Diesel Emission Control Technology

Washington DC, January 23rd, 2019, Paul Sparenberg
Paul Sparenberg

- University of Illinois at Urbana-Champaign
  - Technical Systems Management

- AGCO Corporation: 6 years
  - Marketing & Sales

- MTU America, Inc.: 7+ years (Current)
  - Sr. Sales Manager, Construction & Agriculture

- Associations: MDEC, AEM, AED
Diesel Emissions Over Time
Diesel Emissions Over Time

Data from https://www.arb.ca.gov/msei/ordiesel/ordas_ef_fcf_2017.pdf
Diesel Emission Control Technology

• In just over 20 years, on-engine advancements have...
  – reduced NO\textsubscript{X} by 97%
  – reduced PM by 99%

<table>
<thead>
<tr>
<th></th>
<th>Acquisition Cost</th>
<th>Engine Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complexity</td>
<td>😞</td>
<td>😊</td>
</tr>
<tr>
<td>Space Claim</td>
<td>😞</td>
<td>😊</td>
</tr>
<tr>
<td>Operating Cost</td>
<td>😞</td>
<td>😊</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maintenance Intervals</td>
<td></td>
<td>😊</td>
</tr>
<tr>
<td>Health &amp; Safety</td>
<td></td>
<td>😊</td>
</tr>
<tr>
<td>Operational Data</td>
<td></td>
<td>😊</td>
</tr>
</tbody>
</table>
Diesel Engine Efficiency – Fuel Economy

*in lbs./hr., data per CARB
Diesel Engine Efficiency – Engine Displacement (L)

*data per CARB
Diesel Engine Efficiency – Drivers

• Combustion advancements
  – Higher quality fuels and oils
  – Piston and component designs
  – More precise fuel injections
  – More precise air management

• End user benefits
  – More power and torque... less engine
  – Lower engine RPM
  – High degree of emission control in cylinder
Maintenance Intervals

• Service intervals are getting longer
  – MTU/Mercedes-Benz @ 225 HP
  – Heaviest grade oil & application group
    • Tier 2 = 500 hrs.
    • Tier 4/Stage V = 1000 hrs.

  – Bottom line effect of reducing oil change costs by 50%???

  – How does this impact machine and personnel utilization???
Other Benefits for Workers

- **Less Noise**
  - Less fatigue, distraction, strain on voice, etc.

- **Less Vibration**
  - Less pain, motion sickness, nerve issues, etc.

- **Creates employees who are...**
  - Happier, healthier, more alert, safer etc.
  - More loyal, increases retention, reduces training costs
  - Take pride in what they do and where they work
The Cost of Tier 4 Engines

<table>
<thead>
<tr>
<th>Acquisition Cost</th>
<th>Engine Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complexity</td>
<td>Maintenance Intervals</td>
</tr>
<tr>
<td>Space Claim</td>
<td>Health &amp; Safety</td>
</tr>
<tr>
<td>Operating Cost</td>
<td>Operational Data</td>
</tr>
<tr>
<td></td>
<td>Less Displacement</td>
</tr>
<tr>
<td></td>
<td>Longe Component Life</td>
</tr>
<tr>
<td></td>
<td>Less Noise &amp; Vibration</td>
</tr>
<tr>
<td></td>
<td>Increased Safety</td>
</tr>
</tbody>
</table>
Thank you!