pt news

POST-TENSIONING INSTITUTE OF AUSTRALIA LIMITED

NEWSLETTER No 2 – 2008

POST-TENSIONING DESIGN WORKSHOPS

Some 30 engineers attended the PTIA sponsored workshop conducted in Brisbane by Cement and Concrete Services. At the time of writing, the Melbourne workshop registrations demonstrate the keen interest in these workshops. The next will be conducted in Sydney on 7 & 8 May. Consulting Engineering firms who are Associate members of the PTIA are entitled to a substantial subsidy on the course fee.

Post Tensioning – a credible and progressive industry

As the second anniversary of the formation of the PTIA approaches, I reflect on its original objective which are –

- to ensure that the post-tensioning contracting industry is both viable and competitive, and
- to promote high standards in design, construction and materials for post-tensioning systems, consistent with world best practice, and verified by certification of its Corporate and Associate Members, and
- to develop industry work standards which establish appropriate skills of employees, personal development opportunities, a safe working environment, and environmental responsibility, and
- to achieve ongoing technical advances in materials and systems for post-tensioning.

Competitiveness – Post Tensioned systems offer viable construction solutions as evidenced be recent industry studies and as exemplified by the article on Metal Decking Formwork for post-tensioned structures in this newsletter, together with the many project reports featured in this and past newsletters, and in our seminar series.

Accreditation – post tensioning contractors and suppliers of essential materials are required to be certified with accredited systems and materials in order to become members of PTIA. A number of organisations are currently completing their assessments for membership of PTIA, evidence that the aim of PTIA to raise standards within the industry is taking effect.

Training – PTIA is strongly focussed on the need for training for members of this industry. The PTIA sponsored PT Design Workshops, conducted by Cement and Concrete Services, are well advanced and receiving good attendances. The PTIA skills training courses continue and are being enhanced following liaisons with our USA counterparts who have provided their training manuals for use in Australia. PTIA seminars, mainly held in conjunction with the Concrete Institute of Australia aim to present relevant information to the many sectors of our industry.

Technical developments – PTIA has produced many technical articles which have been published in the newsletters and which are available for review from our web site. Recent meetings with CCAA Technical committee have led to a greater interaction with the cement and concrete technology experts in order to progress specifications for PT works. The Technical committee of PTIA is keen to expand these activities and seeks to involve inputs from designers and material suppliers through a series of working committees focussing on specific technical issues.

DAVID PASH
President

PROJECT REPORT

Location: Alfords Point, Sydney
Client: Roads & Traffic Authority, NSW
Contractor: Abigroup
Consultant: Maunsell Australia

Alfords Point Bridge Duplication

VSL Australia has just completed its works on the Alfords Point Bridge Duplication project in the south of Sydney. The new bridge is intended to relieve traffic congestion on Alfords Point Road increasing the existing 3 lanes that are operated in a tidal flow arrangement to 6 lanes as well as a pedestrian walkway

The project was managed by the RTA, designed with the assistance of Maunsell and was constructed by Abigroup Contractors.

The new bridge consists of a 445m long double cell box section that was constructed using an incremental launch technique.

VSL's scope involved the supply and installation of both permanent and temporary ground anchors to the abutments, supply and installation of post tensioning (169 tonnes strand), as well as the supply, installation and operation of the launching system including stress bar and associated

components for the launching nose and end launching frames. VSL also supplied the elastomeric bearings to the project through its international partnership arrangements.

Construction of the bridge deck commenced in mid 2007 and the last segment was cast and launched into place by VSL in March 2008. The construction of the bridge deck was broken into 23 segments, with a typical pour, stress and launch cycle of around 1 week.

Each bridge deck segment contained twelve nine strand launching prestress tendons that coupled the segment to the previous segments. Stressing and launching of the bridge was carried out on the same day with stressing being carried out in the morning and launching in the afternoon.

The VSL supplied launching system comprised of 2 sets of 330t braking jacks with 670t pushing jacks located on 31*15.2mm strand bundles. Oil delivery came via 2 control pumps that were backed up by 4 booster pumps. Each launch operation took approximately 5 hours to complete.

PRESTRESSED CONCRETE DESIGN WORKSHOPS – 2008

PTIA is sponsoring a series of Prestressed Concrete Design workshops to be presented by Cement and Concrete Services (CCS). For consulting engineering firms who are Associate Members of the PTIA, there are significant subsidies on the fees for these courses – details are available from CCS at www.cementandconcrete.com. Registrations for workshops are to be made through CCS.

These two day workshops are developed for engineers who are familiar with reinforced concrete but who have little experience with prestressed concrete and who wish to gain an understanding of the principles of analysing and designing statically determinate prestressed beams. An optional third day workshop on computer aided design for prestressed concrete is also available.

City	Venue	Dates
Melbourne	Hotel Grand Chancellor	16 & 17 April, 2008
Sydney	Stamford Grand Hotel, North Ryde	7 & 8 May, 2008
Melbourne	Hotel Grand Chancellor	17 & 18 September, 2008
Sydney	Stamford Grand Hotel, North Ryde	15 & 16 October, 2008
Brisbane	Mercure Hotel	12 & 13 November, 2008

SEMINARS AND OTHER EVENTS SCHEDULE - 2008

Location	Event	Dates
Sydney	Seminar with Eng Aust	27 May, 2008
Melbourne	Seminar with CIA	14 July, 2008
Newcastle	Latest developments in post-tensioned concrete structures	17 & 18 September, 2008
Jointly with CIA & Eng Aust	20 August, 2008	15 & 16 October, 2008
Brisbane	Seminar with CIA	27 August, 2008

Member Companies

Corporate Members

Australian Prestressing Services Pty Ltd (founding member)
Austress Freyssinet Pty Ltd (founding member)
Structural Systems Group (founding member)
VSL Australia Pty Ltd (founding member)

Associate Members – suppliers

Ajax Foundry Pty Ltd
Cemex Pty Ltd
CMC (Australia) Pty Ltd
Haggie Reid Pty Ltd
OneSteel Wire Pty Ltd

Associate Members – consulting engineers

Hyder Consulting Pty Ltd
Taylor Thomson Whitting

PTIA welcomes its new members

- **Cemex as an Associate member**

Post-Tensioning Institute of Australia Limited
ABN 86 121 218 228
PO Box 861, Five Dock NSW 2046
Phone 02 8765 6199
Fax 02 9743 4013
Email info@ptia.org.au

Please visit the PTIA web site **www.ptia.org.au** for details about membership, membership benefits and membership application forms. If you have questions about membership, please contact PTIA through this web site and our office will contact you to discuss your questions.

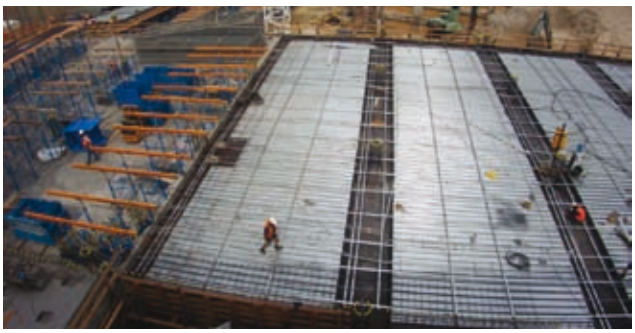
POST-TENSIONING INSTITUTE OF AUSTRALIA LIMITED

"ensuring excellence and accreditation for the post-tensioning industry"

THE USE OF PERMANENT METAL DECKING AS FORMWORK FOR POST-TENSIONED STRUCTURES

The use of permanent metal deck as formwork for post-tensioned structures is now widespread across Australia. The typical systems used are Bondek, Condeck and KingFlor. The PTIA Member Companies have literally completed hundreds of successful projects and the ease, speed and economics of this type of construction method are well recognised.

The usual use of metal deck formwork is as a simple infill between conventionally formed band beams. The metal ribs are laid perpendicular to the band beams and allow the one way spanning tendons to pass between the ribs as shown in diagram below.



Metal deck & band beams

The soffits are quite clean and are often more attractive than a concrete off form finish. Painted finishes are available along with pre-coated metal decking.

Apart from any direct material cost savings, the advantages for the Builder include much less waste, increased formwork laying productivity, elimination of formwork stripping, and less manpower required on the work site.
When considering the use of metal deck formwork coupled with post-tensioning there are a number of things to consider as follows:

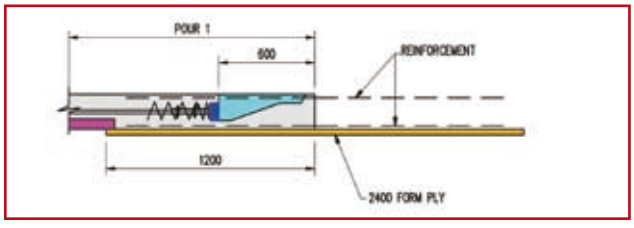
- **Strength**
  The metal decking is bonded to the post-tensioned structure and therefore composite design actions are possible. However, it is usually deflection and "hogging" moment capacities that govern the design of post-tensioned structures and therefore any increased strength in the "sagging" moment regions may not lead to any direct advantage. Judicious redistribution of ultimate moments may result in an improved result, however, caution should be observed since service moments cannot be redistributed.

- **Deflection**
  The use of metal deck formwork may lead to larger deflections under long term actions. The metal decking restrains the bottom surface of the concrete member and effectively over reinforces this section. This leads to a theoretical increase in deflections due to shrinkage warping. This should only be an issue when the floor is supporting brittle partitions or there are tight surface tolerances.

- **Concentrated Loads**
  The capacity of the slab due to concentrated loads needs to be accurately assessed. Because the slab thickness above the rib is less than that for a solid slab, the slab stiffness in the secondary direction is reduced leading to a reduction in the slab width supporting concentrated loads.

- **Fire Rating**
  When considering fire rating the suppliers of metal deck formwork have written documentation on the effects of fire and its influence on the post-tensioned tendons. Generally fire ratings of 2 hours are satisfactory with the most common metal deck systems, but you should obtain job specific certification from the supplier. Metal deck systems that are shaped like ribbed slabs such that the slab thickness varies across the section will need special consideration and advice from suppliers should be sought.

- **Detailing**
  Detailing the slabs with the use of metal decking is particularly important, particularly at post-tensioning anchorage locations (slab edges, joints, etc). The critical factors are to get enough solid concrete around the anchorage and also to be able to physically fit the helical anti-burst in place. It's the latter that generally governs. Generally the slabs need to be increased in thickness locally to 200mm minimum internally and 220mm to exposed slabs. There are other ways of achieving thinner slabs yet allowing anchorages to fit and it usually requires a small amount of conventional plywood to be used in lieu of the metal decking locally as shown below.



Construction Joint and Stressing Pocket

And don't forget that the concrete framing plans should clearly show the conventionally formed sections and importantly must always indicate the laying direction of the metal deck ribs.

More specific project by project information on the successful use of metal deck formwork can be obtained through a PTIA Member Company.

PTIA Technical Committee