

PipeMedic™

Flow with Innovation™



QuakeWrap®
AUSTRALIA
Stronger Than Steel™



PipeMedic+™
By QuakeWrap, Inc.





Dr. Mo Ehsani, founder of QuakeWrap, Inc., is an internationally recognized expert and pioneer in the use of Fiber Reinforced Polymer (FRP) products and a Professor Emeritus of Structural Engineering at the University of Arizona. A visionary and creative engineer, he has

developed numerous technologies related to infrastructure renovation.

Dr. Ehsani has been featured on CNN, The History Channel, National Public Radio, and in other media, including Engineering News Record (ENR) for his expertise on the strengthening of structures, particularly related to earthquakes, terrorist attacks and other potential structural disasters.

PipeMedic, LLC is a member of the QuakeWrap, Inc. (QWI) family of companies founded in 1994. The original focus of QWI was on seismic upgrade of structures with Fiber Reinforced Polymer (FRP) products, a field that Professor Ehsani had pioneered in the late 1980s. Since 1998, QWI has provided solutions for repair of large diameter Prestressed Concrete Cylinder Pipe (PCCP) with Carbon FRP products and has been recognized by numerous awards of excellence for repair of structures and pipelines. To serve the needs of our clients, we have formed the following three companies in recent years:



QuakeWrap, Inc.

Engineering Design; Materials; Research & Development
www.QuakeWrap.com



PipeMedic, LLC.

Pipeline related technologies and products
www.PipeMedic.com



PileMedic, LLC.

Products for repair of corroded columns and submerged piles
www.PileMedic.com



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Wet Layup

For internal and external repair of pressure and gravity flow pipes; applied by hand or with a packer.



SuperLaminate™

For internal repair of pressure pipes; can bridge across large openings; applied with a packer.



StifPipe™

Custom-made pipe for slip-lining deteriorated pipes and culverts; designed for any internal pressure and external loading.



InfiniPipe®

Infinitely long, on-site manufactured, stand-alone pipe for new installation or slip-lining culverts.



Wet Layup

DESCRIPTION

Layers of carbon or glass fabric saturated with epoxy resin are applied inside the pipe to create a pressure vessel that can resist all or part of the internal pressure of the pipe.

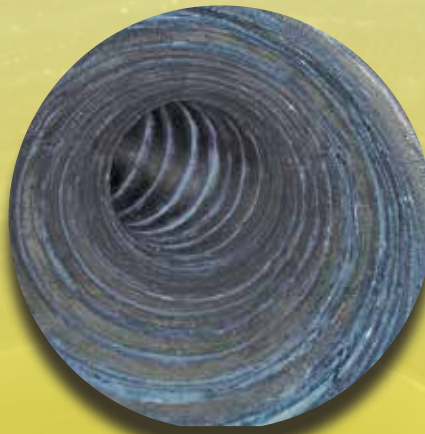
Suitable for both spot repairs and for repair of long pipeline segments. Provides watertight pipe rehabilitation for high pressure and gravity pipelines.

APPLICATIONS

- ▶ Large diameter pressure pipes allowing man-entry
- ▶ Small diameter pipe with the aid of a packer
- ▶ Increase pipe pressure rating beyond original values
- ▶ Long segment repair
- ▶ Joint and spot repair

ADVANTAGES

- ▶ CFRP is 3 times stronger than steel
- ▶ Fits virtually all pipe sizes and shapes
- ▶ Trenchless technology; no excavation required in most cases
- ▶ Non-corrosive to H_2S gas
- ▶ NSF-61 Certified
- ▶ Repair pipe without replacing



Repair of curved steel pipe conveying hot gases



Repair of joints in oval-shaped concrete culvert



Glass fabric applied as dielectric barrier on steel pipe



Top coating of CFRP in a curved, large-diameter PCCP



Equipment is delivered through access ports to avoid open cut trenches



Applying pre-saturated roll of fabric to concrete pipe

In this award-winning project, over 5,700 feet (1,700 m) of an 84 inch (2100 mm) diameter reinforced concrete penstock at El Encanto Hydroelectric Power Plant in Costa Rica was repaired in just 15 days. The repair was completed with access only through four existing 2 x 2 ft (600 x 600 mm) ports.



SuperLaminate™

DESCRIPTION

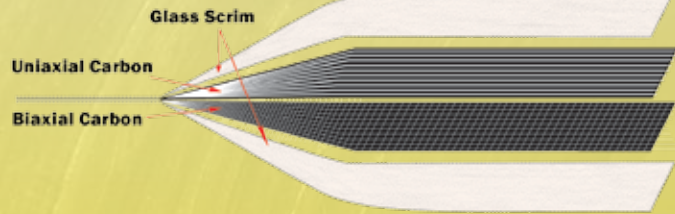
An innovative pipe rehabilitation process utilizing pre-manufactured laminates containing multiple layers of carbon fiber or fiberglass fabrics. SuperLaminates™ are manufactured under intense heat and pressure into 4 ft wide x 150 ft long (1.2 m x 45 m) rolls of extremely strong reinforcement for pipeline rehabilitation. SuperLaminates™ are also very thin (<0.025 inch or 0.6 mm) providing maximum flow with minimal encroachment of the host pipe's diameter. These are typically installed using a "packer" device and available for diameters 6 inches (150 mm) and larger.

APPLICATIONS

- ▶ High pressure pipelines (500 psi (35 bar) and higher)
- ▶ Bridging gaps or cracks in pipelines
- ▶ Small-diameter pipe rehabilitation
- ▶ Joints and spot repair
- ▶ Used to increase existing pipe's pressure rating

ADVANTAGES

- ▶ High tensile strength
- ▶ Pre-manufactured laminates offer higher levels of quality control compared to field installation processes
- ▶ SuperLaminates™ provide shorter downtime for installation
- ▶ Non-corrosive material

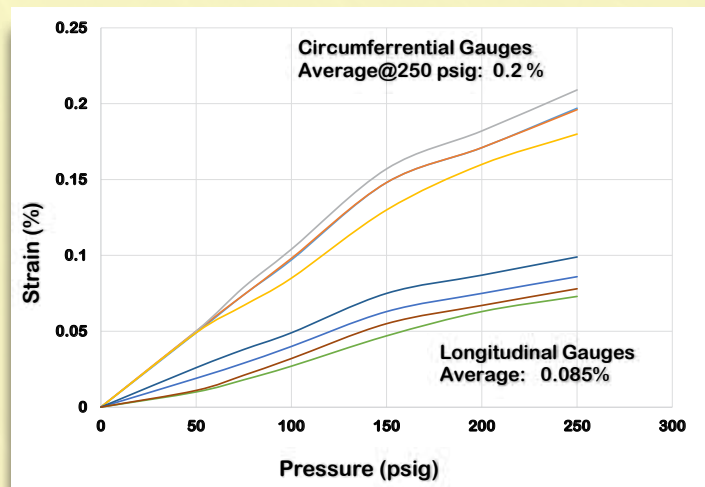


Tested and Approved by Gas Technology Institute

SuperLaminates™ have been independently tested by the Gas Technology Institute (GTI) according to ASTM F-2207 standards. Three specimens with diameters of 6, 12 and 16 inches (150, 300, and 400 mm) were lined with SuperLaminates™ to bridge a 24 inch (600 mm) missing part or gap in the pipe, simulating an abandoned T or drip pot. The pipes were capped and subjected to internal pressures, exceeding 4 times the Maximum Allowable Operating Pressure (MAOP). As indicated in by the strain measurements, the 16 inch (400 mm) pipe could resist a pressure of 900 psi (62 bar).



SuperLaminates™ are extensively used by various gas utility companies to line older gas mains. The first application of this product in 2011 was to repair a 16 inch (400 mm) steel gas main for Public Service Electric & Gas Co. (PSE&G) in New Jersey. That project received the coveted Trenchless Technology Project of the Year Award.



PipeMedic™ was awarded the Trenchless Technology's 2011 Project of the Year Award for the repair of a high-pressure cast iron gas main over 100 years old.

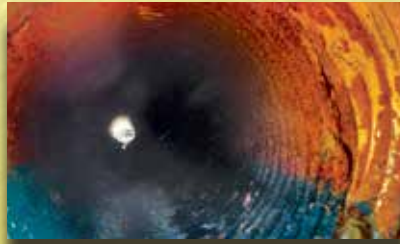




DESCRIPTION

An FRP composite pipe technology that uses a lightweight core with carbon or glass fabric reinforcement to create an extremely lightweight pipe capable of resisting heavy external loads.

StifPipe™ can be installed as a wet layup directly on the host pipe or it can be pre-manufactured for installation by traditional slip-lining methods.



StifPipe™ made with glass fabric was used in the repair of this culvert. The 8 ft (2.4 m) long segments were joined together in the field for slip-lining the deteriorated culvert, and the annular space was grouted.

APPLICATIONS

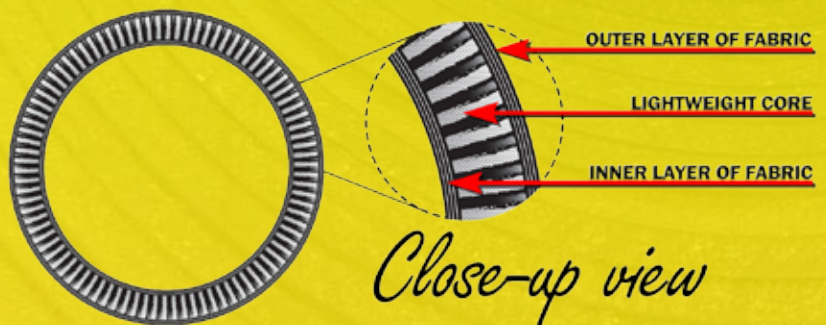
- ▶ Pressure pipe rehabilitation
- ▶ Slip-lining gravity sewers and culverts
- ▶ Strengthening existing pipelines for added loads
- ▶ Joint repairs
- ▶ Available in diameters 6 inches (150 mm) and larger
- ▶ Repair of non-cylindrical pipes & culverts



For this pressure pipe repair project, StifPipe™ with an outside diameter of 47 ¼ inch (1200 mm) was constructed with carbon fabric. The pipe was used to slip line the 48 inch (1220 mm) corroded steel pipes with minimal loss of diameter.

ADVANTAGES

- ▶ A fully structural pipe
- ▶ Engineered and manufactured to meet or exceed specific project requirements
- ▶ Available in virtually any shape and diameter
- ▶ Reduces field installation time
- ▶ Non-corroding, providing long service life
- ▶ NSF-61 Certified



StifPipe™ can be manufactured in any shape and size for slip-lining repair of non-cylindrical pipes and culverts. StifPipe™ can be designed as an independent fully structural liner.



DESCRIPTION

InfinitPipe® is a revolutionary green and sustainable technology that allows onsite manufacturing of a continuous pipe of virtually any length, shape and size.

InfinitPipe® effectively eliminates all mainline joints, pipe delivery costs and delays in manufacturing and field installation common for off-site pipe production.

APPLICATIONS

- ▶ New construction of water transmission lines
- ▶ Slip-lining of culverts and water or sewer pipes
- ▶ High-pressure oil and gas pipelines
- ▶ As a secondary containment (a pipe in a pipe)

ADVANTAGES

- ▶ Built onsite to any length
- ▶ Fewer joints and less pipeline leakage
- ▶ Designed for specific project conditions and requirements
- ▶ Non-metallic, does not corrode
- ▶ Simple to install with direct trench placement or stringing along the right-of-way
- ▶ Ease of handling; InfinitPipe® weighs 10% of conventional pipes
- ▶ Sustainable green technology
- ▶ Ship a mile of pipe in one truck!



In this game-changing sustainable technology, the constituent materials of the pipe, i.e. the fabrics, resins and lightweight core, are shipped in containers to the job site. The pipe is manufactured onsite using a Mobile Manufacturing Equipment (MME) that travels along an access road. Layers of fabric and lightweight core are wrapped around the mandrel. The materials are allowed to cure and the mandrel is partially collapsed and slipped out of the finished pipe. Additional pipe segments are continuously constructed to create a seamless pipe of any length.

As the MME travels, the finished pipe is laid either directly in the trench or along the access road. It is expected that the MME will produce approximately 1500 feet (450 m) of pipe per day.



The development of InfinitPipe® is supported through a Small Business Innovation Research (SBIR) Grant funded by the United States National Science Foundation.

All services, methods, and products of QuakeWrap, Inc. and PipeMedic, LLC whether offered by this company or through any other channel, are protected by multiple US and foreign patents and pending patent applications.



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