

RHEINMETALL AUTOMOTIVE

Capital Markets Day 2019

Rene Gansauge, President Division Mechatronics

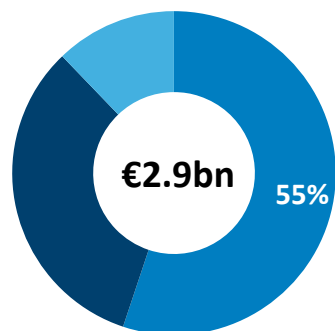
Unterlüß | 20. November 2019

OUR **HEART** BEATS FOR YOUR ENGINE.

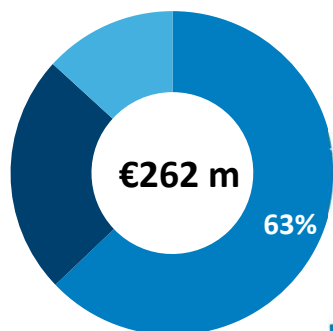
Mechatronics profile

Leading technology provider for efficiency, emission and electrification

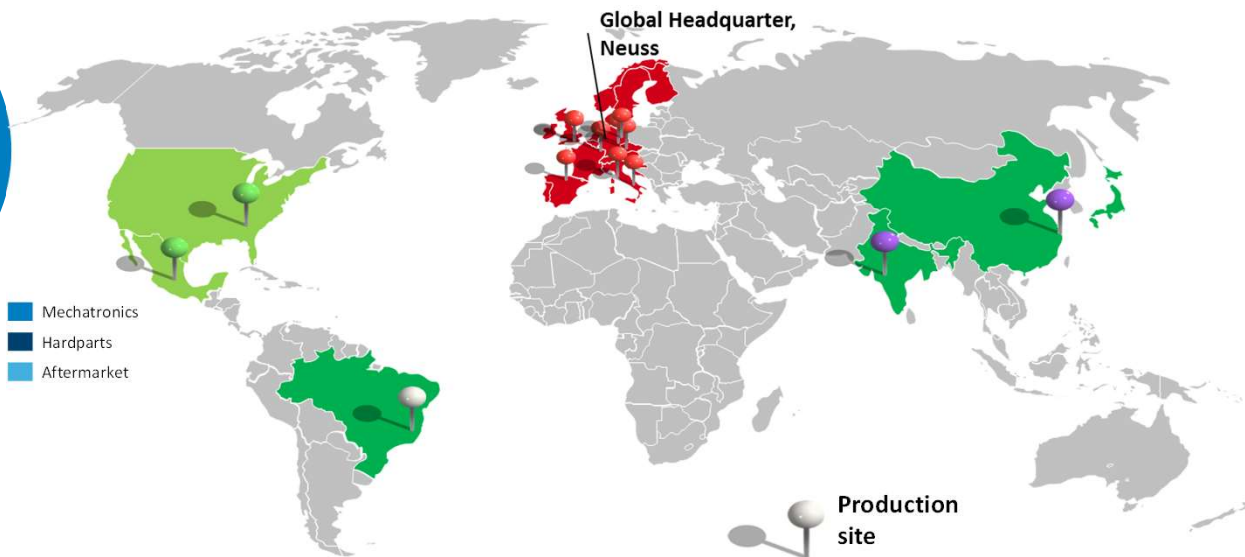
2018 Automotive KPI



Sales



Operating profit



■ Mechatronics
■ Hardparts
■ Aftermarket

Production site

Market trend

negative positive Very positive

Division Mechatronics

- Actuators
- Automotive Emission Systems
- Commercial Diesel Systems
- Pump Technology
- Solenoid Valves

DISRUPTIVE MOBILITY

Carless cities

Carsharing

Autonomous
Driving

E-Mobility

Connectivity



From carburator to e-mobility

INNOVATION IS OUR STRENGTH



Carburator



E-Mobility

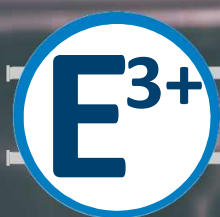
**INNOVATION AND
PRODUCTS**

illustrative



Market trends

The growth drivers of Mechatronics remain strong

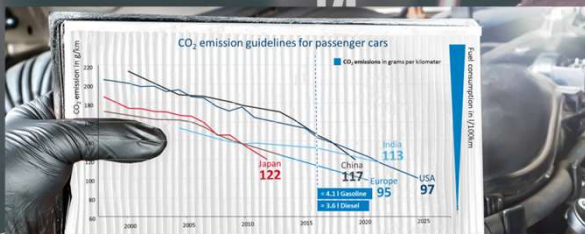


Efficiency
(CO₂ Reduction)

Emission
(Reduction)

Electrification

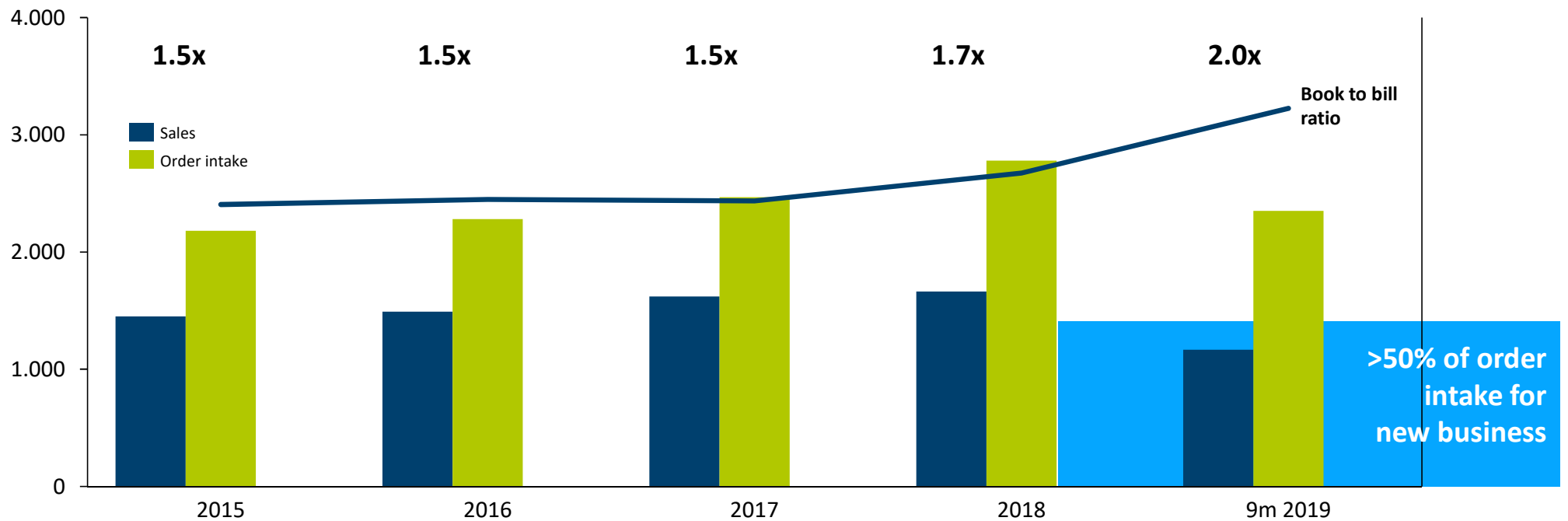
NT
Outside powertrain



The innovation pipeline for all three trends is packed!

Mechatronics order intake

Favorable increase of book to bill ratio due to rising order intake



Innovations for ICE



Electric vapor pump

First to market with an innovative product for ICE

USP Mechatronics



Regulatory requirements for emissions increased

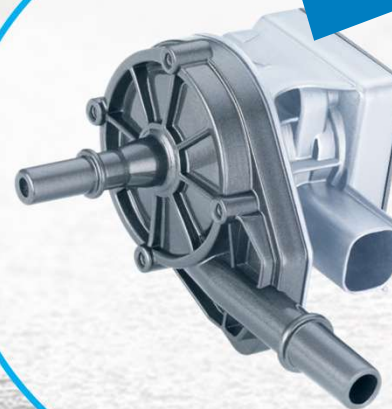
Serial production started in mid-2018

High delivery at low pressure levels

Serial production of > 750k units in 2019

Production in USA and China

€700m
orders
booked until
2026



Innovations for E-mobility



Electric cooling pumps

Leveraging our capabilities

Application



Cooling / Heating of high performance batteries

Cooling of e-engine

Cooling of DC-DC Converter, Inverter, Onboard Charger

Global market leader in electric cooling pumps (20-450W)

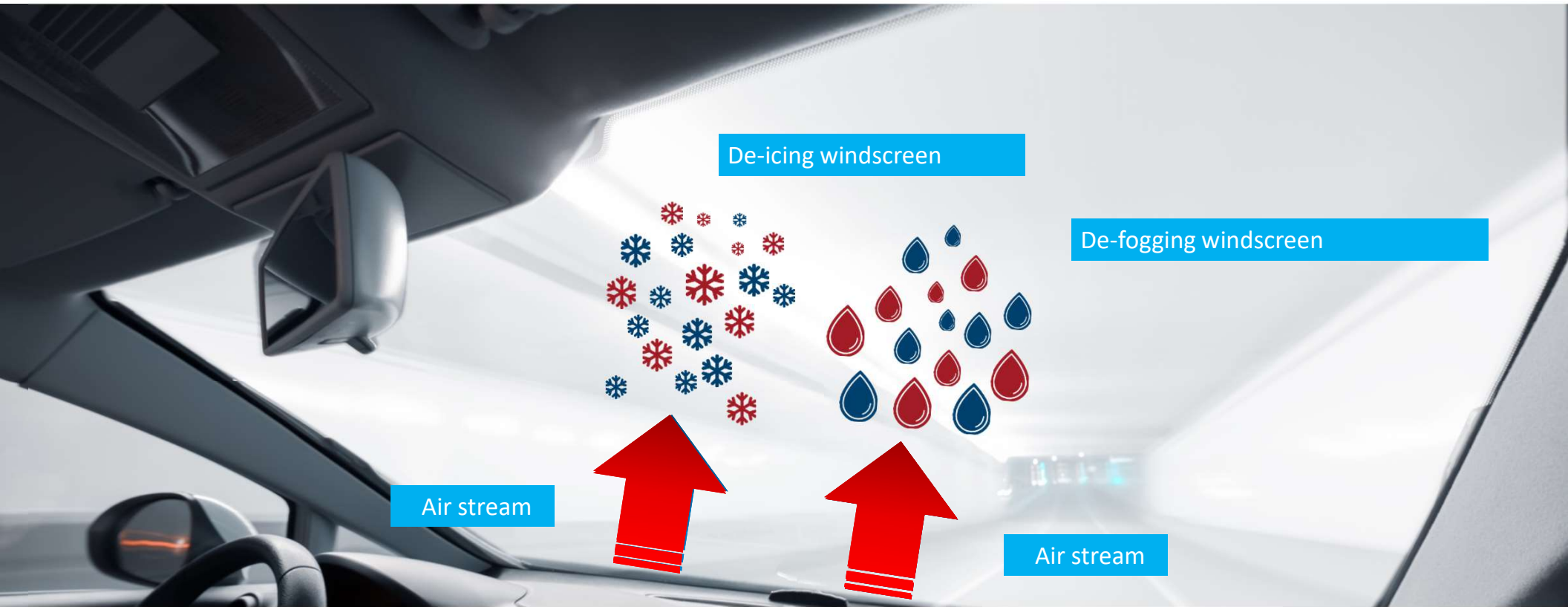
Life time > 40.000h

NVH sensitive

Market 2025 ~25m vehicles @ ~ >€1.6bn total value



Electric Climate Compressor (eCC) Functionality is important for every day use



Electric Climate Compressor (eCC)

We created outstanding USP for the product

USP Mechatronics



Designed for AC, heat pump and battery cooling operation

High efficiency over the entire operating range:

- innovative scroll design
- high flow rate due to robust back pressure system

Optimized NVH performance

Market size 2025 > €2.5bn



High-Voltage Contactor

HV Contactors are a safety critical element for BEV



- HV Contactors are mandatory for all EVs with HV battery.
- HV Contactors have to safely interrupt the electric circuit and secure a safe (i.e. voltage-free) state.
- Market size 2025 > €0.6bn

Innovations for fuel cell technology



Strategic product

Fuel Cell is a pioneering technology

Application



Maintain product leadership for hydrogen recirculation blower

Capitalize our capabilities

Participate in growth potential of the fuel cell technology



Under
development
contract from
German
Premium OEM

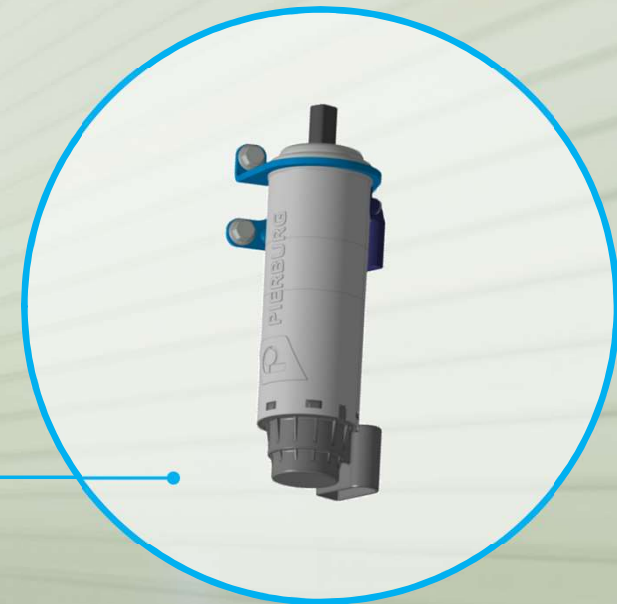


7x

Innovations outside the powertrain

Compact

Door Actuator



Compact Door Actuator

Door handling is crucial for autonomous cars

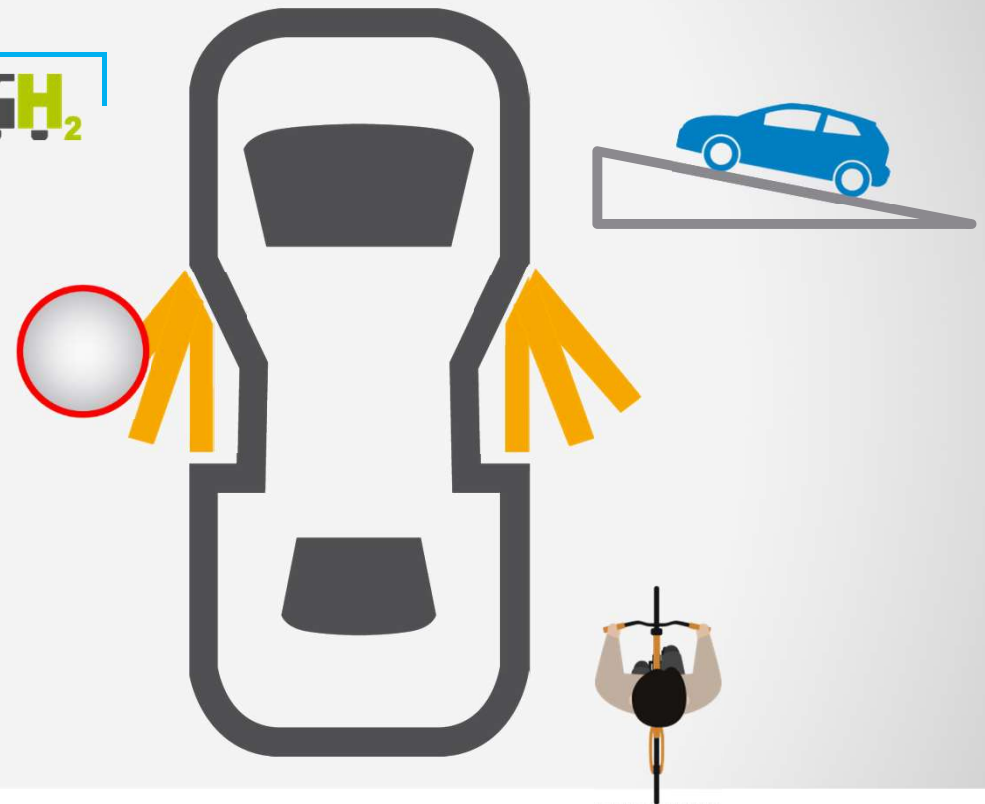
Functionality



Automated door handling

Hold function in any door position, even on a slope or an incline

Servo function = easy movement of the door, especially on slopes



Compact Door Actuator

Our product differentiates

USP Mechatronics



Compact design

Innovative gear design for low noise level

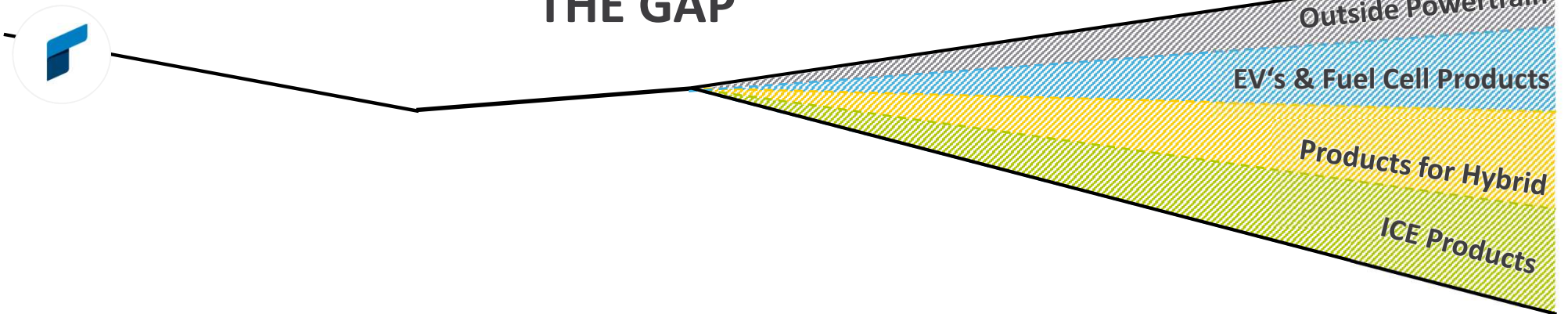
Powerless holding function

Total market of electric side door > 4 million vehicles in 2025



Mechatronics strategic focus

HOW TO FILL THE GAP



w/o Aquisition

illustrative

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