The bridge steelwork, for the atrium link, is lifted into place.

Historic bridge inspires school design

FACT FILE
South West Fife High School
Main client: **Fife Council**
Architect: **AHR Architects**
Main contractor: **BAM Construction**
Structural engineer: **Goodson Associates**
Steelwork contractor: **BHC**
Steel tonnage: **850t**

Built to low energy use principles, the new South West Fife High School takes some of its steel-framed design from the nearby Forth Bridge.

Part of Fife Council's ambitious programme to renew all of its secondary education buildings, a new high school is rapidly taking shape on land overlooking the north bank of the River Forth.

Being constructed on former sports fields in Rosyth, the £88 million South West Fife High School will replace the nearby Inverkeithing High School, offering places for 1,800 pupils.

Fife Council Leader David Ross, says: "With revenue funding support from Scottish Government, we are working with our trusted partners, hub East Central Scotland, contractors BAM and the Scottish Futures Trust to deliver this brand-new state-of-the-art high school for the young people of South West Fife.

"It demonstrates the Council's continued commitment to provide the best learning environment and facilities we can for Fife's young people and this new school is an exciting opportunity which will benefit learners and community users now and into the future."

The project aims to meet the Council's net zero carbon target.

To this end, many of the school's facilities will be available for community use in the evenings and at weekends. This includes the planned mixture of all-weather and grass pitches, as well as multi-use games facilities that will be made available to local people.

With the future in mind, the project is a beacon of sustainable design, as it is targeting the Royal Institute of British Architects' (RIBA) embodied carbon standards, as well as Scottish Futures Trusts' net zero standard, in line with their national goal of achieving net zero carbon by 2045.

CEO of hub East Central Scotland, Gary Bushnell, described how the building process will also follow the Passivhaus principles of low energy use: "Designing and building the school to Passivhaus principles ensures that learners will enjoy an environment that is full of natural light and with exceptional comfort standards.

"The facility will benefit from comfortable even temperatures and a constant supply of fresh air, while energy consumption is optimised to reduce carbon and running costs. This makes a significant contribution to meeting the Council's net zero carbon ambition."

The Passivhaus standard is an internationally recognised design guideline and rating system that aims to reduce energy use in buildings, while providing a comfortable indoor environment.

An air tight building fabric is an essential element of achieving the standard, and to this end, a steel framed solution, supporting precast floors was chosen as the preferred method of construction.

"At the early design stage of the project, three different options, steel frame, concrete frame and CLT timber and glulam, were considered," says AHR Senior Architect Keith Peterson.

"Each option was assessed against a variety of criteria to determine the best fit for the project and client requirements.

A steel frame was ultimately selected because of the ability of steel to provide an economical frame solution and create large clear spans where they were required."

A steel frame has also provided a quicker and more cost-effective construction programme than other framing solutions, while the material has also allowed the scheme to take inspiration from the nearby and historic steel structures (see box).

Creating further carbon credentials, BHC has sourced around 80% of the steel frame from electric arc furnace (EAF) production facilities.

EAF steelwork is considered to be much greener and more efficient in terms of energy consumption for the production process, as it can utilise renewable energy from wind farms, while the process relies on recycled content.

Once the steelwork arrives onsite, it is being erected to form a pair of three-storey teaching blocks that are approximately 100m long. Designed around a regular 7.2m column grid pattern, each of the block's floors has a central corridor separating two rows of classrooms.

"Keeping the column lines regular and designing out the need for any transfer structures has allowed the teaching blocks to be built with hot-rolled sections that are readily available from EAF sources," says Euan Kerr, Associate at Goodson Associates.

Positioned between the teaching blocks is a triple-height atrium, accommodating circulation routes between the two wings, and an assembly hall. The hall can accommodate 350 pupils and is a multi-purpose area with retractable, tiered seating that can be moved away to allow the space to be used for a variety of purposes.

Also, located in the middle of the school and connected to the hall, is a double-height sports hall, formed with a series of 21m-long roof beams.

As well as certain elements of the steelwork within the atrium, the sports hall's beams will be fully exposed in the completed scheme, providing another architectural nod to the school's location. ■

Link bridge to the past

The decision to opt for a steel frame was also considered appropriate given the location of the new school, where views south face toward the Goliath crane in Rosyth Dockyard and the Unesco World Heritage Forth Bridge.

Opened in 1890 and renowned for being the first major UK structure to be built with steel, the Forth Bridge is an industrial icon of Scotland and carries twin rail lines across the Forth of Firth.

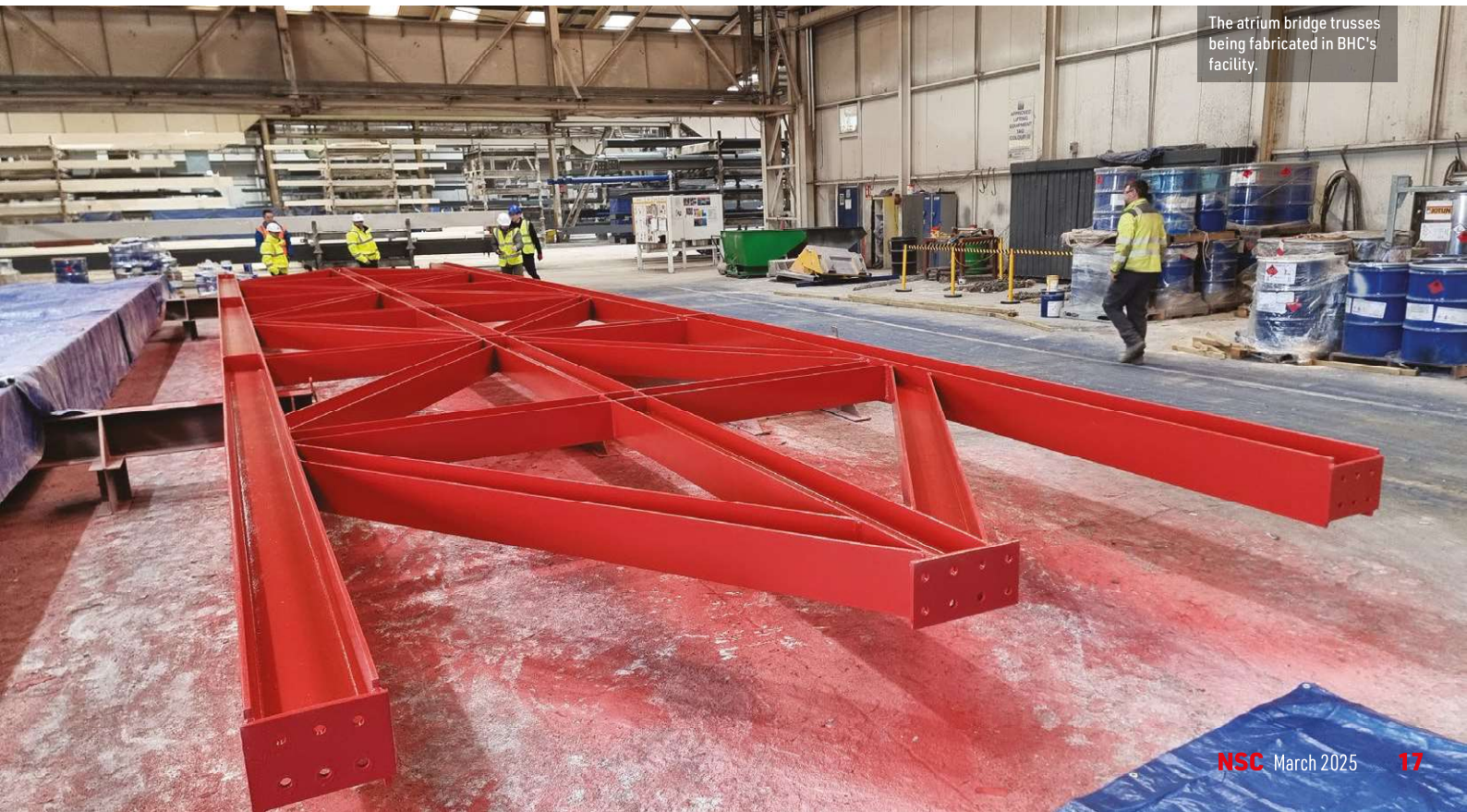
As a tribute to its famous neighbour, two fully-exposed steel elements of the school's design have taken inspiration from the Victorian red-painted cantilever bridge.

Connecting the two teaching blocks at first floor level, a steel link bridge spans the school's atrium. Formed with two 18m-long x 3.7m-high trusses, the steel members are designed to look similar to the Forth Bridge's famous cantilever arms.

Each weighing 6t, the trusses were transported to site and lifted into place as complete sections.

After the fabrication process, BHC painted the trusses with a similar red coating as the historic bridge, which can be seen through the school's windows when crossing the link.

The other element is a steel canopy, see picture below, also formed with red steelwork that signposts one of the school's entrances. The canopy is fabricated from RHS sections and is supported by two pairs of CHS columns, arranged in a V-shape. ■



The atrium bridge trusses being fabricated in BHC's facility.