Hydrocarbon Pathway - Steady State, cruise condition

- Fuel (100%)
  - Flame converts fuel to CO₂, CO, H₂O, H₂ etc.
  - HC Mechanisms
    - Liq. Fuel 1.2%
    - Deposits (1%) 2.5%
    - Oil Layers (1%) 2.5%
    - Crankcase (0.7%) - Recycled - 4.6%
    - Quenching (0.5%)
    - Crevices (5.2%)
    - Exh. Valve Leakage (0.1%)

- Fuel Only
  - Blow-by (0.6%) - Recycled - 5.1%
  - In-Cylinder Oxidation
    - 1/3 Oxidized 1.7%
    - 2/3 Oxidized 1.7%

- Fuel-Air Mixture
  - Unburned HC in Residual (1.3%) - Recycled - 3.4%
  - Engine- out HC (1.6%)

- Fully Burned Exhaust 1/3
  - Exhaust Oxidation (0.8%) 2.3%
  - Catalyst

- Tailpipe- out HC (0.1-0.4%)
## HC Sources: Magnitudes and Percent of Total Engine-out Emissions

<table>
<thead>
<tr>
<th>Source</th>
<th>% Fuel Escaping Normal Combustion</th>
<th>Fraction Emitted as EOHC</th>
<th>% Fuel as HC Emissions</th>
<th>% of Total EOHC Emissions</th>
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</thead>
<tbody>
<tr>
<td>Crevices</td>
<td>5.2</td>
<td>0.15*</td>
<td>0.682*</td>
<td>42.6</td>
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<tr>
<td>Quench</td>
<td>0.5</td>
<td>0.15</td>
<td>0.074</td>
<td>4.6</td>
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<tr>
<td>Oil Layers</td>
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<td>0.09**</td>
<td>0.090**</td>
<td>5.6</td>
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<td>Deposits</td>
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<td>0.300</td>
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<td>0.356</td>
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<tr>
<td>Valve Leakage</td>
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<td>1.00</td>
<td>0.100</td>
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<td>Total</td>
<td>9.0</td>
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<td>1.60</td>
<td>100</td>
</tr>
</tbody>
</table>

* Blowby (0.6%) subtracted
** Amount to crank case (0.7%) subtracted