

UNIVERSITY OF NAPLES FEDERICO II



DEPARTMENT OF STRUCTURES FOR ENGINEERING AND ARCHITECTURE
PHD PROGRAM IN
STRUCTURAL, GEOTECHNICAL ENGINEERING AND SEISMIC RISK

CYCLE XXXVII

The undersigned prof. ANTONIO FORMISANO

(Full Associate Researcher)

Department of STRUCTURES FOR ENGINEERING AND ARCHITECTURE

S.S.D. (ICAR/09 - TECNICA DELLE COSTRUZIONI)

ASKS

to be included in the list of tutors for cycle XXXVII.

1. Curriculum vitae (max 500 words)

Antonio Formisano is Associate Professor of Structural Design at the Department of Structures for Engineering and Architecture of the University of Naples "Federico II". He is lecturer in courses on metal structures and vulnerability and seismic retrofitting of existing buildings within the framework of the International Masters ETeC, Design of Steel Structures in Smart Cities, SUSCOS, ELARCH, ArINT and DYCLAM. His research is mainly focused on the following topics: analysis of steel and aluminium alloy structural systems and connections; seismic vulnerability analysis of masonry buildings, with particular reference to building aggregates in historic centres, and reinforced concrete ones; vulnerability and seismic risk of historic centres; seismic consolidation of existing structures by systems based on the use of metal materials; seismic analysis of cold-formed thin walled structures; robustness of steel structures; composite materials made of natural fibres, life cycle assessment and energy requalification of buildings. He is the author of more than 350 publications published in national and international journals and books, as well as on national and international conference proceedings, where he participated as speaker and chairman. His records on Scopus are as follows: Documents 176, Citations: 2038, H-index: 27 (updated on 30/04/21). He was part of the working group that delivered the technical document CNR-DT 208/2011 on the design of aluminium alloy structures. He was a consultant of UNI for the translation of EuroCode 3 Part 1.8 on the design of steel joints. Currently he is a member of the project teams for the development of the new version of Eurocode 9 "Design of aluminium alloy structures".

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He was member of the editorial and scientific committee of numerous national and international conferences and congresses. He participated and is participating as a member and coordinator of numerous national and international research projects. He is a member of the editorial board and reviewer of numerous national and international journals. He held lectures and seminars at several Universities and National and International Research Centres, as well as training courses at Universities and Professional Orders on European Community marking, design of steel and aluminium structures and connections, seismic vulnerability and retrofitting of existing buildings, study and experimentation on new eco-friendly building materials. He received awards in the fields of Structural Engineering and Green buildings. In particular, he was featured among the World's Top 2% Scientists 2019, as published by Stanford University on Plos Biology.

2. PhD students of whom the undersigned has been a tutor in the last three years

<i>n. _____</i>	<i>specify the type of scholarship: university funds, PON, POR, etc.</i> _____
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3. Title of the proposed research

“ECO F.A.B. (Fennel and Artichoke Brick) Prototype” - Construction of a prototyping line to produce eco-sustainable bricks by means of fennel and artichoke wastes

4. Field of study

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Geotechnical Engineering

Structural Engineering

Seismic Risk

5. Summary of the research project (max 500 words. State of the art, short program planned for the activities, etc.)

The project aims to recover wastes from fennel and artichoke processing, identified as Secondary Raw Material (SRM), for green building components to be used in the construction sector.

The fennel processing process generates on average between 40 and 60% of the input product. At present, 60/70% of these wastes are delivered and treated as landfill garbage, while about 30/40% is used in the livestock (feed) and composting (soil improver mixed with other wastes).

The artichoke machining process generates a quantity of processing scrap/wastes around 20/30% of the input product. Nowadays, 20/30% of these wastes are delivered and treated as landfill waste, while 30/40% is used for composting (soil improver mixed with other wastes).

The project aims to develop a prototyping production line of Green Building components under form of bricks to be used for the construction of infill and partition walls.

To this purpose, the SRM of fennel and artichoke wastes will be mixed with hydraulic binders of different kind (lime or cement) premixed with sand for the production of artificial blocks with performance similar or larger than products currently used on the market and with a high rate of eco-compatibility.

In particular, the prototyping production line will aim to create eco-sustainable bricks based on the use of fennel (type 1), artichoke (type 2) and mixed fennel-artichoke (type 3) wastes.

The project will be divided into two phases:

The first phase is industrial research and it will aim to develop, from theoretical and experimental points of view, all the activities necessary to define the chemical-physical features and percentages of the elementary components intended at establishing correct proportions (mix design) of the products covered by this research.

The emerging data output from the industrial research phase will be the input of the experimental development phase, which will achieve the project target, that is the implementation of the prototyping line for the production of sustainable bricks.



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The second phase is experimental development, related both to the implementation of the prototyping line for brick production and to laboratory activities aimed at evaluating the mechanical-physical properties of bricks.

On one hand, this phase will include the implementation of the EPC (Engineering, Procurement, Construction) line, i.e. the production line of the output products with related final trial tests, while, on the other hand, the knowledge of the physical and mechanical characteristics of the different brick types will be used to perform diagonal compression tests on walls manufactured with these eco-sustainable products.

6. Research publications

- Formisano, A., Chiumiento, G., Lautieri, E. (2020). Experimental tests on cement mortars manufactured with hemp flour. *Open Civil Engineering Journal*, 14 (1), pp. 302-313. DOI: 10.2174/1874149502014010302.
- Formisano, A., Chiumiento, G., Dessì, E.J. (2020). Laboratory tests on hydraulic lime mortar reinforced with jute fibres. *Open Civil Engineering Journal*, 14 (1), pp. 152-162. DOI: 10.2174/1874149502014010152.
- Formisano, A., Chiumiento, G., Fabbrocino, F. (2020). Experimentation on lime mortars reinforced with jute fibres: Mixture workability and mechanical strengths. *Lecture Notes in Mechanical Engineering*, pp. 1869-1880. DOI: 10.1007/978-3-030-41057-5_150.
- Formisano, A., Dessì, E., Jr., Landolfo, R. (2017). Mechanical-physical experimental tests on lime mortars and bricks reinforced with hemp. *AIP Conference Proceedings*, 1906, art. no. 090006. DOI: 10.1063/1.5012363.
- Formisano, A., Fabbrocino, F., Dessi, E., Jr., Chiumiento, G. (2017). Experimental shear tests on tuff blocks triplets with hemp fibres reinforced lime mortar. *AIMETA 2017 - Proceedings of the 23rd Conference of the Italian Association of Theoretical and Applied Mechanics*, 2, pp. 2022-2028.

7. Funded research projects in which the proposed research fits

Three-years Research and Development Project (2021-2023) funded by Ministry of Economic Development (MISE) under the "Fund for Sustainable Growth - Smart Factory Desk" (PON I&C 2014-2020).

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8. Funds available for research grants, equipment, missions, etc.

PhD scholarship funded by the above research project.

9. Information related to the research period abroad (min. 3 months) provided for the PhD student (please indicate University/research institution and professor/researcher of reference) (max 300 words)

A minimum of 3 months will be spent at one of the following universities:

- Politecnica University of Timisoara (Romania - Reference Professor: Marius Mosoarca)
 - University of Mons (Belgium - Reference Professor: Laurent Van Parys)
- which are working in the field of sustainable products for Building Engineering.

10. Collaborations with companies on the research topic (if available) (max 300 words)

- Agrosistemi srl (headquarter: Via Nazionale 166, Angri - SA), consulting company for SMEs involved in agri-food processing and agricultural sector - leader of the research project;
- Naddeo Technologies S.r.l. (headquarter: Via delle Industrie snc, Scafati - SA), company specialized in the field of engineering and construction of machines dedicated to the agri-food industry – partner of the research project.

Naples, 30/04/2021

SIGNATURE

This form must be filled and sent to the e-mail address phd.dist@unina.it no later than Friday 30/04/2021.