Smart Linings for Longer Pipe Life

J Gardner[1], J Goode[1], D. Vitanage[2], G Ryan[1]
[1]Water Services Association of Australia, Melbourne, VIC, Australia
[2]Sydney Water, Sydney, NSW, Australia

KEYWORDS: Water, Sewage, Pipes, Trenchless, Rehabilitation.

1 Introduction

Water Services Association of Australia (WSAA) is leading a $24 million international project investigating innovation into smart lining for pipes and infrastructure. The Australian Government, through the Cooperative Research Centre (CRC), has funded $3 million to this partnership, comprising of over 30 project partners across the globe. The CRC Program supports industry-led collaborations between industry, researchers and the community and this project will strategically position Australia as a global leader in pipe lining technologies

Pipe liners can provide significant cost savings over current approaches by deferring replacement. However, there is currently no standard by which to assess the quality of liners. This project is developing specifications to provide criteria and conditions that will to ensure longevity of the applied product along with innovative sensing technology for monitoring and assessment.

The liner types being investigated are: Cure-In-Place Pipe (CIPP) liners and Spray liners for water infrastructure and calcium-aluminate-cement (CAC) and Geopolymer coatings for wastewater infrastructure.

This project will position Australia as a global leader in smart water infrastructure through achieving:
- Improved industry confidence in the technology by independent validation of liner products;
- Acceptance of cost-effective, high-performance product that extends pipe asset life;
- Improvement to the total life cycle cost of pipe rehabilitation and quality with material selection;
- Development of smart tools for pipeline renewal technology selection;
- Increased applicator know-how and capability; and
- Increased access for Australian SMEs to international industry networks.

Presented at the IPW conference will be the draft framework of the proposed water and wastewater standards as well as concepts for asset life prediction models and smart tools for pipeline renewal technologies.

2 Methods

This project is a collaboration between WSAA, water utilities, manufacturers, applicators, researchers and international organisations.

Each of the project participants supply expertise from a different perspective to ensure the product standards and codes of practice are practical and fit for purpose. In addition, each participant supports the project through cash funding and in-kind contributions. The current project participants include:

Water Utilities
Barwon Water
Central Highlands Water
Coliban Water
Hunter Water
Icon Water
Melbourne Water
Queensland Urban Utilities
SA Water
South East Water
Sydney Water
Unitywater
Water Corporation
Yarra Valley Water

Researchers
Monash University
University of Sydney
University of Technology Sydney

Manufacturers
BASF Australia
Bisley
Calucem
Hychem
Insituform Pacific
Interflow (also an applicator)
Milliken Infrastructure Solutions
Parchem
Sanexen Environmental Services

Applicators
Abergeldie
Downer
Metropolitan Restorations
Ventia

Organisations
The Australian Society for Trenchless Technology (ASTT)
The Water Research Foundation (US)
UK Water Industry Research (UKWIR)

Due to the complex nature of the project, it has been set-up to be delivered through 4 sub-projects, as shown in Figure 3. The 4 sub-projects are:

1. *Intelligent decision tools and standards* – development of industry standards, product specifications and tools to support lining rehabilitation.
2. *Lining innovation to enhance market uptake* – lab and field trials to evaluate lining functionalities and performance and to understand lining failure modes.
3. *Smart sensing and application* – development of an easy to use real-time tool to non-destructively assess the application quality and performace of linings and integration of sensors into liners for real-time monitoring.
4. *Implementation and adoption of research* – platform for disseminating project outcomes.

3 Outcomes

The project will develop codes of practice, products standards and liner selection tools to facilitate the use of smart linings.

The codes of practice are intended to support water utilities in the application of water and sewer linings. Each product assessed will also have a product standard, which will specify minimum requirements for product properties, such as tensile strength, adhesive properties and corrosion resistance.

The product standards will also provide test methods to be used to demonstrate that products can meet the requirements of the standard. The codes of practice and product standards will enable water utilities to make an informed decision regarding the various pipe renewal options.

The project will also develop liner selection tools and pipe rehabilitation prioritization tools for both water and waste water. These will only be in their conceptual stage by mid 2019. An example of an output improved criteria for prioritizing sewer pipes for rehabilitation such as using alkalinity instead of pipe age.

4 Conclusion

At just over one year into a three year project, there is still a long way to go until the final tangible outputs are produced. Draft outputs will be available throughout the project, and it is expected the final outputs will remain a live documents/tools that are updated as further testing is undertaken.

The overall objective is to facilitate the use of coatings and linings in the water industry though product standards, codes of practice and decision tools. However a collaborative project such as this also generates knowledge in the correct allocation of risk, improved research processes and relationships for ongoing improvement of the water industry.