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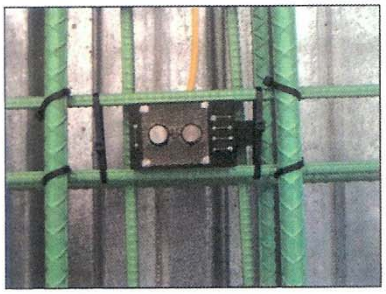
NDE Corrosion Detection



WITHOUT proper upkeep, it is only a matter of time before all reinforced concrete structures fall to the forces of our natural world. Technologists know that to counteract corrosion of the concrete's rebar, vigilant maintenance is necessary.

The repair bill to fix the nation's highways, bridges, dams, and buildings that do suffer from rebar corrosion nears $250 billion each year, or about 4.2 percent of our annual Gross National Product. Until new construction materials replace or reformulate reinforced concrete, it is extremely important that we find non-evasive methods of locating corrosion before it causes structural damage.

A predictive diagnostic system is the most cost-effective way to determine such maintenance needs. These systems mine data to report a structure's current working conditions. They can also project when specific types of maintenance should be performed.

A new predictive diagnostic system that can network information about the steel rebar of reinforced concrete has just reached the marketplace. The system has been developed by the Charlottesville, VA, electronics instrumentation company, Virginia Technologies Inc.

During construction, their Embedded Corrosion Instruments (ECI) sensor units are attached to the rebar at appropriate locations before the concrete is poured. This turns the completed structure into a system of networked sensors that can use wired or wireless communication to monitor the full structure.

Since the ECI-1 system is embedded into the concrete during construction, it is called a Non-Destructive Evaluation (NDE) system, which has many advantages over older systems that require drilling holes into a completed structure. The two most obvious advantages are that sensors aren't individually monitored and their placement can be critically planned into a corrosion map of the full structure.

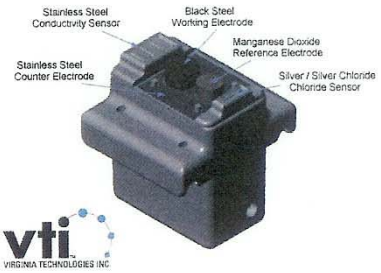
Even before the construction project is completed, the ECI-1s that have already been embedded into the concrete can start communicating with each other and send their information to a Datalogger mounted in a safe storage area on the premises. The ECI-1 system then begins monitoring during construction, providing readouts of the temperature, moisture, and sodium chloride levels of the curing concrete that has already been poured.

The Datalogger is the name of the data collection unit, and it is not embedded in the concrete. It is protected from the environment and outsider tampering by placing it in an approved locked structure or box.

The communications and power cables that tie together all of the ECI-1s attach to the Datalogger. These cables supply power and cross communication to the system. The Datalogger is powered by the electrical system of the structure or a solar-powered collector if the structure has no power service.

Photos courtesy of Virginia Technologies Inc.

The first system was installed in March of this year in the 460 Bi-Pass under construction in Lynchburg, VA. A second system is presenting being installed at the Kennedy Space Center in



Florida. When these structures are completed, data mined from the individual ECI-1 units will be processed into a map that monitors the levels of corrosion throughout the entire structure. A computer program may then be used to plan the structure's maintenance.

You can learn more about NDE corrosion detection by visiting VTI's website at **www.vatechnologies.com/eci.htm**.

Recalling the Facts

1. What is NDE corrosion detection and why is it important?
2. What is a predictive diagnostic system?
3. How many structures currently use the ECI-1 system?