

## **High Build, 100% Solids Epoxy - Case Studies and New Applications**

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### **Introduction –**

This presentation will describe high build epoxy coating and its uses for protecting and rehabilitating critical infrastructure assets. High build or ultra-high build epoxy is formulated to provide structural renewal for deteriorated structures. The product can be applied from 100 mils up to 500 mils with the typical specified thickness between 125 mils and 250 mils. The product exhibits tremendous adhesion to various substrates including concrete, brick, and steel. Additional features of the product include proven resistance to H<sub>2</sub>S induced corrosion found in aggressive sewer environments and resistance to treatment chemicals like chlorine and ozone. Learn how high build epoxy excels in protecting and rebuilding concrete, brick, steel, and iron found in today's collection, conveyance, and treatment systems.

The attributes and physical properties of this product type are described in detail including product uses, compatible substrates, and application methods. The high build epoxy's properties include structural enhancement, zero volatile organic compounds (VOCs), superior adhesion results, and high chemical resistance.

### **Objectives –**

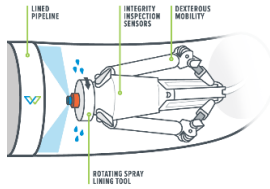
High Build epoxies have been around since the early to mid-1990's. My experience has been that owners and engineers sometimes lump many coatings together whether they are 100% epoxies, thin epoxy over regular cement, Polyurethane, or Modified Polyurea's. Modified cements like Calcium Aluminate Cement or even concrete admixtures are all sometimes used with the expectation that they will provide similar adhesion, chemical resistance, and structural capabilities. The truth is that most have their limitations, but none provide the across-the-board benefits like a quality high build 100% solids epoxy.

### **Case Studies – where is it used?**

The following case studies will be described as examples of common problems that can be solved with high build epoxy coating systems. The project examples include the following:

1. Pipe Lining Robot - Warren Environmental, GE Research and Garver Engineering won the Emerging Technology of the Year at the UCT Conference in Orlando on February 9<sup>th</sup>, 2023. The team has been working together on the PLUTO project as part of the Department of Energy's ARPA-E Repair program. Advanced Research Projects Agency-Energy (ARPA-E) project – Rapid

encapsulation of gas pipelines avoiding intensive replacement initiative. The team’s PipeLine Underground Trenchless Overhaul (PLUTO) project is designed to perform structural rehabilitation of gas pipes over long distances with increased speed, reducing costs otherwise incurred with full excavation and replacement.





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The project team consisting of [GE Research](#), [Warren Environmental](#) and Garver was proud to accept the Emerging Technology of the Year Award during the UCT International Conference & Exhibition this week! [...see more](#)

2. Epoxy Spin Cast of 400’ LF of a 24” cast iron water main SE of downtown Houston, Texas for COH – Cleaned and lined with NSF 61 approved 100% solids epoxy using a computerized spin-cast rig. The epoxy was uniformly applied to the interior pipe wall at approximately 150 mils. Tests showed excellent adhesion of the new lining.



	
<p>24” C.I. Water Main – During Spin-Cast (Being pulled into and thru the pipe).</p>	<p>24” C.I. Water Main – Relined with no need to reconnect the services!</p>

3. American Water Clearwell Coating – Fort Leavenworth, Kansas. Warren’s BPA free epoxy extends the service life of a 90-year-old potable finished water clear well at a military base. Scope included the surface preparation and coating installation of the 77-foot by 66-foot by 14-foot clear well tank using Warren’s 501-02 BPA free epoxy, NSF and Water Quality Association certified to ANSI Standard 61.
4. Brownsville (BPUB) Grit Basins and Influent Channel – Brownsville, TX. The 2021 South Wastewater Treatment Plant Improvements project expanded the plant’s capacity to 12.8 MGD. Four 21’ x 21’ grit channel basins and a 6-1/2’ x 5’ influent channel were rehabilitated using a corrosive resistant, structurally enhancing and highly adhesive epoxy coating.
5. Lake Arlington Lift Station – protective coating of a new 60-foot x 20-foot x 50-foot-deep trench style wet well in Fort Worth, Texas. The post-application testing required spark testing and 30 total adhesion (pull) tests per ASTM 7234-21 across the interior surface of the wet well. In most projects, pull test values that exceed 300 pounds per square inch (psi) are typically required. The average pull test value was greater than 550 psi, highlighting Warren epoxy’s superior adhesion.
6. Holiday Creek Sanitary Sewer Rehab project in Wichita Falls, Texas – A large manhole leak was sealed, and a heavily deteriorated diversion box was salvaged using high build epoxy.

7. Pidgeon Point Landfill Manhole Lining in New Castle, DE - The manholes were highly corroded and severely deteriorated from years of exposure to corrosive chemicals from the landfill's leachate. Leachate is a toxic liquid formed when rainwater filters through waste in a landfill. Carried through pipes and manholes, leachate is highly corrosive to unprotected concrete. The work included the surface preparation and lining of 48-inch leachate manholes varying in depth from 11 to 22 VF.
8. McAlpine Creek Wastewater Management Facility in Charlotte, North Carolina – A pilot study led to the selection of the best high build epoxy on this plant renewal project. 16 clarifiers, 28 aeration basins and additional plant structures were successfully rehabilitated which totaled over 75,000 SF of coating work.

### **Lessons Learned**

The following are lessons learned from the case histories:

- 100% Solids Epoxy is extremely versatile and can be used to protect and rehabilitate many different substrates in a multitude of environments.
- Surface Preparation is King!
- The formula for achieving quality coatings involves 4 key elements: Good Product, Good Applicator, Good Specifications, and Good Inspection including post application testing (pinhole testing and adhesion testing)!
- High Build Epoxies are now being used to rehabilitate pipelines on a much larger scale and the technology improvements will only increase the popularity of this very trenchless solution for water, wastewater, stormwater, and gas pipelines.

**References** - <https://www.warrenenviro.com/>