

Harmonic Balancer Torque Tester

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Background

Harmonic balancers damp torsional vibration from the crankshaft of a car engine. Without harmonic balancers, the engine smoothness and durability are greatly decreased as the overall torsion of the crankshaft is increased. Harmonic balancers are made of three components: the hub, the inertia ring, and the rubber ring. Between the hub and inertia ring is the rubber ring. This rubber ring affects damping effects through its torsional spring rate, which is dependent on the properties of the rubber.

Problem Statement

A machine is needed to test the functional characteristics of the rubber ring contained within a typical harmonic balancer.

Requirements:

- This test will be conducted by holding either the hub or inertia ring statically in a fixture and applying the other with a torque until the rubber ring slips or shears.
- The machine will collect live data showing the relationship of torque versus angular displacement to determine the torsional spring rate and torque resistance of the assembly.



Project Objectives

Mechanical

Create a mechanism which can drive a specified torque or a torque resulting in 5 degrees of angular deformation or failure

Electrical

A fully automated testing process with sensors which can precisely record torque and the resulting angular deformation

Coding

Develop a computer program that can convert the output from sensors into values of torque and deformation as well as summarize the data on a graphical plot

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