Conventional and Hybrid Powertrain
Contents

- Description Powertrain Test Bench
- Plan of Test Bench
- Test Bench / Equipment
- Integration of Hybrid Components
Description Powertrain Test Bench

- Powertrain test bed with up to three suitable load units with braking and driving torques of 3,200 Nm up to 5,100 Nm (each wheel)
- Transfer and summation gearbox for adaptation to different powertrain topologies and test conditions
- Scope of tests for engine, transmission, clutch, and other components within powertrain
- Simultaneous operation of combustion engine and electrified components within powertrain
Plan of Test Bench

Wheel Machine Test Bench with High Voltage Source

- Combustion Engine
- Electric Machine
- Manual/Automatic Transmission
- Wheel Machine
- CAN-Bus / µP
- AC/DC
- High Voltage Network
- Ultracap High Voltage Battery
- Optional: Battery operation with conditioning

If applicable:
- Plug-in-Charging Unit
- 12V Low Voltage Network
- DC-HQ
- DC/DC
Test Bench Drive Train

Exemplary Drive-Train Set-up with a motoring dyno
Test Bench Drive Train

Exemplary Drive-Train Set-up with an engine
## Test Bench / Equipment

### Load Units / Drive Machines

<table>
<thead>
<tr>
<th></th>
<th>Power [kW]</th>
<th>Torque [Nm]</th>
<th>Speed(_{\text{max}}) [rpm]</th>
<th>Inertia [kgm(^2)]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drive Machines</td>
<td>460</td>
<td>1000</td>
<td>10000</td>
<td>0,90</td>
</tr>
<tr>
<td>Drive Machines</td>
<td>180</td>
<td>430</td>
<td>15000</td>
<td>0,20</td>
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<tr>
<td>Wheel Machines</td>
<td>260</td>
<td>3200</td>
<td>3000</td>
<td>10,55</td>
</tr>
<tr>
<td></td>
<td>389</td>
<td>5100</td>
<td>3200</td>
<td>13,50</td>
</tr>
<tr>
<td>Multiplier Gear Boxes</td>
<td>200</td>
<td>500</td>
<td>22000</td>
<td>Gear ratio 1:6</td>
</tr>
</tbody>
</table>
## Test Bench / Equipment

### Battery Simulation for E-Drive Testing

<table>
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<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>DC-Power Supply (Kratzer)</td>
<td>150</td>
<td>0 - 600</td>
<td>± 500</td>
</tr>
<tr>
<td>DC-Power Supplies (Horiba)</td>
<td>150</td>
<td>0 - 600</td>
<td>± 600</td>
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<tr>
<td>DC-Power Supplies (Heinzinger)</td>
<td>150</td>
<td>0 - 600</td>
<td>± 600</td>
</tr>
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</table>
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