SPRAY APPLIED PIPE LINING SYSTEMS FOR SEWER AND POTABLE WATER REHABILITATION

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UCT FORT WORTH TEXAS

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SIPP Liner Technology

Qualified SIPP liner systems utilize super fast gel elastomeric products, that are spray applied in a composite of two products, delivering the physical properties required in underground pipe rehabilitation.

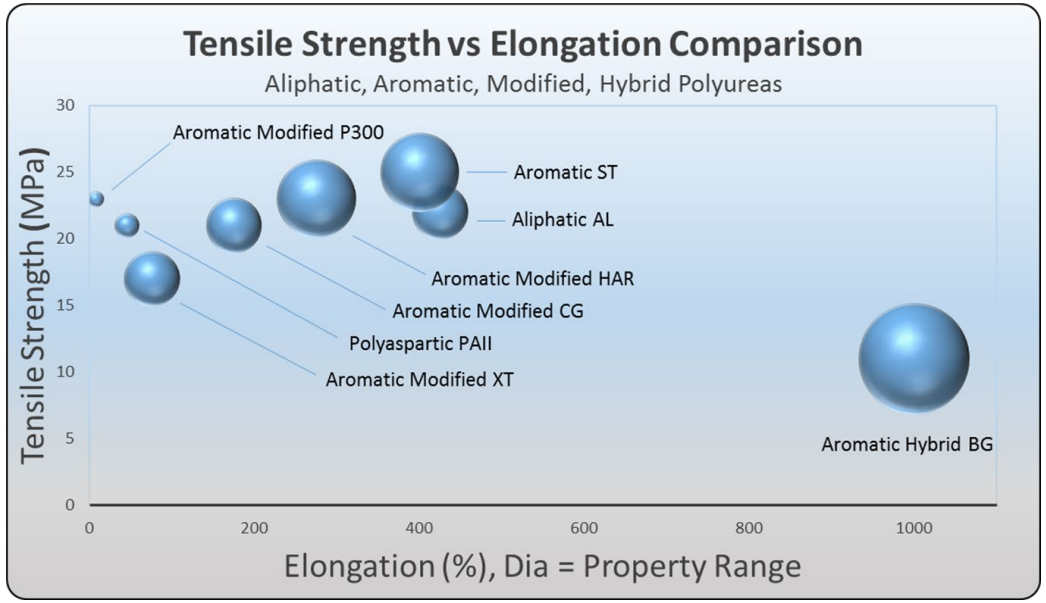
This composite provides:

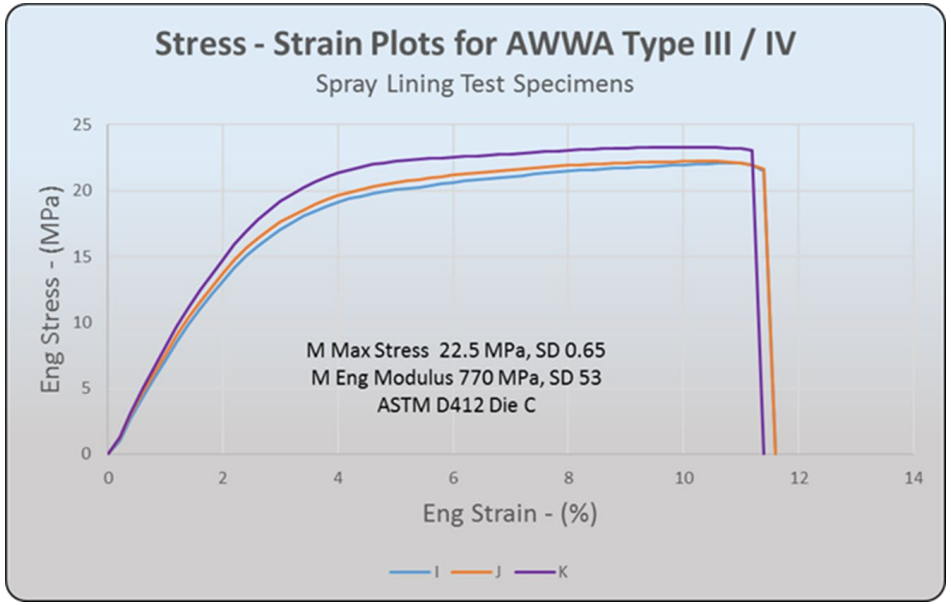
- ✓ The required high ring stress, derived from the structural portion of the composite
- ✓ Hiigh erosion/impact resistance, derived from the elastomeric portion of the composite
- ✓ 4-5 second gel/30 second tack free allowing both forward and reverse application at high builds
- ✓ Fast cure allowing for light traffic in 1 minute and back in service immediately
- ✓ No VOC 100% solids
- ✓ Completely inert can be disposed on in a common landfill
- ✓ ANSI NSF approvals on all product used

By composite we mean two distinct products with different properties, applied in a 2:1 Ratio robotically, monolithically (no layers see samples provided)

SIPP Liner Technology

The development of Aegis® liner products was derived from solutions provided to NATO, the composites utilized are similar to composites applied to armored vehicles that stop military rounds of 9mm (308) and 12mm (45 caliber)

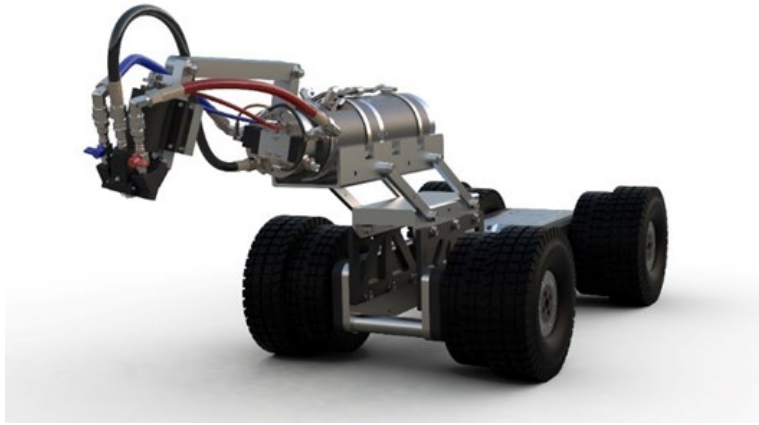




The solution requires a product with a modulus of 450,000 (structural portion of the composite) with a specific elongation of 5%, combined with a more elastomeric product with a modulus of 150,000 and a specific elongation of 400%. This combination is ideal for SIPP. Total liner design including its thickness is an engineered solution that we develop through information provided by the EOR for each project.

Robotic Horizontal Application Technology

The development of our Aegis® liner system required concurrent development of 360 Ringtech ® robotic application equipment. This equipment allows for remote application to specific design parameters, guaranteeing perfect film thickness while monitoring consumption, speed, head rotation and process equipment temperatures, pressure and other relevant data.

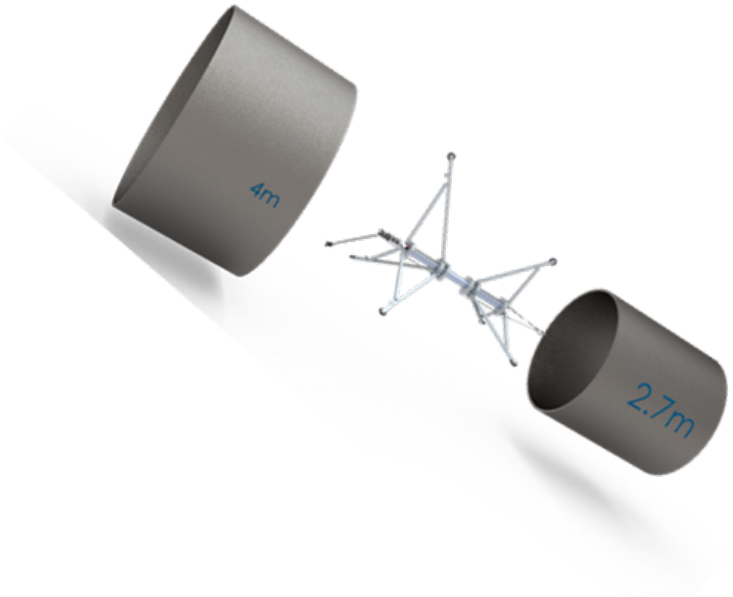


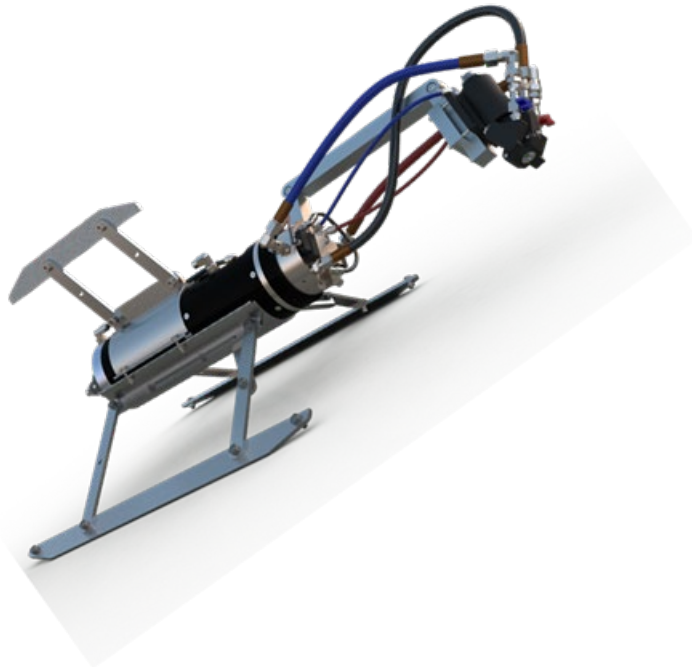
4 Wheel drive steerable with two wheel assemblies
PLC controls operated at station or tablet
Fixed HD 360 Degree pan tilt camera assembly
Reach up to 1142 feet / 350 meters optional

360 Degree rotational spray capability
Suitable for diameters 20” to 160”
5 Material rotation valve assembly
Modular control integration standard

Robotic Vertical Application Technology

Robotic application equipment can be utilized in vertical applications using the same control system and rotational spray head combined with a variable speed drive supply winch/reel hose management module. This method is utilized in applications where slopes and access parameters do not allow the use of the horizontal system. Gravity flow lines, penstocks, laterals, etc.



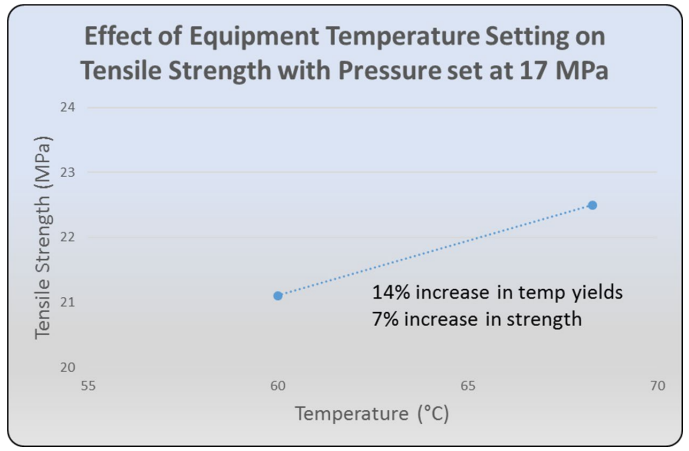


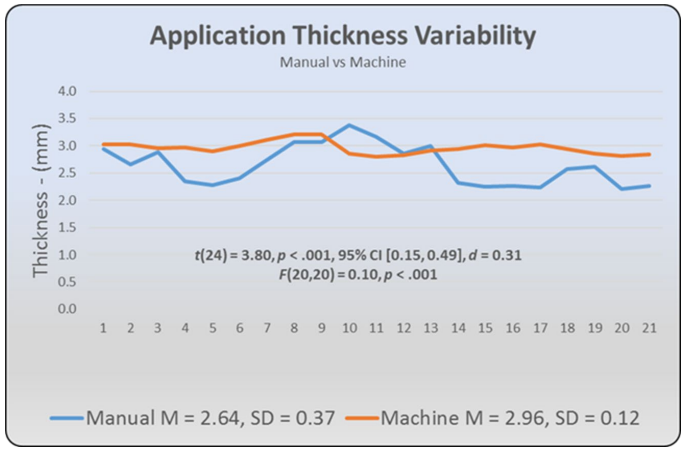
Robotics with Ancillary Equipment Configurations

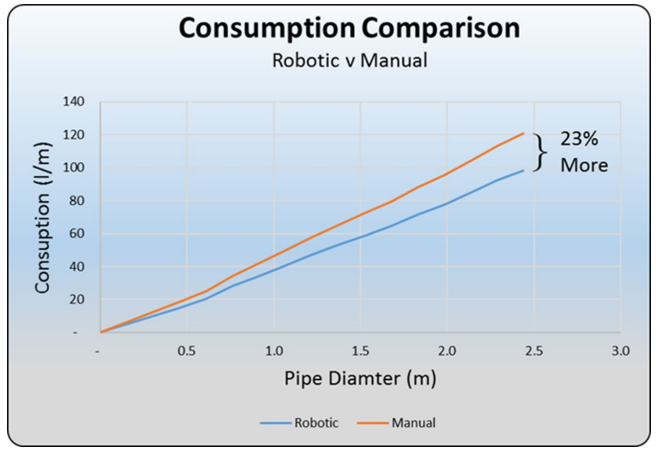
360 Ringtech® robotic application equipment is provided stand alone in a variety of configurations with reach limits of 150 lineal meters/ 500 lineal feet or 350 lineal meters/ 1148 lineal feet.

Why Robotics in SIPP?

- ✓ Temperature and pressure are critical to achieving liner properties.
- ✓ Meeting design liner thickness is also critical to achieving design thickness.
- ✓ Material consumption directly relates to total application costs





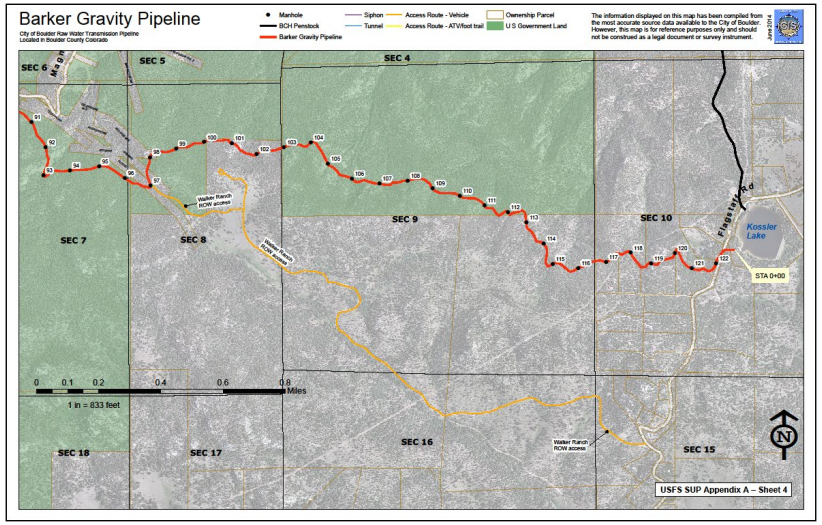


Properly developed robotic application equipment monitors and records all critical application parameters, assuring that the installed liner meets the approved design specification.

Barker Reservoir Penstocks

Rehabilitation of a 36” RCP potable water reservoir penstock for the city of Boulder Colorado. Originally installed in 24” segments, at 7000-9000 feet of elevation. The total project covers 7 miles that follow ridgelines. Installation occurs in off peak months from October through April.

Specification:	240 mil Structural Liner
Access:	20’ Manholes from 6-8’ wide right of way along ridge lines
Sag Lines:	1500 to 2000 LF applied bi directionally
Flow Lines:	350-450 LF applied bi directionally



Space Center Boulevard Storm Water Rehabilitation

Rehabilitation of a storm water RCP gravity line in varying diameters including laterals, catch basins, and manholes. The project is in the median of a highway that traverses a swamp. Egress historically caused sinkholes, highway settling and flooding. Groundwater level was less than 18” below grade.

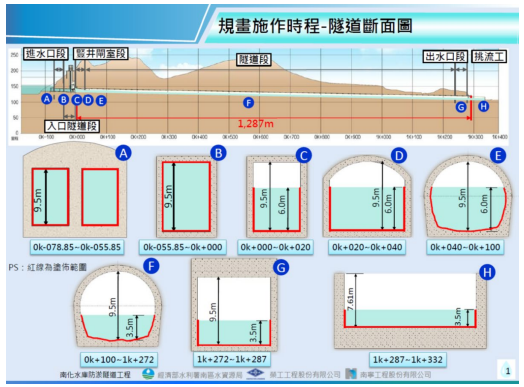
Specification:	Structural liner 240 mil to 480 mil dependent on pipe degradation.
Access:	20’ Manholes from 6-8’ in median
Flow Lines:	5500 lineal feet applied bi directionally
Laterals:	800 linea feet feet 24” diameter
Vaults:	17 each diameter 48




Nanhua Silt Release Penstocks

A new construction project designed to release silt from the reservoir to eliminate annual dredging costs to maintain capacities. Diameter 30'. Flow rate 930 feet second with abrasive content above 15%. Design and engineering were performed over 2 years to develop a method statement and QA/ITP plan. Testing included 240 hours of simulation at same pressures and abrasive content.

Specification:	SIPP liner at 280 mil diameter 30'
Access:	Both ends of 1000 meter tunnel
Project:	Steel Penstock 297 feet / Gate Dams 2 / Gravity Line 3,00= feet
Vaults:	1 each depth 297 feet / diameter 19.8 feet

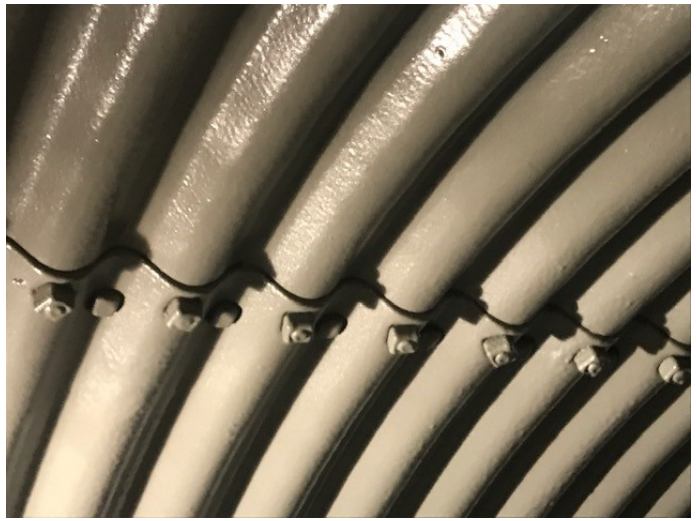


City of Toronto Combi Storm and Sewer Renovation

Pilot projects undertake by the city to fast tract an alternative to CIPP. Both pilot projects completed in July and December 2019. Concurrent product testing carried out by an independent laboratory designated by the client. Testing regimen included product properties and complete parallel plate crush testing.

Virginia Department of Transportation

These projects were designed to renovate culverts under bridges as full structural liners that deny ingress or egress and carry the entire bridge loading to DOT standards. Diameters range from 48” to 144” and shapes include; round, arch and oval. Complete specification approval by multiple state DOT’s. Liner Thicknesses vary depending on size, depth of bury and loading standards defined

Technology Summary

SIPP liner system features and benefits are:

- ✓ Diameters from 20” to 160” applied robotically. Larger diameters applied manually
- ✓ Fast application speed. 60% faster than CML, 50% faster than CIPP
- ✓ Lower total cost. Material 18-20% of total cost. Less crew days = lower total costs
- ✓ Total costs average 30% less than CIPP and 25% less than CML
- ✓ Liner performance exceeds CML and CIPP
- ✓ Exceeds AWWA M28 all classes including structural Class IV
- ✓ Engineered specifically for each diameter and application type
- ✓ ANSI NSF approvals on all product used
- ✓ Suitable for storm water, domestic sewer, industrial waste, potable water and more
- ✓ Full structural solutions are available, when needed and if required
- ✓ Design life 50 years +.

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