

OPINION

A Better Way To Pour Concrete

Wireless sensors, data analysis, and artificial intelligence are transforming concrete into a more precise building tool.

by *Rick Yelton*

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If Joerg Westreicher has his way, the process of delivering fresh concrete will soon change. Contractors, owners, and engineers will no longer experience the 28-day wait for final concrete results. The Austrian engineer envisions a cohesive information system that creates a just-in-time delivery procedure with accurate quality control, bringing kaizen, or continuous improvement, to one of construction's most inefficient processes.

Westreicher is just one of a group of engineers who are combining telemetric and wireless sensing and artificial intelligence to improve the delivery and quality of fresh concrete. The net result of this technology fusion is the transformation of ready-mixed concrete from a

Combining technologies

For more than a decade, new technology has worked its way into concrete construction projects. Concrete mixer trucks are equipped with GPS transmitters connecting drivers to dispatchers. Engineers are monitoring the hardening rate of fresh concrete on projects using maturity meters. And powerful computer software programs have enabled design engineers to assess the effectiveness of mix designs following placement.



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THE DIGITIZATION OF CONSTRUCTION EQUIPMENT

What's new is the effective combination of these technologies. And, more importantly, these new information transfer systems are allowing contractors to collect real-time data on their projects. Now, control of the project's efficiency is in the hands of the superintendent on a jobsite.

The right product in the right spot

Proper concrete delivery is important to reduce risk factors for a contractor's legal liability for concrete quality. While large, costly legal settlements are rare, minor errors in delivery procedures are common. Ready-mixed concrete producers have hundreds of recipes on hand that must be matched to thousands of projects across their marketplaces. Ensuring that the proper mix is delivered to the exact location with the proper consistency is challenging.

Westreicher and his team at Amstetten, Austria-based Doka recently unveiled Smart Pouring. The mobile app is designed to optimize the entire order and delivery process. The system monitors key order details such as required compressive strength, delivery time, delivery site, and placement method. When the job order is placed by the placing crew, Smart Pouring verifies key data to avoid mix-ups and misunderstandings.

The app follows the order through batching into the assigned concrete truck. The system then monitors the delivery to ensure that concrete load is consistent from the initial order to the

Smart Pouring also monitors the location of the concrete's placement. It can use Bluetooth beacons to ensure that the concrete ordered is installed in the specified location on a building or on the proper lot.



Bulk Construction Materials Initiative's Material Now app for concrete contractors captures actual contractor/producer performance data on every placement.

Increasing contractor productivity

Delays and delivery inefficiencies are the bane of every residential concrete project. A new interactive concrete dispatching system goes beyond tracking orders to actually provide owners and contractors real-time information that allows for better business decisions.

Bulk Construction Materials Initiative's Material Now app captures actual contractor/producer performance data on every placement. It transforms information such as length of pour, waiting time, and job completion time to create job, crew, and company efficiency factors. Contractors and project managers can follow a job's progress using mobile or web apps.

Mining big data for better quality

When project timelines are tight, waiting for fresh concrete to harden can be a frustrating guessing game. The guesswork involved in selecting the most effective concrete recipe for current project conditions can be eliminated with the application of a process called machine intelligence.

Maturity sensors have been providing real-time monitoring of early-age concrete strength for several years. Contractors use information to decide when to strip forms, tighten post-tension anchors, and remove shores. These decisions can significantly reduce project build time.

But by using the analysis process of machine technology, the Roxi artificial intelligence tool can detect anomalies at various stages of the concrete life cycle. Roxi was built specifically for Giatec's SmartRock wireless concrete sensor.

Roxi's technology compares current sensor conditions to past measurements gathered by Giatec maturity sensors placed on more than 3,800 projects worldwide. Users can select the conditions to be compared with in regards to jobsite ambient temperature, placement type, and anticipated strength gain.

Roxi can detect any subtle variance from what should be the norm. The technology alerts users of a potential problem during production, delivery, placement, hardening, and even in service. The technology is so accurate that it produces a real-time assessment and prediction of concrete performance during these stages at a speed that is nearly impossible for humans.

By incorporating the power of big data, wireless sensors, and artificial intelligence, the latest generation of technology can transform the inefficient concrete pouring process into a precise, high-performance building practice.

Rick Yelton

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