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Senior Design  
Trade Study Proposal

#### Purpose:

This study is intended to maximize the power output of the Stirling engine by determining the length of the links in the mechanism connecting the power piston to the output shaft. In addition, this study will be used to size a flywheel to smooth operation of the system.

#### Engineering Analysis and Simulation Tools:

The primary analysis of this study will be a kinematic analysis of the crank-slider mechanism consisting of the power piston on one end and the rotating output shaft on the other. The analytical results of this analysis will then be integrated into a MATLAB program which will be used to determine the length of two links in the system such that it will produce the biggest power output for a given input. This input, as well as the engine's diameter will be assumed. To optimally size the flywheel, methods learned in Design of Machine Elements will be utilized.

#### Information to be Developed:

- Optimal lengths of the links of the mechanism
- The power produced by links of these lengths
- The optimal size of a flywheel to smooth out the engine's operation
- Formulas and relations used to size link lengths based on a given pressure input

#### Decisions to be Influenced by this Study:

The size/mass of the flywheel and length of links in the mechanism will be heavily influenced by this study. In addition, as these components will add weight to the entire system, decisions regarding the support structure will be influenced. Finally, since this study will result in part in a means to predicting the amount of power that can be produced by the engine, it will ultimately influence or assessment as to whether or not the system a feasible concept.

#### Task Schedule:

2/12	–	Turn in proposal
2/12	–	Discuss flywheel sizing with Professor Schmid
2/15	–	Have a working MATLAB code which will output the optimal link lengths
2/18	–	Have the flywheel sized based on the link lengths chosen
2/21	–	Have the study completed and ready to share with team
2/21 – 2/28	–	Make necessary revisions, formalize study into a report
2/28	–	Turn in report