FAUSTYN RECHA, PhD C.Eng

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Academic and research career

Information on education, academic degrees/titles and employment

In June 2010, I graduated with distinction from the High School in Psary. In the same year, I began my studies at the Faculty of Civil Engineering at the Częstochowa University of Technology. I studied full-time, specializing in Building and Engineering Structures. I defended both my engineering and master's thesis with very good results. After graduating in 2015, I worked for 1 year in a design studio closely related to the prefabrication of reinforced concrete elements. In 2016, I began my doctoral studies at the Faculty of Civil Engineering at the Silesian University of Technology in Gliwice, while simultaneously working in design offices. In June 2018, I obtained construction qualifications to design and manage construction works in the construction and building specialty without restrictions.

I carried out scientific issues related to the durability of reinforced concrete elements and the mechanics of their fracture. As a result of this work, in January 2021 I submitted my doctoral thesis entitled "Modelling the degradation of reinforced concrete elements due to reinforcement corrosion", which, after receiving positive reviews, I finally defended in May of the same year, obtaining a degree in engineering and technical sciences in the scientific discipline of Civil Engineering and Transport. In the same year, I began working as an assistant professor at the Faculty of Architecture, Construction and Applied Arts of the then Higher School of Technology in Katowice, where I still work (currently Academy of Silesia). As part of my scientific work, I undertake further issues related to the issues of the theory of reinforced concrete structures, numerical modelling of structures and the mechanics of reinforced concrete structures.

In parallel to my scientific activity, I cooperate with the economic and industrial environment as a designer in the field of construction and building. I am the author of numerous design works, assessments of technical condition and studies related to the analysis of stress states of construction elements.

Lectures and presentations

I am the author of numerous publications in the above-mentioned scope in the field of domestic and foreign industry journals. Throughout the entire period of my professional and scientific development, I have participated in numerous training courses, domestic and international conferences, where I presented my scientific achievements.

The most important of which recently include:

- 14th International Conference on New Trends in Statics and Dynamics of Buildings, 13-14 October 2016, Bratislava (Slovakia).
- 12th Central European Congress on Concrete Engineering, 31 August - 1 September 2017, Tokaj (Hungary);
- 15th International Conference on New Trends in Statics and Dynamics of Buildings, 19-20 October 2017 Bratislava (Slovakia).
- 27th National Scientific and Technical Conference Anti-Corrosion. Systems – Materials – Coatings, EFC Event No. 450**,** 20-22 March 2019, Ustroń (Poland);
- 66th Krynica Scientific Conference of the Committee of Civil and Water Engineering of the Polish Academy of Sciences and the Science Committee of the Polish Association of Engineers and Technicians, 20-24 September 2020, Krynica Zdrój – Muszyna Złockie (Poland).
- 68th Krynica Scientific Conference of the Committee of Civil and Water Engineering of the Polish Academy of Sciences and the Science Committee of the Polish Association of Engineers and Technicians, 24-28 September 2023, Gliwice (Poland);
- 31st International Conference on Sructural Failures, 20-24 May 2024, Międzyzdroje (Poland);
- Creative Construction Conference, 29 June - 2 July 2024, Prague (Czech Republic).

- 69th Krynica Scientific Conference of the Committee of Civil and Water Engineering of the Polish Academy of Sciences and the Science Committee of the Polish Association of Engineers and Technicians, 21-24 September 2025, Gliwice (Poland);

Prizes and Awards
For my scientific activity related to the analyzed issues, I have been awarded several times including, together with my co-authors, a one-time scholarship from the Rector of the Silesian University of Technology in Gliwice (Poland).

In September 2020, I took second place in the poster session of young scientists at the 66th Scientific Conference of the Committee on Civil and Water Engineering of the Polish Academy of Sciences and the Science Committee of the Polish Association of Engineers and Technicians.

In the technical knowledge competition "Modern Engineer" organized by the Silesian District Chamber of Construction Engineers in Katowice, I took fourth place in the autumn edition of 2018, and then seventh place in the spring edition of 2019.

Other significant achievements
Since 2022, I have been the coordinator of the scientific discipline of Civil Engineering, Geodesy and Transport at the Academy of Silesia in Katowice (Poland). I work closely with scientific units in Germany, Slovakia, China and the USA, where I have completed research internships or have joint publications.

I completed in 2022 a 5-day internship at the Technische Hohschule in Deggendorf (Germany) on April 24-29, where I was a lecturer on issues related to the durability of reinforced concrete elements and mechanics of materials. As part of the internship, I also participated in seminars entitled "Preparation of a concrete mixture design using the example of a large-area load-bearing floor slab of the underground car park of a multi-storey building" and "The repair principle 8.3 - opportunities - risks and current developments". Then in 2024, from October 14 to 31, I completed an scientific internship at the University of Zilina (Slovakia), within which I established contacts in the field of research and analysis of corroded reinforced concrete elements. I led a seminar on the topic of corrosion damage in reinforced concrete. Thanks to the cooperation, I gained the opportunity to act as a reviewer for the Civil and Environmental Engineering journal.

I developed an individual solution for an innovative connection of prefabricated balcony slabs with prefabricated slabs of ceiling systems. Currently, my solution is at the stage of verification by the Patent Office of the Republic of Poland.

I teach first- and second-cycle students in the following subjects: concrete structures, structural mechanics, corrosion of building materials and advanced mechanical issues.

My cooperation with the economic community, in which I use my scientific knowledge, is confirmed by references from institutions and local governments.

Since 2018, I have been a member of the PZITB branch in Gliwice.

I have been pursuing my scientific career continuously since 2016.

I have construction qualifications to design and manage construction works without restrictions in the construction specialty. I'm an author of over 200 construction and executive designs as well as technical condition opinions, construction manager, investor's supervision inspector.

Participant of numerous trainings and courses in the field of technical knowledge in construction.

Most important research achievement

I consider the description and formulation of a model of the degradation of a reinforced concrete element due to the corrosion of reinforcing steel, along with its experimental verification, to be the greatest

scientific achievement in my career. When undertaking the task, the focus was on several aspects that are important from the perspective of developing the model:

Formulation of a thermomechanical model that allows for the assessment of the propagation of crack opening in concrete elements subjected to accelerated reinforcement corrosion tests.

Formulation of the volumetric strain rate tensor, the coordinates of which depend on the intensity of the corrosion current, the function characterizing the interaction of corrosion products in time and the phase of the corrosion process, as well as the computational electrochemical equivalent of reinforcing steel.

Development of a method that allows for the experimental determination of the critical time, which is crucial for the correct description of the degradation of the concrete cover.

Assessment using simulation methods (Monte Carlo) of the sensitivity of the model to the uncertainty of physicochemical parameters defining the corrosion process of reinforcement in concrete.

I am currently working on issues related to the development of a non-invasive methodology for estimating the density of the corrosion current based on its deflection. The work is at the stage of experimental verification of the theoretical model.

EMPLOYMENT:

- **2021.09.27 – until today** – Assistant professor at the Faculty of Architecture, Construction and Applied Arts of the Academy of Silesia in Katowice (Poland).
- **2024.10.14 – 2024.10.31 -** Department of Structures and Bridges, Faculty of Civil Engineering, University of Zilina, (Slovakia) - science internship.
- **2022.04.14 – 2022.04.18 -** Faculty of Civil Engineering, Technische Hohschule in Deggendorf (Germany) - science internship.
- **2016.10.01 – 2021.05.27** – PhD student at the Faculty of Civil Engineering of the Silesian University of Technology in Gliwice (Poland).

EDUCATION:

- **2021.05.27**: Completed third-cycle studies - doctoral studies at the Faculty of Construction of the Silesian University of Technology, obtained the title: Ph.D. engineering and technical sciences in the scientific discipline of civil engineering and transport, specializing in construction.
- **2015.07.09** – Completed second-cycle studies - master's degree at the Częstochowa University of Technology, obtained title: M.Sc. construction, specializing in Building and Engineering Structures.
- **2014.02.07** – Completed first-cycle engineering studies at the Częstochowa University of Technology, obtained the title: Eng. construction, specializing in Building and Engineering Structures.

SCIENCE PUBLICATIONS:

1) Recha F.: Estimation of corrosion current density taking into account the uncertainty of the model parameters. Civil and Environmental Engineering, 2024 (article accepted, in publication).
2) Recha, F.; Raczkiewicz, W.; Bacharz, K.; Wójcicki, A.; Bujňáková, P.; Koteš, P. Experimental Verification of the Model for Estimating the Corrosion Current of Reinforcement in an RC Element. *Materials* 2025, *18*, 2945. https://doi.org/10.3390/ma18132945
3) Recha F; Blazy J.. Assessment of the structure work and repair of the museum building in Lisowice. Przegląd Budowlany, 7/2024, doi: 10.5604/01.3001.0054.8885
4) Kępniak, M.; Recha, F.; Prochoń, P. *Application of a Generalized Utility Function to Determine the Optimal Composition of Geopolymer Mortar*. Materials 2024, *17*, 6237. https://doi.org/10.3390/ma17246237
5) Recha F. *Expert assessment of the suitability of a residential building for use based on the level of ceiling*

stress. Zeszyty Naukowe Wyższej Szkoły Technicznej w Katowicach ISSN 2082-7016; eISSN 2450-5552 2023, nr 17, s. 43-57, DOI: 10.54264/0074
6) Recha F., Yurkova K., Krykowski T. *Application of Interval Analysis to Assess Concrete Cover Degradation in Accelerated Corrosion Tests*. Materials , 2023 16. doi: 10.3390/ma16175845.
7) Drobiec Ł., Recha F.: *Assessment of the performance of the reinforced concrete structure of an underground water tank*. Przegląd budowlany 3-4, str. 39-46, 2023, doi: 10.5604/01.3001.0016.3249.
8) Recha F.: *Estimation method of corrosion current density of RC elements*. Open Engineering. 13 2023, 10.1515/eng-2022-0430.
9) Recha F.: *Method of estimation of corrosion current based on deflection of reinforced concrete elements*. Zeszyty naukowe WST, 2022 str. 57-64. doi:10.54264/0032.
10) Recha F., Nagel P.: *Rules for conducting periodic technical inspections of buildings in terms of safety and use*. BUILDER 295(2):12-14, January 2022
11) Recha F.: *Modelowanie korozji zbrojenia elementów żelbetowych przy uwzględnieniu różnych postaci funkcji uszkodzenia.* Współczesne zagadnienia z inżynierii lądowej. Prace naukowe doktorantów. Pod. red. Iwona Pokorska-Silva, Krzysztof Gromysz. s. 279-290, bibliogr. 25 poz. Gliwice: Wydaw. Politechniki Śląskiej, 2020, p-ISBN 978-83-7880-696-7
12) Krykowski T., Jaśniok T., Recha F.: *Modelowanie czasu uszkodzenia otuliny betonowej z uwzględnieniem niepewności parametrów modelu.* Ochrona przed Korozją, 62 nr 3 s. 69-73, 2019 r. bibliogr. 11 poz. p-ISSN: 0473-7733 e-ISSN: 2449-9501 DOI: 10.15199/40.2019.3.1
13) Recha F.: *Weryfikacja doświadczalna numerycznego modelu pękania betonu wywołanego przyspieszoną korozją zbrojenia*, Ujęcie aktualnych problemów inżynierii lądowej. Prace naukowe doktorantów. Praca zbiorowa. Pod red. Karolina Knapik-Jajkiewicz, Krzysztof Gromysz, s. 325-336, bibliogr. 8 poz., Gliwice: Wydaw. Politechniki Śląskiej, 2019, p-ISBN: 978-83-7880-637-0
14) Recha F.: *Symulacja MES nośności ramy żelbetowej poddanej lokalnym wpływom korozji stali zbrojeniowej.* Ujęcie aktualnych problemów budownictwa. Prace naukowe doktorantów. Praca zbiorowa. Pod red. Karolina Knapik, Krzysztof Gromysz, s. 189-198, bibliogr. 7 poz., Gliwice: Wydaw. Politechniki Śląskiej, 2018 p-ISBN: 978-83-7880-539-7
15) Jaśniok T., Krykowski T., Recha F.: *Ciągły pomiar stężenia jonów chlorkowych w betonie.* Ochrona przed Korozją 60 nr 5 s. 182, 2017r. p-ISSN: 0473-7733 e-ISSN: 2449-9501
16) Recha F., Jaśniok T., Krykowski T.: *Numeryczna symulacja spadku nośności konstrukcji żelbetowej w wyniku korozji zbrojenia.* 15th International Conference on New Trends in Statics and Dynamics of Buildings, Bratislava, Slovakia, October 19-20, 2017. Conference proceedings. Eds. Norbert Jendzelovsky, Alzbeta Grmanova. Slovak University of Technology in Bratislava. Faculty of Civil Engineering, Slovak Society of Mechanics SAS, Tecnologico de Monterrey. Campus Puebla. Mexico, Bratislava: dysk optyczny (CD-ROM) s. 39-44, bibliogr. 7 poz., Slovak University of Technology, 2017r., e-ISBN: 978-80-227-4732-5 http://www.newtrends.sk/dokumenty/proceedings_2017.pdf
17) Recha F.: *Symulacja MES pękania próbek betonowych w wyniku korozji zbrojenia w zależności od przyjętej funkcji osłabienia.* Wprowadzenie do wybranych zagadnień z inżynierii lądowej. Prace naukowe doktorantów. Praca zbiorowa. Pod red. Krzysztof Gromysz, Rafał Domagała, s. 165-172, bibliogr. 12 poz., Gliwice: Wydaw. Politechniki Śląskiej, 2017r., p-ISBN: 978-83-7880-453-6
18) Recha F., Jaśniok T., Krykowski T.: *The simulation of corrosion degradation of concrete specimen in stationary heat and moisture conditions.* Architecture Civil Engineering Environment vol. 10 nr 4 s. 107-113, bibliogr. 17 poz., 2017r., p-ISSN: 1899-0142, http://acee-journal.pl/cmd.php?cmd=download&id=dbitem:article:id=489&field=fullpdf, work presented during a scientific conference: Innovative materials and technologies for concrete structures. The 12th Central European Congress on Concrete Engineering CCC 2017, Tokaj, Hungary, 31 August to 1 September 2017. Proceedings of the fib Congress. Ed. by Gyorgy L. Balazs, Kalman Koris, Katalin Kopecsko, s. 127-134, bibliogr. 20 poz., Hungarian Group of fib, 2017r., p-ISBN: 978-963-12-9651-8
19) Recha F., Bartoszek M., Krykowski T.: *Analiza porównawcza wpływu wyboru modelu betonu na czas degradacji otuliny betonowej w wyniku korozji zbrojenia* 14th International Conference on New Trends in Statics and Dynamics of Buildings, Bratislava, Slovakia, October 13-14, 2016. Conference proceedings. [Dokument elektroniczny]. Eds. N. Jendzelovsky, A. Grmanova. Slovak University of Technology in Bratislava. Faculty of Civil Engineering, Slovak Society of Mechanics SAS, Bratislava: Slovak University of Technology, 2016r., dysk optyczny (CD-ROM) s. 1-6, bibliogr. 13 poz., e-ISBN: 978-80-227-4613-7, http://www.newtrends.sk/dokumenty/proceedings_2016.pdf,
20) Krykowski T., Jaśniok T., Recha F., Karolak M. *A Cracking Model for Reinforced Concrete Cover, Taking Account of the Accumulation of Corrosion Products in the ITZ Layer, and Including Computational and Experimental Verification*. Materials 13 (23), 5375, 2020.
21) Recha F.: *Modeling the degradation of reinforced concrete elements as a result of reinforcement corrosion.,* Dissertation, Gliwice, January 2021.