CURRICULUM VITAE
OF MADDALENA CARSANA

Maddalena Carsana teaches courses of construction materials and durability of materials to students of the Schools of Civil, Environmental and Land Management Engineering, Building Engineering and Architecture of Politecnico di Milano.

Education and qualifications

2000: Degree in Civil Engineering at the Engineering Faculty of Politecnico di Milano, with curriculum "*Protection of steel in controlled low strength materials (CLSM)*" (in italian). (Tutors: Prof. Pietro Pedeferri, Prof. Luca Bertolini).

2004: Research Doctorate in Materials Engineering at Politecnico di Milano (cum Laude), with curriculum "Use of waste materials with pozzolanic properties for construction materials", Tutor Prof. P. Pedeferri, Supervisor Prof. L. Bertolini. A Part of research doctorate was carried out at Department of Civil Engineering Materials of Leeds University under the supervision of Prof. Chris L. Page.

2005 - 2018: Research assistant in the field of Materials Science and Technology (ING-IND/22) at Department of Chemistry, Materials and Chemical Engineering "G.Natta" of Politecnico di Milano.

Since May 2018: Associate professor in the field of Materials Science and Technology (ING-IND/22) at Department of Chemistry, Materials and Chemical Engineering "G.Natta" of Politecnico di Milano.

Teaching activity

A.Y 2004-2005: Science a*nd Technology of Materials, 2 CFU* (Scienza e Tecnologia dei Materiali) in the integrated course of Fundamental of Technology (Fondamenti di tecnologia), School of Architecture of Politecnico di Milano;

A. Y. 2005-2006: course of *Technology of Materials, 5 CFU* (Tecnologia dei Materiali), bachelor level in Civil and Architectural Engineering of Politecnico di Milano – Polo di Lecco; Science a*nd Technology of Materials, 2 CFU* in the integrated course of Fundamental of Technology (Fondamenti di tecnologia), School of Architecture of Politecnico di Milano;

A. Y. 2006-2007: course of *Technology of Materials, 5 CFU* (Tecnologia dei Materiali), bachelor level in Civil and Architectural Engineering of Politecnico di Milano – Polo di Lecco;

A. Y. 2007-2008: course of *Technology of Materials, 5 CFU* (Tecnologia dei Materiali), bachelor level in Civil Engineering of the School of Civil, Environmental and Land Management Engineering of Politecnico di Milano;

A. Y. 2008-2009: *Technology of Materials, 5 CFU* (Tecnologia dei materiali) in the integrated course of Chemistry + Technology of Materials (Chimica + Tecnologia dei Materiali), bachelor level in Civil Engineering of Politecnico di Milano – Polo di Lecco;

A. Y. 2009-2010, 2010-2011: course of *Construction Materials, 9 CFU* (Materiali da costruzione) bachelor level in Building Engineering of Politecnico di Milano; *Technology of Materials, 5 CFU* (Tecnologia dei materiali) in the integrated course of Chemistry + Technology of Materials (Chimica + Tecnologia dei Materiali), bachelor level in Civil Engineering of Politecnico di Milano – Polo di Lecco;

A. Y. 2011-2012: *Technology of Materials, 5 CFU* (Tecnologia dei materiali) in the integrated course of Chemistry + Technology of Materials (Chimica + Tecnologia dei Materiali), bachelor level in Civil Engineering of Politecnico di Milano – Polo di Lecco;

A. Y. 2012-2013, A. Y. 2013-2014: course of *Technology of Materials, 5 CFU* (Tecnologia dei Materiali), bachelor level in Civil Engineering of the School of Civil, Environmental and Land Management Engineering of Politecnico di Milano;

A. Y. 2014-2015: *Technology of Materials, 5 CFU* (Tecnologia dei materiali) in the integrated course of Chemistry + Technology of Materials (Chimica + Tecnologia dei Materiali), bachelor level in Civil Engineering of Politecnico di Milano – Polo di Lecco; course of *Construction Materials, 6 CFU* (Materiali da costruzione), bachelor level in Civil Engineering of the School of Civil, Environmental and Land Management Engineering of Politecnico di Milano;

A. Y. 2015-2016: *Technology of Materials, 4 CFU* (Tecnologia dei materiali) in the integrated course of Chemistry + Technology of Materials (Chimica + Tecnologia dei Materiali), bachelor level in Civil Engineering of Politecnico di Milano – Polo di Lecco; course of *Construction Materials, 6 CFU* (Materiali da costruzione),

bachelor level in Civil Engineering of the School of Civil, Environmental and Land Management Engineering of Politecnico di Milano;

A. Y. 2016-2017: Course of Science a*nd Technology of Materials for architecture, 4 CFU* (Scienza e Tecnologia dei Materiali per l'architettura), School of Architecture of Politecnico di Milano; course of *Construction Materials*, *6 CFU* (Materiali da costruzione), bachelor level in Civil Engineering of the School of Civil, Environmental and Land Management Engineering of Politecnico di Milano;

A. Y. 2017-2018: Course of *Materials, Durability and restoration* (Materiali, Durabilità e Restauro), *9 CFU* master level of Building Engineering of Politecnico di Milano; course of *Construction Materials, 6 CFU* (Materiali da costruzione), bachelor level in Civil Engineering of the School of Civil, Environmental and Land Management Engineering of Politecnico di Milano.

A. Y. 2018-2019: Course of *Materials, Durability and restoration* (Materiali, Durabilità e Restauro), *9 CFU* master level of Building Engineering of Politecnico di Milano; course of *Materials for Structures, 6 CFU* (Materiali per le strutture), bachelor level in Civil Engineering of the School of Civil, Environmental and Land Management Engineering of Politecnico di Milano – Polo di Lecco.

Maddalena Carsana has also made seminars and exercises of various courses of Materials Science and Technology (since 2000).

Maddalena Carsana has been supervisor and co-supervisor of almost 60 theses of Bachelor degree and Master degree of Civil Engineering and Building Engineering at Politecnico di Milano (since 2001).
She has been supervisor of one Ph.D. thesis in Materials Engineering at Politecnico di Milano (Fan Yang, "Corrosion protection of steel embedded in new sustainable cementitious materials", 2018).

Scientific activity

The scientific activity of Maddalena Carsana is focused on the durability of building materials, especially reinforced concrete. Corrosion of steel in concrete and its prevention are the main fields of her scientific activity. Different aspects of corrosion of steel in concrete have been investigated in order to define the factors that influence the initiation and the propagation of the phenomenon.

Her research field concerns the study of new cements (such as sulfoaluminate-based binders) and mineral additions to use in concrete (both traditional and innovative supplementary cementitious materials); different studies have been carried out with aim at evaluating the effect of different mineral additions on corrosion of reinforcement concrete structures.

Performance and durability properties of self-compacting concrete (SCC), light-weight concrete (such as no-fines concrete and those made with expanded clay and expanded glass aggregates), cementitious materials suitable for backfilling of mini-tunnels and mines (such as controlled low strength materials (CLSM) and flowable soil-cement mixtures) have also been studied. With regard the soil-cement mixtures, also durability properties of cement-stabilised rammed earth have been studied. Moreover, corrosion behaviour of steel reinforcement embedded in these innovative cementitious materials has been evaluated. Research activity of Maddalena Carsana pays special attention to corrosion of carbon steel induced by carbonation and by chlorides penetration, through the study and definition of the different factors which influence the initiation and the propagation of such phenomena. Corrosion due to stray currents has been also studied. The corrosion behavior of stainless steel and galvanized reinforcing bars in conventional concrete and new cementitious materials exposed to aggressive environments has been also studied. Influence of surface conditions of steels and the presence of welding oxides have been also investigated.

Her research activity is focused also on the inspection and diagnosis of the degradation of reinforced concrete structures and the repair of these structures by means of conventional and electrochemical techniques. Different preventative techniques have been studied with the aim of providing adequate tools to designers of reinforced concrete structures for a proper evaluation of their technical and economical effectiveness, in relation with the aggressiveness of the environment and the required service life of the structure.

Part of research activity of Maddalena Carsana has also considered the inspection of cultural heritage structures with historical and architectural relevance to evaluate conservation state of ancient mortars and modern cementitious materials and the techniques used in the restoration of these structures. Another her research topic is related to corrosion of metal inserts embedded in masonry on the consequent degradation of historic buildings. Effects of the composition of the materials in masonry and the humidity and temperature conditions on the corrosion behavior of metal inserts have been studied.

Maddalena Carsana is member of Editorial board of the journal Structural (since 2016).

She is also member of World Road Association AIPCR, Technical Committee "Infrastructures – Roads

bridges (2017-2019).

She is member of the Council of School of Civil, Environmental and Land Management Engineering (since 2017). She collaborates as segretary in Programme board (Consiglio di Corso di Studio or CCS) of School of Civil, Environmental and Land Management Engineering (since 2017).

Publications

Maddalena Carsana is co-authored of about 120 publications on international and national journals and conference proceedings. She is an author of the book Bertolini, L., Carsana, M., Materiali da Costruzione, Volume I. CittàStudi, Aprile 2014.

Selected publications are listed below:

Carsana M., Gastaldi M., Lollini F., Redaelli E., Durability-related properties of concrete made with chloride-contaminated materials, Advances in Civil Engineering Materials, 2019; 8:1-18; DOI: 10.1520/ACEM20180123;

Meek A.H., Beckett C.T.S., Carsana M., Ciancio D., Corrosion protection of steel embedded in cement-stabilised rammed earth, Construction and Building Materials, 2018; 187: 942-953, DOI: 10.1016/j.conbuildmat.2018.07.210;

Carsana M., Canonico F., Bertolini L., Corrosion resistance of steel embedded in sulfoaluminate-based binders, Cement and Concrete Composites, 2018; 88:211-219, DOI: 10.1016/j.cemconcomp.2018.01.014;

Redaelli E., Carsana M., Gastaldi M., Lollini F., Torabian Isfahani F., Bertolini L., Corrosion behaviour of reinforcement in concrete with chloride-contaminated raw materials-Part II: On site preliminary results, Metallurgia Italiana, 2017; 109(7-8) :43-46;

Lollini F., Carsana M., Gastaldi M., Redaelli E., Torabian Isfahani F., Bertolini L., Corrosion behaviour of reinforcement in concrete with chloride-contaminated raw materials-Part I: Laboratory tests, Metallurgia Italiana, 2017; 109(7-8) :39-42;

Lollini F., Carsana M., Bertolini L., A study on the cement-based decorative materials in the San Fedele Church in Milan, 2017; 7:36-44; DOI : 10.1016/j.cscm.2017.05.004;

Carsana M., Bertolini L., Characterization of segregated grout promoting corrosion of posttensioning tendons, Journal of Materials in Civil Engineering, 2016; 28(6), DOI: 10.1061/(ASCE)MT.1943-5533.0001451;

Carsana M., Gastaldi M., Lollini F., Redaelli E., Bertolini L., Improving durability of reinforced concrete structures by recycling wet-ground MSWI bottom ash, Materials and Corrosion, 2016; 67(6):573-582, DOI: 10.1002/maco.201608881;

Bertolini L., Carsana M., Gastaldi M., Lollini F., Redaelli E., Corrosion of steel in concrete and its prevention in aggressive chloride-bearing environments, International Conference on Durability of Concrete Structures, 5th International Conference on Durability of Concrete Structures, ICDCS 2016; pp:13:25, Shenzhen University Shenzhen, Guangdong Province; China; 30 June 2016 through 1 July 2016;

Lollini F., Carsana M., Gastaldi M., Redaelli E., Bertolini L., Nanni A., Preliminary assessment of durability of sustainable RC structures with mixed-in seawater and stainless steel reinforcement, Key Engineering Materials, 2016, 711:52-59;

Carsana M., Marra E., Bertolini L., Corrosion behavior of metal inserts in simulated ancient masonry mortars, Construction and Building Materials, 2015; 95:457-466, DOI: 10.1016/j.conbuildmat.2015.07.110;

Carsana M., Bertolini L., Corrosion failure of post-tensioning tendons in alkaline and chloride-free segregated grout: a case study, Structure and Infrastructure Engineering, 2015; 11(3):402-411, DOI: 10.1080/15732479.2014.887736;

Lollini F., Carsana M., Gastaldi M., Redaelli E., Bertolini L., The challenge of the performance-based approach for the design of reinforced concrete structures in chloride bearing environment, Construction and Building Materials, 2015;79:245-254, 10.1016/j.conbuildmat.2014.12.044;

Ferrara L., Krelani V., Carsana M., A "fracture testing" based approach to assess crack healing of concrete with and without crystalline admixtures, Construction and Building Materials, 2014; 68:535-551, DOI: 10.1016/j.conbuildmat.2014.07.008;

Tittarelli F., Carsana M., Ruello M.L., Effect of hydrophobic admixture and recycled aggregate on physical-mechanical properties and durability aspects of no-fines concrete, Construction and Building Materials, 2014; 66:30-37, 10.1016/j.conbuildmat.2014.05.043;

Carsana M., Frassoni M., Bertolini L., Comparison of ground waste glass with other supplementary cementitious materials, Cement and Concrete Composites, 2014; 45:39-45, DOI: 10.1016/j.cemconcomp.2013.09.005;

Solgaard A.O.S., Carsana M., Geiker M.R., Küter A., Bertolini L., Experimental observations of stray current effects

on steel fibres embedded in mortar, Corrosion Science, 2013; 74:1-12, DOI: 10.1016/j.corsci.2013.03.014;

Tittarelli F., Carsana M., Bellezze T., Corrosion behavior of reinforced no-fines concrete, Corrosion Science, 2013; 70:119:126, 10.1016/j.corsci.2013.01.020;

Bertolini L., Carsana M., Gastaldi M., Lollini F., Redaelli E., Binder characterisation of mortars used at different ages in the San Lorenzo church in Milan, Materials Characterization, 2013; 80:9-20, DOI: 10.1016/j.matchar.2013.03.008;

Carsana M., Tittarelli F., Bertolini L., Use of no-fines concrete as a building material: Strength, durability properties and corrosion protection of embedded steel, Cement and Concrete Research, 2013; 48:64-73, DOI: 10.1016/j.cemconres.2013.02.006;

Carsana M., Bertolini L., Fluidized soil-cement mixes for backfilling of flooded cavities, Materials and Structures, 2012; 45(1-2):53-65, DOI: 10.1617/s11527-011-9748-3;

Bertolini L., Carsana M., High ph corrosion of prestressing steel in segregated grout, RILEM Bookseries, 2011; 5:147:158, DOI: 10.1007/978-94-007-0677-4_10;

Redaelli E., Carsana M., Gastaldi M., Lollini F., Bertolini L., Electrochemical techniques for the repair of reinforced concrete suffering carbonation-induced corrosion, Corrosion Reviews, 2011; 29(5-6):179-190, DOI: 10.1515/CORRREV.2011.008;

Bertolini L., Carsana M., Gastaldi M., Lollini F., Redaelli E., Corrosion assessment and restoration strategies of reinforced concrete buildings of the cultural heritage, Materials and Corrosion, 2011; 62(2):146-154, DOI: 10.1002/maco.201005773;

Bertolini L., Carsana M., Frassoni M., Gelli M., Pozzolanic additions for durability of concrete structures, Proceedings of Institution of Civil Engineers: Construction Materials, 2011; 164(6):283:291, DOI: 10.1680/coma.1000041;

Bertolini L., Carsana M., Spada M., Filling of a flooded gypsum mine with a flowable soil-cement mix, Journal of Materials in Civil Engineering, 2010; 22(6):628-636, DOI: 10.1061;

Bertolini L., Carsana M., Fluidized Soil-Cement Mixes for Backfilling, SPECIAL TOPICS ON MATERIALS SCIENCE AND TECHNOLOGY: AN ITALIAN PANORAMA, Edited by: Acierno, D; DAmore, A; Caputo, D; et al., 2009, pp:35:44;

Bertolini L., Carsana M., Marra E., Degradation of Mortars and Steel Inserts from the Ciborium of the Medieval Abbey of San Pietro al Monte, SPECIAL TOPICS ON MATERIALS SCIENCE AND TECHNOLOGY: AN ITALIAN PANORAMA, Edited by: Acierno, D; DAmore, A; Caputo, D; et al., 2009, pp:45:54;

Bertolini L., Carsana M., Redaelli E., Conservation of historical reinforced concrete structures damaged by carbonation induced corrosion by means of electrochemical realkalisation, Journal of Cultural Heritage, 2008; 9(4):376-385, DOI: 10.1016/j.culher.2008.01.006;

Shaw S.J., Page C.L., Brough A.R., Forth J.P., Page M.M., Jones T.R., Carsana M., Supercritical carbonation of Casamic, Sustainable Construction Materials and Technologies - International Conference on Sustainable Construction Materials and Technologies, 2007, pp:367:373;

Bertolini L., Carsana M., Pedeferri P., Corrosion behaviour of steel in concrete in the presence of stray current, Corrosion Science, 2007; 49(3):1056-1068, DOI: 10.1016/j.corsci.2006.05.048;

Bertolini, L.; Carsana, M.; Pedeferri, P, Influence of stray currents on corrosion of steel in concrete, CORROSION OF REINFORCEMENT IN CONCRETE: MONITORING, PREVENTION AND REHABILITATION TECHNIQUES, 2006, 38:105:119; DOI: 10.1533/9781845692285.105

Bertolini L., Carsana M., Cassago D., Curzio A.Q., Collepardi M., MSWI ashes as mineral additions in concrete, Cement and Concrete Research, 2004; 34(10):1899-1906, DOI: 10.1016/j.cemconres.2004.02.001;

Bertolini, L; Carsana, M; Gastaldi, M, Properties of a self-compacting mortar with lightweight aggregate, SYSTEM-BASED VISION FOR STRATEGIC AND CREATIVE DESIGN, 2003; 1-3:1929:1935;

Milan, July, 2019

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