

Bascule FRP Composite Footbridge

Span 56m, Opened 17. May 2003. CFRP and GRP composites in both single skin and sandwich configurations.

Client: Værste AS and Fredrikstad kommune
Design: Griff kommunikasjon AS (www.griff.no)
Built at Marine Composites AS, Arendal, Norway

The footbridge, crossing the river Vesterelven in Fredrikstad, is a double-leaf bascule bridge without counterweights. It is the largest moveable bridge in Scandinavia using FRP composites as the main load carrying materials. One large hydraulic cylinder helps each of the 28m long leaves to move up and down. The leaves are built as a closed box girder with longitudinal and transverse stiffeners inside, with double curved outer surfaces. Approx. weight of a fully equipped leaf is 20ton, where 9ton is FRP composite materials. The bridge deck is a sandwich construction with carbon fibre (CFRP) laminates and a Balsa core, with embedded heating cables for defrosting during the wintertime. The deck is strong enough to carry a car with up to 2.0ton axel load. The bottom flange of the girder is made of single skin CFRP laminates (10-38mm thick). The internal stiffeners are all sandwich constructions with CFRP and/or GRP laminates and PVC core materials. A steel construction inside the thickest end of the girder is used to distribute the concentrated bearing loads into the composite box girder. Finally, the side panels are made semi- translucent by using a bluish and translucent polyester provided by Reichhold AS, and a custom made internal light system mounted inside the hollow girder. All, except the translucent side panels, which is wet lay-up, where made by vacuum assisted resin infusion.



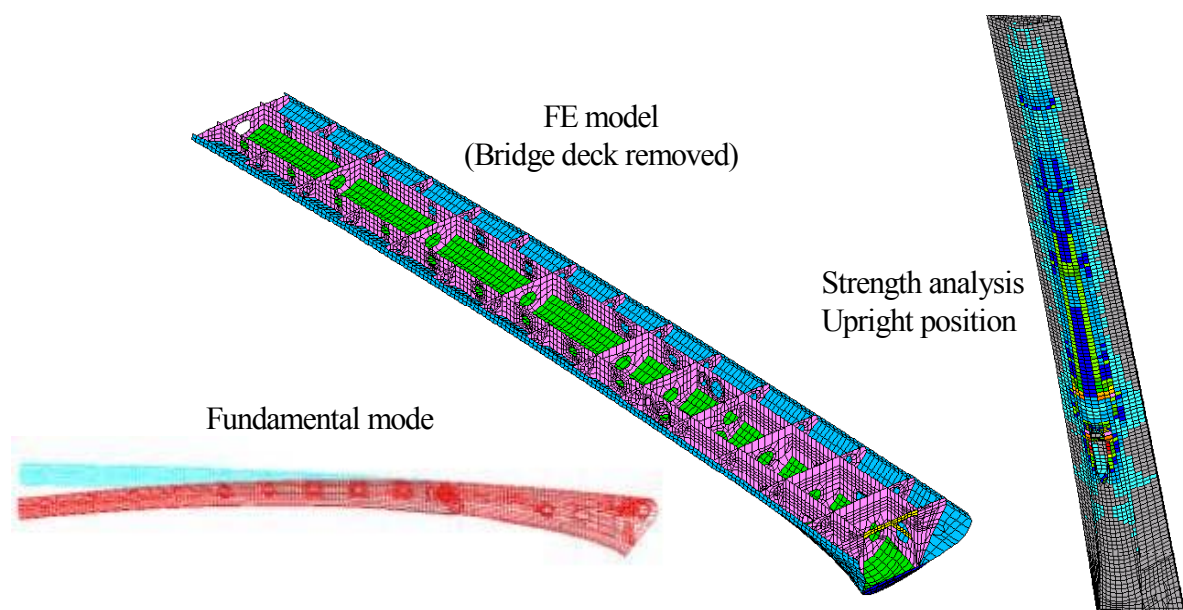
Bridge seen from the main square side in Fredrikstad, Norway

Civil Engineering

- Feasibility study
 - Structural design
 - Load predictions
 - Selection and qualification of materials
 - Strength, stability, and dynamic analyses
- Detailed design phase
 - Detailed strength, stability, and dynamic analyses (FEM)
 - Documentation, tender, and drawings for production
- Inspection during production
- Evaluation of non-conformance during construction



The bridge in open position



FE models and results from static and dynamic analyses