



Vision: Revolutionizing the Construction Industry

The diagram illustrates the application of Giater Scientific technology across different construction stages. It features five circular inset images: a concrete pump truck, a construction worker on a site, a concrete mixer truck, a construction worker on a site, and a tall building under construction. Each inset image contains a small green circular icon with a white 'G' and a signal wave. In the center of the diagram is a hand holding a smartphone. The phone screen displays the 'Giater' app interface, showing real-time data: Temperature (°F) 53.0 (Min. 41.0, Max. 95.0), Moisture (%) 3357, and Strength (PSI) 3750. The date and time 'Oct 17, 2016 at 10:00 AM' are also visible. The Giater Scientific logo is present in the bottom left corner of the diagram area.



In-Place Strength of Concrete

Formwork Removal

Post-Tensioning

Opening Traffic on Concrete Pavement

Mass Concrete

Simultaneous Temperature Measurement

Heat Curing Optimization

Saw Cutting

Precast

+

Slab, walls, columns, beams, foundations, roads, dams, tunnels, tilt up, shotcrete...

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Challenge: How to Measure Concrete Strength?

Field-cured samples



Does not represent the actual concrete in-situ (smaller volume and different temperature)

Lab-cured samples



Does not represent neither the curing condition nor the in-situ concrete

Maturity meters



Measures the real temperature and strength in the concrete element



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Limitations of Concrete Cubes/Cylinders

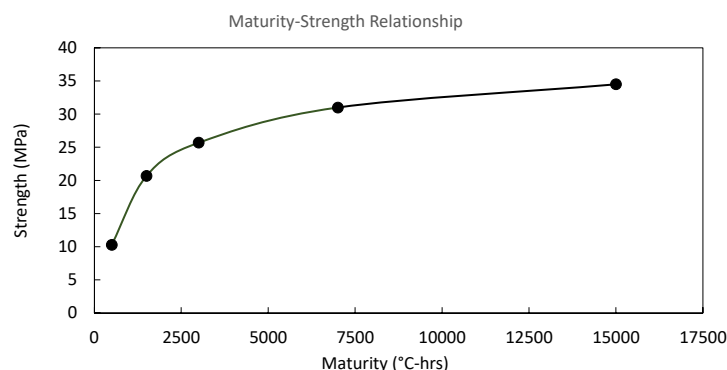
1. Accurate temperature conditions
2. Delayed results
3. Limited information
4. Local Variations
5. Low visibility



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What is Maturity?

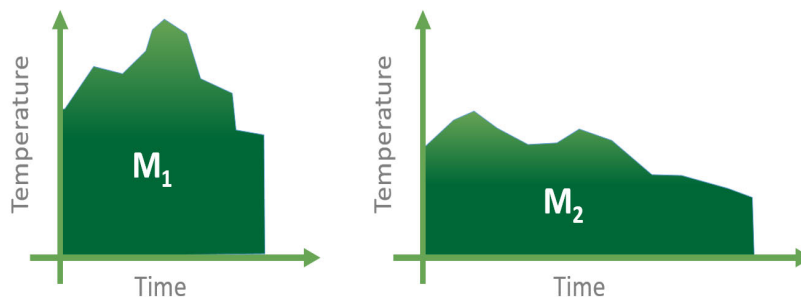
A unique relationship between the Maturity Index (a function of concrete temperature) and Concrete Strength for each concrete mixture



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What is Maturity?

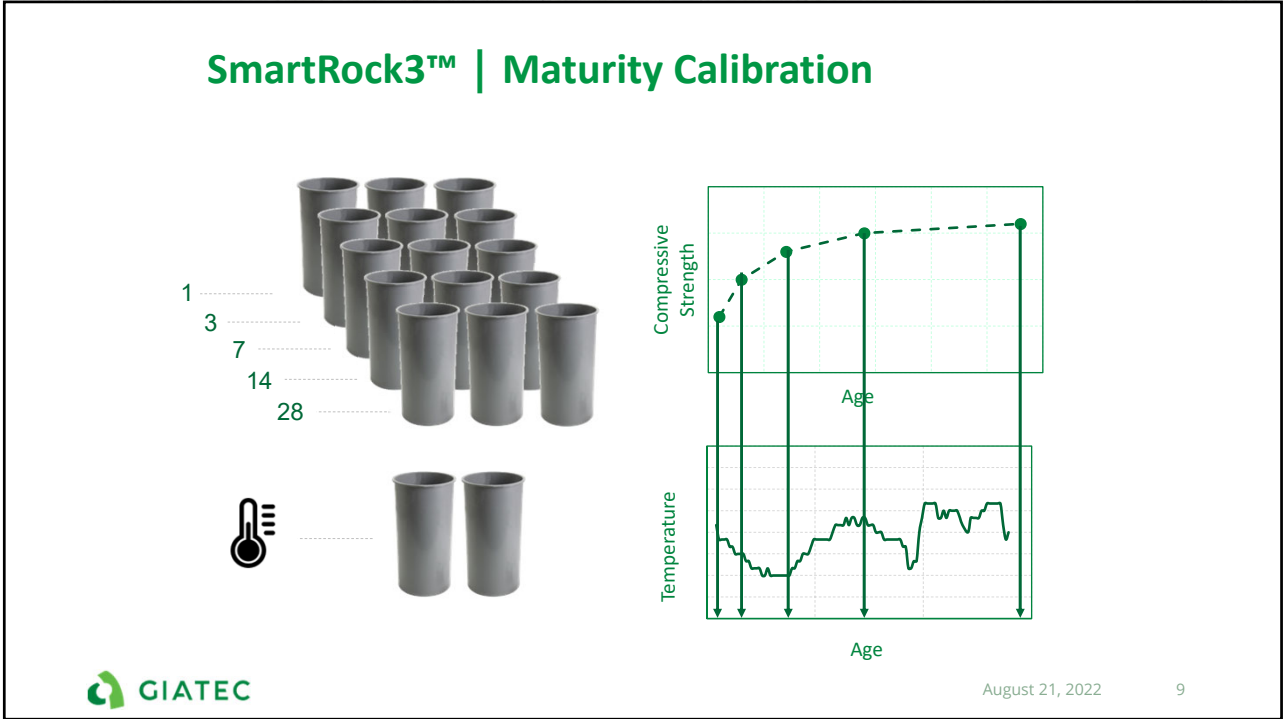
A **non-destructive method** to estimate the **real-time strength** development of in-place concrete, specifically at **early ages** less than 14 days.



$$\text{if } M_1 = M_2 \rightarrow f_1 = f_2$$



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Maturity Standards

North America	South America	Europe
<ul style="list-style-type: none">• ASTM C1074, ASTM C918• ACI 318-6.2, ACI 228.1R, ACI 306R• AASHTO T325• 28 DOTs with Specifications• CSA A23.1,2	<ul style="list-style-type: none">• NCh 170• NCh 3565:2018• NTP 339.217• NTC 3756• NTG 41042• NMX-C-219-ONNCCE-2005• NTE INEN 0694:2010	<ul style="list-style-type: none">• EN 206-1: 2002• BS EN 13670• NEN 5970

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CN Tower – First Maturity Project

- Construction from 1972-1976
- Utilized maturity sensors to indicate when to strip forms
- 3 full-time technicians responsible for readings
- Stripping time of 3 days achieved



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Friction Points: Concrete Maturity Systems

- Time spent installing wires
- Wires damaged and cut
- Expensive reader
- Complex analysis
- Mixture Calibration
- Major Effort





SmartRock3™ Sensor

QR Code: Scan QR code to tag the sensor

Logger/transmitter: Battery, Bluetooth antenna, memory and secondary temperature sensor

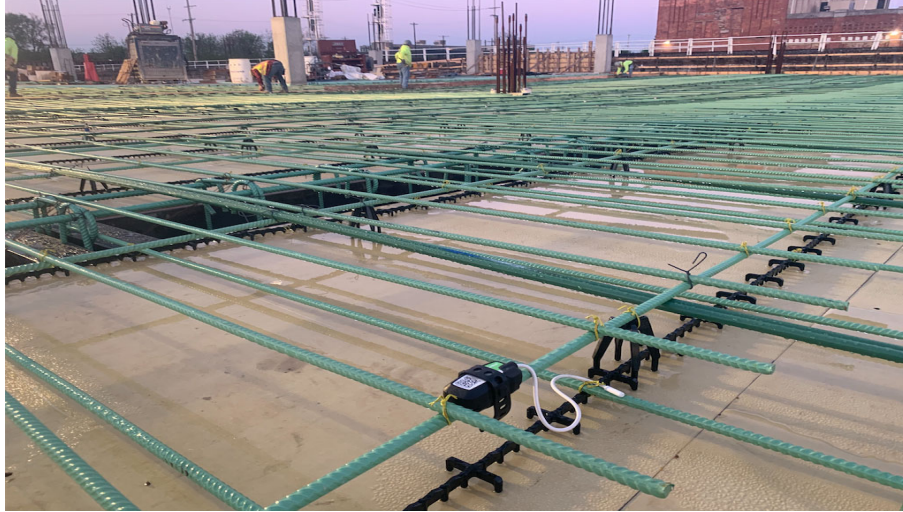
Temperature Cable: NTC

Installation strap: To secure sensor to reinforcement

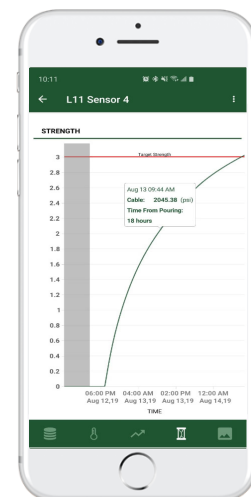
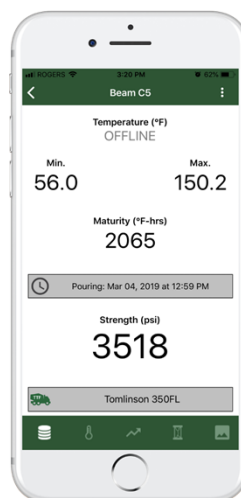
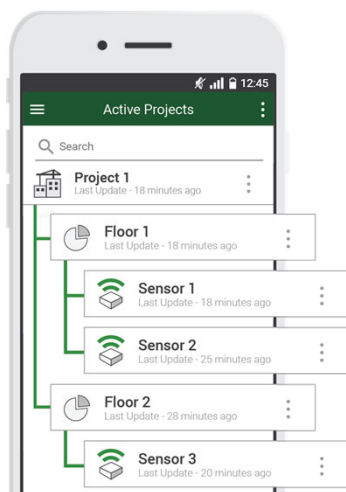
Activation channel: Pull out probe to activate sensor



Field Install Example



Mobile Application



SmartHub Solution

- Without the need to go to the jobsite, users can track the temperature and strength from anywhere, at anytime

- **Range up to 1000 feet**
- Real-time data display
- Wire-free and wireless technology
- Long battery life (1 month)
- Easy installation and activation
- Battery charger



Carbon Reduction Opportunities

- 50 story PT slabs
- 48-hour turnaround to pull
- Sensors gave required strength in 12 hours
- Cycle time was already as efficient as possible
- Instead chose cement saving opportunities
- 500 tonnes of carbon for the whole project
- AKA 1000 cars on the road for a year



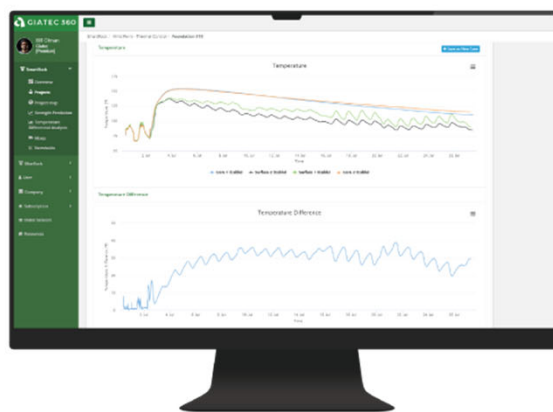
Beyond Maturity

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Giatec 360 & Artificial Intelligence

Giatec 360 – Dashboard



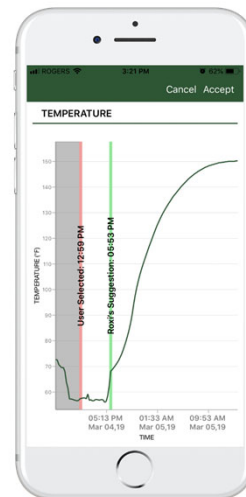
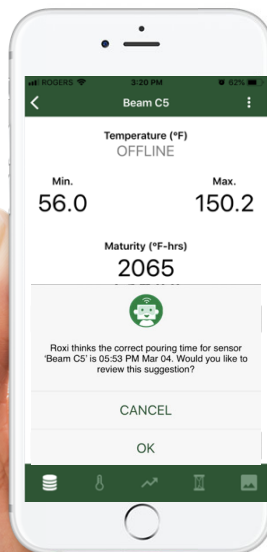
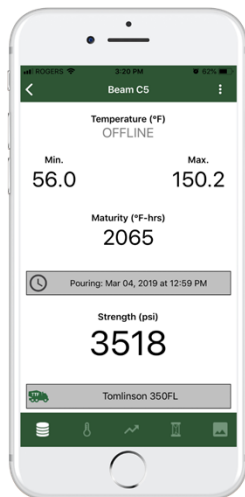
Roxi: Who is she?

The first AI program created for concrete testing

1. Suggests pouring time based on temperature history
2. Mix validation
 - Uncovers human error on maturity calibrations
 - Detects errors based on mix proportions
 - Suggests improvements based on maturity points
 - First unique AI to evaluate mix-design in the world
3. Proposes cement reduction based on mix performance



Roxi: Pouring Time



Roxi: Mix Validation

- Result of years of data collection and analysis
- Giatec's R&D team are still working on her development
- Constant positive feedback from users

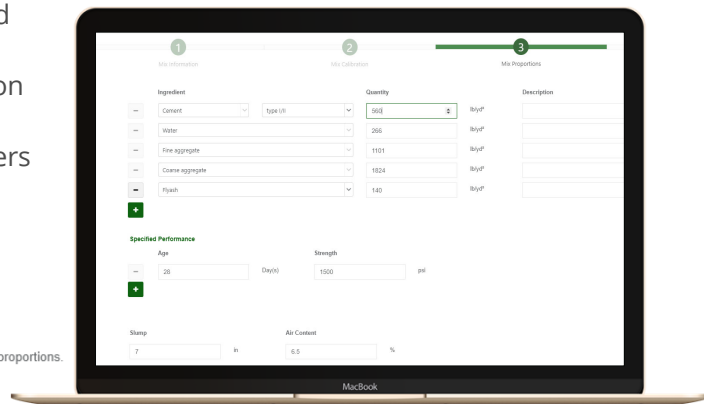


Your mix is looking good. Roxi found 0 issues with your mix



Roxi found 1 possible issues with your calibration

- The entered strength values seem to be high for the entered mixture proportions.



Cement reduction

- Our AI tool suggests:
 - How overperforming the mix is
 - Analysis on how many lb/yd³ (kg/m³) could be reduced
 - Direct relationship with CO₂ emissions

