

Future Developments of Surface Heat Treatment Techniques Using Nitrogen for Powertrain Gears Required for Next-Generation Automobiles

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Abstract

For next-generation automobiles, it is necessary to develop powertrain components that can support the further evolution of internal combustion engines and the higher performance of electric vehicles against the backdrop of tightening regulations on global environmental protection. Powertrain steel gears installed in transmissions and reducers require increased tooth root and tooth surface strength to achieve high-speed rotations and high torque, and reduced overall size and weight, while also having high precision and low friction to achieve high transmission efficiency and low noise. This report describes the studies on surface heat treatment techniques using nitrogen in terms of recent nitriding-potential gas nitriding, nitrided quenching, novel salt-bath oxy-nitrocarburizing, and combined methods.

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