

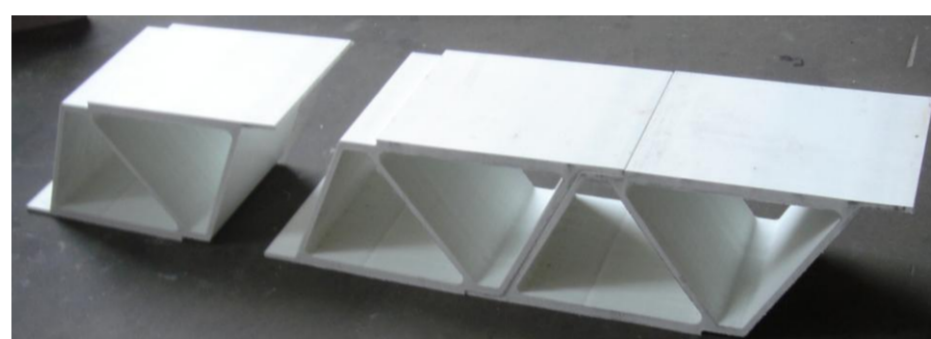
Composites (glass or carbon fibre reinforced polymers) show great potential for enhanced design flexibility, durability and performance of new and existing civil structures. To realise this potential, rigorous theoretical work and large-scale tests are being pursued at Bristol, with industrial support.

Glass Fibre Composite (GFC) Bridge Decks

Researcher - Mr Joel Ross

The Introduction of Composites :

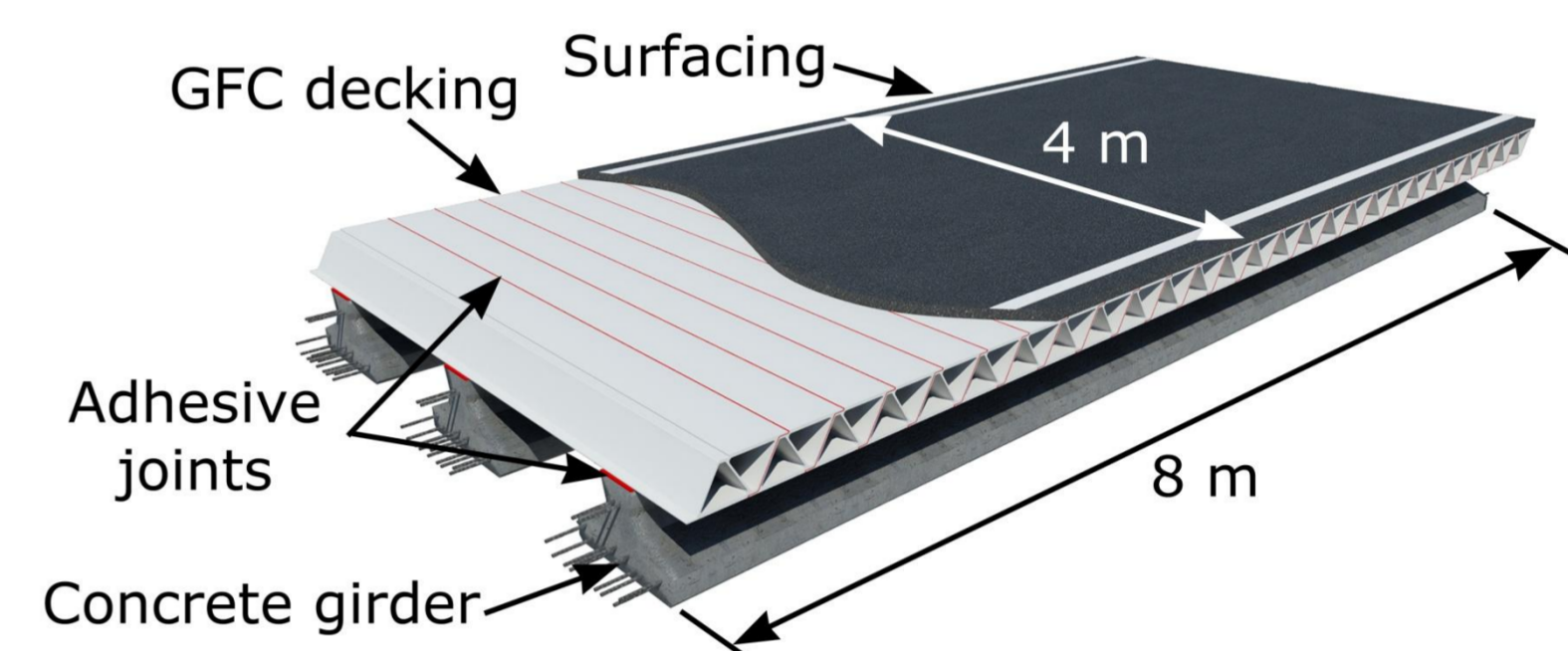
- Composites are successfully used in the aerospace industry, e.g. the low weights + high stiffnesses / strengths of composites enable Boeing's 787 Dreamliner to achieve 20% better fuel efficiency than traditional aircraft.
- Composite (GFC) decks can be highly advantageous in road bridges, because they are :
 - Resistant to corrosive de-icing salts.
 - 80% lighter than concrete decks.
 - Modular, so enabling faster construction.
 - Tending towards bridges of higher load capacity.
 - Less maintenance-prone, giving less future traffic disruption.



GFC Bridge Decking



<http://787flighttest.com>
Boeing 787 Dreamliner



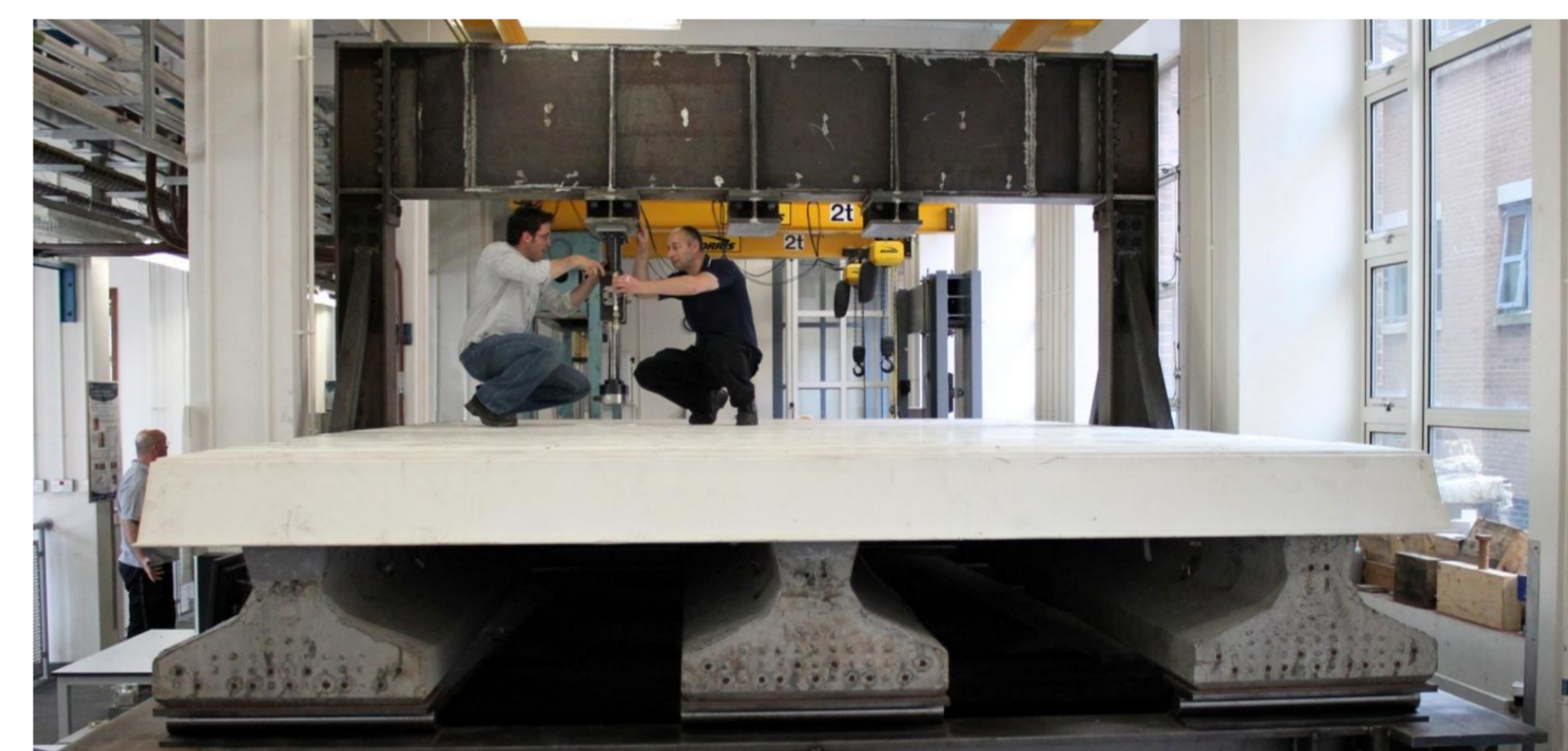
Bridge Specimen Details

Research :

- Partnership with Highways Agency has led to a unique test rig at Bristol, now housing a bridge specimen with GFC deck :
 - 100 tonne test facility.
 - 100 million cycles of heavy lorry loads.
 - 8 m span x 4 m wide bridge specimen.
 - Adhesive joining technology.



GFC Decking in Specimen



End View of Bridge Specimen in Test Rig

Strengthening Buildings With Carbon Fibre Composites (CaFCs)

Researcher - Mr Said Macharkah

Application :

- In these more challenging economic times it is particularly important to extend the lives of existing structures as opposed to rebuilding them.
- To rehabilitate concrete structures, use of carbon fibre rods as external reinforcement significantly increases load capacity in case of :
 - Change of use (e.g. office floor conversion to library)
 - Deficiencies in concrete buildings.

Advantages :

- High strength-to-weight ratio.
- Little added dead load.
- Resists corrosion.
- Can be 85% cheaper than reconstruction.



<http://www.shop.r-g.de>
CaFC Rods



<http://www.hughesbros.com>
Slab Retrofitting



Test on CaFC-Reinforced Continuous Beam