

Accepted Manuscript

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PII: S0142-1123(18)30073-2

DOI: <https://doi.org/10.1016/j.ijfatigue.2018.02.025>

Reference: JIJF 4590

To appear in: *International Journal of Fatigue*

Received Date: 9 December 2017

Revised Date: 12 February 2018

Accepted Date: 17 February 2018



Please cite this article as: Li, W., Xin, Z., Flexural fatigue life prediction of a tooth V-belt made of fiber reinforced rubber, *International Journal of Fatigue* (2018), doi: <https://doi.org/10.1016/j.ijfatigue.2018.02.025>

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Flexural fatigue life prediction of a tooth V-belt made of fiber reinforced rubber

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Abstract:

Fatigue endurance characteristics investigation of driving belts is of great significance to assure the safety and reliability of the mechanical transmission and evaluate the feasibility of a new product design. R1 type tooth V-belts consisting of fiber reinforced rubber generally operate under cyclic flexural fatigue load caused by a clutch tensioner, resulting in propagation of crack at the compression section rubber and thus losing its efficiency. This paper presents a concise methodology to predict the flexural fatigue life of tooth V-belt through a combination of material property test and finite element analysis method. Hyperelasticity, viscoelasticity and Mullins effect of fiber reinforced rubber were completely considered in the finite element model. De Mattia flexural fatigue specimen was adopted as the simulated sample. Crack formation and crack length extension of the De Mattia specimen tested under various cyclic flexural loads have also been studied. The maximum strain energy density used as the damage parameter was obtained through finite element analysis method. An

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