NOVEL METHOD TO MEASURE ABRASION OF SOLID TYRES

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ABSTRACT

Peripheral velocity, load, floor surface and type of rubber compounds are the key determinants considered when selecting solid tyres. These factors also determine the life of the tyres. However, there is no accepted method to measure tyre wear against the factors mentioned above. At present, lifespan of tyres is determined through field tests where the tyres are used in different industries and collecting data on tyre life in terms of running hours. Another method is to use a drum-type apparatus with bonded abrasive paper or abrasive particles between the tyre and the drum. The limitations of these methods include the time requirement and inaccuracies in data to enable accurate analysis of tyre life. As a result, the tyre manufacturers find it difficult to specify the tyre life with adequate degree of certainty to the customers. This gives rise to a need for a standard method to assure the life of tyres, especially solid tyres, for the benefit of the customers and to conduct tests to help improve tyre performance. The proposed apparatus has the facility to change the operating speed, surface and the load. The overall designed length, width and height of the machine are respectively 3000 mm, 1150 mm and 3350 mm. The computer-based simulation results for design evaluation suggest that the stress and stain are within allowable limits under typical loading conditions. Then a scale down prototype was constructed and three samples which were manufactured from three different compounds were tested for measure rubber abrasion and temperature. Results showed high abrasion resistance compound according to DIN 53516 had low wearing and low heat build up compound according to drum testing results had low temperature. Construction and testing of the apparatus are proposed as future work to complete the work.

Keywords: tyre life, testing, apparatus

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LIST OF ABBREVIATIONS

ESC - Electronic Stability and Control

NADS - National Advanced Driving Simulator

POB - Press on band

PLC - Programmable Logic Controller

SIT - Contour or clip of solid tyres

SPEC - Specification

SRT - Solid resilience tyre

STD - Standard solid tyre

TRC - Transportation Research Center