FORCE EFFECTS ON LAMINATED RUBBER-METAL SPRING USING TRANSMISSIBILITY TEST NUMERICAL APPROACH

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This report submitted
in fulfillment of the requirements for the degree of
Bachelor of Mechanical Engineering (Plant & Maintenance)

Faculty of Mechanical Engineering

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

2017

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DECLARATION

I declare that this project entitled "Force Effect on Laminated Rubber Metal Spring Using Transmissibility Test Numerical Approach" is the result of my own work excepts as cited in the references.

Signature :.....

Name : MUHAMMAD IHSAN BIN MADZUKI

Date : 17 MAY 2017

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APPROVAL

I hereby declare that I have read this project report and in my opinion this report is sufficient in terms of scope and quality for the award of the degree of Bachelor of Mechanical Engineering (Plant & Maintenance).

Signature :.....

Supervisor's Name : **DR. MOHD AZLI BIN SALIM**

Date :.....

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DEDICATION

To my beloved mother, father, wife, siblings and all my friends.

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ABSTRACT

The purpose of this project is to study and analyses the laminated rubber-metal spring model by using the finite element analysis software. The model is drawn part by part and assembly by using the CATIA solid modelling software. By using the ANSYS FEA finite element analysis software, the natural rubber rod is analyses with 5 different type of natural rubber rod. This 5-different type of the natural rubber rod that been drawn and be analyses. The 5 different types of the natural rubber rod are the nature rubber rod without embedded plate, the nature rubber rod with 1 embedded aluminium alloy plate, the nature rubber rod with 2 embedded aluminium alloy plate, the nature rubber rod with 3 embedded aluminium alloy plate and the last one is the nature rubber rod with 4 embedded aluminium alloy plate. Every type of the natural rubber rod was analysed by using the 5-different force which is 200N, 400N, 600N, 800N, and 1000N. The result and data of the analysis then is show and represent based on the graph and table. By referring the result, the comparison of the value of the modal analysis, stress frequency response and the deformation frequency response of each type of the natural rubber rod is done, As the summary of the project, the number of embedded plate on the natural rubber rod will affect the result of the modal analysis, stress frequency response and the deformation frequency response.

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ABSTRAK

Tujuan project ini adalah untuk mengkaji dan menganalisis model model spring getah berlapis dengan logam dengan menggunakan perisian analisis. Model tersebut telah dilukis bahagian demi bahagian dan digabung dengan menggunakan perisian permodelan pepejal CATIA. 5 jenis rod getah asli telah dianalisis dengan menggunakan perisian ANSYS FEA. 5 jenis rod getah asli tersebut yang telah sediakan telah dianalisis. 5 jenis rod getah asli tersebut ialah rod getah asli tanpa plat aluminium aloi yg tertanam di dalamnya, rod getah asli dengan 1 plate aluminium aloi tertanam di dalamnya, rod getah asli dengan 2 plate aluminium aloi tertanam di dalamnya, rod getah asli dengan 3 plate aluminium aloi tertanam di dalamnya, dan rod getah asli dengan 4 plate aluminium aloi tertanam di dalamnya. Setiap jenis rod getah asli telah dianalisis dengan menggunakan daya 5 yang berbeza iaitu 200N, 400N, 600N, 800N, dan 1000N. Keputusan dan data dari analisis telah di paparkan dalam bentuk graf dan jadual. Merujuk kepada keputusan dan data yang diperolihi, perbandingan diantara setiap analisis telah dilakukan. Sebagai penutup untuk project ini, ternyata bilangan plate aluminium aloi yang tertanam di dalam rod getah asli akan memberi kesan kepada analisis.

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LIST OF ABBEREVATIONS

NR	Nature Rubber
FE	Finite Element
FEA	Finite Element Analysis
3D	Three Dimensional
LR-MS	Laminated Rubber-Metal Spring
DOF	Degree-of-Freedom
CAD	Computer Aided Design

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