Seminar abstract (20th of June at 1.45 pm)

1.45 pm: Messaoud Hommia: Characterization of the microstructure of a high carbon bainite steel after XTP rolling process

This research is performed in the frame of a collaboration between the research center of Ascometal company CREAS and LEM3 laboratory in Metz. It focuses on the influence of different parameters of a new thermomechanical process (XTP technology) on the inherited steel microstructures and mechanical properties. Our purpose is to apply adapted methods of microstructure characterization to control the efficiency of XTP rolling process on a high carbon bainitic steel (Metasco® BAE75). Thus, in depth microstructure analysis is carried out from Light Optical Microscopy (LOM) to EBSD analysis and crystallographic reconstruction of parent austenite microstructures. The results are analyzed to find the influence of the XTP rolling process parameters to the inherited microstructures and mechanical properties measured on BAE75.

2.05 pm: Yossra Kammoun: Study of Nickel-base superalloy brazed joints with a quaternary Ni-Cr-Si-B filler metal

Brazed joints are commonly used in the manufacture and repair of aerospace components including high temperature gas turbine components made of Ni-base superalloys This graduating project reports theoretical and experimental investigations carried out to understand the effects of temperature (1150, 1125°C) and time (1h30, 3h and 6h) on the microstructure of the transient liquid phase (TLP) joints of MC2 Nickel-based superalloys with quaternary Ni-Cr-Si-B fillers. During isothermal TLP brazing, solidification of the brazing zone proceeds due to the diffusion of Boron and Silicon into base metal, which leads to increase the liquidus temperature of the liquid, while temperature remains constant. Metallurgical characterization of these brazed joints using OM, SEM and SEM/EDS analysis showed two primary microstructural regions; a soft, ductile γ-Ni phase that formed at the joint interface, mainly during isothermal solidification and a hard, brittle multi-phase centerline eutectic formed during anisothermal solidification. During this last step, solutes such as B are rejected to the liquid and the liquid enriched with the solutes produces brittle phases such as borides and eutectic phases witch are known to deteriorate the properties of the joint. So the aim was to follow those phases with the idea of eliminating them. On the other hand, the morphology of phases in diffusion affected zone (DAZ) was studied.

2.25 pm: Dassidi Douksouna: Mechanical characteristics and laws of behavior of a brazing joint for application automobile exchangers

The environmental and economic constraints lead to a constant reduction of the weight of the automobile exchangers and therefore the thickness of the materials engaged. In addition, emission standards significantly increase operating stress. Following these constraints, critical conditions are reached for the use of aluminum and steel alloys in terms of mechanical strength and corrosion resistance. Due to these boundary conditions, we need to better predict the fatigue behavior of our exchangers. However, the current simulation does not take into account the mechanical characteristics of the brazed joint during a mesh of an automobile heat exchanger. The objective of the internship is initially to be able to obtain the mechanical characteristics by nanoindentation of brazed joint and to obtain a law of behavior of the brazed joint brick of an exchanger. And secondly, study the boundary soldering conditions according to different material configurations in order to obtain the differences of mechanical characteristics if there are some and to see the laws of boundary behaviors at ambient temperature and temperatures of operation of the exchangers.

2.45 pm: Anis Aliouat: Influence of oxidation of gas atomized aluminum powders

The presentation will focus on understanding the influence of the formation of aluminum oxides (Al_2O_3) on the fusion/solidification mechanisms usually considered in selective laser melting (SLM) and also in Spark Plasma Sintering (SPS). Aluminum powders obtained by gas atomisation must be passivated before venting. These passive layers are likely to play an inconsiderable role in the behaviour of the powder during its implementation (modification of the coultability, compressibility, reactivity, etc.) than in the generation of microstructures of parts densified by SLM and SPS. So the objective is to understand and document the effect of the rate of oxidation of atomized powders on the quality of the parts made by additive deposition.