ABSTRACT

The austenitic stainless steel 316L part was fabricated by cold metal transfer wire and arc additive manufacturing (CMT-WAAM) and its microstructure, micro hardness and tensile properties were investigated. Results showed that the as-built 316L part exhibited a multilayered structure along the building direction. In the transverse direction (perpendicular to scanning direction) of each layer, there was also a multilayered structure of alternating overlapping zone (OA) and re-melting zone (RA). The overall multilayered structure and the intra-layer non-equilibrium microstructure exhibit a great influence on the mechanical properties of as-built 316L part. Along the building and transverse direction, the micro-hardness distribution effect shows the increases in micro-hardness value in lower region about 204 HV when compare to other regions. The effect of multilayered structure on wear properties was stronger in the transverse direction than that in the building direction due to strong crystallographic grain orientation. The increases in applied load 20N causes the increase in coefficient of friction (1.4mm) and wear rate (2.73mm^3/min) which is attributed due to formation of adhesive wear and severe plastic deformation.