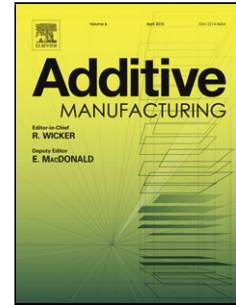


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## On the effect of shot-peening on fatigue resistance of AlSi10Mg specimens fabricated by additive manufacturing using selective laser melting (AM-SLM)

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### Abstract

The effect on fatigue resistance of additively manufactured (AM) AlSi10Mg specimens fabricated by selective laser melting (SLM) following surface treatment by shot-peening was investigated. Specimen surface was shot-peened with either steel or ceramic balls. Nano-indentation measurements revealed that shot-peening caused surface hardening, with the hardness profile from the surface to the interior of the bulk disappearing 50  $\mu\text{m}$  below the surface. Surfaces polished before shot-peening or following removal of about 25-30  $\mu\text{m}$  from the surface after shot-peening by either mechanical or electrolytic polishing showed improved fatigue resistance and fatigue limit. Fractography of broken specimens demonstrated that for shot-peened specimens, the site of fatigue crack initiation was deeper than that for specimens that had not undergone shot-peening. The fracture area of AM-SLM AlSi10Mg specimens before and after shot-peening displayed a ductile fracture with relatively deep dimples. In contrast to AM specimens, the final fracture area of die-cast samples exhibited a brittle fracture surface, containing numerous cleavage facets and micro-cracks.

**Keywords:** Additive manufacturing, AlSi10Mg, fatigue, fractography, polishing, shot-peening.

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