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Design of an Opposed-piston, Opposed-stroke Diesel Engine for use in Utility Aircraft
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Purpose: Design an opposed-piston, opposed-stroke, two-stroke diesel engine with a takeoff power of 800hp at 3600rpm

Motivation
- Bridge the power and cost gap between turboprop engines and piston engines
- Desired specifications: 800hp at an engine speed of 3600rpm
- Historical Comparison – Junkers Jumo 207B
  - 1000hp, 16.6L, 1907lb, 250g/kWh
  - Below is the very similar 205 model

Why Opposed-Piston, Two-stroke (2S)
- Power density of 2S – leads to leaner combustion
- Lighter and simpler design with no camshafts or piston heads. This results in the engine being 12% cheaper, having 34% fewer parts, and being 32% lighter
- Leaner combustion – 9% better Fuel economy compared to 4S

Simulation Model
Recreated the literature model [1]. It was validated with the following Graphs. The recreated values are shown in yellow over the values from the literature itself.

Design Work
- Determined dimensions with the following equations
  - \( m_{ep} = \frac{P_{N_F}}{V_{dN}} \)
  - \( \bar{S}_p = 2LN \)
- New dimensions run through the literature model.

<table>
<thead>
<tr>
<th>Results</th>
<th>My Engine</th>
<th>Junkers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power [hp]</td>
<td>1223</td>
<td>1000</td>
</tr>
<tr>
<td>Weight [lb]</td>
<td>1413-2064</td>
<td>1907</td>
</tr>
<tr>
<td>Sfc [g/kWh]</td>
<td>155*</td>
<td>250</td>
</tr>
</tbody>
</table>

* Indicated value – will increase with additional losses


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