pti POST-TENSIONING CONVENTION

2021 PROCEEDINGS

APRIL 19-23, 2021
PTI Virtual Convention

For more information, please visit post-tensioning.org.

Table of Contents

2021 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 the PowerPoint and select "video" to view the recording. Please note that not all sessions were approved for publication.

Technical Session 1: Cable Stayed Bridges

Moderator: Tony Johnson, PTI

Robotically Installed Protective Butyl Rubber Tape For Cable Stayed Bridge Stays

Mr Felix Foerster, Dywidag-Systems International

This presentation discusses how DYWIDAG maintained the Fred Hartman Bridge by wrapping all 192 cable stays with a robotically applied butyl rubber tape system. Advantages of this technology which will be discussed include the system ability to be applied over existing thin film tape technology, no need for any type of curing, an extremely efficient method of installation, and a highly robust and durable three ply co-extruded tape technology.

Video | **Presentation**

Design and Load Test of a 4 Line Cable Stayed Bridge with a Slender Concrete Deck in Chandrapur, India

Pietro Paolo Mossone - Ing. Pietro Paolo Mossone

This presentation discusses the Irai Bridge, a 4 line Major Cable Stayed Bridge across Irai River in India. Main characteristics are a very slender deck of average 50 cm thick concrete slab, 235 m total length, 120 m main span and 21,75 m deck width. Tensa TSFR anchors with clevis plate and STU (shock transmitter units) were used. Wind Analysis was performed by Vento AEC CFD software.

Video | **Presentation**

Fatigue Resistance of 7-Wire Prestressing Strands in Air

Azam Nabizadeh, University of Wisconsin Milwaukee

This presentation recognizes that different types of 7-wire strands that are covered under the ASTM A416 standard can have substantially different fatigue resistance. This presentation will help you understand the differences in fatigue strength of "classic", "modern", and "cable-quality" strands and the relationship between short-length individual strand fatigue resistance and the fatigue resistance of long stay cables made with bundled 7-wire strands.

Video | **Presentation**

Back to Table of Contents

Technical Session 1: Cable Stayed Bridges

Moderator: Tony Johnson, PTI

Design Considerations and Qualification Testing for Bending Fatigue in Stay Cables

Habib Tabatabai - University of Wisconsin Milwaukee

This study examines the effect of cable size and bending stiffness (moment of inertia) on the cable bending stresses using computational models. The bending fatigue test procedures proposed by fib are also assessed with respect to consistency of bending stresses for various cable sizes. Finally, the design community and fib test procedures commonly use angle change within the cable as a primary indicator for assessing bending stresses (in lieu of curvature change).

Video | **Presentation**

Back to Table of Contents

Technical Session 2: PT Bridges & Multistrand PT

Moderator: Tony Johnson, PTI

Monitoring of First Circular (Reusable) Bridge

Chris Fielding, Dywidag

This presentation will provide a conceptual overview of the circular bridge approach with a focus on the IHM system used to validate the design principles. It will discuss a bridge that utilizes standardized PT concrete blocks that have a 200 year lifespan, so after the lifespan of the bridge is complete (~40 years), these blocks can be de-installed and re-used again.

Video | **Presentation**

Post-Tensioning Assessment and Rehabilitation of the I-526 Wando River Bridge

Nick Amico, HDR

This presentation discusses the post-tensioning and design and implement repairs of the I-526 Wando River Bridge. An expandable supplemental tendon system using post-installed anchorages and deviators was designed and constructed to provide additional post-tensioning in select spans where tendons could not be removed or replaced.

Video | **Presentation**

Durability, Tensioning and Installation Methods of Greased Sheathed-Strand (GSS) Tendons

Hyeongyeop Shin & Thomas Kang, Seoul National University

This project discusses research on Greased Sheathed-Strand (GSS) tendons and performance evaluation on corrosion resistance of GSS tendons. Additionally, this presentation covers tendon installation methods and related code provisions as well as characteristics on friction loss and tensile force distribution.

Video | **Presentation**

Back to Table of Contents

Technical Session 2: PT Bridges & Multistrand PT

Moderator: Tony Johnson, PTI

Condition Assessment of Grouted PostTensioning Tendons in Voided Slab Bridges

Liao Haixue & Doug Dixon, Vector Corrosion Technologies & Doug Dixon Associates, Inc.

This presentation discusses corrosion mitigation options for post-tensioning systems and evaluation techniques of existing post-tensioning tendons and of post-tensioning anchors. Specifically the presentation will examine the Archie Duckworth Bridge.

Video | **Presentation**

Back to Table of Contents

Technical Session 3: PT Buildings

Moderator: Bryce Barker, PTI

Finite Element Method (FEM): The Analysis Method of Choice for PT Designs

Carine Magalhaes Leys, Odeh Engineers

This presentation is intended to illustrate the benefits of Finite Element Method (FEM) tools on PT designs, the considerations for an efficient preliminary tendon layout and several of the basic concepts to complete a design using FEM analysis.

Video | **Presentation**

Augmented Reality (AR) in Post-Tensioned Structures

Fabio Albino De Souza, Instituto Nacional De Estruturas Protendidas

This presentation shows how augmented reality (AR) is a solution to diminish mistakes made in the field when assembling post-tensioned structures. Marker-based augmented reality makes it possible to display detail in 3D with the possibilities of rotating, zooming, making the elements transparent and also suppressing information that is not useful at the moment.

Video | **Presentation**

Resolving Structural Engineering Challenges with Ingenuity and PT Concrete Technology

Martin Cuadra, Uzun Case

This presentation illustrates the process followed by Uzun + Case Engineers to engineer a roughly 1,000,000 square feet project through designing a "banded-banded" system consisting of post-tensioning cables banded in both directions with a mild reinforced slab system spanning in two directions (when current ACI codes does not address this structural system).

Video | **Presentation**

Back to Table of Contents

Technical Session 3: PT Buildings

Moderator: Bryce Barker, PTI

Fire Performance of Post-Tensioned One Way Slabs

Siyoung Park & Thomas Kang, Seoul National University

In this study, fire performance of post-tensioned (PT) one-way slab is evaluated through fire tests and finite element analysis. Full-scale fire tests of eight one-way simply-supported PT slabs (unrestrained condition) are conducted following the procedure in ASTM E119-20, and fire performance of slab structure is assessed by monitoring deflection, prestress loss, and inner temperature change.

Video | **Presentation**

Wave One - Pushing Post-Tensioning in India

Anantha Chittur & Steve Baldridge, BASE

This presentation discusses Wave One, a 41-story mixed-use building with more than two million square feet of floor area located in the heart of Sector 18 in Noida. The building is characterized by a large 200-ft by 103-ft rectangular aperture extending between Levels 15 and 32 that was designed using the principles of Vastu Shastra of enhancing positive and eliminating negative energies by allowing them to "flow" through the property.

Video | **Presentation**

Ensuring Your PT Project is Built Per Plan: The Evolving Field of PT Shop Drawings Review, Losses Calculations and Elongation Records

Carine Magalhaes Leys, Odeh Engineers

This presentation is intended to address the coordination required to ensure that the information submitted on a project's shop drawings is structurally adequate and responsive to the intent of the structural documents. Areas of special concern include post-tensioning provided forces, profiles, conflict with MEP openings, and elongation records.

Video | **Presentation**

Back to Table of Contents

Technical Session 4: LA Automated People Mover

Moderator: Sara Steptoe-Campbell, PTI

Los Angeles World Airports Automated People Mover - Elevated Guideway

Chester Werts, HDR Engineering

An overview of the project and challenges associated with building an elevated Automated People Mover system within the Central Terminal Area at one of the busiest airports in the US will be included in this presentation, as well as in depth discussion on the seismic analyses, unique box-girder design, and segmental portions of the guideway.

Presentation not released for distribution

Seismic Design of Post-Tensioned Box Girders for the Los Angeles World Airports Automated People Mover

Anthony Messmer, HDR Engineering

This presentation will provide an overview of the seismic design of the post-tensioned box girder guideway structure for the Automated People Mover at LAX airport. The two-level seismic design criteria, the 150-year Operating Design Earthquake and 2500-year Maximum Design Earthquake, will be discussed.

Presentation not released for distribution

Seismic Vehicle-Structure Interaction for an APM Elevated Guideway System

Greg Knutson, HDR Engineering

This presentation will introduce the audience to the challenges faced when trying to estimate the motions and forces produced by a fully loaded Automated People Mover vehicle as it rests on an elevated guideway structure that is subjected to the ground motions produced by a seismic event with a 2500 year recurrence interval.

Presentation not released for distribution

Back to Table of Contents

Technical Session 4: LA Automated People Mover

Moderator: Sara Steptoe-Campbell, PTI

3GW1 Elevated Guideway Triangular Bridge for the Los Angeles World Airports Automated People Mover

Ted Bush, HDR Engineering

This presentation focuses on the complex triangular 3GW1 guideway bridge segment design that consists of a main 3-span post-tensioned box girder that monolithically supports two 75-foot radius, 2-span reinforced concrete box girder sections that then merge into a single 4-span reinforced concrete box girder.

Presentation not released for distribution

Hybrid Cast-in-Place Segmental Bridges for the Los Angeles World Airports Automated People Mover

Anthony Messmer, HDR Engineering

This presentation will provide an overview of the cast-in-place (CIP) segmental box girder bridge frames that make up a portion of the Automated People Mover. It will discuss the hybrid system created by combining CIP segmental main spans, up to 275 feet, with traditional CIP-on-falsework backspans within the same continuous frame.

Presentation not released for distribution

Los Angeles World Airports Automated People Mover Session Panel Discussion

Chester Werts, Anthony Messmer, Greg Knutson, Ted Bush, HDR Engineering

Presentation not released for distribution

Back to Table of Contents

Technical Session 5: Parking Structures

Moderator: Amy Dowell, PTI

Durability Design of Post-Tensioned Parking Structures in Corrosive Environments

Carine Magalhaes Leys, Odeh Engineers

Though most concrete structures conform to the requirements set for them for durability, we all know of some that have not, particularly in aggressive environments. In this presentation ACI 318 addresses some durability issues and ACI and PTI offer further guidance to achieve durable concrete.

Video | **Presentation**

PT Parking Structures from a Contractor's Perspective

Michael Pedraza, United Forming

This presentation discusses what is important to most concrete contractors and common "issues" that occur during the construction phase. The presentation will also identify areas that improve cost, schedule, and overall performance, as well as provide suggestions to help guide you on your next project.

Video | **Presentation**

Structural Integrity and Progressive Collapse Resistance of a Full-Scale PostTensioned Concrete Parking Structure

Mehrdad Sasani, Northeastern University

Despite the popularity of post-tensioned floors for parking garages and the likelihood of a column loss due to blast or vehicle impact, there is a lack of research on progressive collapse potential of this structural system following initial damage. In this presentation, progressive collapse resistance of an actual post-tensioned parking garage will be evaluated following the removal of an interior column by explosion.

Presentation not released for distribution

Back to Table of Contents

Technical Session 5: Parking Structures

Moderator: Amy Dowell, PTI

Inspection Findings from a 30 year old Salt Lake City Airport Parking Garage containing Silica Fume Concrete

Amanda Bordelon, Utah Valley University

The Salt Lake City airport parking garage structure was demolished in 2020 due to construction of a new airport, despite the structure being in excellent condition. The presentation shows the results of the visual inspection gathered during this last year and some preliminary test results to capture the benefits of the low-permeability concrete that was used in the concrete structure.

Video | **Presentation**

PT Parking Structures Session, Panel Discussion

Rashid Ahmed, Michael Pedraza, Mehrdad Sasani, Amanda Bordelon

Presentation not released for distribution

Back to Table of Contents

Technical Session 6: PT Repair, Rehabilitation, Strengthening

Moderators: Carole Berrelez & Matt Hartiage, PTI

Repair of Spiral Paper Wrap Tendons

Jason Haislip & Matt Hartlage, CCL USA, Inc.

This presentation will discuss the investigation and repair, including the means and methods, of working on paper wrapped tendons in an elevated parking structure. We will review several restoration practices to repair the original construction as well as fixes to existing repairs that were poorly executed in the past.

Video | **Presentation**

Back to Table of Contents

Technical Session 7: Slab-On-Ground

Moderator: Michelle Stern, PTI

A Case Study for Value Engineering with Innovative Suspended PT Technology

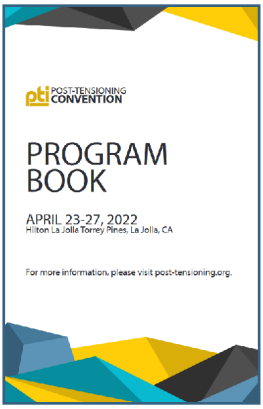
Tony Childress & Chase Gooding, Childress Engineering Services, Inc.

In November 2015, Comal County, TX approved a $76 million bond package for a 150,000 sq. ft expansion of a county jail facility. CES redesigned the foundation utilizing a suspended post-tension slab that was formed on the ground and raised using a unique patented process. This session will look at unique design aspects and details associated with this project and other similar projects that have utilized this patented process.

Video | **Presentation**

Back to Table of Contents

Program Booklet & Awards Booklet



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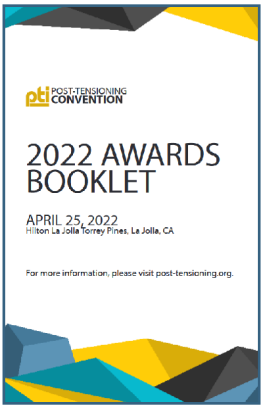

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PDH Tracker Form

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Back to Table of Contents

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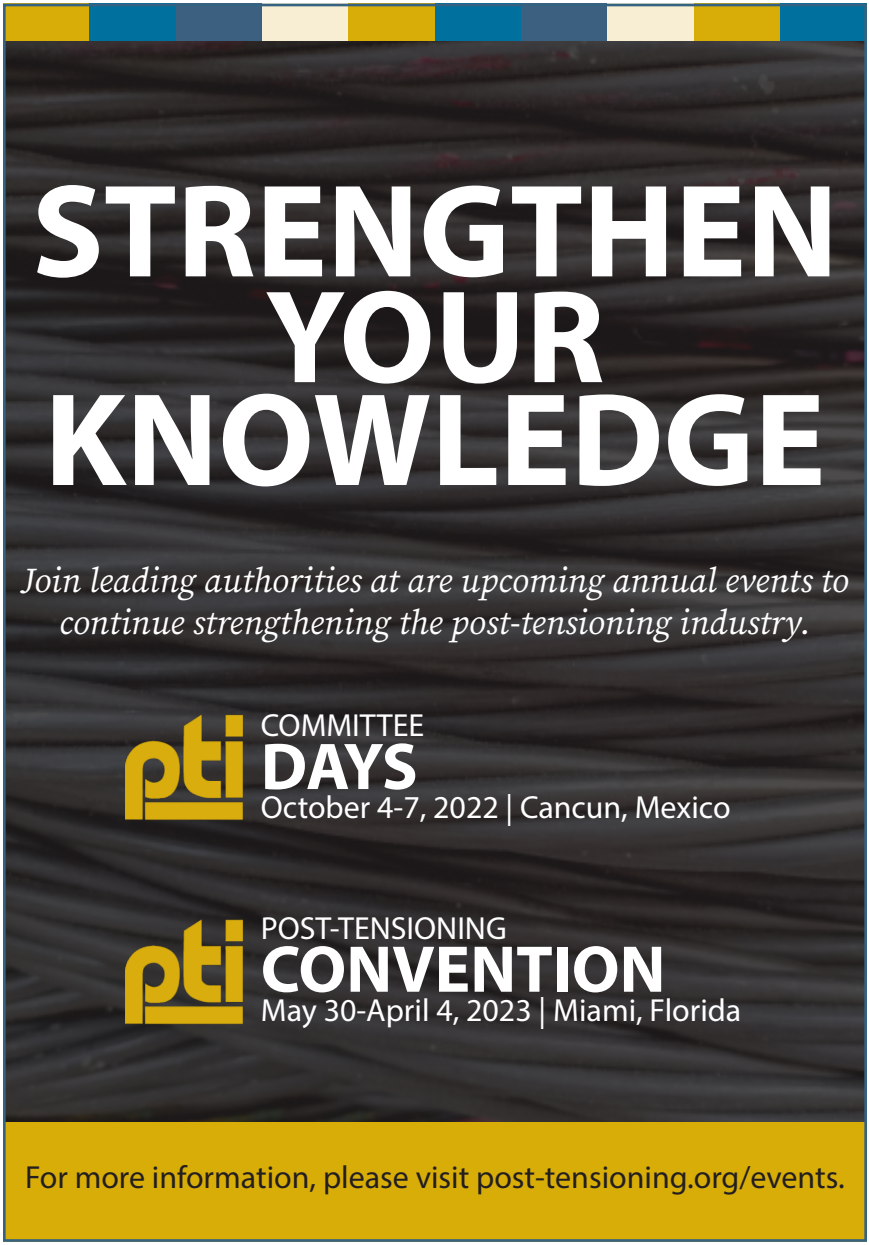
Back to Table of Contents

Upcoming PTI Events



Back to Table of Contents

Have Post-Tensioning Questions? We Have Reinforced Answers.

PTI has engineering staff available to assist you with any post-tensioning related technical questions you might have about a document or a project.

If you have a technical question, issue, or challenge to be met with post-tensioning, our team can provide assistance and answer. Contact us via e-mail at *technical.inquiries@post-tensioning.org*.

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