

## **AVL POWERTRAIN ENGINEERING**

- \* FOUNDED IN 1946. NOW A GLOBAL NETWORK OF 36 TECHNICAL & ENGINEERING CENTERS, HQ IN GRAZ, AUSTRIA**
- \* OVER 4000 STAFF WORKING IN ALL ASPECTS OF ENGINES, TRANSMISSIONS, DRIVETRAINS & MECHANICAL, ELECTRICAL, BATTERY, FUEL CELL POWER SYSTEMS & COMPONENTS AND RELATED VEHICLE & STATIONARY POWER APPLICATIONS**
- \* WE STARTED SOFC SYSTEM ENGINEERING IN 2002. THERE ARE NOW 100 STAFF INVOLVED IN THE FUEL CELL SYSTEMS ENGINEERING DEPARTMENT (IN AUSTRIA)**
- \* AVL'S FUEL CELL PROJECTS START GENERALLY AT THE STACK LEVEL. WE HAVE CAPABILITY TO DESIGN, ANALYSE, PROTOTYPE BUILD, TEST & DEVELOP PEM & SOLID OXIDE FC POWER SYSTEMS TO PRODUCTION INTENT DESIGN LEVEL**

# FUEL CELL PRODUCT DEVELOPMENT

Business Unit: Powertrain Engineering



## SOFC APU Systems

- 3-5kW, >40% efficiency, conventional fuels (diesel, ethanol, Nat Gas, etc.)
- Portable power generator and for range extenders & HD & military vehicles



## SOFC POWER & CHP & Cooling Systems

- For grid connected & distributed power generation from 1kW to 1.0+ MW at >60% electrical efficiency



## PEM Systems

- System development, design and packaging
- System controls, integration and testing



## Vehicle Applications (using PEM & SOFC systems)

- Design, functional integration, mechanical conversion,
- H<sub>2</sub> system, safety, controls & calibration and testing



## Diagnostics & monitoring

- AVL THDA™, low cost stack monitoring
- Industry leading PEM stack monitoring (in use by 8 auto OEMs)

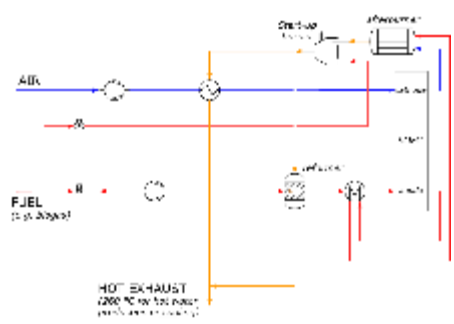
# EXAMPLES OF AVL SOFC SYSTEMS DEVELOPMENT



Some AVL SOFC systems engineering projects



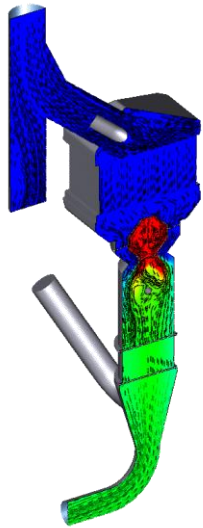
xx kW hotbox for MW plant



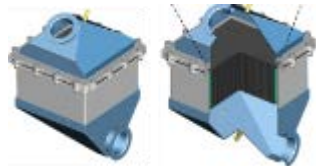
Process simulation



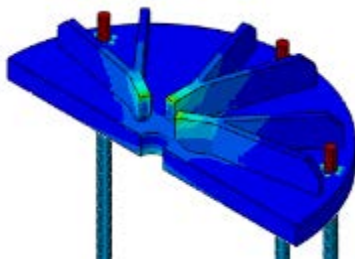
Fully automatic 10 kW stationary SOFC CHP platform



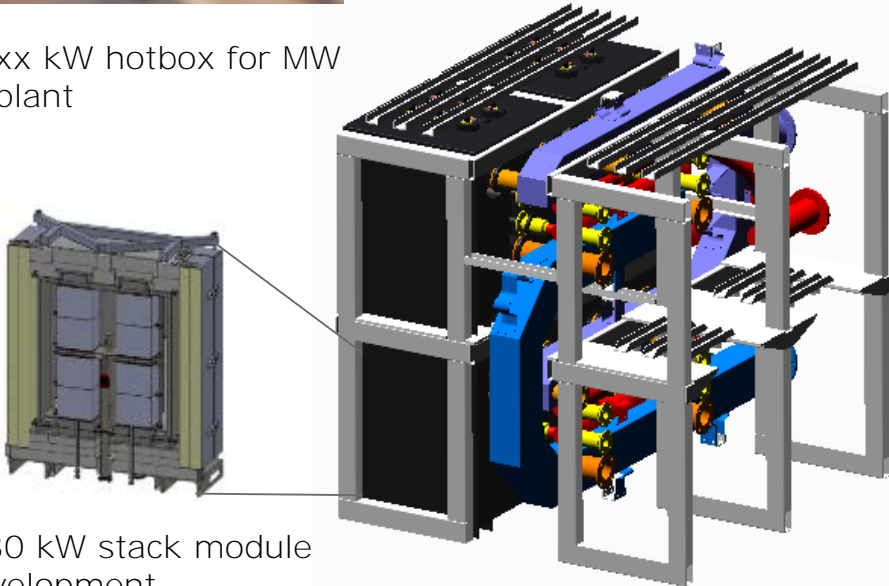
CFD analysis of start-up burner



CAD design of afterburner



FE analysis of stack compression plate

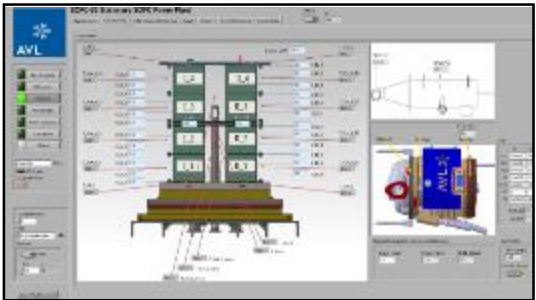


5-30 kW stack module development

>200 kW SOFC module



AVL compact high speed blowers



AVL control system