

New Hitachi Rail Europe Class 800/801 Series Train Interior Designed With Pedal Powered Traveller Appeal

For its new class 800/801 series train, Hitachi Rail has risen to the challenge of accommodating the differing needs of rail passengers, including 'pedal powered' commuters and travellers. Working in close cooperation with its design and production partners, the result has been the development of a PRM-TSI compliant, lightweight storage unit for bicycles throughout the train, located close to passenger seated areas. In the UK, these new Hitachi Class 800/801 trains will be replacing existing high speed trains as part of the latest Intercity Express Programme (IEP).

The original concept for the new class 800/801 series train was, to design spacious new passenger carriage interiors, including convenient bike storage facilities. Right at this early concept stage, Hitachi also brought in Lyndon Newman, Engineering Director of TRB Lightweight Structures and his team. The role of TRB was to evaluate the design and provide a cost effective method of manufacturing the bike storage unit to meet all technical specifications and rail standards, and to comply with PRM (persons of reduced mobility) passenger needs.

Proven Partnership

TRB Lightweight Structures Ltd. has a long established track record in the manufacture and supply of high-quality, lightweight interior and exterior rail solutions globally. Hitachi Rail Europe selected TRB for this project based on a proven track record as a value-added supplier partner; TRB has already designed, manufactured, and delivered more than 200 products to Hitachi in Japan for fitting on prototype trains. Hitachi's Procurement Director Jamie Foster commented, "With the Class 800/801 trains, Hitachi aims to set *the* standard for design, quality, and weight savings. Once again the TRB engineers and designers have risen to these challenges, meeting the demands of the program. Working with partners who provide collaborative solutions to engineering challenges is essential to the smooth progress of these types of projects." The supply of bike storage units is in addition to contracts already awarded to TRB Lightweight Structures by Hitachi back in Sept 2014, with the first prototype units having already been shipped to Japan. The first twelve trains will be built in Japan before manufacture and assembly switches to Hitachi's new purpose-built Newton Aycliffe plant in northeast England.

Design Validation

A key objective for TRB was to satisfy all the weight, performance and installation requirements from Hitachi engineering for the bike unit, which must also meet GM/RT2100 - issue 5 for railway vehicles, and be fully PRM-TSI compliant. Using the design and indicative materials specifications from Hitachi, the TRB technical team set about doing a detailed analysis and design validation of individual components, creating bills of materials, production costings and the production planning for completed bike units. During 2013, after a number of project review meetings with Hitachi, final specifications were agreed for nine 'prototype' left and right handed bike storage units to be manufactured at TRB's UK production site in Huntingdon, Cambridgeshire.

Production Processes

The bike storage units are mostly comprised of TRB manufactured components, including wall panels, the sliding door, sills, ceiling and flooring framework. The racking inside each bike unit is custom built locally by Lordgate Engineering Ltd., a long term TRB partner, which also supplies other parts to Hitachi Rail Europe.

To minimize weight and maximize space, aluminium honeycomb sandwich panels were specified for the walls, the sliding and folding door sections, and for the ceiling. The type of sandwich panels used are fabricated using an aluminium honeycomb core with inner and outer aluminium skins, bonded together with a high strength modified epoxy adhesive film, then finished by spray painting using a water based paint system. Aluminium honeycomb sandwich panels have been successfully used by TRB in other rail applications, such as partitions and headers, where a lightweight, strong and durable structure is needed in minimal space. For the sliding door and gangway panels, a

high pressure laminate is specified. The same door system is also specified for the catering units, also being supplied by TRB.

Flat sandwich panels are fabricated on a platen press, with the curved door sections being produced using a custom made tool, moulding the aluminium core and skins together using a lay-up and vacuum bagging process in an oven. A number of painted fibre reinforced plastic (FRP) components are also fabricated for the bike units.

Fire Testing & Validation

The validation process carried out by TRB for this project included extensive in-house component performance testing. Accelerated cyclic testing (equivalent to seven years of use without failure or breakdown) were conducted on all critical moving components, such as the sliding door mechanism, door handles and latches using proprietary equipment and software developed by TRB engineers. Impact, load bearing strength and other mechanical property tests were also carried out.

The Fire, smoke and toxicity (FST) testing was carried out by Exova Warrington Fire using TRB manufactured components, including painted aluminium honeycomb panels and painted FRP panels. The new class 800/ 801 series Hitachi trains are specified to meet BS 6853:1999-Category 1b.

End-to-End Services

Customer support for this project has included TRB engineers providing on-site training of production teams at Hitachi's Kasado plant to correctly disassemble and then reassemble the bike storage units inside carriages. For TRB, production is only part of the overall end-to-end service provided to customers. Lyndon Newman explains, "Our philosophy is to work on continuous improvement programmes with customers to identify ways to rationalise designs and take out cost as part of the ramp up to full production, without compromising quality. The bike storage solution is a perfect example of the end-to-end service we provide to our customers. We are already collaborating with Hitachi on the next phase of development".

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Photos & Captions

Photo 1: New Hitachi Class 800/ 801 series train



Photo 1 caption:

The Class 800 bi-mode trains and Class 801 electric trains will be built by Hitachi Rail Europe in Newton Aycliffe, County Durham. The new trains will come into service in the UK on the Great Western Main Line in 2017 and on the East Coast Main Line in 2018.

[Image courtesy of Hitachi Rail Europe]

Photo 2: Bike storage unit installed in the passenger carriage of the new Hitachi Rail Class 800/801 Series train



Photo 2 caption:

PRM TSI compliant storage units for bicycles, manufactured to GM-RT standard 2100 - issue 5 by TRB Lightweight Structures Ltd. are being installed in passenger carriages of the new Hitachi class 800/ 801 series trains.

[Image courtesy of DCA Design International]