PIPELINE HAZARDOUS MATERIALS SAFETY ADMINISTRATION (PHMSA)

Pipeline Transportation: Hydrogen and Emerging Fuels R&D

Public Meeting and Forum – Nov 30 to to Dec 02, 2021

TECHNOLOGY UPDATE

STARLINE CURED-IN-PLACE LINING (CIPL)

FOR REHABILITATION NATURAL GAS PIPELINES

PROGRESSIVE PIPELINE MANAGEMENT

THE INFRASTRUCTURE RENEWAL SPECIALISTS

DAVID WICKERSHAM

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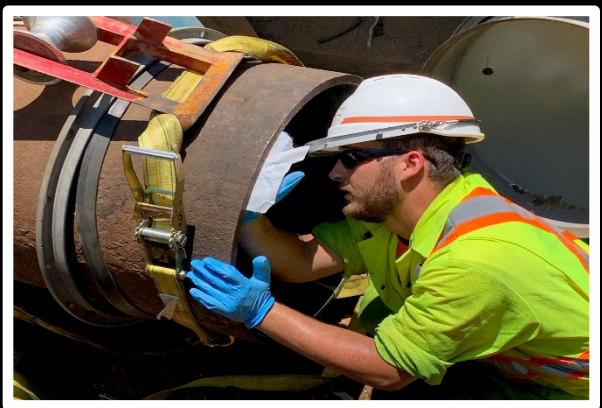
ABOUT PROGRESSIVE PIPELINE

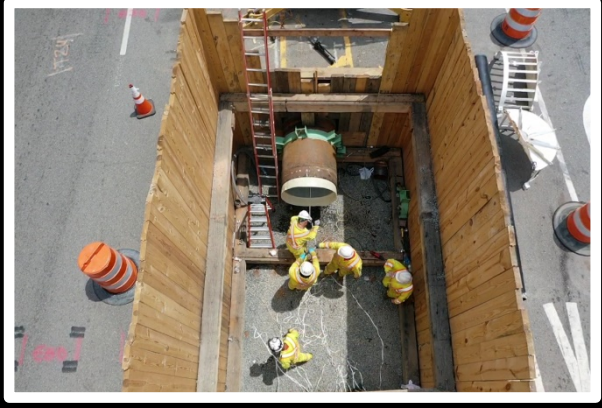
- Formed August 2002 – Starting our 20th Year in Operation
- USA Licensee for Starline CIPL Since Inception
- Facilities in Wenonah, NJ and Deer Park, NY
- 200 Employees & 500 Pieces of Specialized Pipeline Equipment / Trucks
- Rigorous Training (OQ, Starline, OSHA, Road Safety & Hazwoper)

STARLINE HISTORY & PEDIGREE

PROGRESSIVE PIPELINE MGT
SINCE 2002
Genuine PPM Quality
www.progressivepipe.com

- Invented by Karl Weiss Group – Berlin Germany
- First Starline Installation in USA was 1998
- Over 1,000,000 Feet of Gas Mains Lined in 15 States (To Date)
- $15m Invested by USDOT , GTI, NYSEARCH & Gas Utilities for Testing
- Technology Continues to Evolve to Face Emerging Needs



THE STARLINE PROCESS - SOP

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- Site Selection, Layout & Project Design
- Pre-Lining Site Preparation (Turn-Key or Utility Provided)
- CCTV Inspection & Pipeline Cleaning (Includes PCB Decon)
- Liner Inversion & Ambient Pressure Curing
- Post Lining Inspection, Pressure Test & Tie-In

SITE SELECTION

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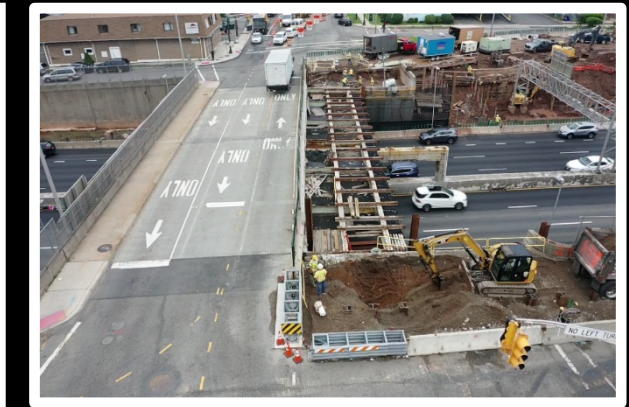
- Crossings (Bridges, Railroads, Rivers, Highways, Intersections)
- Large Diameter Pipe Where Throughput Cannot be Reduced
- Urban Centers & Areas of High Concern (Inner Cities, Hospitals, Churches)
- High $ Restoration areas (Curb to Curb Paving, Stringent & Costly Stips)
- Urgent Response where a main break or leak occurs



PHMSA TESTING (2017)

- 2017: PHMSA – NYSEARCH TESTING AT CORNELL
- Testing showed 100-year plus service life of pre-existing lined pipe.
- Confirmed localized debonding at weak joints remained gas tight.
- Study paved way for technology advancements to address industry needs.
- Link Original Reports & Video https://primis.phmsa.dot.gov/matrix/PrjHome.rdm?prj=502

TECH ADVANCES POST 2017 TESTING

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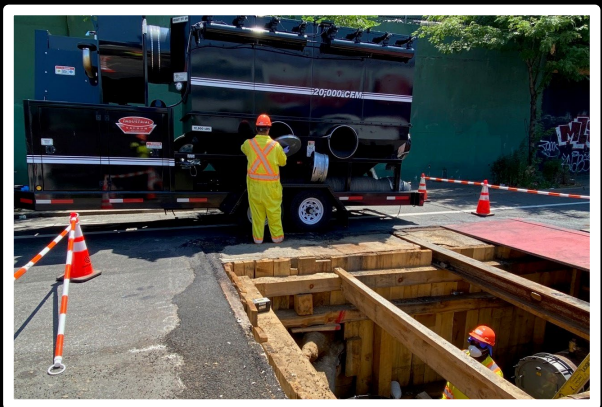
- High-Capacity Cleaning Head For Large Diameter Pipe
- 40,000 CFM Dust Recovery Units – More Efficient Waste Recovery
- State of the Art Lining Drums – Larger Size & Longer Distances
- Remote Monitoring of Lined Pipe during Curing Process
- Advance Robotics Platform for Surface Prep & Service Reinstatement



42” Gas Main – East Orange, NJ - 2019

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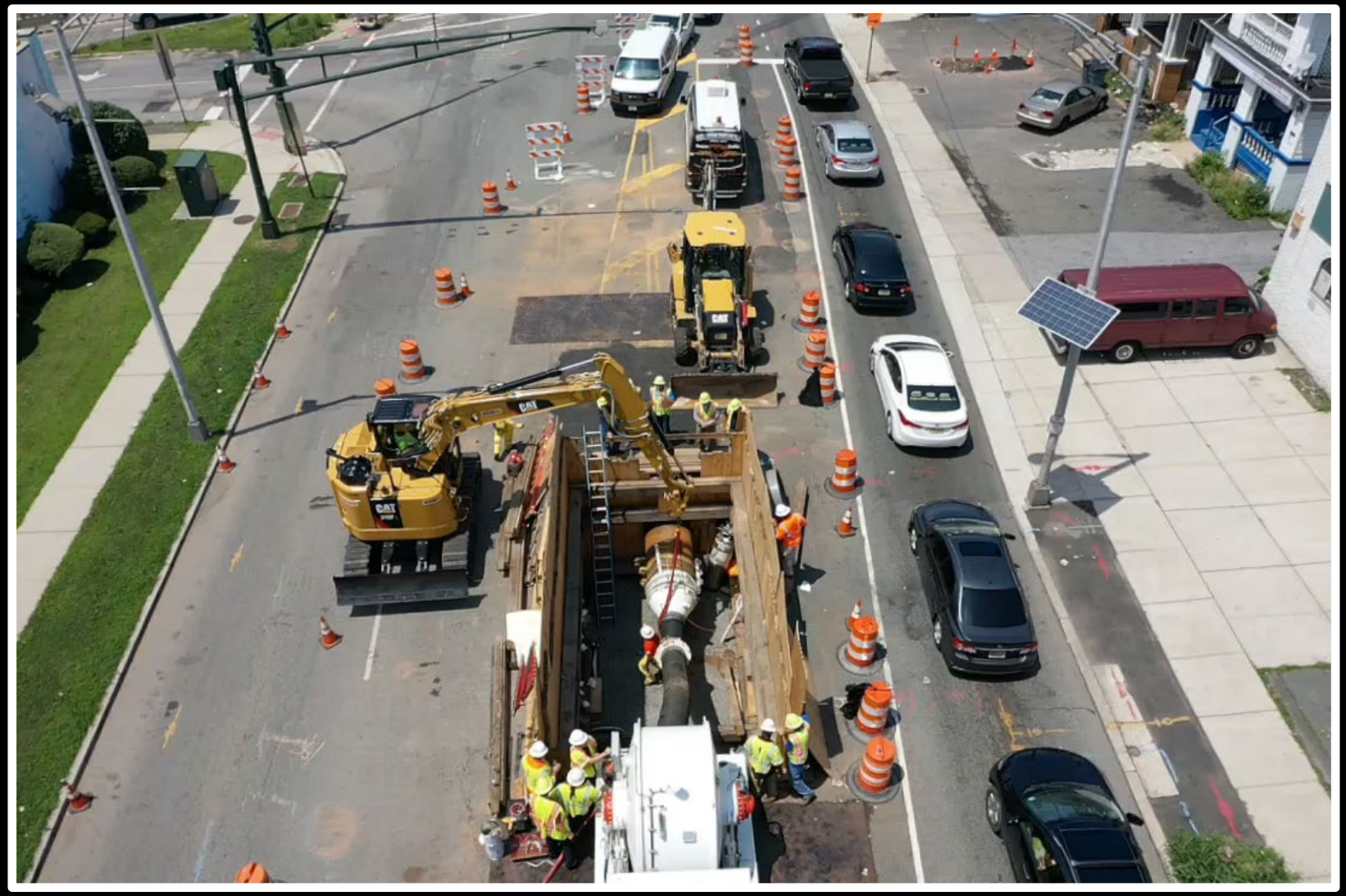

NEW LINING DRUM

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LINER CUT OUT

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WHAT'S NEXT

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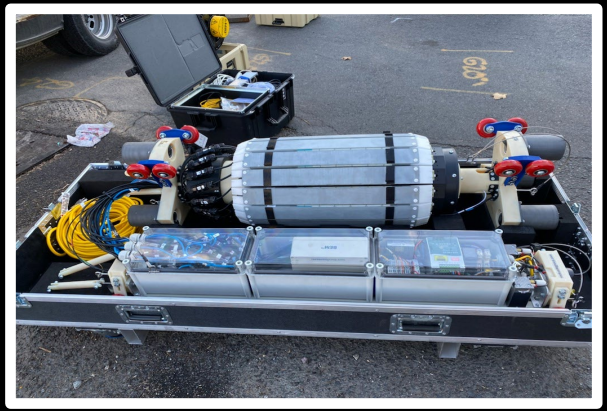
- Broadband Electro-Magnetic Spectrum (BEM) – (Ready Now)
- Structural CIPL for Bare Steel Mains (In Development with Karl Weiss)
- Lining Gas Mains near Steam Mains (R&D Opportunity)
- Liner Resistance to Hydrogen (R&D Opportunity)
- Lining Live Gas Environment (R&D Opportunity)



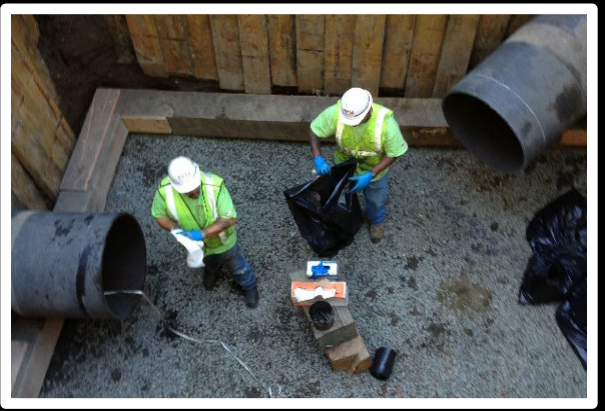


Tabelle 2: Ergebnisse der Gas-Permeation am unbeschichteten PUR-Schaum

Gas	Diffusion [10^{-8} cm²/s]	Löslichkeit [10^{-3} cm³(STP)/cm³ x cmHg]
O_2	43	0,57
N_2	21	0,24
He	1076	0,07
H_2	374	0,23
CO_2	13	16,21
CH_4	14	0,74

THANK YOU . . .

QUESTIONS?

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