

Simple solution allows more efficient inspection



DOING THE WORK OF DIVERS: (l-r) Tony DePasquale and Tom Heary of the Civil & Structural Section oversee placement of "DZI" (dry setting installation) mobile cofferdam against a steel sheet pile bulkhead along New Jersey's Point Pleasant Canal on Oct. 19. (Photo by Jan Makowski)

"Why didn't I think of that?"

Every so often, some new product will come forward that causes millions of Thomas Edison wannabes to ask such a question. Best known are consumer offerings like 3M's Post-It® note, whose inventor had an engineering epiphany one day while struggling to keep bookmarks from falling out of his church choir

hymnbook. His idea was so simple, using long-established technology. Yet no one else had thought of it before, or at least had not acted on it.

No one knows how many other examples of this phenomenon go unnoticed, but at least one has just made its North American debut—on Oct. 19, right up the Jersey shore along the Point Pleasant Canal in Ocean County.

This "innovation", which has actually been in use in Europe for a number of years, is called DZI, or Dry Setting Installation (as translated into English). A

small mobile cofferdam that eliminated the need for divers, the DZI allows dry inspection and maintenance of submerged structures—in this case, the steel sheet pile bulkheads lining the canal, part of the district's New Jersey Intracoastal Waterway navigation project.

At the heart of the DZI are its patented steel-and-rubber "teeth", custom-designed to fit different bulkhead shapes, that get attached to the one open side of a three-sided rectangular box. When the box is lowered into place by crane with the open side against the face of the bulkhead, the rubber pads on the teeth form a tight seal with the bulkhead. A submersible pump then removes all water from inside the box, leaving a safe, dry space for inspectors and skilled trades to do their work.



DZI "tooth"

DZI is the property of Acotec, N.V., a Finnish company incorporated in Belgium. Acotec's main business is the inspection and repair of steel sheet piles, which they are doing as the district's O&M contractor at Point Pleasant in response to recent public concerns over the bulkhead's integrity.

This first use of DZI in the U.S. allowed the Philadelphia District and Acotec to run a comparison between sand and water blasting (to see which cleans off bulkheads better and faster) and to test another Acotec product, Humidur, an epoxy-based protective coating with zero curing time that can be submerged immediately after application. "We have Humidur applications in Europe that have been holding off deterioration for more than 20 years," says Acotec U.S. representative David Sciacchitano.

"DZI does several things for us," says project engineer Tom Heary of the Civil & Structural Section. "Most important, it allows for much more accurate inspection than even the most experienced divers can perform. Not only can we clearly see the condition of the bulkhead, we can also take full advantage of electronic thickness gages that tell us where the steel is about to wear through.

"Along with accuracy comes speed. Setup time is more than compensated by the ease of inspecting and making repairs in the dry versus underwater. And of course the dry conditions make for faster and better results."

"The combination of DZI and the Humidur coating offer the district a tremendous cost-saving opportunity," says C&S Section Chief Tony DePasquale. "The existing bulkheads at Point Pleasant are reaching the end of their effective lifespan—they range from 25 to 35 years old—but with this new approach we can extend that lifespan with spot repairs instead of outright replacement. The long-term savings to the district? Somewhere upwards of \$25 million."

(Trip report and photos from Oct. 19 site visit follow)

MEMORANDUM FOR RECORD

SUBJECT: Site Visit to Point Pleasant Canal to witness demonstration application of "Humidur" protective bulkhead coating

DATE: October 19, 2000

ATTENDANCE: Thomas Heary (CENAP-EN-DC), Anthony DePasquale (CENAP-EN-DC), Jerry Jones (CENAP-OP), Tor Solvang (Acotec), David Sciacchitano (Acotec) and Jeff Steinke (Acotec Subcontractor), etc.

LOCATION: Point Pleasant Canal on east side at approximately station 72+00

1. Contractor has work barge with tug and tender on site. Contractor used the barge-based crane to lift the DZI inspection box into place against the steel sheet piles. The piles in that area are Z27 piles installed in 1971. The piles were coated in the late 1980s with an epoxy coating on the top 7 feet.
2. Contractor had no difficulty in setting the DZI and dewatering the chamber. Contractor set the DZI at 1000 hours and dewatered the chamber in 5 minutes. The steel was grit blasted to white metal in an approximate 8-square-foot area; it took over one hour to complete the grit blasting. The contractor then switched to high pressure (35,000 pounds per square inch) water blasting. The remainder of the dewatered steel sheet pile was cleaned in approximately 90 minutes (a rate of 100 square feet per hour).

The subcontractor doing the liquid blasting stated that the confining space of the inspection box prevented him from completing the cleaning in a quicker time. The box that would be used for large-scale coating would be twice the width (8 feet) and up to 14 feet in length. A finer second sand blasting was used to go over the water blasted areas. Tor Solvang stated that the light finish sand blasting is not required but that it helps to completely dry the steel before application of the coating. Visually, the finer second grit blasting seemed to really bring the steel to a white metal condition.

3. There were a number of pin or slightly larger size holes visible in the upper 2-3 feet of the steel sheet piling. A rough number would be around 7-10. No hole was anywhere near the size of 1 square inch. The holes were leaking water down the front of the sheetpiling. The leakage was from the liquid blasting water that had leaked from the pump and ponded on the landside of the bulkhead. The contractor plugged the holes with a mix of Humidur and grit sand. The mixture made a thick paste that was applied to the holes before the spray application. The contractor also applied a brush application of the coating to the steel nuts and inner edge of the sheet pile knuckles before spraying.

4. Spray application of Humidur went smoothly and took under 10 minutes for roughly 100 square feet. The mil thickness of the spray application is on the order of 25 to 30 mils. The pump for spraying is a special pump that accommodates highly viscous liquids. Tor Solvang performed most of the spray application himself. He then explained to the workers present at the site how to do it, and they completed the spraying operation.

Thomas E. Heary
Civil Engineer



Setting the DZI against the steel sheet pile bulkhead



Initial grit blasting of existing steel sheet piles within DZI



Liquid blasting of sheet piles within DZI using potable water



Sheet pile after liquid blasting



Sheet piles after completion of second finer sandblasting



Brushing "Humidur" on nuts and knuckles of sheets and plugging pin holes with Humidur paste



Spray application of Humidur



Finished coating of Humidur on sheet piles within inspection box



DZI removed within minutes after completion of coating

<http://www.nap.usace.army.mil/cenap-pa/001112/ppc.htm>