

Investigation of shockwave generated in a DC thermal plasma torch in low pressure operation

Abstract

The very low pressure plasma spray process has evoked much interest in recent years because of its ability to deposit high quality coatings in fast time scales. The technique can be used in many new applications such as coating critical turbine engine parts and medical implants. However, despite significant improvements over several decades, many parameters affecting the quality of coatings and the process as a whole remains to be understood. The transfer of heat and momentum to the in-flight particle plays a crucial role in defining the coating quality. One of the parameters affecting the heat and momentum transfer is the shockwave generated during the plasma spraying process. One of the methods to study the location and intensity of shockwave is to measure the variation in ambient pressure surrounding the plasma jet. Current project proposal aims to use a simple capacitive pressure sensor located at different axial locations to provide the information associated with the perturbation of the pressure due to shockwave. The student will work in the plasma torch laboratory where a high power torch yields a supersonic plasma plume in vacuum.

Scope of work:

- Design and development of temperature shield for capacitive pressure sensor
- Design of associated electronics for measurement and diagnostics of shockwave.
- Experimental investigation and analysis of the data collected from the sensor.

Academic Project Requirements:

- 1) **Required No. of student(s) for academic project: One**
- 2) **Name of course with branch/discipline: Final year M. Tech. (Electronics/Electrical)**
- 3) **Academic Project duration:**
 - (a) **Total academic project duration: 9 – 12 Months**
 - (b) **Student's presence at IPR for academic project work: Three Full working Days per week**

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