Re-Design of Ragi Thresher and De-Husking Machine

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Abstract:

Developing countries like India are focusing on mechanizing agricultural operations due to the shortage of farm labour. There is a strong need for developing machines at affordable costs to meet the demands of large as well as smallholding farmers. To meet the demands in ragi production and to mechanize the operations involved in ragi crop harvesting, a working model of low cost "Ragi Threshing and De-husking Machine" was developed. The working model of machine was tested for performance and obtained an efficiency of 35% indicating a significant seed loss, wastage of crop thus leading to low productivity.

In order to overcome the design drawbacks of available "Ragi-Threshing and De-husking Machine", an attempt has been in this work to re-design the working model for improved productivity. The reverse engineering approach was carried out to capture engineering design data for the re-design purpose. The design drawbacks while processing the ragi crop in available machine was found through task analysis. Using agricultural parameters, an engineering design approach was used to re-design the key components of the machine like hopper drum, belt drives, threshing cylinder shaft, winnower shaft and sieving mechanism.

The geometry of the arrived design was modelled in CATIA software and suitability of the mechanism was analysed using Multi-Body dynamics tool ADAMS. Further, structural analysis was carried out using Finite Element tools (Hyper mesh/ANSYS) to ensure that re-designed machine parts are safe. Finally, all machine parts were fabricated, developed and tested for the performance. The tested results indicated that the productivity of re-designed model was increased by 56.67 % compared to available machine.
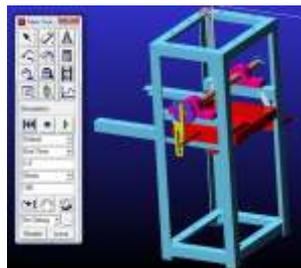
CAD model of Ragi harvester
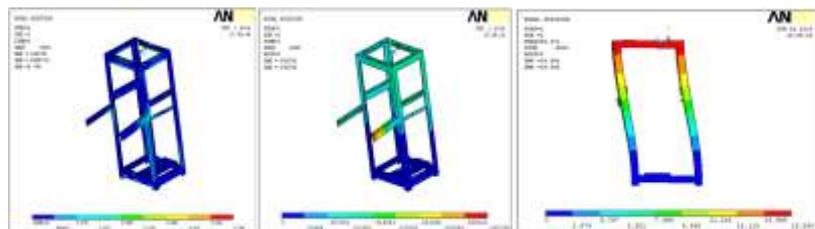
Structural Analysis of the frame
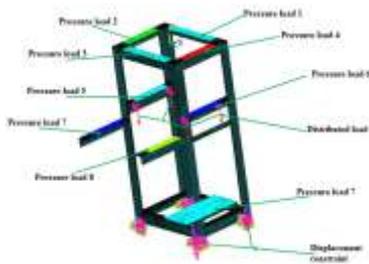
FE model of frame

Kinematic model

Developed model