

pt news

NEWSLETTER No 1

It is the ambition of the Post Tensioning Institute of Australia (PTIA) to establish significantly improved standards of design, construction and work skills for post –tensioning in the Australian construction industry. Until now the post-tensioning industry in Australia has been largely unregulated and has relied upon the strength of large international groups to underwrite its performance. Serious quality problems in the Middle East and previous problems in the UK (where post-tensioning was banned for 10 years due to poor quality control and workmanship) highlight the urgent need to accredit companies involved in the business and to set minimum standards of competence and work skills.

This newsletter is the first in a series of quarterly newsletters aimed at advising the PTIA's progress towards achieving the four basic key objectives of:

- Promoting high standards in design, construction and materials for post-tensioning systems, consistent with world best practice and verified by certificates of competence by its corporate and associate members
- Developing industry work standards which establish appropriate skills of employees, personal development opportunities, a safe working environment and environmental responsibility

- Achieving ongoing technical advances in materials and systems for post-tensioning
- Ensuring that the post-tensioning contracting industry is both viable and competitive.

Within this first newsletter are technical papers and job reports relating to quality, interesting projects recently completed and incorporating significant post-tensioning techniques. Persons interested in looking at past issues formalised by the PTIA should also reference the PTIA website www.ptia.org.au that has been operating for several months now.

PTIA MEMBERSHIP

So far the PTIA comprises four founder member companies that have all passed an accreditation system independently reviewed and audited by David Hicks & Co Pty Ltd and two Associate Members. Other companies are currently being reviewed for the following classes of membership:

- Corporate - covering post-tensioning contracting organisations
 - Associate – for non-contracting organisations and includes material and /or equipment suppliers and consultants
 - Association – for related industry associations;
- There is also an Individual Member Category.

The various members will be listed on the last page of each newsletter and will be updated at each issue. Apart from accreditation of members each company's field employees will be trained and tested by the PTIA in four levels of post-tensioning skills. Tickets of competency will be issued by the PTIA. Further detail of these training courses is presented in this issue on page 3.



The Founding Directors of PTIA at a recent meeting - from left to right, Vice President - Ian Stuart, Secretary/Treasurer - Max Schweiger, Directors - Ed Cross and Mike O'Neill and President - David Pash.



PROJECT REPORT

Client: Roads and Traffic Authority (RTA)

Main Contractor: Abigroup Contractors

Alliance for Bridge Works: Abigroup Contractors and VSL Australia

Windsor Flood Evacuation route - Sydney Australia

VSL-Abigroup Alliance was contracted to construct the Bridge Over South Creek as part of the Windsor Flood Evacuation Route Project located in the Western outskirts of Sydney Australia. The bridge is 1,500m long and was constructed using the segmental match cast method with an under-slung erection system.

The bridge is made up of 34 simply supported spans of 44.3 metres long. The deck is 12m wide and the box girder 2.40m high. Each span weighs 800t and consists of 15 segments with 18T of external prestressing. The deck erection started in June 2006 and the final was erected in October 2006. The fastest cycle being 24 working hours (3 days). The superstructure was finished 2 months ahead of the programmed finish date of Jan. 2007.

As well as the erection of the superstructure (segments supplied by Abigroup) the scope of works for the alliance included construction of the 70No Ø1500mm bored cast-in-situ piles totalling nearly 1,100 lineal metres, 33 cast-in-situ piers totalling 3450m³ of reinforced concrete, both abutments, and all link slabs, bearings and deck drainage.

VSL Australia personnel were responsible for procuring, erecting and operating the Underslung Gantry System. They also managed the installation, stressing and grouting of the Post Tensioning System supplying all key equipment (stressing jacks, grout pumps).

VSL Australia handled all the technical aspects for the bridge construction from bridge design coordination to equipment/formwork design and supply.

VSL supplied the following Key Personnel: Technical Manager; Project/Bridge Engineer; Erection Foreman; experienced Post Tensioning/Bridge Erection personnel; and were responsible for training additional personnel supplied by Abigroup. Likewise VSL supplied key grouting operatives to work with the grouting crew. VSL also supplied Commercial/Administration personnel to assist in the Alliance for the management of cost control and procurement.



COMMITTEES TO DRIVE CHANGE

The PTIA is managed by a Board of 6 individuals (from the four founder companies) and a Management Committee comprising 10 persons that meets monthly. The Board has approved Membership Criteria for Corporate and Associate members, and members are independently audited against these criteria by David Hicks & Co Pty Ltd. Four ongoing separate sub-committees have been established to drive the following key issues:

- Work Standards Committee – Establishing requirements for Training and experience for workers on Construction sites with an emphasis on trade specific work safety.
- Technical Committee – Providing relevant technical developments and information to the wider industry.
- Industry Viability Committee – to ensure that the industry understands the needs to implement in Australia something akin to the UK requirement in the CARES Model specification for bonded and unbonded post-tensioned flat slabs to recognise the importance of selecting certified organisations for the installation of post-tensioning systems; and
- Membership and Publicity Committee – to support the PTIA's objectives through relevant membership and publicity.

The progress of each committee will be referenced in each newsletter. The separate Works Standards Committee Report below addresses the training courses that the PTIA will commence in August / September 2007.

WORKS COMMITTEE REPORT – TRAINING AND PROCEDURES.

The Works Committee has finalised its programme of courses and publications with the initial emphasis to be focused on mono-strand post-tensioning procedures and training to accredit all site workers on building projects.

The PTIA will commence training courses for Mono-strand stressing in Sydney initially and these courses will then be continued in all other states of Australia and New Zealand as demand arises. The initial courses in Sydney will commence in August / September 2007 for the first and second modules 1 and 2 with instruction by PTIA certified trainers (Certificate IV in Training and Assessment component training with emphasis on Workplace Training). The first courses will be held at a central location and an examination (oral and written) will be implemented by the PTIA to ensure that a minimum standard of understanding and skill has been acquired. Only then will a ticket of competency be issued. The tickets will be employer specific and be limited to a 12 month period and will require workplace assessment for annual renewal. The annual renewal will be limited to two years before refresher courses and re-examination are required to be completed.

THE FIRST COURSES – DATES AND VENUES WILL BE ADVERTISED IN THE NEXT NEWSLETTER.

PLEASE NOTE COURSES ARE ONLY OPEN TO EMPLOYEES OF CORPORATE MEMBERS OF PTIA.

The Mono-strand stressing course will comprise 4 skill levels:

First Module

Why post-tensioning is used

General safety aspects for PT sites (grinders, bri-packs, etc.)

Storage and care of materials and tools

Clean up and

Company procedures.

Second Module

Material types and handling techniques

Cable set-out

Cable handling, cutting and setting up

Cable pushing

Cutting Edge boards

Fixing Anchorages

Fixing ducts/profiling/cable support chairs.

Third Module

Equipment and maintenance of Equipment

Stressing record taking

Over head and special stressing applications

Cutting off and sealing

Grouting

Grouting record taking.

Fourth Module

(Envisaged as a minimum requirement for site foremen)

Basic Reading of Drawings

Inspection Requests

Final Reports/certification

Time Management

Leadership Issues

Special Company Procedures.

Other first actions include a rewriting of the Code of Practice to incorporate the latest techniques and systems. Preliminary discussions have commenced with Workcover NSW and the style and format have been progressed.

A submission to Workcover NSW for its review is anticipated by June 2007.

Over future years the training courses and procedures will be expanded to include:

1. Multi-strand including basic grouting
2. Permanent Ground Anchoring
3. Specialist Grouting Systems,

and in future special courses could be developed for:

- Bar installations
- Cable Stay
- Restressable Systems

CONCRETE REQUIREMENTS FOR POST-TENSIONING

Post-tensioned concrete relies upon the transfer of the prestressing force into the surrounding concrete. This process occurs early in the life of a structure and therefore the specification of the concrete performance is critical. Post-tensioning is usually carried out in 2 stages as noted below:

Initial stress	25% of the prestressing force is applied when the concrete strength reaches 7 to 9 MPa.
Final stress	100% of the prestressing force is applied when the concrete strength reaches 22 MPa for 12.7mm diameter strands and 25 MPa for 15.2mm diameter strands. (usually between day 4 and day 7 after the concrete pour).

It is therefore essential that the concrete early age strength is specified. Clause 19.6.2.8 of AS3600 Concrete Structures deals with the testing of cylinders for early age strength and states in part "the sample specimens stored and cured under conditions similar to those of the concrete in the works". Therefore 'site curing' of cylinders used for early age testing is mandatory.

The early stressing of concrete relies on both the compressive and tensile strength of the concrete. Anecdotal evidence suggests that concrete mixes containing low levels of cement (and corresponding high levels of flyash) exhibit a lower gain of tensile strength in the first 48 hours. This can lead to bond failures of the post-tensioning 'dead' end, which are more closely related to tensile strength rather than compressive strength. It is therefore recommended that a limit on flyash be applied, or alternatively, the specification of a minimum amount of cement in the mix (notionally 330kg/m³).

The 56 day shrinkage strain of the concrete is also important. Post-tensioned concrete structures shorten axially partly due to their response to the shrinkage of concrete. It is usual to specify the maximum 56 day shrinkage strain of the concrete. This value varies across Australia due mainly to the variance in aggregates used within the concrete. The value commonly used is between 600 and 750 μ . Generally concrete with a higher shrinkage strain will exhibit larger axial shortening and a greater chance of minor shrinkage cracks. For this reason, joint spacing in post-tensioned buildings need careful consideration depending upon the concrete shrinkage strain.

For concrete which has been designed to be watertight it is usual to specify a 56 day shrinkage stress far lower than previously stated. A value between 500 and 550 μ is recommended. Of course the attainment of waterproofing concrete is quite a complex issue and relies on a great deal more than a simple limitation on concrete shrinkage. Refer to a PTIA member for more detail.

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

CMC (Australia) Pty Ltd
OneSteel Wire



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