ENERGY TRANSITION TECHNOLOGY, INC.

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50% thermo-mechanical efficiency utilizing a free-piston engine in Hybrid vehicles

Poster-28

Theoretical Efficiency of the ICRE depends on the compression ratio

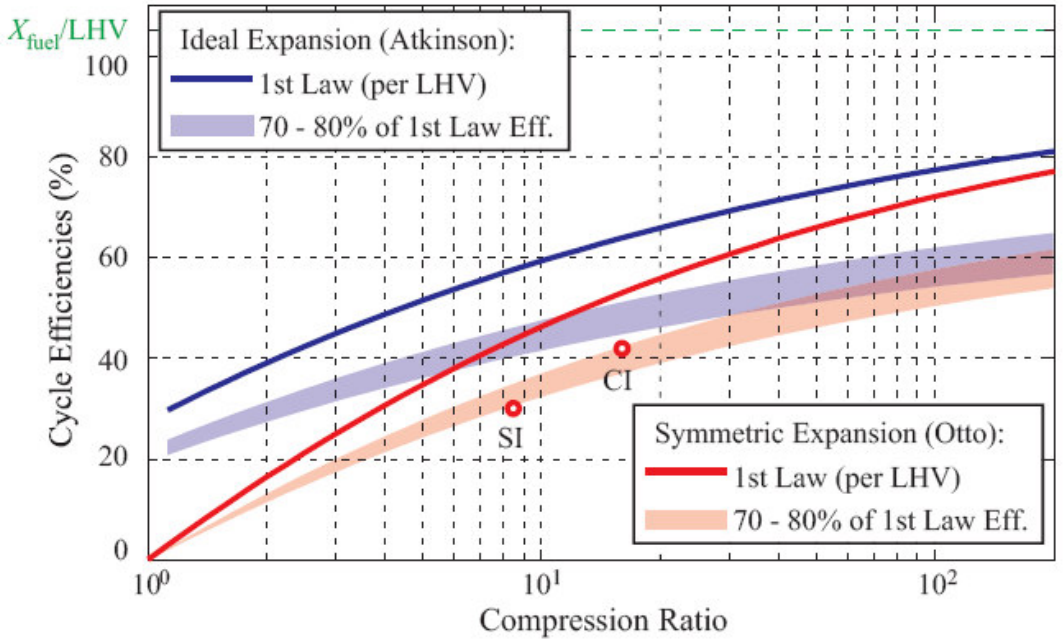
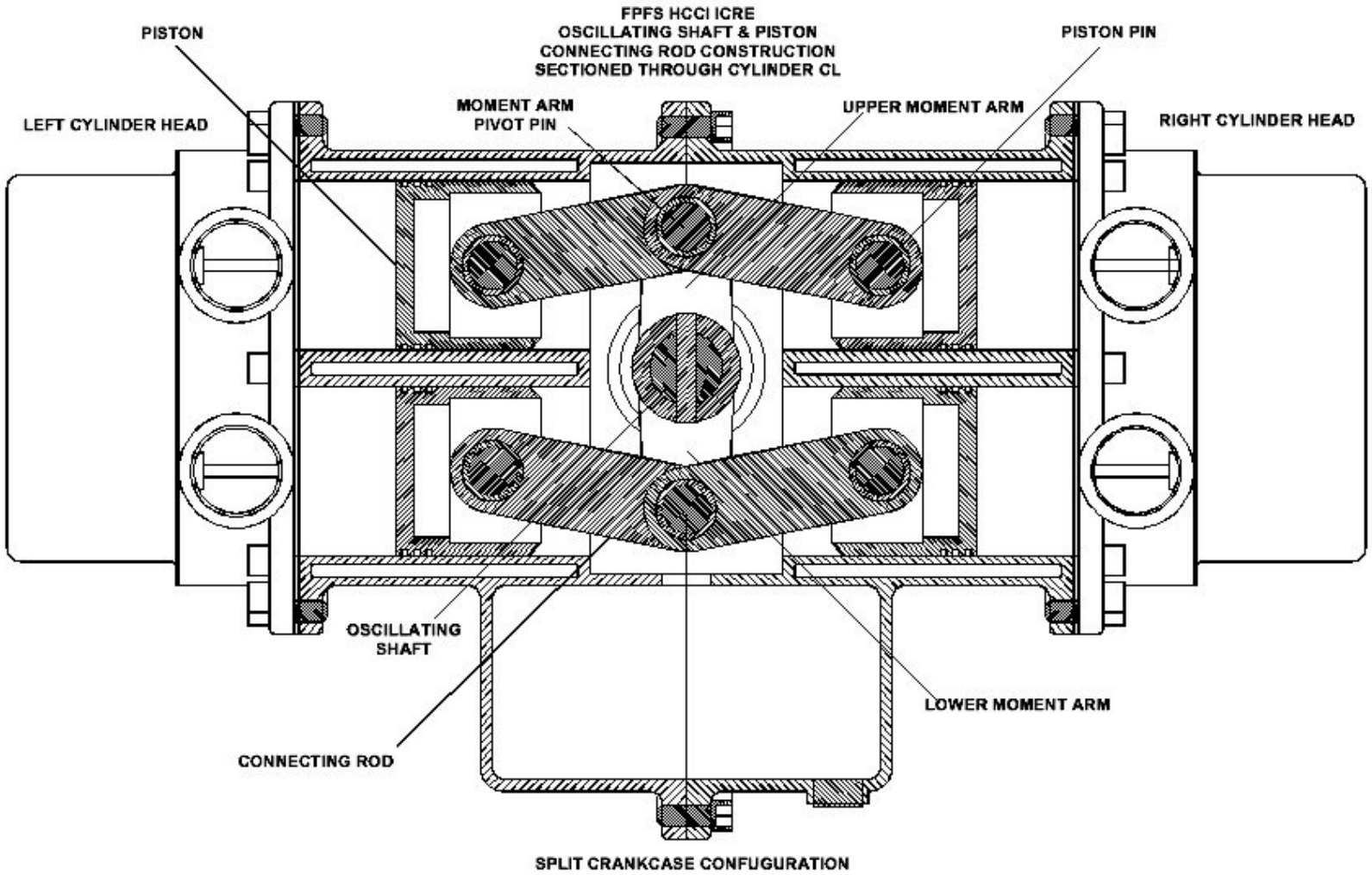


Figure 3: First law efficiencies vs. compression ratio for stoichiometric propane/air. As compression ratio increases, S_{gen} decreases and more exergy is transferred to work during expansion. As such, the Atkinson-cycle and Otto-cycle efficiencies begin to converge. The red and blue bands represent 70-80% of the first law efficiencies, which is representative of what current engines often achieve in practice after implementation efficiencies are included.

From: Development of Low-Exergy-Loss, High-Efficiency Chemical Engines
http://gcep.stanford.edu/pdfs/QeJ5maLQQrugiSYMF3ATDA/2.6.6.edwards_06.pdf

The path to higher efficiency is through higher compression ratios by:

- **Eliminating the crankshaft constraint and using variable compression**
- **Adopting the free-piston engine design (four cycle)**
- **Using constant volume HCCI combustion**



The Free-Piston Floating Stroke (FPFS) engine -
the optimal internal combustion reciprocating engine
US Patent 7,258,086 - Other Patents Pending