

Rehabilitation Work of Pressure Pipeline by Fiberglass Laminates

Yeung's Fiberglass

Hong Kong

Government Approved Specialist Contractor

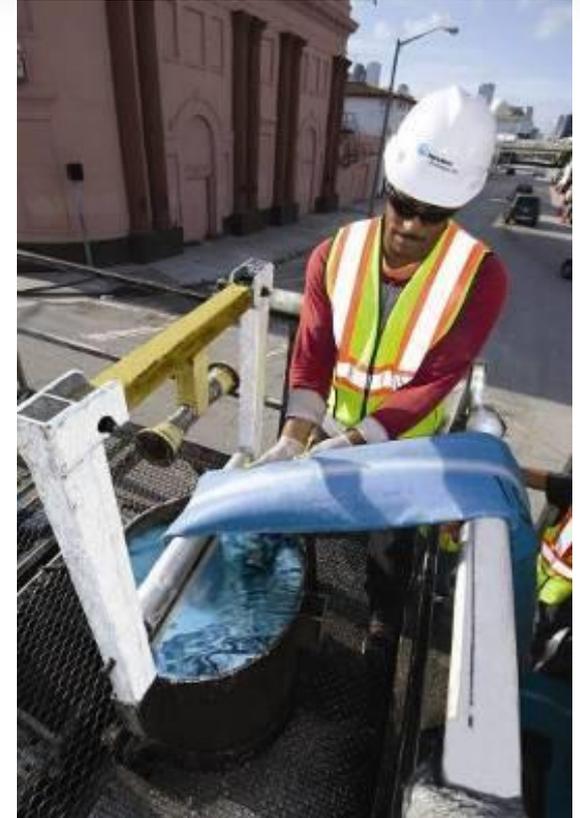


Pressure Pipe Rehab and Installation Objectives

- ✓ Extend life of existing infrastructure
- ✓ Structural or Semi-Structural design
- ✓ Minimally disruptive
- ✓ WSD, WRAS, BS 6920, ISO 9001:2015, ISO 14001:2015 Certified

Cured-In-Place Pressure Pipe Lining

- In existence for over 40 years, cured-in-place pipe (CIPP) is a trenchless technology
 - Initially used in sewers
 - Pressure CIPP uses modified properties to make it suitable for the drinking water market
 - End product is a joint less, pipe-within-a-pipe that protects against spills, breaks and pipe leakage
- Suitable for the following applications:
 - Distribution and transmission mains
 - Cooling water lines
 - Fire water mains
 - Industrial pressure applications
 - Sewage force mains
 - Pressure Pipes
 - Water Pipes



Carbon/Glass Fiber (FRP) Systems

- High-strength, lightweight, low profile characteristics provides a less intrusive value engineering solution; adds minimal weight/area and **maintains hydraulics**
- Installed without removal and replacement of many existing obstacles...**trenchless**
- Small project site footprint...**low impact and rapid installation**
- Proven **long term durability** and excellent resistance to corrosion
- Can be applied onto **complex shapes** (tees, elbows, etc.)

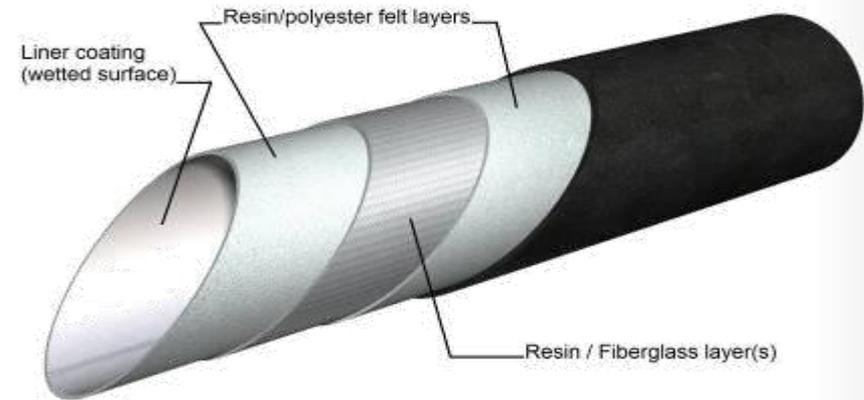


Independent/stand alone or an interactive/composite system

Diameter range	36" & Above
Effluent temperature	Up to 150°F
Internal pressure capability	Up to 450 psi
Bends	Any
Host pipe material	All materials
Mechanical properties	Specifically designed as conditions require

FiberTech Fiber-Reinforced Composite Structure

- Epoxy/fiberglass structure
 - Provides high tensile strength
 - Number of layers vary depending on diameter and internal pressure
- Epoxy/polyester felt structure
 - Provides for external load capacity
 - Layer thickness can be varied depending on loading conditions
- PP/TPU coating
 - Water contact surface
 - Coating also provides water barrier for installation processes



Diameter range	8" to 72"
Effluent temperature	Up to 130°F
Internal pressure capability	Up to 250 psi (safety factor of 4)
Bends	Up to 45°
Host pipe material	All materials
Mechanical properties	Exceeds ASTM F1216 and ASTM F1743

Capabilities of Internal Wrapping with FRP Systems



- Restore pipeline to original hydrostatic pressure capacity
- Accommodate increased internal pressure requirements
- Re-establish flexural loading capabilities
- Restore original external loading capacity of pipeline
- Upgrade external loading capability due to higher live load/traffic requirements
- Provide watertight rehabilitation at joints/couplings or transition zones

FRP System Case Study



- numerous sections of its 66-inch pipeline had broken pre-stressed wires and were structurally unsound
- Yeung's determined traditional remove and replace method was not practical
- FRP system allowed for a shortened construction schedule, minimal curing time and immediate return to service

Industrial Outside Strengthening



When Long Runs of FRP Can Be Cost Effective

- Larger Diameter (48" or greater)
- Higher Pressure (90 psi or greater)
- Difficult Configuration
 - Vertical/horizontal bends or changes
- Difficult Access – Some FRP systems can be truly trenchless
 - Limited/No access needed

Trenchless Installation Methods Using New Thermoplastic Piping

- ✓ Horizontal Directional Drilling (HDD)
- ✓ Sliplining
- ✓ Pipe Bursting

Questions?



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Thank you!