

## **FULL-TIME CHAIR HOLDER POSITION IN ENERGY ELECTRONICS**

**University of Mons – Faculty of Engineering**

Application deadline: 15/04/2021

Start date: 01/09/2021

### **Project summary:**

ALSTOM company, through its Transport subsidiary, has decided to fund an academic and research chair in Energy Electronics at the Faculty of Engineering of the University of Mons (UMONS). Both the university and company are located in the Walloon Region of Belgium. This chair is part of a global structured partnership strategy between the members of the “Cyber Physical System in Energy conversion and Transportation” (CPSET) innovation platform and the universities (see Appendix for a more detailed description of this platform).

The principal objectives of this chair are (i) to contribute to the creation of a regional center of excellence in the field of Energy Electronics through the implementation of higher education and training programs adapted to the needs of industry; (ii) to reinforce excellence in research at UMONS in the field through the successful achievement of ambitious R&D projects in partnership with industrials of the CPSET platform, and, possibly, other stakeholders from the industry and/or academic world; (iii) to improve a network around the theme to the benefit of UMONS and the CPSET members as well as the main regional, national and European stakeholders.

### **Job description:**

The job consists in a **5-year full time position, starting September 1<sup>st</sup>, 2021, within the Electrical Power Engineering Unit (Research Institute for Energy) located in Mons**. The mission will be potentially extended for another 5 years period or be converted into a different mission in UMONS. The candidate recruited as chair holder will strengthen the academic and research team of this group.

The candidate is expected to develop and lead a new research team in the field of Energy Electronics that will have to interact strongly with industrials (primarily those of the CPSET platform) as well as the existing departments of UMONS involved with the themes of the chair. S/He will have to coordinate actions and stimulate multi-disciplinary approaches with these departments according to the needs. S/He will be responsible for R&D project management, research team leading and for re-enforcing networking activities with external stakeholders. It will also be his/her responsibility to conduct the necessary actions to ensure long term viability of the research team with a strong emphasis on raising additional funding for building a strong R&D projects portfolio and sound research valorization perspectives for both the research team and the industrials of the CPSET platform.

Complementary to these tasks, it will be entrusted with (i) proposing new educational programs merging the different themes of the chair and (ii) actively participating in academic activities at master’s and postgraduate levels. These activities, mainly in English, will take place both in Mons and Charleroi. For instance, the candidate will have to propose/contribute to student’s projects with industry in the targeted field (mainly internships, first year master’s projects and master’s degree final projects), coordinate the participation of industrials through seminars included in master’s teachings, and arrange visits for the students within the companies of the CPSET platform. At postgraduate level, s/he will have to suggest and supervise doctoral theses in collaboration with the industry partners of the chair.

S/he will also have to support the development of the existing Joint Certificate in Energy Electronics (particularly in an international perspective) and participate to complementary training programs according to the identified needs.

As one of her/his missions, the candidate is also expected to steer the chair activities and organize events, such as introductory workshops and scientific symposiums (with, as far as possible, an international visibility) for industrials, researchers, etc., on the research topics covered by the chair. S/He is at the head of the steering committee of the chair and prepares the activity report. The steering committee, who meets twice a year, is composed of academic members and industrials (as well as possibly external experts).

To carry out his/her work program, the chair holder will be assisted by support persons from the industry partners, from the department of Research Support and Technology Transfer of UMONS as well as from the research and teaching departments involved in the chair activities.

### **Suitable background and qualification:**

The applicant will hold a doctoral degree in Engineering Sciences in the relevant field. S/He will have achieved well-recognized scientific excellence in previous research in the field of Energy Electronics, preferably with confirmed expertise in one or more of the following fields (non-exhaustive list):

- Power converter architectures and design
- Active devices and passive components (including their intrinsic reliability)
- Reliability of power electronic converter systems
- Control and modulation of power electronic converters
- Computer networks for power control
- Thermal management of power electronic systems
- Electromagnetic compatibility
- Acoustic noise control in power electronic systems
- Electrical energy storage

Knowledge of industrial applications in the field of railway transportation and/or in the space sector would be a plus.

The candidate will have gained significant experience outside her/his home institution (including a research stay of minimum 6 months abroad). S/He will have demonstrated high experience in Research Team leadership and s/he should be an expert in managing research projects with a proven record in securing significant research funding and resources for his/her team. The candidate will be at ease with multi-disciplinary working environment and teaching in higher education environment. S/He will be an ordered and conscientious person prone to easy contact. S/He will be fluent in English. A minimum command of the French language (oral understanding) is preferred but not mandatory.

### **Interested ?**

Application must be sent by e-mail to the Head of Electrical Power Engineering Unit: Prof. Olivier Deblecker ([olivier.deblecker@umons.ac.be](mailto:olivier.deblecker@umons.ac.be)).

They must include the following:

- A motivation letter including your vision of the project
- A *curriculum vitae* with:
  - o Professional and education profile
  - o List of publications
  - o List of research projects (as a researcher)
  - o List of research projects (as a project leader)
  - o Experience in research funding activities
  - o Experience in academic teaching
  - o Language skills
  - o Software (use and development) skills.
- Three letters of recommendation with names, e-mail addresses and phone numbers

## Appendix

The UMONS University Chair in Energy Electronics is supported by the CPSET Platform. This appendix briefly presents this Platform founded in 2018 by industrial and research actors. Alstom is one of the founding members of this technological Platform.



### The CPSET Platform

The return on experience from multiple collaborations in different industrial domains such as aeronautics, railway, space and automotive industries has pushed some industrial and research actors in Wallonia to consider strengthening the sustainability of these collaborations through the creation of a new R&D ecosystem centered on Cyber-Physical Systems (CPS). It has been implemented as a shared and open Platform, supported by training tools dedicated to critical resources.

This initiative allows to federate skills and resources over the long term in a context of multi-partnerships involving research centers, universities, university colleges and industrial actors and capitalize on the results. The involvement of research centers in the management committee together with industrial members ensures that their research efforts meet the innovation needs of the industry. It also accelerates the complete maturity growth cycle from concepts towards industrial applications.

CPSET is a new, shared and open innovation Platform with the following objectives:

- Develop and integrate technological building blocks to be integrated into complex systems in domains interconnected in terms of innovation such as railway, automotive, space and aeronautics industries;
- Allow focusing R&D resources on generic themes in order to increase the innovation capacity and efficiency of the industry in these fields;
- Create a sustainable ecosystem mixing public and industrial research actors to master the technological assets and build up a critical mass of competencies, infrastructures, equipment and collocated technical resources;
- Facilitate the transfer of technologies and competencies into the industry through services and training;
- Dynamically involve SMEs and start-ups to allow them developing their technologies and getting access to an ecosystem connected to multiple markets;
- Contribute to the creation of a regional centre of excellence by supporting training programs adapted to the needs of the industry.

The CPSET Platform is structured around the following themes:

- Simulation of complex systems: digital modelling, simulation and virtual prototyping;
- Methods and tools for the development and validation of Cyber Physical Systems (CPS), new cybersecurity testing tools and processes;
- Electrical energy conversion, energy storage and production: power electronics, high efficiency architectures, new materials and components;
- Autonomous vehicles and automated driving;

- Asset management & Infrastructure Integrity: preventive / predictive maintenance;
- New architectures for complex systems: multicore processors, distributed systems.

CPSET currently includes the four founding industrial actors (Alstom, TAS-B Alenia Space, AISIN and Sonaca), two research centers (CETIC and CENAERO) and is supported by three competitiveness clusters (Mecatech, Logistics in Wallonia and Skywin). It is open to all willing to join this collaborative approach.

A Memorandum of Understanding was established and signed at the end of 2018 by the founding partners of the Platform.







CPSET supervises over time a set of collaborative R&D projects involving at least one of the two certified research centers and at least one industrial partner and addressing some of the generic themes defined above. Each project (single or multi-industry) supported by the Platform will systematically address a generic content which will then be further deployed by the Platform in all the targeted industrial domains.

This University Chair is part of a global strategy including structured partnerships between CPSET members and Universities.

The themes of this structured partnerships are defined in the table below.

## Topics and Priority Themes



Topics	 Power Conversion	 Production & Storage	 Complex Systems	 Methods & Tools	 Autonomous Vehicles	 Asset Management
Energy Electronics	<ul style="list-style-type: none"> <li>• Architecture of power converters</li> <li>• Semiconductors and components</li> <li>• Digital networks applied to power converters control and command</li> <li>• Electromagnetic Compatibility</li> <li>• Thermal engineering of power converters</li> <li>• Energy storage</li> </ul>					
Embedded Critical Systems			<ul style="list-style-type: none"> <li>• Development processes (cycle V / Agile)</li> <li>• Model-based System Engineering and tools</li> <li>• Hardware and Software reliability</li> <li>• Safety by design and demonstration</li> <li>• Applicable standards et Certification</li> <li>• Cybersecurity</li> </ul>			
Mobility					<ul style="list-style-type: none"> <li>• Autonomous Vehicles / Driving assistance</li> <li>• Intermodal mobility / Supervision</li> <li>• Connected passenger / Passenger Experience</li> <li>• Big data / Artificial Intelligence</li> <li>• Asset Management / Maintenance</li> <li>• Human factors / Legal aspects</li> <li>• New business models in</li> </ul>	

The partnership with UMONS addresses the "Energy Electronics" theme.