

METHODOLOGY TO TEST THE STEERING SYSTEM OF AN AUTOMOBILE BY MEANS OF FORCES MEASUREMENT

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ABSTRACT - A few systems, such as steering, braking or suspension, critically affect the vehicle's safety. In light of this, it is necessary to check these components periodically in order to maintain the vehicle in optimal safety conditions. This study is part of a project about effectiveness of Periodic Motor Vehicle Inspections (PMVI), in order to suggest methodologies, instruments and criterions to inspect the vehicle's safety. The inspection must meet certain requirements in order to generalize, and reduce the costs of implementation. Probably one of the most important requirements for any inspection procedure is to use as little time as possible. This defines the process and elements to use.

It's well known the relationship between steering geometries and the force in contact patch. The measurement of these geometries is important in order to evaluate the vehicle's dynamic performance. This relationship would allow us to determine the state of the steering system and the degree of mismatch that it may suffer and consequently, guarantee the vehicle's security standards.

The aim of this study is to raise a new steering inspection method at low speed, based on forces measurements by means of dynamometer plate (figure 1). It was sought to ensure a minimum test time, the use of simple operation, and the avoidance of any manipulation done on the vehicle. It has been possible to establish precise and objective limits for acceptance or rejection. Thus the proposed procedure meets all the conditions to be applied in a simple manner in the current system of the Periodic Motor Vehicle Inspections.

The angle that has more influence on the PMVI is the toe angle, being the principal parameter of the analysis. Experimental force in contact patch with dynamometer plate and direct steering geometries measurements have been carried out in order to validate the methodology of steering inspection and to check the information obtained in these tests.