



Industrial Member Report Summary – Key Findings for Industry

Surface Characterisation and Preparation for Thermal Spray Coatings: Technical Review

TWI Core Research Programme

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Industrial need

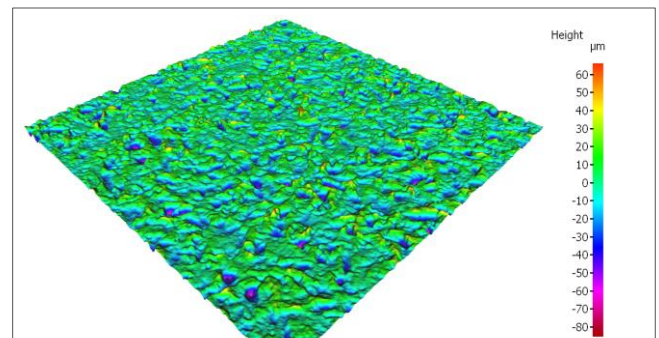
Thermal spray processes are widely used in industry to deposit a range of coatings. The bond strength between substrate and coating is critical for many applications and is dependent on both (a) good substrate surface preparation and (b) optimised spray parameters. While spray parameters are usually carefully monitored and controlled, most surface preparation is performed by manual grit blasting, with little or no process monitoring or calibration.

This report covers a technical review of surface preparation techniques for the application of thermal spray coatings, with a view to improving surface preparation using mechanised processes to ensure tighter control of grit blasting and repeatability. In addition to the state-of-the-art review of grit blasting, methods of surface characterisation are included and other surface preparation techniques are considered.

Key Findings

Topography of the substrate surface is considered to be the key consideration for the application of thermal spray coatings and grit blasting is the main technique employed to achieve a rough surface.

- Grit blasting parameters can be split into three main categories:
 - Blast media (composition, purity, size, morphology)
 - Media feeding (equipment, pressure, feed rate, nozzle)
 - Geometry (angle, standoff, traverse speed, no of passes)
- Limited data are available on the influence of blasting parameters on surface finish and direct comparison between studies can be problematic due to uncontrolled/unmonitored parameters and individual reports being generally being restricted to a single coating-substrate system.
- No conclusive consensus has been reached as to what the desired surface profile should be for optimum adhesion between a substrate and thermal spray coating.
- Further work is needed to understand the relationship between grit blasting process parameters, surface profile and coating adhesion using mechanised setups and process monitoring tools.



3D profilometry of blasted surfaces allows for enhanced surface characterisation and the relation to blasting parameters.

How to benefit from this work:

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- If you are not an Industrial Member of TWI, find out how your company could benefit from Membership www.twi.co.uk/membership
- Contact surfacing@twi.co.uk to learn more