

pt news

NEWSLETTER No 2 - 2007

SEMINAR:

Latest developments in post-tensioned concrete structures

In conjunction with the Concrete Institute of Australia, PTIA will be conducting a seminar dealing with latest developments in Post-Tensioning on Wednesday 22 August at the Epping Club. This seminar will be of particular interest to designers and builders. To obtain a brochure and registration form, visit the PTIA web site www.ptia.org.au or the Concrete Institute website www.concreteinstitute.com.au. Members of the PTIA will be sent a brochure through the mail and should register through the PTIA to receive a substantial discount on the registration fee.

Welcome to the second edition of the PTIA newsletter for 2007

Although the Institute is still in its infancy, I am delighted with the overwhelming support received from the construction industry to the aims and goals set by the PTIA.

Your response and support of our aims has clearly indicated to us that the industry stakeholders are committed to:

- the promotion of high standards in design and construction of post-tensioning
- the further development of industry work standards
- implementation of training courses for post-tensioning industry operatives to ensure all our people go home safely to their families each evening
- ongoing support of technical advances in materials and systems.

I would like to particularly acknowledge Taylor Thomson Whitting who is the first company to join the PTIA as a consulting engineering member. We warmly welcome you to the PTIA. I also must acknowledge Onesteel Wire and CMC Australia who are the first material supplier organisations to join the PTIA.

We have an exciting couple of months ahead of us at the PTIA with our first seminar on post-tensioning to be held in Sydney on August 22nd.

We are commencing the rollout of our training courses for

operatives of member companies in August this year and the rewriting of the "Procedures Document" is well underway with the support of Workcover.

We will be officially launching the PTIA at a function as part of the CIA Concrete 07 conference in Adelaide. All conference delegates are invited to join us for drinks on Friday 19 October.

The technical committee is currently working on a number of issues and has finalised the anti-burst reinforcement technical note, published in this Newsletter, and soon to be posted on our website.

Please feel free to visit our website on a regular basis www.ptia.org.au. It is updated regularly and is the main method for the dissemination of information to members and all construction industry stakeholders.

Should you have any enquiries, questions or comments, please do not hesitate to contact us via the website email link or by phoning our Executive Officer, Peter Mallesch on 0405 110 126.

DAVID PASH
President

PROJECT REPORT

Owner: Qantas Airways Limited
Client: Multiplex Constructions Pty Ltd
Consultant: Holmes Consulting Group
Contractor: Austress Freyssinet Pty Ltd

Qantas heavy lift



THE BRISBANE AIRPORT MAINTENANCE HANGER

is the largest facility of its type in Australia and it has marked a major coup for the Queensland State Government in cooperation with the principal contractor Multiplex Constructions. This “state of the art” hanger facility features a 160m wide clear span with a door opening height of 26 metres. It allows enough room to simultaneously accommodate three B767 aircraft and will be able to house the massive Boeing A380-100 when it comes into service. The works also included the aircraft apron pavement as well as service roads and buildings for the permanent workforce of 300 people.

The hanger structure is composed of a steel truss roof, weighing 3000 tonnes (170m x 80m x 13m) which is supported around its perimeter by 8No x 40m high concrete columns. The construction procedure was simple – erect the concrete columns, fabricate the truss on a 3.0m high temporary support, then lift the truss to its final position on the columns and mechanically lock it into place.

Austress Freyssinet was the specialist contractor engaged to lift the truss to its final position. The company proposed the use of heavy lift jacks situated on temporary steel platforms at the top of the concrete columns. The two front columns each had 4No x 400t jacks and the six back columns were each fitted with 2 No x 150t jacks. The jacks were hydraulically linked to a central control system where they could be operated individually or in any combination that would be required to control the transfer of load to the truss. A set of video surveillance cameras and a laser survey system allowed

the loads on all jacks and the height of the truss at ten different points to be monitored continually from the central control.

The lift was completed in three stages. The first stage or pre-lift required that the truss be raised by 1.5m and held in position to allow for removal of temporary works. This was the most difficult part of the operation because the front portion of the truss had a built in pre-camber of 1.5m which would straighten under load. Months of planning was required to develop an incremental jacking sequence which would allow the load to transfer to the truss from temporary supports without overstressing structural elements. Consideration had to be given to calculate the deflection of the front truss pre-camber under various loads and how incremental lifting of the back truss jacks could be used to maintain the horizontal plane in coordination with loss of pre-camber in the front truss.

The second stage of the lift raised the truss by 25.0m to its final position on the concrete columns. The truss load was held by the jacks in this position for one week while all the permanent steel connections were assembled. The load was then released by the jacks and successfully transferred to the structure. Overall the total of all actual lifting operations were completed in three days with a crew of six men.



PTIA PROVIDES IMPORTANT BENEFITS FOR ITS CLIENTS

Post-tensioning offers major advantages on many projects, and when properly designed and installed it provides a very successful end product. Post-tensioning is, however, a lot more difficult than might appear and one needs experienced and capable people designing the details, installing the systems and completing the work.

Failure to properly do so not only leads to potential safety issues during construction, but also, significant complications with the works can follow.

The PTIA is one large step towards ensuring the best and correct product for post-tensioning clients by assuring them that PTIA members have been inspected and certified as capable of providing a safe and sure result. Problems have recently occurred on projects and the establishment of the PTIA promises to avoid such situations in the future, where PTIA members are engaged.

Very notable and costly outcomes on some projects have resulted from inexperienced or fraudulent subcontractors taking on work they should never have attempted. One very recent project overseas has cost hundreds of thousands of dollars to rectify after a large subcontract group, with little or no post-tensioning experience, undertook a project involving thousands of tonnes of post-tensioning. They thought they could do what looked easy. The outcome was that the main contractor had to take over the subcontract work, seeking assistance from other competent post-tensioning subcontractors. The main contractor also had to employ several experienced people from the post-tensioning industry to supervise the work.

This was a classical case where inexperience and incompetence led to lack of performance on the project. There was also concern about the false reporting of the progress and quality of the works because of deficient installation.

Other more dangerous situations have arisen where lack of experience with installation or on site control has caused collapse at pour joints when not correctly handled. These issues have occurred in recent years and should have been prevented with correct site supervision. The PTIA aims to ensure that all sub-contractors involved in the post-tensioning industry in Australia are competent with certified systems, proper levels of insurance, and skilled staff and site personnel, supported by third party audited operational procedures (QA, OHS and Environmental). All aspects of post-tensioning procedures are to be audited and monitored via an independent, third party auditor appointed by the PTIA.

The PTIA will ensure that its members undertake design and detailing by, with or under the supervision of experienced post-tensioning designers employed by the subcontractor. Site supervision, site management and site operations will be carried out by certified personnel, trained and tested annually by the PTIA.

Post-tensioning systems will be approved and tested to National Authority standards. This is to ensure that all PTIA approved systems work as a complete system and not as a mix of individual components, purchased from various suppliers, which may not necessarily be compatible or work together. The PTIA aims to ensure its members will meet standards believed necessary for the safe and certain application of post-tensioning.

A main contractor, builder or client engaging a PTIA member can take significant comfort in the fact that their PTIA certified post-tensioning contractor is supported by systems, procedures and personnel that can get the job done – the way you want it done!

CODE OF ETHICS FOR MEMBERS OF PTIA

The PTIA Board recently approved a Code of Ethics related to its membership, in accordance with the Constitution of the PTIA.

The code is based on principles of fairness, honesty and integrity, with due regard to the dignity of the individual, the welfare of the community, and responsibility to the PTIA and its objectives. These principles address the members' responsibilities regarding:

- the environment
- the community
- individuals
- employees
- work relationships involving clients, suppliers, sub-contractors
- other members of the PTIA, and
- the PTIA

The Code includes a total of twenty seven guidelines, and Corporate and Associate members specifically agree to abide by the Code as a condition of their membership of PTIA.

The Code also contains a Complaints and Disciplinary Actions procedure. Complaints received will be considered by the Board of the PTIA through a respectful, unbiased and confidential process which allows for a member, against whom a complaint may be made, to address the Board on the particulars of the matter. The PTIA Constitution empowers the Board, where it finds a complaint justified, to censure, suspend or expel a member as it sees appropriate. Where disciplinary action is taken, the Board may publicise such action.

The Code of Ethics may be viewed in full on the PTIA web site, www.ptia.org.au.

STANDARDISATION OF ANCHORAGE REINFORCEMENT

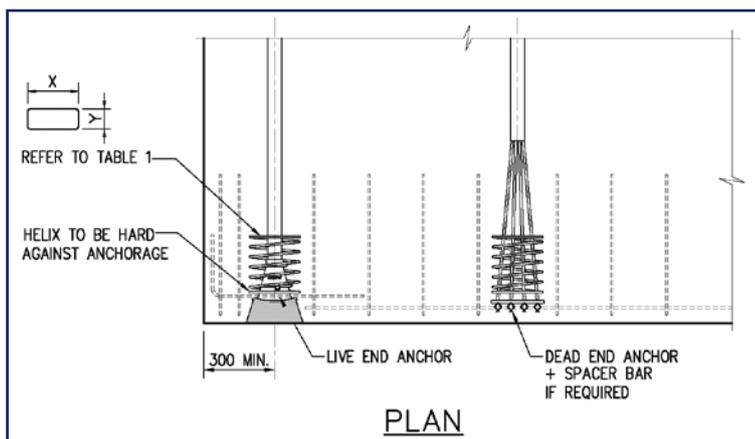
Post-tensioning of concrete relies on the transfer of the stressing force from the high tensile steel tendons to the surrounding concrete. This is achieved by the use of post-tensioning anchorages. For live ends (or stressing ends) this force is transferred mainly by direct bearing of a cast iron anchorage on the concrete.

This transfer of force leads to both tensile and compressive stresses directly around the anchorage zone. The tensile stresses have been termed 'bursting' stresses and this leads to the term 'anti-burst' reinforcement to describe the reinforcement cage surrounding the anchorages.

The PTIA member companies have had their anchorage testing verified by an external auditor to confirm compliance to Australian Standards. The Technical Committee of the PTIA has been able to standardize the helical anti-burst reinforcement for the two main anchorage types. This reinforcement is noted in *Table 1* below. It has been found that helical reinforcement leads to the objective of having sufficient strength and yet it is simple to construct and as economical as possible.

It is important to recognize that this reinforcement is for the primary bursting stresses and must be supplemented with other edge reinforcement and/or additional shear ties within a beam. Along the edge of the slab it is always recommended to detail U-bars plus longitudinal reinforcement to control tensile spalling stresses between the anchorages and to adequately reinforce the un-tensioned zone which occurs between anchorages. The detailing of additional reinforcement is critical and should always be checked with a PTIA member company and the project's structural engineer.

SYSTEM	BAR	PITCH (mm)	No. TURNS	Dim. X (mm)	Dim. Y (mm)
Up to 5 x 12.7	R10	60	5	260	100
Up to 5 x 15.2	N10	60	7	300	110



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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POST-TENSIONING INSTITUTE
OF AUSTRALIA LIMITED

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

www.ptia.org.au