

Modulares Brennstoffzellensystem

– Vorteile für die Instandhaltung

Modular fuel cell system

– *Advantages for maintenance*

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Overview

- **Conventional Concept**
- **The modular design FC Stack**
- **Advantage of the modular concept**
- **The modular fuel cell system**
- **Modular fuel cell system – 19” rack concept**
- **Development of FC Stack**
- **Expertise FH-GE: Development of FC Systems**

Conventional Concept

Disadvantages of a Standard FC Stack

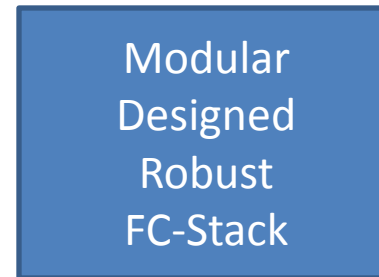
- Defect of one FC:
 - disassemble the whole Stack
 - replace the whole Stack
- Degradation of the Stack:
 - change the whole Stack including the pressure plate
- Irregular swaging of the FC Stack
- Sensitive graphite pole plates
- Necessity of cooling
 - integrate special cooling cells



Standard FC Stack

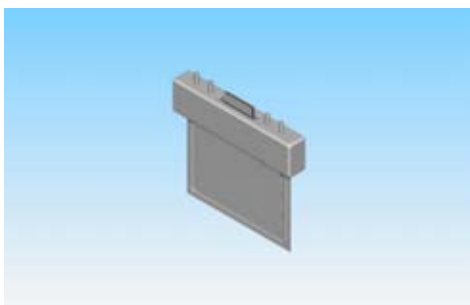
What is the goal to achieve for a FC Stack?

- Change the defect FC with small effort
- Constant pressure on the FC
- Robust pole plates
- No cooling plates



PEM-FC-Module

The modular designed FC Stack – PEM-FC-Module



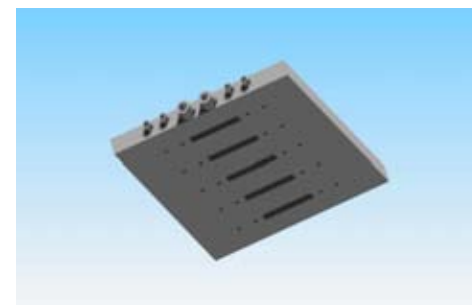
single FC

- metal flow-field pole plates
- CCM/GDL assembly
- flexible housing



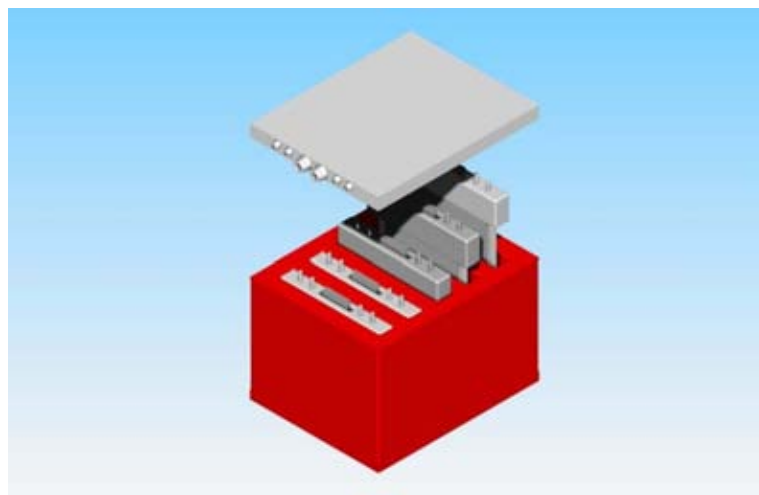
chassis

- liquid filled chassis
- some single FC slots (5 pieces)



backplane

- gas distribution
- electric circuit points



PEM-FC-Module

Advantages of the modular concept

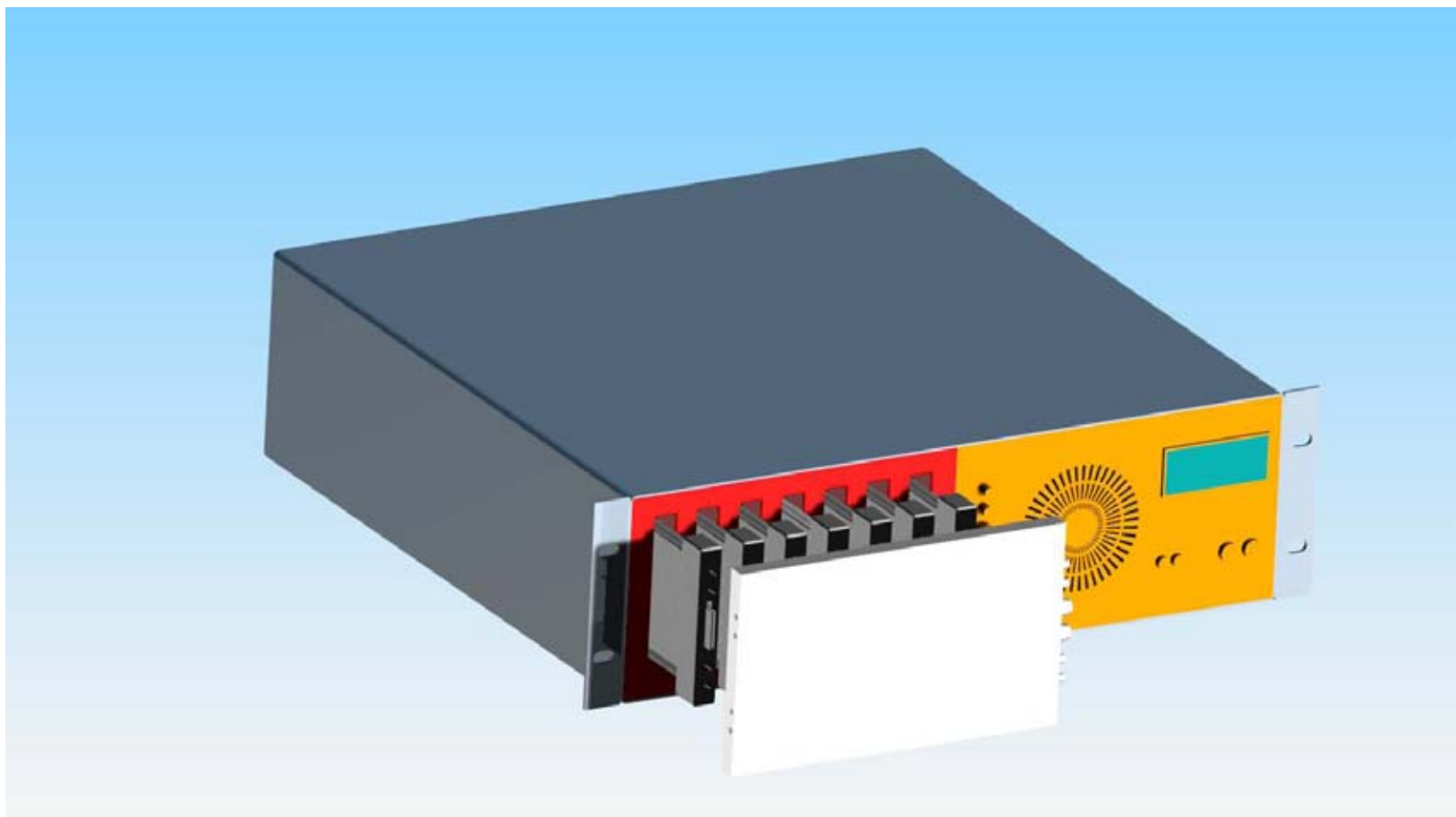
- swaging of the FCs → constant at all points
- power dissipation → cooled with the pressure liquid
- scalable power → number of FCs can be different
- defect of one FC → change only the defect FC without disassembling
- degradation of the stack → easy change of the FCs
- robust stack → because of metal pole plates

Advantages of the modular concept for maintenance purposes

The modular fuel cell system

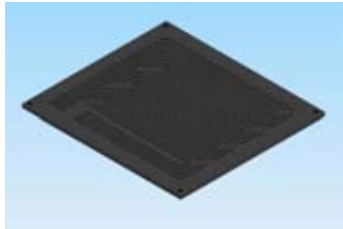


Modular fuel cell system – 19" rack concept



Development of FC Stack

from CAD drawing to prototype



flow field design



production of prototype



in-house milling



assembly

testing of fuel cells and FC stacks

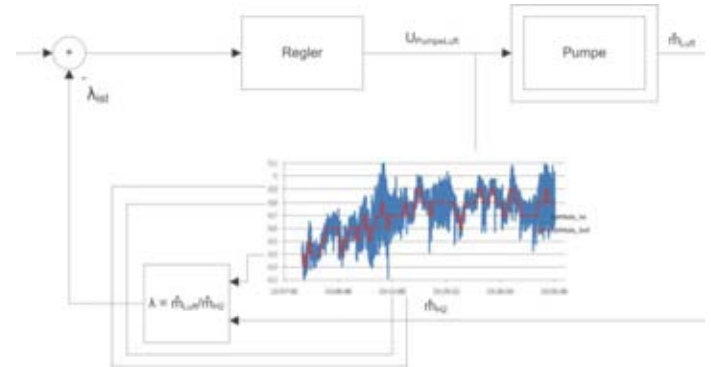


operate and monitor



integrated database

control and feedback control systems



closed loop control concept and adaptive lambda control

Expertise FH-GE: Development of FC Systems

Development of fuel cells, fuel cell test bench and fuel cell systems

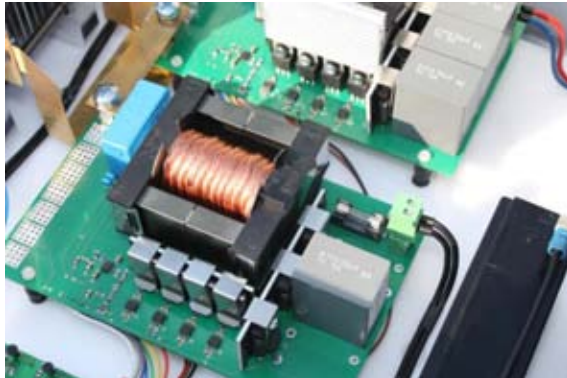


Fuel cell laboratory

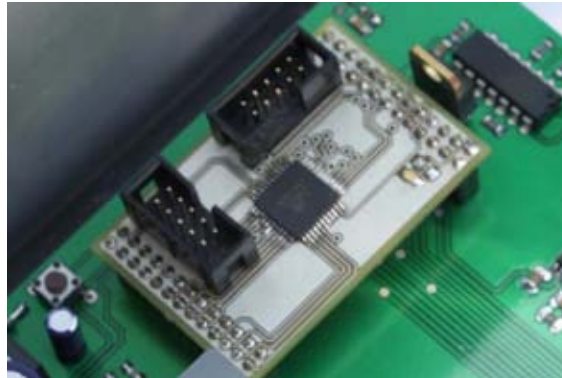


Solar cell supplied fuel cell facility with electrolysis

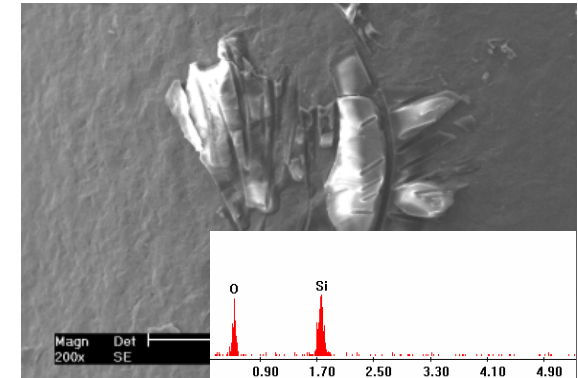
Development of DC/DC converters and embedded systems



Power electronics laboratory



Material analysis



Material sciences laboratory

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