

Analysis of Project-Specific Computation Design Scripts for Bridge Structures

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Abstract

This paper presents the findings of a Design Scholar as part of their final year research thesis at the Aurecon Design Academy - an internal accelerator learning programme aimed at achieving technical mastery and design excellence among Aurecon's top senior design, engineering, and advisory practitioners. The programme runs for three-years in collaboration with RMIT.

Through a comprehensive survey and analysis of existing project-specific computational design scripts developed by Aurecon's international Bridges and Civil Structures capability, the study aimed to develop a modularised framework for future scripts development. In addition, the study also sought to identify standard modules within the existing scripts—akin to 'Lego blocks'—that can be developed and applied to automate future bridge design.

The script developed for the Weiti River Bridge as part of the O Mahurangi - Penlink project was chosen for detailed mapping and analysis. The bridge itself is a long-span extradosed bridge with an overall length of 535 metres. The script was developed using the visual scripting platform Grasshopper to fully parameterise the bridge structure geometry and design variables to carry out analysis modelling in Midas Civil, as well as contribute to the Building Information Models (BIM).

The research found that while computational design methods are embedded as business as usual in Building Information Models (BIM), there is significant work to be done in for analysis and structural design. The Weiti River Bridge script was successfully mapped into its component modules which was then used as a basis for a framework for future script development that is scalable and covers a variety of bridge types. The process also informed the identification standard modules for future development.