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Damage and Fatigue Life Evaluation of Train Wheels

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DESCRIPTION

The wheels of trains and trains suffer constant but serious damage as a result of high rates and heavy loads. Normally, these damaged wheels are repaired using the rotatory fix technique; however, this method wastes a lot of material. In order to address this issue, laser cladding remanufacturing technology was used to repair a damaged wheel in this study. Simpack, a unique recreation programming programme, was also used to resolve contact pressure and creep qualities of the cladded wheel.

The existing harm work model, which is based on the wear number, was changed, and the remanufactured wheel's harm evaluations were performed using this adjusted model. In addition, a daily life assessment model for wheels remanufactured with this laser cladding technology was developed. The cladded wheel's service life, as determined by this model, was very close to the wheel's planned life.

With China's rail travel industry advancing at a rapid pace, demand for rail travel versatile hardware is growing. The wheels of trains and trains wear out due to heavy loads and high speeds, eventually resulting in wheel weakness breaks, track scraped spots, and other damage. It consolidates the rail line gear undertakings' support responsibility.

Wheels that have reached their wear limit are subjected to high-temperature purification on a regular basis; however, this method is energy inefficient and pollutes the environment. As a result, it is preferable to embrace the "adding materials" methodology to fix the wear of such haggles' unique appearance and execution for reuse. This is due to the fact that, in addition to reducing pollution, this method also saves energy, time, and money.

Laser cladding technology is widely used not only in the fields of apparatus, aeronautics, and aviation, but also in biomedical applications. The expansion of material properties, such as wear resistance, consumption obstruction, surface hardness, or the durability of the materials created, are examples of these objects. Many experts have detailed successful endeavours in applying this technology to the field of rail travel, particularly for examining the microstructure, mechanical properties, remaining pressure, wear, and moving contact exhaustion of laser-cladded haggles.

Laser cladding was used to fix haggle materials, with the goal of determining the hardness and wear resistance of the samples after laser cladding. The microhardness of the haggle examples increased significantly (by over 40%) after laser cladding, and the wear resistance was multiple times greater than before laser cladding, according to the results of their study. The ideal cycle boundaries for the symmetrical test were determined by concentrating on the wear issue of a fast train wheelset fixed by laser cladding.

The direct remanufacturing of damaged wheels using laser cladding technology is challenging due to the variety of models and wheel materials, especially given the severe requirements of the interaction. During the most common method of cladding and remanufacturing, protective measures should be taken to ensure that the cladding layer and the heat-affected zone do not foster breaks or other deformities that could affect the nature of remanufacturing, and thus the construction and mechanical properties of the remanufactured items. Metal innovation, thermodynamics, elastoplastic mechanics, and tribology are all aspects of laser cladding remanufacturing.

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CONFLICT OF INTEREST

The author has nothing to disclose and also state no conflict of interest in the submission of this manuscript.

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