EAWD CONGRESS IN GRAZ

AKKA – Modular E-Drive Concept

10.05.2019
AKKA
Global Player
REVENUE YEAR 2018
€ 1.5 Mrd. worldwide

EMPLOYEES YEAR 2018
21,000 worldwide

PLACES IN
Europe, Asia, America, Middle East and Africa
MODULAR E-DRIVE CONCEPT

E-Mobility
MODULAR E-DRIVE CONCEPT - COMPONENTS

- INVERTER
- THERMAL MANAGEMENT
- DRIVE CONTROL UNIT
- E-MOTORS
- HV-BATTERY BATTERY MANAGEMENT SYSTEM
- WIRING HARNESS
- 12V-BATTERY FUSE BOX LV-WIRING HARNESS
- HUMAN MACHINE INTERFACE
- BATTERY CHARGER
MODULAR E-DRIVE CONCEPT - COMPONENTS

**INVERTER**
- Max. voltage: 450 V
- Max. power: 180 kW
- Max. temperature: 60°C

**HV-BATTERY, BMS**
- Capacity: 2.87 kWh
- Max. voltage: 403.2 V
- Max. current: 200 A (10s)
- SoC-calculation, monitoring, insulating resistance, etc.

**DRIVE CONTROL UNIT**
- Implementation of safety functions (Interlock, temperature control, etc.)
- Communication with the vehicle control unit
MODULAR E-DRIVE CONCEPT - COMPONENTS

<table>
<thead>
<tr>
<th>WHEEL HUB MOTOR</th>
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<tbody>
<tr>
<td>▪ Power 75 KW, max. Torque 700 Nm,</td>
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<tr>
<td>▪ Weight 23 kg</td>
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<tr>
<td><strong>Sensor system:</strong></td>
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<tr>
<td>▪ Sensor for ABS/ESP</td>
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<td>▪ Temperature sensor</td>
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<thead>
<tr>
<th>THERMAL MANAGEMENT</th>
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<tr>
<td>▪ Cooler and fan</td>
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<tr>
<td>▪ Electrical water pump</td>
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<tr>
<td>▪ <strong>Cooling circuit:</strong></td>
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<tr>
<td>▪ E- Motor – Power Electronic Unit</td>
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<tr>
<th>CHASSIS</th>
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<tr>
<td>▪ Adaption of suspension, shock absorber, knuckle, …</td>
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<th>DISPLAY UNIT</th>
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<td>▪ SoC, battery-condition, speed, temperature, …</td>
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</table>
E-DRIVE WORK PACKAGES

- E-MOTOR, INVERTER, TRANSMISSION
- CHARGING SYSTEM, HV-BATTERY, HV-WIRING HARNESS
- HV SAFETY
- FUNCTIONAL SAFETY
- OPERATIONS STRATEGY / ENERGY MANAGEMENT / SIMULATION / CALIBRATION
- SYSTEM-INTEGRATION HOMOLOGATION
- TESTING AND VALIDATION, EMC-VALIDATION
- AFTER SALES
POWER CONSUMPTION & DRIVING PERFORMANCE

1D LONGITUDINAL DYNAMICS MODEL DESCRIPTION

- 1D longitudinal dynamics model containing
  - Powertrain of tractor vehicle
  - Electrified 1-axle trailer
  - Driver & e-drive operation strategy models
  - Simplified battery model → Electric energy demand

- For calculation of
  - Fuel consumption
  - Battery energy & power demand
  - Powertrain efficiency improvement
  - Optimization of operation strategies
POWER CONSUMPTION & DRIVING PERFORMANCE

VEHICLE DESCRIPTION
- Vehicle class: Compact car
- Engine: 2.0L Diesel, 120kW
- Vehicle: 1500kg
- Trailer weight: 1800kg
- Performance (eTrailer): 15KW

TRACK DESCRIPTION
- Road profile / cycle: Brenner Pass / WLTC
- Electric boost supported until 80kph

TARGET
- Fuel consumption & agility evaluation

Fuel consumption
conventional vs. e-trailer

-13%
-17%
THANK YOU

QUESTIONS?
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