

MIE Graduate Student Seminar

Professor Armelle Vardelle

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Surface finishing in the context of green manufacturing: Case study of thermal spray processes

Surface finishing involves a broad range of coating and surface treatment processes used to protect a substrate layer, improve its function, or enhance its appearance. It plays a vital role in manufacturing and is used in nearly every industry including the automotive, aerospace, electronics and medical industries. It is also often considered to help conserve natural resources, e.g. protection against wear and corrosion, refurbishment of worn parts and reduction of vehicle consumption and emission. However, surface finishing processes use energy, materials and chemicals and do have impacts on human health, ecosystems and resource conservation.

Societal needs require the manufacturing of products with full consideration of their environmental, health, and economic impacts over their entire life cycle from the extraction of raw materials to the ultimate disposal of the used products. In addition to technological advances and global price competition, they are forcing the surface finishing industry to evolve. This is a challenge but also an opportunity for surface engineering processes that are environmentally friendly and sustainable. Life Cycle Assessment (LCA) methodology makes it possible to identify and evaluate the environmental burdens associated with a surface process.

Thermal spray processes are the leading technologies for applying a relatively thick coating on a substrate to protect its surface or improve its function. They are applicable to a large range of materials, have a high deposition rate and a rather simple operation. They also do not generate wastewater like electroplating processes.

In this talk, we will examine the application of a life cycle assessment to thermal sprayed and electroplated coatings in the context of green manufacturing.

Thursday, October 15th, 2015

11:00am to 12:00pm

EV 2.260



Armelle Vardelle research interests deal with thermal spraying, physics-based model of plasma torch operation, modelling of plasma processes using powder and liquid feedstock, coatings elaborated by emerging and conventional plasma spraying for transport and energy production applications, solid waste valorisation by thermal plasma technologies and green manufacturing.

Armelle received a Ph.D. in Physics and Chemistry from the University of Limoges in 1979 and a “Thèse de Doctorat d’Etat” in Ceramics Sciences in 1987. She has authored or coauthored 109 peer-reviewed publications and 141 publications in International Conference Proceedings and has given 42 invited talks in international conferences.

Armelle supervised or co-supervised 29 PhD students and more than 40 Master students. She is Fellow of the International Plasma Chemistry Society and Fellow of ASM International.

Currently, Armelle is a distinguished professor at the university of Limoges, France and co-chair of the Department of Materials (Surface Treatments and Environment) Engineering.