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Improvement of interfacial bonding between plasma-sprayed cast iron splat and aluminum substrate through preheating substrate

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Abstract: During the plasma spraying process, the splat-substrate interaction is a key factor to understanding the formation of the coating-substrate adhesion. In the present study, both experimental and simulation methods were employed to analyse the splat-substrate interfacial bond and its formation. Individual cast iron splats were sprayed onto polished aluminum substrate surfaces, which were preheated to temperatures ranging from 25°C to 240°C. After spraying, polished cross sections of the collected splats were examined by scanning electron microscopy to identify the splat-substrate interface bonding characteristics. Furthermore, numerical simulation was conducted using a finite element method (FEM) to obtain quantitative information on heat exchange between the splat and the substrate. Results showed that the substrate preheating

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