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ME 476C 18F02 KineticA

To: Dr. Sarah Oman
From: Holden Chapin, Joshua Glenn, Dylan Lovato, Jonathan Walgren
Date: October 8, 2018
Re: Analytical Tasks Team Memo

Introduction:
Contained within this memo is the Kinetic Sculpture team's proposed analytical tasks that they will analyze for the project. Below are the team members and their proposals for their tasks and descriptions on how they would analyze these tasks.

Holden Chapin: Life Cycle Analysis
A crucial engineering requirement for this project is the reliability of the proposed sculpture, meaning the team is to make sure that the sculpture will be in working order after numerous cycles for the years to come. Clearly then it is imperative to perform an analysis on the long term life cycle of the sculpture. In this analysis I will be calculating the life cycles of the gears for multiple different metals (i.e. brass, aluminum, steel, copper) that the team would like to implement in the final design. Along with the life cycle analysis of gears, I would like to analyze the life cycle of any shafts that may be used in the final proposal, again calculating for the different materials that are being considered. This analysis will be conducted with the help of knowledge previously learned from prior courses here at NAU, like Materials Science (ME 240) and Machine Design (ME 365).

Joshua Glenn: Corrosion Due to Fluid Flow of Four Metallics
The analysis of corrosion will be done on four different metallics the group plans to use in their kinetic sculpture. By analyzing the corrosion through contact of brass, aluminum, steel, and copper the group will be able to decide the viability of using each of the metallics as well as their general "life cycles" through corrosion and how to best reduce corrosion The analysis for this will be done through use of materials used in the Materials Science (ME 240) class from NAU, the textbook, and Microsoft Excel. In order to complete this analysis accurately and efficiently, the group will also use advice and guidance from their professors.

Dylan Lovato: Gear Manufacturing
Since the team plans to cast their own metal gears, an analysis of the following topics will be important; the cost and time of production, the type of mold that should be used (open or closed), and the amount of heat required to raise the temperature of the metal to the pouring temperature. This calculation will be done four different times, since the material for the final product is undecided. This analysis will help the team come 2nd semester. With these calculations, the team will determine if manufacturing the gears themselves or asking the shop to produce the gears.

Jonathan Walgren: Constant Torque Spring and Gear Ratio Analysis
One key aspect to the team's design is the ability to maintain motion for a period of at least 30 minutes. This can be achieved by implementing a constant torque spring. I will do an analysis using a series of measurements and calculations that will estimate the torque needed to be

applied to the input shaft from the constant force spring. I also intend to use a computer generated model that will estimate the inertia of each component of the team's design.