

Effect of ultrasonic rolling strengthening on the bending fatigue characteristic of 12Cr2Ni4A steel gear

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Abstract

To improve the bending fatigue life of gears, a novelty method of the ultrasonic rolling strengthening is proposed to process tooth roots of the spur cylindrical gears . The variations in the residual stress, surface hardness and the depth of hardened layer of the tooth root were studied. Subsequently, the bending fatigue experiments of the single tooth were performed, and the relationship among the surface residual stress σ , surface hardness H_v , the depth of the hardened layer δ and the bending fatigue life was investigated. The results exhibit that the tensile residual stress located on the tooth roots is converted to the residual compressive stress. Compared with the unreinforced condition, the bending fatigue strength of the strengthened gears is increased by 2 times, and its fatigue life is extended by 15 times.

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