

A long road ahead

Ancon's Bartec Plus range is helping to meet the demanding construction schedule for the new Queensferry Crossing – a huge civil engineering project for Transport Scotland



MEMBER PROJECTS

Almost 100,000 Ancon Rebar Couplers have been used in the concrete support towers, end piers and road deck of one of the longest cable-stayed bridges in the world, currently under construction near Edinburgh.

Due to open in May 2017, the new Queensferry Crossing will be the third bridge to span the Forth

Estuary and is located next to the current road bridge (1964) and the historic rail bridge (1890).

Designed to safeguard the transport network in the east of Scotland, the crossing is a huge civil engineering project for Transport Scotland, and at 1.7 miles, the structure will be the longest three-tower, cable-stayed bridge in the world.

The new bridge has benefited

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greatly from major technical advances in design. The pioneering cable arrangement provides extra strength and stiffness, enabling the tower and bridge deck construction to be a slimmer, more attractive profile. Nevertheless, the structure demands 150,000 tonnes of concrete and the bridge deck steel alone weighs 35,000 tonnes.

Reinforcing bars that strengthen



the concrete deck, towers and end piers had to be reliably, mechanically connected end to end throughout the structure. To perform this hidden – but vital – structural task, almost 100,000 Bartec Plus Parallel Threaded Couplers were selected from the comprehensive Ancon range.

Standard Type A and Type C Bartec Plus couplers, stainless steel BT couplers and Bartec Plus Headed Anchors were delivered to site in a variety of sizes to match rebar diameters 12, 16, 20, 25, 28, 32 and 40 mm, with the three largest sizes being used to join reinforcement running the full height of the three 680 ft support towers.

TA1-A CARES-approved Bartec Plus couplers offer a full-strength connection together with enhanced fatigue resistance, making them ideal for this major infrastructure project. Each end of the rebar to be joined is cut square and enlarged using a cold forge process. A thread is then formed on the enlarged bar end using a thread rolling machine. The thread is such that the cross-sectional area of the bar ends are not reduced, ensuring the strength of the connection matches or exceeds that of the parent bars.

It is the application of the rolled thread that differentiates Bartec Plus from other threaded rebar systems. Each thread-rolled bar end is proof-loaded to a force equal to the characteristic yield strength of the rebar. It is the

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combination of these processes that provide the connection with enhanced Class D fatigue resistance, which is demanded in infrastructure applications such as road and rail bridges.

Special purpose couplers

Ancon BT stainless steel couplers, manufactured from 1.4462 duplex for optimum strength and increased corrosion resistance, were used to connect stainless steel reinforcing bars in the support towers, below and around the water line to accommodate tidal fluctuations.

Bartec Plus Headed Anchors were used in the support towers to provide an effective and proven method of anchoring the rebar end within the concrete. A headed anchor is essentially an oversized coupler capable of carrying the full tension load of the bar when it bears against the concrete in which it is cast. The Headed Anchor removes the need for a

hooked rebar end and subsequently reduces congestion, simplifying bar placement.

Ancon couplers can simplify the design of reinforced concrete, speed up construction and, because there are no lapped joints, reduce the amount of reinforcement required. Furthermore, coupled reinforcing bar is not dependent on the integrity of the concrete and retains its strength if there is any concrete degradation.

The Queensferry project had specific rebar coupler criteria for tensile capacity, permanent set and fatigue resistance, together with a requirement for UK CARES TA1-A Approval Certification. Ancon won this contract as its Bartec Plus range met these stringent product requirements, and with a proven track record the company's UK manufacturing operations were trusted to meet the project's demanding construction schedule.