ErgonArmor™ | PROJECT PROFILE

Process Trench Upgrade for DuPont's Oxone® Powder Packaging Area Using ACROLINE™ Thermoplastic Liner

LOCATION
Memphis, Tennessee

COMPLETION
1998

OPERATION
Powder packaging

PRODUCTS
ACROLINE™ Systems

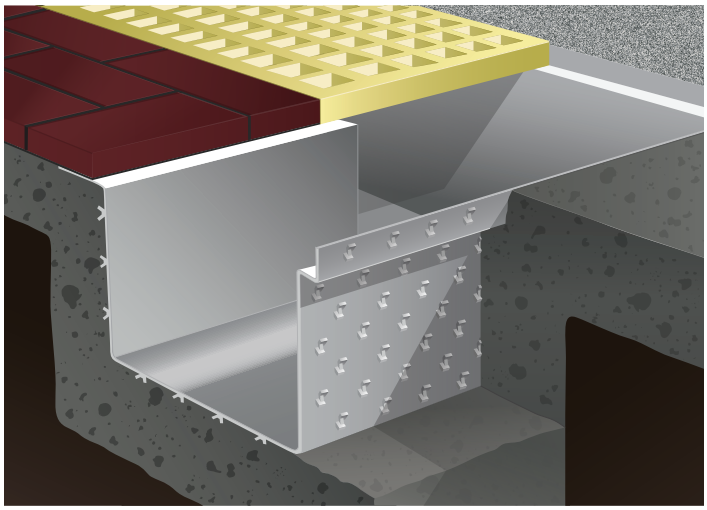
Challenge: Quick installation of a trench lining system for a powder packaging area

Solution: Off-site fabrication of ACROLINE Systems for rapid installation exceeding scheduled production down-time expectations

In 1998, DuPont upgraded existing process trenches and constructed new trenching in the Oxone® manufacturing unit at its plant in Memphis, Tennessee. Approximately 70 lineal feet of trenches were lined with ACROLINE anchored thermoplastic liners. The customer selected 5mm thick, high density polyethylene liners to handle wash down runoff in the new packaging area.

The trench liners were 10 inches wide and averaged 10 inches deep with a rectangular cross-section. An L-shaped grating seat was fabricated of ACROLINE liner and was incorporated into the prefabricated trench liners. The grating seat was 2-1/4 inches deep in one area that tied into an existing trench, previously lined with ACROLINE Systems. The majority of the new trench had a grating seat 1-3/4 inches deep.

The trench liners were prefabricated in three sections off site. Plant carpenters constructed the wooden formwork inside the liners prior to the plant shut down, during which the liners were installed. Plant iron workers prefabricated the reinforcing steel cages in advance of the shut down as well. In the area where new trenches were being constructed, the concrete was saw-cut while the plant was still running, though excavation could not commence before the shut down.



After production was taken off line and the area was decontaminated, the installers got to work. The following photos illustrate the installation process. The liners were installed in less than 10 days, allowing the plant to start up on time. ACROLINE Systems are an excellent choice for lining process trenches and sumps. Fabrication off-site expedites installation and minimizes downtime. The light weight of the thermoplastic, especially when compared with precast polymer concrete, allows large prefabricated components to be handled easily.

For systems that require concrete rehabilitation, installation of ACROLINE Systems simultaneously restores and protects the concrete. There is no need to restore the concrete and wait for it to cure before installing the protective lining, as with liquid applied, resinous systems. Plus, high-voltage spark testing and/or vacuum box testing ensure a leak-tight, environmentally sound, containment system.

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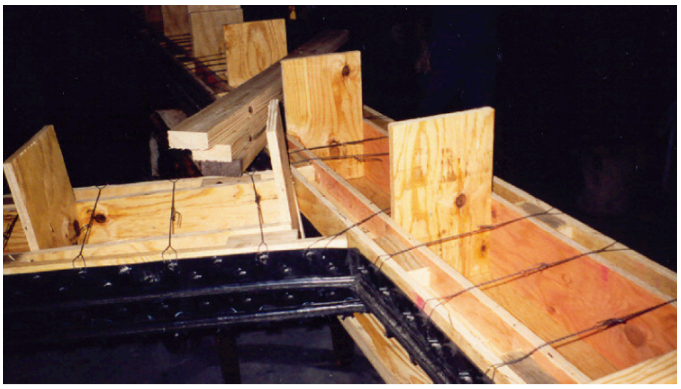
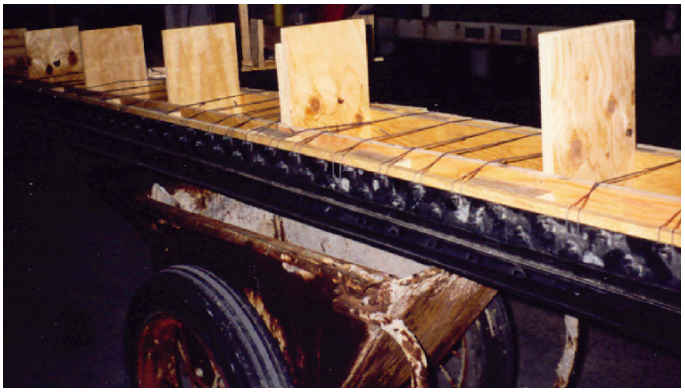


1. Wooden formwork is in intimate contact with all interior surfaces of the prefabricated ACROLINE trench liner. Note the grating seat is rigidly formed with 2 x 4s and small blocks of wood to ensure a level, true 90 degrees seat. Off-kilter grating could create a tripping hazard. A combination of strong foam and wood may be used in lieu of wooden forms.



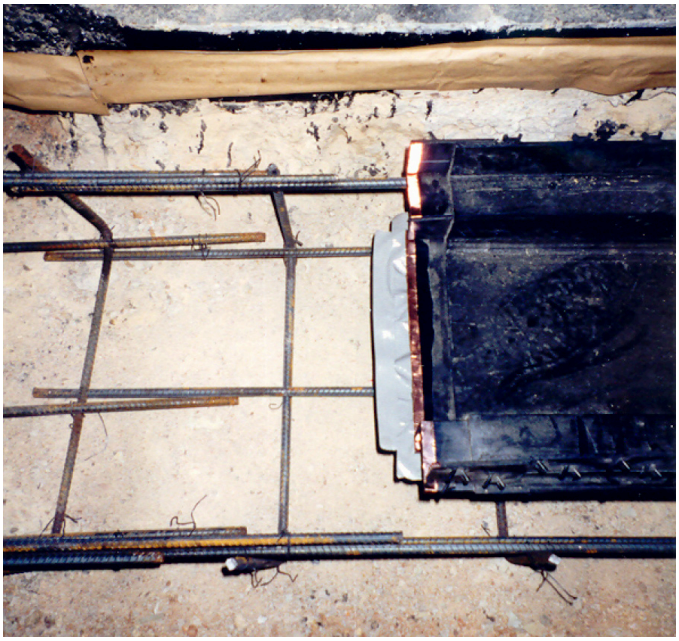
2. Closely spaced tie wires secure the forms inside the liner to prevent deformation of the trench liner bottom during concrete casting. Wires are tied to the top row of anchors. No penetrations are made in the liners to attach the formwork. Without this restraint, the forms could be pushed out of the liner, creating a bulge in the bottom of the trench.

3. New trenches were saw-cut into the existing concrete floor. The customer elected to excavate a space large enough for the trench liners, plus 6 inches of clearance for new reinforcing steel. An expansive water stop was used on the saw-cut face of the existing concrete.

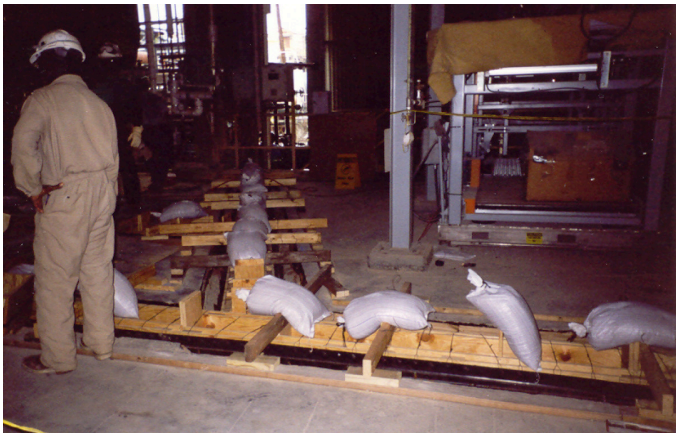
4. Note the 2 x 4s along the sides of the trenches. These are used to support the 2 x 4 cross beams from which the trench liners are hung.

5. Workers carry the trench liners into the construction area by the 2 x 4 cross beams.

6. The trench liners are hung in the excavation by the 2 x 4 cross beams to ensure adequate clearance between the liner and reinforcing steel and to set the invert elevations.



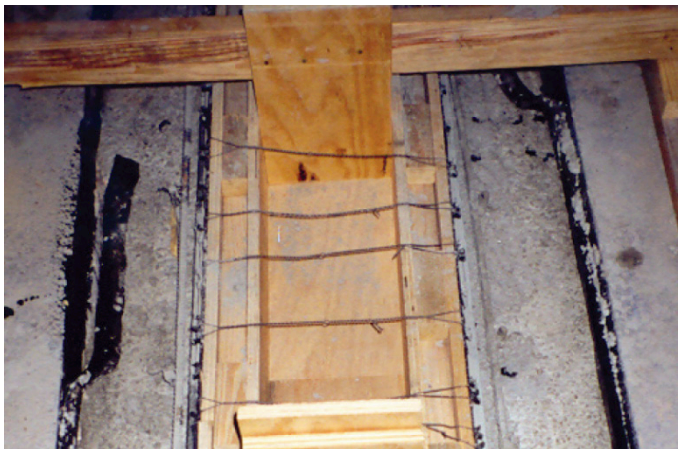
7. Copper tape is affixed to the trench liner flange, creating a counter electrode for high voltage spark testing of the field welds. The adjacent liner will overlap the flange. The flange keeps concrete out of the field weld area and creates a moisture barrier between the weld and the green concrete. Without this barrier, moisture can be drawn into the joint during welding, trapping steam in the weld and reducing its strength.



8. Sand bags are set on the trench liner formwork to help prevent the liner from floating during casting. The liner is cast in two lifts, with the first lift coming just to the bottom of the trench liner to lock it in.

9. Workers shovel the first lift of Portland cement concrete (pea gravel mix) into the space between the trench and existing concrete.

10. Sand bags are removed before the second lift of concrete is installed. The sand bags are no longer necessary, because the first lift of concrete has locked the liner in place, so it won't float.

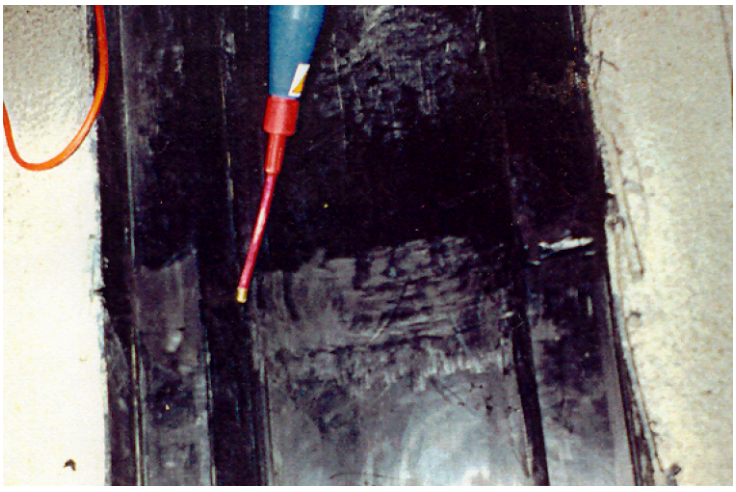


11. A ¼-inch chemical resistant monolithic topping will be installed over the Portland cement concrete. The second lift of concrete was finished ¼-inch shy of the adjacent floor elevation to accommodate the topping. This also keeps the top row of anchors accessible for removal of the tie wires. However, the tie wires could have been removed after the first lift of concrete was installed.

12. A worker grinds a seam area in the trench. Polyethylene must be clean, dry and scraped prior to welding. The scraping or grinding removes the layer of oxidation that forms on the surface of the plastic and could adversely impact weld quality.

13. Photo shows an extrusion welding gun with built-in air compressor. The top discharge pipe is for the preheat air, which melts the materials being joined. The larger, lower discharge pipe with the white block (shoe) on the end is for the molten extrudate, or filler material, which will fuse the adjacent sheets together.

14. Worker makes field weld between adjacent trench liner sections using extrusion welding equipment



15. High-voltage spark test equipment is used to non-destructively evaluate the leak-tightness of the field welds. The same test is conducted on the shop welds by the fabricator prior to delivery of the prefabricated liner components.

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