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(51) International classification	:B23K0020120000, G09G0003340000, H04B0007185000, H04W0012080000, H04W0072045300	(71)Name of Applicant : 1)PANDIT DEENDAYAL ENERGY UNIVERSITY Address of Applicant :PANDIT DEENDAYAL ENERGY UNIVERSITY, KNOWLEDGE CORRIDOR, RAISAN VILLAGE, GANDHINAGAR, GUJARAT, INDIA 382426. Gujarat India
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(57) Abstract :

The present invention relates to a knurl profile-assisted friction stir cladding (FSC) process, an advanced development of friction-based solid-state surface engineering technology designed for flat-position cladding applications. The process involves forming a knurl profile on a mild steel substrate using knurling tools of various geometries to create enhanced mechanical interlocking at the material interface. Aluminum 6061-T6 is employed as the cladding material due to its lightweight and corrosion-resistant characteristics, particularly beneficial for marine applications. Experimental evaluation using a push-off test demonstrated that the knurl profile-assisted FSC achieved a bonding strength of up to 15.2 N, compared to 11.1 N obtained from conventional friction surfacing. The invention thus provides a technically superior and industrially feasible solution for producing high-strength, corrosion-resistant surface cladding on dissimilar material combinations. By integrating engineered surface profiling with friction stir deposition, the process achieves improved bond strength, uniformity, and overall cladding quality compared to conventional friction surfacing techniques. Figure -1

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