

Creative solutions driven by steel

Volvo truck and bus headquarters, Chullora, Sydney



The impressive steel glazed feature façade and entry awning to the Volvo showroom attracts attention from the Hume highway.

Steel design, fabrication and construction delivered Lang Walker's property development firm McRoss Developments greater speed, accuracy, quality and project control on the Volvo Truck & Bus Headquarters project in Sydney. This case study outlines the benefits structural steel delivered for McRoss Developments to achieve design flexibility and a brilliant creative solution for their client.

Volvo Truck Australia required an elegant truck and bus headquarters to be purpose designed for a sales showroom and huge maintenance facility to service the entire fleet of Volvo trucks and buses. This new facility also needed to incorporate head offices, a canteen and parking bays.

"We faced a few challenges with this project", said Ben Fairfax, General Manager Development at McRoss. "First, we needed to design for a difficult sloping site, create a functional, beautiful building that would allow Volvo to integrate head office, sales and workshop cultures on

a single site, and also generate good highway exposure for the Truck Sales Showroom," he said.

McRoss Developments delivered the creative solutions with innovative designs using structural steel. The company has many years of industry experience tackling difficult projects, with extensive in-house design expertise. The architectural design was by Alan Wong of McRoss Developments.

Composite structural steel with composite Kingflor KF-70 1.00mm structural decking was selected by the design and construction team. The ground floor is some 8.0m below the first floor level off the Hume Highway. Framing this project in steel enabled ease of construction, otherwise constrained by the higher than usual ground to first floor height needed to accommodate access for the largest Volvo trucks.

Although the steel glazed feature façade and awning on the Hume Highway are impressive, the rest of the Volvo Offices and Showroom appears a modest structure. But modest is an understatement when almost 10,000m² of Kingflor KF-70 has been used in the project.

The sloping site down to Anzac Street was excavated and retained using precast units fixed to short steel columns founded at the top of the sloped embankment. Lateral stability was provided through raked 273 x 6.4 CHS props fixed to the top of this short column to the foundation/base plate of the first interior column row and 168 x 4.8 CHS struts in the plane of the first floor.

A ground floor parking and roadway system height of 8.0m was formed and creates this deceptive appearance from the Hume Highway frontage. Designed by Alan Wright and Associates, project design engineers, the flooring system is unique in that it is the first in Australia to use un-propped structural composite decking with secondary beam spacings at 3.5m centres. Designing for the elimination of propping to both decking and structural steel represented a significant cost saving.

Front parking areas for cars and trucks comprised a 180mm slab with 3.1m secondary beam centres using Kingflor KF-70 1.00mm unpropped. Secondary beams were composite 610UB101 spanning 13.5m. Primary composite beams were 610UB113 and spanning

8m. Extended parking and showroom design live loads were 6KPa.

The commercial offices with 3KPa live loading comprised a 120mm slab with 3.5m secondary beam centres using Kingflor KF-70 1.00mm un-propped. Secondary beams were composite 360UB51 spanning 10m. Primary composite beams were 610UB125 and spanned 13.5m.

Large column free spaces were achieved with composite steel secondary beams in both the parking bays and roadway below first floor. Fully welded transfer trusses

Steel framing costs

Averaged costs across the project represent a steelwork cost of \$220/sq m.

This is a total steel cost of approximately \$2500/tonne.

All steelwork was designed unpropped during construction.

Costs include decking, shear studs, decking installation work, reinforcing steel, concrete supply, place and finish, structural steelwork supply including columns and all painted.

falsework and back-propping through the use of Kingflor KF-70 1.00mm structural decking spanning up to 3.5m released large floor areas for following trades, as well as minimizing on site labour levels. Delivery truck movements to and from the site were also reduced as a result.

The decking was laid on site safely and efficiently by the subcontractor, Santana E Compania, based in Port Kembla, NSW. This included the site welding of shear studs ready for the placement of reinforcement and concrete. Early occupation delivered a

Volvo Truck and Bus Headquarters at Chullora is a showpiece of best practice delivery in the efficient and cost effective total project solution. Design, detailing, steel fabrication and erection, laying of structural decking, shear studs and reinforcement and the placement of concrete were all smoothly integrated. This eliminated any interfacing problems and the possibility of sub-contract demarcations.

The Australian Steel Institute encourages and assists all sectors of the steel industry to come together in providing the total project solution to service the Australian construction market. Lang Walker and his design development team in many respects are already leading the way, proving what can be achieved.



Site shot depicting the elevated first floor supporting showroom and offices with the truck and bus service facilities at the rear.

comprising 200UC52 top and bottom chords along with 200UB25 verticals and 100UC15 webs were adopted at the turn points in the roadway. In the offices and showroom, steel offered increased useable floor area, partitioning flexibility and smaller visual obstructions. All connections were designed for ease of fabrication utilising standardised web side plates and bolted moment end plates.

A total of 390 tonnes of structural steel was required in this project and the fabricator and erector was Torresan Engineering based at South Windsor.

Danny Wilson, McRoss Development's General Manager, Construction, noted that: "it is up to 20 per cent quicker to build with structural steel and steel decking as you don't have to wait to strip and reuse your formwork. An underpinning key to this success is an

efficient engineering structural design with an understanding of fabrication detailing utilising standardised connections and designing for highly automated fabrication processes such as beam lines. Overall the benefits of the steel solution are enhanced by:

- early planning
- builder/ developer taking control of the process early
- the engineer designing for effective fabrication
- fabricator taking responsibility for contracting the erection and decking
- fabricator bringing to the table effective construction expertise."

Site works were able to proceed on a number of fronts with the structural steel solution adopted on this job. The elimination of temporary formwork,

faster return on investment and less disruption to Volvo's operations.

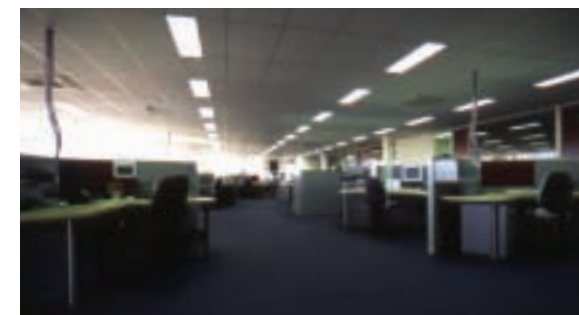
All structural steel was fabricated off-site whilst the ground works and foundations were being carried out, contributing to the shorter construction period. This reduced exposure to on-site risks, enhanced safety and had the added advantage of reduced delays from bad weather and on-site congestion.

The truck and bus maintenance bay is impressive, using a conventional rigid portal frame structure behind the office, showroom and parking facilities. The maintenance bay has an overhead travelling Eilbeck Crane spanning 27.5 metres with a safe working load of 5 tonne for servicing of the trucks and buses. Columns were 610UB113 and rafters 410UB54 at 10m centres.



Project Team

Building: Volvo Truck & Bus Headquarters, Chullora, Sydney
Client: Volvo Truck Australia Pty Ltd
Developer: McRoss Developments – a Lang Walker company
Builder: McRoss Developments – a Lang Walker company
Architect: Alan Wong of McRoss Developments in-house design team
Interior Design: Bindi Edmonds of McRoss Developments in-house design team
Engineer: Alan Wright & Associates
Fabricator: Torresan Engineering
Decking Supplier: Fielders
Decking/Stud Welding Contractor: Santana E Compania



TOP: Showroom, first and mezzanine floors under construction.

ABOVE: In the offices steel offered increased useable floor area, partitioning flexibility and smaller visual obstructions.

LEFT: Overhead travelling Eilbeck Crane spanning 27.5 metres with a safe working load of 5 tonne.

BELOW: Long span composite steel flooring and transfer trusses.

