INTELLIROCK MATURITY MONITORING SYSTEM

What the innovation is
intelliRock from Nomadics Construction Labs is a concrete maturity and temperature logging system. Using sacrificial sensors that embed in fresh concrete placements, the system calculates the in-situ strength gain in the concrete in real time. For mass concrete placements it also logs frequent temperature data to track the gradient between the core and the surface temperatures. Two patents have been filed on this product.

Why it is innovative
The intelliRock innovation is contained in the sensor, a highly engineered component containing a microprocessor, thermister and battery - all the electronics needed to calculate and digitally document in-situ concrete strength in real time, in an un-alterable (encrypted) format. It allows construction superintendents to make on-the-spot quality assurance decisions about construction activities such as form stripping, shoring / reshoring, post-tensioning, saw cutting, opening to traffic, etc. It is also an approved method under the January '02 OSHA (sec. 1926.752) requirement whereby the concrete strength must be documented prior to erecting steel on a concrete structure.

What it changed or replaced
The intelliRock system provides critical strength data to the concrete construction industry on-demand. As a result, it is changing the concrete construction industry in the following ways:

1. It enhances the contractor's critical path
2. It allows for early field validation of the concrete batching process
3. It provides quality assurance for the continuation of critical construction activities
4. It changes concrete placement in cold weather by providing real-time strength/temperature information: Allowing engineers to easily determine how much thermal protection is needed for the proper hydration process to continue in a timely fashion. Allowing construction to proceed safely, at the fastest possible rate

External maturity monitoring devices. These systems require a permanently connected external box to process maturity and temperature data. These devices are subject to damage, theft and vandalism. If the external box loses power or becomes disconnected from the thermocouple, they loose the data.

Where and when it originated, has been used and is expected to be used in the future
intelliRock was developed by Nomadics, Inc. of Stillwater, OK in mid-2002. To date, it is in use, or accepted for use by 25 state departments of transportation, the Federal Highway Administration, Department of Energy and Federal Aviation Administration projects. More recently Fairfax County VA Critical Structures Commercial Inspections Division has written the use of intelliRock into its inspection specification, allowing the use of concrete maturity (intelliRock) as an approved test method. This is a first for Fairfax County.

Tennessee Tech University's L.K. Crouch, Ph.D. completed a study in February 2003 comparing the strength gain curve at various temperatures and recommended to Tennessee DOT the adoption of the intelliRock system. The Houston District of TxDOT that previously had never allowed the use of concrete maturity, in one year (August 2002 -03) has let $850 million of projects that allow the utilization of the maturity method (intelliRock). Other notable uses of intelliRock: The 1-40 OK bridge rebuilding project (ENR August 19, 2002), contractor Kiewit; Dallas High Five project ($281 million) the largest single project in TxDOT history, contractor Zachry; Woodrow Wilson Bridge, contractor Tidewater/ Kiewit JV; Oakland Bay Bridge/ San Francisco approach contract ($171 million), contractor TutorSaliba, Washington Metro Area Transit Authority (WMATA) metro extension ($217 million), contractor Lane / Granite IV (ENR September 2003); Maricopa County Jail ($93 million), contractor McCarthy; University of Oklahoma Stadium Expansion ($52 million), contractor FLINTCO; Indiana Dept. of Transportation IH 65, contractor Gohmann Construction; DOE's first nuclear waste disposal project, Hanford, WA, contractor Bechtel. IntelliRock has also been recommended by Construction Technologies Lab (CTQ for use on mass concrete placement projects where they are consultants. Published case studies are available on our web site: www.intelliRock.com)

On the McCarthy and FLINTCO projects, project engineers provided a cost/benefit analysis showing savings of $175,000 against expenditure for intelliRock of $3500, and $309,000 saved versus $5000 spent respectively. On the WMATA / Lane project intelliRock allowed the project to progress on time without purchasing an additional traveling form system for approximately $1 million. intelliRock has been used on many civil as well as commercial concrete projects in the U.S. as well as in five foreign countries. It allowed construction projects to confidently continue placing concrete during the harsh winter of 2002-03, because of its ability to monitor and document in-situ concrete temperature in real time, e.g. Minnesota DOT, Washington D.C. metro, University of OK football stadium, Marriott Courtyard.

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intelliRock
concrete facts • superior results

2004 NOVA Award Nomination

The intelliRock System

Pam Culbertson, McCarthy Project Engineer, takes a reading using the intelliRock System

Paving contractor embeds intelliRock sensor in freshly poured section of pavement

Taking a strength reading using the intelliRock system

IRD CONCRETE MATURITY MONITORING SYSTEM

What the innovation is

The IRD Concrete Maturity Monitoring System is a “wireless” concrete maturity and temperature logging system. The system uses RFID (Radio Frequency Identification) which allows you to receive the in-situ temperature of the concrete without connecting wires.

Why it is innovative

Almost everyone in the concrete industry agrees that using concrete maturity to determine the fitness and strength of the concrete is the preferred method. The benefit of maturity testing is that it provides immediate and continuous data on the progress of concrete strength gain of the inplace concrete. This is especially important if you need to open the project to traffic quickly or are on a fast track schedule. The IRD Concrete Maturity Monitoring System allows users to save time by communicating to RFID Sensor Tags buried in concrete. With recent advancements in technology, it is now possible to use Radio Frequency Identification to gather temperature data in a very cost efficient and cost effective manner. The raw temperature data provides the information to determine optimum concrete strength, curing rates, and documented quality control data. The IRD Concrete Maturity Monitoring System consists of a handheld reader, a transponder with the ability to monitor temperature along with the software needed to collect the RFID data.

What it changed or replaced

This new concrete maturity system differs from older systems which required that the user string wires from buried sensors to an external device to read the temperatures. This older method of sensors and wires caused frustration for users because of the difficult process of stringing the wires, then discovering later that one or more wires was broken either internally or externally. The IRD Concrete Maturity Monitor requires no wires. Instead a RFID Sensor is buried in the concrete and is read by a handheld RF device, such as a HP, PDA.

Where and when it originated, has been used, and is expected to be used in the future

The IRD Concrete Maturity Monitoring System was developed in 2002/03 by International Road Dynamics Inc. of Saskatoon, Canada and Identec Solutions Inc. of British Columbia, Canada. The system uses RFID Tags from Identec Solutions, a handheld PC, and IRD Concrete Maturity Software. The system is marketed in the United States by Wake, Inc., of Sturgis, Michigan. Tony Angelo Cement Construction Company (TA) of Novi, Michigan, who is the paving contractor on the reconstruction and widening of Grand River from Novi Road to Beck Road in Oakland County, used the IRD Concrete Maturity Monitoring System in 2003. TA embedded several of the wireless temperature meters into the newly placed pavement. With a handheld computer, data was collected and analyzed to provide a concrete strength value. The information recorded included the current temperature of the concrete, the temperature when the concrete was poured, the date it was poured, and the dates of when it was previously checked.

According to Andrew Definis, Project Engineer for Tony Angelo, they decided to use maturity testing on this project in order to expedite the opening of the entrances to businesses along the project providing customers with access to their shops as soon as possible. "By using the maturity testing, we are able to open the pavement as quickly as possible. The maturity system provided instant real time concrete strength results. During critical times, readings were often taken a couple of hours apart to monitor the concrete strength in an effort to move traffic on to the concrete.”

The use of wireless technology in the construction industry is gaining momentum daily, as proven by DOT’s, Port of Authority’s, Cement and Construction Companies. The IRD System has been used to date by the Port of Authority NY & NJ, Michigan DOT, Federal Highway Administration, CalTrans, Tony Angelo Cement Construction Co., Six-S, Inc. Pavers, and the Kentucky Transportation Center.

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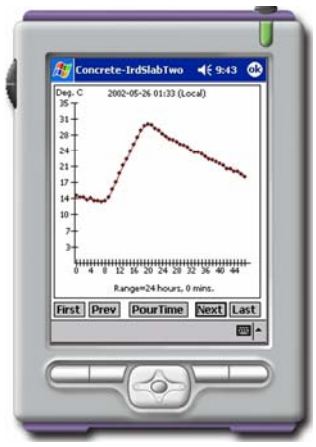
This engineer is receiving his concrete maturity temperature while sitting in his truck at the side of the road.



A sample of the temperature log as displayed on the handheld PC.

A photo of the handheld PC during a reading.

The iTAG.