SCHAEFFLER
ENGINEERING

Von der Idee zur Realität:
Schaeffler Engineering präsentiert Wasserstoff-Produkte für nachhaltige Mobilität

From idea to reality:
Schaeffler Engineering Presents Hydrogen Products for Sustainable Mobility

Moses Kowski – Systems Engineer

AGENDA

1 **Schaeffler Engineering – The Company**

2 **Business Portfolio**

3 **From idea to reality**

4 **ECU portfolio**

5 **Project examples in H2 context**
- Hydrogen Storage Control Unit – HSCU
- Fuel Cell Control Unit – FCCU
- Hydrogen combustion engine

6 **Testing at Schaeffler Engineering**

7 **Conclusion**

Schaeffler Engineering

Sustainable mobility through hydrogen technology from Schaeffler Engineering

- Market-ready hydrogen products for sustainable mobility
- Innovative systems for significant reduction of CO_2 emissions in road traffic
- Use of hydrogen also as a stationary energy carrier
- Combination of long-standing experience, system understanding, software and hardware development
- Application of state-of-the-art processes and standards for reliable solutions

Business Portfolio

SCHAEFFLER ENGINEERING

Facts & Figures:

- Founded 1979 in Werdohl (Germany)
- 100 % subsidiary of Schaeffler Technologies AG & Co. KG
- Employees 2024: ≈ 200
- Sales 2024: 27.6 Mio. €

IT Security:

- TISAX® certified since 2019

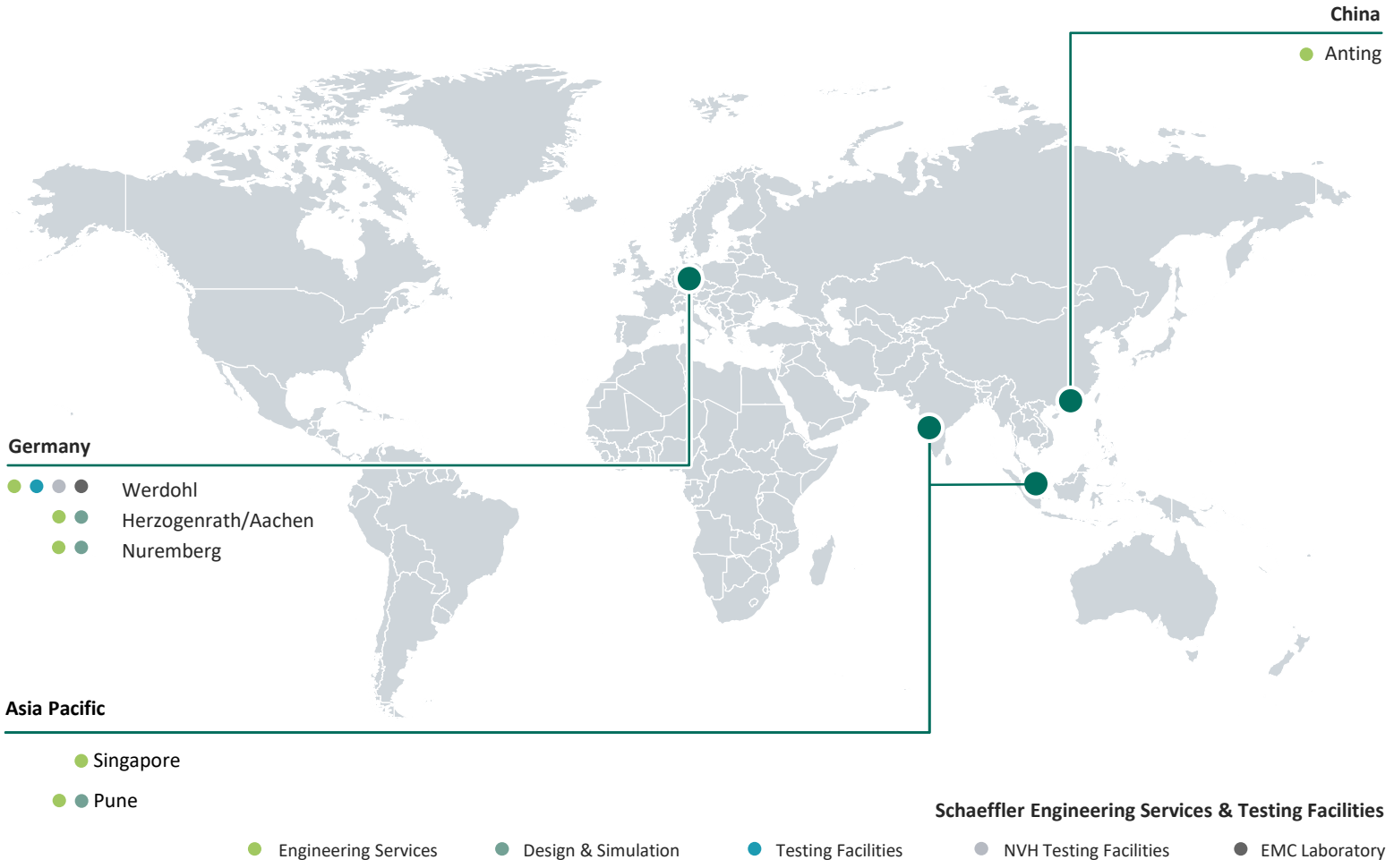
EMC accreditation:

- DAkkS since 2024

DAkkS Deutsche Akkreditierungsstelle D-PL-22135-01-00

Quality Management:

- ISO 9001:2015
- DIN EN ISO 17025
- DIN EN ISO 14001



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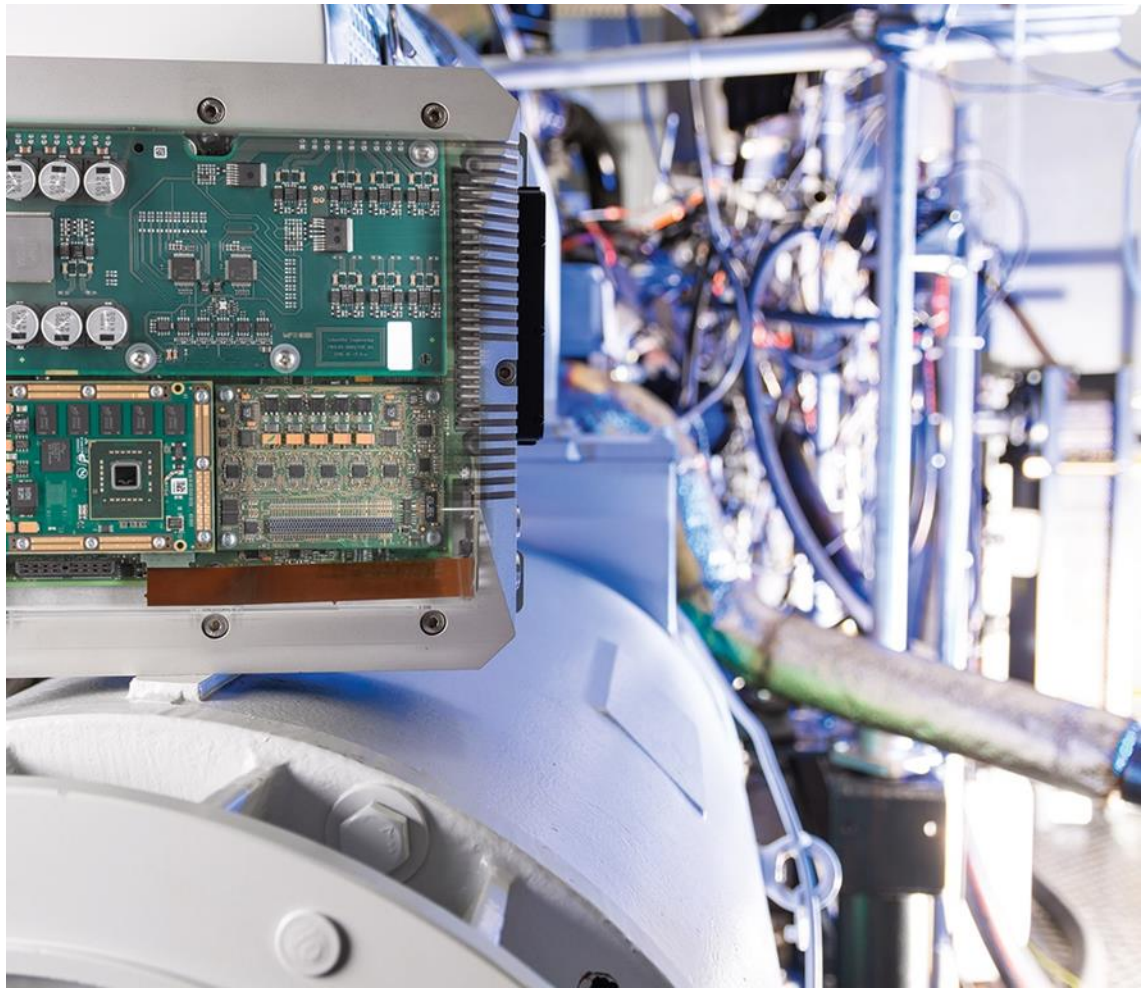
Business Portfolio

Business Portfolio

Engineering	Validation	Products	Consulting
			
• Mechanical Engineering • Electronic Hardware Development • Software Development • Testing	• Powertrain test rigs incl. H2 supply • EMC testing • NVH testing	• Prototyping ECUs • ECUs for small series applications	• Systems Engineering • Functional Safety • Product Cyber Security • Process Improvement & Product Quality

From Idea to reality



Advanced system development for

- Hydrogen tank systems
- Hydrogen fuel cell systems
- Hydrogen combustion engines

Focus on commercial vehicles, buses, and off-highway applications as well as stationary applications.

Market-ready solutions with high efficiency and reliability,
from idea to reality.

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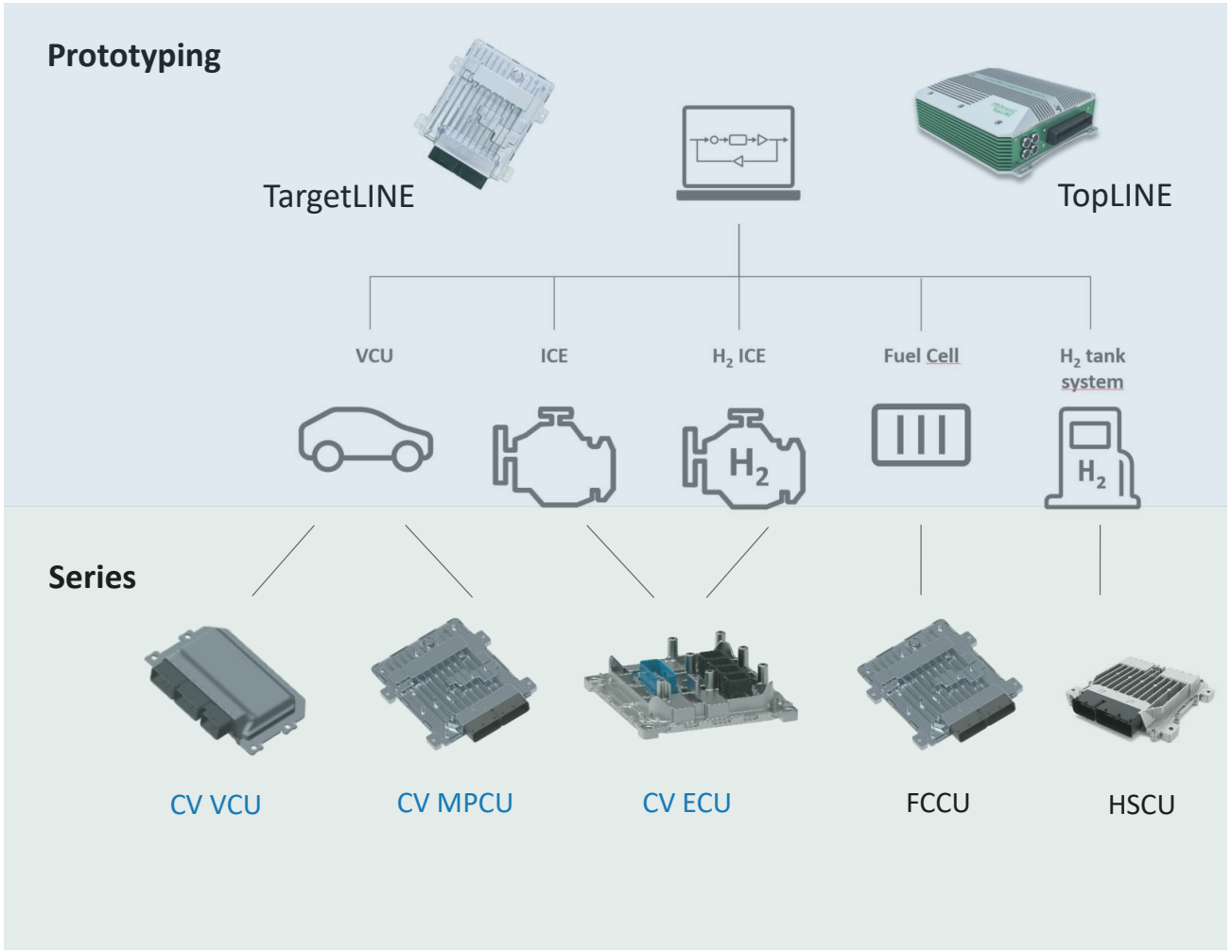
ECU Portfolio



Support through hardware and software development

Seamless support of the innovation process: From the initial idea, through prototypes to series production:

- RCP control units
- Development of Basic & Application Software
- Series production ECUs

"Schaeffler-New" Portfolio

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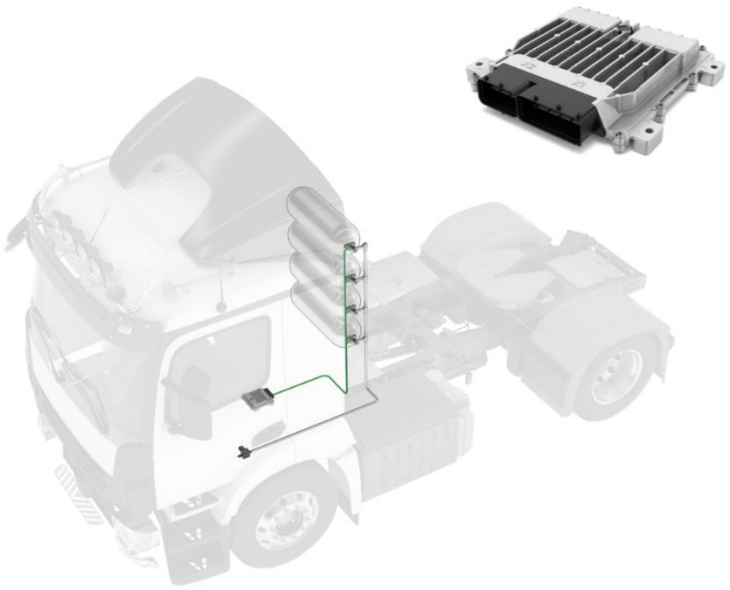
Project examples in H2 context

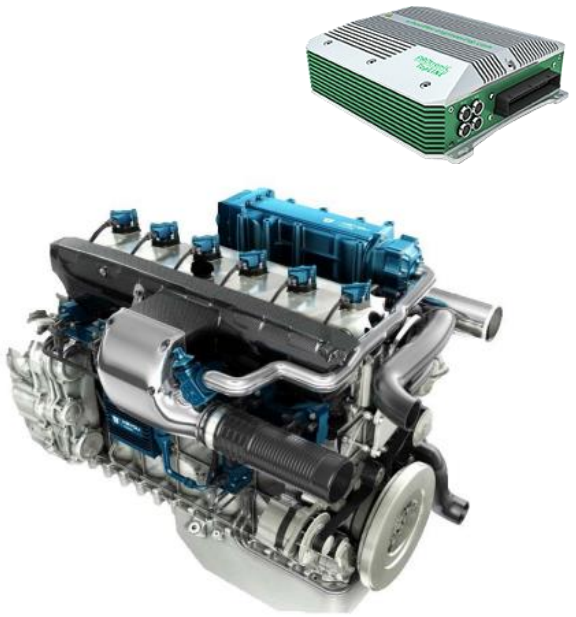
Collaboration with OEMs, research partners, and infrastructure companies

Hydrogen Storage Control Unit - HSCU



Fuel Cell control unit - FCCU

Hydrogen combustion engine



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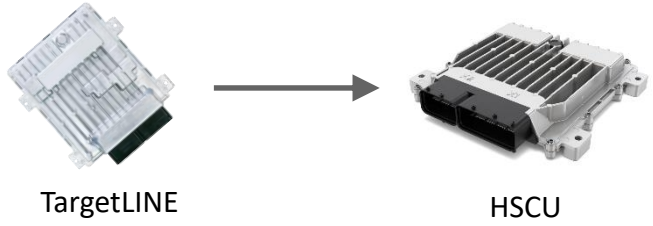
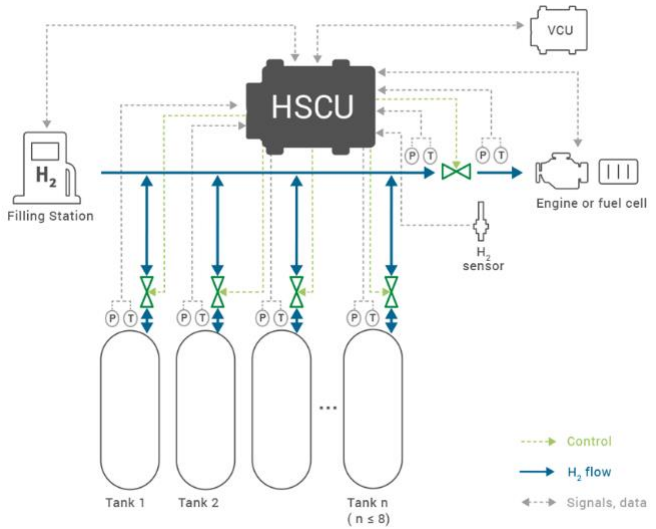
Project examples in H2 context

Hydrogen Storage Control Unit as the central control in the hydrogen tank system:

- Hardware/Electronics development & qualification
- Software development & integration into customer System
- Flexible prototype software on RCP platform PROtroniC TargetLINE
- Transfer to customer-specific series software
- Modern AUTOSAR Architecture
- Programmable with MATLAB/Simulink



TargetLINE HSCU



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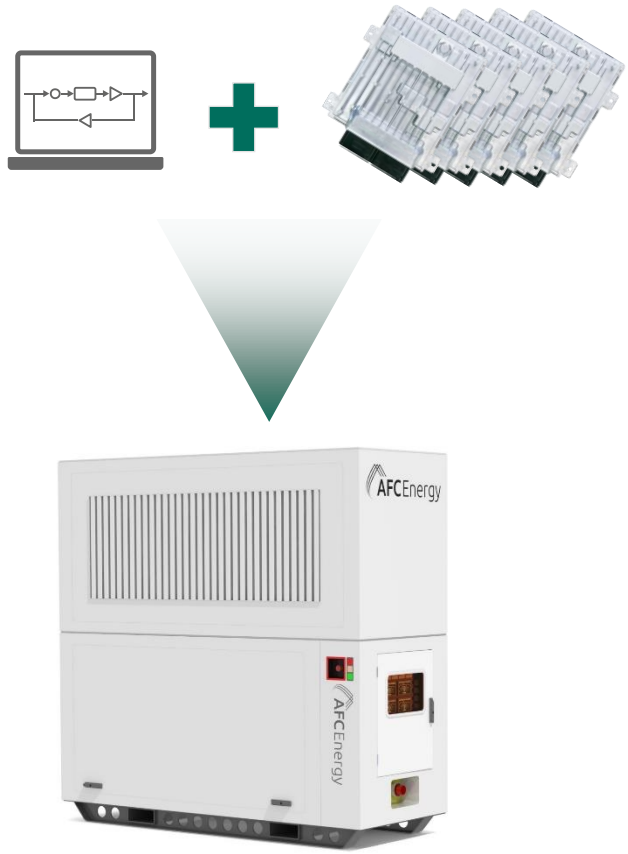
Project examples in H2 context

Project target:

Fuel cell systems for stationary applications (off-grid power supply, e.g., for charging electric vehicles, construction sites, shipping, etc.)

Project Scope:

- Application software for control, regulation & operating strategy of the fuel cell system
- ECU Platform PROtroniC TargetLINE
- E/E Support



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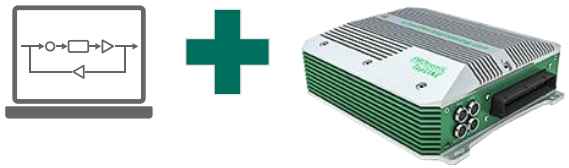
Project examples in H2 context

Project target:

Development and build up of a first prototype of an hydrogen combustion engine driven commercial vehicle

Project scope:

- Development of application software for hydrogen combustion engine
- Commissioning and first firing on test bench
- Operation of ICE in dynamic cycle
- Integration in demo vehicle
- In-vehicle calibration
- Homologation support



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Testing at Schaeffler Engineering

Test-Benches

- 5 Test-Benches with H2 Infrastructures
  - For ICE, fuel cell systems and H2 components
  - Up to 100 bar supply pressure and 40 kg/h mass current

NVH Testing Facilities

- NVH Testing Facilities
  - 4WD Anechoic Chassis Dyno (Ø 3.18 m & 1.60 m)
  - 2 chamber Anechoic Dyno Cell (dynos up to 215 kW & e-motor up to 180 kW)

EMC Laboratory

- Semi anechoic chamber (9.1 x 4.6 m)
- Power test bench with 2 independent hydraulic circuits

7 Powertrain and Engine Test-Rigs

- Flexible test-benches for drivetrain applications
- Loading device up to max. 475 kW/3,000 Nm, battery simulation up to 320 kW

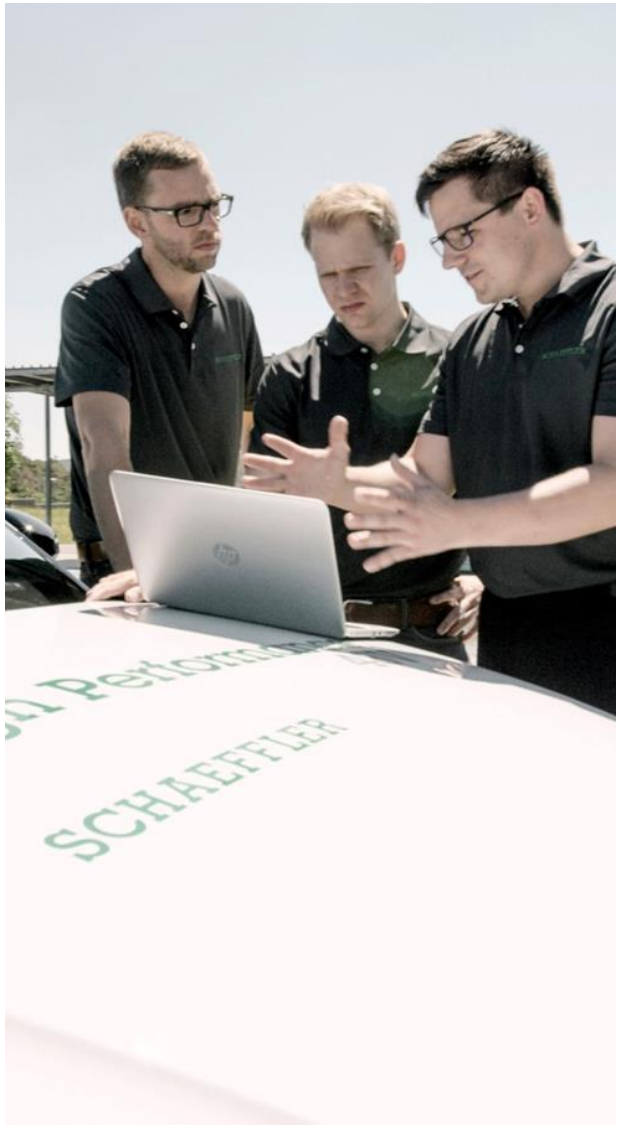
Conclusion

Schaeffler Engineering turns innovative ideas into real, series-ready hydrogen products

- Engineering
- Validation
- Products
- Consulting

Combination of long-standing experience, system understanding, software and hardware development

from idea to reality



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Vielen Dank für Ihre Aufmerksamkeit

Thank you for your attention

Moses Kowski – Systems Engineer