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(57) Abstract :

The present invention relates to a laser-based process for topography correction of Wire-Arc Additive Manufactured (WAAM) components. The fibre laser source (1) emits a laser beam (5) to irradiate the exposed lateral surface (8) of the wire arc additive manufactured wall (7). As a result, the morphological apexes or the protrusions on the surface quickly reach the temperature at which melting occurs and undergo melting. Once a molten metal pool (6) is formed, the molten metal within the pool tends to redistribute and level itself horizontally due to the combined effects of surface tension and gravity. As the laser beam (5) progresses and moves away from the laser-irradiated area (8), the temperature of the laser-irradiated surface reduces quickly. This causes the molten pool to solidify, resulting in a highly finished surface. The major findings reflected the improvement in the topography i.e., average surface roughness (Sa) of the laser-treated sample is found to be reduced from 35.2 µm to 6.9 µm, i.e., 80.4% reduction. In addition, the microstructure is found to be transformed from columnar to equiaxed throughout the laser treated surface. Moreover, micro-hardness and tensile properties are also improved. [figure 1]

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