

1) Develop a WM simulation for an in-line slider crank in a single cylinder air compressor with 2.75 inch bore, 1.97 inch stroke and connecting rod length 4.33 inch operating at constant 1000 rpm crank speed. Export the position, velocity and acceleration of the piston into a *.dta file. Be certain to start your simulation at Top Dead Center (TDC). Attach a screen shot of your WM mechanism.

2) Use MS-Notepad or MS-Word to remove the header lines from the *.dta file. Write a MATLAB program to read the data from the modified *.dta file with the *load* function.

3) Program exact geometric equations in MATLAB to compute piston position, velocity and acceleration for the slider crank. Attach hard copy of your code.

4) Create three MATLAB graphs with WM and exact geometric equation results on the same graph. Use circle symbols for your WM results and a continuous line for your equation results.

- a) piston position versus crank angle
- b) piston velocity versus crank angle
- c) piston acceleration versus crank angle

5) How many standard CFM (cubic feet per minute) of air will this compressor deliver?

CFM _____

6) Save your WM file with the Measure window active and record the file size. Then open your WM file, delete the Measure window, save under a new name and record file size.

with Measure window _____ without Measure window _____

EXTRA CREDIT

Numerically subtract the difference between exact geometric equations and binomial series approximations for this slider crank and plot on three additional MATLAB graphs as a function of crank angle.