Design of Precision Rotary Indexer for Non-Machining Applications

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Abstract:

Today technology is more customers centric with ample number of choices available for a new product requirement. Automation is becoming one of the important choices in today's mechanical industry. Different automation concepts are available in market, indexing is an important mechanism for automation. Indexing equipment has huge opportunity in non-machining applications. This equipment will help the accessibility to component for its all four faces, in turn reduction of human intervention for setup changes.

This work was an effort to design a low cost precision rotary indexing table. The challenge was to design a rotary indexing table for non-machining application with low cost, high reliability, safety etc. Various literatures were studied with regard to indexing mechanism, specification and table design. Different concept designs with the specifications were developed and final concept design was arrived at by using a decision matrix. The mechanical design was done by using suitable mathematical design calculations. The model was developed in Solid works 2012 and topology optimization was carried out using Ansys 12.0. Material selection was carried out using CES 2010, kinematic analysis was carried out using ADAMS 2013. Stress and deflections in final assembly was verified using Hypermesh 10.0 and Ansys 12.0, and the final design of rotary index table for non-machining application was arrived.

The final design of the rotary table was ensured to meet the various specifications mentioned for dimensional data, operational data, load and force data and accuracies. The rotary indexer for non-machining application was designed with the weight of 45 kg and the deformation in various parts in assembly are table top = 0.002 mm, housing = 0.009 mm, and in assembly = 0.001 mm The von-Mises Stress for various parts in assembly are table top = 2.66 MPa, housing= 14.02 MPa and assembly = 54.1 MPa. The results were well within the limits.
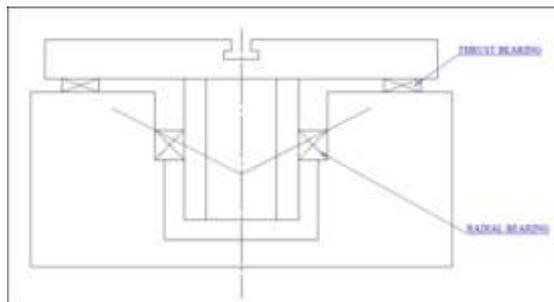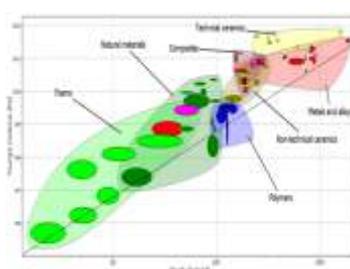
Concept design
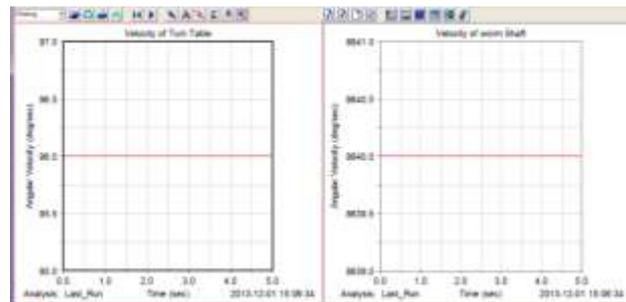
Angular velocity graph of turn table and worm shaft
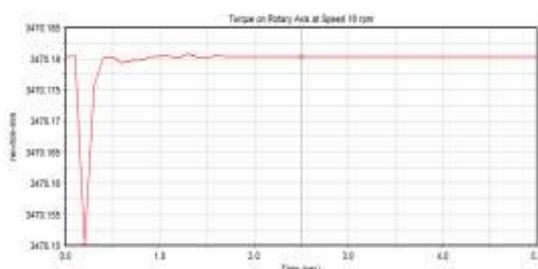
Torque in rotary indexer

Material selection chart

Final rendered model