

## Doctoral Programme in Civil, Environmental and Mechanical Engineering

### Research subjects proposed for the 39<sup>th</sup> cycle – second call

A mandatory attachment of the application is a description of the research project (max 4 pages) relative to the research areas of the Doctoral Programme in Civil, Environmental and Mechanical Engineering, **preferably** on one of the research themes suggested below. Candidates applying for a scholarship on a reserved topic (with an ID and in red) must write a project proposal related to the specific topic of the scholarship.

**Additional positions:** scholarships/fellowships that will be available after the publication of the call (and published on the selection website) can be selected by using the entry “Other” in the proper section of the online application, and indicating in the specific space the title and ID of the position chosen. Applicants who have already closed and sent the application before the publication of additional positions can apply for those grants using an additional online application (more information will be given on the selection website).

### Curriculum C - Modelling and Simulation

- **Reference person:** Nicola Tondini (UNITN/DICAM)

**C5 - scholarship on reserved topics – additional posted on**

Funded by: [ArcelorMittal Belval & Differdange](#)

**Title: Automatized choice of fire design of steel structure with new generation of fire models**

#### Context

- Natural fire models have offered significant (and physically sound/rationale) opportunities for sustainable and economic fire design of steel structures.
- Natural fire models were first introduced in the 1990's. Recently, a new generation of natural fire models has been introduced in the next generation of Eurocodes based on recent research. This includes LOCAFI, TFM GoZONE, TRAFIR model.
- There is thus a need (i) to understand implications of these new fire models for structural fire design of steel construction, (ii) to develop guidance and efficient tools to enable use of these new fire models by design offices, (iii) to identify the best steel structural solutions that maximise the benefits of the application of the new fire models and consequently to demonstrate optimization for steel structures resulting from the use of these new fire models.

#### The main objectives of this study are:

- To build knowledge on structural behavior of steel structural systems under natural fires, with link to performance-based approach and fire models recently incorporated into the Eurocodes;
- To identify optimal fire design solutions for prototype buildings in terms of safety, performance, and cost;
- To develop tools to facilitate adoption of new Eurocode fire models, support training and translation to practice of these advanced methods, and quantify safety of design within a probabilistic Performance-based design (PBD) approach.

The expected outcomes are journal and conference papers as well as worked examples and design guidelines. A numerical tool supporting application of the new fire models in the context of Eurocodes and in a full probabilistic approach will be sought.

The intellectual property of the research results that will derive from the activities carried out by the doctoral student is owned by the Financer.