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Editorial

JTST Special Issue on "Reliability and Consistency in Thermal Spray"

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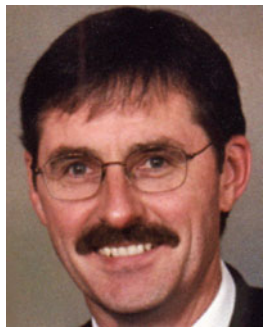

Basil Marple

First applied about 100 years ago, thermal spraying today is a worldwide, well-established technology employed to generate coatings for many types of important applications. The remarkable growth of thermal spraying during the last decades was based on the flexibility and broad applicability of this technology. Numerous different thermal spraying processes were invented and continuously improved after their introduction into practice. Today a wide velocity-temperature range for the dynamic and thermal treatment of coating material is covered. To date in numerous thermal spraying processes, electric arc discharges have been used as heat sources that generate plasmas of relatively high temperature. HVOF and the new cold gas processes produce gas flows with lower temperatures but higher velocities. Besides the development of thermal spray equipment and of new coating materials, significant steps have been undertaken concerning process diagnostics as well as process modelling and simulation.

Despite the advanced state of the art achieved to date, further demands have to be fulfilled by the thermal spraying technology in order to consolidate existing markets and to become established in new and growing markets. To succeed in competition with other surface technologies, thermal spraying has to meet the challenges of reducing production costs and increasing coating quality. These are the prevailing demands of today. To reach these goals, different efforts must be made simultaneously. The wear of parts in spray systems must be reduced in order to achieve longer lifetimes of the spraying units at constant level of production quality. Also, deposition rates have to be increased without causing a loss of coating quality. To ensure that the particular spraying process is kept in the desired range of operation and quality, diagnostic and monitoring units have to be used, which are rugged, robust and simple enough to operate in the harsh environments of thermal spraying processes. All the mentioned efforts can be summarized in the challenge to increase the reliability and consistency of present thermal spraying processes. Efforts to meet this challenge must focus on all aspects, including feedstock materials, substrate surface preparation, spray equipment, monitoring and control of the spray process and characterization of coatings. In this way, an important contribution can be made to further growth and to find new application areas of thermal spraying technology.

This special issue on "Reliability and Consistency in Thermal Spray" features a series of papers focused on this increasingly important area. It builds upon a successful ASM-sponsored event "Symposium on Improving Reliability and Consistency in Thermal Spray," held in Montreal, Canada in December 2008, where a wide range of topics touching on this theme were discussed. A number of invited contributions, as well as articles submitted in response to a call for papers, are contained herein. A comprehensive review paper, full-length manuscripts and technical notes address many of the aspects involved in this critical topic. It is hoped that this collection of papers will serve to foster new research in this field, leading to further progress in improving the reliability and consistency in thermal spray.

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