

NYSEARCH Project Update with RapiCure Solutions

Track: Pipeline Safety, Risk Mitigation and Regulatory Change
NGA Fall Meeting, 2026

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Presentation Overview

Introduction to RapiCure:

- Fast-curing, durable pipeline-renewal coatings, liners, and wraps
- Backed by energy and water utilities, service providers, municipalities, Chevron, NYSEARCH, PHMSA/DOT, NSF, COEDIT, and others

NYSEARCH Supported SIPP Feasibility Study Update:

- Current spray-in-place pipe (SIPP) feasibility findings
- Remaining work and future studies needed for trenchless gas-distribution renewal

RapiCure Additional Impacts & Developments:

- Plastic-pipe squeeze-off repair feasibility and utility interviews
- PHMSA-supported SIPP coating selection tool
- Trenchless liner development



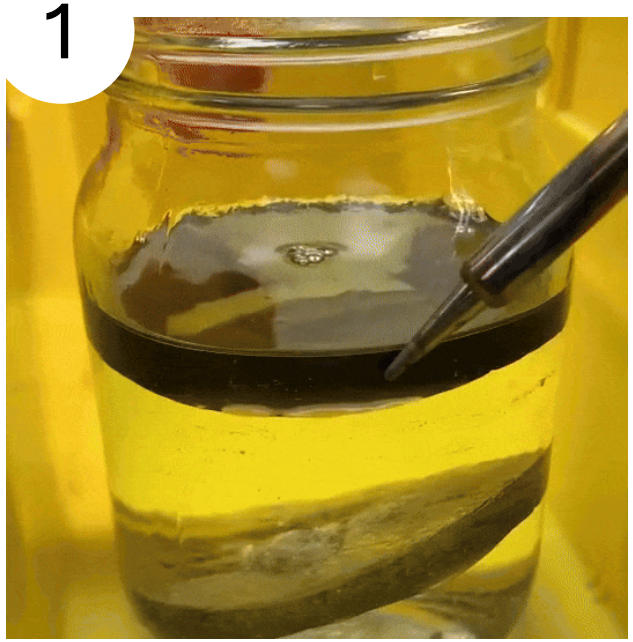
SIPP Application

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RapiCure Manufactures Minute-Class Resins

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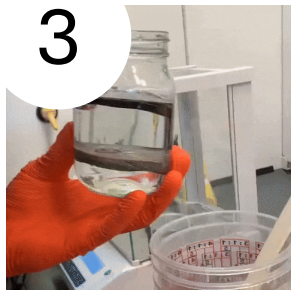
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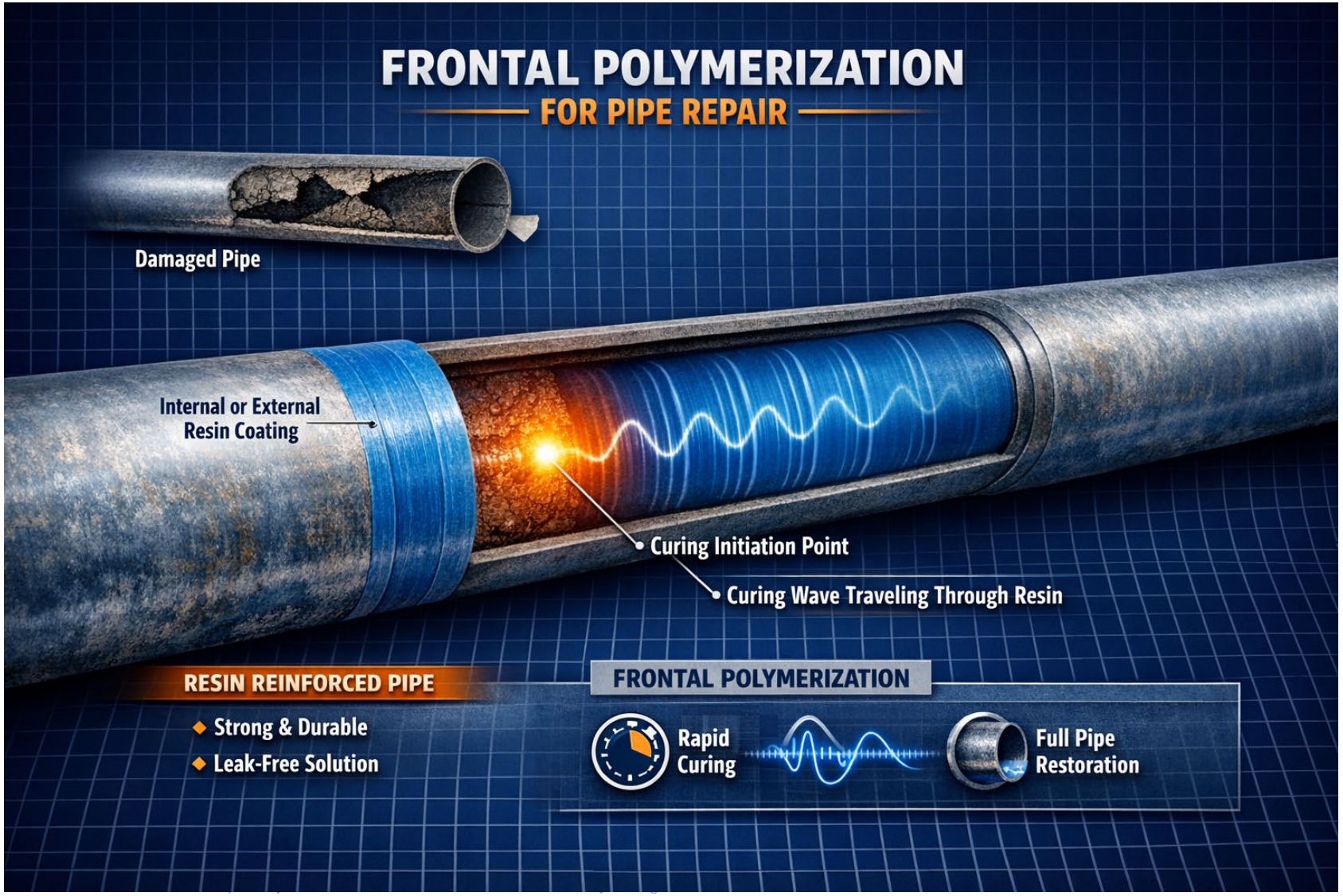


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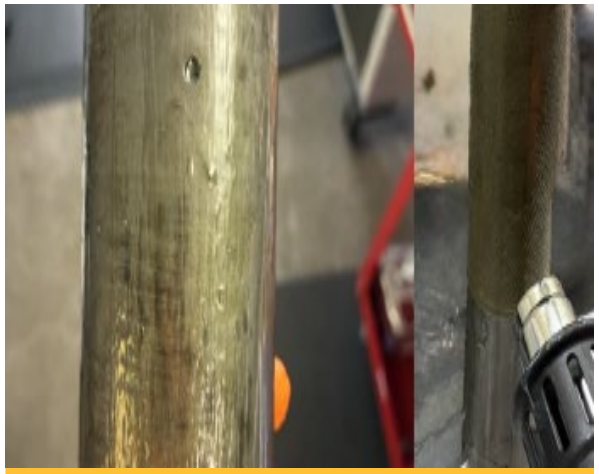
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Our Infrastructure & Construction Products



MEDUSA™ WRAPS & TAPES

Easy-to-use, fiber-reinforced, aerospace-grade emergency repair and protection solutions for pipes and similar



ON-DEMAND PLUGS RESIN-ONLY KITS

Used for quickly painting, coating, and curing to fill gaps and holes nearly anywhere, anytime



JOINT & LEAK FILL RESIN-ONLY KITS

Seals joints and pins and prevents unwanted leaks with a simple paint, coat, and cure in minutes vs. hours



Cures in minutes, operational in challenging environments including fully cured in just minutes in high humidity, rain, pH 2 – 12 surfaces, or -10 to 275+ degrees Fahrenheit

Versatile working on steel, wood, concrete, most plastics, and more for the protection of new assets and the restoration of aging ones

RapiCure

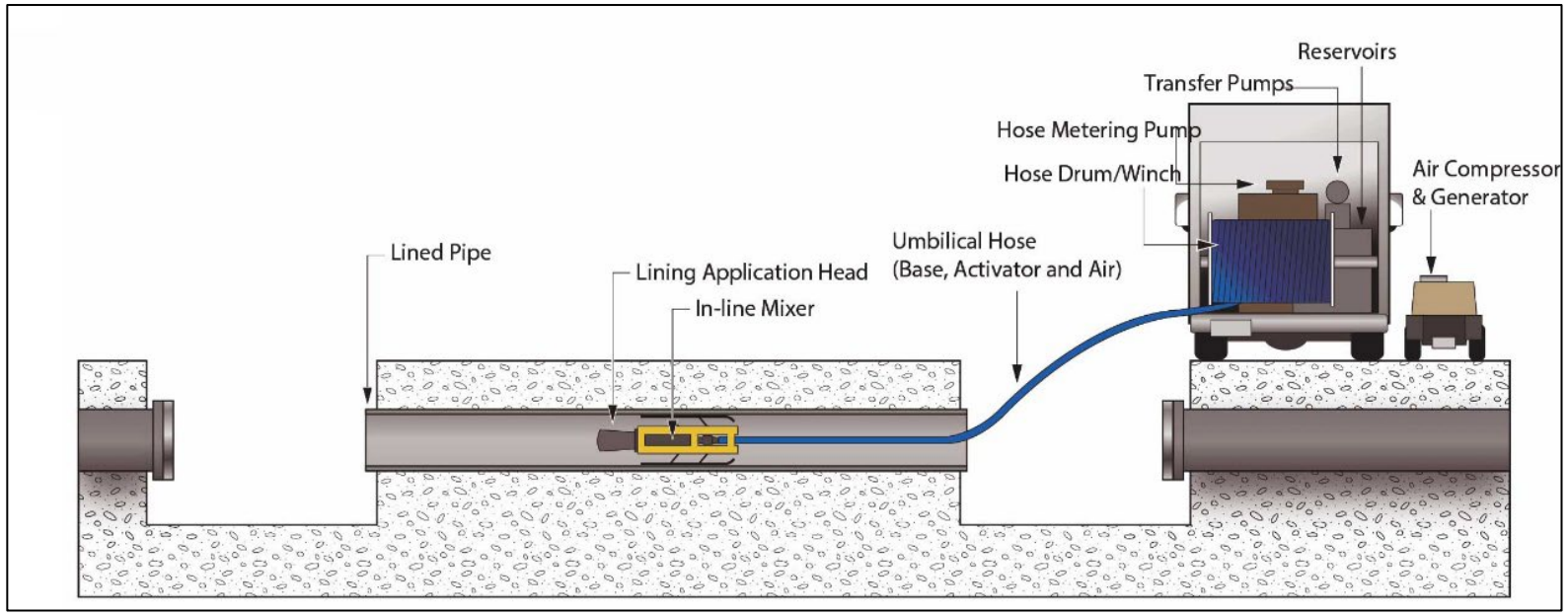
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NYSEARCH Project Update

SIPP Feasibility Research Study

- **The Problem:** Aging gas pipeline networks require extensive maintenance; conventional replacement is costly, environmentally disruptive, and often impractical.
- **The Solution:** Sprayed-in-place pipe (SIPP) offers a proven trenchless renewal method in water infrastructure with strong potential for gas distribution.



RapiCure's Role: Equip gas utilities with clear SIPP comparisons and define the testing required to accelerate industry adoption.

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Fully Structural Products

Compilation of SIPP products on the market – primarily used by the water industry

SIPP products that meet the following criteria:

1. Currently operate under positive pressure
2. Are rated as structural solutions (that do not rely on the host pipe) rather than solely acting as corrosion protection

Only 2 products meet these requirements:

- Resiline 320 (SIPP Americas)
- PipeCast Rigid (IPP Solutions)

	Properties	Resiline 320	PipeCast Rigid
Product Description	**Company**	SIPP Americas LLC	IPP Solutions
	Material	Polyurea	Polyurethane – polyurea hybrid
	Intended Application	• Ideal for in-situ lining and renovation of pipelines and pipe networks • For use on drinking water pipelines and pipe networks	• Ideal for SIPP, protective coatings, and structural reinforcement in municipal and industrial projects
	Features	• High tensile strength for pressure pipes • High wet strength • Low water absorption • Can be applied to wet and moist pipes • BPA free • VOC free	• High tensile strength and flexural modulus • Unfilled coating should last after the substrate deteriorates • Exceptional adhesion to a variety of substrates • Designed to withstand aggressive environmental conditions, ensuring extended service time • Rapid curing
	Repair Type	Structural & Corrosion	Structural & Corrosion
	Metal Compatibility	Steel, iron	Steel, iron
	Plastic Compatibility	PVC	PVC, fiberglass, geotextile
	Masonry Compatibility	Asbestos cement, concrete, mortar	Concrete, VCP, wood
	Certifications	NSF 61, UK BS 6920, ASA/NZA 4020	ASTM F1216

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Technical Feasibility – Fully Structural

	Properties	Resiline 320	PipeCast Rigid
Application Parameters	Pipe Diameter	4 – 24 in (102 – 610 mm)	2 – 24 in (51 – 610 mm)
	Ambient Temperature	> 37 °F (> 3 °C)	
	Ambient Humidity		
	Surface Temperature	> 37 °F (> 3 °C)	
	Material Temperature	68 – 86 °F (20 – 30 °C)	120 – 160 °F (49 – 71 °C) Material must be agitated every 10 minutes or stirred constantly
	Surface Preparation	NACE No. 4/SSPC-SP 7 • The surface should be suitably cleaned to remove all loose or adhered deposits caused by corrosion and mains deterioration processes. • The surface of the pipe shall be smooth and clean free from dust, debris, and standing water. • Suitable cleaning processes includes boring power, drag scraping, abrasing pigging, pressure scraping, pressure jetting, vortex/air technique.	NACE No.4/SSPC-SP 7
	Coating Thickness	40 – 120 mil/layer (1 – 3 mm/layer) Max: 551 mil (14 mm)	60 – 125 mil/layer (1.5 – 3.2 mm/layer)
	Overcoat Window	60 min – 8 hours	3 – 5 hours
	Suggested Spray Tool	Plural, heated, and centrifugal proprietary sprayer	Plural, heated, and airless sprayer • Must be capable of dynamic spray pressures of 2,000 psi • At least 4" – 8" static mix nozzle

	Properties	Resiline 320	PipeCast Rigid
Mechanical Performance	Pot Life	2 min	10 s
	Cure Time	15 min	Gel: 10 s @ 77 °F (25 °C) Tack free: 12 s @ 77 °F (25 °C) Full cure: 24 h @ 75 °F (24 °C)
	Return to Service Time	60 min	Same day or next day
	Service Temperature		≤ 302 °F (≤ 150 °C)
	Tensile Strength	6,527 psi (45 MPa)	6,500 psi (45 MPa)
	Tensile Elongation	4.2 %	7 %
	Flexural Strength	10,000 psi (71 MPa)	11,000 psi (76 MPa)
	Flexural Modulus	290,000 psi (2,000 MPa)	320,000 psi (2,206 MPa)
	Compressive Strength		
	Burst Pressure	255 psi (1.76 MPa) 6" diameter @ 3mm	
	Hoop Stress		
	Projected 50 Year Tensile Creep Rupture Strength	1,958 psi (13.5 MPa)	n/a
	Projected 50 Year Flexural Creep Rupture Strength	3,263 psi (22.5 MPa)	n/a
	Shore D Hardness	83	82
	Abrasion Resistance	150 mg/1,000 cycles (CS17 wheel, 1 kg load)	n/a
	Sag Resistance		
	Absolute Roughness	0.06 – 0.40 mil (1.5 – 10 μm)	

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Semi-Structural & Non-Structural

Many SIPP solutions exist that are not specifically rated for structural renewal of positive pressure piping, but these additional products may warrant further investigation.

Some of these products **DO** operate under positive pressure, but their structural strength relies on the host pipe **OR** it has never been tested as a fully structural renewal.

- Before use, these products would require further structural testing
- They have the potential to become structural if:
  - The coating thickness is increased
  - It is combined with fiber

Semi-Structural

- ElastoFlake (Relining Group)
- SprayWall (Sprayroq)
- Scotchkote 169HB (3M)
- PipeCast EXT Plus LB (IPP Solutions)
- PipeCast EXT (IPP Solutions)
- Subcote Pipe Resin (Radius Systems)
- POLYSHIELD SIPP 122 (SPI)
- Series 457 CPP Sprayliner MH (EpoxyTec)
- Series 451 CPP Spraylinger MH (EpoxyTec)
- Series 456 CPP Sprayliner (EpoxyTec)
- 301-1 (Warren Environmental)
- 301-CF (Warren Environmental)
- 301-14 (Warren Environmental)
- Medusa Resin (RapiCure Solutions)

Non-Structural

- SprayShield Green II (Sprayroq)
- SprayShield Aqua Guard (Sprayroq)
- AR-3400 (Sprayroq)
- PipeCast S-HCR (IPP Solutions)
- PipeCast Flex Polyurea Coating (IPP Solutions)
- POLYSHIELD HT 100F (SPI)
- POLYSHIELD K5 (SPI)
- POLYSHIELD HT SLOW FC (SPI)
- POLYSHIELD AMP 100 UB (SPI)
- Scotchkote Epoxy Coating 162 HB (3M)
- NuCoat (NuFlow)
- Aquatapoxy A-61 (PPG)
- Series FC22 Epoxoline (Tnemecc)
- Sherplate 600 (Sherwin-Williams)
- Sherplate PW (Sherwin-Williams)
- Polyclad 951 (Carboline)
- Polyclad 952 (Carboline)
- Polyclas 956 (Carboline)

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Process Comparison – In Progress

	Pipe Replacement	SIPP Renewal	Advantage
Pipe Abandonment	Abandon old pipe	n/a	Pipe Replacement
Pipe Assessment	n/a	CCTV to verify pipe renewal is viable	
Engineering Design	Select fittings, valves, diameter	Select resin, determine thickness, and surface prep requirements	Pipe Replacement
Excavation	Entire length of repair trenched	At least 2 trench areas + possibly above service lines. However, service trenches may not be necessary.	SIPP Renewal
Install New Pipe	Lay new pipe	n/a	SIPP completed faster but cannot stop once it has started. Leaves less room for error.
Heat Fusion	Electrofusion	n/a	
Pipe Cleaning & Surface Preparation	n/a	Remove debris and prep surface according to resin for best adhesion	
Pipe Inspection	n/a	CCTV to verify pipe is clear and ready for coating	
SIPP Application & Cure	n/a	Robotic sprayer, potentially multiple passes. Ambient, UV, or hot air cure. Spray service joints if possible	
Post Cure Inspection	n/a	CCTV to verify complete coating and correct thickness achieved	
Restore Site	Entire length of repair	Restore 2 area + any areas above service lines	SIPP Renewal

SIPP Feasibility Future Considerations

Required testing for a new technology such as SIPP for gas pipe renewal:

- **Structural integrity:** A fully structural renewal reduces regulatory hurdles
  - Many SIPP products have not been burst tested or fully tested per ASTM F2207
- **Chemical compatibility:** How do SIPP coatings resist the chemical environment of gas lines?
- **Adhesive compatibility:** Can SIPP coatings bond to PE pipe? What is the right level of adhesion for a SIPP coating?
- **Methane permeability:** What is the gas permeability of SIPP coatings?
- **Regulatory standards**: Can SIPP coatings meet the needs for structural classification, safety, and environmental concerns?
- **Cutting and welding within SIPP:** How can SIPP-lined pipes be serviced in the future?
- **Spraying around valve and service lines:** Can the connections to service lines be sprayed simultaneously with the main?
- **Filling defects and bridging gaps:** What is the largest hole size SIPP could effectively bridge?
- **Engineering around the spraying process:** Spraying in one directions vs. two
  - Can the coating thickness be metered?
- **Thermocycling:** How does material performance change with varying temperatures?

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Composite Gas Pipe Squeeze-off Repair

NYSEARCH utility interviews revealed that squeeze off plastic pipe sections can be weak points and expressed significant impact for a rapid composite option with plastic welding / high adhesion to plastic pipe to fully restore the initial strength of the pipe.



1. Squeeze off section of a poly (HDPE) 12” NPS pipe.



2. Application of RapiCure Medusa Tape (fiberglass) to squeeze off section.



3. Cured fiberglass repair. Total installation and cure time of **5 minutes**. Resulting repair is stronger than the original host pipe and exhibits excellent adhesion to host pipe.

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Related Work:

What Material to Choose?

How to Choose the Right Material?

Solution: A weighted decision-making matrix that ranks user-provided internal coating materials using PCC-2, ASTM F2207 and ASTM F3777

Problem: Aging infrastructure → Current Go-To: Replacement → High cost and long down-times → Alternative Solution: Trenchless Renewal → *What to choose?* What material to pick from a class?

- Consistent and impartial
- Justifiable/defendable when audited
- Modifiable as needed
- *Limitation*: not useful for structural repairs which is determined by the coating thickness

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IPCE ASME SIPP Decision Making Tool

International Pipeline Conference & Expo 2026

U.S. Department of Transportation
Pipeline and Hazardous Materials Safety Administration

The Solution: Decision Worksheet

Define project inputs (defect, service T, chemistry, outage, budget)

↓

Input material properties and define scoring bins (user-provided)

↓

Generate raw scores and apply weight factors

↓

Identify performance and budget flags based on user-defined limits

↓

Apply penalties and generate final normalized score for ranking

To get your scoring chart visit: www.rapicuresolutions.com

SIPP RESIN PRODUCT SELECTION WORKSHEET

Compare candidate spray-in-place pipe resin products using project requirements and product-specific data.

1. PROJECT REQUIREMENTS

Complete from operator/project requirements, integrity assessment, and planned installation conditions.

Project / Segment ID: _____	**Pipe Diameter:** ____ in.	**Service:** _____	**Structural Repair Required?:** ☐ Yes ☐ No	**Required MAOP:** ____ psi
Install Temperature: ____ °C	**Max. Service Temperature:** ____ °C	**Available Outage:** ____ hr	**Chemistry Class:** A / B / C / D / E / F	**Installed-Cost Budget:** $____ / ft

Chemistry: A=sweet dry gas | B=wet gas/brine | C=sour wet gas/H2S + brine | D=condensate/NGL/light hydrocarbons | E=crude/refined products | F=particulate/erosive flow

2. PRODUCT DATA AND SCORES

Use supplier TDS, qualification/test reports, or other product-specific data. Enter the product value first, then the 1-5 score from the scoring guide on Page 2. Enter each weight from 0 to 1 based on importance to this project.

Evaluation Factor	Weight	Product A (Epoxy)	Product B (Urethane / Polyurea)	Product C (Vinyl Ester)	Product D (Rapid-Cure Polyolefin TS)
Product / Manufacturer	–	_____	_____	_____	_____
Structural alignment	___	____ / ___	____ / ___	____ / ___	____ / ___
Cure time / outage	___	____ / ___	____ / ___	____ / ___	____ / ___
Chemistry compatibility	___	____ / ___	____ / ___	____ / ___	____ / ___
Service-temperature margin	___	____ / ___	____ / ___	____ / ___	____ / ___
Installation-temperature margin	___	____ / ___	____ / ___	____ / ___	____ / ___
Adhesion - ASTM D4541	___	____ / ___	____ / ___	____ / ___	____ / ___
Abrasion - ASTM D4060	___	____ / ___	____ / ___	____ / ___	____ / ___
Barrier integrity	___	____ / ___	____ / ___	____ / ___	____ / ___
Hydraulic impact	___	____ / ___	____ / ___	____ / ___	____ / ___
Design-life evidence	___	____ / ___	____ / ___	____ / ___	____ / ___
BASE SCORE / 100	–	_____	_____	_____	_____

3. PENALTIES AND FINAL RANKING

After scoring, check each applicable trigger. Multiply all triggered technical penalties together. Chemistry "Caution" does not trigger a penalty.

TECHNICAL PENALTIES

Trigger	Penalty
☐ Structural mismatch	0.10
☐ Cure time > outage	0.10
☐ Temperature out of range	0.30
☐ Chemistry = No	0.20
☐ Required data unavailable	0.85

BUDGET PENALTY

Installed cost ÷ project budget

Cost / Budget	Penalty
≤1.00	1.00
>1.00-1.20	0.90
>1.20-1.50	0.75
>1.50-2.00	0.50
>2.00	0.25

RESULTS

A: Base ___ Tech. P ___ Cost ___
Budget P ___ Final ___ Rank ___
B: Base ___ Tech. P ___ Cost ___
Budget P ___ Final ___ Rank ___
C: Base ___ Tech. P ___ Cost ___
Budget P ___ Final ___ Rank ___
D: Base ___ Tech. P ___ Cost ___
Budget P ___ Final ___ Rank ___

Base Score: score × weight each row; add; divide by maximum possible weighted points; convert to /100.

Scoring framework adapted from IPC2026-186429 draft decision matrix. Worksheet v1.

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Operator Defined Project Inputs

Example project inputs are given in the table
These values put a frame to all candidate materials' properties

Project	Example Rehabilitation of a natural gas distribution segment
ID	6”
Outage window	≤12 h
MAOP	100 psi
C_{budget}	$250 /feet
$T_{install}$	60 °F (16 °C)
$T_{service}$	140 °F (60 °C)
Chemistry Class	A (sweet, dry gas)

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Generate Normalized Score and Ranking

	Epoxy	Urethane / Polyurea	Vinyl ester	Polyolefin	Thermoplastic
BASE SCORE	78	80	80	80	76
$P_{Multiplier}$ (product of all applicable multipliers)	0.10	n/a	n/a	n/a	n/a
P_{budget}	1.00	1.00	0.90	1.00	0.50
NORMALIZED SCORE = Base × $P_{Multiplier}$ × P_{budget}	7.80	80.00	72.00	80.00	38.00
RANK (1=best)	5	1	3	1	4

- The normalized scores and final rankings preserve the flags and penalties
- In this working example, urea/polyurethane and polyolefin have the same ranking, both are strong candidates
- Re-prioritizing the required framework for your project and re-assigning multipliers will re-rank urethane / polyurea and polyolefin

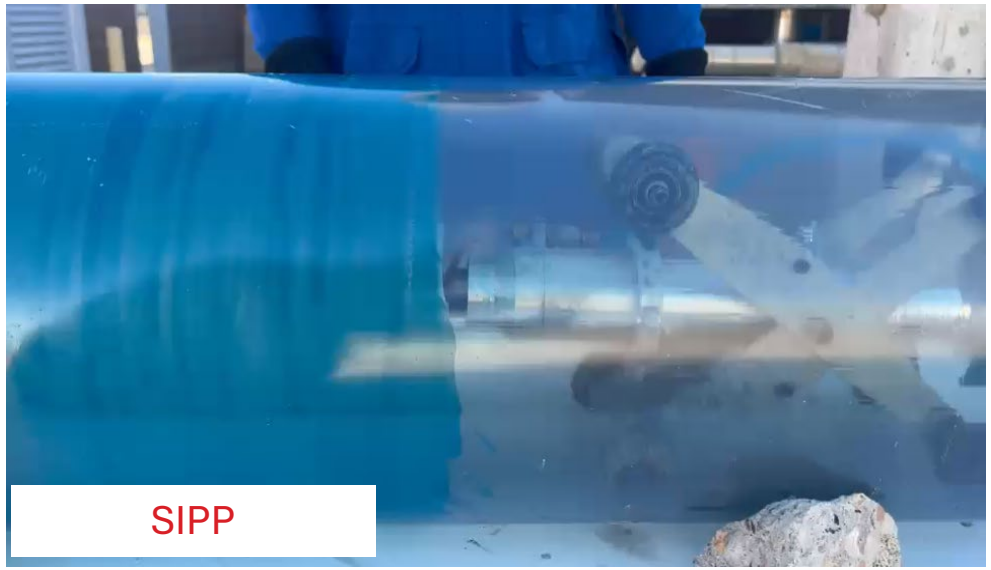
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Related Work:

RapiCure Additional Impacts & Developments

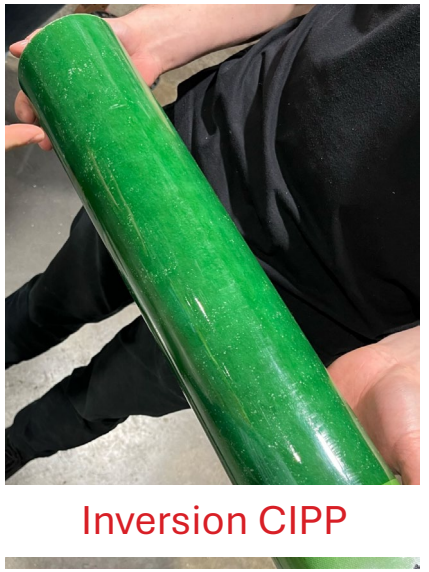
Polyolefin resins for coatings and liners by RapiCure



SIPP



SIPP



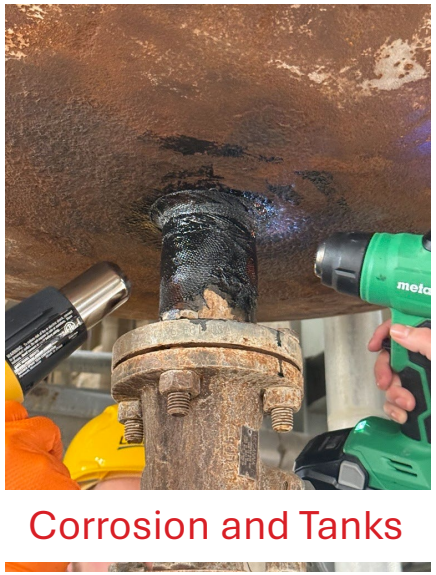
Inversion CIPP



Composite renewal



Manhole renewal



Corrosion and Tanks



12” ID Point renewal



Demos & Training


RapiCure
Resin reimagined.™
NYSEARCH
Natural Gas RD&D
Thank You
Questions or suggestions? Please reach out to:
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