



Use of Cured-In-Place (CIP) for Permanent Repair of Gas Distribution Mains

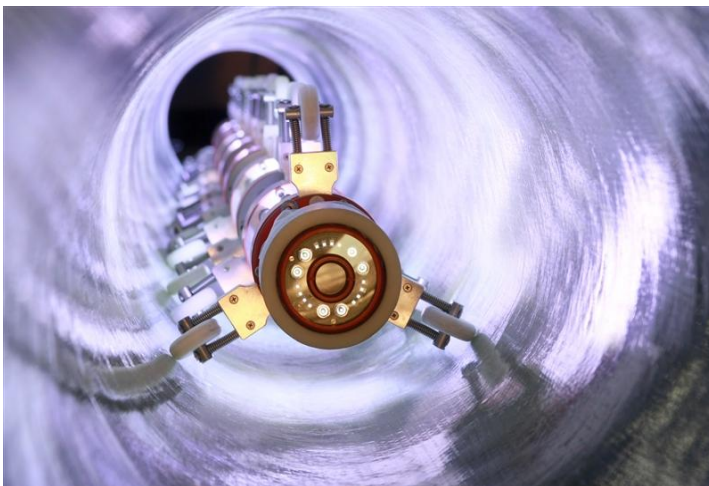
Dr Andy Russell

Distribution Mains Replacement



- ca £7bn repex in RIIO-GD1
- “If it’s not broke don’t fix it”
- Polyethylene and Steel will continue to form backbone of replacement
- However, limited options for large diameter cast iron replacement





- HSE enforcement policy of IMRRP allows refurbishment of larger diameter cast iron mains
- GDN's can manage the risk/extend asset life
- Opportunity for Innovation/Technology Transfer

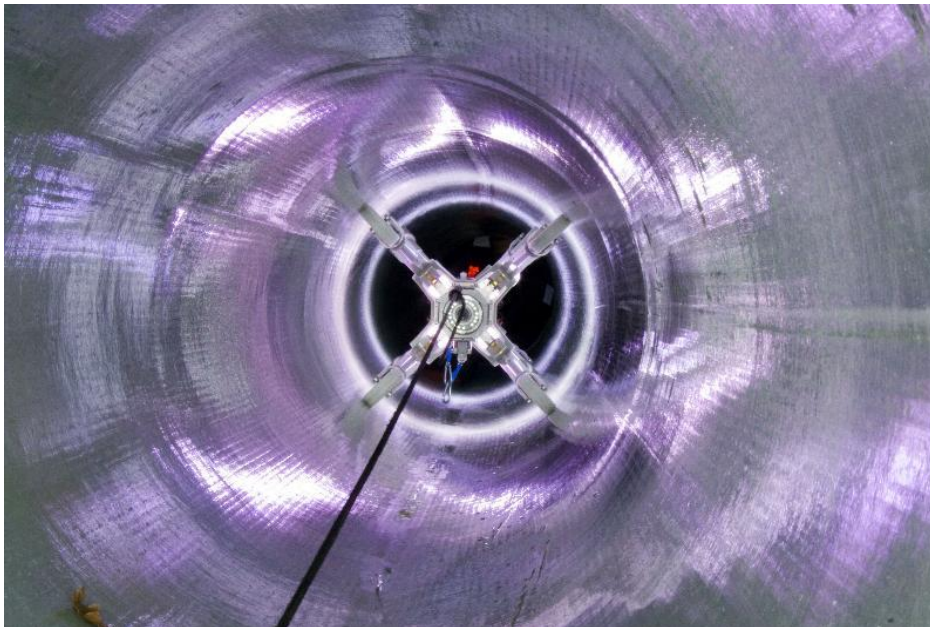
Cured-In-Place (CIP) Liners



- A composite system of fabric and resin
- Built 'on-site'
- Deployed for 40 years; non-structural use in GB gas sector during 1980s
- 70,000km installed Worldwide
- Water Industry: quick installation, minimal disruption, cost-effective



- Curing of the resin results in a rigid liner
- Curing can be achieved using hot water, steam or ultra-violet (UV) light



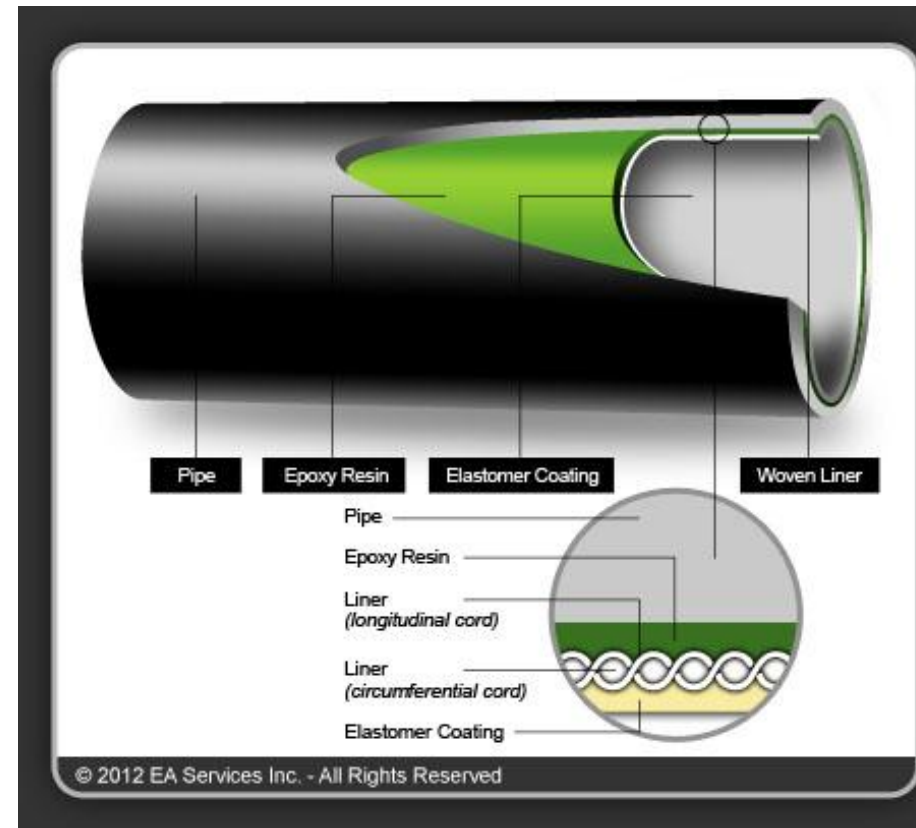
Fully Structural Liner



- Results in a ‘standalone’ replacement pipe (liner)
- Does not rely upon the ‘host’ cast iron gas pipe
- Designed to resist all imposed loading

Semi-Structural Liner

- Liner is 'interactive' with the host cast iron pipe
- Liner requires support from the host pipe for the duration of the liner design life
- Typically used to stop leakage through defects (e.g. joints, holes)



NIA funded collaborative research project

Final outputs:

- CIP Performance Specification
- Best Practice Guide (installation)
- CIP liner 'fit-for-purpose' Certification Scheme
- CIP liner Risk Assessment Framework
- 'CIP liners in service'

nationalgrid



SGN
Your gas. Our network.

Northern
Gas Networks



WALES&WEST
UTILITIES

CIP Stage 2 Project



- ‘Managed demonstration’ of 4 CIP liner systems; the first large scale collaborative programme between GDNs
- Accessed technologies from North America, Europe and Far East
- Installation trials at WRc to produce samples for life-testing (pictures)

CIP Stage 2 Project Test Programme



- Comprehensive £400,000 test programme
- Potential 'show stopper' gas permeability – but materials shown to be as good as PE

Reproduced courtesy of TWI Ltd



- Site installations within GDN networks



Potential size of the market (2013-21):

- Fully structural CIP liners in Tier 1 mains
 - (29,460km Tier 1)
- Fully or semi-structural liners in Tier 2/3 mains for abandonment, refurbishment or risk management
 - (294 km Tier 1 fully structural)
 - (899 km Tier 2 semi structural)
 - (464 km Tier 3 semi structural)