

Study on the Tightening Characteristics of Wheel Bolts Through Real Vehicle Field-Testing[⊖]

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Abstract: Utilizing the theory of ultrasonic acoustic elasticity, a field-test method for evaluating the tightening characteristics of wheel bolts was conceived. By designing specific testing items, the axial force degradation pattern during wheel bolt tightening was discerned, and the impact of various dynamic driving conditions on axial force degradation was identified. Factors such as test part temperature and environmental temperature on the results were analyzed. From these insights, an equivalent axial force calculation formula tailored for field-testing of wheel bolt tightening was derived. A streamlined segmented operating condition testing approach was devised, and its axial force measurement consistency was verified against the traditional method. Through evaluating axial force alterations across different road conditions for average users, a comparative relationship between the wheel bolt tightening field-test and routine road conditions was deduced. The results indicated that the segmented wheel bolt tightening force field-test, using the ultrasonic method, is compliant with standard assessment criteria.

Key words: wheel bolt, tightening characteristics, ultrasonic, axial force, dynamic driving conditions, simplified segmented conditions

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