

# Huge spans to house heaps of horse happenings



*“For the main arena, s<sup>2</sup> devised a unique work methodology which saw the 60-metre main trusses assembled in pairs at one end of the site, fitted with purlins, stressed and lifted onto the main concrete deck.”*

## Australian Equine and Livestock Events Centre, Tamworth

Australian-developed post-tensioned steel technology is being used to deliver some of the largest clear spans to be found anywhere in the world servicing equine events.

The Australian Equine and Livestock Events Centre (AELEC) is being constructed for Tamworth Regional Council in northern NSW to showcase those industries' finest.

The development encompasses an indoor arena to seat 3500 (ultimately 5000), stables for 478 horses (ultimately 700), a covered stud selling centre with seating for 660 which can double as a warm up area, and truck and camping facilities for at least 195 vehicles.

Tamworth is home of the Australian Quarter Horse Association (AQHA), National Cutting Horse Association (NCHA), Australian Bushman's Campdraft and Rodeo Association (ABCRA) and other equine bodies.

The Council and equine bodies recognised that horse events are a major economic, social

and cultural asset there and that such a complex was needed to retain that business and service growing market demand. The equine industry generates an estimated \$45 million into the region each year and hundreds of jobs all year round.

The core engineering brief was to design a structural steel and concrete works package that turned the AELEC's architectural design into reality.

s<sup>2</sup> Corporation drew from its proven track record in the design and delivery of large span structures from both Australia and overseas to develop the main arena (60m span), the stud selling centre (42m span dome structure) and six stable buildings (25m span each).

s<sup>2</sup> utilise a post-tensioned cable system loaded to calculated forces by hydraulic stressing, pre-loading energy into the structure before external forces are applied.

The concept of stored energy results in an approximate saving of up to 60 percent in overall steel weight due to the degree of deflection control provided by the stressed and grouted composite structural form when compared to conventional designs.

A further unique feature is the ability to confirm its computed structural performance from analysis in the field through load measurements on the hydraulic jacks so the structure is actually proof tested during the construction process.

Top chord members for the main arena's 60 metre clear span were made up of 200 by 200 by 8.0 SHS, narrowing to 150 by 150 by 6.0 SHS with post-tensioned bottom chord members comprising 150 by 150 by 8.0 SHS and narrowing to 125 by 125 by 4.0 SHS.

The dome structure comprised 125 by 125 by 4.0 SHS narrowing to 100 by 100 by 3.0 SHS for the top chords and 125 by 125 by 4.0 SHS,

narrowing to 100 by 100 by 4.0 SHS for the bottom chords.

All three main elements of AELEC are post-tensioned and considered to be a 'world first' for equine facilities. In particular, the dome over the stud selling centre is believed to be the largest post-tensioned steel dome in Australia, if not the world.

For the main arena, s<sup>2</sup> devised a unique work methodology which saw the 60-metre main trusses assembled in pairs at one end of the site, fitted with purlins, stressed and lifted onto the main concrete deck. The truss sections were then placed on a heavy duty roller 'skate' system and moved up to 95 metres to the adjacent end of the arena for final lifting onto columns.

This unique methodology allowed for concrete works to begin early in the project timeline while steel fabrication and assembly could take place independently of this.

s<sup>2</sup> Corporation owner and director, **Murray Ellen** has designed and delivered solutions around the world of up to 120-metre clear spans utilising post-tensioned steel technology he has developed and patented, particularly from the aviation sector where the need for efficient, large spans is obvious.

He is the recipient of previous ASI structural awards in NSW and Queensland for his work on the Telstra Stadium post-Olympic reconfiguration (114m clear span), Westpac call centre (66m clear span) and highly commended for the National Jet hangar in Brisbane (78m clear span).

“AELEC represented a number of challenges, particularly the large dome selling centre and the need for a structural methodology suited for construction of the main arena,” Mr Ellen said.

“Projects like this are all about people as there has been tremendous interaction between all the main parties involved that will ultimately deliver a unique world class facility.

“We delivered sizable reductions in overall steel weights across the three main elements of AELEC. The carbon footprint for the facility would have been much higher if conventional methods had been employed.

“Clever use of structural steel can therefore have environmental impact advantages without compromising structural strength or integrity.”

Tamworth Showground has traditionally staged national events and is a popular venue for other agricultural societies' activities as well. Covered cattle yards, campdraft and outdoor arenas, and equine sporting fields will also be built at AELEC and TAFE equine and livestock educational buildings will be constructed later this year.

### Project Team

**Structural Engineer:** s<sup>2</sup> Corporation

**Detail Engineer:** Healey Castle & Associates

**Architect:** Timothy Court & Co

**Builder:** National Buildplan

**Steel Fabricator:** Belmore Engineering

**Civil Engineer:** Tamworth Regional Council

