

Composite Testing Program on an I-Beam

Overview

The ICR.IAS JV partnered with the University of Western Australia to conduct research on using our composite repair system Technowrap™ on an I-Beam to reinstate the integrity of the structure.

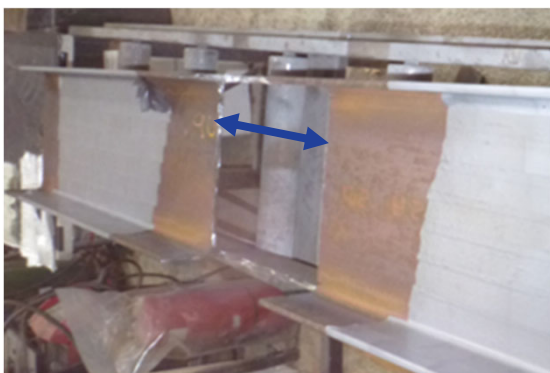
Multiple beam test pieces had a 300mm section removed from the centre in order to simulate a loss of steel. In total four (4) beams were tested:

- (1) I-Beam intact with no sectional loss
- (2) I-Beam with 300mm sectional loss
- (3) I-Beam with 300mm sectional loss repaired with 8 layers of Technowrap™ SRS (Carbon Fibre)
- (4) I-Beam with 300mm sectional loss repaired with 8 layers of Technowrap™ 2K (Glass Fibre)

Scope

Performance and failure modes:

No.	Description	Ultimate Load (kN)	Performance	Failure mode
1	Intact I-Beam	432	Intact capacity	Lateral Torsional Buckling
2	Damaged I-Beam	99	23% of Intact capacity	Yielding in Top flange
3	Damaged I-Beam repaired with SRS	372	277% improvement from damaged state & 86% of Intact capacity	Lateral Torsional Buckling
4	Damaged I-Beam repaired with 2K	344	248% improvement from damaged state & 80% of Intact capacity	Lateral Torsional Buckling



Section of the beam removed to simulate loss of steel



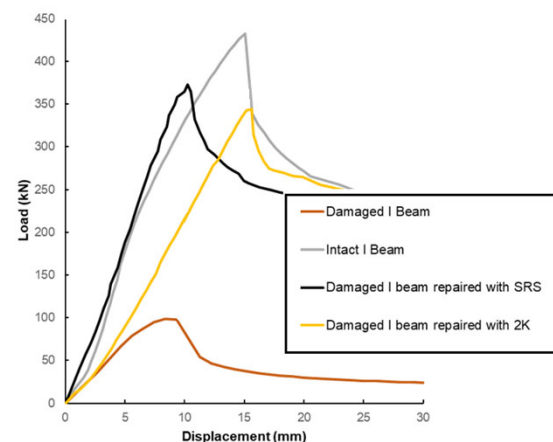
Repaired section prepared for testing

Results

- The I-Beam repaired with SRS (Carbon Fibre) resulted in a 277% improvement from a “damaged” state and 86% of the original intact capacity.
- The I-Beam repaired with 2K (Glass Fibre) resulted in a 248% improvement from a “damaged” state and 80% of the original intact capacity.

Benefits

- Increased knowledge and capacity to work with complex geometries and large-scale substrate loss especially with regards to failure modes.
- The testing output will be used alongside specialised composite engineering to build additional client confidence for site specific questions relating to critical works and emergent scopes.



Comparison of Results