

Numerical and Simulation Analysis of Composite Friction Materials Using Single Plate Clutch Pad in Agricultural Tractors

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Abstract : For smooth transition of the power from the engine to the transmission system, a clutch is used. In agricultural tractors, friction clutches are widely used in power transmission applications. To transmit the maximum torque in friction clutches, selection of materials is one of the important tasks. The present used material for friction disc is Asbestos, Ceramic etc. In this study, analysis is performed using composites materials. The composite materials are considered due to their high strength to weight ratio. Composite materials like kevlar49, kevlar 29U were used in the study. The paper presents a systematic approach to optimize the structural and thermal characteristics of the clutch friction pad. A single plate clutch is modeled using Creo 2.0 software and analyzed using ANSYS. Thermal analysis considers the reduction of heat generated between the friction surfaces and reducing the temperature rise during the steady state period. Structural analysis is done to minimize the stresses developed as a result of the loading contact between friction surfaces. Also, modal analysis is done to optimize the natural frequency of the friction plate to avoid being in resonance with the engine frequency range. The analysis carried out on ANSYS workbench to get the foremost appropriate friction material for clutch. From the analyzed results stress, strain / total deformation values and natural frequency of the materials were compared for all the composite materials and the best one was taken out. For the study purpose, specifications of the clutch are obtained from the MF1035 (47KW) Tractor model.

Keywords : ANSYS, clutch, composite materials, creo

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