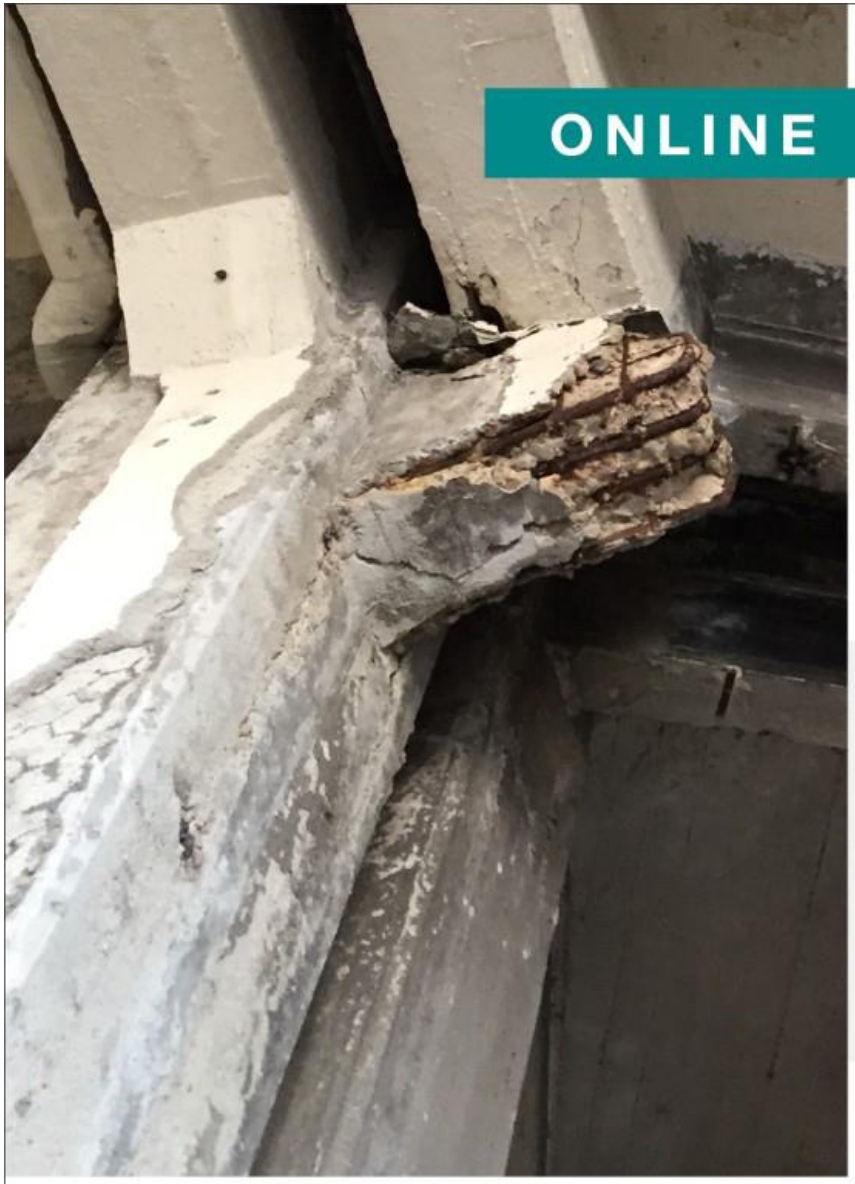
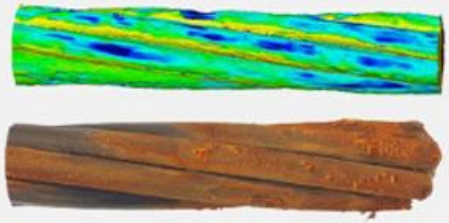


ONLINE

CACRCS DAYS 2021

Capacity Assessment of Corroded Reinforced Concrete Structures: from Research to Daily Engineering Evaluation

30 November - 3 December 2021



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6° ANNOUNCEMENT

Collegio dei Tecnici della Industrializzazione Edilizia

The International Federation for Structural Concrete

Organize

CACRCS DAYS 2021
Capacity Assessment of Corroded Reinforced Concrete Structures: from Research to Daily Engineering Evaluation

30 november-3 December 2021

Venue: ON LINE

3rd Edition

PRELIMINARY PROGRAM

SUPPORT OF

Associazione Italiana Calcestruzzo Armato Precompresso

Associazione Italiana di Metallurgia

Associazione Tecnologi per l'Edilizia

fib Italy Young Members Group

Politecnico di Milano

Università degli Studi di Parma

TOPIC

CACRCS DAYS 2021 edition will focus on practical engineering applications achieved by consolidated research work on corroded reinforced concrete and prestressed concrete structures.
Two round tables have been organised, the first one on information of pre-normative and normative documents, and the second one dedicated to focus on technical gaps for the structural evaluation of corroded concrete structures.
Since 2019 the Workshop has seen the participation of experts in the capacity assessment of corroded reinforced concrete structures. The workshop is open to young researchers, experts and practitioners.
In CACRCS DAYS context, professional engineers can find a community of people able to assist in practice problem solving and in making- decision procedures for the maintenance of existing structures.

ORGANIZING COMMITTEE

Coordinators: **Beatrice Belletti (University of Parma), Dario Coronelli (Politecnico di Milano)**
Anna Magri (*CTE*)
David Fernández-Ordóñez (*fib Secretary General)*
Luc Taerwe (*Ghent University, Editor-in-Chief Structural Concrete Journal)*
Isabella Giorgia Colombo, Marta Del Zoppo, Lorenzo Franceschini, Francesca Vecchi (*fib Italy Young Members Group)*
Carmen Andrade (*CIMNE - UPC*), Fabio Bolzoni (*Politecnico di Milano*), Joan Ramon Casas (*UPC*), Airong Chen (*Tongji University*), Zila Rinaldi (*Università di Roma Tor Vergata*), Jesus Rodriguez (*UPM*), Joost Walraven (*Em. TU Delft*), Weiping Zhang (*Tongji University*)

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Gulikers (*Rijkswaterstaat*), Donatella Guzzoni (*ATE*), Raul Husni (*University of Buenos Aires*), Mehdi Kashani (*University of Southampton*), Federica Lollini (*Politecnico di Milano*), Sergio Lorenzi (*Università degli Studi di Bergamo*), Cecilia Monticelli (*Università degli Studi di Ferrara*), Chris Mundell (*Atkins*), Alan O'Connor (*Trinity College Dublin*), Alessandro Palermo (*University of Canterbury*), Fabrizio Palmisano (*Politecnico di Bari*), Frank Papworth (*BCRC*), Edoardo Proverbio (*Università di Messina*), Michael Raupach *(RWTH Aachen University)*

CALL FOR ABSTRACT

The CACRCS DAYS 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.
Abstracts and papers may be submitted to the website of CACRCS event.

PAPER SUBMISSION

Authors willing to present their work at the CACRCS DAYS 2021 are invited to kindly submit an abstract in accordance with the sessions of the workshop. The abstract should not exceed 750 characters.
Extended abstracts (4 pages long) will be included in the Proceedings of the Workshop.
The Authors of selected extended abstracts will be invited to submit a full manuscript to a Special Issue of Structural Concrete. The submission of full manuscript will undergo the usual peer-review process of Structural Concrete.
The template for abstracts and extended abstracts is available on the CACRCS website (www.cte-eventi.com/cacrcs/).

AWARDS

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

IMPORTANT DATES

abstract submission	30.05.2021
abstract acceptance notification	15.06.2021
extended abstract submission	04.10.2021*
extended abstract acceptance	**16.11.2021**
final extended abstract submission	**20.11.2021**
author's registration	20.11.2021
cv presentation submission	20.11.2021
full manuscript to a Special Issue in Structural Concrete	28.02.2022

*those interested in submitting the extended abstract after the deadline, please contact the organizing committee at the following address cacrcs@cte-eventi.com.

EVENT ON LINE

As a speaker, you will intervene live **in streaming** on Zoom from anywhere in the world.

The authors will be asked to sign a document authorising the use of the records of their presentations by the organizing committee for the purpose of the event.

This authorization document is available on CACRCS website (www.cte-eventi.com/cacrcs/).

SPONSORS

The companies interested in supporting the event can contact us by e-mail to cacrcs@cte-eventi.com

PRELIMINARY PROGRAM

Special sessions are organised during the workshop. During the submission process, Authors are invited to kindly select the session where they are willing to present their papers. Each session will include both research and engineering applications focussing on what is needed for the evaluation of corroded structures.
CACRCS DAYS 2021 includes Round tables to promote discussions.
The virtual workshop offers didactic material for engineers, practitioners, scientists, concrete technologists, researchers, and academics to improve the knowledge about the corrosion of reinforced concrete structures.

Tuesday 30 November

11:00 (*CET) OPENING OF THE WORKSHOP
*(Central European Time)

Welcome and Introduction

11:00 **B. Belletti**, **D. Coronelli**, Event Coordinators

11:15 **Claudio Failla**, CTE President

11:30 **David Fernández-Ordóñez**, *fib* Secretary General

11:45 **Luc Taerwe**, Editor-in-Chief of Structural Concrete

12:00 Structural assessment codes for corroded Concrete structures

Round table on pre-normative and normative documents

CHAIR: **Jesus Rodriguez**, *UPM*

The participants invited will share their views on normative (codes and standards) and pre-normative (model codes, manuals, guides) documents treating the structural assessment of existing deteriorated concrete structures with special emphasis on corrosion.

12:00 Round Table 1st part

Joel Netley, Waka Kotahi Transport Agency, New Zealand
Andy Ng, Department of Transport, Australia
Torill Pape, Department of Transport and Main Roads, Australia
Takumi Shimomura, Nagaoka University of Technology, Japan
Huangjun Jiang, Tongji University, China
Ditao Niu, Xi'an University of Architecture and Technology, China

13:30 Round Table 2nd part

Fabrizio Palmisano, PPV consulting, Italy: Eurocodes
Alfred Strauss, Institute of Structural Engineering (IKI), Austria: *fib* MC2020
Agnieszka Bigaj-van Vliet, TNO, The Netherlands: *fib* Model Code 2020 & IM-Safe project
Rade Hajdin, Infrastructure Management Consultants, Switzerland: IABSE
Christopher Higgins, Oregon State University, US & **Dan Frangopol**, Lehigh University, US

15:00 (CET) Closing of the 1st Round Table

15:00-15:30 Coffee Break

A1) Basis of design, safety approach

KEY-NOTE LECTURES

15:30 **Robby Caspeele**, Ghent University
Partial factor based assessment of existing concrete structures: new developments and applications

16:00 **Peter Tanner,** IETcc-CSIC
Perspectives and challenges in standardization for the assessment of existing structures

A2) Models of material deterioration for the integration in the structural assessment

KEY-NOTE LECTURES

16:30 **Carmen Andrade**, CIMNE – UPC
Approach to the residual strength of steel bars due to corrosion

17:00 **Federica Lollini**, Politecnico di Milano
Evaluation of corrosion conditions of reinforced concrete structures exposed to chloride-bearing environment

17:30 **Gomez E.D., Leporace-Guimil B., Conforti A., G.A. Plizzari*, Duffo G.S., Zerbino R.,** *Università degli Studi di Brescia
RC and FRC elements exposed to chloride-rich environments: An experimental program on pre-cracked specimens

PRESENTED PAPERS 1st part

18:00 **Bolzoni F., Beretta S., Diamanti M.V., Brenna A., Ormellese M., Pedeferri M.**
Corrosion propagation: comparison of electrochemical and mass loss measurements

18:20 **Avadh K., Nagai K.**
Investigating the effect of corrosion on cracking and tension stiffening in reinforced concrete by 3D mesoscale discrete model

18:40 **Russo N., Gastaldi M., Schiavi L., Strini A., Lollini F.**
Chloride-induced corrosion initiation and propagation in sound and micro-cracked concretes

19:00 **Benenato A., Ferracuti B., Imperatore S., Lignola G.P.**
Statistical analysis of predictive models for crack width induced by natural corrosion in beams

(*CET) CLOSING OF 1st DAY

Wednesday 1 December

10:00 (*CET) OPENING OF THE 2nd DAY

A2) Models of material deterioration for the integration in the structural assessment

PRESENTED PAPERS 2nd part

10:00 **Pedrosa F., Andrade C.**
Experimental results on the spatial variability of some concrete corrosion parameters

10:20 **Bellezze T., Mobili A., Tittarelli F.**
Durability benefits of galvanized steel in reinforced concrete under different exposure conditions

10:40 **Imperatore S., Benenato A., Kioumarsi M., Ferracuti B.**
The corrosion influence on the bond performance of different reinforcement tipologies

11:00 **Yilmaz D., Angst U.**
Localised rebar corrosion morphology – Data collection on structures

11:20 **Belluco S., Fabris N., Faleschini F., Caprili S.**
Mechanical behaviour of corroded strands: a review of constitutive models

11:40 **Franceschini L., Vecchi F., Belletti B., Tondolo F., Sanchez Montero J.**
SCPS-model: a simplified stress-strain model for corroded prestressing strands

12:00 **Bolzoni F., Ormellese M., Proverbio E., Pedeferri M.**
Big milestones in the study of steel corrosion in concrete

12:20-12:30 Coffee Break

B1) Structural assessment of corroded members (beams, slabs, columns, walls)

KEY-NOTE LECTURES

12:30 **Weiping Zhang*, Zhang Y., Chen J.**, *Tongji University (Weiping Zhang, Yunpeng Zhang, Junyu Chen)
Stochastic Analysis of Deterioration of Structural Behavior of Reinforced Concrete Beams in Marine Atmosphere

13:00 **Joost Walraven**, Em. TU Delft
Assessment of concrete structures with corroded reinforcement: development of recommendations

13:30 **Pieter Desnerck**, University of Cambridge
Assessment of deteriorated reinforced concrete half-joint bridges

PRESENTED PAPERS

14:00 **Ding H., Jiang C., Gu X.L., Zhang W.P.**
Simplified calculation methods for bearing capacities of corroded reinforced concrete columns in uniaxial compression

14:20 **De Domenico D., Messina D., Recupero A.**
Cyclic behavior prediction of corroded reinforced concrete columns through a fiber hinge model

14:40 **Dabas M., Martín-Pérez B., Almansour H.**
Effects of different levels and patterns of reinforcement corrosion on aged columns: numerical and experimental investigation

15:00 **Zaghian S., Martín-Pérez B., Almansour H., Shirkhani H.**
Nonlinear Finite Element Modelling of Bridge Piers Subjected to Corrosion, Freeze-Thaw Cycles, and Traffic Load

15:20 **Prieto M., Tanner P.**
Assessment procedure of corrosion-damaged structures with stress field models

15:40 **Haefliger S., Kaufmann W.**
Experiments on locally corroded retaining wall segments and their assessment with the Corroded Tension Chord Model

16:00 **Bouteiller V., Adelaïde L., Marie-Victoire E., Bouichou M., Thauvin B., Villain G.**
Non Destructive Testing and Corrosion Health Monitoring of reinforced concrete slabs exposed to chloride ions

16:20 **Casprini E., Passoni C., Marini A., Bartoli G.**
Modelling corrosion effects in Reinforced Concrete structural members through equivalent damage parameters

16:40-17:00 Coffee Break

17:00 **Di Carlo F., Isabella P., Rinaldi Z., Spagnuolo S.**
Influence of corrosion on the flexural behavior of corroded reinforced concrete beams

17:20 **Cladera A., Frontera A., Ribas C., Ruiz-Pinilla J.G., Marí A.**
Mechanical model for the long-term shear strength prediction of corrosion-damaged reinforced concrete beams

17:40 **Messina D., Scionti G., Proverbio E.**
Effect of prestressing corrosion on failure in structures

18:00 **Coronelli D., Mircea C., Rosati G., Rogers R.**
Natural corrosion effects on prestressed beams failure modes

18:20 **Granata M.F., La Mendola L., Recupero A.**
Influence of bond deterioration on shear-flexure failure of prestressed girders with post-tensioned tendons

18:40 **Franceschini L., Belletti B., Violi B.**
Service Life Prediction of Corroded Prestressed Concrete Beams based on Probabilistic Assumptions

(*CET) CLOSING OF 2nd DAY

Thursday 2 December

12:00 (*CET) OPENING OF THE 3rd DAY

B2) Assessment of corroded structures subjected to seismic or accidental actions

KEY-NOTE LECTURES

12:00 **Michael Fardis**, University of Patras
Seismic Assessment and Retrofitting of Concrete Structures with Corroded Reinforcement

12:30 **Camillo Nuti*, Pelle A., Quaranta G., Bergami A., Briseghella B., Fiorentino G., Lavorato D., Rasulo A.**
*Università degli Studi Roma Tre
Durability analysis and environmental impact of ultra-high performance fibre reinforced concrete (UHPFRC) for bridge applications

PRESENTED PAPERS

13:00 **Njeem W., Aoude H., Martin-Perez B., Jrade A.**
Effect of Corrosion on the Flexural Response of Reinforced Concrete Beams Subjected to Blast Loads

13:20 **Franceschini L., Belletti B., Calcavecchia B.**
Capacity assessment of existing RC columns taking into account bi-axial shear failure

13:40 **Matthews B., Palermo A., Scott A.**
Overview of the Cyclic Shear Deterioration of Circular Reinforced Concrete Columns due to Accelerated Corrosion

14:00 **Tastani S., Kyriakou A., Antonis A.**
Assessment of laterally reinforced concrete columns with corroded splices

14:20 **Belletti B., Franceschini F., Martinelli E., Michelini E., Vecchi F.**
Seismic fragility assessment for an existing RC frame-wall dual system building with corroded bars

14:40 – 15:00 Coffee Break

C1) Prolongation of structural life with proactive or reactive interventions

KEY-NOTE LECTURES

15:00 **Tamon Ueda**, Shenzhen University
Prolongation of service life with structural interventions

15:30 **Benoit Bissonnette**, CRIB - Laval University
Practical Considerations and Guidance Pertaining to the Repair of Corroded Reinforced Concrete Structures

PRESENTED PAPERS

16:00 **Carisi F., Larocca M., Belardi A., De Paola A., Baldovin E., D'Antonio L., Vergnani M.**
Safety by material restoration of the flood detention basin's weir of the Enza river, Northern Italy

16:20 **Basdeki M., Apostolopoulos C.**
Mechanical behavior evaluation of B500c steel reinforcing bars with coating in a marine environment

16:40 **Becerra Mosquera J.A., Carro-López D., Herrador-Barrios M.F.**
Prolongation of structural life in carbonated basements and car parks

17:00 **Koulouris K., Gotsopoulos A., Apostolopoulos C.**
Experimental study on the recovery's degree of bond strength after using repair mortars

17:20 **Tastani S.**
Corroded steel anchorages in strain resilient cementitious composites

17:40 **Ruiz-Pinilla J.G., Montoya-Coronado L.A., del Río S., Ribas C., Cladera A.**
Active confinement of beams and columns using iron-based shape memory alloys

(*CET) CLOSING OF 3rd DAY

Friday 3 December

12:00 (*CET) OPENING OF THE 3rd DAY

C2) Case studies of corroded existing bridges and infrastructures

KEY-NOTE LECTURES

12:00 **Akio Kasuga**, Sumitomo Mitsui Construction
Evolution of bridge construction - Non-metallic bridges

12:30 **Edoardo Cosenza***, **Sessa M., Losanno D., Bilotta A.**, *Università degli Studi di Napoli Federico II
Application of the new Italian guidelines for existing bridges: an early case-study

13:00 **Marco di Prisco**, Politecnico di Milano
The maintenance plan for existing bridges: a useless piece of paper or a strategic document?

PRESENTED PAPERS

13:40 **Formisano A., Felitti M., Oliveto F., Mendicino L.**
Influence of different degradation mechanisms on structural robustness: the case study of a reinforced concrete arch bridge

14:00 **Markovic I., Kagermanov A.**
Structural capacity of an existing reinforced-concrete bridge with corroded reinforcement

14:20 **Granata M.F., La Mendola L., Lo Giudice E., Messina D.**
Effect of degradation on the structural behaviour of an existing cantilever reinforced concrete bridge in Southern Italy

14:40 **Spinella N., Messina D.**
Flexural and Shear Capacity Assessment of Corroded Bridge Beams

15:00 **Menga A., Kanstad T., Cantero D., Bathen L., Hornbostel K.**
Review of corrosion-induced failures of post-tensioned bridges

15:20 **Proverbio E., Recupero A., Venturi V.**
Integrating destructive and non-destructive inspection techniques in evaluating tendon corrosion in post-tensioned concrete beams

15:40 – 16:00 Coffee Break

16:00 **Round table on identifying the technical gaps for the structural evaluation of corroded concrete structures**
CHAIR: **Joost Walraven**, Em. TU Delft

As the main objective of this workshop is to move from research to daily engineering evaluation, this final Round Table aims to exchange some views and comments on the pending technical gaps for the structural evaluation of corroded concrete structures in spite of the contributions to this workshop

17:00 (*CET) **CLOSING CEREMONY**

- AWARDS
- Conclusion of the Workshop with Beatrice Belletti and Dario Coronelli

17:30 (*CET) CLOSING OF THE WORKSHOP
*(Central European Time)

REGISTRATION FEES

are VAT exempted and include participation in the virtual workshop and proceedings in electronic format.

Standard fee **€250,00**
(including CTE membership)

Reduced fee **€150,00**
(for CTE, *fib,* aicap Member 2021)

REGISTRATION FORM

You will **register** directly from the **CACRCS website** (www.cte-eventi.com/cacrcs/) and make the payment by credit card or bank transfer to CTE.

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