

## **SHS Signpost Fatigue Design: FEA & Experiment Validation**

*Mahdi Saadati , Mechanical Structural Engineer in Transport for NSW*

### **Author:**

*mahdi.saadati@transport.nsw.gov.au*

### **Co Authors:**

*Hadi.ALRAWI@transport.nsw.gov.au*

*Saeed.Saadatibanafshehdaragh@transport.nsw.gov.au*

*David.Lowardi@transport.nsw.gov.au*

### **Abstract:**

The study presented in this report addresses the fatigue design of Square Hollow Section (SHS) signposts, which was identified as a gap by Austroads. Commissioned by Transport for New South Wales (TfNSW), the research aimed to develop a finite element model (FEM) for evaluating the fatigue performance of SHS sections, and to experimentally validate these models. The SHS sections investigated included 300x10, 200x9, and 125x9, all constructed from AS1163 350 grade material welded to AS3678 350 plate. The criteria for fatigue evaluation adhered to the AASHTO Appendix C for the infinite life scenario. Experimental validation, conducted at the University of Queensland's Material Performance laboratory, involved testing the 125x9 SHS section to establish the maximum allowable bending moments for each SHS section. Results indicated the allowable bending moments as 5.20 kNm, 7.63 kNm, and 28.92 kNm for the 125x9, 200x9, and 300x10 sections respectively. The experimental findings correlated well with the FEM predictions, with an acceptable average error margin of 7.8%, thereby confirming the model's reliability. These validated models are intended to inform the guidelines for the fatigue design of SHS signposts, ensuring their durability and safety in real-world applications