

RABIT™ Bridge Deck Assessment Tool



Winner of the 2014
Charles Pankow Award for Innovation



Selected as an ASCE
Game Changer in 2015

#GAMECHANGERS



Cited in the ASCE
2017 Report Card

Developed by

RUTGERS

Center for Advanced Infrastructure
and Transportation



U.S. Department of Transportation
Federal Highway Administration

RABIT™ is the first fully automated robotic device for making comprehensive condition assessments of concrete bridge decks based on quantitative data. It is a fast, safe, and thorough tool to help bridge owners make data-driven maintenance and repair decisions that extend the service life of vital infrastructure.

Provides comprehensive condition assessment of concrete bridge decks. RABIT™ uses high-resolution imaging and multiple NDE tools simultaneously to gather and geo-tag quantitative data on areas of delamination, corrosion, and degradation as well as surface conditions.

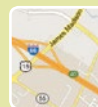
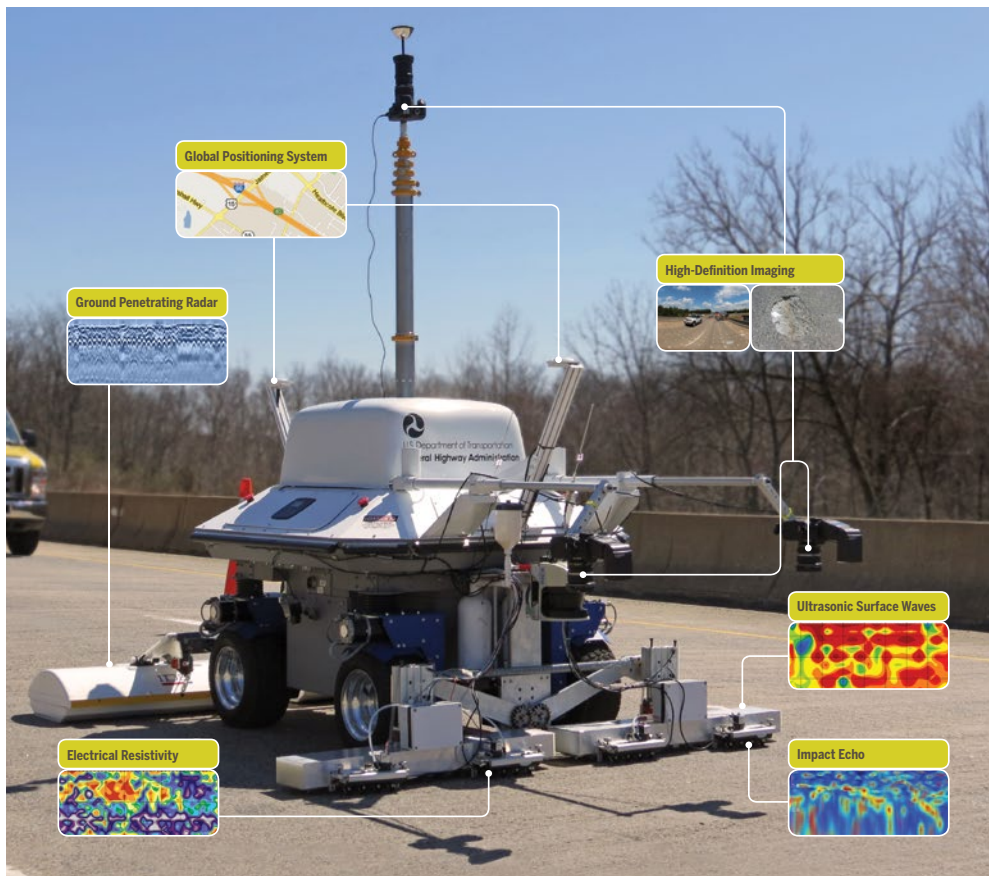
Simplifies operation, data presentation, and analysis. RABIT™ is easy to set up, operates autonomously, and automates the majority of data analysis. Its custom data integration and visualization modules provide an intuitive, comprehensive picture of all critical deterioration features.

Improves speed of data collection and analysis. Because RABIT™ deploys multiple tools simultaneously, it gathers data four times faster than individual NDE tools. It is transported in a vehicle that serves as a mobile command center in which real-time data transmitted wirelessly from the robot is processed and compiled by on-board computers and displayed as clear visualizations of deck condition. Crack maps, surface images, and NDE data can be analyzed on the spot.

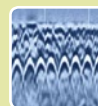
Saves time and money. RABIT™ significantly reduces the cost of comprehensive bridge deck inspections. It increases productivity, reduces the number of field technicians needed on site, and lessens traffic disruptions that can inconvenience drivers and businesses.

Improves safety for inspectors and motorists. With faster data collection, shorter lane closures, and fewer technicians on the bridge, RABIT™ minimizes workers' and drivers' exposure to the risks inherent in roadway work zones.

Minimizes negative environmental impacts. RABIT™ runs on clean, rechargeable batteries. It also alleviates work zone congestion and resulting traffic emissions.



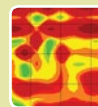
Global Positioning System records and tags all data gathered with exact position coordinates and orients/guides the robot.



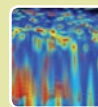
Ground Penetrating Radar is used to detect suspected flaws or characterize apparent deterioration.



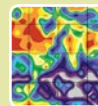
High-Definition Imaging captures detailed images of the deck surface and 360-degree views of bridge features.



Ultrasonic Surface Waves assess the quality and modulus of elasticity, indicators of the strength of the concrete deck.



Impact Echo detects and characterizes delamination (horizontal cracking) with respect to depth, spread, and severity.



Electrical Resistivity diagnoses the severity of the corrosive environment within concrete decks.

The RABIT™ Story

In 2011, FHWA Administrator Victor Mendez challenged FHWA's Long-Term Bridge Performance (LTBP) Program and CAIT to develop a system that would enhance and streamline condition assessment of the nation's bridge inventory.

The team set to work, conceptualizing a way to deploy multiple NDE tools that are effective for detecting and characterizing the biggest culprits in bridge deck degradation: corrosion, delamination, and concrete quality. They wanted their invention to operate autonomously so it could systematically collect data faster than manual NDE methods, but without compromising data integrity or resolution.

The product had to link data points with their exact location, merge the data from all the NDE tools, and deliver an easy-to-interpret, comprehensive picture of deck condition—inside and out—in real time. Safety, efficiency, and easy operation had to be part of the package as well.

It was a tall order, but in November 2012, about a year after Mendez's challenge, RABIT™ functioned flawlessly at its public debut. Mendez and the other FHWA dignitaries there to witness its unveiling were duly impressed.

"This is what we've been talking about at USDOT and FHWA—it's about innovation and bringing solutions to the real world. ... It's so important that we're able to solve problems today, not five years from today. ... What you have done here is really, really amazing," said Mendez.

Since 2012, the team has been refining RABIT™ and validating its performance in the field. To date, it has inspected about 1.2 million square feet of bridge decks in Delaware, Illinois, Maryland, New Jersey, Pennsylvania, and Virginia for clients such as the New Jersey Turnpike Authority, Michael Baker Corporation, USDOT, and state DOTs.

Steps to commercialize RABIT™ and make it available to transportation agencies across the country are underway.

RABIT™ Creators

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