

(54) Title of the invention : PROCESS OF ELECTRIC ARC-BASED SMOOTHENING OF WIRE ARC ADDITIVE MANUFACTURED (WAAM) COMPONENTS

(51) International classification :B23K0009040000, B23K0009167000, B33Y0010000000, B23K0009320000, B23K0028020000 (86) International Application No :NA Filing Date :NA (87) International Publication No : NA (61) Patent of Addition to Application Number :NA Filing Date :NA (62) Divisional to Application Number :NA Filing Date :NA		(71)Name of Applicant : 1)INDIAN INSTITUTE OF TECHNOLOGY (INDIAN SCHOOL OF MINES), DHANBAD Address of Applicant :Dhanbad - 826004, Jharkhand, India Dhanbad ----- Name of Applicant : NA Address of Applicant : NA (72)Name of Inventor : 1)Kumar Ujjwal Address of Applicant :Dept. of Mechanical Engineering, INDIAN INSTITUTE OF TECHNOLOGY (INDIAN SCHOOL OF MINES), DHANBAD, Dhanbad – 826004, Jharkhand, India Dhanbad ----- 2)Mukul Anand Address of Applicant :Dept. of Mechanical Engineering, INDIAN INSTITUTE OF TECHNOLOGY (INDIAN SCHOOL OF MINES), DHANBAD, Dhanbad – 826004, Jharkhand, India Dhanbad ----- 3)Robin Singh Address of Applicant :Dept. of Mechanical Engineering, INDIAN INSTITUTE OF TECHNOLOGY (INDIAN SCHOOL OF MINES), DHANBAD, Dhanbad – 826004, Jharkhand, India Dhanbad ----- 4)Alok Kumar Das Address of Applicant :Dept. of Mechanical Engineering, INDIAN INSTITUTE OF TECHNOLOGY (INDIAN SCHOOL OF MINES), DHANBAD, Dhanbad – 826004, Jharkhand, India Dhanbad -----
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(57) Abstract :
The present invention relates to a process of electric arc-based smoothening of wire arc additive manufactured (WAAM) components (4, 10). The gas tungsten arc welding machine (2) is interfaced with the robot to switch on and switch off the electric arc by instructing the robot (3). A wire arc additive manufactured component (4, 10) is placed onto the stage (5). The gas tungsten arc welding torch (8) is positioned close to the WAAM component (4, 10), maintaining a few millimetres gap between the tungsten electrode tip (11) and the WAAM component (10). The ultra-pure argon gas is purged just before switching on the electric arc (9) between the tungsten electrode tip (11) and the surface of the WAAM component (4, 10), creating an inert environment. The rough surface (15) subjected to the electric arc (9), melts and forms a molten pool (12) due to the heat generated from the electric arc (9). The molten pool (12) solidifies as the electric arc (9) moves away from that spot leaving a smooth surface (14) behind. The surface characteristic investigation reveals 45 % reduction in the average surface roughness (Sa) of the top surface and 70 % reduction in the Sa value for the side surface of the WAAM component (4, 10).

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