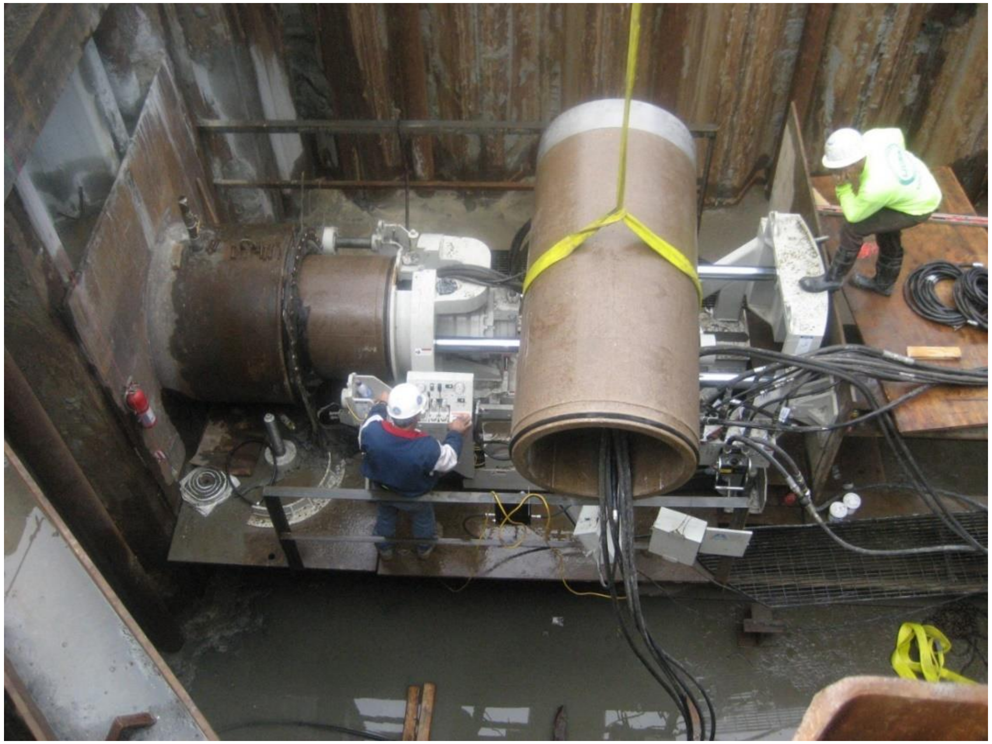


PRESENTATION

Impact Polymer, LLC
301 SE 8th St
Des Moines, IA 50309
www.ImpactPolymer.com

CONFIDENTIAL

PolymerCrete™

- High Strength
- Corrosion resistant
- Non-porous / Frost resistance resulting from non absorbing property
- Good adhesion to essential construction materials – Steel
- High abrasion resistance
- High surface smoothness
- Non conductive / good electrical insulation values
- High Tensile strength
- High Flexural Strength

The principal advantages of polymer concrete products include:

- Increased **physical properties** such as higher compressive, flexural and tensile strengths with a corrosion resistant matrix throughout the wall cross section.
- There are **no secondary** linings to connect to or coatings to apply during the manufacturing or installation process.
- In cases where the use of **conventional** steel reinforcement is either required or desired, polymer concrete can be designed with well known and accepted rigid pipe design methods such as ASTM C-76.

PolymerCrete™

WHAT IS POLYMER CONCRETE?

It is a resin based precast product that is manufactured with conventional concrete precast practices and procedures (forming and equipment).

Products are similar to conventional concrete in that they contain selected blends of aggregates and fillers, which are held together utilizing a binder.

However, conventional concrete uses a combination of cement and water for the binder, while our polymer products use thermosetting resin blends in place of water and cement for the binder.

Our product can be reinforced using precast concrete industry standard methods (rebar / wire)

PolymerCrete™ is a corrosive resistant rigid design precast product that is ideal for both new and rehab construction projects

PolymerCrete™

Mechanical Properties of Polymer Concrete

Physical	Test	Property
Compressive Strength	ASTM C-579	8,000 to 12,000 psi
Shear Strength	ACI 318	260 psi
Young's Modulus	NA	1 to 2.4 X 10^6 psi
Flexural Strength	ASTM C-78	2,000 to 3,000 psi
Elastic Strain Limit	NA	0.014
Permeability	NA	Negligible
Porosity	NA	Negligible
Tensile Strength	ASTM C-307	1,200 to 2,000 psi
Splitting Tensile Strength	ASTM C-496	1,280 psi average
% Absorption	ASTM C-301	0.1%
% Acid-soluble Matter	ASTM C-301	0.0014 to 0.0019%
Manning's Coefficient "N" Value	NA	0.009 to 0.012%
Freeze / Thaw Resistance	ASTM C-666	2,500 cycles No significant change
Density	NA	138 to 140 # / cu. ft.
Thermal Conductivity	NA	79 BTU/FT^2/FT/HOUR/^{0}F
Dielectric Constant	NA	5.3 to 6.0
pH Service Range	NA	1 to 13
Abrasion Resistance	ASTM C-944	Applied load = 20lbf @ 3 min Mass loss after 1st run = 0.003% Mass loss after 2nd run = 0.006% Mass loss after 3rd run = 0.008% Total mass loss = 0.008%

PolymerCrete™

Structural Testing of Alternative Materials for Stainless – Steel Lined Concrete

Idaho National Engineering Laboratory (INEL)

The purpose of the study was to investigate the materials resistance to a number of harsh chemical environments. The structural capabilities of the four materials examined in the study were tested following exposure to chemical environments for 90 days.

The study evaluated the corrosion resistance of Portland Cement Concrete (PCC), Silica Fume Concrete (SFC), Sulfur Concrete (SC), and ImpactPolymer polymer concrete (PC). Chemicals used in the study were Sulfuric Acid (25%), Hydrochloric Acid (10%), Nitric Acid (5%), Ammonium Nitrate (20%), 10,000 ppm Chloride, and Hydrogen Peroxide (20%).

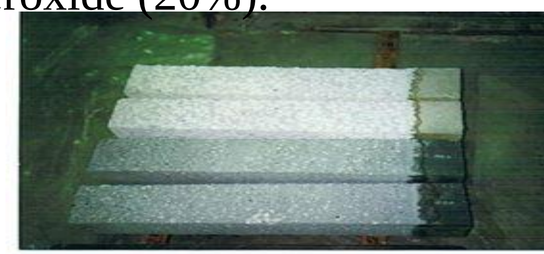


Figure 5.3 PCC and SFC beams after 90 days of exposure to H_2SO_4

Figure 5.4 ICOM beam after 90 days of exposure to H_2SO_4

PolymerCrete™

Proof Loading of Refining Tanks

Tank Size: 4.5’ X 4.5’ X 14’

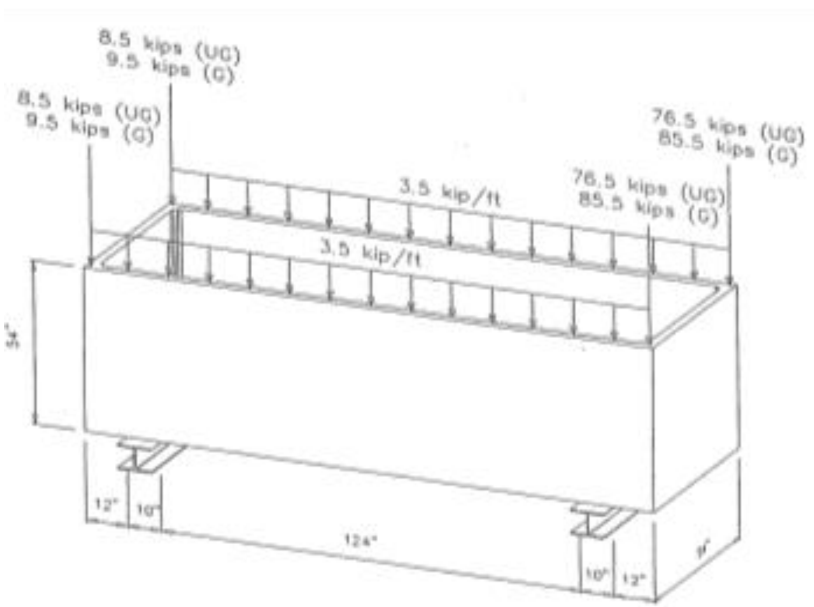
Load applied: Specified base load of 96,000 #

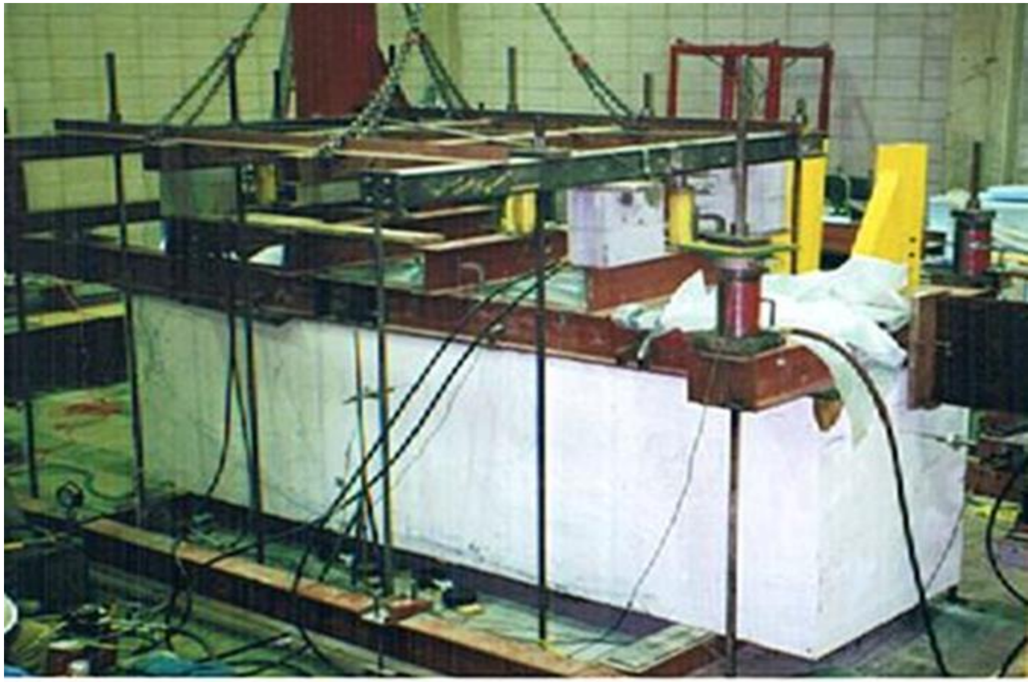
Solution: Salt water solution of approximate density 69.5lb/cu ft

First test: Loaded to twice the specified proof load level with no visible damage

Second test: Loaded to 8.5 times base load then one corner cracked

Third test: Repaired the crack with our polymer mortar. Loaded to 9.5 times base load with no damage. Test was terminated because the applied load approached the safe working load of the test frame.





PolymerCrete™

Pipe Loading Test

24” ID X 48” length with 2.25” wall thickness in the barrel and 1.5” wall thickness of the joint end / spigot.

The pipe failed at a compressive load of 1,211 kips (1.211 million pounds).

The failure mode was uniform local spalling of the reduced section of the pipe in the spigot area, adjacent to the compression ring

The rated compressive strength of the spigot joint is 300 kips.

The specimen tested had an ultimate compressive strength slightly greater than four times the rated compressive strength

PolymerCrete™

D-Load Testing

Reinforced vs Non-Reinforced

<u>Polymer Concrete 48" Pipe Tests</u>

Steel reinforced to Non-reinforced pipe testing and comparisons.

Sample I.D.	D-Load to Produce 0.01-inch crack (cracking load)	D-Load to Produce Ultimate Load (Class IV)
Sample 1	9,827 lbs/ft	12,000 lbs/ft
Sample 2	8,739 lbs/ft	12,000 lbs/ft
Sample 3	9,630 lbs/ft	12,000 lbs/ft
Average	9,398 lbs/ft	12,000 lbs/ft
Sample 4 Steel Reinforced	**25,271 lbs/ft**	12,000 lbs/ft

NOTE:
Same wall thickness and length for all samples

Steel area used for sample four per "B" Wall Class III ASTM C-76

Samples 1,2 and 3 **<u>do not</u>** have steel reinforcement

Standard "B" wall class III ASTM C-76 standard concrete pipe performance equals - **8,000** lbs/ft = Class III Ultimate with **5,400** lbs/ft = Class III D-Load to 0.01 crack

Testing performed at Stork Southwest Lab of Houston Texas

PolymerCrete™

Rebar “Pullout” Test

Failure occurred when rebar failed in tensile

STORK — Twin City Testing Corporation

Polymer Pipe Technology
Attn: Robert Espeland
2041 Grand Ave. Suite A
W. Des Moines, IA 50265

Project: 2004 General Testing

Project No. 38C-011
Report No.: 384-0023
Date: January 15, 2004

REPORT OF TESTS ON Polymer Concrete
SUBMITTED BY Above MARKED
DATE RECEIVED 01/09/04 DATE TESTED 01/15/04 BY MJ

REBAR "PULLOUT" TEST

Samples: Three 4" x 8" cylinders were cast with a ½" diameter steel rebar approximately 2' in length. The steel was embedded in the concrete the full 8" depth. The samples were cast on 01/09/04.

Test Method: The specimens were mounted in a fixture witch allowed the rebar to be pulled from the sample. Force was applied using a calibrated universal compression / tensile testing machine. The maximum force was recorded.

Results: In all three specimens failure occurred when the rebar failed in tensile, approximately 4 - 6 inches out of the cylinder. No movement of the rebar in the cylinder was noted.

Sample ID:	Maximum Load, lbf.
#1	27,000
#2	25,800
#3	26,000

Respectfully Submitted,
STORK/ Twin City Testing Corp.

Research Affiliations

Waterways Experiment Station (WES), Vicksburg, MS. U.S. Army Corp. of Engineers

Construction Engineering Research Laboratory (CERL) U.S. Army Corp. of Engineers

Stork Southwest Labs

Maxim Technology Laboratory

Law Engineering

Battelle laboratory

Center for Advanced Technology Development (CATD)

U.S. Department of Energy (DOE)

Idaho National Engineering Laboratory (INEL)

Lockheed Idaho Technologies Company (LITCO)

Iowa State Innovation Systems (ISIS)

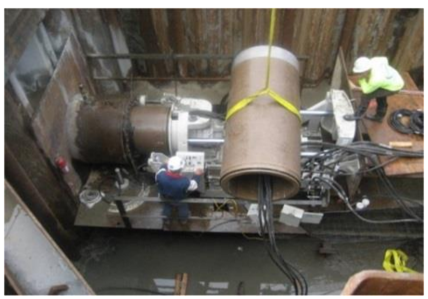
Iowa State University Civil Engineering Dept State University Mechanical Engineering Dept.

Iowa State University Nuclear Engineering Program.

Markets Served

Underground

- Sanitary Sewer
- Structures
- Tunnel Pipe
- Water Treatment

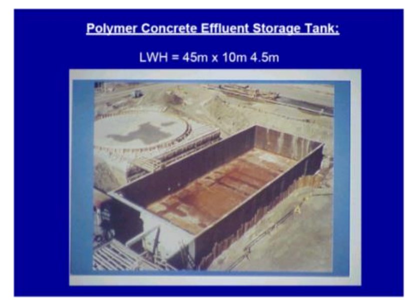


Industrial

- Energy – Petrochemical
- Mining & Refining industry

Federal

- General Construction
- Containment Energy & Federal
- Bridge Retrofit



Underground

Sanitary Sewer Pipe

- ✓ Direct Bury
- ✓ Jacking
- ✓ Microtunnel
- ✓ Slipline

Structures

- ✓ Manholes
- ✓ Flow Structures
- ✓ Lift Stations
- ✓ Box Culverts

Tunnel Pipe (large diameter)

- ✓ Tunnel Segments
- ✓ Shafts
- ✓ Liner Pipe

Water Treatment

- ✓ Pipe
- ✓ Structures
- ✓ Containment
- ✓ Trench

Industrial Market

Energy – Petrochemical / Oil Platforms

- ✓ Corrosion Resistant Precast and Pipe

Mining and Refining Industry

- ✓ SX&EW Cells (tanks), Trench, Sumps, Columns and Beams

Federal Market

General Construction

- ✓ Blast Panels
- ✓ Homeland Security Upgrades

Containment Energy & Federal

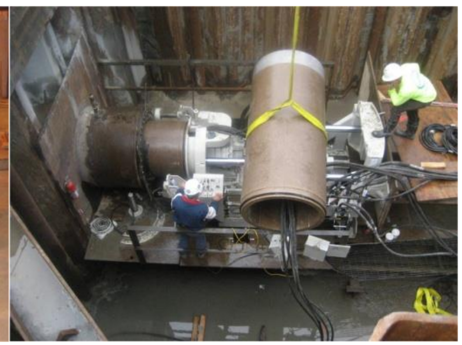
- ✓ Low Level Radioactive
- ✓ Mixed Waste Containment

Bridge Retrofit

- ✓ Bridge decks and ramps

Sanitary Sewer

Pipe



Overview

Pipe products to service the sanitary sewer industry

- **Flush bell trenchless pipe**
  - **Microtunnel**
  - **Jacking pipe**
  - **Pilot tube pipe**
  - **Kite shape pipe**
- **Open cut / direct burial pipe**
  - **Bell end pipe**
  - **Flush bell pipe**
  - **Kite shape pipe**
- **Tunnel segments**
  - **Large diameter single pass tunnel segments**

Target Market

- **Sanitary sewer industry**
- **Process and refining industry**
- **Industrial applications**

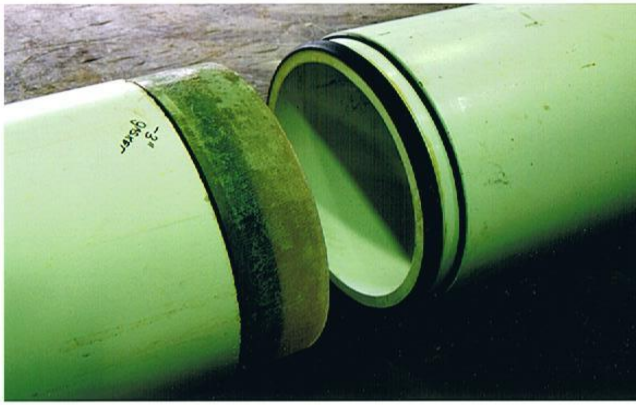
Sanitary Sewer

Pipe




Key Partners

- Local and regional manufacturers
- Industry engineering firms
- Municipalities / owners
- Direct sales and marketing
- Partnering with contractors on design-bid-build projects



Sanitary Sewer

Manholes, Shafts and Structures






Overview

Products to service the manhole and structures industry

- Industry standard 48”, 60”, 72”, 84”, 96” and 120” inside diameter manholes
- Custom diameter manholes such as 144” and greater
- Structures that may be boxes, vertical segments, vaults,…etc.
- Lift stations, junction structures and wet wells
- Intermediate platforms, transitions, base structures, cones and flat top lids

Target Market

- Sanitary sewer industry
- Process and refining industry
- Industrial applications
- New construction and rehab projects

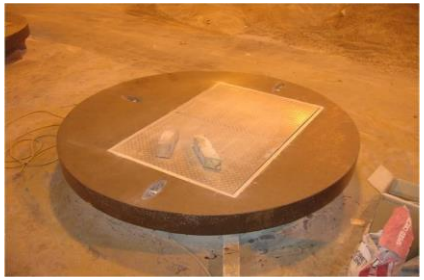
Sanitary Sewer

Manholes, Shafts and Structures

Market

Key Partners

-
- Local and regional manufacturers
- Industry engineering firms
- Municipalities / owners
- Direct sales and marketing
- Partnering with contractors on design-bid-build projects



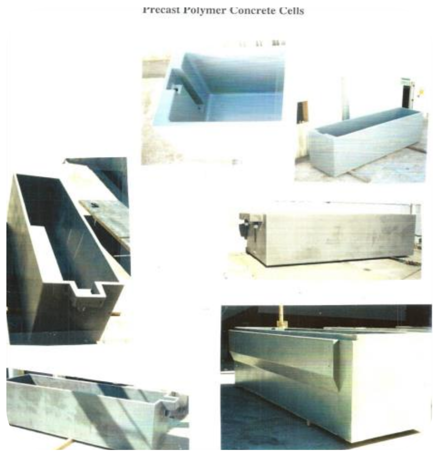
Mining and Refining

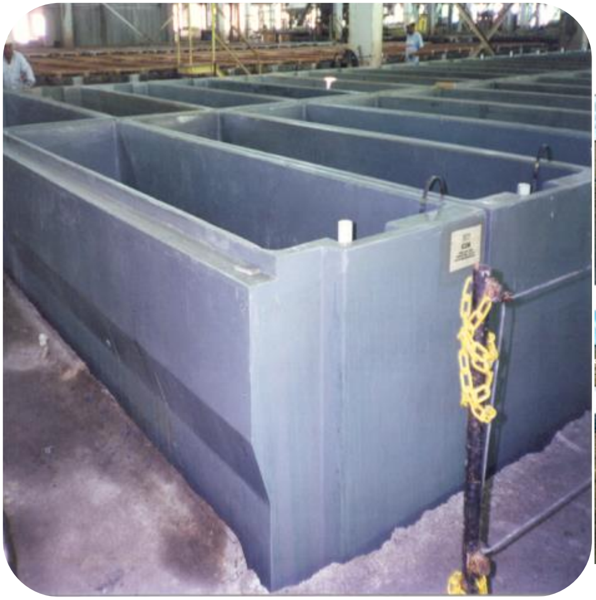
Process Cells and Tanks (Copper)

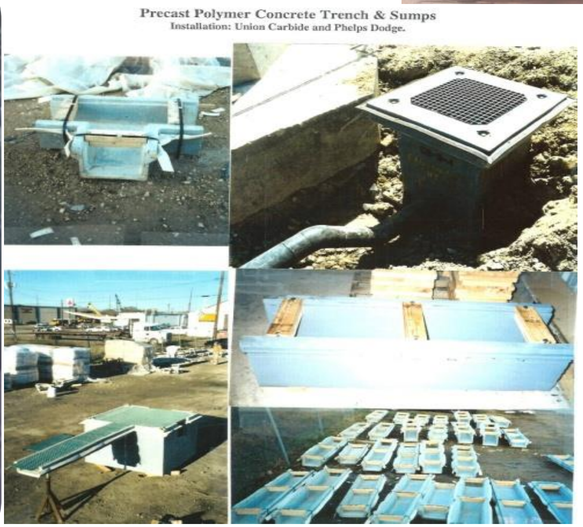
Overview

Products to service the Mining and Refining Industry

- SX&EW Cells (tanks)
- Trench and sump systems
- Columns and beams cell elevation platforms
- Panelized systems
- 16% sulfuric acid at a constant temperature of 160 degrees Fahrenheit







Mining and Refining

Cable, Utility Box Enclosures and Pump Pads

Enclosures

Overview

Products to service the cable and utility industry

-

Formwork Example

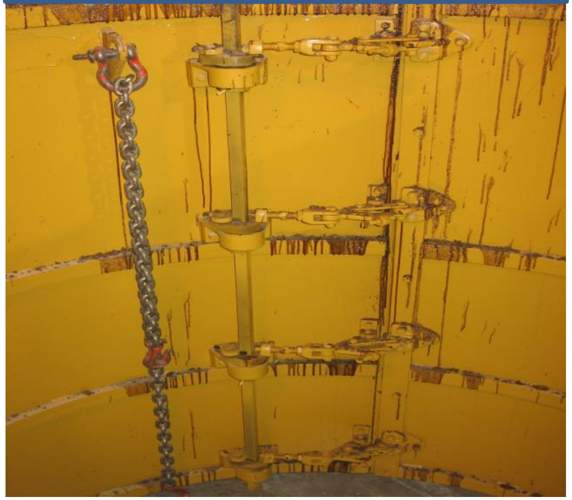
Header Ring (top)

Pallet Ring (bottom)

Core with steel

Core (center form) and Jacks (outer forms)

Inside release cam system



Outside form jacks (half side)

IMPACT POLYMER

PolymerCrete™

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