

Sewer Rehabilitation & Prioritisation Decision Platform

Introduction

Concrete, protective coatings and other materials are subject to corrosion when exposed to chemical conditions such as those found in sewers.

Calcium aluminate cement mortars (CAC) and geopolymer cement mortars (GEO) can be applied to the internal surface of wastewater assets and pipes to form a corrosion resistant barrier to extend the life of the assets.

The Smart Linings for Pipe and Infrastructure Project researched CAC and GEO liners in wastewater assets with a range of corrosivities (how corrosive the sewer environment is).

To assist with the effective use of these products a tool was developed to:

- Classify the corrosivity of the asset based on the aggressiveness of corrosion in the gas phase.
- Prioritise concrete and reinforced concrete assets for rehabilitation and intervention based on the likelihood of failure from corrosion.
- Determine suitability of CAC or GEO products for the corrosivity level.
- Determine how much material (thickness) must be applied to achieve the required service life.

The model used in the tool is based on the conditions in the sewer (refer fact sheet: [Corrosion Classification](#)) and the components of the CAC or GEO.

General

The Sewer Rehabilitation & Prioritisation Decision Platform is an excel-based platform that is available via [email request](#). Users can input data and run the models.

Selection of Environmental Conditions

Monitoring of the sewer is required to determine the environmental conditions and corrosivity level of the sewer. The key parameters are:

- Hydrogen sulfide (H₂S)

- Carbon dioxide (CO₂)
- Relative Humidity
- Temperature

Refer to this [fact sheet](#) for additional information.

Predictive Model – Sewer Asset Failure

This model predicts the likelihood of failure of a concrete, or reinforced concrete, wastewater asset based on the corrosivity and age of the asset. It is able to provide an estimate of the remaining life of the asset. It considers both the depth of the corrosion (reinforcement exposure) and residual compressive strength.

This allows targeted condition assessment to verify the integrity of the asset.

The model outputs are:

- Remaining life
- Severity grade (1-5)
- Risk of failure
- Recommended actions

Coating Service Life Model(s)

Service life models are used to predict the required thickness and remaining strength of CAC or GEO product for a given service life. For example, a 50 year service life in a low corrosivity sewer will require a lower application thickness than the same product used in a high corrosivity environment.

The coating thickness and remaining strength prediction will rely on asset corrosivity and coating properties. The tool has a limited database of coatings and their properties that can be used for an initial selection. For new coatings, the coating properties need to be entered. The information required for new coatings is provided by manufacturers as a part of the product appraisal process, based on the water industry standards developed as part of the project.

- WSA 160 Water Industry Standard for Calcium Aluminate Cement Mortars used for the renovation of wastewater structures and large diameter pipes

- WSA 161 Water Industry Standard for Alkali Activated Binder Including Geopolymer Cement Mortar used for the renovation of wastewater structures and large diameter pipes
- An update for WSA 201 Manual for Selection and Application of Protective Coatings.
- Product Standards for CAC and GEO products.
- Additional information is available at the [project website](#).

Coating Selection

The coating thicknesses can be used to calculate the total material require to provide a cost comparison of the coating system. For coatings that are required to provide structural support, the tool will also predict the remaining strength of the coating at the end of its service life to provide an alternative means of assessing the suitability of the coating.

Additional Information

The Smart Linings for Pipe and Infrastructure Project has also produced the following information to assist with the successful application of CAC and GEO products:

The Sewer Rehabilitation & Prioritisation Decision Platform was developed by the University of Sydney.

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