

Mouad MADHOUNI, Structural Engineer, PhD

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SUMMARY

After nearly 9 years of dedication within the confines of the National Institute of Applied Science (INSA Rennes, France), with two periods abroad in England (2020) and Canada (2024), I was finally declared a doctor of engineering on December 20, 2024, with highest praise (*summa cum laude*) from the jury members regarding the quality of the established work. The subject of my PhD thesis was part of the European project LASTTS, specializing in I-beam to rectangular hollow section (RHS) column connections using passing-through plates.

I currently work as a civil engineer at Egis Industries, in the nuclear sector. Egis is a leading international player, particularly in the design and construction of nuclear islands across Europe, North America, and Asia. My work involves, but no limited to, the design and calculation of buildings both in the nuclear and conventional islands to withstand accidental loads such as earthquakes and airplane crash.

WORK EXPERIENCE

Structural Engineer - Nuclear Sector (Egis, France) Jun. 2025 - Present

- Pre-design of the fuel (HK) and electric (HL) buildings to resist airplane crash and seismic loads.
- Design study of SpeedCore-like panels (double skinned steel plates filled with concrete) in order to take advantage of modular construction in the nuclear industry in France.

International visiting scholar - MITACS fellow (UofT, Toronto) Sep. 2024 - Jan. 2025

- Evaluation of how research findings from the LASTTS project can be integrated into North American practice.
- Proposal of design methods aligned with North American codes (AISC - CISC/CSA S16:24) for connections with through plates.
- An article, outlining design recommendations, will soon be submitted to the AISC Engineering Journal.
- Host supervisor: Prof. Jeffrey Packer - jeffrey.packer@utoronto.ca

R&D and Design Engineer - LASTTS EU project (LGCGM, Rennes) Sep. 2021 - Jan. 2025

- Supervisor: Associate Prof. Maël Couchaux - mael.couchaux@insa-rennes.fr
- PhD at the National Institute of Applied Science (INSA) Rennes, France
- European project LASTTS (LASer cutting Technology for Tubular Structures)
- Semi-rigid and fully-rigid beam-column connections (HSS tubes with and without concrete infill)
- 12 full-scale experimental tests: monotonic (8) and cyclic (4)
- Numerical simulations using Ansys Mechanical APDL (+1000 simulations run)
- Design recommendations for both strength and stiffness, to be integrated in Eurocodes 3 (steel structures) and 4 (composite steel and concrete structures).

R&D and Design Intern (CTICM, Paris Greater Metropolitan Area) Feb. 2021 - Aug. 2021

- The CTICM is a french technical organization of reference in steel and composite construction.
- I was assigned to the Department of Innovation and Valorization (DRV), where I had worked on the diaphragm effect of skin-stressed steel structures, more precisely on the lateral support of purlins/joists by steel sheet against lateral-torsional buckling (especially during the concrete pouring phase of floors with collaborative trapezoidal steel sheet).
- Objective: Determination of the need for shoring during the pouring phase of composite floors.
- The results of this work were published in the *Revue Construction Métallique* (2021).

Internship - R&D - TREPOS Project (LGCGM, Rennes)

June - August 2020

Published paper on the elastic behavior of T-stubs on a flexible Winkler foundation, encountered in simple solutions of thermal breaks.

Internship - Technical Inspector (QualiConsult, Rennes)

June - August 2019

Verification of compliance with construction standards both on design drawings and on site.

EDUCATION

2024 - 2025 Mitacs fellow, **University of Toronto**

2021 - 2024 PhD on beam-to-HSS column moment resisting connections, **INSA Rennes**

2021 M.Sc, double degree, in research and advanced design engineering at **Université de Rennes**

2020 Erasmus exchange at **University of Exeter**

2016 - 2021 Civil Engineering Degree at **INSA Rennes, France** (Q1 journal article published)

TECHNICAL SKILLS

- Solid Mechanics: **Elasticity, Visco-elaticity, Plasticity and thermal behaviours**
- Advanced Structural Analysis: **Beam theory (Bernoulli, Timoshenko, Vlasov), Plate theory, Continuous beams, FEM..**
- Construction standards: **Eurocodes, AISC, CISC/CSA..**
- Finite Element Modeling: **Ansys, Abaqus, LS-Dyna, Robot, CATIA, IDEASstatica..**
- Programming: **APDL, Python, Maple, MATLAB, VBA**

LANGUAGES

English, French, Arabic

PUBLICATIONS [12]

T. M. Nguyen and **M. Madhouni** (2021). "Calculation of shear flexibility of steel decks due to profile distortion". In: *Revue Construction Métallique 4: 2021 (Published in both french and english)*.

M. Couchaux and **M. Madhouni** (2022). "Theoretical models for T-stubs in contact with intermediate layer". In: *Journal of Constructional Steel Research* 192, p. 107158. ISSN: 0143-974X. DOI: <https://doi.org/10.1016/j.jcsr.2022.107158>.

M. Madhouni, M. Couchaux, M. Hjiaj, and A. Kanyilmaz (2023). "I-beam-to-SHS column moment resisting joints using passing-through plates under opposite bending moments: numerical and analytical studies". In: *Proceedings of Eurosteel 2023* 6.3-4, pp. 1451–1457. DOI: <https://doi.org/10.1002/cepa.2370>.

M. Madhouni, M. Couchaux, M. Hjiaj, and A. Kanyilmaz (2023). "I-beam-to-SHS-column moment resisting joints using passing-through plates under equal bendings". In: *Proceedings of Eurosteel 2023* 6.3-4, pp. 1445–1450. DOI: <https://doi.org/10.1002/cepa.2367>.

R. Das, A. Kanyilmaz, **M. Madhouni**, and H. Degee (2023). "Innovative One-way Connections between I-beams and CHS columns". In: *Proceedings of Eurosteel 2023* 6.3-4, pp. 1539–1544. DOI: <https://doi.org/10.1002/cepa.2271>.

M. Madhouni, M. Couchaux, M. Hjiaj, and A. Kanyilmaz (2024). "Passing-through I-plates-to-SHS moment resisting joints subjected to symmetric bending moments: Experimental, Analytical, and Nu-

merical analyses”. In: *Thin-Walled Structures* Volume 209. ISSN: 0263-8231. DOI: <https://doi.org/10.1016/j.tws.2024.112442>.

- M. Madhouni** (2024). “I-beam-to-SHS Column Moment Resistant Joints Using Passing-Through I-Plates with and without concrete infill”. In: *INSA de Rennes, France*. PhD thesis (defended, to be published soon).
- M. Madhouni**, M. Couchaux, M. Hjiiaj, and A. Kanyilmaz (2025). “Antisymmetric in-plane bending of passing I-beam-to-RHS joints using laser cutting technology: Experimental, Analytical, and Numerical analyses”. In: *Thin-Walled Structures* (Submitted).
- M. Madhouni**, M. Couchaux, M. Hjiiaj, and A. Kanyilmaz (2025). “I-beam-to-infilled RHS LCT-joints under lateral loads”. In: *Thin-Walled Structures* (To be submitted).
- M. Madhouni**, J.A. Packer, and M. Couchaux (2025). “Design Recommendations for Through Plates in beam-to-RHS Connections”. In: *AISC Engineering Journal* (in process).
- M. Madhouni**, M. Couchaux, J. Packer, et al. (2025). “Static and Cyclic Behavior of Beam-to-Infilled HSS Column Connections Using Through Plates”. In: *Proceedings of 10th International Conference on Composite Construction in Steel and Concrete (CCX) July 27-30, 2025, Blaine, WA (USA)* (Accepted).
- M. Madhouni**, J. Couchaux, M. Hjiiaj, and A. Kanyilmaz (2025). “Experimental tests on I-beam-to-SHS-column joints using through plates subjected to equal self-equilibrating bending moments”. In: *Proceedings of the 19th International Symposium on Tubular Structures (ISTS19) 1st - 3rd December 2025, Hong Kong (China)*. (Accepted).