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### **Thermal Plasmas: Influence of Current Modulation on Process Performance<sup>1</sup>**

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Due to the widespread industrial use of thermal plasmas in the field of joining, cutting and the application of coatings new challenges arise owed to the advent of new materials or the drive to reduce cost or improve quality. These challenges may be met by using technological innovations like innovative fast power supplies. In the presence of strong gas flows and a fixed cathodic attachment the anode attachment position is determined by an unstable balance between the drag force on the plasma column exerted by the gas and the Lorentz Force due to the system's magnetic field distribution, leading to a constant arc motion and arc voltage fluctuation. Thus by supplying a sufficiently high and steep current pulse a re-positioning might be initiated by a sudden change of the Lorentz Force thus an externally controlled movement of the arc would be possible. In wire arc spraying a pulsed current is imposed upon the DC supply of the wire arc system. It is observed that steep current increases tend to produce sudden current drops, indicating a jump of the arc. For a certain pulse frequency this pulsing leads to a controlled motion of the arc along the electrode surfaces. Coatings produced with this technology exhibited a lower porosity than DC sprayed coatings and a lower oxide content.

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