EFFECT OF LASER SURFACE TREATMENT ON THE CORROSION AND FATIGUE PERFORMANCE OF AA5456-H116 ALLOYS

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Key Words: Laser surface treatment and fatigue life

AA50546-H116 alloys are widely used in marine environments due to their excellent mechanical strength and corrosion resistance. However, the presence of detrimental beta/(Al_3mg_2) precipitates along grain boundaries makes these materials susceptible to intergranular corrosion and corrosion fatigue. In this work, laser surface treatment (LST) on the AA5456-H116 alloy is performed with the aim of improving its corrosion resistance without significantly compromising its fatigue performance. Microstructural examination by EBSD and SEM indicates that laser irradiation resolutionizes the beta particles and constituent particles effectively in the laser-treated region, leading to enhanced corrosion resistance. The crack initiation location in the fracture surface during fatigue testing was determined using marker band analysis. The laser-treated region showed a faster rate of crack propagation, with the total fatigue life decreasing considerably for LST. Fractography investigation revealed that laser-induced defects such as pores and cracks played a significant role in the reduction of fatigue crack initiation life