Automotive

Prof. Dr. Peter Pleus
CEO Automotive

Matthias Zink
President Transmission Systems Division
Overview

Above-market growth

Flagship initiative "E-mobility"

Outlook

Summary and key statements
1 Overview

Schaeffler Automotive – Growing profitably above market

Sales and EBIT margin

<table>
<thead>
<tr>
<th>Year</th>
<th>Sales</th>
<th>Growth rate (y-o-y)</th>
<th>EBIT margin1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>7,658</td>
<td>+7.0%</td>
<td>13.5%</td>
</tr>
<tr>
<td>2013</td>
<td>8,164</td>
<td>+6.6%</td>
<td>13.0%</td>
</tr>
<tr>
<td>2014</td>
<td>8,986</td>
<td>+10.0%</td>
<td>14.0%</td>
</tr>
<tr>
<td>2015</td>
<td>9,993</td>
<td>+11.2%</td>
<td>13.6%</td>
</tr>
</tbody>
</table>

1) Before one-off effects

Out-performance in all regions1)

<table>
<thead>
<tr>
<th>Region</th>
<th>Global Market</th>
<th>Schaeffler Automotive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Americas</td>
<td>5%</td>
<td>15%</td>
</tr>
<tr>
<td>Europe</td>
<td>2%</td>
<td>5%</td>
</tr>
<tr>
<td>Asia / Pacific</td>
<td>1%</td>
<td>9%</td>
</tr>
<tr>
<td>Greater China</td>
<td>7%</td>
<td>24%</td>
</tr>
</tbody>
</table>

1) Schaeffler Automotive CAGR 2010 – 2015 excluding Aftermarket and FX

Sales by region

- Europe: 53%
- Asia/Pacific: 15%
- Greater China: 22%
- Americas: 10%

Broad customer mix

- Top 10 automotive customers: 60%
- Other customers: 40%

Top 10 customers:
- Volkswagen
- Toyota
- Ford
- BMW
- Daimler
- FCA
- Hyundai
- Renault
- Getrag
- Other customers
Overview

Broad drivetrain know-how

Engine systems 26% of Automotive sales in 2015

Transmission systems 42% of Automotive sales in 2015

Automotive Aftermarket 17% of Automotive sales in 2015

Chassis systems 15% of Automotive sales in 2015
Overview

Broad know-how in engine

Engine systems

- Valve train components & systems
- Engine bearings and applications
- Hydraulic and electro-mechanic phasing systems
- Belt & chain drive systems for primary and accessory drives
- Thermal management modules
Transmission systems

- Clutch systems, E-Clutches and damping technology (e.g. dual mass flywheels)
- Double clutches, torque converter and CVT technologies
- Bearings for all transmission types as and inside the transmission products
- Hybrid modules and e-axles
1 Overview

Broad know-how in chassis

Chassis systems

- Chassis bearings
- Wheel bearings
- Ball screw drives for electric parking brakes and electro-mechanic steering
- Electro-mechanic roll stabilizer
Automotive trends relevant for Schaeffler

1. **CO₂ & Emission reduction**
2. **Continuous growth in Emerging Markets**

**Comfort & Safety**

**Connectivity**
1 Overview

CO₂ & Emission reduction – More stringent environmental targets

**Key aspects Europe**

- High penalties, if targets are exceeded
  - Excess
    - 0 to 1 g/km: 5 €/g
    - 1 to 2 g/km: 15 €/g
    - 2 to 3 g/km: 25 €/g
    - > 3 g/km: 95 €/g
  - From 2019
    - From 1st g/km: 95 €/g

- Admission-/access-restrictions for conventional cars enacted in several large cities (e.g. in China) and planned in several other countries (e.g. in Norway)

- New challenging drive-cycles currently being introduced, e.g. WLTP / RDE in EU

- Stricter emission-legislation after 2025 expected

Further optimization of conventional drivetrain in combination with higher share of hybrids and electric vehicles necessary
### Powertrain concepts

#### Light vehicle production (in mn)

<table>
<thead>
<tr>
<th>Year</th>
<th>Combustion engine</th>
<th>Hybrids</th>
<th>Electric</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>74</td>
<td>98%</td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td>89</td>
<td>97%</td>
<td>2%</td>
</tr>
<tr>
<td>2020</td>
<td>102</td>
<td>85%</td>
<td>13%</td>
</tr>
<tr>
<td>2025</td>
<td>111</td>
<td>72%</td>
<td>24%</td>
</tr>
<tr>
<td>2030</td>
<td>120</td>
<td>53%</td>
<td>10%</td>
</tr>
</tbody>
</table>

Source: IHS and Schaeffler assumptions

### Key aspects

- Gradual shift towards full electrification of the drivetrain
- By 2020, the absolute number of pure combustion engines driven light vehicles is expected to be at the same level as today
- By 2020, 98% of light vehicles are expected to still have a combustion engine – thereof, 13% are expected to be in combination with an electric engine (hybrids)
- Emission legislation will be the key driver toward more electrification, in many markets combined with consumer incentives
1 Overview
Continuous growth in emerging markets – China to grow above average

Share of emerging markets
in % of light vehicle production

<table>
<thead>
<tr>
<th>Year</th>
<th>China</th>
<th>Other emerging markets</th>
<th>Developed markets</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>58%</td>
<td>19%</td>
<td>23%</td>
</tr>
<tr>
<td>2015</td>
<td>55%</td>
<td>18%</td>
<td>27%</td>
</tr>
<tr>
<td>2020</td>
<td>51%</td>
<td>20%</td>
<td>29%</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Region</th>
<th>Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>India</td>
<td>9%</td>
</tr>
<tr>
<td>Iran</td>
<td>9%</td>
</tr>
<tr>
<td>Russia</td>
<td>8%</td>
</tr>
<tr>
<td>Indonesia</td>
<td>5%</td>
</tr>
<tr>
<td>Thailand</td>
<td>5%</td>
</tr>
<tr>
<td>Brazil</td>
<td>1%</td>
</tr>
<tr>
<td>Turkey</td>
<td>1%</td>
</tr>
</tbody>
</table>

Key aspects

- By 2020, China is expected to produce 29% of global light vehicles
- Growth rate 2015 – 2020 in China expected to be lower than in 2010 – 2015, however, low vehicle density in China\(^1\) still shows a lot of potential:
- Growth in other emerging markets expected to accelerate in the next five years
- Growth in Poland and Mexico mainly driven by carmakers moving production to lower-cost countries

\(^1\) Passenger cars per 1,000 inhabitants; Source: IHS
Four growth pillars for Schaeffler Automotive

1. Growth from new technologies / products
2. Growth from higher systems share
3. Growth from new customers and markets
4. Growth from Aftermarket business

Current examples:

- Finger follower (not switchable)
  - ~ 4 x more content
- Conventional clutch
  - ~ 10 x more content
- Double clutch with actuation and control unit
- Ball screw drive for electric brake China
- Dual mass flywheel (single parts)
  - > 4 x faster growth
- RepSet dual mass flywheel

Legend:

1) based on unit price; 2) installation rate 10% in 2015, 25% in 2020; 3) Sales CAGR 2015 – 2020

Most relevant Automotive trends

- CO₂ & Emission reduction
- Continuous growth in Emerging Markets
- Comfort & Safety
- Connectivity

July 20, 2016
2 Above-market growth

Growth from new technologies / products

We are positioned in a number of fast growing technologies¹)

- **Growth**
  - Next-generation Dual Mass Flywheels
  - Double Clutches
  - Next-generation Torque Converters
  - Hydraulic and electro-mechanical Phasing Systems
  - Clutch Actuators

- **Accelerated growth**
  - Crankshaft Decoupler Systems
  - Turbocharger Ball Bearings
  - Fully variable Valve Train Systems (Uniair)

- **High growth**
  - Start Stop: Belt Alternator Starter Tensioner (48V)
  - E-Clutch
  - Switchable Finger Followers
  - Thermal Management Modules
  - Electro-mechanic Roll Stabilizer
  - Hybrid Module
  - Electric Axles

Expected OE sales from innovations launched since 2012

- **2015**
  - ~1.4bn
  - CAGR: 24%

- **2020**
  - ~3.6bn

Key aspects

- In 2020, we expect EUR 3.6 bn of OE sales from innovations launched since 2012 (CAGR of 24%)
- Major CO₂ emission regulation trends for combustion engines persist, i.e. friction reduction, growing variability of the valve train
- Complex mechatronic systems gain market share, i.e. fully variable valve train systems
- Shift towards more automated transmissions continues over the coming five years
- Increasing electrification of the drivetrain enables new innovations, i.e. E-Clutch, 48V start-stop systems, hybrid modules, electric axles

¹) Market growth rates CAGR 2015-2020
Above-market growth

Growth from higher systems share

Systems share to grow by 2020 in OE business

- **2010**: 78% Mechanical components, 16% Mechanical systems, 6% Mechatronic systems
- **2015**: 68% Mechanical components, 23% Mechanical systems, 9% Mechatronic systems
- **2020**: 68% Mechanical components, 23% Mechanical systems, 9% Mechatronic systems

**Key aspects**

- Supplying components will remain our core business
- In addition, we will further expand our systems business
- Systems are becoming more complex (i.e. UniAir, Electro-mechanic Roll Stabilizer, E-Clutch); electronic content is growing
- As demonstrated in the past, we are confident to secure our value add in mechatronic systems (e.g. UniAir, Thermal Management Module)

**Definition:**

- **Mechanical systems**: Products with Schaeffler components and high level of complexity
- **Mechatronic systems**: Mechanical systems with electronic content
**Growth from new customers and markets**

**Content per car growth in China**

<table>
<thead>
<tr>
<th>Year</th>
<th>Non Chinese OEMs</th>
<th>Chinese OEMs</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>~40</td>
<td>~10</td>
</tr>
<tr>
<td>2015</td>
<td>~70</td>
<td>~40</td>
</tr>
<tr>
<td>2020</td>
<td>~95</td>
<td>~90</td>
</tr>
</tbody>
</table>

- **Non Chinese OEMs**: 1.8x more content for 2015 vs 2010, 1.4x more content for 2020 vs 2010.
- **Chinese OEMs**: 4.0x more content for 2010 vs 2010, 2.3x more content for 2020 vs 2010.

**Key aspects**

- Schaeffler present in China since 1995.
- The share of sales with local Chinese OEMs is expected to increase from 33% in 2015 to approximately 45% by 2020.
- As a consequence, we will over-proportionally increase our content per car with Chinese OEMs.
- Main growth drivers for Schaeffler in China in the next 5 years are thermal management module, double clutch transmission, CVT, hybrid module, e-axle.
- Strong potential for Schaeffler Aftermarket business since relevant market size is expected to grow by 10%+ CAGR until 2020.

1) For selected OE customers
**Key growth trends**

- **From parts to solutions:**
  - Complexity of repairs and interaction between components remain key drivers for new repair solutions and services
  - European sales share generated with kits & sets is expected to increase from 53% in 2015 to around 60% by 2020

- **Expansion into emerging markets**

- **Full range product solution offering**

- **Use of cross selling opportunities**

**Sales split**

- 75% Independent Aftermarket
- 17% OE
- 8% Other

**Sales growth Schaeffler Automotive Aftermarket**

- **2010**: CAGR: 8.5%
- **2015**: CAGR: >4%
- **2020**: CAGR: >4%

1) Expected CAGR at constant currency
We know how to integrate E-drive modules into powertrains. Requirements are similar to a combustion drive, i.e. installation space neutrality, efficient design.

Mechanical know-how

We know how to bring the power on the road. Requirements are similar to a combustion drive, i.e. performance, space, long-term durability, weight, acoustics.

Integration know-how

Vehicle and Drive-train know-how

Based on long-term experience in engine, transmission and chassis systems we are able to provide optimal system solutions for future drivetrains in different regions of the world.

20 years of experience in transmission technologies

1990 first automatic clutch

17 years e-mobility knowhow

3 Schaeffler USPs in e-mobility

3 Flagship initiative "E-mobility" Schaeffler USPs
3 Flagship initiative "E-mobility"

Schaeffler E-mobility portfolio today and tomorrow

1999
1st Schaeffler E-mobility symposium

2002
1st E-mobility concept car

2005
1st serial production of components for hybrid modules

2016
- 500 Million Euro investment to date
- 1,200 employees globally in R&D and manufacturing of mechatronics, hybrid technologies and e-mobility
- 4 customer projects for hybrid modules
- 4 customer projects for e-axles

2020
- Further 500 Million Euro investment
- Doubling of employees in R&D and manufacturing

Level of integration

CO₂ Reduction

Grade of electrification

Mild hybrid vehicles (48 V) | Hybrid vehicles (HEV, PHEV) | Electric vehicles (BEV)

1 E-Clutch
2 HV hybrid module
3 HV e-axle

Level of integration:

- Mild hybrid vehicles (48 V)
- Hybrid vehicles (HEV, PHEV)
- Electric vehicles (BEV)

**Key aspects**

- 44% of all transmissions produced globally are manual transmissions (2020e: 40%)
- E-Clutch allows for significant reduction of CO₂ emission via sailing
- We provide partly or fully automatic clutch actuation (no clutch pedal needed)
- E-Clutch solutions are derived from Schaeffler clutch systems and actuation / software know-how
- Content in cars with manual transmissions to significantly increase through E-Clutch
- Start-of-production (SOP) expected in 2018/2019
- GreenTec Award winner 2016 for E-Clutch
Hybrid module – System expertise successfully transferred

Key aspects

- P2 hybrid module with clutch system integrated into the rotor
- Located between ICE and transmission – High flexibility to adapt to suit various engines and transmissions
- Includes electric motor, DMF damper, dry disconnect clutch and electromechanical actuator in an extremely compact design → High value add
- Can be used in 48V architectures and HV drive concepts
- SOP in 2017

From clutches and dampers for manual transmission over double clutch systems with innovative actuation and control units to highly integrated P2 hybrid modules
### Electric axle – Highly integrated system based on Schaeffler technologies

**Key aspects**

- Modular electric axle
- Compact design based on Schaeffler’s planetary transmission and lightweight differential technology
- Two speed e-axle with gearshift actuator; second gear is required for high top-speed
- Basic configuration can be extended by adding functional elements, e.g. integrated torque vectoring technology for sporty driving
- Integrated control unit for actuation and power electronics for torque vectoring
- SOP in 2017

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**Conventional products**

- "Normal" differential
- "Normal" planetary carrier

**Schaeffler products**

- Lightweight differential
  - 30% less weight
  - 70% less axial space
- Sheet metal planetary carrier
  - 40% less weight
  - 30% lower cost

**Schaeffler electric axles**

- From conventional products over significantly improved Schaeffler technology to highly integrated P4 electric axles with differential and Schaeffler planetary transmission
**4 Outlook**

**Filled order book – We target at least 4%-pts OE sales growth above market**\(^1\) **until 2020**

**Key aspects**

- Around 90% of our OE business for 2020 is either booked business or customer projects that are already initiated.
- We target an average growth rate of at least 4%-pts above market\(^1\) for our Automotive OE business until 2020.
- Mix impact from mechatronics is expected to remain limited; we aim to maintain our high level of profitability.
- We are confident to be able to secure our value add in mechatronic systems.

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**Estimated share of booked business and initiated customer projects**

in % of net sales (excluding Aftermarket)

<table>
<thead>
<tr>
<th>Year</th>
<th>Booked</th>
<th>Customer projects initiated</th>
<th>New business</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2016</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>2017</td>
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<td>2019</td>
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<tr>
<td>2020</td>
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</table>

**CAGR 4%+pts above market**\(^1\)

\(^1\) At constant currency
Key messages

1. We expect OE sales CAGR of at least 4%-pts\(^1\) above global market and Aftermarket growth of at least 4\(^1\) CAGR in 2015 – 2020.

\(^1\) At constant currency

2. Supplying components will remain our core business. In addition we expect to further increase our systems share by 2020.

3. We plan to invest an additional EUR 500 mn into E-mobility by 2020.

4. Until 2020, we expect our value add and our profitability to remain at a high level.