

NO DUST NO PROBLEM

Saving Time and Money on Concrete Sludge Tank Rehab Project

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FIG. 1: Wastewater treatment facilities house not only sludge tanks, but also complex piping, ventilation, electrical conduit and access systems. Abrasive blasting using sponge media created very little ricochet, allowing the contractors to simply cover all equipment with reinforced poly.

When conducting rehabilitation work on concrete sludge tanks in a wastewater treatment plant, there are many many factors to consider including protecting the pipes, equipment, ventilation system and electrical conduit from damage during each stage of the rehab process. This can prove challenging, especially when adjacent tanks are in service during all phases of the work, even abrasive blasting.

One Fairfield, Maine-based coatings contracting crew encountered just such a challenge when they were tasked with the failed coating removal, surface preparation and recoating of three concrete sludge tanks for the Kennebunk Sewer District.

According to the scope of the project, there were three concrete sludge tanks that needed to be worked on, one at a time. All three tanks were located in the same area, and the tanks that weren't being worked on were to be kept in service with the building's ventilation system on the entire time. The contracting crews couldn't afford to create a lot of dust and overwhelm the ventilation system while abrasive blasting, and also needed to make sure that they didn't have any ricochet issues while they prepped and profiled the concrete tanks for the new coating system.

Ultimately, the four-man crew used a sponge media abrasive to remove the existing rubberized coating and create the proper profile for the application of a new coating system. This article will go through the steps of the project and highlight how these materials contributed to a successful completion.

Project Background

With beaches, shopping, dining and charming historical districts, Kennebunk, and its neighboring town of Kennebunkport, are two of Maine's most popular tourist destinations. Kennebunk has a population of approximately 11,500, and the Kennebunk Sewer District meets the sanitary sewer needs of all residents

PHOTO: COURTESY OF THE AUTHOR

and visitors to the town. The wastewater collection system encompasses more than 40 miles of sewers and 28 pumping stations. Wastewater is received and treated at a secondary treatment facility that treats 1.31 million gallons per day (mgd). This secondary treatment facility is where the three below-grade concrete sludge tanks are located. Each tank is 2,000 square feet in area, and all three were in need of rehabilitation.

A condition assessment found that the existing thick, rubberized coating was failing and delaminating in many areas throughout the tanks' interiors. The crew was tasked with removing the existing coating without damaging the concrete underneath. The last thing they wanted to do was create more issues by damaging the substrate and then having to repair those damaged areas, especially since they needed to stay on schedule and within budget.

Given the various constraints of the job, traditional abrasive blasting did not seem to be the right choice for removing the existing coating and meeting the surface profile specifications. The crew turned to a sponge media abrasive that includes within it 60-grit aluminum oxide, an option that would create little to no dust and would create the proper surface profile without damaging the interior of the concrete tanks.

Keeping Dust, Rebound and Waste to a Minimum

The crew got to work on the first tank, manually chiseling and grinding parts of the first layer to remove excessively thick spots left from the existing protective coating system. They were then ready to begin abrasive blasting of the first tank, and they were to do this while the other two adjacent sludge tanks were completely in service and the ventilation system in the building was still online.

Ordinary abrasive blasting would have created a great deal of dust, forcing the crew to reroute the air supply in order to protect the process equipment and control room next door. However, because the sponge



FIG. 2: The Kennebunk Sewer District meets the sanitary sewer needs of all residents and visitors to the town. Wastewater is received and treated at a secondary treatment facility that houses the three below grade concrete sludge tanks.



FIG. 3: Each sludge tank is 2,000 square feet in area, and all three were in need of rehabilitation. The crew worked on one tank at a time, completing all coating removal, abrasive blasting and coating application before returning it to service and starting on the next tank. The two tanks not being worked on remained fully operational.



FIG. 4: The existing coating in tanks was a thick, rubberized coating that was failing and delaminating in many areas. The challenge for the crew was completely removing the failed coating and not damaging the concrete substrate underneath.



FIG. 5: Once the sponge media abrasive blasting was completed, the crew blew down and vacuumed the tank's interior to rid the surface of any debris. This was the final step prior to the coating application.



FIG. 6: Only 17 30-pound bags of the sponge media were used per tank. With conventional abrasives, the disposal process would have been time-consuming and expensive, especially considering the tanks are 15 feet below grade.

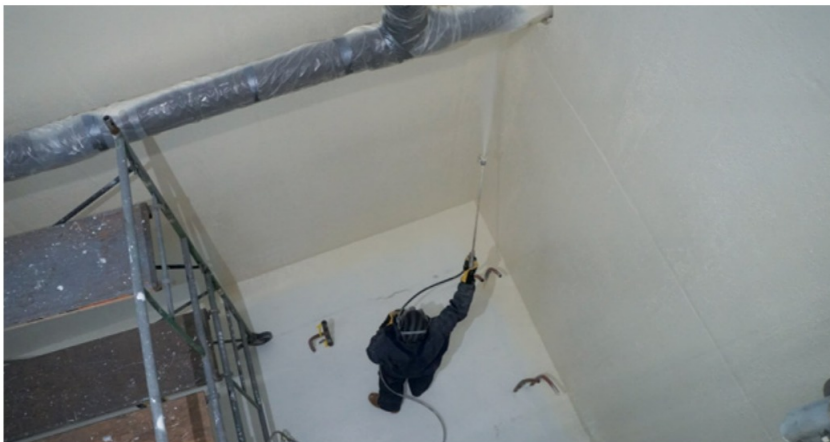


FIG. 7: The coating system consisted of an epoxy primer coat and polyamide epoxy topcoat, applied using airless, plural-component spray equipment.

media blasting suppresses dust, all the crew had to do was put up a poly curtain between the tanks; no other containment was necessary. In fact, the Kennebunk Sewer District operators were able to get in and out of the area to monitor the working concrete sludge tanks throughout the entire duration of the job without impacting either the functionality of the tanks or the sponge abrasive blasting process.

Because the abrasive blasting created so little dust, the crew was able to keep on schedule without having to go back and “touch up” areas that they missed on the first pass. According to the crew’s foreman, there was at least 75% less dust on the jobsite than there would have been if traditional blasting was performed. With an average removal rate of 360 square feet per hour (34 square meters per hour), the crew was able to move quickly through the tank, while not sacrificing quality or surface profile.

Creating the proper profile on the concrete was a top priority for this job, but so was keeping the concrete substrate in good condition with no damage occurring from the blasting process. The sponge media was able to create the specified profile of ICRI CSP 3 without damaging the concrete. This meant that no additional concrete filling or repair was needed prior to the application of the new coating system. It should be noted, however, that the concrete did have some pre-existing cracks prior to the abrasive blasting process. The crew used a two-component, 100%-solids epoxy compound to repair these cracks. This epoxy patching and surfacing compound is specially formulated for use in the water and wastewater industry.

The sponge abrasive also created very little ricochet during the blast process. With traditional abrasive blasting, the crew would have had to wrap all the surrounding piping and equipment in rubber to protect them from the ricochet. Instead, they just had to cover the piping with reinforced poly. This was a much easier and a less labor-intensive process for the crew.

In addition, the crew saved time and money as far as blast media waste was concerned. Unlike conventional, single-use

abrasive media, the sponge media used on this project is recyclable. The crew originally looked into using a different type of non-toxic media, but quickly realized that that single-use abrasive would create cleanup issues. If they had gone with the original plan to blast with ordinary abrasives, they would have used 8,000 pounds for each of the 2,000-square-foot concrete tanks, compared to only 17 30-pound bags of sponge media per tank. With ordinary abrasives, the crew would have needed to bring in vacuum trucks, and the disposal process would have been more time-consuming and costly, especially considering the tanks are 15-feet below grade. With the recyclability of the blast media, cleanup was relatively easy and not labor intensive.

A New Protective Coating System

Once the old coating system was completely removed from the interior of the tank, the concrete was properly profiled and all debris was removed, the crew was ready to begin applying the new protective coating system. They started with a primer coat of a polyamide epoxy mastic at a thickness of 6-8 mils using airless spray equipment. This fast-cure mastic is a high-solids, high-build epoxy designed to protect concrete in industrial exposures, such as wastewater treatment facilities.

For the topcoat, the team installed a two-component, 100% solids, elastomeric, aromatic polyurethane. For this coating application, the crew members used a plural-component spray unit to lay down 100-125 mils over three passes.

In the sumps of the tanks, the existing coating didn't need to be completely removed as it was in good condition. For these areas, the team applied a bonding agent before applying the epoxy primer coat. The bonding agent used was an organo-silane compound dispersed in isopropyl alcohol that improves adhesion of coatings to a variety of substrates, including existing protective coatings that are past the recoat window.

Safety Measures and a Ventilation Win

Throughout the entire coating application, the crew members wore protective suits, respirators and gloves. During the blasting process, the workers always wore blast hoods, blast suits and hearing protection. In addition, the crew constantly monitored the air in the confined space of the tank using a four-gas detection gage, and fresh air was pumped down into the tanks.

According to the foreman, it was a game changer for crew to be able to use the treatment plant's ventilation system, from both a safety and cost perspective. Since so little dust was created during the blast process, they were able to use the facility's ventilation system without any issues. If this hadn't been the case, they would have had to bring dehumidifiers, dust collectors, heaters and other large equipment on the jobsite. This would have cost the Kennebunk Sewer District a considerable amount of money and would have been a much more difficult setup for the crew.

75%
LESS DUST AND
AN AVERAGE
REMOVAL RATE OF
360 SQUARE
FEET PER HOUR
HELPED KEEP THE
JOB ON SCHEDULE.



FIG. 8: With all three tanks completed, the Kennebunk Sewer District wastewater treatment facility is back up and running at full capacity.



FIG. 9: The job was completed over a two-month timeframe, with each tank taking an equal number of days. The new protective coating system provides a long-term solution for the three sludge tanks.

On Schedule and On Budget

From start to finish, the rehabilitation of all three tanks took two months, with each tank requiring an equal amount of time. The coating removal and abrasive blasting process took about seven to eight days per tank, and the coating application took the crew about four days per tank. As far as sequencing goes, the crew would drain one tank, remove the failing coating, prep and profile the surface, apply the new coating system, put the tank back into service and then start with the next one.

Along with the crew's hard work, abrasive blasting with sponge media instead of a traditional media set the project up for success from the start. The time saved on the setup and cleanup of the abrasive blasting portion of the job saved the Kennebunk Sewer District a considerable amount of money. Because abrasive sponge blasting didn't damage the concrete, the crew didn't have to spend any time, money or resources on concrete repair after the blast. In addition, because the media is recyclable and yields a minimal amount of waste, this project also came out ahead as far as an environmental impact is concerned.

Overall, the focus of the four-man team, as well the abrasive selection and high-quality coating materials, led to the success of the job. The crew was able to keep two of the sludge tanks in service while they worked, minimizing downtime – a win for everyone involved, including the contracting company and the Kennebunk Sewer District. JPCL

ABOUT THE AUTHOR

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