

# Combustion, Chap 3

ME419 Thermal Systems Design  
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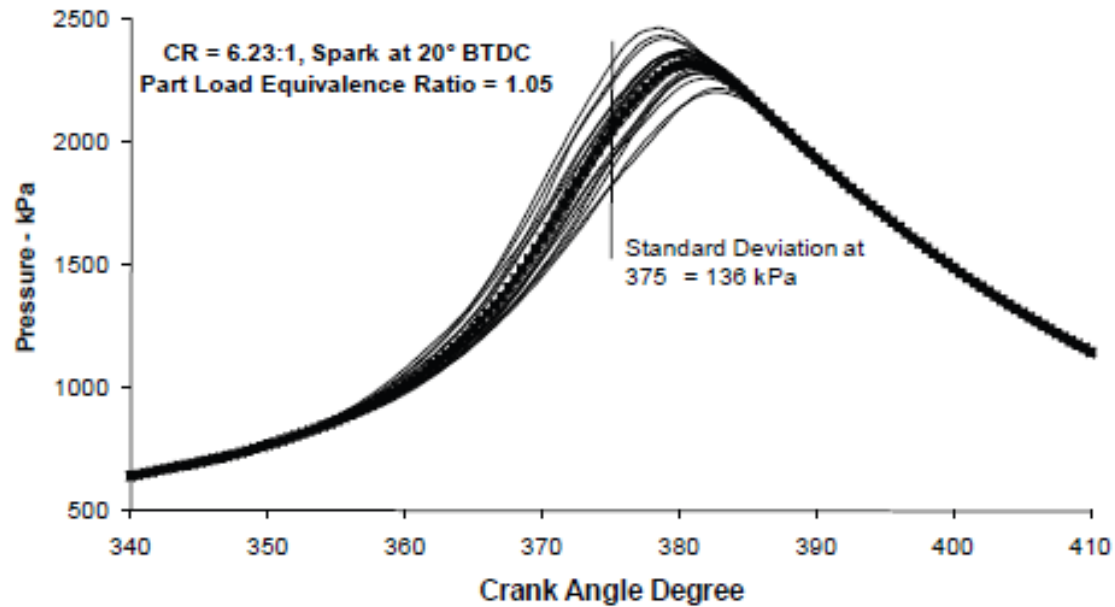


Figure 3.1: Typical pressure time measurements for 20 consecutive cycles of a CFR spark ignition engine, showing the standard deviation of cylinder pressure at 15° After TDC. The square data points show the average pressure for the 20 cycles.

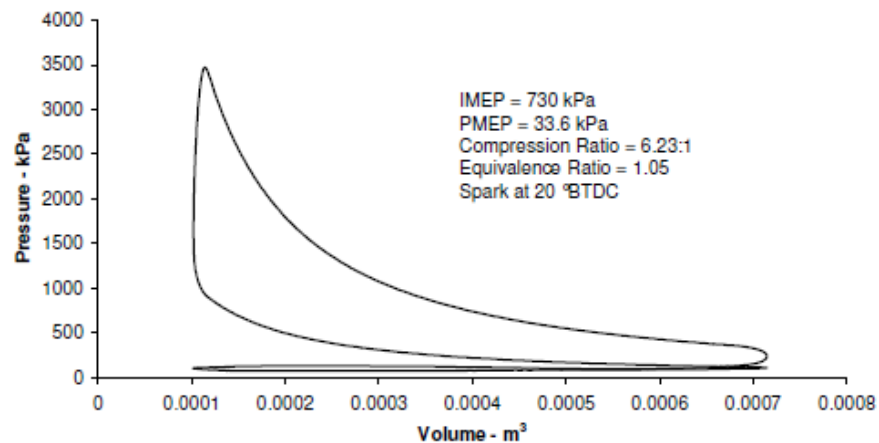
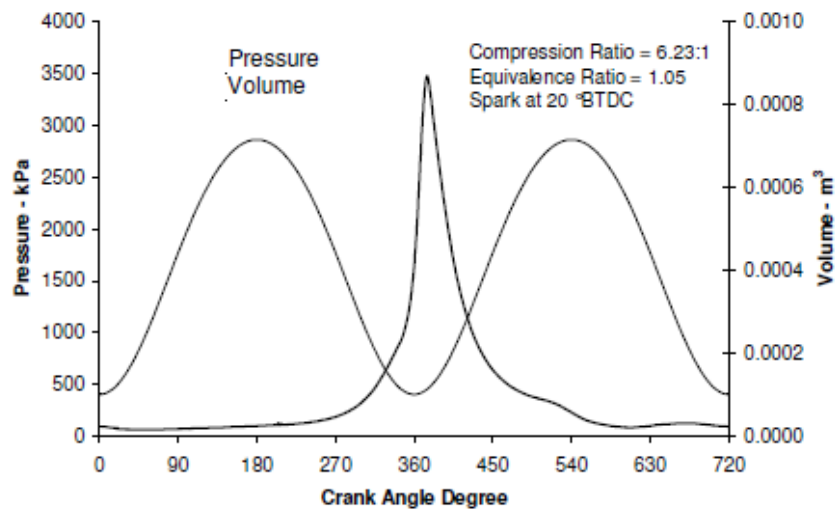


Figure 3.2: Basic data for volume and cylinder pressure time measurements for one cycle of a single cylinder spark ignition engine.

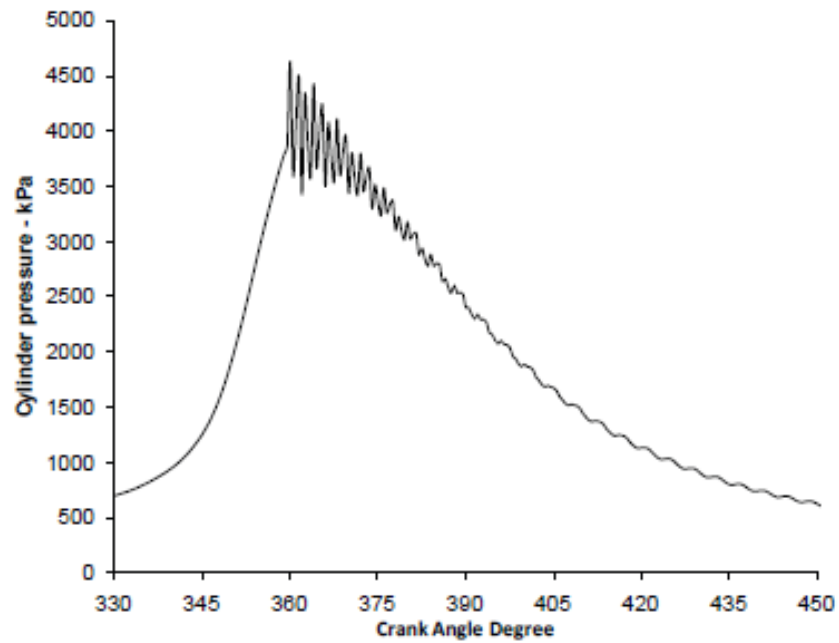


Figure 3.3: A pressure time diagram for a spark ignition under knocking conditions.

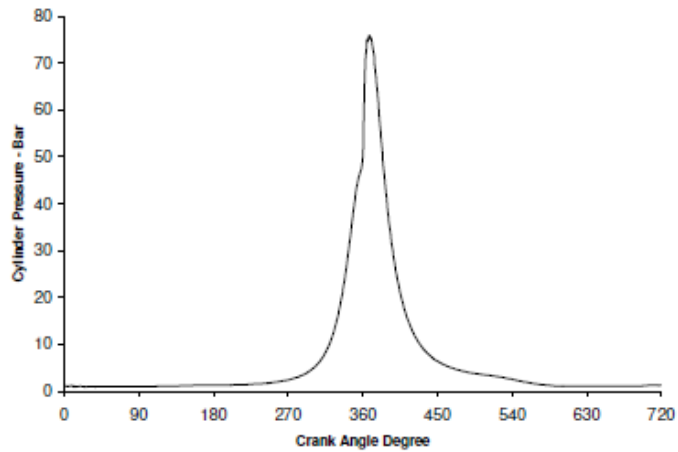


Figure 3.4: A pressure time diagram for a naturally aspirated diesel engine. 2-cyl with 0.483l/cyl, 2355 rpm, bmep= 655 kPa, imep=832 kPa.

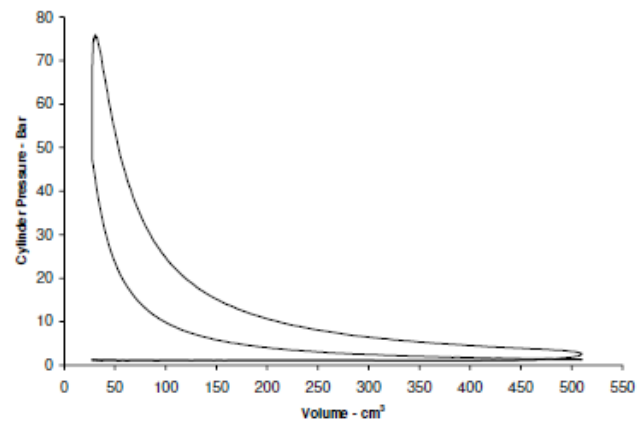


Figure 3.5: A pressure volume diagram for a naturally aspirated diesel engine. 2-cyl with 0.483l/cyl, 2355 rpm, bmep= 655 kPa, imep=832 kPa.

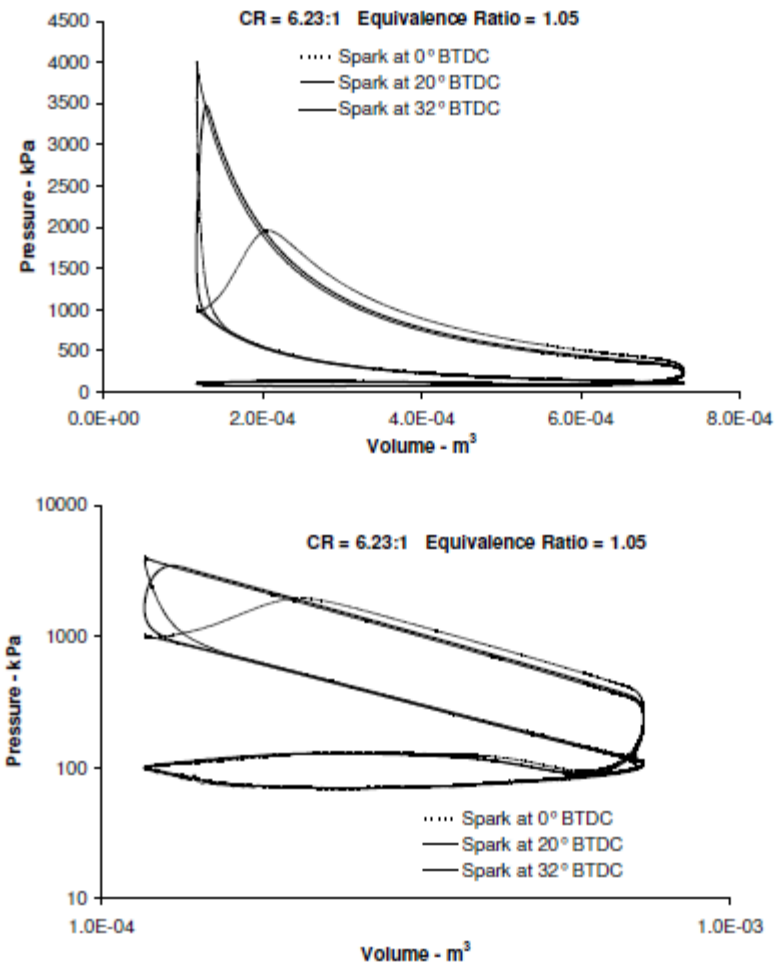


Figure 3.6: Pressure-volume diagram for a spark ignition engine for different spark timing, 20° BTDC, the optimum for this engine and condition, advanced timing 32° BTDC, and retarded timing, 0° BTDC. Logarithmic diagrams of the same data are shown in the bottom set of curves

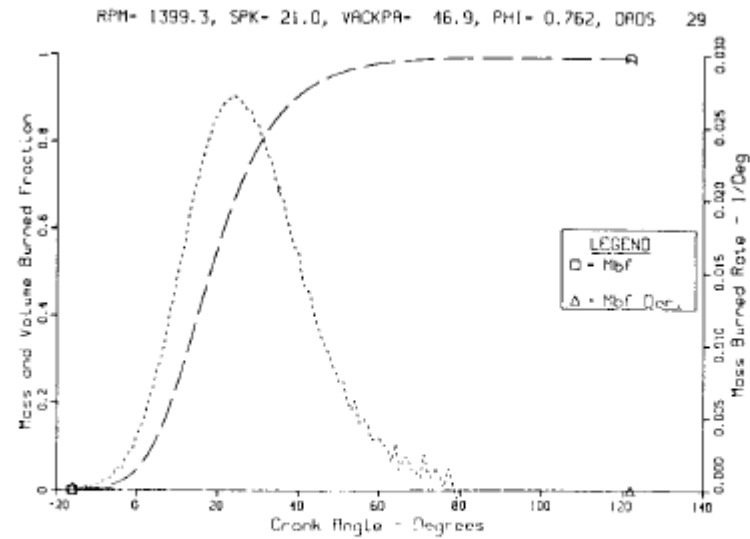


Figure 3.7: Instantaneous rate of heat release (dotted) and cumulative heat release (dashed) as functions of crank angle degree for a spark ignition engine [22].

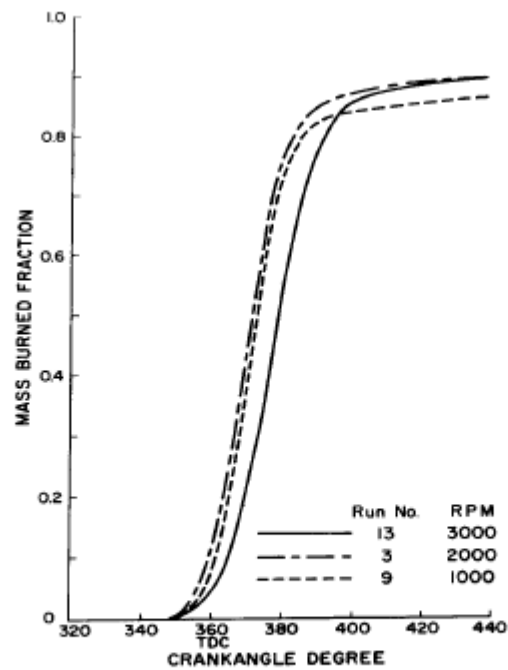


Figure 3.8: The cumulative heat release for a spark ignition engine as a function of engine speed.



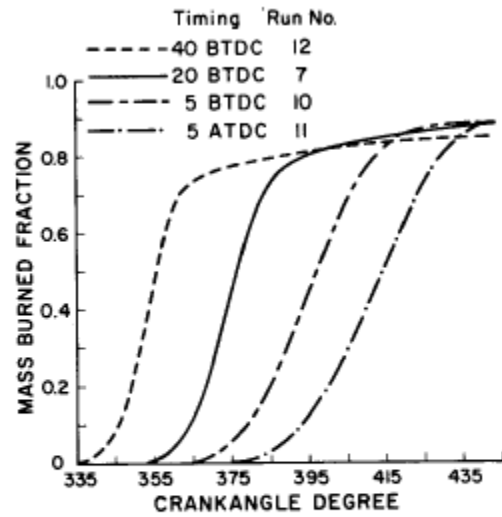


Figure 3.9: The cumulative heat release for a spark ignition engine as a function of ignition timing.

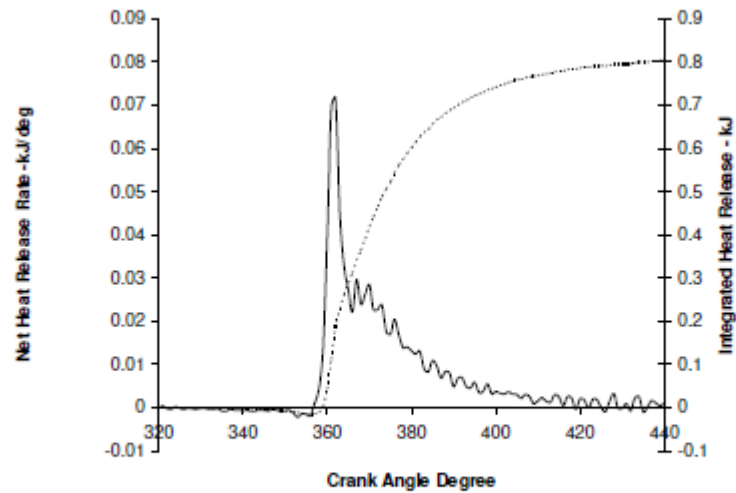


Figure 3.11: A net heat release - crank angle diagram for a naturally aspirated diesel engine. 2 cyl with 0.483l/cyl, 2355 rpm, bmep= 655 kPa, imep=832 kPa.

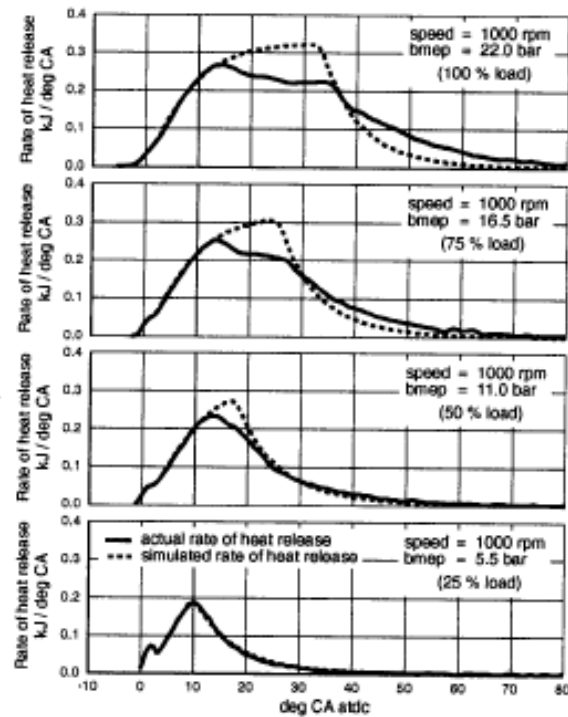


Figure 3.13: Rate of heat release for different loads in a turbocharged direct injection diesel engine, with a displacement volume of 2 liters per cylinder. [27]

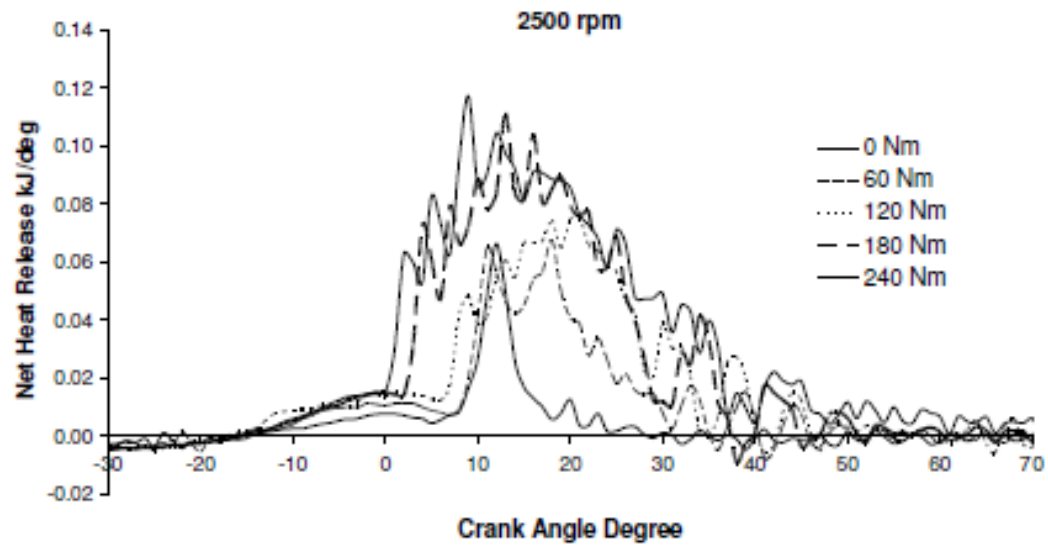


Figure 3.16: Heat release rate for a modern, common rail 2 liter direct injection diesel engine operating at a speed of 2500 rpm.