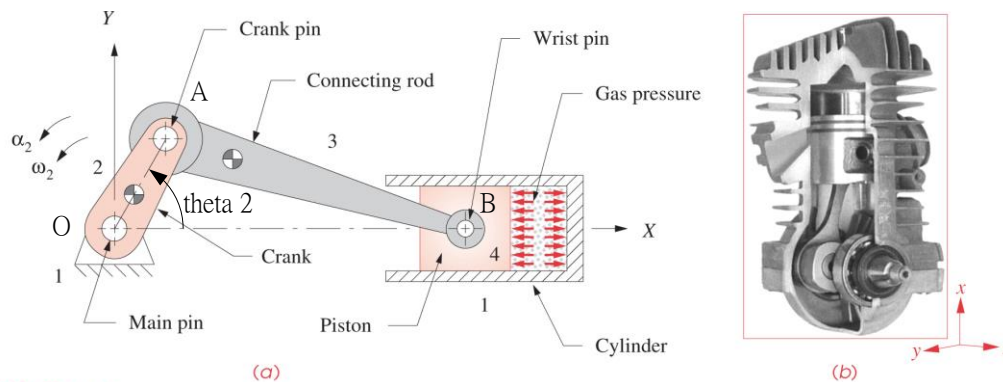


# Machine Dynamics – Assignment 4

Continued from Assignment 3. Derive the equations of motion of the slider-crank mechanism. As the engine starts, the angular velocity of the crank  $\omega$  is 200 rpm CCW and  $\theta_2$  is 0 degree. The driving torque  $T$  is  $0.0001 \cdot \omega^2 \text{ N}\cdot\text{m}$ ,

- 1) Simulate the dynamics of the engine during  $t = 0$  to  $10 \text{ s}$ .
- 2) In the simulation, find the required time to speed up from 200 to 3600 rpm.
- 3) According to the result in Assignment 3 to design a flywheel for the crank to achieve  $k = 0.05$ . Repeat 1) and 2) to find the influence of the flywheel.



**FIGURE 13-3**  
Fourbar slider-crank mechanism (a) for single-cylinder internal combustion engine (b) Mahle Inc., Morristown, NJ

Figure 1. Engine

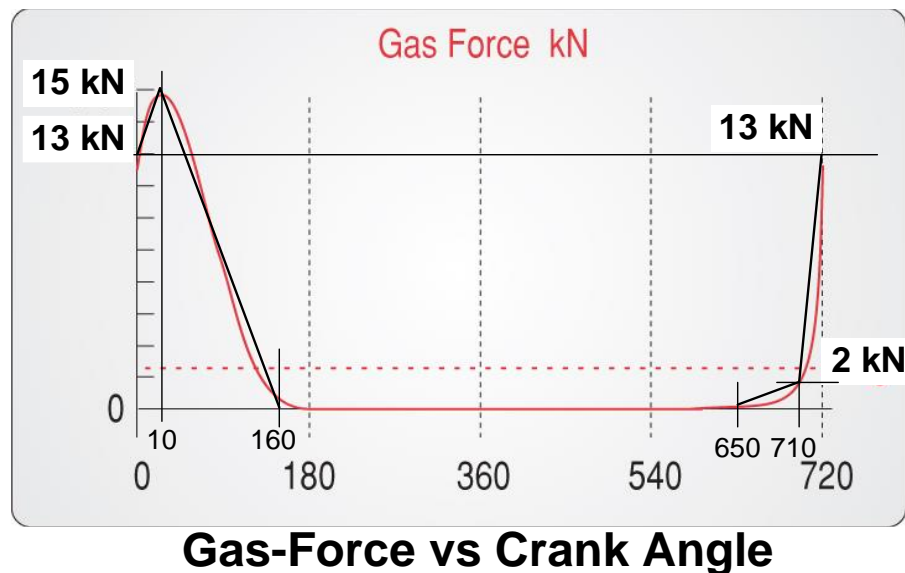


Figure 2. Gas Force