2025 Austroads Bridge Conference – Abstract
Normanby Overpass, Bridge Strike: Assessment, Management and Rehabilitation

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Title

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Theme

Bridge Analysis, Design and Assessment

Abstract

A truck carrying an over-height load travelling on Bruce Highway struck the superstructure of the Normanby Overpass in Gympie, Queensland, Australia. The overpass is a 13.5 m long single span bridge with signs attached indicating a 5.0 m clearance. The impact damaged the steel girders.

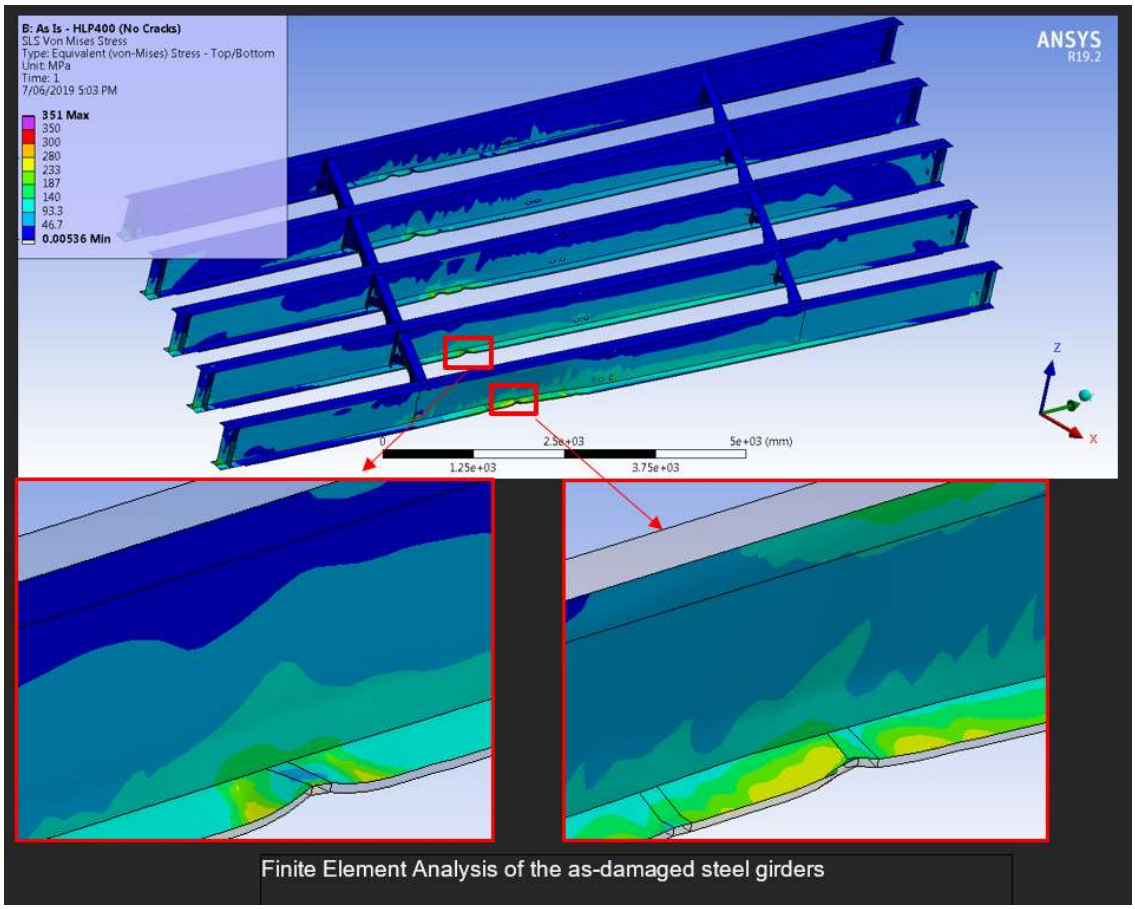
Load restriction of 17 tonnes and reduced speed limit were then imposed to keep the overpass operational while an investigation into the preferred rehabilitation method was conducted.

Nonlinear finite element analysis (NLFEA) was used to assess the load rating and remaining fatigue life of the as-damaged girders, and to derive repair options to carry Regulation Mass Vehicles (62.5 tonne B-Doubles) and AS 5100 design traffic loads (SM1600 and HLP400). 3D laser scan data of the damaged overpass was used to accurately model the damaged girders for the NLFEA assessment.

Traffic monitoring by cameras detected that load restrictions were being exceeded, largely by 22.5 tonnes rigid trucks. Fatigue damage due to these rigid trucks was estimated using NLFEA, and the remaining fatigue life was predicted to be less than a year. A rigorous monitoring strategy was put in place to check for any deterioration in the damaged girders to maintain safety while keeping the overpass operational until an optimal rehabilitation method was determined and implemented. The monitoring strategy included regular visual inspections and non-destructive testing (e.g. magnetic particle testing).

Despite the estimated design, construction, and future inspection cost of superstructure replacement being 50% more than the preferred repair option, replacement was adopted because:

- 100 years of design life could be achieved, compared to approximately 31 years for the repair
- design and construction of the repair were complex due to the extent and severity of the damage, and
- satisfactory site welding quality could be difficult to achieve for the repair.



Finite Element Analysis of the as-damaged steel girders