JUNE 2021

THE UNPARALLELED SUSTAINABILITY OF STRUCTURAL STEEL

Take a look at Red Steel's head office and manufacturing facility in Hawke's Bay and you'd never guess the structure was hiding a great story and a slice of local history. The building, which was constructed in 2014, is comprised of structural steel that's 90 years old.

The story begins on February 3rd, 1931 when a 7.8 magnitude earthquake hit the Hawke's Bay. Centred just 15km north of Napier, nearly all of the buildings in central Napier and Hastings were levelled.

Meanwhile, across the Ditch, the Sydney Harbour Bridge was under construction. It was completed in 1932 and took eight years to build. Reaching 134m from water level to the top, it remains the tallest steel arch bridge in the world.

So it happened that in 1931 a ship from England carrying steel destined for a small portion of the Sydney Harbour Bridge was diverted to the Hawke's Bay to help with the region's rebuild. The steel was used in the construction of woolstores located on Napier's foreshore, now known as Ahuriri.

More recently, Ahuriri has been undergoing an urban transformation. Industrial spaces are being replaced by business hubs, bars and apartments as the area gives way to a bustling seaside village.

In 2007, local structural steel contractor Red Steel was involved in one of the woolstore apartment conversions. In this instance, some of the original steel beams had to be

THE FACTS

- 90 tonnes of structural steel in total
- 12 percent, the proportion of repurposed steel beams
- 2,400sqm purpose-built facility
- 32 RSJs are used in the building's columns
- 16 overhead cranes are supported by the structure
- 1931, the year the steel landed in New Zealand
- 90 percent of steel from demolition sites is recycled worldwide

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replaced because they weren't suitable for use in the upper storey of the structure's new purpose as an apartment building. Rather than sending the material to the scrap yard to be melted down, the team derigged the rolled steel joists (RSJs), beam by beam, with relative ease. In the process, Red Steel took possession of a large quantity of 380 RSJ beams, storing them on a recently purchased block of land in Pandora, Napier.

And there they sat for about five years until inspiration struck: the RSJs were perfectly suited for reuse in the construction of Red Steel's planned new facility on the Pandora site, which was in its early design stage.

Steel boasts strong sustainability credentials, key of which is its recyclability – steel can be recycled and reused endlessly without compromising its remarkable physical properties. The material can be dismantled and removed from one building and repurposed and installed in another without altering its performance. Worldwide, it is estimated that 90 percent of steel from demolition sites is returned to steel mills for recycling.

The steel beams were in excellent condition and, when they arrived in Red Steel's workshop for processing, they were treated as new steel. The team got to work welding, sandblasting and painting the material.

Because the precise grade of the steel was unknown, the engineer assumed the lowest grade steel and applied this criteria to the design calculations to ensure the material was fit for purpose.

Today, the RSJs are located in Red Steel's 2,400sqm purpose-built facility and are used in 32 of the columns in the building.

Red Steel's new plant replaces a series of structures that had been erected and adapted over time with a futureproofed, single-footprint operation. Home to 39 staff, the space houses the business' head office and state-of-the-art fabrication workshop.

The workshop is well-equipped with modern plant and serviced by 16 overhead cranes to provide a highly efficient operation under one roof. The horizontal bottom chord of the trussed roof structure allows multiple rails for the bespoke winches and hooks to run on. With frames required at five-metre centres to support the load of the overhead cranes, it was fortunate that Red Steel did not have to 'purchase' all of the columns.

In all, the new structure has 90 tonnes of structural steel, of which the repurposed steel beams make up 12 percent. In fact, none of the original steel was wasted – offcuts of the material were used to create furniture that now grace the reception area and office space.

While recycling and remelting steel is widely practised globally, including New Zealand, repurposing existing steel is much less common. When it comes to the redevelopment of an existing building, it's worth considering if there are any elements that can be reused. Care is required to ensure steel is reused appropriately as the steel in older buildings does not meet today's seismic requirements (new grades have been the market for less than 10 years).