

CASE STUDY



Ensuring a "Concrete" Infrastructure

Massachusetts DOT partners with Metalcraft using RFID to identify specimens for testing

According to the US Department of Transportation and the Federal Highway Administration, the repair and rehabilitation of aging highway infrastructure continues to be a challenge for all US highway agencies. Thousands of miles of highway pavements need rehabilitation with many carrying over 100,000 vehicles per day.

With service life expectations of at least 20 years for repairs and at least 40 years for continuous applications, precast concrete pavement (PCP) technology is gaining wider acceptance over inconsistent methods like rapid-setting concrete in the United States for rapid repair and rehabilitation of concrete pavements. It is also used for the reconstruction of heavily trafficked asphalt concrete intersections.

So, as millions of families set out on summer vacation this year, they take for granted that the roads are safe, well-constructed and well-maintained. But, as you are about to read here, there's a lot going on behind the scenes that goes into ensuring that is the case.

The Central Laboratory at the Massachusetts Department of Transportation houses the Research and Materials Section. One of their primary duties is to test materials used in construction to make sure they are high quality and meet the specifications set forth by both local and national organizations.

Testing the materials requires assigning each specimen a unique identifier according to Jason Robertson, Chief of Laboratories with the Massachusetts DOT. The team decided to use radio frequency identification (RFID) technology due to its robustness, plus the fact that RFID does not require line-of-sight to read the tag. As Program Coordinator Alana Geary explained, "If the concrete was particularly watery, the ink on barcode only tags would wipe off."

Each RFID is programmed with a unique identifier that links a specific concrete specimen to a sample record with information about the concrete mix design, sampling conditions and test requirements. Robertson explains that with a sample comprised of 12 or more cylinder specimens, some specimens are tested at 7 days while others are tested at 28 or 56 days. "The RFID tags help us track the sample inventory for each specific cylinder," he said. "Having that unique serial number allows us to manage and retrieve data quicker."

The ability to quickly retrieve the data is key according to Richard Mulcahy, Materials Field Control Engineer with the Massachusetts DOT. "RFID gives us the ability to serialize a specimen and attach it to a test result, a source location - all the stuff you have on a test card is now attached at the hip with that specimen number," he said.

The team uses the RFID tags to identify the different concrete specimens either by embedding them into the concrete cylinder or taping them on after the concrete has set with minimal difference in readability - still within the standard deviation.

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**RICHARD
MULCAHY**

Materials Field Control Engineer
- Massachusetts DOT

SOLUTION

The team researched a half dozen RFID/barcode companies and came across Metalcraft. "They were the best as far as giving us what we needed for it anywhere from the inlay to the tag material itself," said Mulcahy. "They had the most success in providing durable tags with the adhesion we needed for the specimens we were tagging."

Metalcraft recommended two tags for the applications presented. One of the tags is a 3.8" round version of Metalcraft's Flex Hard Tag. This best-selling RFID tag features a semi-rigid polyester construction that offers increased durability and strength over other RFID tags. The RFID Flex Hard Tag is also rated for IP68 Ingress Protection, ensuring protection against submersion in water and against dust particles.

RESULT

Although the design and construction of the RFID tag took some time and the team tested various prototypes in the field, the team is pleased with the outcome and plans to continue tracking the concrete specimens using RFID technology. "It's been extremely helpful for inventory management," said Geary.

They would like to expand the use of RFID technology within the department. "Ultimately, asset management is something we could do down the road," she said. "But I think the focus right now is on lab management."

Geary feels especially good about the valuable information the team can provide and is then used in the evaluation process. "Taxpayer money that goes into the construction projects we know will be used efficiently because it is being used on very high-quality products."

For more information on this application or RFID for concrete products, please contact Metalcraft at 800-437-5283 or info@idplate.com.

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