INVITED SESSION TITLE

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ABSTRACT

Additive manufacturing (AM) is becoming increasingly popular in producing various engineered structures, with many applications in aerospace, automotive engines and marine vehicles, both for novel designs and for repairing existing parts. It has the potential to save nearly 30% in fuel costs compared to conventional manufacturing techniques by introducing intricate lightweight designs and reducing assembly and machining operations. Nevertheless, AM parts in manufacturing industries are still in the early stages, as mechanical reliability is an indispensable prerequisite for real-life applications. Recent years have seen some attention given to aluminium parts produced by laser powder bed fusion (L-PBF). Nevertheless, one of the critical challenges is the presence of defects that compromise the mechanical properties of the parts, especially when it comes to fatigue life. Considering these aspects, this session will feature research that investigates the effects of defects, such as surface roughness and internal porosity, on the fatigue performance and failure mechanisms of a wide range of AM alloys to predict FAIL-SAFE as well as damage tolerant design criteria. The key emphasis will be advanced modelling techniques, including finite element analysis to determine the stresses around the pores and the resulting effects of the defects on the fatigue life of AM alloy components.