



# Modular engineered mesh solution meets EastLink tunnel challenges



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Precise profiling was essential for each of the 110 kilogram modules. Once installed in the tunnels each mesh segment was surveyed against a datum line to ensure the concrete cover from the front face of the mesh was within acceptable tolerances.

Mesh aperture sizes which increased with their vertical position on the modules also introduced an additional requirement for quality control in the manufacturing process. The project requirement was for 4900 sheets of engineered mesh using 550 tonnes of special grade rod.



**An innovative mesh solution developed by OneSteel Reinforcing has overcome a construction challenge facing builders of the \$2.5 billion EastLink project in Melbourne.**

Australia's largest road project, EastLink, in Melbourne comprises 39 kilometres of toll road and six kilometres of untolled bypasses in Melbourne's fast-growing east and south-eastern corridor.

Joint venture partners Thiess Pty Ltd and John Holland Group Pty Ltd (TJH) constructed twin three-lane, 1.6 km tunnels under the Mullum Mullum Valley between Deep Creek Road, Mitcham and Hillcrest Reserve, Donvale as part of the project.

TJH engaged Connell Wagner subsidiary CW-DC to design the tunnels and portal structures as part of a package which involved 8 kilometres of freeway, 12 bridges and associated design including noise walls, shared use paths, retaining walls, drainage and wetlands.

The tunnel designs developed by CW-DC required 12mm reinforcing bar only for the lower portion of the cross section of

the tunnel below the spring line. With 6km of tunnel wall in total the magnitude of the steel fixing was going to be immense, very time consuming and proposed a significant threat to the plastic waterproofing membrane. It seemed the only solution was a mesh substitute, but standard L class mesh was not an option.

"Because this was a tunnel structure we required more performance from the reinforcing mesh than you get from conventional L class reinforcing mesh," CW-DC Senior Tunnel Designer, Karl Assi said.

"The mesh performance was critical," he said. "It needed to be flexible in response to ground conditions."

Discussions with OneSteel Reinforcing began more than a year before the scheduled start of tunnel lining construction on the EastLink project. The aim was to find an alternative to conventional steel fixing of individual 12mm rebars along a combined tunnel wall length of 6 kilometres.

"The curved profile of the tunnel walls also prompted us to look for a safer and quicker mesh installation alternative and



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there were also quality control considerations," Karl Assi said.

Discussions involving Karl Assi, OneSteel Reinforcing's National Manager Specialised Mesh Products, Greg Giles and Technical Development Manager, Winston Marsden, eventually led to the development of an engineered modular mesh product to replace hundreds of thousands of individual rebars.

"In the very early stages of developing an engineering solution for the tunnels, CW-DC had identified steel fixing of the mesh as a potential threat to the project's critical path progress," Greg Giles said.

"We had overcome a similar challenge for the Abigroup Leighton joint venture on Sydney's M7 Westlink by providing an engineered mesh solution for 26 kilometres of slip formed barrier kerbs."

OneSteel Reinforcing used the experience of that project as a starting point to design mesh modules based on a 12mm special grade plain round rod for mesh. Because of the EastLink tunnel design they needed to fabricate the modules in near face, far face, left and right hand shapes. Each module was approximately four metres by two metres.

OneSteel Reinforcing harnessed its resources in two states to produce prototype modules for the mesh requirements of the EastLink tunnels. The special grade rod for mesh was produced by hot rolling, rather than by the cold drawing process used for conventional L Grade mesh.

Mesh sheets (2 metres by 4 metres) were manufactured in Brisbane, profiled in Sydney then shipped to the construction project site in Melbourne.

"The requirements of this project were unique and we came up with a unique solution," Greg Giles said. "Producing the mesh wasn't a huge challenge for our Brisbane plant, but the profiling which took place at Minchinbury required all of our skill and experience."

Julianne Armstrong, a site engineer at the Eastlink tunnels project for Thiess John Holland supervised installation, quality control, scheduling and planning.

"The installation of the modular mesh all went ahead very smoothly," she said. "We settled on bar chair and wheel placement procedures then standardised the method for tying the two layers of mesh together."

"It never held us up and we were able to maintain a consistent interval between the installation of the lining membrane, the modular mesh and the concrete form.

"It was quick and it was easy, which was exactly what we needed."

OneSteel Reinforcing's Greg Giles pointed out that the modular engineered solution had twice proven itself to be a winner in major civil infrastructure projects.

"We are working to change the perception in civil construction and in mining as to what we can contribute to accommodate site requirements," he said. "There is no doubt that the use of a modular engineered mesh solution is a big trend in the engineering field. It offers a major solution to a very common challenge."