Volvo Construction Equipment

Overview
Volvo Construction Equipment (VCE) tasked the team with building a reduced scale double drum asphalt compactor model to experimentally verify computer simulations. Double drum asphalt compactors are designed to vibrate up and down to increase the compaction of the machine. The scale model will create similar vibration patterns to the full-size counterpart.

Objectives
The objective of the project is to create a 10:1 scale model of Volvo Construction’s double drum asphalt compactor. Other specifications of the model include a weight ratio of 500:1 and a rotating frequency of 70 Hz. A control system must also be created in order to control the relative speeds of the two eccentric shafts.

Approach
- Visited Volvo Construction site in Shippensburg, PA in order to gather customer needs
- Weighted the customer needs in AHP and matrices
- Turned the customer needs into a set of specifications that our model must achieve
- Conducted research including a patent study and an analysis of existing products
- Generated concepts using brainstorming methods
- Selected a concept using screening and scoring matrices, and combined ideas to come up with our final design
- Selected parts including bearings, couplings, motors, shafts, etc.
- Developed a CAD model of the scale model in SolidWorks using all of the selected parts
- Conducted FEA on the model rotating at different frequencies
- Ordered the necessary materials, including stock steel
- Manufactured the model in the learning factory
- Created a control system to monitor the speed of the two eccentric shafts relative to each other
- Tested the accuracy of the control system

Outcomes
- The sponsor will be able to run some additional tests and verify their computer simulations
- VCE will have a model to show customers and clients the inner workings of their asphalt compactors