Powertrain 2020, Challenges and Solutions from a suppliers perspective

Karsten Hofmann
Continental Corporation
Future of Electric Mobility from a Suppliers’ Perspective

- Continental at a glance
- Mobility outlook 2050
- Megatrends, legislation, technologies
- Patterns & challenges in e-mobility
- Continental e-mobility portfolio
# Continental Corporation Organization

## Continental Corporation

Dr. Elmar Degenhart CEO

### Automotive Group

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Continental Corporation
Worldwide Footprint

Nearly 190 sites for production and R&D in 39 countries. Corporate headquarters in Hanover, Germany.

2009
Sales €20.1 billion
Employees 134 thousand

Automotive HQs
Chassis Frankfurt
Interior Regensburg
Powertrain Regensburg

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Focus on the Megatrends

Environment – Zero Emissions

CO₂ targets EU & US (g/km)

EU figures refer to passenger cars only. US figures refer to passenger cars and light-duty trucks.

Information – Always on

Safety – Zero Accidents

Evolution 2000–2010 EU 27 road fatalities

Source: Global Insight 3Q09

Zero Emissions & Affordability

Dacia – Sandero 09E-14E (k units)

2009E 2014E

9.8% 533


EU Fatalities 2010 Objective: Halve the Number of Fatalities

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EU 7 – Challenges Ahead

Powertrain balancing - Managing the system
Holistic approach to increase efficiency and reduce emissions & cost

Energy Efficiency
- Downsizing
- Downspeeding
- Turbo Charging
- Friction Reduction
- Weight Reduction
- Onboard Power Generation
- Demand driven aggregates

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2009
CO2 (g/km)

Advanced Combustion

Advanced Aftertreatment

Drivetrain & Transmission Electrification

2020

95

140
Combustion Vehicle
Improve efficiency of conventional powertrain (short and mid term)

Hybrid Vehicle
Back up combustion engine by electric motor (mid term)

EV
Emission free electric vehicles (long term)
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Split of installed power in medium size vehicle

Typical installed mechanical power [kW] (Europe)

- Pure ICE: 134 gr
- Full hybrid: 92 gr
- Range Extender: 40 gr
- Pure EV: 0 gr

CO2 Estimations from tank / battery to wheel in NEDC cycle

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Enabling factors for E-mobility

Urban mobility
Oil prices
State fundings
Storage technology
Emission legislation
End user acceptance

2020
2050

System Approach
Holistic Mix
Infrastructure, Innovation, Current technologies, Universities, Government, OEM's, Tier I / II / III

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Future Mobility Patterns

Travelled distances supported by different vehicle types

- **Pedelec**: Open body (2 or 3 wheels)
- **ICE with Hybrid**: Closed body (4 wheels)
- **EV**: Open body (2 or 3 wheels)

**Personal transportation**

- Downtown: < 5
- Suburban: 50
- Regional: 150
- Cross-regional: 500
- Long distance: 1000 +

**Public transportation**

- Bus, Subway, Commuter train
- Airplane

High speed trains: Transrapid, TGV

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Mainstream EV development

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<td>Based on existing C-class combustion platforms</td>
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<tr>
<td><strong>Range = 100 km</strong></td>
<td>Derived platforms with electric vehicle specific requirements</td>
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<td><strong>Range = 300 km</strong></td>
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<td>Conventional losses</td>
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<td>(example: hydraulics)</td>
<td>New heat &amp; climate concept</td>
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<td>Energy loss of heating</td>
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New constructional approaches
New applications
Predictive active / passive safety
Wheel hub motor

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Technical challenges for EVs

Electric Components
- New E-motor concepts,
- Low energy Inverter, DC/DC
- New transmission systems

By wire Systems
- All electric systems
- Replace e.g. booster, hydraulic

Heating, venting, cooling (driver)
- New concepts / components
- Electrical vs. e.g. separate oil heater

Vehicle architecture
- Power net
- E/E architecture
  Fail safe (SIL, fallback, Redundancy,..)

Recycling
- Design / Cost request

Voltage standardization
- Cascade e.g. 12/42/400V

Chassis concepts
- Logical E-corner
- Central E-motor with transmission

Body concepts
(Exchange battery, Range extender)
- Standardization connectors
- Safety (Battery placement)

Infrastructure
- Outside vehicle
- Replace battery
- Public charging

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EV system challenges

Holistic challenge

EV system efficiency

System balancing

Architectures

Components

System Integration
Thank you for your Attention