

Cable Stays

Flintshire Bridge



FREYSSINET
SUSTAINABLE TECHNOLOGY

Client

Flintshire County Council

Architect

Percy Thomas Partnership

Consulting Engineers

Gifford Graham & Partners

Principal Contractor

NWH / Kier / SGE JV

Stay Cables & Post Tensioning

Freyssinet Ltd

Completion

Autumn 1997

Value

£5m

The Flintshire Bridge crosses the River Dee, linking Flintshire and Cheshire with Merseyside. The bridge is an asymmetric stay cable bridge with a 100 m end span that acts as a counterweight to the 194 m long main span. The deck is supported by 38 pairs of stay cables anchored to a 115 m high pylon. A clear height of 18 m above the river enables ships to pass. Freyssinet was responsible for installation of the stay cables and for prestressing of the main structure and the approach viaducts.



The inverted 'Y' pylon is supported on two 4 m thick rafts connected by a stiffening beam. The pylon is formed from white coloured pre-cast segments with an in-situ filling. The upper part of the pylon includes an internal metal frame onto which the stay cables are anchored. Construction of the two access viaducts, one 390 m long on the east side, and the other 270 m long on the west side, was also a major part of the project.



Stay cables were installed after the deck slabs built by cantilever construction had been poured. Their length varies from 38 to 135 m, and they were anchored in the deck and the pylon by means of 37HD, 55HD and 61HD anchorages. The stay cables were then tensioned to between 2,000 and 5,600 kN using Freyssinet's Isotension technique.



The main span deck is prestressed longitudinally and transversally. 40 mm diameter Macalloy bars are used for longitudinal prestressing of deck segments. The transverse prestressing is provided by 19K15 tendons. There are two tendons in each concrete rib. Access spans are multiple concrete box girder bridges. A total of twenty-four 27K15 tendons were used in the six webs to provide longitudinal prestress. These tendons are coupled at the interface of each 40 m section.



The bridge was one of only a few post-tensioned structures to be constructed in the UK during the Highways Agency's four year moratorium on grouted post-tensioning. Through a series of trials, Freyssinet has convincingly demonstrated that grout completely fills the ducts. The use of HDPE ducts, sealed pressurised duct couplers and vents provided with purge valves has contributed to obtaining high quality complete grouting.

- 1 Aerial view of the bridge opened to traffic
- 2 Y pylon and cable stays during construction
- 3 Strand pushing

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