cte organizes

CACRCS DAYS 2020

1-4 DECEMBER 2020

WORKSHOP ONLINE

Capacity Assessment of Corroded Reinforced Concrete Structures

in collaboration with

fib CEB-FIP

fib Italy Young Members

aicap

with the support of

MASTER® BUILDERS SOLUTIONS

For any information about the event, please visit the website: www.cte-it.org

Collegio dei Tecnici della Industrializzazione Edilizia

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CACRCS DAYS 2020
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Venue: ON LINE

PROGRAM

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Fédération International du Béton

fib Italy Young Member

Associazione Italiana Calcestruzzo Armato Precompresso

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TOPIC

The capacity assessment of corroding reinforced concrete, fibre reinforced concrete and prestressed structures has become a most relevant engineering task with a significant social and economic impact. The need to develop codes for use in the practice spurs the research community to establish and share methods for the determination of material deterioration and mechanical properties, member resistance and structural capacity.

At the beginning of each session, chairpersons prepare two education presentations: the first one illustrates the fundamental, while the second one the research challenges of the topic treated in the session. Therefore, the virtual workshop offers didactic material for engineers, practitioners and a forum for scientists, concrete technologists, researchers, and academics to get a deeper knowledge about the corrosion of reinforced concrete structures

Accepted papers will be included in the Proceedings of the Workshop that will be send to Scopus-Database.

ORGANIZING COMMITTEE

Coordinators: **Beatrice Belletti, Dario Coronelli**
Anna Magri, *CTE*
David Fernández-Ordóñez, *fib Secretary General*
Luc Taerwe, *Editor-in-Chief Structural Concrete Journal fib*
Marta del Zoppo, Francesca Vecchi, Isabella Giorgia Colombo, *fib Italia Young Member*

SCIENTIFIC COMMITTEE

Carmen Andrade, Fabio Biondini, Fabio Bolzoni, Robby Caspeele, Airong Chen, Hugo Corres, Edoardo Cosenza, Marco di Prisco, Pawan Gupta, Mehdi Kashani, Federica Lollini, Karin Lundgren, Stuart Matthews, Camillo Nuti, Giovanni Plizzari, Zila Rinaldi, Jesús Rodríguez, Francesco Tondolo, Joost Walraven

AWARDS

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

VIDEO

As a speaker, You will present **in streaming** on Zoom from anywhere in the world. Anyway you will be invited to record your presentation and send it to the Organising Committee within.
We will use the registration only in the case, for any reason, you are unable to connect to zoom at the time scheduled for your presentation.
The author will have to sign an authorization document in order to grant the use of the videos by the organizing committee for the purpose of the event.

Recording/downloading of your video by other participants is strictly forbidden.

EVALUATION QUESTIONNAIRE

At the end of event all participants will be invited to fill in an evaluation questionnaire to express not only their degree of satisfaction of the event but also their suggestions for the improvement on the next CACRCS DAYS events and correlated initiatives.

PROGRAM

Tuesday 1 December

12:00 *CET OPENING OF THE WORKSHOP

*(Central European Time)

Welcome and Introduction

12:00 B. Belletti, D. Coronelli, Coordinator Event

12:15 Claudio Failla, CTE President

12:30 David Fernandez Odonez, fib Secretary General

INTRODUCTIVE KEY NOTES

13.00 Airong Chen
Disease inspection and performance evaluation of concrete components in bridges: engineering practices in China

13:30 Stuart Matthews
fib Model Code 2020, life-cycle management of existing concrete structures and the potential benefits of building as little as possible

A1) CORROSION INDUCED DAMAGE IN MATERIALS

KEY-NOTE LECTURES

14:00 Fabio Bolzoni, Matte Gastaldi
Experimental evaluation of rebars corrosion rate in concrete

14:30
Carmen Andrade
Advances in the description of corrosion induced cracking

PRESENTED PAPERS

15:00 N. Russo, E. Rossi, T. G. Nijland, R. Polder, F. Lollini
Corrosion products resulting from carbonation acting upon chloride-induced corrosion in 22 years old blast furnace slag concrete (ID23)

15:20 G. Scionti, D. Messina, A. Recupero, E. Proverbio
Issues in identifying damage progression in corroded PT concrete beams under flexural loads by Acoustic Emission technique (ID06)

15:40 F. Zanotto, A. Sirico, F. Vecchi, A. Balbo, P.Bernardi, B. Belletti, A. Malcevschi, V. Grassi, S. Merchiori, C. Monticelli
Durability of reinforced concrete containing biochar (ID08)

16:00 F. Lollini, E. Redaelli
Effect of environmental exposure conditions on the corrosion rate of carbon steel bars in carbonated concrete (ID03)

16:40 Break

A3) MECHANICAL PROPERTIES OF CONCRETE AND STEEL, BOND - SLIP RELATION IN THE CASE OF CORROSION

17:00 CET KEY-NOTE LECTURES

17:00 Karin Lundgren
What do we know about concrete, steel, and bond-slip relation for corroded bars?

17:30 Francesco Tondolo
Research developments on bond between corroded steel and concrete

PRESENTED PAPERS

18:00 A. Benenato, B. Ferracuti, S. Imperatore, M.Kioumarsi
Experimental tests on the bond performance of corroded plain steel bars (ID12)

18:20 S. Robuschi, K. Lundgren, I. Fernandez
Corrosion of naturally corroded, plain reinforcing bars (ID25)

18:40 K. Koulouris, M. Basdeki, C. Apostolopoulos
Influence of stirrups spacing on bond behaviour of corroded reinforced concrete elements (ID33)

19:00 H. Nasser, R. Vrijdaghs, C. Van Steen, L. Vandewalle, E. Verstrynge
Effect of corrosion damage on the tension-stiffening effect: A numerical investigation of the RC tension bar (ID37)

19:20 S. Haefliger, D. Yilmaz, U. Angst, W. Kaufmann
Corroded Tension Chord Model (CTCM) for Concrete Structures with locally corroded reinforcement (ID40)

Wednesday 2 December

A2) IN SITU INSPECTIONS IN CASES OF CORROSION

13:00 CET KEY-NOTE LECTURES

*(Central European Time)

13:00 Giovanni Plizzari
Chloride-Induced Corrosion in RC and FRC elements: test procedure and preliminary results

13:30 Pawan Gupta
Evaluation and Restoration of Severely Damaged Unbonded Post-Tensioned Structures"

PRESENTED PAPERS

14:00 C. Andrade
In-situ measurements of corrosion rate: methods and observed values (ID19)

14:20 C. Van Steen, H. Nasser, R. Vrijdaghs, E. Verstrynge
Upscaling acoustic emission monitoring from laboratory experiments to on-site application (ID32)

14:40 A. Benenato, B. Ferracuti, S. Imperatore, G.P. Lignola
The surface crack width: an index for the evaluation the stress state around the corroded reinforcement (ID38)

15:00 N. Di Stefano, E. Faccin, S. Giuseppe Mantelli, F. Minelli
Evaluation of reinforcement corrosion in reinforced or prestressed concrete bridges: a Province of Brescia case study (ID45)

15:20 A. Abdel-Mohti, S. Rupakheti
Monitoring Thermal Resistance of Concrete Slab (ID17)

15:40 Break

B1) EXPERIMENTAL TESTS ON CORRODED RC AND PC STRUCTURES

16:00 CET KEY-NOTE LECTURES

16:00 Zila Rinaldi
Failure mechanisms in corroded RC and PC elements

16:30 Jesús Rodríguez
Some thoughts on the structural performance of corroded concrete structures arising from past experimental results

PRESENTED PAPERS

17:00 A. Celik, H. Yalciner, A. Kumbasaroglu, A.I. Turan
Cyclic Loading Test on Highly Corroded Reinforced Concrete Columns (ID02)

17:20 F. Vecchi, B. Belletti, L. Franceschini, C. Andrade, J. Rodriguez, J.S. Montero
Flexural Tests on Prestressed Beams Exposed to Natural Chloride Action (ID04)

17:40 D. Messina, G. Scionti, A. Recupero, E. Proverbio
Failure behaviour of post-tensioned concrete beams presenting different corrosion damage in prestressing tendons (ID05)

18:00 A. Benenato, B. Ferracuti, S. Imperatore, M. Kioumarsi, S. Spagnuolo
Behaviour of corroded prestressed concrete beams damaged by corrosion (ID11)

Thursday 3 December

B2) IMPLEMENTATION OF THE EFFECT OF REINFORCEMENT CORROSION IN MODELS FOR THE DETERMINATION THE BEARING CAPACITY

12:00 CET KEY-NOTE LECTURES

*(Central European Time)

12:00 Marco di Prisco,
Design approaches concerning SLS and ULS in corroded structural elements

12:30 Joost Walraven
Significance of reinforcement corrosion for modelling the behaviour of existing structures

PRESENTED PAPERS

13:00 N. El-Joukhadar, S. Pantazopoulou
Assessment Procedures for Corroded Structures (ID07)

13:20 A. Marí, J. Bairán, E. Oller. N. Duarte
Simulation of the structural effects of corrosion and strengthening interventions on reinforced and prestressed concrete frames using a nonlinear step by step analysis model (ID26)

13:40 G. Campione, F. Cannella
Analytical prediction of the flexural response of prestressed concrete beams with corroded strands and loss of bond (ID27)

14:00 M. Del Zoppo, M. Di Ludovico, A. Prota
Effect of corrosion to the fragility assessment of RC buildings under tsunami loads (ID34)

14:40 A. Castel, D. Coronelli, K. Zandi
Structural modelling of the Response of Deteriorated RC and PSC members: Levels of Approximation for Model Code 2020 (ID42)

15:00 Break

C1) CASE STUDY OF EXISTING STRUCTURES AND INFRASTRUCTUREs

15:30 KEY-NOTE LECTURES

15:30 Hugo Corres Peiretti
What do we need to understand in order to inspect, assess and design interventions in concrete structures affected by corrosion?

16:00 Edoardo Cosenza
A focus on the new Italian guidelines for safety assessment of existing bridges

PRESENTED PAPERS

16:30 M.F. Granata, D. Messina, A. Recupero
Case-studies of corroded reinforced concrete bridges in Sicily (ID13)

16:50 M. Minotto, T. Serrapica, A. Contin, E. Viviani, L. Casarin, M. Cavetti, A. Mardegan
Static Safety Assessment of Existing Prestressed Concrete Bridges: Case Studies (ID15)

17:10 J. Wang, B. Joshi, M. Masud, Y. Lin, Y.L. Mo, T.T.C. Hsu
Structural Performance of Corroded Bridge Column and Drilled Shaft Connections with Non-Contact Lap Splices (ID30)

17:30 B. Bissonnette, D. Coronelli
A tale of two bridges: half joint failure and deterioration processes (ID43)

17:50 M.J. Osmolska, T. Kanstad, M.A.N. Hendriks, G. Markeset
Corrosion assessment and effect on the structural performance of pretensioned bridge girders in a coastal climate (ID35)

18 :10 S. Zaghian, B. Martín-Pérez, H. Almansour
The Effect of Corrosion and Traffic Loads on Bridge Columns Using Three-Dimensional Non-Linear Finite Element Analysis (ID29)

Friday 4 December

C2) PERFORMANCE OF CORRODED REINFORCEMENT CONCRETE STRUCTURES IN SEISMIC SITUATIONS

12:00 CET KEY-NOTE LECTURES

*(Central European Time)

12:00 Mehdi Kashani
Seismic Performance of Corrosion-Damaged RC Bridges: Current Trends and Future Demands

12:30 Camillo Nuti
Bridge Pier Corrosion in Seismic Areas: Forecasting and Future Behaviour and Assessment

PRESENTED PAPERS

13:00 M.F. Granata, B. Fontana, G. Culotta
Seismic assessment and retrofit of a concrete building highly damaged by reinforcement corrosion (ID01)

13:20 M. Bartolozzi, J.R. Casas, M. Domaneschi
Seismic performance of deteriorated concrete bridges: bonding failure effects (ID09)

13:40 S. Caprili, F. Mattei, W. Salvatore
A comparison between RC buildings with Dual-Phase and TempCore® bars in reference and corroded conditions (ID44)

14:00 E. Erduran, E. Martinelli
Some remarks on the seismic assessment of RC frames affected by carbonation-induced corrosion of steel bars (ID16)

14:20 F. Vecchi, B. Belletti
Parametric analysis of corroded reinforced concrete columns subjected to cyclic loading (ID21)

14:40 Break

C3) ROBUSTNESS AND RESILIENCE ISSUES OF CORRODED RC AND PC STRUCTURES. PREDICTIVE ESTIMATION OF THE RESIDUAL LIFE AND THE EFFECTS OF REPAIRING ACTIONS

15:00 KEY-NOTE LECTURES

15:00 Fabio Biondini

Life-Cycle Risk, Reliability, Robustness, and Resilience of Corroding RC/PC Bridges and Bridge Networks

15:30 Robby Caspeele
Time-Dependent Structural Resistance, Reliability and Robustness Assessment of Degrading Reinforced Concrete Structures Under Uncertainty: Recent Developments and Future Challenges

PRESENTED PAPERS

16:00 B. Belletti, H. Corres Peiretti, C. Andrade, M. Ghiretti, L. Franceschini, F. Vecchi
Evaluation of The Residual Life of Prestressed Concrete Beams Subjected to Corrosion (ID22)

16:20 E. Casprini, C. Passoni, A. Marini, G. Bartoli, M. Gastaldi, P. Riva
Effects of natural corrosion on the structural behaviour of existing structures: Corrosion Risk Scenarios and equivalent parameters (ID14)

16:40 C. Andrade, D. Izquierdo
Statistical considerations of corrosion onset and propagation (ID20)

17:00 D. Yilmaz, S. Haefliger, W. Kaufmann, U. Angst
New conceptual approach combining the probabilistic nature of chloride-induced, localized rebar corrosion and the structural load-deformation behaviour (ID41)

17:20 R. Vrijdaghs, C. Van Steen, H. Nasser, E. Verstrynge
Efficiently assessing the structural reliability of corroded reinforced concrete bridge girders (ID36)

17:40 M. A. Zanini, K. Toska, F. Faleschini, C. Pellegrino
How to schedule seismic retrofitting of reinforced concrete bridges subject to environmental deterioration, through seismic reliability analyses: Part 1 (ID46)

18:00 M. A. Zanini, K. Toska, F. Faleschini, C. Pellegrino
How to schedule seismic retrofitting of reinforced concrete bridges subject to environmental deterioration through seismic reliability analyses: Part 2 (ID47)

18:20 Engin Seyhan
Dual-phase, surface applied corrosion inhibitors for reinforced concrete

18:40 AWARDS

18:45 Conclusion of the workshop
with Beatrice Belletti e Dario Coronelli