EURO VI as Marine engines

Sander Langenberg
Founded in 1905
Family-owned business, 4th generation
Located at the Merwede river, near to Rotterdam
Royal Warrant Holder, since 2005
17 fte employees
Service, sales, repair, overhaul and installation of diesel engines
Authorised dealer for MAN, Doosan and DAF diesel engines
EURO VI as marine engines?

- Benefits of a Paccar MX Euro VI engine
- Modifications
- Field test
- Results
- Projects
Key benefits of a Euro VI engine

1. Ultra modern technology
2. High emission standards
3. Low fuel consumption
4. High torque at low engine speed
5. Engine and After-treatment > one compact system
6. Proven quality and reliability
7. Long service intervals
8. Low Total Costs of Ownership
9. Low sound level
10. High production numbers
Exhaust After-treatment System

• Compact system
• Engine and After Treatment System works harmonious together
• Paccar After Treatment Control Module
• On Board Diagnostic System

Filter box
- Diesel Oxidation Catalyst
- Diesel Particular filter

SCR box
- Exhaust silencer
- Selective Catalytic Converter
- Ammonia Oxidation Catalyst
- Airless AdBlue dosing
Engine modifications

- Standard Road engine is not suitable as marine engine:
  - Cooling system
  - Mechanical
  - Electrical system
  - Software modifications
  - Conform directive 2006/87/EG
Electrical system

• Communication
• Monitoring system
• Throttle control
• Back-up supply
Software modifications

- Reprogram missing inputs on ECU;
- Simulate inputs on EC;
- Throttle signal conversion;
- (Torque request > Speed request);
- Respect of emission limits.
Euro VI as Marine engines

- Emission Euro VI acc. EC e4*595 / 2009
- Emission levels demonstrated after modifications by on board measuring
- On-board diagnostic system
Field test

- Ms. Noord, 2 pcs Vink-Paccar MX 11 -210 propulsion
- Technical feasibility
- Testing – collecting data
- Certification
- Modifications
Test

- Emission test (E3 cycle)
- Torque measurement
- Fuel consumption
Results of project Ms. Noord

<table>
<thead>
<tr>
<th>Component</th>
<th>ProMonitoring ①</th>
<th>BlueCo ②</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>g/kWh</td>
<td>g/kWh</td>
<td>g/kWh</td>
</tr>
<tr>
<td>CO</td>
<td>&lt;0,006</td>
<td>0,01</td>
<td>3,5</td>
</tr>
<tr>
<td>CxHy</td>
<td>0,079</td>
<td>0,19</td>
<td></td>
</tr>
<tr>
<td>Nox</td>
<td>0,16</td>
<td>0,19</td>
<td>1,8</td>
</tr>
<tr>
<td>PM</td>
<td>0,014</td>
<td>0</td>
<td>0,1</td>
</tr>
</tbody>
</table>

© Vink diesel bv

① Promonitoring report r013323
② BlueCo report
Ms. IJmeer

- 37.5m x 9m
- 2 x Vink - MX 11 – 240 kW
- Installed March, 2018
Results of project Ms. IJmeer

### Summary: Results of STAGE V measurements

<table>
<thead>
<tr>
<th>Engine</th>
<th>Manufacturer</th>
<th>Type</th>
<th>Number</th>
<th>Location</th>
<th>Cycle</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Paccar</td>
<td>Vink-MX11 240</td>
<td>K068090</td>
<td>MS IJmeer</td>
<td>E3: 240 kW @ 1700 rpm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Emissions</th>
<th>Measured (g/kWh)</th>
<th>Demand</th>
<th>Comply</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOx relative emission</td>
<td>0,3</td>
<td>2,1</td>
<td>Yes</td>
</tr>
<tr>
<td>CO relative emission</td>
<td>0,0</td>
<td>3,5</td>
<td>Yes</td>
</tr>
<tr>
<td>CxHy as C relative emission</td>
<td>0,0</td>
<td>1,0</td>
<td>Yes</td>
</tr>
<tr>
<td>Particle relative emission</td>
<td>0,05</td>
<td>0,1</td>
<td>Yes</td>
</tr>
<tr>
<td>NOx + HC relative emission</td>
<td>0,3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

100% 75% 50% 25%

| Fuel consumption (g/kWh) | 194,4 | 193,8 | 195,9 | 192,6 |
Ms. Liane

- 39m x 5m
- 377 ton
- 1 x Vink MX 11 -240 kW
- Installed in April, 2018
Ms. Wantij

- 86m x 9m
- 1.653 TON
- 2 x Vink MX 13 - 355 kW
- Installation April – May, 2018
Air set

• Self propelled water injection dredger;
• 2 x Vink MX 11 -210 kW propulsion;
• 3 x Vink MX 11 – 390 kVA auxiliary gen sets, PMS;
• Installation planned in May – June, 2018
# Vink-Paccar MX engine range

## Paccar MX-11

<table>
<thead>
<tr>
<th>Engine type</th>
<th>Performance</th>
<th>Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>MX-11 220</td>
<td>220 kW/299 hp at 1675 rpm</td>
<td>1.650 Nm at 900-1400 rpm</td>
</tr>
<tr>
<td>MX-11 251</td>
<td>251 kW/341 hp at 1675 rpm</td>
<td>1.500 Nm at 900-1400 rpm</td>
</tr>
<tr>
<td>MX-11 270</td>
<td>270 kW/367 hp at 1600 rpm</td>
<td>1.900 Nm at 900-1125 rpm</td>
</tr>
<tr>
<td>MX-11 300</td>
<td>300 kW/408 hp at 1600 rpm</td>
<td>2.100 Nm at 900-1125 rpm</td>
</tr>
<tr>
<td>MX-11 330</td>
<td>330 kW/449 hp at 1600 rpm</td>
<td>2.300 Nm at 900-1125 rpm</td>
</tr>
</tbody>
</table>

## Paccar MX-13

<table>
<thead>
<tr>
<th>Engine type</th>
<th>Performance</th>
<th>Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>MX-13 315</td>
<td>315 kW/428 hp at 1600 rpm</td>
<td>2.300 Nm at 900-1125 rpm</td>
</tr>
<tr>
<td>MX-13 355</td>
<td>355 kW/483 hp at 1600 rpm</td>
<td>2.500 Nm at 900-1125 rpm</td>
</tr>
<tr>
<td>MX-13 390</td>
<td>390 kW/ 530 hp at 1675 rpm</td>
<td>2.600 Nm at 1000-1400 rpm</td>
</tr>
</tbody>
</table>
Engine range Euro VI < 390 kW

Two engines – one shaft

Hybrid solutions
Services

- Propulsion engines
- Auxiliary engines
- Gearboxes
- Installation packages
- Installation
- Commissioning

- 24 x 7 service

www.vinkdiesel.nl
Thank you for your attention

Sander Langenberg

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