Figure 8.1: Basic processes in a 2-stroke engine gasoline engine.
Figure 8.2: Commonly used scavenging systems in 2-stroke engines.
Figure 8.3: Pressure crank angle diagrams for the cylinder (solid line) and crankcase (dashed line) of a single cylinder 2-stroke engine using the crankcase to provide scavenging air.
Figure 8.5: Examples of 2-stroke engines. A diesel engine with a blower to aid scavenging (left) and a small SI engine for a scooter or power tool application.
Figure 8.6: A large 2-stroke Marine diesel engine, the engine shown has a bore of 60 cm and a stroke of 2.29m.
Some Definitions

- **Delivery Ratio** – actual air flow rate to ideal flow rate that would fill the cylinder

- **Trapping efficiency** – ratio of fresh charge mass trapped in the cylinder to that supplied to the engine.  *How much air bypasses during scavenging?*

- **Scavenging Efficiency** – ratio of fresh air charge mass trapped in the cylinder to the total cylinder charge at the end of scavenging.  *What does it take to scavenge the engine?*
Figure 8.9: Typical trapping efficiencies for a 2-stroke SI engine efficiency as a function of engine speed for good trapping and poor trapping [84].
FIGURE 6-30
Delivery ratio $\Lambda$, trapping efficiency $\eta_{tr}$, charging efficiency $\eta_{ch}$, and scavenging efficiency $\eta_{sc}$, at full load, as functions of speed for two single-cylinder two-stroke cycle spark-ignition engines. Solid line is 147 cm$^3$ displacement engine.$^{24}$ Dashed line is loop-scavenged 246 cm$^3$ displacement engine.$^{35}$
FIGURE 6-27
Scavenging efficiency $\eta_{sc}$ and trapping efficiency $\eta_{tr}$ versus delivery ratio $\Lambda$ for perfect displacement and complete mixing models.
FIGURE 6-31
Purity as a function of delivery ratio $\Lambda$ for different types of large marine two-stroke diesel engines.$^{37}$
Figure 8.10: Full load performance, fuel consumption and emissions for different versions of 2-stroke engines compared to a 4-stroke SI engine with electronic fuel injection. [84]
poorer performance at low engine speeds
lower (not quite half) fuel consumption
lower NOx at low speed because of low temperature and high concentration of exhaust (exhaust valve open during intake)
much higher HC emissions