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Investigation on wear and damage performance of laser cladding Co-based alloy on single wheel or rail material

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Abstract: The aim of this study is to investigate the microstructure and wear behavior of laser cladding Co-based alloy coating on single wheel or rail material (the laser cladding coating is applied only to the wheel or to the rail) using a rolling-sliding wear test apparatus. The coating of laser cladding Co-based alloy consists of dendrite and eutectic. Single-treated wheel or rail specimen undergone the laser cladding treatment effectively decreases rolling friction coefficient and improve wear resistance of both wheel and rail materials. Single-treated wheel or rail roller presents mild wear damage. Furthermore, it is helpful to alleviate the surface damage and plastic flow of wheel and rail rollers. It is concluded that the laser cladding Co-based alloy coating is suitable for single treatment of wheel or rail material. However, further work should be carried out to clarify the rolling contact fatigue mechanism and to characterise the laser cladding Co-based alloy coating.

Keywords: Laser cladding; wheel/rail materials; microstructure; rolling wear; surface damage

1. Introduction

With a steady increase in total traffic and loads, the wheel/rail is frequently asked to sustain service conditions more severe than those considered in their original design. A variety of damages happen on wheel/rail system such as the side wear of wheel/rail, rail corrugation, head checks, and so on [1-4]. It is well known that the increase of axle load and traffic volume

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