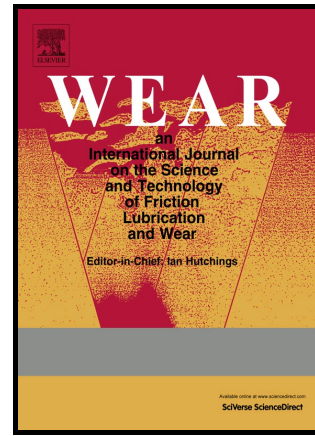


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# Effect of deposition material and heat treatment on wear and rolling contact fatigue of laser clad rails

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## Abstract

To develop a laser cladding technique for repairing rail surface damages due to rolling contact, wear and rolling contact fatigue characteristics of a set of laser clad rails were investigated using a roller-on-disc test machine. Three deposition materials 410L, SS420 and Stellite 6, were chosen to clad a premium hypereutectoid steel rail under two different heat treatment processes. In the first heat treatment, only preheating at 350<sup>0</sup>C was conducted and in the second heat treatment, preheating at 350<sup>0</sup>C, post-heating at 350<sup>0</sup>C (1 hour) then slow-cooling to room temperature was conducted. Preheating the substrate was insufficient to prevent martensite formation resulting from the rapid cooling rate, whereas post heat treatment was beneficial for refining the lamellar spacing and eliminating martensite formation in the clad layer and heat affected zone. Following the roller-on-disc tests, wear loss was calculated from wear track profiles using a laser optical profilometer. The level of

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