

Aim

In this project, you are going to find the work and power produced for a given cycle of a two stroke engine based on the cylinder pressure data. You should also find the rate of pressure change, $\frac{dp}{dt}$.

Specifics

Knowing the volume and pressure inside a cylinder, work can be calculated by integrating $\int p dv$. Figure 1 shows the relevant geometrical characteristics of a slider-crank mechanism commonly found in a piston engine.

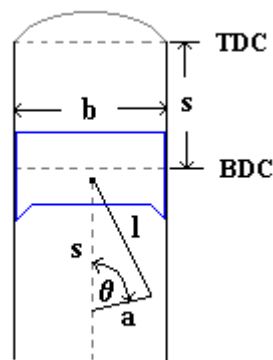


Figure 1: Slider-crank mechanism

Crank angle and volume can be related by the equation below

$$V = \frac{V_d}{r-1} + \frac{V_d}{2} \left[1 + R - \cos \theta - (R^2 - \sin^2 \theta)^{\frac{1}{2}} \right]$$

where V_d = cylinder displacement, r = compression ratio, and $R = \frac{l}{a}$. Download the crank angle vs. pressure data from my website. You will find the relevant data from the datafile. Edit the datafile so that you can load it directly from Matlab. For rate of pressure change calculation, assume a direct relationship between crank angle and time. Refer to your Thermo II notes for other relevant formulas.

Deliverables

Your report should include the description of the problem, how you set up the problem, assumptions, method of solution, the Matlab code that you used, the results, all relevant plots, discussion and potential weaknesses in your solution method. Hand in your work on a CD containing all relevant files.