

## **Fracture mechanics-based fatigue life assessment of additively manufactured Ti-6Al-4V**

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Additive manufacturing using titanium alloys is well suited to the South African context with regard to economic climate, strong manufacturing relationships, and the abundance of mineral titanium reserves. Despite extensive research on the fatigue behaviour, challenges persist to reliably certify the dynamic behaviour of these material. This complexity stems from the intricate relationships between AM parameters, build orientation, surface roughness, inherent defects, residual stresses, and meso- and microstructure; establishing reliable baseline fatigue strength values required by the industry is particularly challenging. To address this, a novel damage-tolerant method is developed, incorporating fracture mechanics-based frameworks along with non-destructive testing.