

VENUE:  
Politecnico di Milano  
Polo Territoriale di Lecco  
Via G. Previati 1/c Lecco,  
Italy

<http://cacrcs.cte-eventi.com>

# fibCACRCS 2025

ORGANIZED BY



COLLEGIO  
DEI TECNICI DELLA  
INDUSTRIALIZZAZIONE  
EDILIZIA



ASSOCIAZIONE ITALIANA  
CALCESTRUZZO  
ARMATO E  
PRECOMPRESSO



THE INTERNATIONAL  
FEDERATION  
FOR STRUCTURAL  
CONCRETE

FIFTH EDITION

2025 • Lecco - June 30 / July 3

## CAPACITY ASSESSMENT OF CORRODED REINFORCED CONCRETE STRUCTURES: FROM RESEARCH TO DAILY ENGINEERING EVALUATION

WITH THE UNCONDITIONAL SUPPORT OF



UNDER THE PATRONAGE OF



Consiglio Nazionale  
delle Ricerche



UNIVERSITÀ  
DI PARMA

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# fibCACRCS 2025

FIFTH EDITION

## CAPACITY ASSESSMENT OF CORRODED REINFORCED CONCRETE STRUCTURES

### TOPIC

The **fibCACRCS 2025 5th edition** will focus on practical engineering applications achieved through consolidated research on corroded reinforced concrete and prestressed concrete structures. The workshop will cover a range of topics, starting with the definition of corrosion damage indicators and analysis of material characteristics, moving on to the evaluation of the structural behaviour of corroded members, and concluding with the prediction of the remaining service life of corroded structures and intervention strategies.

Case studies on the assessment of deteriorated structures are of particular interest.

Since 2019, the Workshop has attracted participation from experts in the capacity assessment of corroded reinforced concrete structures. Starting in 2025, the CACRCS DAYS Workshop is officially become the **fibCACRCS 2025** Conference, being integrated into fib's global network of conferences and initiatives.

The workshop is open to young researchers, experts, and practitioners.

During the **fibCACRCS 2025**, professional engineers will have the opportunity to connect with a community of experts who can assist in practical problem-solving and optimizing decision-making procedures for the assessment, interventions and maintenance of existing structures. Additionally, a Round Table discussion will be scheduled to stimulate debate on the analysis of available codes and guidelines for the evaluation of deteriorating existing structures affected by corrosion, as well as identify gaps and future research areas based on the contributions submitted to this workshop.

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FIFTH EDITION

## CAPACITY ASSESSMENT OF CORRODED REINFORCED CONCRETE STRUCTURES

### ORGANIZING COMMITTEE

Coordinators: **Beatrice BELLETTI** (University of Parma), **Dario CORONELLI** (Politecnico di Milano), **Marco DI PRISCO** (Politecnico di Milano)

**Olha Palii** (University of Parma)

**Anna Magri, Ludovica De Cobelli** (CTE)

**David Fernández-Ordóñez** (*fib* Secretary General)

**Luc Taerwe** (Ghent University, Editor-in-Chief Structural Concrete Journal)

**Simone Ravasini, Marco Carlo Rampini, Biagio Calcavecchia, Katherina Flores, Giulio Zani** (*fib* Italy Young Members Group)

**Mitsuyoshi Akiyama** (Waseda University), **Carmen Andrade** (CIMNE - UPC), **Véronique Bouteiller** (Université Gustave Eiffel), **Walter**

**Kaufmann** (ETH Zurich), **Beatriz Martín-Pérez** (University of Ottawa), **Elena Miceli** (Politecnico di Torino), **Jesus Rodriguez** (UPM),

**Takumi Shimomura** (Nagaoka University of Technology), **Els Verstrynghe** (KU Leuven University), **Joost Walraven** (Em. TU Delft),

**Weiping Zhang** (Tongji University)

### SCIENTIFIC COMMITTEE

**Lucas Adelaide** (University Gustave Eiffel), **Fabio Bolzoni** (Politecnico di Milano), **Joan Ramon Casas** (UPC), **Robby Caspeepe** (Ghent

University), **Antoni Cladera** (Universitat de les Illes Balears), **Matteo Colombo** (Politecnico di Milano), **Marta Del Zoppo** (University of

Naples Federico II), **Pieter Desnerck** (University of Cambridge), **Michael Fardis** (University of Patras), **Severin Häfliger** (ETHZ), **Rade Haj-**

**din** (Infrastructure Management Consultants, Switzerland: IABSE), **Chris Hendy** (Atkins, University of Cambridge), **Christopher Higgins**

(Oregon State University), **Stefania Imperatore** (Niccolò Cusano University of Rome), **Akio Kasuga** (Sumitomo Mitsui Construction),

**Federica Lollini** (Politecnico di Milano), **Fausto Minelli** (University of Brescia), **Boumediene Nedjar** (University d'Evry Paris-Saclay), **Ca-**

**millo Nuti** (Università degli Studi Roma Tre), **Antonino Recupero** (University of Messina), **Claude Rospars** (University Gustave Eiffel),

**Peter Tanner** (IETcc-CSIC), **Francesco Tondolo** (Politecnico di Torino), **Tamon Ueda** (Shenzhen University)

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# *fib*CACRCS 2025

FIFTH EDITION

CAPACITY ASSESSMENT OF CORRODED  
REINFORCED CONCRETE STRUCTURES



The venue of the  
*fib*CACRCS 2025 will be the  
Politecnico di Milano  
Polo Territoriale di Lecco  
Via Gaetano Previati 1/c, Lecco, Italy  
<http://cacrcs.cte-eventi.com>

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# *fib*CACRCS 2025

FIFTH EDITION

## CAPACITY ASSESSMENT OF CORRODED REINFORCED CONCRETE STRUCTURES

### CALL FOR ABSTRACTS

The *fibCACRCS 2025* welcome all contributions related to the behaviour of reinforced concrete, fibre reinforced concrete and prestressed concrete structures damaged by corrosion, with both numerical and experimental approaches, and including some recommendations for the daily engineering evaluation of corroded structures.

You can submit abstracts and papers to the website of the *fibCACRCS 2025* event: <http://cacrcs.cte-eventi.com>

### PAPER SUBMISSION

Authors willing to present their work at the *fibCACRCS 2025* are invited to kindly submit an abstract in accordance with the sessions of the workshop. Papers (8 pages long) will be reviewed and will be included in the Proceedings of the Workshop if they will be accepted. The Authors of the paper will be invited to submit a full manuscript to a Special Issue of Structural Concrete. The submission of full manuscripts will undergo the usual peer-review process of Structural Concrete.

In order to promote and facilitate the transfer of knowledge from Research to Daily Engineering Evaluation, the template for extended abstracts contains a paragraph dedicated to a description of the use of the presented results in engineering applications. The template for abstracts and papers is available on the *fibCACRCS 2025* website (<http://cacrcs.cte-eventi.com>).

### IMPORTANT DATES

<b>ABSTRACT SUBMISSION</b>	30.06.2024	<b>ABSTRACT ACCEPTANCE NOTIFICATION</b>	30.07.2024
<b>PAPER SUBMISSION</b>	31.12.2024	<b>PAPER ACCEPTANCE</b>	31.01.2025
<b>FINAL VERSION OF THE PAPER SUBMISSION</b>	31.03.2025	<b>AUTHOR'S REGISTRATION</b>	01.04.2025
<b>PRESENTATION SUBMISSION</b>	15.06.2025	<b>ATTENDEES' REGISTRATION</b>	30.06.2025
<b>FULL MANUSCRIPT SUBMISSION FOR A SPECIAL ISSUE OF STRUCTURAL CONCRETE</b>			30.11.2025

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## CAPACITY ASSESSMENT OF CORRODED REINFORCED CONCRETE STRUCTURES

### SPONSORS

Companies interested in supporting the event can contact us by e-mail to [cacracs@cte-eventi.com](mailto:cacracs@cte-eventi.com).

**SPONSOR FEES € 1500 + VAT** including

- Conference registration of 1 person.
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### AWARDS

Awards will be conferred to the most outstanding paper presented by a young researcher and to the most excellent paper presented in the workshop.

### REGISTRATION FEES

are VAT exempted and include participation to the workshop, gala dinner and electronic proceedings.

**Standard fee** € 600,00 (including CTE membership)

**Reduced fee for Young People** € 530,00 (valid only for people aged <30 years and including CTE membership)

**Reduced fee for CTE fib Member** € 500,00 (valid only for CTE, fib, Member 2025)

You will register directly from the **fibCACRCS 2025 website** (<http://cacracs.cte-eventi.com>)

and make the payment by credit card or bank transfer to **CTE**

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### CONTACTS

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Secretary of the event

E-mail: [cacracs@cte-eventi.com](mailto:cacracs@cte-eventi.com)

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<http://cacracs.cte-eventi.com>  
[www.cte-it.org](http://www.cte-it.org)

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# fibCACRCS 2025

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## DETAILED FINAL PROGRAM

### Monday, June 30th

9:00 (\*CET) **OPENING OF THE WORKSHOP**

\*Central European Time

#### Welcome & Introduction

9:15 **B. Belletti, D. Coronelli, M. di Prisco**, Event Coordinators

9:45 **Enrico Nusiner**, CTE President

10:00 **David Fernández-Ordóñez**, *fib* Secretary General

10:15 **Luc Taerwe**, Editor-in-Chief of Structural Concrete

#### • OPENING KEY-NOTE LECTURES

10:30 **Joost Walraven** (Em. TU Delft, Delft, The Netherlands)

*Capacity assessment of existing structures according to fib Model code 2020*

11:00 **Rade Hajdin** (Infrastructure Management Consultants GmbH, Zurich, Switzerland / University of Belgrade, Serbia)

*Bridge Management Systems – The next generation*

[11:30-12:00 Coffee Break](#)

#### S1) DAMAGE INDICATORS OF CORROSION IN RC, SFRC AND PC MEMBERS AND MODELS FOR DETERIORATED MATERIALS

##### • KEY-NOTE LECTURES

12:00 **Edoardo Proverbio** (University of Messina, Messina, Italy)

*Corrosion in PT Tendons: Review of Estimation & Forecasting Models*

12:30 **Carmen Andrade** (CIMNE – UPC, Barcelona, Spain)

*Effect of local climate in the concrete degree of water saturation and on the corrosion rate*

[13:00-14:00 LUNCH](#)

##### • PRESENTED PAPERS

14:00 **Giglio M., Di Vita C.P., Proverbio E.**

*Corrosion induced damage evaluation on post-tensioned reinforced concrete structures*

14:15 **Russo N., Redaelli E., Lollini F.**

*Electrochemical and gravimetric corrosion rate of steel bars in carbonated concrete*

14:30 **Belletti B., Bernardi P., Sirico A., Zanotto F., Balbo A., Malcevschi A.**

*Bond performance for uncorroded and corroded steel reinforcement in biochar-added concrete*

14:45 **Martens C., Caspee R., Verstryng E.**

*Exploring the Effects of Mechanical Cracking on the Corrosion Rate in Reinforced Concrete*

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## FIFTH EDITION

15:00 Imperatore S., Nerilli F., Monsef Ahmadi H., Monteleone C., Capozzoli L., De Martino G., Salvia G., Di Gennaro D., Vasanelli E.

*Novel NDT methodologies for identifying corrosion damage in reinforced concrete structures*

15:15 Coronelli D., Rosati G.

*Calculation of resistance for corroded strands with localized pits*

15:30 Bolzoni F., Brenna A., Beretta S., Diamanti M.V., Paterlini L., Ormellesse M., Pedferri M.P.

*Reinforced concrete structures affected by chloride induced corrosion: effect of preventative methods on service life*

15:45 Imperatore S., Monteleone C.

*Corrosion assessment and mechanical characterization of naturally corroded reinforcements*

16:00-16:45 Coffee Break

16:45 Sirico A., Palii O., Ravasini S., Belletti B., Sánchez J.

*Pitting morphology of prestressing strands subjected to naturally chloride environment*

17:00 Flores Ferreira K., Rampini M.C., Russo N., Lollini F., Scaccabarozzi D., Zappa E., di Prisco M.

*The effects of artificial corrosion on reinforced concrete structures: experimental campaign on small-scale beam specimens*

17:30 (\*CET) CLOSING OF THE 1<sup>st</sup> DAY

Tuesday, July 1<sup>st</sup>

9:00 (\*CET) OPENING OF THE 2<sup>nd</sup> DAY

### S2) ANALYTICAL AND NUMERICAL MODELS FOR THE CAPACITY ASSESSMENT OF CORRODED RC BEAMS, PC BEAMS AND BRIDGE DECKS COMPONENTS

#### • KEY-NOTE LECTURES

9:00 Antonino Recupero (University of Messina, Messina, Italy)

*Prestressing Concrete in Italian Bridges: Seventy years of light and shadows in a winning challenge*

9:30 Chao Jiang (Tongji University, Shanghai, China)

*Corrosion-induced failure mode change and bearing capacity degradation of RC beams*

#### • PRESENTED PAPERS

10:00 Ferche A., Habibi S., Vecchio F.

*Modelling of Corroded Rebar in Concrete Members: Scratching the Surface*

10:15 de la Fuente A., Oller E., Todisco L., Sosa P.M., Ruiz G., Martínez F., Ribas C., Rodriguez J., Andrade C.

*ESTRUCOR: The Spanish research network on structural assessment of concrete structures*

10:30 Mezera A., Holý M., Řeháček S.

*Assessment of Actual Conditions of Posttensioned Cables for Reliability Analysis of Existing Bridges*

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## FIFTH EDITION

10:45 **Galano S., Losanno D., Parisi F.**

*Finite element analyses on the flexural response of post-tensioned concrete bridge girders with corroded tendons in different grouting conditions*

[11:00-11:45 Coffee Break](#)

11:45 **Lenticchia E., Tondolo F., Ceravolo R.**

*Experimental test on a ferrocement beam: structural capacity reduction in presence of corrosion*

12:00 **Granata M.F., Colajanni P.**

*Structural behaviour of old reinforced concrete bowstring bridges affected by corrosion*

12:15 **Rinaldi Z., Di Carlo F., Meda A.**

*Analytical modelling strategies comparison to predict the structural behaviour of corroded reinforced concrete beams*

12:30 **Granata M.F., La Mendola L.**

*Influence of partial bond and degradation on post-tensioned prestressed girders*

12:45 **Spinella N., Rossi P.P., Messina D., Recupero A.**

*Modelling at different levels of complexity of RC beams with corroded reinforcing steel*

[13:00-14:00 LUNCH](#)

14:00 **Anghileri M., Biondini F.**

*Experimental validation of nonlinear structural analysis of RC/PC beams under shear failure*

14:15 **Torabian Isfahani F., Vittone M., Nava G., Beltrami C.**

*Corrosion rate assessment of bridge deck post-tension cables with different environmental/maintenance and exposure scenarios*

14:30 **Di Carlo F., Molaioni F., Stella A., Talledo D.A.**

*Analysis of flexural behaviour of corroded RC beams through experimental tests with DIC*

### S3) ANALYTICAL AND NUMERICAL MODELS FOR THE CAPACITY ASSESSMENT OF CORRODED RC COLUMNS, BRIDGE PIERS AND VERTICAL MEMBERS OF STRUCTURES AND INFRASTRUCTURES

#### • KEY-NOTE LECTURES

14:45 **Stavroula Pantazopoulou** (York University, Toronto, ON, Canada)

*Modelling Parameters for Members with Corroded Bars in Seismic Assessment of Existing Structures*

15:15 **Mehdi Kashani** (University of Southampton, Southampton, United Kingdom)

*Recent Advances in Modelling Nonlinear Seismic Performance of Corrosion-Damaged RC Bridges*

#### • PRESENTED PAPERS

15:45 **Michelini E., Dudziak S., Ravasini S., Belletti B.**

*Capacity assessment of corroded reinforced concrete frames subjected to differential ground settlements*

[16:00-16:30 Coffee Break](#)

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16:30 **Ruta D., Bernardini D., Cardone D.**

*On the influence of the choice of the steel degradation law on the modeling of corroded Reinforced Concrete structures*

16:45 **Santarsiero G., Masi A., Gaetano R., Picciano V.**

*Seismic behaviour of simply supported reinforced concrete bridges with corroded piers*

17:00 **Coronelli D., Martinelli L.**

*Bridge piers load and deformation capacity: tests and numerical modelling*

17:15 **Zucca M., Stochino F., Vecchi E., Crespi P.**

*On the seismic performance of existing RC motorway viaducts subject to corrosion effects*

17:30 **Poeta A., Scozzese F., Micozzi F., Dall'Asta A.**

*Influence of degradation uncertainties on seismic risk of reinforced concrete bridge pier: preliminary investigation*

18:00 (\*CET) **CLOSING OF THE 2<sup>nd</sup> DAY**

19:00 **GALA DINNER**

Wednesday, July 2<sup>nd</sup>

9:00 (\*CET) **OPENING OF THE 3<sup>rd</sup> DAY**

**S4) ANALYTICAL AND NUMERICAL MODELS FOR THE CAPACITY ASSESSMENT OF CORRODED HALF JOINTS, SQUAT MEMBERS, ETC.**

• KEY-NOTE LECTURES

9:00 **Marco di Prisco** (Politecnico di Milano, Milan, Italy)

*The half-joint in the Italian bridges: residual bearing capacity and smart solutions for retrofitting*

9:30 **De-Cheng Feng** (Southeast University, Nanjing, China)

*Integrated model updating, probabilistic assessment, and digital twin of nuclear containment structures considering time-dependent corrosion effects*

• PRESENTED PAPERS

10:00 **Luyten K., Botte W., Caspele R.**

*Effect of time-dependent degradation on the structural reliability of concrete half-joints based on strut-and-tie model calculations*

10:15 **Pizzini P., Di Stefano N., Facconi L., Minelli F., Plizzari G.**

*Experimental and numerical analyses of artificially corroded half-joint beams*

10:30 **Tenca P., Calcavecchia B., Luyten K., Caspele R., Ravasini S., Bernardi P., Belletti B.**

*Numerical assessment of the load-bearing capacity of existing bridges with dapped-end beams*

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10:45 **Martinelli P. Colombo M., di Prisco M.**

*Robustness assessment of half-joint RC girder bridges under corrosion*

11:00 **Flores Ferreira K., Rampini M.C., di Prisco M.**

*Analytical investigation on the structural impact of chloride-induced corrosion in reinforced concrete dapped-end beams*

[11:15-12:00 Coffee Break](#)

### **S5) VERIFICATION METHODS FOR CORRODED STRUCTURES**

#### **• KEY-NOTE LECTURE**

12:00 **Alan O'Connor** (Trinity College Dublin, Dublin, Ireland)

*Probabilistic assessment of existing bridges*

12:30 **Alfred Strauss** (University of Natural Resources and Life Science, Vienna, Austria),

**Helder F. M. Sousa** (BRISA Group, São Domingos de Rana, Portugal)

*Quality management in concrete structures – from construction throughout the lifetime*

[13:00-14:00 LUNCH](#)

14:00 **Mitsuyoshi Akiyama** (Waseda University, Tokyo, Japan), **Dan M. Frangopol** (Lehigh University, Bethlehem, USA)

*Probabilistic prediction of residual service life of corroded concrete structures*

14:30 **Lollini Federica** (Politecnico di Milano, Milan, Italy)

*Durability design of tunnels: present and future*

#### **• PRESENTED PAPERS**

14:45 **Baldassari A., Piemonti A., Plizzari G., Conforti A.**

*Influence of pitting corrosion on the flexural behavior of reinforced concrete beams*

15:00 **Vescovi M., Belletti B., Ferretti D., Pagliari F.**

*Experimental tests on bond-slip of corroded post-tensioning strand*

### **S6) MONITORING AND DIGITAL TWINS FOR THE PREDICTION OF THE RESIDUAL SERVICE LIFE OF CORRODED STRUCTURES**

#### **• KEY-NOTE LECTURES**

15:15 **Javier Sanchez** (Institute Edoardo Torroja, Madrid, Spain)

*Monitoring corrosion in reinforced concrete structures: case studies, results, analysis and outputs*

15:45 **Mauro Dolce** (University Federico II, Naples, Italy)

*Research on infrastructures deterioration in the ReLUIS project: visual inspections and experimental tests*

#### **• PRESENTED PAPERS**

16:15 **Messina D., Galatà C., Venturi V.D., Recupero A., Proverbio E.**

*Analytical and experimental procedure for in situ stress measurements in prestressed concrete structures*

[16:30-17:00 Coffee Break](#)

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FIFTH EDITION

17:00 **Jamal J., Carboni B., Quaranta G., Lacarbonara W.**

*Experimental assessment of corroded RC structures using non-contact techniques*

17:15 **Bouteiller V., Bonnet A., Da-Silva V., Marie-Victoire E., Bouichou M., Thauvin B., Queguiner R., Duros E., Villain G., Achenbach R., Raupach M.**

*Assessment of chloride-induced corrosion of reinforced concrete by non-destructive testing and continuous monitoring*

17:30 **Keßler S., Köhncke M.**

*Enhancing Corrosion Condition Assessment via Digital Modeling*

17:45 **Fritz B.**

*Long-term Corrosion Monitoring for Evaluating the Performance of Repair Measures*

18:00 (\*CET) **CLOSING OF THE 3<sup>rd</sup> DAY**

Thursday, July 3<sup>rd</sup>

9:00 (\*CET) **OPENING OF THE 4<sup>th</sup> DAY**

**S7) UPGRADING OF DETERIORATED STRUCTURES BY REACTIVE AND PROACTIVE**

**INTERVENTIONS**

• **KEY-NOTE LECTURES**

9:00 **José Matos, Hélder S. Sousa** (University of Minho, Guimarães, Portugal) *The implementation of reactive and proactive interventions towards increasing the resilience of reinforced concrete structures*

9:30 **Steffen Marx** (Dresden University of Technology, Institute for Concrete Structures, DB Netz AG, Germany) *Forensic analysis of the Carola bridge collapse in Dresden*

• **PRESENTED PAPERS**

10:00 **Van Den Hende K., Botte W., Matthys S., Lombaert G., Caspele R.** *Optimization of preventive repair strategies for a prestressed concrete girder subjected to chloride-induced corrosion*

10:15 **Řeháček S., Citek D., Pokorný P., Krystov M., Citek A.** *Evaluation of Inspected Bridges Built of Prestressed Standardized Precast Girders I-73 After 40 Years of Use*

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### S8) CASE STUDIES

#### • KEY-NOTE LECTURES

10:30 **Mario Petrangeli, Luigi Fieno** (MPA, Roma, Italy)  
*Corrosion effects of post-tensioned strands on the safety of highway viaducts - The case study of mountain viaducts*

#### 11:00-11:30 Coffee Break

11:30 **Joan Ramon Casas** (UPC-BarcelonaTech, Barcelona, Spain)  
*Capacity assessment and proactive intervention in damaged bridges: two case studies*

#### • PRESENTED PAPERS

12:00 **Bernardini S., Papworth F., Newby R.**  
*Investigation and repair of an immersed concrete box subject to restrained and structural cracking*

12:15 **Miceli E., Gino D., Giordano L., De Iulii M., Castaldo P., Mancini G., Deiana M.**  
*Experience from experimental testing of an existing PRC bridge beam*

12:30 **Newby R., Papworth F., Bernardini S.**  
*Residual life and repair for an existing concrete wharf*

12:45 **Khadija A., El Mendili Y., Cherkaoui M.**  
*Mechanical, and electrochemical (EIS) characterization of reinforced concrete by Natural Moroccan Pozzolan and fly ash*

#### 13:00-14:00 LUNCH

14:15 **Newby R., Papworth F., Bernardini S.**  
*Corrosion Assessment of Post-Tensioned Cables*

14:30 **Casprini E., Passoni C., Haefliger S., Todisco L.**  
*Defining corrosion parameters from naturally corroded bars: the CORR-DATA database*

14:45 **Duarte N., Bairán J.M.**  
*Assessment of corroded prestressed concrete wharves in Catalan Marinas*

15:00 **Reale S., Furinghetti M., Pavese A.**  
*Experimental and Numerical Studies on the Seismic Response of a Corroded RC Bridge*

15:15 **Lollini F., Carsana M., Gastaldi M., Giannini L., Redaelli E.**  
*Experimental tests for the evaluation of the durability of a tunnel under construction*

#### 15:30-16:00 Coffee Break

16:00 **Round table on identifying the technical gaps for the structural evaluation of corroded concrete structures for future guidelines and code on short and long-term assessment of corroded structures**  
**CHAIR: Walter Kaufmann, ETH Zurich, Switzerland**

### CLOSING CEREMONY

17:30 • AWARDS

• CONCLUSION OF THE WORKSHOP

18:00 (\*CET) CLOSING OF THE WORKSHOP

\*Centre European Time