

# Development trends for the next generation of BoP products

ZBT Hydrogen Days | Duisburg | 05.02.205 | Dr. Maximilian Wick



#### What does the FC Market look like today?

















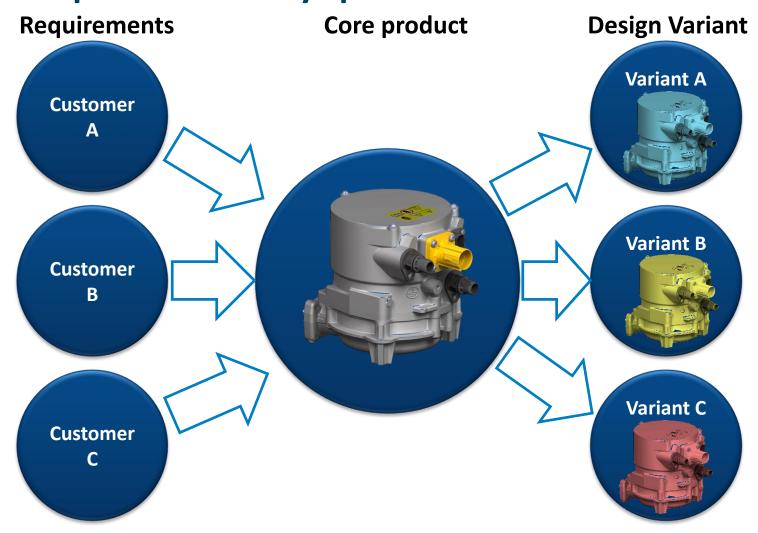
- **Standardization**
- Modularization
- Digitalization



- **Standardization**
- Modularization
- Digitalization



#### One product – many specifications



#### **Variation of:**

- HV+LV-Connector
  - Type
  - Orientation
- Media connection
  - Type
  - Diameter
  - Orientation
- Mounting
- Material
- \\...

No competitive advantage for BoP component suppliers!



- 1 Standardization
- 2 Modularization
- 3 Digitalization



#### **Development strategy for modules and subsystems**

Inhouse or external "Basic" modules Customized modules and subsystems components or subsystems Customer Analysis of Α market **Technical** Evolution of Benchexisting solutions products Customer HRB **Purge Valve Drain Valve Cathode Flaps** Air shut up valve **HV Fan** Customer **CWA Coolant Valves** 

# **Benefits of** Modularization:

- Integration of functions
- Optimized packaging
- Reduction of single components
- Reduction of interfaces
- Reduction of testing and validation
- Reduction of cost



10/02/25



# Numerous discussions with customers have revealed a high interest for fuel cell modules

#### **Customer Requirements**

Technical analysis and definition of optimization potential

Development goals

• Increased cooling requirement for fuel cell systems:

Hydrogen energy use = 100%

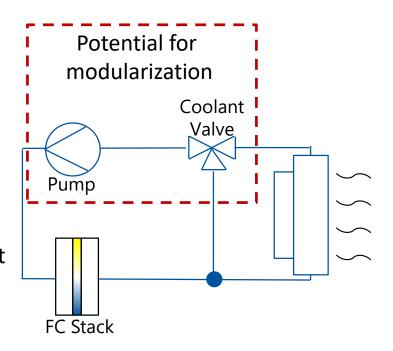
Waste heat to cooler

Waste heat in exhaust gas

Drive work

■ Rapid heat-up, especially during frost start → Compact cooling circuit required!

Coolant circuits in FCEV:



 Development of thermal management module

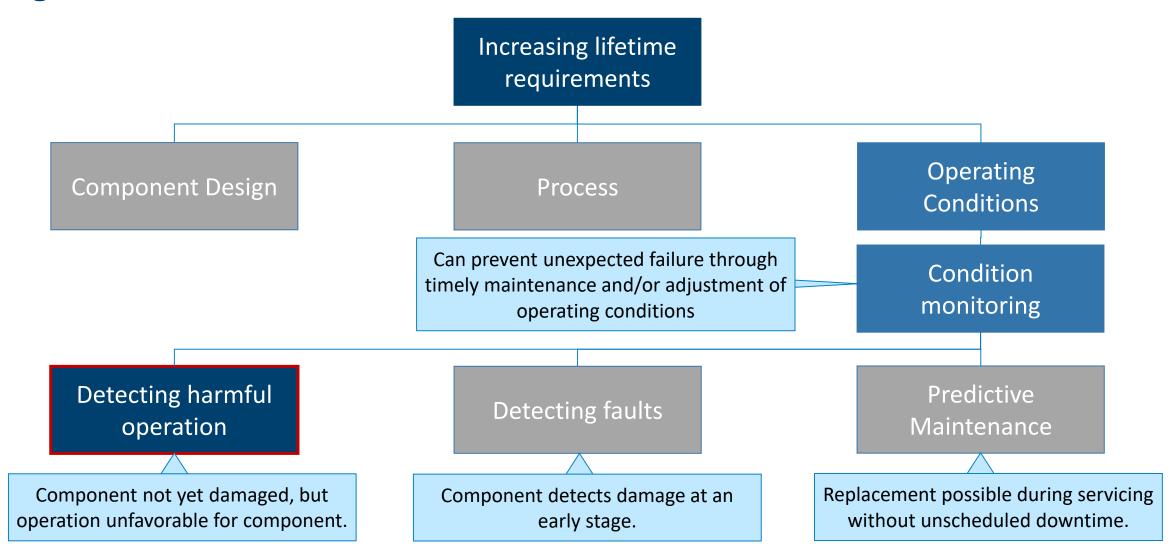




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#### **Digitalization**





#### **Summary**

**Standardization** 

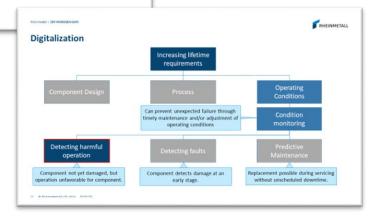
One product - many specifications Requirements Core product **Design Variant** Variation of: HV+LV-Connector Type Media connection Type Diameter Orientation Mounting Material Numerous discussions with customers have revealed a high interest Technical analysis and definition of **Development goals**  Increased cooling requirement for Coolant circuits in FCEV: Development of thermal management fuel cell systems: module Potential for modularization

**Modularization** 

Digitalization

Rapid heat-up, especially during frost start → Compact cooling circuit

required!





# TAKING RESPONSIBILITY IN A CHANGING WORLD