RÉGION
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EIPHI-BFC
GRADUATE SCHOOL
CROSS DISCIPLINARY SCIENCE
AND TECHNOLOGY

Ph.D Position Project EIPHI GS Tocade

Job title	Experimental characterization of the operation of cascade flares
Job type (PhD, Post-doc, Engineer)	PhD
Contract duration (months)	36 months
Qualifications (Master, Ph.D …)	Master, Engineer
Job hours (full time/ part time)	Full Time
Employer	UBFC Université Bourgogne Franche-Comté
Financing Institutions	Région Bourgogne Franche-Comté & Graduate School EIPHI
Host Laboratory	ICB PMDM site de Sevenans
URL Host Laboratory	www.lermps.utbm.fr
Address Host Laboratory	UTBM, rue de Leupe, 90400 Sevenans
Job description	This thesis, resulting from a partnership between GULHFI AG and the PMDM-LERMPS team, would focus on the development and analysis of different cascade torch configurations, in order to control and optimize the coating properties. For this, different steps are to be deployed from the design to the characterization of the torch to the analysis of the coating properties: 1st phase: Torch design The first phase will consist in the design and the realization of various configurations of cascade torch. Indeed, the number and size of the neutrodes will act on the length of the electric arc, and thus modify the voltage of the torch and the intensity and frequency of its fluctuations. We can also assume that the geometry also influences the behavior of the plasma gases flowing between the electrodes. 2nd phase: The second step will focus on the study of the different flare configurations. Different diagnostic means (fast camera, digital oscilloscope, ...) will be used to observe the incidence of the number of neutrodes (proportional to the length of the torch) and the displacement of the arc and to measure the temporal variations of voltage. Different operating parameters of the torch can be tested (current intensity, plasma gases used, flow rate of these gases, etc.) in order to understand their influence on the modification of the voltage value and its fluctuation. 3rd phase: The third step will consist in analyzing the characteristics of the material injected in the plasma. For the different configurations based on the modification of the torch geometries and the operating parameters of plasma generation (current intensity, flow rates and plasma gas mixtures), the velocity and temperature of the material will be measured on line by means of special diagnostic equipment. Correlations will be sought in order to conclude on the effect of the various parameters. An observation of the behavior of the material injected in the plasma will also be carried out by means of diagnostic devices of the camera or spraycam type in order to visualize the distribution of the particles in the jet. 4th phase: The last step will consist in the realization of coatings with the parameters identified previously. From different torch

	configurations and different plasma parameters, many test windows will be tested in order to understand the influence of these factors on the characteristics of the deposits: their microstructure, composition and mechanical properties for example. The optimization of the couples geometry/plasma parameters will be sought according to the targeted application and the coatings will be compared to the coatings carried out with a conventional plasma torch of F4 type. Finally, it will be necessary to prove the contribution of this technology in terms of functional properties, spraying yield (possible quantity of material deposited per unit of time), spraying cost (power required, consumables used, etc.), etc.
Supervisor(s)	PLANCHE Marie Pierre, DARUT Geoffrey
Candidate profile	• The candidate should have a strong interest in experimental work and good writing skills (French and English). • The candidate should have expertise in thermal spray deposit characterisation techniques. Knowledge of signal analysis and processing will be a plus. • Ideally, he/she will have a background in process engineering, materials, and deposit characterization.
Keywords	Cascade torch plasma process, Deposition characterisation, Ceramic materials, Signal processing, On-line diagnostics: electric arc and particles
Application deadline	01/06/2022
Application Depending on the type of position	Please send the following documents (all in one PDF file) by e-mail to marie-pierre.planche@utbm.fr : 1) For EU candidates: Copy of your national ID card or of your passport page where your photo is printed. For non-EU candidates: Copy of your passport page where your photo is printed. 2) Curriculum Vitae (may include hyperlinks to your ResearchID, Research Gate Google Scholar accounts). 3) Detailed list of publications (may include hyperlinks to DOI of publications). 4) Letter of motivation relatively to the position (Cover Letter) in which applicants describe themselves and their contributions to previous research projects (maximum2 pages) 5) Copy of your Master degree if already available. 6) Coordinates of reference persons (maximum 3, at least your master thesis supervisor): Title, Name, organization, e-mail. If you have questions regarding the application, please contact the supervisor.