown. It is nitrogen rich and is harmless to the environment. Nitrogen is not toxic since about 78% of the air we breathe contains this gas. It is lightweight, durable, solvent free, non-toxic and inert, non-flammable, and rot-resistant to both salt and fresh water. This material can be removed and re-purposed to grow plants. It is biodegradable and the perfect substrate for agricultural purposes.

Advantages of FillFoam™ Compares to Alternatives?

- The installation process of FillFoam™ is less invasive to the environment because there is little to no on site excavation. Once installed some formulas of FillFoam™ are able to stabilize the soil without disturbing or redirecting natural water flow other formulas can stop water flow.

- FillFoam™ is transported as a concentrate. Requiring less trucking and transport pollution than alternatives.

- FillFoam™ can absorb and retain water from surrounding soils that are over-saturated or overburdened by water. This water can be retained until it is drawn out from soils or plant life requiring water. Carrying this extra weight from water does not impact the strength or structure of the foam.

- In addition to filling voids and stabilizing soils, versions of FillFoam™ can be used to support plant growth. FillFoam™ products can increase watering efficiency by storing water and nutrients important to healthy plant growth. Formula options can be biodegradable and the perfect substrate for agricultural purposes.

Proven Safe

- Testing of non-metallic material for use with drinking water
- Water-leachable organic substances
- Environmental Risk Assessment
- University Studies
- Municipal Studies

Products - Soil Stabilizer

RR600 HMI soil binder is a low viscosity single component polyurethane designed to bind and stabilize loose soils. When the resin is pumped into soils, it reacts with the moisture and expands to fill voids and form a watertight barrier.

Note: SINGLE COMPONENT

RR600

Physical Properties	
Flash Point	395°
Auto Ignition Temp	>600°C
Viscosity	Dynamic; 380 MPA
Weight	10.4 per gallon
Boiling Point	>300° decomposes
Saturated Vapor Concentration	>32 µg/m^3
Relative Density	1.21
Vapor Density	8.5
Corrosiveness	Non Corrosive
Toxicity	Non Toxic

Appearance	
Physical State	Liquid
Color	Amber
Odor	SlightlyMusky

Applications **Stabilize Loose Soils in/under**	
Peat	LooseSands
SeaWalls	ConcreteFloors
Foundations	HelicalPiers

Cure Time
Results may vary

Factors that affect cure time

Moisturepresent %ofcatalystused

Lab Results in Sand	
%ofCatalyst	**CureTime**
0%	4hrs58min
.5%	24min
1%	23min
2%	19min
3%	16min
4%	8min

HMI SOILBINDER in stone	
519 psi	ASTM 39

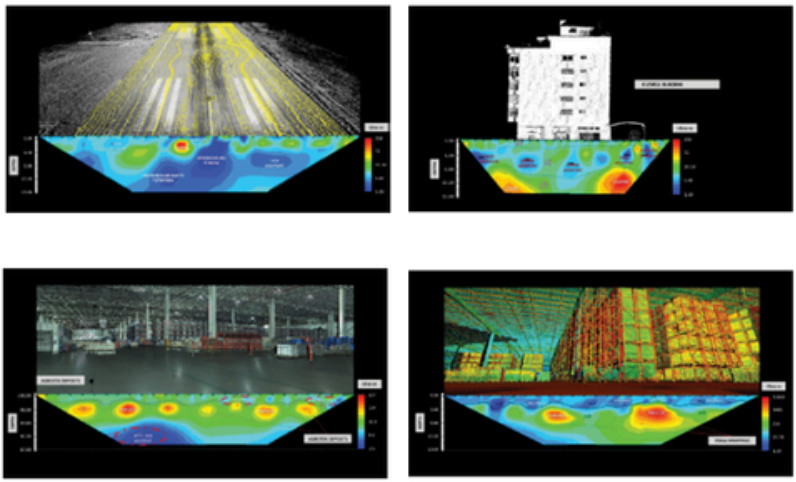
HMI SOILBINDER in sands	
783 2831 psi	ASTM 39

Engineering Support

- Project Consultation
- Project Design Recommendations
- Soil Evaluations

Project designs often call for more than one solution. Allow HMI to help evaluate your project. Understanding the existing soils, structures and failure points will show the way to your solution.
HMI and FillRite Technologies manufacture a variety of products to fit your project needs. With one or many of our amazing products you can stabilize soils, increase load bearing capacity and potentially reposition slabs or structures back to their original position.

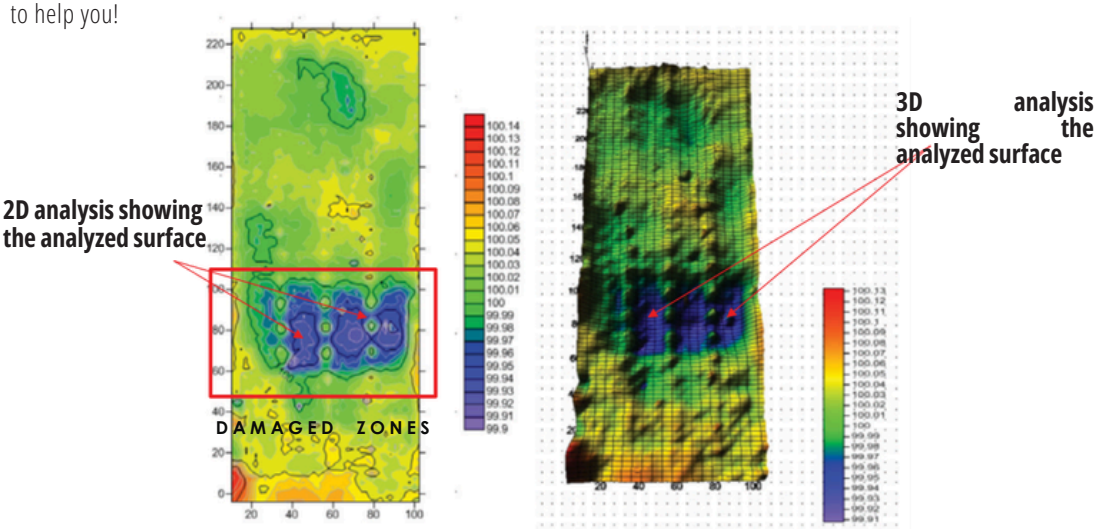
HMI & Fillrite Technologies rely on advanced technologies to evaluate and recommend project designs, allow our talented team to review your project. A complete understanding of the
problem will allow for a customized solution.

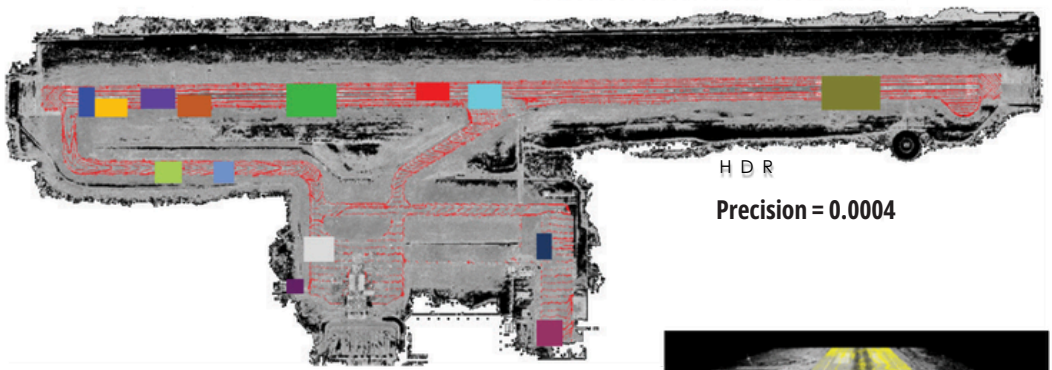


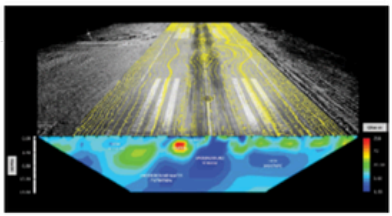
Engineering Potential

Vectorial System

Having a complete understanding of conditions above and below the surface is important to design an effective repair strategy. It is also important to consider how soils and moisture behaved that caused the failure. Knowing these details can guide the types of materials that should be used, where to put the materials and estimate how much material will be necessary. Not incorporating this engineering knowledge into a repair strategy could lead to insufficient repairs. HMI and FillRite technologies have access to the systems necessary for this sophisticated evaluation. Allow our team to help you!



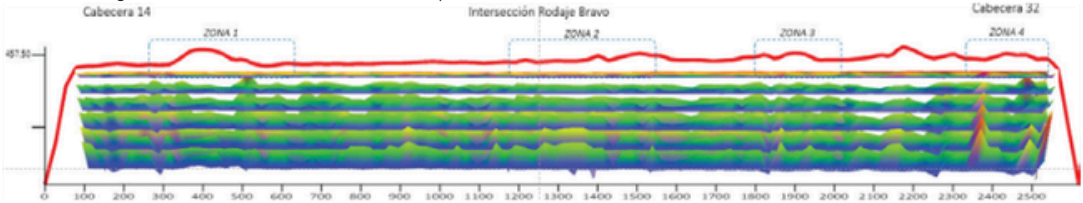




ZONE "A"
ZONE "B"
ZONE "C"
ZONE "D"
ZONE "E"
ZONE "F"
ZONE "G"
ZONE "H"
ZONE "I"
ZONE "J"
ZONE "K"
ZONE "L"
ZONE "M"
ZONE "N"

High Frequency Microwave Definition

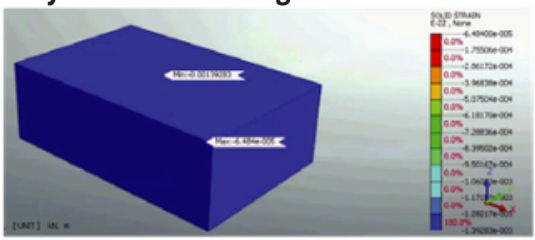
The study of High Frequency Microwave, allows to know the surface strata of the soil. 10,000 million signals per second bounce off the sub-floor, pavement, dirt and interior layers of concrete and masonry structures. Microwaves are measured and compared to mathematical models; The analysis of the data it generates allows to visualize and analyze the characteristics of these elements, and determine the thicknesses and humidity in the different strata that make them up, detect underground infrastructure, internal components and holes in the subsoil.



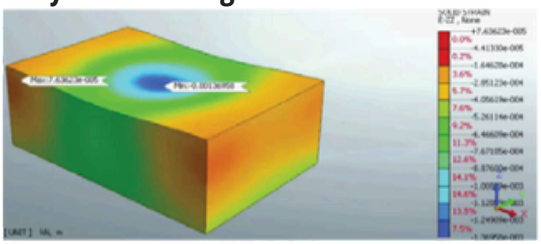
Finite Element Modeling Examples

After a Geophysical analysis is completed, modeling can be done to anticipate how the improvements will behave. Models can be executed to demonstrate how a runway was behaving prior to repair and also for how it is expected to behave after repairs are made. Similar models can show how a structure will behave with or without repair in a seismic event.

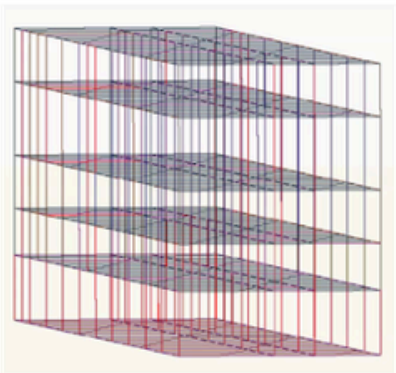
Polymer Free Modeling



Polymer Modeling



Seismic Accelerometer



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