


SuperLaminate™ :
A No-Dig Point Repair Technology for Steel Transmission Pipes

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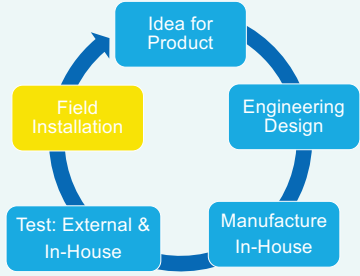

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A Unique Organization & Delivery System

We frequently collaborate with:

- Engineers
- Contractors

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Sample Other Innovations



PileMedic® for submerged pile



ESeaWall: for rising sea levels



StifPipe® 16-ft dia. pipe




Sheet Pile Repair (SPiRe@+)



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The SuperLaminate™ Technology




Packer going through 90-degree elbow

Originally developed as a hard liner to span drip pots in gas distribution lines

Was a part of the project (by PSE&G) that won the trenchless project of the year award by TT Magazine

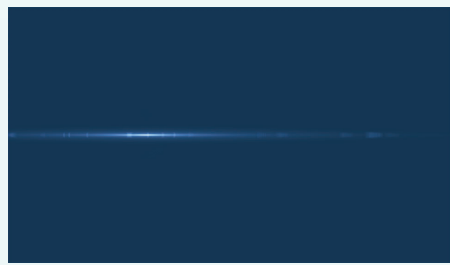
Now transitioning to soft laminae for better adhesion to rugged surfaces and ability to navigate bends (vertical and horizontal)




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The SuperLaminate™ Technology - Animation







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PHASE I TESTING

- 6 months long
- \$150,000
- Proof of concept





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THREE PILLARS OF PHASE II

- 24 months long
- \$1,200,000

<p>Outreach</p> <p>USDOT/PHMSA Pipeline operators Integrity management professionals Other stake holders (e.g., Sprint Robotics, PRCI)</p>	<p>Testing</p> <ul style="list-style-type: none"> • Pressure tests • Cyclic loading • Dents, cracks, weld seam defects • By third party (ADV Integrity) • Chemical resistance 	<p>Installation Plan</p> <ul style="list-style-type: none"> • Long distance launching • Working in tandem with pigging/ILI • Test setup at QuakeWrap facility • Troubleshooting
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PRESSURE/CYCLIC LOAD TEST BY ADV INTEGRITY OVERVIEW OF TEST SAMPLES

Sample	OD (inch)	WT (inch)	Material Grade	Defect	Defect Details
QW12C-1	12.75	0.375	X42	Corrosion	50% Deep
QW22C-2	22.00	0.300	X52	Corrosion	50% Deep
QW12ERWC-3	12.75	0.250	X46	Crack	30% Deep EDM Notch
QW12ERWCL-4	12.75	0.250	X46	Crack	30% Deep EDM Notch (thru-wall leak)
QW12D-5	12.75	0.250	X42	Dent	4% Deep Plain Dent
QW22D-6	22.00	0.300	X52	Dent	4% Deep Plain Dent
QW22URD-7	22.00	0.300	X52	Dent	4% Deep Plain Dent (unreinforced)

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PRESSURE/CYCLIC LOAD TEST BY ADV INTEGRITY PROCEDURE

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PRESSURE/CYCLIC LOAD TEST BY ADV INTEGRITY CRACKED AND DENTED SAMPLES

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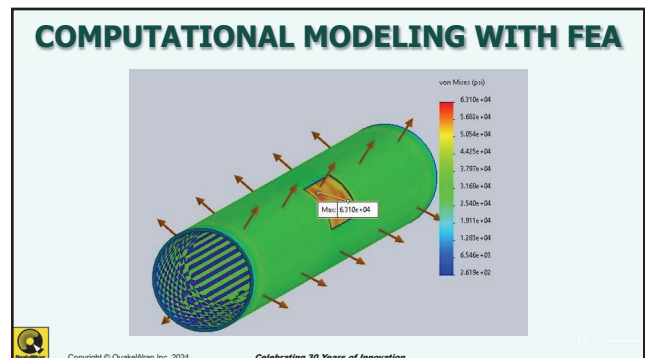
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PRESSURE/CYCLIC LOAD TEST BY ADV INTEGRITY RESULTS SUMMARY

Sample	Description	Number of Cycles	Burst Pressure (psig)
QW12C-1	12-inch – Corrosion	25,000 (runout)	3,446
QW22C-2	22-inch – Corrosion	17,381	-
QW12ERWC-3	12-inch – Crack	5,849	-
QW12ERWCL-4	12-inch – Leaking Crack	242	-
QW12D-5	12-inch – Plain Dent	25,000 (runout)	2,197
QW22D-6	22-inch – Plain Dent	12,401	-
QW22URD-7	22-inch – Unreinforced Dent	7,880	-

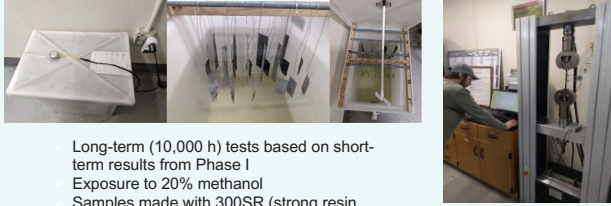
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CHEMICAL RESISTANCE TESTS - PROCEDURE



Long-term (10,000 h) tests based on short-term results from Phase I
 Exposure to 20% methanol
 Samples made with 300SR (strong resin, saturant and 401HCR (not as strong, but chemically resistant)

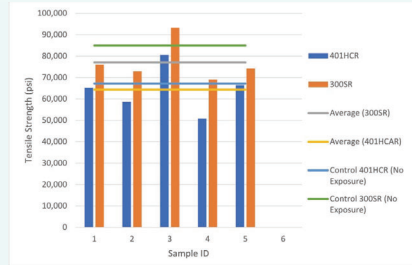


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CHEMICAL RESISTANCE TESTS - RESULTS

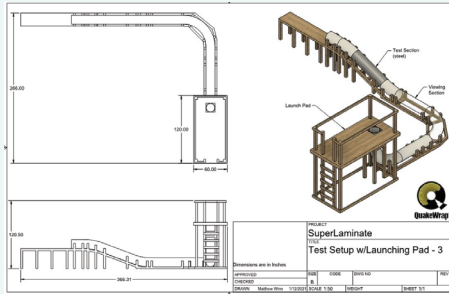


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DEPLOYMENT TEST SETUP



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DEPLOYMENT TEST SETUP – cont'd



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PACKER WITH 8-WHEELED CENTRALIZER

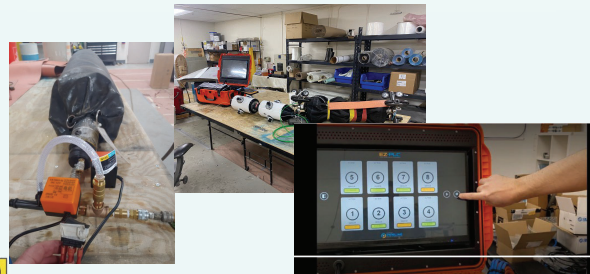


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DEPLOYMENT CONTROL SYSTEM



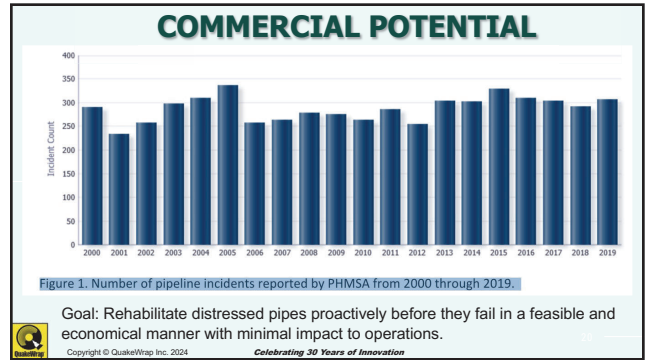
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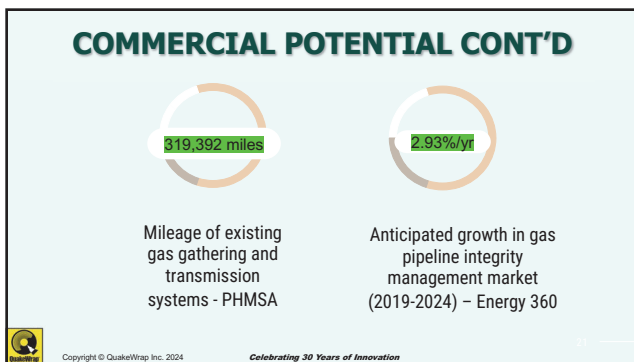
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EXAMPLE BUSINESS MODEL

Active marketing by key team members via conferences, industry journal articles, etc.

Outreach and networking via consultants and sales team

Sell the repair system
Sell or lease the equipment to install

Certification program for contractors

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- Summary**
- ✓ Developed an internal repair system including multiple components
 - ✓ Verified with laboratory testing and FEM
 - ✓ 20% Reduction for long-term exposure to chemicals
 - ✓ Fatigue loading reduction factor
 - ✓ Looking for field pilot applications
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Thank you for your Attention!

Questions?

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