25–27 May 2022

IABSE Symposium Prague 2022

Challenges for Existing and Oncoming Structures

Preliminary Technical Programme

ORGANISED BY
CZECH GROUP OF IABSE

IN COOPERATION WITH
CZECH TECHNICAL UNIVERSITY PRAGUE
IABSE SYMPOSIUM PRAGUE 2022 – CHALLENGES FOR EXISTING AND ONCOMING STRUCTURES

Content

Programme at Glance

<table>
<thead>
<tr>
<th>Day</th>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>Wednesday, 25 May</td>
<td>4</td>
<td>Plenary Session: Opening Ceremony</td>
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<td>Keynote Session: Keynote Lectures I</td>
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<td>Social Programme: Welcome Reception</td>
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www.iabse.org/prague2022
## Programme at Glance

### Wednesday, 25 May 2022

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<td>Scientific Session: Advanced Bridge Solution</td>
<td>Special Session: Structural Steel Connection Design – Challenges and Vision</td>
<td>Scientific Session: Wind, Vibrations and Fatigue</td>
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<td>Special Session: Ultra-High-Performance Concrete is Ready to Revolutionize</td>
<td>Scientific Session: Structural Health Monitoring</td>
<td>Scientific Session: Coming up Standards</td>
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<td><strong>Special Session:</strong> Bridge Management System and Building Information Modelling: Challenges and vision 1</td>
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<td><strong>Scientific Session:</strong> Bridge Management System and Building Information Modelling: Challenges and vision 2</td>
<td><strong>Special Session:</strong> Bridge Management System and Building Information Modelling: Challenges and vision 2</td>
<td><strong>Scientific Session:</strong> New Bridge Solutions</td>
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<td>Special Session: New European Standardisation on Monitoring, Safety Assessment and Bridge Maintenance</td>
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<td>Scientific Session: Design by FEA</td>
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Scientific Programme
Itinerary

IABSE Symposium Prague 2022
25–27 May 2022

Wednesday, 25 May 2022

Plenary Session: Opening Ceremony
08:30–09:30
FORUM HALL

Keynote Session: Keynote Lectures I
09:30–11:00
FORUM HALL

Chairs: Pavel Ryjáček, Czech Republic,
Ysabel Guil Celada, Spain

09:30
Carbon Concrete – Towards a climate neutral building industry
Manfred Curbach, Germany

10:15
Multilevel FEA and BIM for the design of structural steel
František Wald, Czech Republic

Coffee Break
11:00–11:30
FOYER/EXHIBITION AREA

Special Session: The Storstrøm Bridge in Denmark – Challenges in Design and Construction
11:30–13:00
FORUM HALL

Chairs: Martin Svendsen, Denmark,
Marco Raimondi, Denmark

11:30
The New Storstrøm Bridge – From tender requirements to reality
Barbara MacAulay, Denmark
11:43  Independent check and validation activities for the New Storstrøm Bridge
Ysabel Guil Celada, Spain

11:56  The New Storstrøm Bridge – Construction tolerances and precast structures installation challenges
Marco Raimondi, Denmark

12:09  The New Storstrøm Bridge – Pier Design
Michael Needham, United Kingdom

12:22  The New Storstrøm Bridge – Prestressed Box Girder Design
Luca Cargnino, Denmark

12:35  The New Storstrøm Bridge – Pylon and Stay Cable Design
James Wharton, United Kingdom

12:48  Discussion

Scientific Session: Advanced Bridge Solution

11:30–13:00 NORTH HALL

Chairs: Pablo Tarín, Spain, Nagy Zsolt, Romania

11:30  Weathering Steel Bridges – the New European ECCS Design Guide
Peter Hatke, Germany

11:45  Economical Steel Bridges
Martin Van Leeuwen, Belgium

12:00  Structural stress analyses of long-span railway extradosed cable-stayed bridge based on rational construction state
Bruno Briseghella, China

12:15  Methods and technologies for evaluating and minimising noise from road bridge expansion joints
Simon Hoffmann, Switzerland

12:30  Modular composite bridges with integral sheet piling abutments for a time efficient construction
Mike Tibolt, Luxembourg

12:45  Discussion
**Special Session: Structural Steel Connection Design – Challenges and Vision**

**11:30–13:00**

**TERRACE 2 A**

Chair: Milan Veljkovic, *Netherlands*

11:30

**Experimental Database on Resistance of Hybrid Joints with High-strength Bolts and Epoxy Adhesive**

Hitoshi Moriyama, *Japan*

11:45

**Mechanical behavior of multi-row riveted joint partially replaced by high strength bolts**

Yu Chen, *Japan*

12:00

**Numerical and experimental analysis of hanger-arch connections for tied arch bridges with rolled sections**

Riccardo Zanon, *Luxembourg*

12:15

**Experimental study on the cooperative slip/bearing limit state of high-strength bolted frictional girder connection**

Ryo Sakura, *Japan*

12:30

**Development of Ductile Cast Iron Components to Shorten On-site Assembly of Existing Steel Earth-Retaining Beams**

Yuma Sugimoto, *Japan*

12:45

**Discussion**

**Scientific Session: Wind, Vibrations and Fatigue**

**11:30–13:00**

**TERRACE 2 B**

Chair: Alexandre Mathern, *Sweden*

11:30

**Active moment connection system for mitigating wind-induced vibrations**

Anurag Bura, *USA*

11:45

**Recent and future trends of onshore wind turbine foundations**

Jesus Armesto Barros, *Sweden*

12:00

**Development of an accurate low-cost device for structural vibration acquisition**

Seyedmilad Komarizadehasl, *Spain*

12:15

**Improving of fatigue assessment method for stud shear connectors using experimental data from studs’ test of existing road bridge**

Nikolai Kozak, *Russian Federation*
12:30  Collapse Fragility Development of Electrical Transmission Towers Subjected to Hurricanes  
Jerome Hajjar, USA

12:45  Discussion

Scientific Session: Experimental Design of Structures

11:30–13:00  SOUTH HALL 2 B  
Chair: Abdelhamid Bouchair, France

11:30  Experimental study of the shallow wide-flange steel beam-column under cyclic Loading with constant compressive axial force  
Atsushi Sato, Japan

11:45  A state-of-the-art, flexible, easy-to-replace plug-type expansion joint for the Delaware Memorial Bridges  
Gustav Gallai, Austria

12:00  Structural characteristics and analysis simulation of new Core Truss structure  
Shunichi Nakagawa, Japan

12:15  Experimental Testing of Mechanical Splices for Titanium Alloy Bars  
Mustafa Mashal, USA

12:30  Large-Scale Flexural Testing of Concrete Beams Reinforced with Conventional Steel and Titanium Alloy Bars  
Mustafa Mashal, USA

12:45  Discussion

Lunch

13:00–14:00  FOYER/EXHIBITION AREA

Special Session: Ultra-High-Performance Concrete is Ready to Revolutionize

14:00–15:30  FORUM HALL  
Chair: Eugen Brühwiler, Switzerland,  
Petr Tej, Czech Republic

14:00  Short span UHPFRC railway bridge in Switzerland – from design to implementation  
Ngoc Thanh Trinh, Switzerland
14:15  Design and construction of the “Chaumény” footbridge in posttensioned UHPFRC
Eugen Brühwiler, Switzerland

14:30  Development of timber–UHPC composite bridge system
Milan Holý, Czech Republic

14:45  Use of fibre reinforcement concrete for encased composite bridge sections – an opportunity?
Riccardo Zanon, Luxembourg

15:00  New UHPFRC footbridges in the Czech Republic
Petr Tej, Czech Republic

15:15  Discussion

Scientific Session: Structural Health Monitoring

14:00–15:30  NORTH HALL

Chair: Robert Veit-Egerer, Austria,
Miloš Drdácký, Czech Republic

14:00  Structural Health Monitoring of the Canakkale Bridge in Turkey, the largest monitoring system for the longer bridge in the world
Stephane Joye, France

14:15  Monitoring to secure the Ile-de-Ré Viaduct, France
Stephane Joye, France

14:30  Periodic assessment of an old concrete road bridge based on operational dynamic bridge behaviour with regard to structural integrity and the remaining load bearing capacity
Robert Veit-Egerer, Austria

14:45  A Framework for Automated Bridge Inspections and Assessments with Visual Sensing Technology
Jerome Hajjar, USA

15:00  Monitoring and assessment of bridge cable stays consisting of bundles of fully locked coil ropes
Rudolf Aroch, Slovakia

15:15  Discussion
Scientific Session: Coming up Standards

14:00–15:30  TERRACE 2 A

Chair: Michael Schäfers, Germany

14:00  Risk-Based Design of Bridges
Dana Prochazkova, Czech Republic

14:15  Shear design of composite columns with sheet metal sections
Michael Schäfers, Germany

14:30  From ETAG to EADs – The ongoing development of the European regulatory system governing the design and manufacture of bridge expansion joints
Simon Hoffmann, Switzerland

14:45  Beam-column behaviour of stainless steel I-section members
Michal Jandera, Czech Republic

15:00  Safety level of longitudinally stiffened plates under biaxial loading considering different launching bearings and eccentricities
Nadine Maier, Germany

15:15  Discussion

Scientific Session: Seismic and Dynamic Design

14:00–15:30  TERRACE 2 B

14:00  Seismic Performance Evaluation of an Existing Low-Rise RC Building after Strengthening using the Nonlinear Static Procedure
Samard Buddee, Thailand

14:15  Standardized Seismic Design of Modular High-rise Steel Structure Equipped with Viscous Dampers
Gang Wang, China

14:30  Development of simplified Bridge-Weigh-In-Motion based on displacement evaluation using an accelerometer
Nanami Ashizawa, Japan

14:45  Development of a 3D Finite-Element Modelling Technique Based on Data Processing Platform and Fatigue Analysis of Full-Scale Reinforced-Concrete Bridge Deck
Taiju Yoneda, Japan

15:00  Proposal of nonlinear buffeting analysis framework for long-span bridges using Volterra series-based non-stationary wind force model
Aleena Saleem, Japan

15:15  Discussion
Scientific Session: Diagnostics of Bridges

14:00–15:30  SOUTH HALL 2 B

Chairs: Vanessa Saback, Sweden,  
Kouichi Takeya, Japan

14:00  Subsurface defect detection in concretes by active infrared thermography  
Masoud Pedram, United Kingdom

14:15  Crack monitoring by fibre optics and image correlation: a pilot study  
Vanessa Saback, Sweden

14:30  Physics-informed Gaussian process model for Euler-Bernoulli beam elements  
Gledson Rodrigo Tondo, Germany

14:45  Damage detection in concrete with coda wave interferometry using a 60 kHz ultrasonic signal  
Stefan Grabke, Germany

15:00  Design of energy harvesting from temperature difference in concrete bridges  
Kouichi Takeya, Japan

15:15  Discussion

Coffee Break

15:30–16:00  FOYER/EXHIBITION AREA

Scientific Session: Railway Bridges

16:00–17:30  FORUM HALL

Chairs: Jakub Dolejš, Czech Republic,  
Jindřich Potůček, Czech Republic

16:00  Replacing of a steel bridge by a rotation around the longitudinal axis  
Jakub Dolejš, Czech Republic

16:15  Structural analysis of a historical masonry arch railway bridge in Gata de Gorgos, using a commercial Finite Element Analysis software  
Pablo Tarín, Spain

16:30  The design of the anchoring of the steel double track railway integral bridge in Mechelen contrasting the historical Vierendeel bridges  
Bart De Pauw, Belgium

16:45  System identification and finite element model updating of a multi-span railway bridge with uncertain boundary conditions  
Emrah Erduran, Norway
17:00  
**Railway bridges – Monuments in the network**  
Johanna Monka, Germany

17:15  
Discussion

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**Scientific Session: Fatigue I**

16:00–17:30  
NORTH HALL  
**Chairs:** Lisa-Marie Götz, Germany, Philippe Van Bogaert, Belgium

16:00  
**Fatigue behaviour of cracked concrete decks under cyclic shear loading**  
Lena Stempniewski, Germany

16:15  
**Fatigue analysis of existing railway bridges: strengthening through geometry improvement**  
Hans Pétursson, Sweden

16:30  
**Fatigue behaviour of tubular bracings in steel and composite bridges**  
Lisa-Marie Götz, Germany

16:45  
**Experimental and numerical investigations on the fatigue behavior of high-strength concrete under combined shear-compression loading**  
Henrik Becks, Germany

17:00  
**The effect of undue transverse welding on the fatigue resistance of hanger connections for steel tied arch bridges**  
Philippe Van Bogaert, Belgium

17:15  
Discussion

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**Scientific Session: Damage Repair and Retrofitting I**

16:00–17:30  
TERRACE 2 A  
**Chairs:** Rob Vergoossen, Netherlands, Milan Veljkovic, Netherlands

16:00  
**West Seattle bridge rehabilitation**  
Jan Žitný, Czech Republic

16:15  
**Re-using existing prefabricated prestressed concrete girders in new bridges**  
Rob Vergoossen, Netherlands

16:30  
**Structural Assessment of existing masonry arch bridges**  
Thomas Harrewijn, Netherlands
16:45 Shear performance of replaced bolt shear connectors used in prefabricated steel-concrete composite beams
Milan Veljkovic, Netherlands

17:00 D4R7. Prievoz Interchange refurbishment at Bratislava
Wojciech Wlodzimirski, Poland

17:15 Discussion

Scientific Session: Steel Connections
16:00–17:30 TERRACE 2 B

16:00 An experimental and numerical approach to investigate the load – deformation behavior of anchorages with headed fasteners in reinforced-concrete columns
Taygun Firat Yolacan, Luxembourg

16:15 An experimental investigation on base-plate joints of steel storage pallet racks
Riccardo Zandonini, Italy

16:30 Prototype of no-projected and Sandglass-shaped Bolt Having High Strength and Durability for Efficient Steel Structures Maintenance
Tatsuya Hashimoto, Japan

16:45 Investigating strength and stiffness of out-of-plane bending by biaxial testing of a nailed glulam connection
Oskar Ranefjärd, Sweden

17:00 New possibilities with the use of automated laser- laser-hybrid welding methods for steel bridges
Johannes Veie, Norway

17:15 Discussion

Scientific Session: Seismic Design and Testing
16:00–17:30 SOUTH HALL 2 B

16:00 Influence of design criteria on the seismic response of single-storey steel buildings
Nicola Ceccolini, Italy

16:15 Evaluation of Seismic Performance and Proposing the reinforcement methods for the Bridge with Rocking Piers Penetrating the Railway Platform
Taiki Giga, Japan
16:30
**Experimental study of potential bearing uplift of long-span cable-stayed bridges under earthquakes**
*Wei Guo, China*

16:45
**Evaluation of bidirectional seismic input compatible with a maximum-direction target spectrum**
*Alan Rivera-Figueroa, Puerto Rico*

17:00
**Dynamic responses and failure pattern of suspended cable tray system through shaking table test**
*Chen Wu, China*

17:15
**Discussion**

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**Social Programme: Welcome Reception**

**17:30–19:30**
*FOYER/EXHIBITION AREA*

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**Thursday, 26 May 2022**

**Keynote Session: Keynote Lectures II**

**09:00–10:30**
*FORUM HALL*

*Czech Republic*

09:00
**UHPFRC is ready to revolutionize existing and new structures**
*Eugen Brühwiler, Switzerland*

09:45
**Extrapolation of test data in time, size and risk – a challenge for concrete design codes**
*Zdeněk P. Bažant, USA*

**Coffee Break**

**10:30–11:00**
*FOYER/EXHIBITION AREA*

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**Scientific Session: Landmark Bridges**

**11:00–12:30**
*FORUM HALL*

*Sweden*

11:00
**Pelješac Bridge – design and construction**
*Marjan Pipenbaher, Slovenia*
11:15  New Pumarejo bridge over Magdalena river  
Miguel Ortega, Spain

11:30  The Design of the new Storstrom Bridge: design philosophy, structural concepts, fundamental design and innovative Construction Methods  
Mario de Miranda, Italy

11:45  Process and methods for verification of performance requirements for transport infrastructure  
Rasmus Rempling, Sweden

12:00  The New Little Belt Bridge – the role of the physical model and it’s digital twin for the first suspension bridge in Denmark  
Baris Wenzel, Germany

12:15  Discussion

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Special Session: Bridge Management System and Building Information Modelling: Challenges and vision 1

11:00–12:30  NORTH HALL  
Chairs: Vanja Samec, Austria,  
Rade Hajdin, Switzerland

11:00  BIM and BMS: current status and challenges  
Rade Hajdin, Switzerland

11:15  From data to bridge information model  
Eetu Partala, Finland

11:30  Geometry as a common ground for BMS and BIM  
Dušan Isailović, Serbia

11:45  Creating digital twins of existing bridges through AI-based methods  
M. Saeed Mafipour, Germany

12:00  Bridge Condition Assessment Based on Image Data and Digital Twins  
Marcel Helmrich, Germany

12:15  Discussion
Scientific Session: Advanced Modelling I

11:00–12:30 TERRACE 2 A

Chair: Wolfgang Bachofner, Austria, Jörg-Martin Hohberg, Switzerland

11:00 Long-term concrete strain measurements of large-scale experiments exposed to environmental effects
Wolfgang Bachofner, Austria

11:15 Strength assessment of prestressed concrete sections under the combined action of internal forces
Filip Svoboda, Czech Republic

11:30 Analysis of Machine Learning for Detect Concrete Crack Depths Using Infrared Thermography Technique
Young K. Ju, Republic of Korea

11:45 Rehabilitation of Earth Retaining Wall for Slope Failure due to Strength Reduction and Seismic Accelleration, Considering Nonlinear Soil-Structure Interaction
Jörg-Martin Hohberg, Switzerland

12:00 Modelling rebar-concrete interaction, (bond) with a mesh-objective equivalent transition layer scheme for FE analysis of RC structures
Hongning Ye, United Kingdom

12:15 Discussion

Scientific Session: Fatigue II

11:00–12:30 TERRACE 2 B

Chair: Atte Mikkonen, Finland, Dana Procházková, Czech Republic

11:00 Study on the Improvement of Fatigue Durability of Steel Box Girder Corner Plate by Peening at the Un-welded Area
Takamitsu Nishishiba, Japan

11:15 Cracking and Fatigue in Heavy Loaded Prestressed Concrete Bridge in Sweden
Jaime Gonzalez-Libreros, Sweden

11:30 Experimental investigations of welding induced temperature gradients and distortions in a segment of OSD
Arvid Maarleveld, Netherlands
11:45  Behavior of Orthotropic Steel-UHPC Composite Bridge Deck under Cyclic Loading
Zhanchong Shi, China

12:00  Verification of fatigue load model for stay cables
Atte Mikkonen, Finland

12:15  Discussion

Scientific Session: Strengthening of Bridges I

11:00–12:30  SOUTH HALL 2 B
Chairs: Paul Herrmann, Austria, Dimitra Achillopoulou, Greece

11:00  Refurbishment, Strengthening and Retrofitting of Façades to increase Seismic Resistances
Matthias Roik, Germany

11:15  Strengthening of road composite bridge using Fe-SMA
Jakub Vůjtěch, Czech Republic

11:30  Refurbishment of Franzensbrücke in Vienna- retrofitting a historical steel arch bridge with composite plate in between limited time frame, restrictive urban environment and challenging structural requirements
Paul Herrmann, Austria

11:45  Efficiency of adhesive layers in strengthening schemes or concrete elements
Dimitra Achillopoulou, Greece

12:00  Influence of Material Stiffness on Bond Behaviour for CFRP and BFRP Strips Glued to Concrete Surface
Szymon Grzesiak, Germany

12:15  Discussion

Lunch

12:30–14:00  FOYER/EXHIBITION AREA
Scientific Session: Assessment of Existing Bridges I

14:00–15:30  FORUM HALL

Chair: Miguel Ortega, Spain, Ioannis Retzepis, Germany

14:00  The assessment and condition survey of concrete prestressed bridges in the Czech railway network
Pavel Ryjáček, Czech Republic

14:15  Evaluation Methods for the Existing Infrastructure in Germany
Ioannis Retzepis, Germany

14:30  Condition assessment of the steel riveted roof structure of heritage value building in Sofia, Bulgaria
Dimitar Dakov, Bulgaria

14:45  Assessment and retrofitting of existing infrastructures in urban area
Theodoros Tzaveas, Qatar

15:00  Equilibrium verification of a steel bridge based on wind tunnel testing, traffic and wind speed probabilistic model
Jan Žitný, Czech Republic

15:15  Discussion

Special Session: Bridge Management System and Building Information Modelling: Challenges and Vision 2

14:00–15:30  NORTH HALL

Chair: Vanja Samec, Austria

14:00  Enhancement in Indian Bridge Management System (IBMS) using analytics within BIM data model
Sachidanand Joshi, India

14:15  Information is for Life not just for BIM Models
Philip Jackson, United Kingdom

14:30  BMS and BIM: the Portuguese scenario
José Matos, Portugal

14:45  Transportation Infrastructure Mega Project in China Upgrading the 4th Ring Transportation Corridor in Zhengzhou, Henan, China
Gernot Komar, USA
15:00  **Correlation between early- and later-age performance indices of early frost-damaged concrete**  
Liu Dongyun, *Sweden*

15:15  **Discussion**

**Special Session: Membrane Structures – Recent Achievements in Practice and Standardization**

14:00–15:30  TERRACE 2 A

**Chair:** Jörg Uhlemann, *Germany,*  
Vipul Surana, *India*

14:00  **Design-driven Uniaxial and Biaxial Tensile Testing of Knitted Fabrics Applied to Construction**  
Alara Kutlu, *Italy*

14:15  **European harmonized design for membrane structures**  
Jörg Uhlemann, *Germany*

14:30  **Developing weathering induced ageing strength modification factors for PVC-coated polyethylene terephthalate fabrics**  
Hastia Asadi, *Germany*

14:45  **Comparison of Stainless Steel with HYSD Rebars**  
Vipul Surana, *India*

15:00  **FC Cincinnati, TQL Stadium featuring an elegant, efficient roof over a complex seating arrangement and a structural façade supporting state-of-the-art dynamic lighting technology was built to a fast-track schedule**  
Joe Darcy, *United Kingdom*

15:15  **Discussion**

**Scientific Session: New Bridge Solutions**

14:00–15:30  TERRACE 2 B

**Chair:** Niklas Schweer, *Germany*

14:00  **Design and construction of the Second Hinterrhein Bridge**  
Andreas Galmarini, *Switzerland*

14:15  **Effects of Truck Platooning on Highway Bridges**  
Marian Ralbovsky, *Austria*
14:30  
**Design and structural behavior analysis of a balanced cantilever bridge with a below suspended bicycle and pedestrian bridge**  
Niklas Schweer, Germany

14:45  
**Building bridges from thin-walled pre-cast elements**  
Franz Untermarzoner, Austria

15:00  
**Integral VFT-RS composite bridges – Efficient standard highway overpasses**  
Riccardo Zanon, Luxembourg

15:15  
Discussion

**Scientific Session: Footbridges**

14:00–15:30  
SOUTH HALL 2 B  
Chair: Vojtěch Kolínský, Czech Republic, Pablo Tarín, Spain

14:00  
**New Prague footbridge connecting the districts of Holešovice and Karlín**  
Petr Tej, Czech Republic

14:15  
**Neby Bru: one footpath, three ways of sustainability**  
Pablo Tarín, Spain

14:30  
**Analysis of the Florida University Pedestrian Bridge Collapse**  
Vojtěch Kolínský, Czech Republic

14:45  
**Bru over Otra, a new footbridge in Kristiansand (Norway)**  
Birger Opgård, Norway

15:00  
**Pedestrian bridge over the River Elbe in Hradec Králové**  
Jiří Keclík, Czech Republic

15:15  
Discussion

**Coffee Break**

15:30–16:00  
FOYER/EXHIBITION AREA

**Scientific Session: Architecture and Structures**

16:00–17:30  
FORUM HALL  
Chair: Petr Tej, Czech Republic, Elif Ünalan, Kuwait

16:00  
**Above Or Below – This Is The Question**  
Cezary Bednarski, United Kingdom
16:15  1 Triton Square – Structural reuse for low-carbon architecture  
Eric Sturel, United Kingdom

16:30  Education City Stadium, Doha, Qatar  
Johanna Isaksson, United Kingdom

16:45  3D scanning applications in structural design  
Zsolt Nagy, Romania

17:00  Challenges of a Bridge Design in Tight Urban Areas  
Elif Ünalan, Kuwait

17:15  Discussion

Scientific Session: Assessment of Existing Bridges II

16:00–17:30  NORTH HALL  
Chair: Jaroslav Odrobiňák, Slovakia,  
Jaime Gonzalez-Libreros, Sweden

16:00  Stochastic degradation model analysis for prestressed concrete bridges  
José Matos, Portugal

16:15  Trough constructions on arched bridges  
Conrad Pelka, Germany

16:30  Torsion of a Norwegian bridge with partial box-action – a case study  
Victor Vestman, Sweden

16:45  Evaluation of Riveted Railway Bridge Using Experimental-Numerical Analyses  
Jaroslav Odrobiňák, Slovakia

17:00  Assessment of available methodologies to evaluate residual prestressing forces in concrete bridges  
Angélica María Agredo, Sweden

17:15  Discussion

Scientific Session: Bolts and Anchors

16:00–17:30  TERRACE 2 A  
Chair: František Wald, Czech Republic

16:00  Quasi-static load bearing behaviour of hybrid grouted joints  
Jakob Boretzki, Germany
Kensho Hirao, Japan  

16:30  Advancement of Eddy Current Based Evaluation of Axial Force of High-Strength Bolts  
Ayako Akutsu, Japan  

16:45  Durability of Rock and Soil Anchor Kits Using Prestressing Steel Strands  
Xiaomeng Wang, Switzerland  

17:00  Improvement of high slip coefficient of the combined joint using adhesive and high strength frictional bolts  
Sae Fukutsuji, Japan  

17:15  Discussion  

Scientific Session: Damage Repair and Retrofitting II  
16:00–17:30  TERRACE 2 B  
Chair: Rudolf Aroch, Slovakia  

16:00  Rehabilitation and Strengthening of Bridges over Boa Vista River  
Marcelo Melo Filho, Brazil  

16:15  Potential of memory steel reinforcement for shear strengthening of concrete bridge girders with I-sections  
Muhammad Arslan Yaqub, Belgium  

16:30  Repair effect of externally bonded CFRP on propagation life of fatigue cracks initiated at in-plane welded gusset joints  
Atsushi Matano, Japan  

16:45 Temperatures during weld repair in orthotropic steel decks  
Rudolf Aroch, Slovakia  

17:00  Influence of anchor length and drilled hole on mechanical behaviour of masonry column structures strengthened with bonded anchor  
Daisuke Sasaki, Japan  

17:15  Discussion
Scientific Session: Innovative Materials and Solutions

16:00–17:30
SOUTH HALL 2 B

Chairs: Mario Rando Campos, Norway, Cosmin Chiorean, Romania

16:00
Fly ash Based Banana Fiber-reinforced Geopolymer Mortar
Vincent Pilien, Philippines

16:15
Mechanical performance of Alkali Treated Kawayan Tinik Bamboo Fiber Textile
Roneh Glenn Libre Jr., Philippines

16:30
SporX – Design and construction of a ten-storey timber building in Drammen, Norway
Mario Rando Campos, Norway

16:45
Control of fatigue in hydraulic steel structures
Ryszard Daniel, Netherlands

17:00
Analysis and Design of Link Slab in Steel-Concrete Composite Bridge
Liang XIAO, China

17:15
Discussion

Friday, 27 May 2022

Keynote Session: Keynote Lectures III

09:00–10:30
FORUM HALL

Chairs: Birger Opgård, Norway, Michal Jandera, Czech Republic

09:00
The bridges in Italy: how to manage the infrastructural heritage guaranteeing safety and sustainability
Marco Di Prisco, Italy

09:45
Steel structure design assisted by finite element analysis
László Dunai, Hungary

Coffee Break

10:30–11:00
FOYER/EXHIBITION AREA
Scientific Session: Large Bridges

11:00–12:30  FORUM HALL

Chair: Bartlomiej Halaczek, United Kingdom

11:00  Braila Suspension Bridge: Construction Methodology of the Pylons
   Oguz Berber, Romania

11:15  The new City Bridge in Drammen, Norway: Designing a new urban landmark for an extreme environment
   Bartlomiej Halaczek, United Kingdom

11:30  Reconstruction of the Vilemov Viaduct on the railway line Rumburk-Sebnitz
   Marek Rusňák, Czech Republic

11:45  The new City Bridge of Drammen: An structural insight
   Birger Opgård, Norway

12:00  Quisi Bridge: a new route for the railway line in Alicante, Spain
   Manuel Sánchez-Solís, Spain

12:15  Discussion

Special Session: New European Standardisation on Monitoring, Safety Assessment and Bridge Maintenance

11:00–12:30  NORTH HALL

Chair: Diego Lorenzo Allaix, Netherlands

11:00  Standardization of structural performance monitoring: existing documents and open questions
   Maria Pina Limongelli, Italy

11:15  Review of surveying and non-destructive techniques for the condition assessment of in-service bridges
   Ana Sánchez Rodríguez, Spain

11:30  Numerical model updating of an ageing bridge based on multidisciplinary experimental campaign
   Brais Barros González, Spain

11:45  Review of the current state of standardisation on monitoring, data-informed safety assessment and decision-making regarding maintenance of the transport infrastructure
   Diego Lorenzo Allaix, Netherlands
Future perspectives of standardisation for a safe European transport infrastructure
Diego Lorenzo Allaix, Netherlands

12:15 Discussion

Scientific Session: Advanced Modelling II

11:00–12:30 TERRACE 2 A

Chairs: Richard Stroetmann, Germany, Martina Eliášová, Czech Republic

11:00 Advanced modeling of concrete bridges
Jan Cervenka, Czech Republic

11:15 New beam element for horizontally curved steel-concrete composite box girder bridges
Iván Campo-Rumoroso, Spain

11:30 Toward crack-based assessment of shear-distressed reinforced concrete infrastructure
Jarrod Zaborac, USA

11:45 Design for Manufacturing and Assembly-Oriented Parametric Modelling of Prefabricated Bridges
Cuong Nguyen, Republic of Korea

12:00 Discussion

Scientific Session: Infrastructure Design

11:00–12:30 TERRACE 2 B

Chair: Michele W.T. Mak, United Kingdom, Michal Jandera, Czech Republic

11:00 New reinforcement concept for radial joints of precast tunnel segments
Clemens Proksch-Weiguni, Austria

11:15 Influence of large-scale asperities on the stability of concrete dams
Adrian Ulfberg, Sweden

11:30 Assessment of scour risk in hydraulic infrastructures. A bridge case study
Ana Margarida Bento, Portugal

11:45 Shear design in concrete beams without transverse reinforcement – A comparative study
Michele W.T. Mak, United Kingdom
12:00  
**Fatigue-resistant design of modular bridge structures made of precast concrete elements**  
David Schaarschmidt, *Germany*

12:15  
Discussion

### Special Session: Design Assisted by Finite Element Analysis

11:00–12:30  
**SOUTH HALL 2 B**

**Chair:** László Dunai, *Hungary*,
Mohammad Ashour, *Kuwait*

11:00  
**Finite element analysis of wind turbine tower with a tapered cross-section using various finite element models**  
Mohammad Ashour, *Kuwait*

11:15  
**Application of ABAQUS secondary development in finite element analysis of rebar behavior in reinforced concrete member**  
Wang Yang, *China*

11:30  
**Evaluation of Prestressed Reinforced Concrete Slab Punching Shear Using Finite Element Method**  
Zhi Zhang, *USA*

11:45  
**Numerical Investigation of Slab-Column Connections with Various Reinforcement Ratios**  
Hadi Panahi, *Canada*

12:00  
**Nonlinear analysis of reinforced concrete structural elements**  
Ananth Ramaswamy, *India*

12:15  
Discussion

### Lunch

12:30–14:00  
**FOYER/EXHIBITION AREA**

### Scientific Session: Dynamic Analysis of Bridges

14:00–15:30  
**FORUM HALL**

**Chairs:** Martin Svendsen, *Denmark*,
Antonia M. Kohl, *Germany*

14:00  
**Advanced analysis of a pedestrian bridge and considerations on crowd-structure interaction**  
Antonio De Luca, *USA*
14:15  The New Storstrøm Bridge – Nonlinear Dynamic Ship Impacts  
Martin Svendsen, Denmark

14:30  Vehicle-bridge interaction: Influence of the train type on the dynamic response of bridges due to a train crossing  
Antonia M. Kohl, Germany

14:45  Effect of skew wind on curved long-span floating bridges  
Pål Grøthe Sandnes, Norway

15:00  Approach for the mathematical calculation of the damping factor of railway bridges with ballasted track  
Andreas Stollwitzer, Austria

15:15  Discussion

**Scientific Session: Composite and Non-steel Materials – Structures and Bridges**

14:00–15:30  NORTH HALL

Chair: Martina Eliášová, Czech Republic,  
Nora Susanne Bies, Germany

14:00  Kagraner Steg – new GFRP pedestrian bridge in Vienna  
Stoyan Ivanov, Bulgaria

14:15  Tensile strength of the bent portion of GFRP rebars  
Nora Susanne Bies, Germany

14:30  Tests of glass banister panels with embedded laminated connections  
Michaela Zdražilová, Czech Republic

14:45  Stability and Resistance of Hybrid Composite Glass Structures under Seismic and Temperature Loads  
Nikoleta Stamataki, Greece

15:00  Adhesive two-part acrylate steel-glass and aluminium-glass connection – influence of temperature and thickness of adhesive layer  
Markéta Zikmundová, Czech Republic

15:15  Discussion
Scientific Session: Challenging Bridges

14:00–15:30 TERRACE 2 A

Chair: Miguel Ortega, Spain, Oguz Berber, Romania

14:00 Balanced cantilever bridge, 125 m maximum span, in a high risk seismic area, at Wiwili, Nicaragua
Jose Luis Sanchez Jimenez, Spain

14:15 Evaluation of a Non-Prismatic Open Cross-Section Arch for the Toronto Port Lands Bridges
Jonathan Werner, Canada

14:30 Functionality, aesthetics and structural efficiency integrated into the design for an outstanding bridge on the access to the new T4 Terminal at Barajas Airport (Madrid)
Miguel Ortega, Spain

14:45 D4R7. New Danube Crossing at Bratislava
Luis Martin-Tereso, Spain

15:00 Addressing design and construction challenges for a complex elevated interchange over the sea
Michael Tapley, Hong Kong

15:15 Discussion

Scientific Session: Seismic Design

14:00–15:30 TERRACE 2 B

Chairs: Peter Paul Hoogendoorn, Spain, Katrina Mae Montes, Japan

14:00 Nonlinear soil–structure interaction analysis of retaining walls subjected to pulse-like earthquakes
Andrea Cruz-Chamorro, Puerto Rico

14:15 Nonlinear Behavior Identification of HDR Bearing using Neural Network for Seismic Structural Design
Katrina Mae Montes, Japan

14:30 Wind and seismic design of steel preheater towers in cement plants. Adjusting ductility capacity to ductility demand for non-seismic design
Peter Paul Hoogendoorn, Spain
A Hysteretic Model of Compressive and Tensile Behavior for Laminated Rubber Bearings
Seita Komori, Japan

A thermo-mechanical coupled model of hysteresis behavior of HDR bearings
Yuqing Tan, Japan

Discussion

Scientific Session: Dynamics of Structures

14:00–15:30
SOUTH HALL 2 B
Chairs: Lara Bettinelli, Austria, Marco Martino Rosso, Italy

14:00
Alternative approach for additional damping in dynamic calculations of railway bridges under high-speed traffic
Lara Bettinelli, Austria

14:15
Dynamic Analysis and Innovative Design of a Kilometer Long Highway Bridge under Extreme Landslide Generated Wave Loadings
Jianping Jiang, Canada

14:30
Vibration response due to group movements on a footbridge
Mehdi Setareh, USA

14:45
Prediction of the floor vibration response due to walking excitation
Mehdi Setareh, USA

15:00
Indirect estimate of concrete compression strength framework with FE model updating and operational modal analysis
Marco Martino Rosso, Italy

15:15
Discussion

Coffee Break

15:30–16:00
FOYER/EXHIBITION AREA

Scientific Session: Advanced Models of Structures and Bridges II

16:00–17:30
FORUM HALL
Chair: Richard Stroetmann, Germany

16:00
Development of an orthotropic composite slab system for road bridges
Richard Stroetmann, Germany
**IABSE SYMPOSIUM PRAGUE 2022 – CHALLENGES FOR EXISTING AND ONCOMING STRUCTURES**

16:15  Externally prestressed concrete: anchor block 3D yield design  
Agnès Fliscounakis, France

16:30  A kinematics-based model for complete behaviour of RC dapped-end connections governed by re-entrant corner cracks  
Chathura Rajapakse, Belgium

16:45  On the use of Volterra series for modelling of nonlinear self-excited forces  
Henrik Skyvulstad, Norway

17:00  Discussion

**Scientific Session: Design by FEA**

16:00–17:30  NORTH HALL  
Chair: Pawel Hawryszków, Poland

16:00  Parametric Study of Existing Concrete Trough Bridges using non-linear Finite Element Analysis  
Silvia J. Sarmiento, Sweden

16:15  Relating stress concentrations in triangular steel bridge piers to simple beam models  
Philippe Van Bogaert, Belgium

16:30  Full-scale Fatigue Simulations for Reinforced Concrete Bridge Slabs with Multi-scale Multi-chemo Physics FEM system  
Yuya Takahashi, Japan

16:45  Computational sensitivity analysis for structural model assessment under consideration of the construction stage process  
Martin Fusseder, Germany

17:00  Discussion

**Scientific Session: Bridge Details and Solutions**

16:00–17:30  TERRACE 2 A  
Chair: Stephan Fasching, Austria, Vojtěch Stančík, Czech Republic

16:00  Horizontal bracing in steel I-girder bridges with composite concrete decks  
Victor Vestman, Sweden

16:15  An engineering approach to analyze displacement rate in embedded rail system coupled with bridge  
Vojtěch Stančík, Czech Republic
16:30  The role of key structural components such as bearings, expansion joints, dampers and STUs in addressing the challenges faced by railway bridges
Filip Kostelecký, Czech Republic

16:45  Semi-precast segmental bridge construction method: Construction of a prototype and shear tests on cross-frames
Stephan Fasching, Austria

17:00  Discussion

Scientific Session: Modern Methods of Design and Models

16:00–17:30  TERRACE 2 B
Chair: Cosmin Chiorean, Romania,
Bidhan Chandra Roy, India

16:00  Ultimate and Nominal Strength Capacity Evaluation of Composite Sections with Arbitrary Shapes at Elevated Temperatures
Cosmin Chiorean, Romania

16:15  Cost and process optimization of precast segmental bridges in Israel
Jindrich Potucek, Czech Republic

16:30  Historic Building Information Modeling for Conservation and Management: A case for using HBIM for Heritage Conservation as part of Urban Infrastructure
Bidhan Chandra Roy, India

16:45  Discussion

Scientific Session: Bridges and Bridge Modelling

16:00–17:30  SOUTH HALL 2 B
Chairs: Francesco Presta, United Arab Emirates,
Xavier Gamme, Belgium

16:00  Design of a flyover for the SAAR Interchange in Bahrain
Francesco Presta, United Arab Emirates

16:15  Load Sharing System Performance considering Each Member contribution for Plate Girder Bridges with Corrosion Damages
Ryoga Oura, Japan

16:30  Design and behavior analysis of a long free expansion length, multi-span, V-shaped pier supported bridge
Xavier Gamme, Belgium
16:45  Loss of cable – design criteria for cable stayed bridges  
    Atte Mikkonen, Finland

17:00  New developments in the design of Z-shaped steel sheet pile walls  
    Alexander Enders, Germany

17:15  Practical Guidance for Design of Steel Truss Footbridges  
    Abhijith Raghuraj Nair, India

17:30  Discussion

Plenary Session: Closing Ceremony

17:45–18:15  FORUM HALL
List of Posters

PS-01 Design methodology for Roads Bridges located on Chilean copper miner roads
Matias A. Valenzuela¹, Francisco Hernandez¹
¹ Pontificia Universidad Católica de Valparaíso, Construction Engineering, Valparaíso, Chile

PS-02 Quantifying the Environmental Impact of Railway Bridges Using Life Cycle Assessment: A Case Study
Majid Al-Gburi¹, Jaime Gonzalez-Libreros¹, Gabriel Sas¹, Martin Nilsson¹
¹ Luleå University of Technology, Division of Structural and Fire Engineering-Department of Civil-Environmental and Natural Resources Engineering, Luleå, Sweden

PS-03 State of the art of typologies of piers and abutments of existing Chilean road bridges, considering the risk of scour
Matias A. Valenzuela¹, Carlos Gaete¹
¹ Pontificia Universidad Católica de Valparaíso, Construction Engineering, Valparaíso, Chile

PS-04 Laser- and laser-hybrid welding of steel bridge structures
Cato Dørum¹, Johannes Veie¹, Tore Askeland²
¹ Norwegian Public Roads Administration, Construction, Hamar, Norway
² Norwegian Public Roads Administration, Construction, Otta, Norway

PS-05 An analysis of the potential for improving cement efficiency through functionally graded concrete elements
Jessica Forsdyke¹, Mar Giménez Fernández¹, Janet Lees¹
¹ University of Cambridge, Department of Engineering, Cambridge, United Kingdom

PS-06 Resolution improvement of Low-Cost MEMS accelerometer by aligning Simulatanouns sensors
Seyedmilad Komarizadehasl¹, Fidel Lozano², Mahyad Komary¹, Jose Antonio Lozano-Galant², Jose Turmo¹
¹ Universitat Politècnica de Catalunya, Department of Civil and Environment Engineering, Barcelona, Spain
² Universidad de Castilla-La Mancha, Department of Civil Engineering, Castilla-La Mancha, Spain

PS-07 Solution to relieve urban traffic Congestion “CHANDIGARH-KHARAR ELEVATED ROAD – A Case Study”
Harpreet Singh¹, Suniti Rautela¹
¹ B&S Engineering Consultants Pvt Ltd, Bridge Design, Noida, India

PS-08 Application of Damped Outriggers in Renovation of Super Tall Building Structures
Daohang Hu¹, Xin Zhao², Gang Wang¹
¹ Tongji University, Department of Structural Engineering, Shanghai, China
² Tongji University, Department of Structural Engineering, Shanghai, China

PS-09 The Implementation Potentials of BIM in Bridge Maintenance Workflows
Sebastian Baumgartner¹, Omar El-Mahrouk¹, Markus Vill¹
¹ University of Applied Sciences FH Campus Wien, Building and Design, Vienna, Austria

PS-10 Combined LoD – Definition for Bridge Maintenance and 3D City Maps
Omar El-Mahrouk¹, Sebastian Baumgartner¹, Markus Vill¹
¹ University of Applied Sciences FH Campus Wien, Building and Design, Vienna, Austria
PS-11 BIM authoring and Data Models for Bridge Maintenance Systems in Korea
Changsu Shim¹, Roh Kitae², Ns Dang³
¹ Chung-Ang University, Dept. of Civil- Env. & Urban, Seoul, Republic of Korea
² Chung-Ang University, Dept. of Civil Engineering, Seoul, Republic of Korea
³ Chung-Ang University, Dept. of Civil Eng., Seoul, Republic of Korea

PS-12 Instabilities in slender flanged cruciform steel columns. Analysis and evaluation of the influence of external and internal restraints on torsional and distortional buckling
Peter Paul Hoogendoorn¹, Ignacio Ares Gestal², José Antonio Franco López³
¹ MSFP, Engineering Department, Madrid, Spain
² MSFP, Technical Director, Madrid, Spain

PS-13 Fabrication of a device testing bonded joint strength under combined stress
Kumiko Kiyono¹, Thay Visal², Nakamura Hitoshi³, Horii Hisakazu³
¹ Tokyo Metropolitan University, Graduate School of Urban Environmental Sciences- Department of Civil and Environmental Engineering, Hachioji-shi, Japan
² Utsunomiya University, Department of Civil Engineering and Regional Design, Utsunomiya-shi, Japan
³ Kanoki Co.- Ltd., Osaka Research Institute, Osaka-shi, Japan

PS-14 Experimental and numerical study on unequal lateral impact behavior of RC circular members
Khalil Al-Bukhaiti¹, liu Yanhui¹, Zhao Shichun¹
¹ Southwest Jiaotong University, School of Civil Engineering, Chengdu, China

PS-15 Izmit Bay Suspension Bridge- Response of Active Mass Damper Using Finite Element Analysis
Oguz Berber¹
¹ Bridge Engineer, Technical Department, Braila, Romania

PS-16 Data-informed building design using artificial intelligence
Linda Cusumano¹, Rasmus Rempling¹, Robert Jockwer², Mats Granath³, Nilla Olsson³
¹ Chalmers University of Technology, Architecture and Civil Engineering, Gothenburg, Sweden
² Gothenburg University, Department of Physics, Gothenburg, Sweden
³ NCC Building Sweden AB, Technology and Sustainability, Malmo, Sweden

PS-17 Hyperbox modeling for externally bonded CFRP beams
Alvin Chua¹, Jason Maximino Ongpeng¹, Kathleen Aviso²
¹ De La Salle University, Civil Engineering, Manila, Philippines
² De La Salle University, Chemical Engineering, Manila, Philippines

PS-18 Seismic detailing of single span bridges to AASHTO for the state of Nevada, US
Pradeep Kancharla¹, Gopalakrishnan Sivasamynathan², Gajanan Wagle³
¹ Design Engineer- Atkins- member of the SNC-Lavalin Group-, Transportation - Bridges, 10th Floor- Safina Towers- 3 Ali Asker Road- Bangalore 560052- Karnataka- INDIA, India
² Lead Engineer- Atkins- member of the SNC-Lavalin Group, Transportation - Bridges, 10th Floor- Safina Towers- 3 Ali Asker Road- Bangalore 560052- Karnataka- INDIA, India
³ Technical Head- Atkins- member of the SNC-Lavalin Group-, Transportation, 10th Floor- Safina Towers- 3 Ali Asker Road- Bangalore 560052- Karnataka- INDIA, India

PS-19 Experimental Study of Link Slab in Steel-Concrete Composite Bridge
Liang Xiao¹, Qingtian Su¹, Fuyu Wang¹
¹ Tongji University, College of civil engineering, Shanghai, China

PS-20 Investigation of damage in reinforced concrete deck slabs of an existing bridge through ambient vibration measurements and finite element analysis
Sania Gohar¹, Yasunao Matsumoto², Satoru Sakuma³
¹ Saitama University, Civil and Environmental Engineering, Saitama, Japan
² East Nippon Expressway Co.- Ltd., Kanto Regional Head Office, Saitama, Japan