

PhD Thesis proposal¹

General Information		
PhD Thesis Title	Integrity Assessment for Power Plants Equipments	
Doctoral Degree	Doctor of Philosophy in Mechanical Engineering Ploytech Orlean – Laboratoire de mecanique – Gabriel Lamé	
Research Unit	NA	
Laboratory	NA	
Axis	Materials and Structures, Energy Systems, Reliability and Integrity Assessment	
PhD Supervisor	Name & Title : Dr. Jad Antonios Jelwan Email : jadjelwan@usek.edu.lb	University Address : Holy Spirit University of Kaslik- USEK
Co-supervisor (if applicable)	Name & Title : Dr. Thomas Sayet Email : thomas.sayet@univ-orleans.fr	University Address :
Location (s)	Location 1: USEK	Work shift calendar /per year (50%):
	Location 2: Ploytech Orlean – Laboratoire de mecanique – Gabriel Lamé	Work shift calendar /per year (50%):
Potential funding and scholarship	CNRS	

Applicant Profile and/or Special Requirements	Master degree in Mechanical Engineering or Aerospace Engineering or Civil Engineering.
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Subject's national or worldwide Context, Objectives & Research lines
<p>Energy is a primary factor for the development of our civilization. In generating energy; power stations makes use of a series of heat exchangers to generate electricity. It requires steam to turn turbines which generate power. With this dependency, come essential requirements for the reliable operation of the plant to constantly supply power, maximize efficiency while at the same time operate in a safe environment. Such power plants contain some components which operate in the creep range, where welding is widely used for fabrication of structures such as pressure vessels.</p> <p>Pressure vessel equipment is used in the oil, chemical, nuclear power plant as well as many other industries. Life prediction of such components subjected to high temperature is very important to avoid the catastrophic consequences of failure. The designer often works to the requirements of a standard or code of practice. In many nations there is a national organization which develops such standards. In France, there is the RCC-MR practice code for creep design; the R5 from the British Energy, and many other methods proposed by the European Creep Collaborative Committee (ECCC) and the National</p>

¹ Thesis proposal should not exceed two pages

Institute of Material Science (NIMS) in Japan. The major shortcomings of the abovementioned standards, are that they are not practical to use and can be too conservative.

Therefore, the aim of this project is to investigate various methods, and provide convenient solutions, in order to reduce accidents which can cause economic disaster even endanger human life.

Outcomes (OCs) : What do we wish to achieve?	
OC1:	To build up unique and world-class expertise in developing novel processes for producing a national database for integrity assessment of power plants equipments operating at high temperature, and in developing high performance structural and functional materials.
OC2:	To develop advanced materials and related technologies that can be utilized by the Lebanese Industry.
OC3 :	Develop a strategic plan to reduce the amount of harmful emissions associated with energy consumption in power plants.
OC4 :	Develop a strategic plan to reduce the amount of study to investigate the power consumption in relation to the heat exchangers and boilers.

References (R) (5 most recent peer-reviewed publications)	
R1:	J.Jelwan, Creep Life Assessment of a Super-Heater Tube, Journal of Solid Mechanics, Accepted in Press, Manuscript ID JSM-1908-1480
R2:	J Jelwan Prediction of creep rupture in 2.25 Cr–1Mo notched bars, Journal of Applied Mechanics and Technical Physics, 58(1) - 2017
R3 :	Jad Jelwan, M. Chowdhury, G.Pearce, Creep life design criterion and its applications to pressure vessel codes, Materials Physics and Mechanics, 11 (2), 2011