WaveLogix®

Transforming Concrete Testing

As infrastructure projects grow more complex, finding smarter ways to monitor and accelerate concrete curing has become a priority for construction agencies. The long wait times to reopen concrete roads and bridges after their construction make the issue even more critical for departments of transportation (DoT) around the country. The Indiana Department of Transportation (INDOT) was facing the same challenge when it commissioned Dr. Luna Lu and her lab at Purdue University's top-ranked Lyles School of Civil Engineering to find a solution.

In response, the team conducted extensive research into concrete's resonant characteristics while curing, culminating in the discovery of the REBEL® concrete sensor. This groundbreaking technology can reliably and rapidly assess the strength of concrete as it cures to help DoTs open the roads as soon as possible — a significant advantage over conventional methods.

"Current testing methods like cylinder and beam tests are time-consuming, inconsistent and prone to human error, often leading to over-design and increased costs. Our technology eliminates these issues by providing continuous, real-time, in-situ data on concrete strength, helping to optimize construction schedules and avoid premature infrastructure damage," says Dr. Lu.

The sensor, placed on the ground or within the concrete, measures its varying resonant characteristics to determine real-time strength, expressed in pounds per square inch (PSI). An extensive database and advanced AI algorithms allow the device to self-calibrate at deployment, making it a true plug-and-play device.

The technology was quickly adopted by various DoTs around the U.S., and the American Association of State Highway and Transportation Officials (AASHTO) approved it as a new standard, AASHTO T412-24. Following the successful R&D program and overwhelmingly positive feedback, Dr. Lu and her team launched Wavelogix® Inc. to expand the product's reach further. The company has partnered with the Federal Highway Administration (FHA) and state DoTs, including California and Texas, to test and refine the REBEL sensor.

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These collaborations have validated the REBEL system's performance across diverse environments, establishing it as a reliable nationwide road and bridge construction tool.

The system includes the REBEL Echo concrete strength sensor and REBEL Sentry datalogger, both rugged, U.S.-made devices designed for durability. The Echo sensor introduces sonic waves into the concrete, directly measuring mechanical properties like strength development over time. Subsequently, the data is shared with the data logger, allowing users to access metrics such as strength, temperature and ambient temperature.

The system is connected via an easy-to-use IoT-enabled platform accessible through mobile or desktop, ensuring that all stakeholders, from engineers and contractors to DoT officials, can monitor project progress remotely and accurately.

Beyond streamlining the testing process, the REBEL® also reduces waste and over-design by providing precise, actionable data. Contractors using the sensor can make decisions based on actual material performance, minimizing the tendency to add extra cement as a precaution.

In one instance, a client using the REBEL system reduced cement use by 30 percent, lowering project costs and environmental impact. Another client using the technology has significantly accelerated their construction schedule by replacing three-day cylinder testing with real-time strength monitoring. They can now determine when concrete reaches the required strength and reopen traffic immediately after major road renovations.

As infrastructure demands continue to grow, Wavelogix® stands at the forefront of a new age in construction management where data accuracy and timeliness can redefine safety standards and economic efficiency. Through the REBEL™ Concrete Sensing System, Wavelogix is simultaneously providing a solution to current construction challenges and paving the way for smarter, more resilient infrastructure worldwide.

Company
WaveLogix®

Management
Dr. Luna Lu, Founder & CEO

Description
Wavelogix® is transforming infrastructure management through the REBEL® Concrete Sensing System, a groundbreaking technology that provides real-time, in-situ concrete strength..Continue Reading