

2025 Austroads Bridge Conference – Abstract

Benefits of computer vision in bridge monitoring system. Stirling Bridge case study

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Title

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Theme

Field Applications and Case Studies

Abstract

Stirling Bridge is a pivotal transport link in Perth, connecting Fremantle port to the broader Western Australia region. The port handles the vast majority of container trade for the area, making the bridge a crucial aspect of the local infrastructure. Constructed in 1974, the bridge features an unconventional span arrangement, with the south abutment span measuring less than 23m, and the longest span reaching 80m. As a result of the unique construction method and span arrangement, Macalloy bars were required to hold the bridge in place, necessitating further on-site fatigue assessment investigation.

Recognizing the initial fatigue assessment in accordance with AS5100 as overly conservative, it became clear that a digital twin long-term monitoring approach was not just beneficial but necessary to reassess the bridge's remaining design life. This refined fatigue assessment, carried out using the Palmgren-Miner method and the conventional rain flow count method, was crucial in better understanding the bridge's design life. The assessment, which considered the contribution of different vehicle classes, provided a more realistic design life estimate, a significant step forward in ensuring the bridge's safety and longevity.

A bridge monitoring study involving two cameras mounted on existing light poles and several sensors was used to assign 12 different vehicle classes to strains and displacement. Using advanced computer vision and AI, the assessment results provide valuable insights into the bridge's design life and are of significant interest to businesses and academics.

