WARRIP
WESTERN AUSTRALIAN ROAD RESEARCH & INNOVATION PROGRAM

Improved Decision-Making Stage 3 (IDM3)

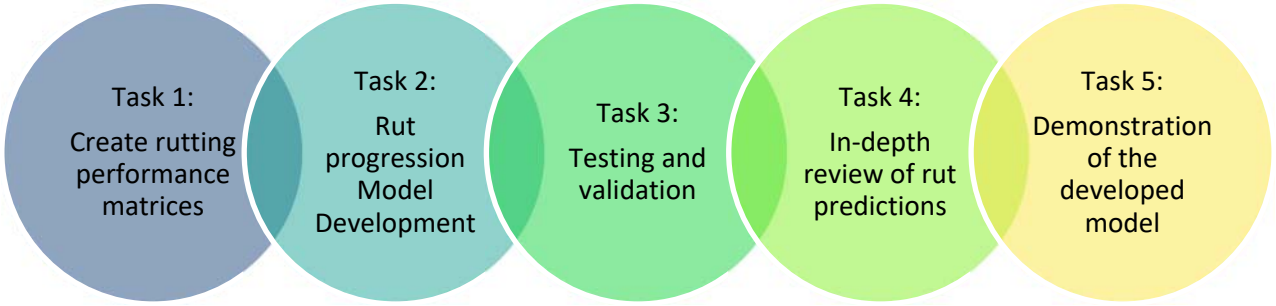
Reference: 2021-0024 Published: March 2022

WARRIP developed and validated an improved rutting deterioration model that allows Main Roads Western Australia (Main Roads) to better predict rutting on the full network and each link category. This is achieved by improving decision making and works program development with continuous network strength and condition data (IDM) – Stage 3 project

Background

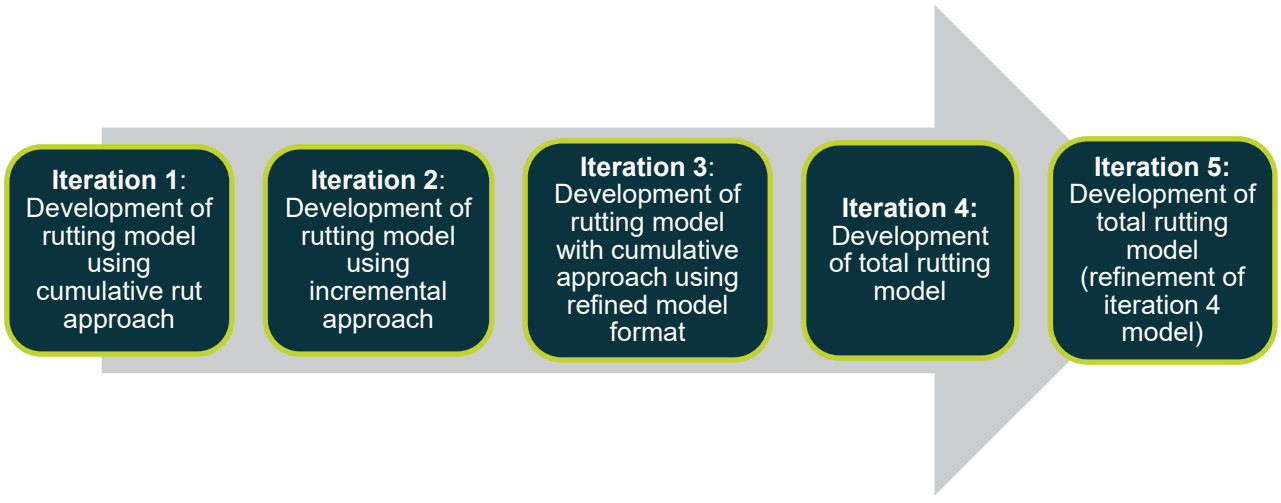
Rutting was identified as one of the main contributing factors to the initiation of rehabilitation work. Being able to predict rutting across the network will allow for strategic planning to apply the correct level of rehabilitation at any given location.

Approach



Model Development

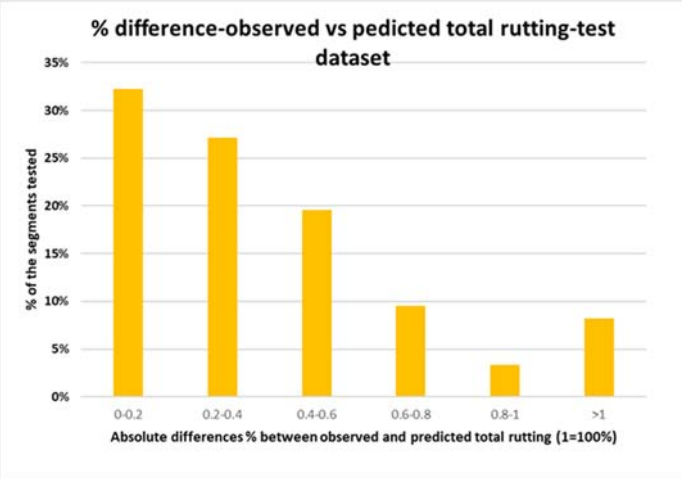
Development of the rutting model was an iterative process where different techniques were tested to generate suitable models.



Validating the models

The validation of the models was undertaken in two steps using the datasets used in the model development as well as an independent dataset not used during the model development. The dataset used in the model development produced more accurate results as expected, but the independent test data still predicted rutting well.

% Differences between observed and predicted total rutting – test dataset



Source: ARRB 2022.

In depth review

- Review Approach 1: Comparison with the rate of rutting progression for selected WA regions - similar matrices for 2 regions as developed during Task1 and review of the proportions in different rut ranges using both observed and predicted data.
- Review Approach 2: Comparison of the predicted rutting for a sample network with observed (surveyed) rutting over time using the same starting rut depth. Outputs show that although the differences between actual observed data and predicted rutting widen over time, the new developed model still predicts rutting within +- 1mm accuracy for 56% of the sample even after 7 years.

Example of rutting

Source: Shutterstock, 2021.

Next stage

- Similar to rehabilitation prediction, how to determine significant functionally based distress variables that identify and initiate non-structural rehabilitation and preservation treatments on the MRWA road network.
- Methodology to help practitioners to compare treatment alternatives in terms of risk, Level of Service, and Whole of Life Cost, when budgetary constraints are posed during program development.

The new rutting model has shown to predict the rut progression well.

This stage of the project builds on the work undertaken in Stage 1 and 2 of the projects.

How does this research change the way we operate?

Rutting is a common trigger for rehabilitation works on the road network. By developing a new and improved model to predict rutting, we can ensure better strategic planning and rehabilitation decisions can be made.