

2024 PROCEEDINGS

APRIL 14-17, 2024
The Westin Indianapolis | Indianapolis, IN, USA

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

Table of Contents

2024 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.

Technical Session 1: PT Bridges & Multistrand PT	3	
Technical Session 2: PT Bridges & Multistrand PTPT	5	
Technical Session 3: PT Buildings	7	
Technical Session 4: PT Buildings	9	
Technical Session 5: PT Slab-on-Ground	10	
Technical Session 6: PT Repair & Strengthening		
Welcome Packet & Awards Brochure	13	
PDH Tracker Form	13	
Exhibitors & Sponsors	14	
Upcoming PTI Events	15	



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PTI Committees are recognized for providing widely accepted standards of practice for nearly every facet of post-tensioning thanks to the participation of professionals across the industry. Help shape the codes and standards of the concrete industry and join a committee!

If you are interested in joining a committee, please visit post-tensioning.org/committees/joinacommittee and fill out the online application.



Technical Session 1: PT Bridges & Multistrand PT

Moderator: Brian Merrill, WJE

The Marion Street Pedestrian Bridge: A New Icon for the Revitalized Seattle Waterfront

Don Nguyen

This presentation covers the construction and design intricacies of the new Marion Street Pedestrian Bridge in Seattle, which is in a high seismic region. Key topics include the site-specific seismic design, foundation construction, interagency coordination of aesthetics, and future extension planning.

Presentation Not Released For Distribution

$Monitoring \ Post-Tensioned \ Tendons \ Using \ Optical \ Fiber \ Technology$

Christopher Williams

Optical fiber sensors embedded in epoxy-coated prestressing strands provide an innovative solution for monitoring strains in post-tensioned tendons. A research project has evaluated this technology, testing the sensor-embedded strands both in the lab and in beam specimens, and the study demonstrates efficient measurement of strains both in bonded and unbonded tendons. This presentation includes details of the research program as well as a summary of key results and observations from the experiments.

Presentation Not Released For Distribution

Construction of the Wekiva Parkway Section 6

Robert Bennett

The Wekiva Parkway project, stretching 6.1 miles, forms a vital part of the 25-mile parkway around Orlando, offering a valuable alternative to I-4. The complex project resulted in 18 new bridges, three of which span the nationally-recognized Wekiva River, requiring a 360-ft main span. These bridges were constructed using a balanced cantilever method with post-tensioning, which allowed construction to occur without disturbing the environmentally sensitive river boundaries.

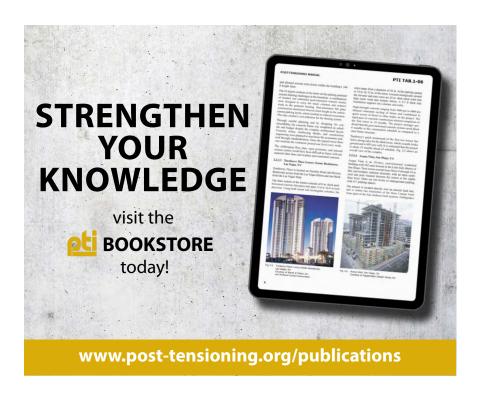
<u>Video</u> | <u>Presentation</u>

Friction Losses in Bonded Post-Tensioning Tendons

Klaus Lanzinger

This presentation covers the complexities of friction losses in bonded posttensioning tendons. Delving into tendon geometry and material characteristics, the speaker explores how these factors impact friction losses. Through practical examples involving metal and plastic ducts, the presentation illustrates the material effects on these losses. With a comprehensive understanding of the contributing factors, attendees will be empowered to make informed decisions for the optimal prestressing design, elevating their structural design processes.

Video | Presentation



Technical Session 2: PT Bridges & Multistrand PT

Moderator: Ron Pierce, DLN Limited Company

Program Launch for Qualification Verification and Multistrand Post-Tensioning Systems' Certification

Miroslav Vejvoda

PTI has introduced a certification program for multistrand post-tensioning systems (PTS), aiming to verify and certify these systems, with support from many DOTs and the FHWA. The certification sees PTS listed on a PTI-linked website, offering owners an efficient alternative to maintaining costly prequalification processes. Currently in full swing, the program necessitates collaboration between DOTs, designers, auditors, and PTS suppliers. The process includes onboarding stakeholders, carrying out sample audits, and familiarizing users with technical requirements and website use. The first system submissions are anticipated by June 2024, with certification completion expected by October 2024.

Video | Presentation

Network Tied Arch with Post-Tensioned Tie Girders

Matt Longfield, Julie Rivera

The 2nd Avenue Bridge over I-94, a first-of-its-kind unbraced network tied arch span in the US, is a key element in Detroit's \$2B freeway reconstruction. The bridge structure, assembled nearby and weighing over 5 million pounds, was erected in three stages. The construction involved careful design and application of post-tensioned concrete tie girders and end diaphragms, with controlled concrete stresses. The bridge successfully accommodates varied traffic, including pedestrians and cyclists, and was installed during a brief closure in July 2022. This presentation discusses the post-tensioning design, assembly of the bridge skeleton, and ABC installation of the bridge which was completed during a short closure of I-94 in July 2022.

Video | Presentation

Risk Assessment of PT Tendons for Designers

Glenn Washer

This presentation describes a methodology for risk assessment of Post-Tensioning (PT) tendons during the design phase. The methodology is intended to aid designers in the selection of appropriate corrosion protection strategies for PT systems in bridges. The risk assessment is intended to prioritize the need for protective technologies and processes considering the likelihood and consequences of corrosion damage (i.e., the risk) based on the attributes of specific PT system designs. The risk model considers the tendon geometry, joints, materials, quality, and environment to assess the potential for corrosion damage and help identify suitable design strategies given the risk level.

Video | Presentation

CONTRIBUTE TO THE PTI JOURNAL?



Would you like your article featured in the PTI JOURNAL?
We are looking for creative technical articles about post-tensioning and its applications.

Deadline for 2024 Issue 2: June 3, 2024

Articles should not exceed 11,000 words. Full submission guidelines are on our website: post-tensioning.org/publications/ptijournal

Submit your article by emailing it to Emily.Emanuelsen@post-tensioning.org

Technical Session 3: PT Buildings

Moderator: Rashid Ahmed, Walker Consultants

Analytical Study on the Impact Behavior of Unbonded Post-Tensioned Slab

Thomas Kang, Hyeonsik Choi

This study explored the resistance performance of post-tensioned concrete structures, such as nuclear containment, under extreme loads. Several challenges, including data accumulation and experiment specificity, have limited experimental research, leading to a reliance on analytical approaches. Despite numerous studies, the impact behavior of unbonded post-tensioned concrete panels remains under-researched. The speakers used nonlinear finite element analysis to simulate the impact test, comparing their findings against actual data. Their results offer valuable insights for future analytical studies.

Video | Presentation

Enhancing Concrete Productivity in Brazil: Leveraging PT Systems with a Focus on Constructability

Mario Esmeraldo dos Santos

This presentation on leveraging PT systems discusses groundbreaking structural designs in Brazil that elevate construction efficiency through post-tensioning systems. It emphasizes constructibility while taking into account economic and environmental factors and shows how these innovative approaches redefine the concrete industry. Attendees gain insights into measurement methods and project comparisons, gaining a comprehensive understanding of advancements in construction practices.

Video | Presentation

Design and Analysis of Semi-Rigid Post-Tensioned Concrete Diaphragm

Thomas Kang, Manwoo Kim

Floor diaphragms significantly impact a building structure's response. They're typically viewed as rigid, undistorted by lateral loads, which can lead to a non-conservative analysis. Considering concrete diaphragms as semi-rigid can distribute loads differently. Analyzing post-tensioned concrete diaphragms with a finite element analysis method showed it's crucial to examine load distribution depending on the relative stiffness ratio for sound design. This study confirmed the rigid-diaphragm assumption's fit for such diaphragms.

Video | Presentation

Automatic System for Management of Prestressing Tendon Force Based on Real-time Data and its Results

Ana Laura Medeiros Cruz

This presentation discusses the groundbreaking "Automatic System for Management of Prestressing Tendon Force Based on Real-time Data" that digitizes tendon elongation and force measurements. Unveiled in 2022, the innovative tool incorporates hardware, sensors, and an internal algorithm, providing real-time, accurate data. This presentation reveals the latest successful results from Brazil's real-life applications on 2000 stressed tendons. Attendees learn about the system's practicality and efficiency advantages in construction projects, revolutionizing tendon force management.

Video | Presentation

Technical Session 4: PT Buildings

Moderator: Neel Khosa, Amsysco

EV Weight – Is it an Issue for Parking Structure Design Loads?

Rashid Ahmed

As the popularity of electric vehicles has grown, there is continued concern that electric vehicles are too heavy predominantly because of the batteries used to power them. The code-prescribed of design live loads needs to be re-evaluated for parking structures based on electric vehicles' weight, relying on a certain percentile weight. The presentation also includes vehicle size and electric vehicle sales trends.

Video | Presentation

Barrier Cables Design Methodology

Asit Baxi

Overview of the barrier cable testing and a good review of Chapter 16 in the new PT Manual, 7th edition. The two design methods, IBC static method and the dynamic energy method, will be presented.

Video | Presentation

Competitive Strategies for PT Parking Structures

Michael Pedraza

The presentation covers the comparison of different PT structural systems and compares the material quantities and cost estimates including the forming cost. This presentation gives a comparative study of various PT structural systems used in PT parking structures.

<u>Video</u> | <u>Presentation</u>

Competitive Strategies Panel Discussion

Michael Pedraza, Asit Baxi, Rashid Ahmed, Neel Khosa

This panel discussion answers questions related to PT parking structures. Topics include a discussion of the current EV vehicles and the design loadings for parking structures, the experimental test results and design methodology of barrier cables, the optimum structural systems based on study of various one-way and two-way slab systems, and CIP Post-Tensioned Parking Structures.

Video | Presentation

Technical Session 5: PT Slab-on-Ground

Moderator: David Sparks, Felton Group

The Impact of the IRC 2024 Code Change on Residential PT Slab-on-Ground

Tim Christle

The International Code Council's new IRC 2024 includes critical updates on post-tensioned slab-on-ground design and construction, notably Section R506.2, necessitating such floors to be designed per PTI DC10.5. This boosts the quality of residential post-tensioned slab-on-ground construction via higher quality materials and workmanship. This presentation is, part of a larger education initiative that targets design professionals, inspectors, contractors, and homeowners, highlighting the significant impact and benefits of this code change.

Video | Presentation

Optimizing Shallow Slab-on-Grade Foundation Designs: Efficient Stiffness vs. Excessive Mass

Anna Olveda, Florian Aalami

The shallow slab-on-grade foundation design offers cost-effectiveness and expeditious construction for low- to mid-rise buildings. It leverages industry-approved guides to calculate controlling moments, shear, and differential deflections. The design variables consider slab stiffness, specifically its modulus of elasticity and moment of inertia. Traditionally, extra concrete added to the design boosted safety. However, rising material costs necessitate optimized designs, achieved by redefining the foundation shape, enhancing inertia, and decreasing concrete volume. This process strengthens the foundation, reduces waste, and lowers the embodied carbon of concrete.

Video | **Presentation**

Modeling of Mat Foundation on an Elastic Base Using the Equivalent Grids x Finite Element Method

Fabio Albino de Souza

This presentation explores soil-foundation interaction analysis methods including Winkler's hypothesis models for easy processing and continuous models for a comprehensive approach. The comparison between the FTOOL's equivalent grid method and the ADAPT MAT's finite element method shows variations in bending moments. Notably, modelling accuracy can significantly reduce project errors. Both reinforced concrete and post-tensioned mat foundations were considered.

Video | Presentation



Technical Session 6: PT Repair & Strengthening

Moderator: Tracy Naso, WJE

Innovative Non-Destructive Testing for Post-Tensioned Structures

Natallia Shanahan

The presentation explores the crucial task of identifying corrosion and defects in bonded and unbonded post-tensioning (PT) to ensure PT structure performance and durability. It presents effective non-destructive methods to identify grout voids, soft grout, and water within a bonded PT. It introduces the Post-Tech Corrosion Evaluation as a non-destructive testing method to assess corrosion risk on steel strands within any PT. Furthermore, the use of ground penetrating radar will be discussed to locate PT and assist engineers in verifying if structures have been built according to design.

Video | Presentation

O'Hare International Airport Parking Garage: Assessment, Repair, and Strengthening

Tim Gregor

The primary 2.6 million sq. ft parking structure at O'Hare International Airport opened in 1973 started showing wear consistent with its age and Midwestern conditions. The 2018 assessment revealed structural and waterproofing deterioration, including concrete freeze-thaw damage, wear of waterproofing membranes, and seal damage. A multi-year restoration program began in September 2020 and concluded in September 2022, repairing concrete, post-tensioning elements, and seals, and implementing unique structural strengthening measures.

Video | Presentation

PT Repair Panel Discussion

Tim Gregor, Tracy Naso, Don Kline, Joe Augustine, Daniel Rosa, Jason Caravello

This panel discussion covers topics including identifying challenges in PT repair from the view of the engineer, repair contractor, and PT supplier; the answer to frequently asked questions from the perspective of an owner, an engineer, and a repair contractor; areas of research that would benefit the PT repair industry; and the different views of the involved parties in PT repair.

<u>Video</u> | <u>Presentation</u>

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PDF Version

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PDF Version

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Tuesday









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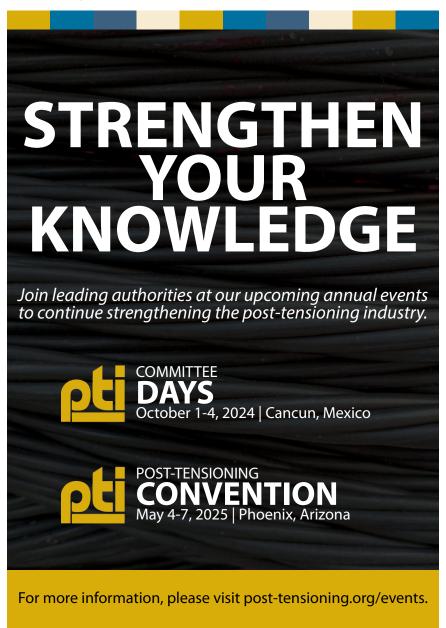


Sunday

Monday

Tuesday

Upcoming PTI Events



Have Post-Tensioning Questions? We Have Reinforced Answers.

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

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

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PTI Staff & Office		
PTI Farmington Hills Office +1.248.848.3180 info@post-tensioning.org	Executive Vice President Tim Christle +1.248.848.3172 tim.christle@post-tensioning.org	
Director of Association Management Services, AOE Bryce Barker bryce.barker@aoeteam.com	Certification Program Manager Miguel Zuñiga +1.248.848.3749 miguel.zuniga@post-tensioning.org	
Marketing Manager Paulina Barbone +1.248.848.3809 paulina.barbone@post-tensioning.org	Technical Program Coordinator Kimberly Curtis +1.248.848.3180 kimberly.curtis@post-tensioning.org	
Membership Coordinator Michelle Stern +1.248.848.3182 michelle.stern@post-tensioning.org	Publications Coordinator Emily Emanuelsen +1.248.848.3818 emily.emanuelsen@post-tensioning.org	
Certification Coordinator MaKayla Steen +1.248.848.3184 makayla.steen@post-tensioning.org		

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