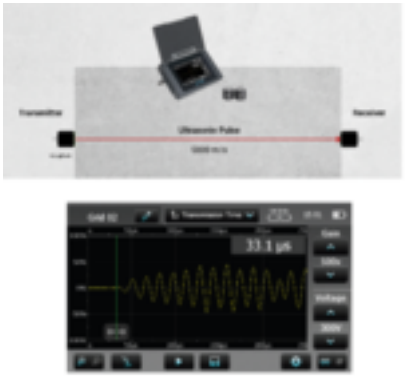
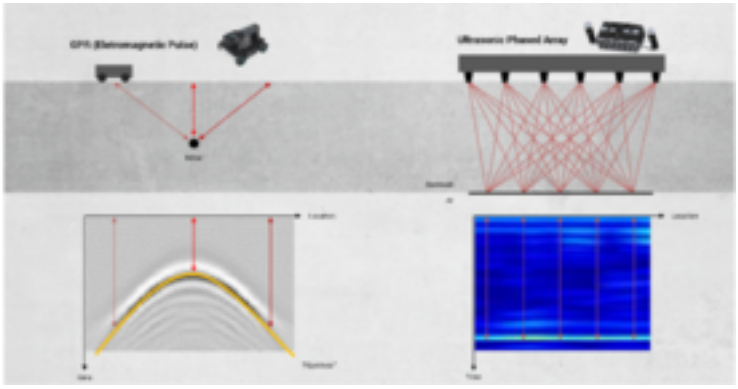
Evaluation of Reinforced Concrete Dock Slab After Epoxy Resin Injection, Brazil

Overview

Due to cracking in the reinforced concrete dock slab caused by failures in the concrete curing process, the injection of epoxy material was evaluated to fill the cracks and maintain the structure within the design requirements.

Three technologies were applied for this crack filling certification: Pundit PL200 Ultrasonic Testing, Pundit PD8050 Phased-Array Ultrasonic Pulse-Echo, and GP8000 Ground Penetrating Radar. In an integrated approach, the three technologies worked together to obtain information about the crack filling in the concrete structure.





Challenges

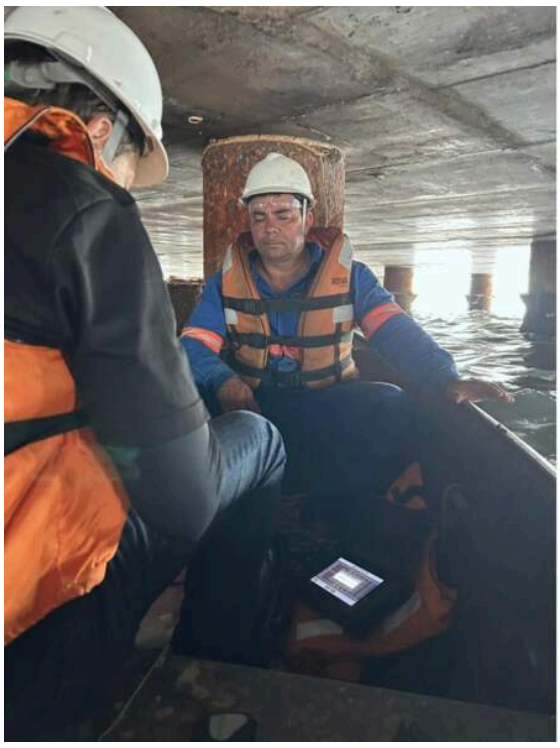
Due to the size of the slab and its position just above sea level, studying the tide chart was the first step to identify which days and times would be suitable for data collection from beneath the concrete slab using the technologies. Truly a race against time. Another time-demanding factor was the preparation of the slab's contact surface for equipment application.

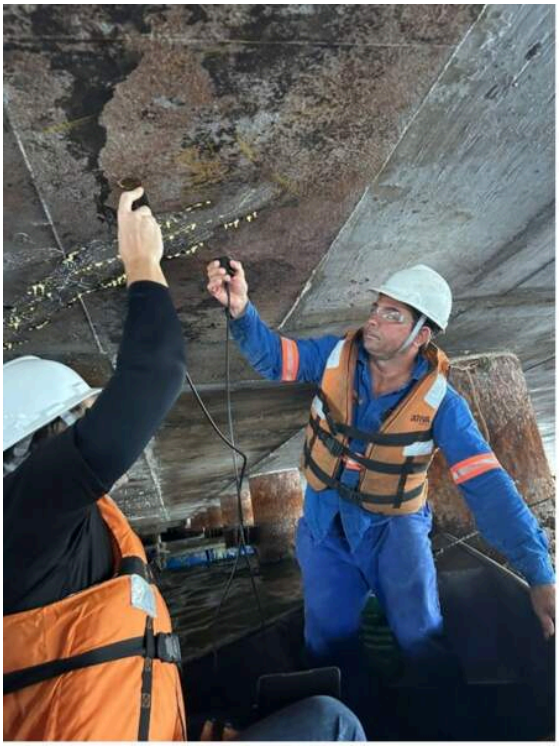
It was necessary to remove the epoxy injection pins and, in some areas, sand the surface to enable transducer coupling for the ultrasonic tests. Marking the reading areas and even data collection with the Pundit PL200, Pundit PD8050, and GP8000 GPR technologies required physical endurance due to the access clearance of less than one (1) meter between sea level and the underside of the concrete slab. Using a simple boat anchored to the structure was the fastest way to access the reading areas.

Solutions

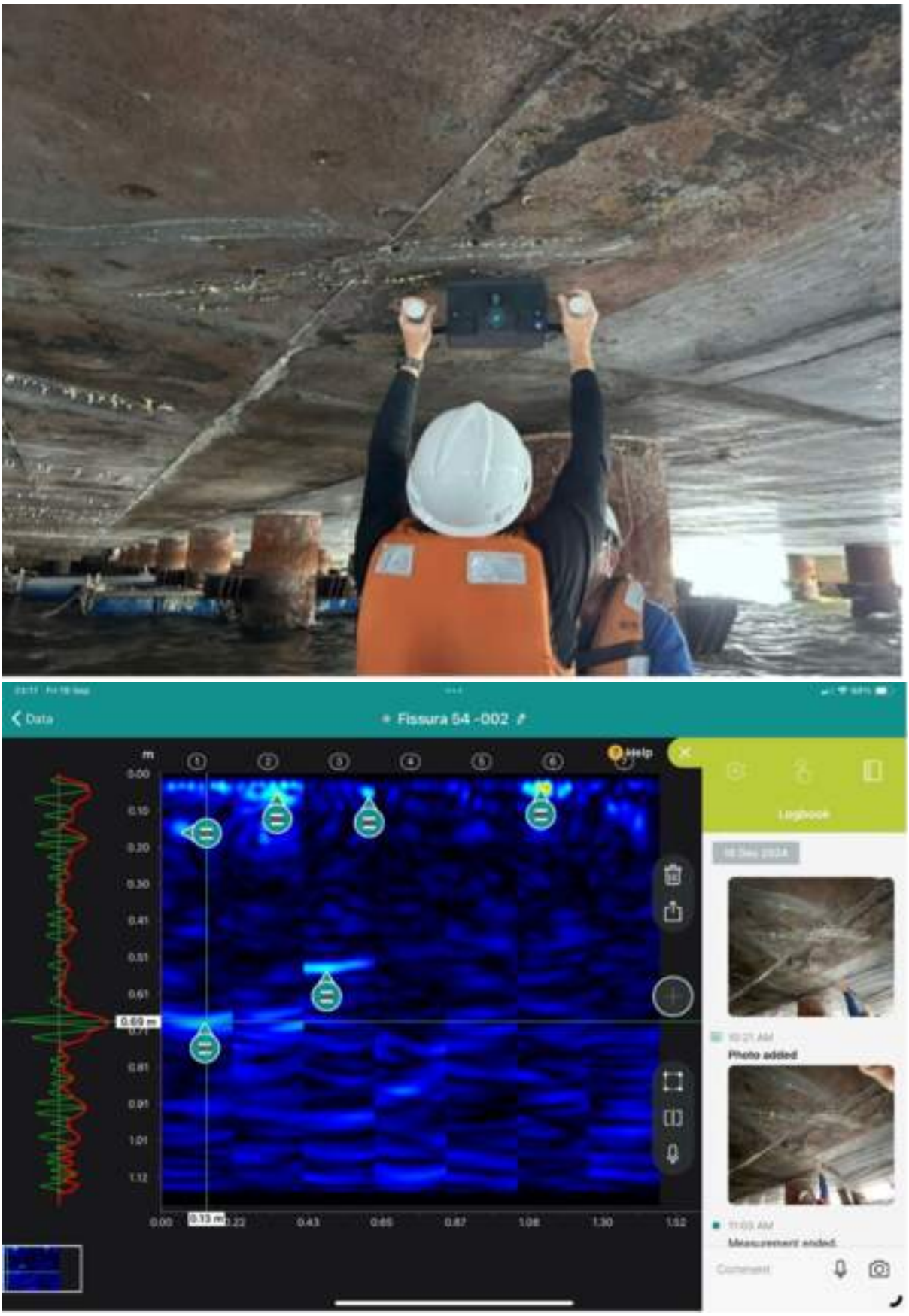
Each technology fulfilled its role in this challenging project. The application of the GP8000 GPR helped us locate the structure's rebar mesh, identify the best data collection areas for ultrasonic testing, and ensure coverage. Thanks to the GP8000's exclusive Stepped Frequency Continuous Wave (SFCW) technology, clear visualization of the structure's reinforcement was possible.

Using the Pundit PL200, it was possible to identify potential areas with inadequate epoxy injection filling through the surface ultrasonic pulse transmission. By analyzing variations in the ultrasonic wave propagation velocity between the Pundit PL200's transmitter and receiver transducers, we identified points where the epoxy injection in the concrete slab was correctly executed.





The use of the Pundit PD8050 phased-array pulse-echo further assisted in verifying areas not filled by the epoxy injection. Through the phased-array pulse-echo, which can reach up to two (2) meters scanning depth, tomographic imaging enabled the visualization of some cracked regions that were not completely filled by the epoxy resin injection.



Conclusion

We understand that each equipment applied for the concrete slab inspection provides specific information about the actual conditions of the structure. The integration and analysis of this information becomes essential for decision-making regarding the success of the concrete structure recovery and its subsequent use.

By Rodrigo Duarte / Screening Eagle Brazil 2025-October

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