

ROTARY FACE PALLET ANALYSIS USING ANSYS SOFTWARE

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ABSTRACT

The finite element method is numerical technique, well suited to digital computers, which can be applied to solve problems in solid mechanics, fluid mechanics, heat transfer and vibrations. The procedures to solve problems in each of these fields are similar in all finite element models of the domain (the solid in solid mechanics problems) is divided into a finite number of elements. These elements are connected at points called nodes. In solid models, displacements in each element are directly related to the nodal displacements. In this project we used FEA technique in order to optimize the weight of rotary face pallet. Rotary tables are mostly used for index parts in defined, angular increments. They can be machined, worked in multiple operations. It consists of a circular steel plate, spindles, a drive system, and pins that hold parts in proper place. Rotary tables have fixed or adjustable indexing angles. The table stops for a specified period of time so that an operation can be performed at each station during every revolution. The supporting bearings of rotary tables determine both the load capacity and accuracy. Re circulating ball bearings are cheaper than Angular contact bearings. But angular contact bearings provide better load capacity and axial stiffness. Cross-roller bearings are also used. For a large sized table with high load capacity, the hydrostatic bearings are also used. Selection of rotary tables requires an analysis of specifications and features.

Keywords: finite element method, Rotary tables

INTRODUCTION

Rotary tables are mostly used for index parts in defined, angular increments. They can be machined, worked in multiple operations. It consists of a circular steel plate, spindles, a drive system, and pins that hold parts in proper place. Rotary tables have fixed or adjustable indexing angles. The table stops for a specified period of time so that an operation can be performed at each station during every revolution. The supporting bearings of rotary tables determine both the load capacity and accuracy. Re circulating ball bearings are cheaper than Angular contact bearings. But angular contact bearings provide better load capacity and axial stiffness. Cross-roller bearings are also used. For a large sized table with high load capacity, the hydrostatic bearings are also used. Selection of rotary tables requires an analysis of specifications and features. It contains maximum indexing increment, rotational speed, torque obtained at the table top, maximum axial load, maximum applicable machining force, maximum radial load, work

table diameter. A variety of features are available. Some table surfaces can be raised or lowered at a controlled angle. Others have more than one rotating work surface. Computer numerically controlled (CNC) devices provide greater accuracy and repeatability. Position encoders are often used to relay the position of the table surface.

PROBLEM STATEMENT

To find the exact shape of the rotary pallet which has optimum stress & deflection by removing the unwanted material to reduce the weight of rotary table.

Analysis of a rotary table pallet will be done for a certain loading condition of an existing model and stresses as well as deflection will be determined for same model by using finite element analysis.

Comparison of the results will be done for the modified pallet obtain by trial and error method, to maintain the allowable stresses and deflection.

OBJECTIVE

- 1) Design of critical parts like Pallet considering machining force and weight of the work piece into the account.
- 2) Optimization of weight of the pallet for particular loading conditions and structural rigidity by analytical method.
- 3) Structural and Dynamic Analysis of pallet will done using finite element package
- 4) Validation of the theoretical optimization results with finite element results.

The Dynamic analysis is carried out to check the dynamic behaviour of the critical components like housing and pallet.

1.3 SCOPE

- Removing the unwanted material of the pallet.
- Reduce the weight of rotary table pallet.
- Easy to handle.
- Less machining work require by using steel plates for housing.
- Use of weldment body for housing there is no need of mould and pattern for manufacturing housing.
- Maintain the high machining accuracy.
- Reduce the manufacturing cost.

METHODOLOGY

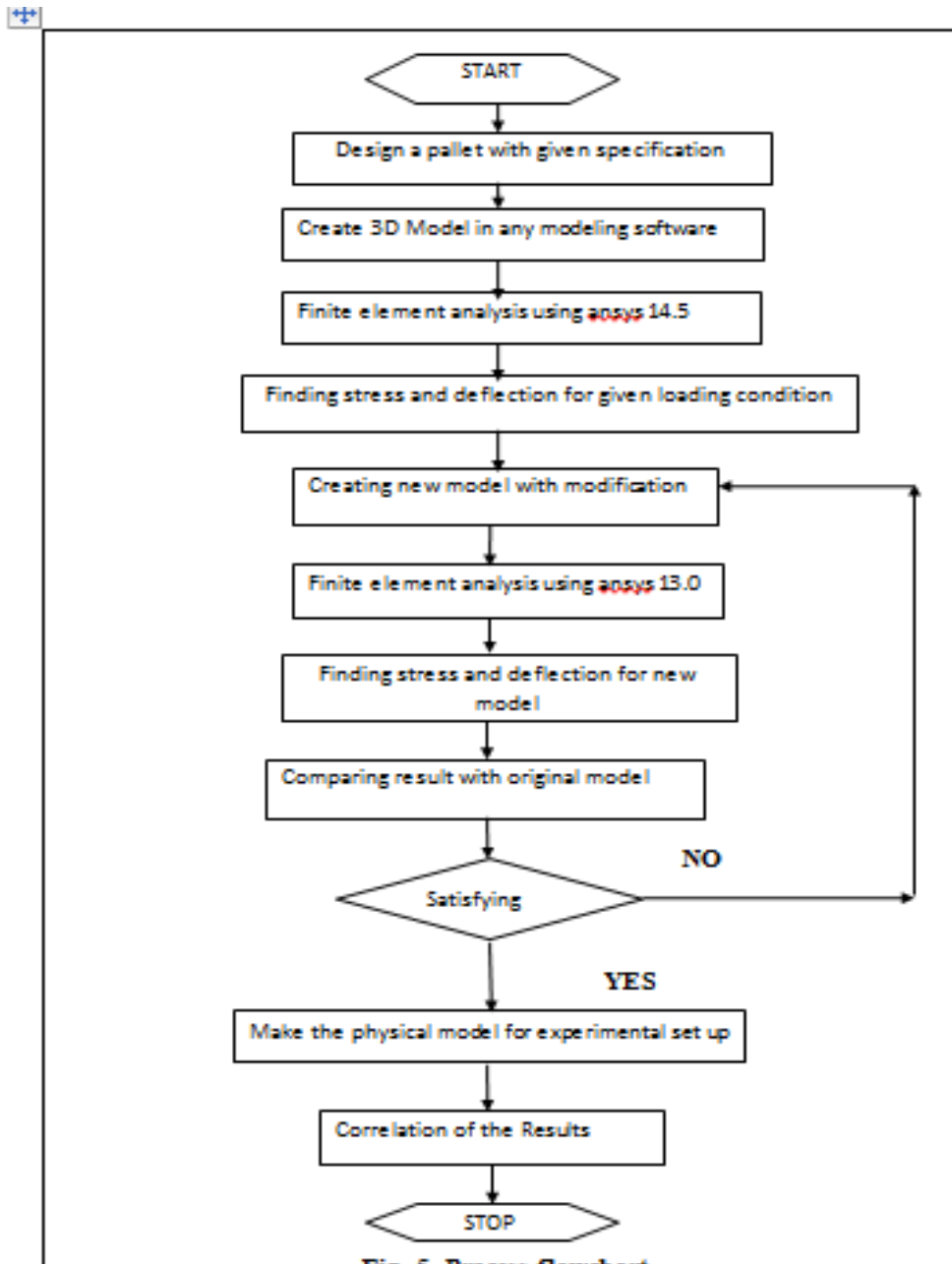


Figure 1. Methodology used in the work

DESIGN CALCULATION OF EXISTING PALLET

Pallet is the most critical component in the rotary table assembly. Design of the pallet should take care of several aspects like work holding space, less deflection, fixture mounting facilities, T – slots for rigid fastening, specific load carrying capacity, and required elevation, less weight as shown in Figure

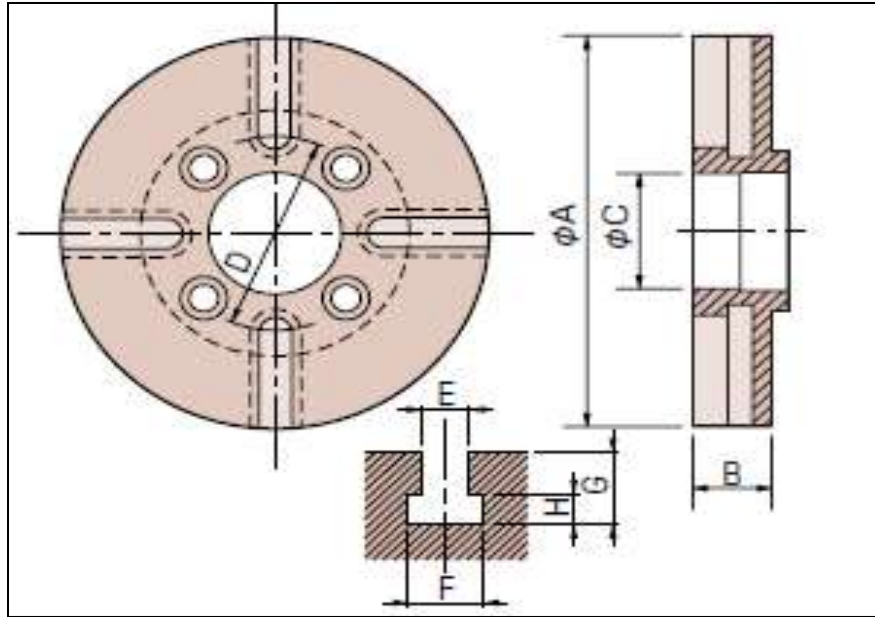


Figure 2. Proposed rotary table to be manufactured





CONCLUSIONS:


- 1., In final designed pallet compare to existing pallet, the weight of pallet is reduced
2. modified pallet is safe under static conditions.
3. The model frequencies of the modified pallet is greater than the operating frequencies. Hence there is no any resonance. So, design of final modified pallet is safe. The frequency occurred in the final model is greater than the existing pallet.
4. Due to reduction in weight this final modified pallet can be used as automatic pallet changer.
5. Reduction in weight of pallets results in to reduced material cost.
6. The provision of T slots in the final modified pallet leads to reduction in manufacturing complexity.

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