POST-TENSIONING INSTITUTE

Stressing the Stronger Concrete Solution™

2017 PTI PROCEEDINGS

April 30-May 3, 2017 | Hyatt Regency Atlanta | Atlanta, GA. USA

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2017 Technical Sessions

Links to the technical session presentations are available from the following pages. Navigate to the session of interest and select "presentation" to view. Please note that not all sessions were approved for publication.

Opening Session

Session Moderator: Theodore L. Neff, Executive Director, Post-Tensioning Institute

Managing Change and Advancing the State of the Art

Theodore L. Neff, Executive Director, Post-Tensioning Institute

This presentation will examine the obstacles to change and will review ways to ensure that change advances the state-of-the-art of post-tensioning and benefits PTI and the industry. The Institute's role in facilitating positive change will also be discussed.

Video | Presentation

Where Does the Institute Go from Here?

Dave Martin, PTI President, Vice President – Business Unit Manager, Dywidag-Systems International USA, Inc.

By taking a brief look back at the accomplishments of the PTI and the challenges we face ahead, our strategic plan will guide our path to growth and success.

Video | Presentation

PTI Committee and Convention Reorganization

Don Kline, TAB Chair, President, Kline Engineering, Inc.

One of the recommendations of the Strategic Planning task group was to enhance the experience of committee members and convention attendees. The reorganized committees allow for more direct engagement in drafting documents in task groups while the consensus process takes place in the committees. The committee members will have the opportunity to also attend the Technical Sessions and get information on the interesting projects and new developments. At the convention, attendees will have the opportunity to attend not only the Technical Sessions but also the committee meetings to see first-hand the document development process and to possibly join some committees.

Video | Presentation

What PTI provides to the Membership and to the Construction Industry

Russell Price, Executive Vice President, Suncoast Post-Tension, Ltd.

Post-tensioning has always been and will always be a system that requires attention to specific details and processes in order for it to perform as designed. The design of a post-tension, pre-stressed concrete structure is performed by the LDP from "10,000-ft," but the application is done by the practitioner at "ground level." The LDP shows the design requirements, but the practitioner is faced with the placement of multiple tendons with anchorages within the concrete element while accommodating other items that are equally necessary for the structure. PTI affords the designer, contractor, installer, and others involved in the process a location for gathering information from industry experts, a forum for obtaining specific information, a place for learning the ins-and-outs of the post-tensioning process and the chance to participate in the direction of the post-tensioning process. There is no other group world-wide where this collective expert knowledge base is available and where information on the specific processes of post-tensioning is found.

Video | Presentation

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Session #1

International Session

Session Moderator: José-Luis Quintana, President, Mexpresa

Sail Bridges vs Cable Stayed Bridges

José-Luis Quintana, President, Mexpresa

The recent opening of the Barra Vieja Bridge in Mexico offers an opportunity to compare the two post-tensioning techniques from the stand points of structural design in difficult conditions, construction ease, economics and speed, and durability. The presentation includes a description of the main features of a sail bridge, develops the comparative issues and shows conclusions that open additional fields of application for the post-tensioning.

Video | Presentation

Hammersmith Flyover

Leon O'Neill, Contract Manager, Freyssinet

The Hammersmith Flyover is a vital link between Central London and the West, avoiding eight roads and four tube tracks. Opened in 1961, its 630 m (2,100 ft), long deck made of pre-cast, post-tensioned concrete segments was a worldwide innovation. In 2011, its structural integrity was in peril because of the corrosion of its pre-stressing cables. A formidable surgery operation, in two phases, fully replaced the existing post-tensioning system. The challenge was to develop cutting edge innovations and in-depth collaboration between all parties.

The solutions implemented by Freyssinet to replace the post-tensioning included the innovative use of UHPFRC (Ultra-High-Performance Fiber-Reinforced Concrete) the development of an adapted external post-tensioning system, the use of wax injected >1,000 ft long post-tensioning cables, and cutting-edge methodologies and equipment to cope with the fast-track schedule and working environment constraints.

Video | Presentation

Criteria for Minimum Reinforcement According to NBR 6118-2014 and ACI 318-14 for Unbonded Post-Tensioned Beams

Fábio Albino de Souza, UNICAMP – EBPX

The present work analyzes post-tensioned beams with unbonded tendons using the method of the Service Limit State (SLS) and Ultimate Limit State (ULS) according to Brazilian Standard NBR 6118: 2014 and the American Standard ACI 318-14 with emphasis on the minimum reinforcement. Six design options are presented, three of which are conventional and the other three are optimized, showing a comparative analysis between methods, including reinforced concrete, to compare rebar quantities. The results indicate that the increase of the post-tension force reduces the quantity of rebar reinforcement drastically, however, when the two standards were followed a difference of 33% in the minimum reinforcement requirements was found for beams with unbonded tendons.

Video | Presentation

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Session #1 cont.

India's Longest River Bridge

Nagarajkumar Bommakanti, Span Systems International Co. Ltd.

This presentation will highlight some of the important features of this significant project in India. It will discuss the bridge launching method and the temporary post-tensioning and some construction challenges. Construction pictures and a short video will be shown.

Video | Presentation

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Session #2

Bridge Design/Construction

Tommaso Ciccone, Technical Director, TENSA

The San Antonio "Y" Interchange—Investigating & Upgrading a 30+ Year Old Bonded PT System While In Service

Jason Caravello, Business Development Manager – Repair and Strengthening Division, DSI

This presentation will describe how original bonded PT systems in a circa 1980s segmental box girder bridge were inspected, evaluated, repaired and upgraded to meet today's PTI M-50 PL-1 modern specifications for bonded PT. Specific examples taken from the 770 spans completed will show anchor cap modifications, tendon duct repairs, grout remediation to ultimately confirm how incredibly durable and long lasting bonded PT systems are.

Video | Presentation

Willapa Hills Trail Bridges—Post-Tensioned Steel Structures

Douglas Sarkkinen, Principal, Otak

This project involved the design and construction of two identical trail bridges that were each 300 foot clear span. The structures consisted of large steel side trusses that included post tensioning inside the HSS bottom chords. The PT was used to minimize the truss depth to allow shipping to the site and also to control deflections. The truss deflection was monitored during the stressing process and the results were successful. The project demonstrates the unique application of post-tensioning that can occur with steel structures.

Video | Presentation

Saddles for Stay Cables—Design, Testing and Development

Tommaso Ciccone, Technical Director, TENSA

Analysis of the structural behavior of saddle systems for stay cables is complex and involves several co-dependent factors. Careful attention must be given to details, design and testing stage is then a crucial milestone to assess system performance.

Aim of the presentation is to provide an overview of state-of-the-art solutions and their relevant detailed process for performance assessment.

Special attention is also given to current International Recommendations on this topic.

Video | Presentation

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Session #2 cont.

St. Croix River Crossing Cable Installation Means and Methods

Michael Lussier, Project Manager, Structural Technologies, Inc.-VSL

The installation of cable stayed bridges in the US typically involves long main spans with long main cables; however, on the St. Croix River Crossing, designers utilized short spans and short, stiff cables to create an intriguing extradosed bridge over the St. Croix River. Structural Technologies-VSL was contracted to install the stays on the project which presented a number of compelling challenges including limited access during construction, numerous cycle time coordination constraints, and high quality standards. Structural Technologies-VSL will present the means and methods used on this project to install 2,200,000 feet of strand over 160 stays with a unique focus on quality.

Video | Presentation

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Session #3

Multistrand and Bonded Post-Tensioning

Carol Hayek, Chief Technical Officer, CCL USA, Inc.

Grouted Post-Tensioning Tendon Corrosion Evaluation and Mitigation

Liao Haixue, CP Specialist, Vector Corrosion Technologies

Corrosion of post-tensioning tendon leading to wire/tendon break and bridge collapse is a serious problem for bridge owners. Water bleeding and grout segregation from conventional portland cement grout and improper grout practice have created pockets of voids, and water/moisture in some bridges. Water or sufficient moisture presence and corrosive ion concentration has caused corrosion in the tendons. Some improper repairs have even accelerated corrosion of post-tensioning tendons. The key is to understand the conditions of post-tensioning and causes of its deterioration.

This paper first discusses the causes of post-tensioning corrosion, then introduces post-tensioning evaluation techniques and process. The PT evaluation of Rogers Ave Pedestrian Bridge, Victoria, BC for the BC MoTi, was completed recently and will presented as a case study.

The evaluation techniques include non-destruction testing and destructive testing. The non-destructive testing includes locating tendons with ground penetrating radar, detecting grout voids with impact-echo, drilling holes for air testing, moisture testing, borescoping to inspect the tendon conditions. Destructive testing includes excavating the cover concrete to expose the tendons for visual inspection and taking grout sample for lab testing. The evaluation process starts from locating tendons, detecting voids, narrowing down the hot spots for borescope and then narrowing down hot spots further for destructive testing.

Video | Presentation

Banding Together to Reach Out: Achieving 40 ft Cantilevers Through Team Collaboration

Doug González, Associate Partner, Leslie E. Robertson Associates, Michael Hopper, Associate, Leslie E. Robertson Associates, Carol Hayek, Chief Technical Officer, CCL USA, Inc.

The design of the 5-story, 185,000-sf Novartis Oncology Building reflects the fast-paced nature of innovation in healthcare research—where teams often form and disperse within a matter of months—by enabling research teams to reorganize easily within the open space concept. The use of a high-density bonded post-tensioning system was key to realizing a simple yet structurally complex design and achieving the desired open, column-free office environment that promotes free-flowing movement and interdisciplinary collaboration.

The 30- and 40-ft cantilevers are structured in high-strength post-tensioned concrete slabs (8,000 psi) that taper in depth from 20 in. in strong column support zones to 8 in. at the perimeter. Using two-way bonded PT slabs helped to avoid the complexities and expenses of having structural steel framing moment connections in two directions, thus allowing the structural floor depth to be minimized and the ceiling heights and open façade to be maximized.

This presentation will discuss the challenges of building a post-tensioned concrete structure in a structural steel market and how the extensive use of post-tensioning posed a difficult challenge in design and construction, met only through an open, creative and precise collaborative effort between the owners, builders, manufacturers, installers and designers.

Video | Presentation

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Session #3 cont.

Redistribution of Column Loads using Post-Tensioned Shear Wall

Florian Aalami, President & CEO, ADAPT

This presentation reviews the design approach used to redistribute column reactions in the 55 Hudson Yards, New York, New York project. 55HY is a 51-story concrete office building partially constructed on and supported by an existing subway station and associated ventilation structure. The natural distribution of column loads for the new construction exceeded the allowable limits provided by the existing structure at the pre-determined support points. To proceed with the planned development of a cheaper but heavier concrete alternative, the design team had to devise a method to re-distribute the column loads and bring them within allowable limits. A design scheme was developed that uses the hyperstatic reaction from bonded post-tensioning draped vertically in the shear walls to meet the project's design requirement in an efficient and cost-effective manner.

Video | Presentation

Construction Overview of a Post-Tensioned Shear Wall

Mark Saliba, Project Engineer, Freyssinet

The 55 Hudson Yards tower, currently under construction in New York City, incorporated a design feature not often seen in the post-tensioning industry. To meet structural constraints imposed by the Metropolitan Transportation Authority, bonded post-tensioning tendons were draped vertically within the structure's shear walls to redistribute column loads. Seven 31-strand tendons were embedded within the structure's walls and draped over three stories to impose the required forces onto the structure. This project called for creative and innovative thinking during design, installation, stressing and grouting operations. This presentation goes over the planning and construction efforts invested into the completion of this work from the standpoint of the post-tensioning subcontractor.

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Session #4

Building Design

Session Moderator: Cary Kopczynski, Senior Principal/CEO Cary Kopczynski & Company

Stressing Quality: Using Post-Tensioning to Resolve Unique Challenges at Lincoln Square Expansion

Cary Kopczynski, Senior Principal/CEO Cary Kopczynski & Company

The Lincoln Square Expansion (LSE) in Bellevue, Washington is one of the largest mixed use projects ever constructed in the Pacific Northwest. LSE includes two high-rise towers—an office tower and a hotel/residential tower, along with a massive retail podium and six stories of subterranean parking. Cast-in-place post-tensioned concrete was used for many key project components. PT was used in long span beam-slab systems, two way flat plates, transfer beams, and other elements. This presentation will discuss the design and construction of LSE, and will be illustrated with photographs taken throughout the iconic project's construction. The project's design and analytical approach will also be presented, along with design details and other information relevant to the value added use of post-tensioning.

Video | Presentation

Stressing the Quality of Unbonded Post-Tensioned Single-Strand System Installations

Ralf Leistikow, Principal, Wiss, Janney, Elstner Associates

Since the 1960s, post-tensioned concrete construction has grown and is now one of the most common and economical systems used for multi-story buildings and parking structures. Over the years, post-tensioning (PT) systems have evolved and the industry has learned about various serviceability issues that are magnified in coastal and other aggressive environments. With the time and effort placed on further improving the long-term performance of these PT systems, has the industry address some of the past serviceability concerns and placed sufficient emphasis on a quality installation? Several case studies of existing PT systems and the long-term performance of these systems will be reviewed.

Unavailable

Unique Ways to Use Post-Tensioning in Place of Structural Steel

Lance Osborne, Director of Sales, Structural Technologies, Inc.

A look at using post-tensioned concrete in place of portions of a structure that would typically be conceived in structural steel. This will be explored through a few project examples.

Unavailable

Alternative Solution Using PT for a Change in Use of an Existing Building

Sivakumar Munuswamy, Senior Project Engineer, Thornton Tomasetti

A conventionally reinforced concrete beam solution was not feasible to convert an existing building reinforced concrete beam/joist slab floor system. A post-tensioned beam solution provided a reduced beam depth eliminating the conflict with MEP installations. The presentation provides a narrative of the existing building, issues related to the conflicts of MEP installations, and how the proposed PT beam solution satisfied the functional requirements without compromising the clear head room of the floor space.

Video | Presentation

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Session #5

Building Construction

Session Moderator: Tracy Naso, Associate Principal, Wiss, Janney, Elstner Associates, Inc.

The Importance of PT Inspections: Lessons Learned from Improperly Constructed PT Structures

Gabriel A. Jimenez, Executive Director, Diagnostics Group Walter P Moore

A post-tensioned concrete structure when properly designed, constructed and maintained generally performs as intended in the design. Design professionals experienced with the design of PT structures incorporate inspection protocols in the construction documents to ensure that the intent of the design is built in the field. The purpose of this presentation is to present case studies and lessons learned from projects in which the structures were not constructed properly due to lack of inspection during construction thus causing distress in the PT facilities in the form of premature corrosion, lack of performance or structural failure. This presentation emphasizes the importance of PT inspections to reduce the occurrence of expensive repairs and loss of functionality of the facility.

Video | Presentation

A Stitch in Time Saves Nine: A PT Repair Case Study

Tracy Naso, Associate Principal, Wiss, Janney, Elstner Associates, Inc.

The quality of repairs to post-tensioning tendons directly impact the long-term performance of the post-tensioning system. A case study will be presented to describe the investigation and repair of post-tensioning tendons in the garage for a residential tower built in the mid-1980s. The tendons primarily failed as a result of insufficiently addressing otherwise minor damage that occurred during repairs performed years before to address corrosion of the conventional reinforcement. Investigation openings and non-destructive evaluation techniques were used to estimate the extent of tendon deterioration, but also revealed limitations of various repairs intended to address tendon damage. Repairs were designed to replace sections of deteriorated tendon and reduce the likelihood of future failures.

Video | Presentation

Lockable Dowels

Imran Khan, Product Manager, Concrete Connections

Lockable dowels are used at temporary movement joints, most commonly found in post-tensioned concrete frames. These dowels allow initial shrinkage of the concrete to take place and are then locked in position with a mechanical plate and a controlled amount of epoxy resin. The locked dowels continue to transfer shear, but prevent further movement from taking place.

Video | Presentation

Tendon Cutting Methods

Paul Hohensee, Marketing & NPD Leader Precision-Hayes Internationa, Jonathan Murphy, Marketing Program Manager, Hypertherm

Several options are available for cutting tendon tails after stressing. This presentation will discuss all options available including oxyethylene torch, plasma torch, and hydraulic shears. The features of the different methods will be highlighted.

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Program Book/Awards Book

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PDH/CEU Form

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2017 PTI Convention

PDH/CEU Tracking Form for Committee Meetings • Atlanta, GA

Sunday, April 30th			No. of credits	Attended
8:00 am – 12:00 pm	Certification - PT Systems Qualification Testing Committee	CRT-70	4 PDHs	❑
8:00 am – 5:00 pm	Cable Stayed Bridge Committee	DC-45	8 PDHs	❑
1:00 pm – 5:00 pm	Multistrand Tendon Committee	PTI/ASBI M-50	4 PDHs	❑
1:00 pm – 5:00 pm	Bridge Design Committee	PTI/ASBI DC-40	4 PDHs	❑
7:30 pm – 11:00 pm	Technical Advisory Board	TAB	3.5 PDHs	❑
Monday, May 1st				
8:00 am – 9:45 am	Opening Session		2 PDHs	❑
10:15 am – 12:00 pm	Session 1: International Session		2 PDHs	❑
10:15 am – 12:00 pm	Marketing Committee	MKT-150	2 PDHs	❑
1:30 pm – 5:30 pm	Slab-on-Ground Committee	DC-10	4 PDHs	❑
1:30 pm – 5:30 pm	Building Information Modeling (BIM) Subcommittee	DC-20 A	4 PDHs	❑
1:30 pm – 5:30 pm	Grouting Committee	M-55	4 PDHs	❑
Tuesday, May 2nd				
8:00 am – 9:45 am	Session 2: Bridge Design/Construction		2 PDHs	❑
10:15 am – 12:00 pm	Session 3: Multistrand and Bonded Post-Tensioning		2 PDHs	❑
10:15 am – 12:00 pm	Professional Member	PM-200	2 PDHs	❑
1:00 pm – 5:30 pm	Building Design Committee	DC-20	4 PDHs	❑
1:00 pm – 5:30 pm	Monostrand Tendon Committee	M-10	4 PDHs	❑
7:00 pm – 11:00 pm	CAB Certification Advisory Board	CAB	4 PDHs	❑
Wednesday, May 3rd				
8:00 am – 9:45 am	Session 4: Building Design		2 PDHs	❑
10:15 am – 12:00 pm	Session 5: Building Construction		2 PDHs	❑
1:00 pm – 5:30 pm	Unbonded Tendon Plant Certification Committee	CRT-20	4 PDHs	❑
1:00 pm – 5:30 pm	Repair, Rehabilitation & Strengthening Committee	DC-80	4 PDHs	❑
3:30 pm – 5:30 pm	Personnel Certification Committee	CRT-100	2 PDHs	❑

TASK GROUP MEETINGS

DATE/TIME	TASK GROUP NAME	TG NUMBER	PDHs	Attended
				❑
				❑
				❑
				❑
				❑
				❑
				❑
			TOTAL	

Name: _____

Address: _____

City, State, Zip Code: _____

E-mail address: _____

I attest that I attended the sessions and/or meetings as marked above for a total of _____ PDHs/CEUs.

Signature: _____

Date: _____

_____
Authorized by PTI Representative
Theodore L. Neff, Executive Director
Post-Tensioning Institute

_____
Date

For PTI use only.

Return form for signature to: Ted Neff, Executive Director; ted.neff@post-tensioning.org or fax to (248) 848-3181.

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Exhibitors

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2017 PTI Committee Days

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