AVL Fuel Cell
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AVL SOFC APU (Auxiliary Power Unit)

Portable power out of diesel fuel without noise and emissions!

AVL SOFC APU

- 3kW electrical power
- 10kW thermal power
- el. efficiency ~35%
- Fuel: road diesel (< 15 ppm S)
- 75L, 60kg
- < 55dB(A) noise

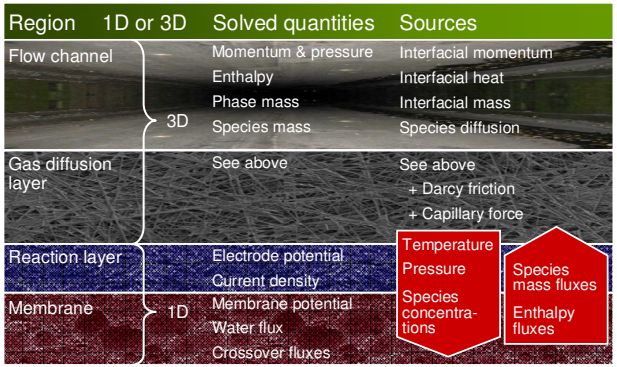
Other markets:

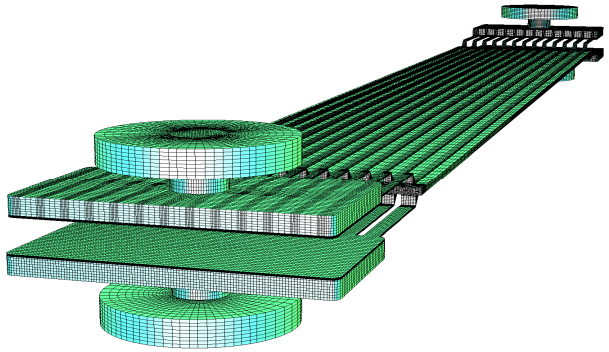
Military

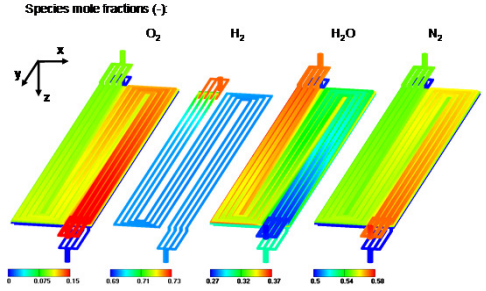
Marine

Camping

CFD Analysis of PEMFC Cells and Components







Background - Fuel Cell Performance Optimisation

Critical part load operating conditions of fuel cells lead to corrosion effects and reduction of stack **life time**. Many effects are related to problems with **water management**. Performance optimisation therefore requires the identification of the problem(s) and their elimination by modification of cell design, material properties and operational parameters.

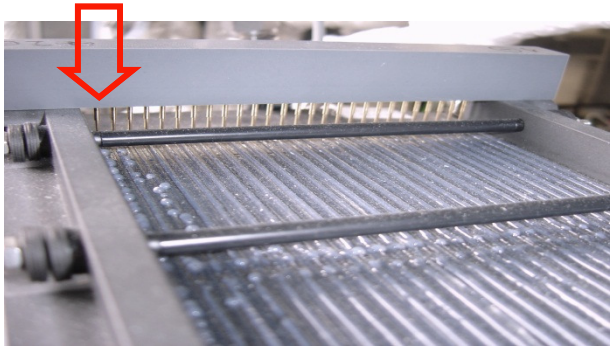
AVL Approach - Simulation

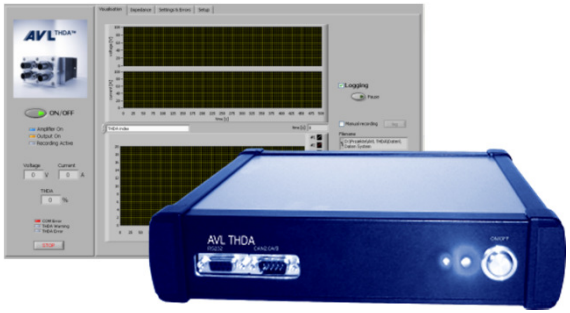
- Consideration of **electrochemical effects, heat transfer** and **water balance** (generation-condensation-evaporation-transport) in MEA
- Modelling of critical gas permeation effects
- Full 3D treatment of 2 phase flow in porous material and open channels

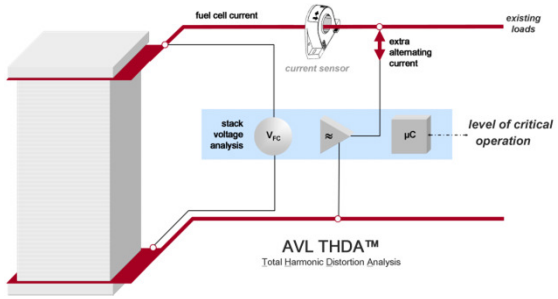
Customer Benefits

- Validated models with flexibility for different membrane and electrode types
- Experienced engineers for assessment and optimisation
- Standard procedures for meshing (AVL-FAME)
- Applications for industrial & research projects since several years

PEMFC Cell and Stack Diagnostics







Background for Stack Diagnostics

Usually critical operating status is monitored by measuring the cell voltages individually. Large stacks thus require costly instrumentation and elaborated wiring layouts.

Cost efficient solutions with less complexity are required.

AVL Approach THDA™

- On-line detection of critical FC operating conditions w/o measuring individual cell voltages
- Analysis of the effects of voltage drops instead of measuring voltage drops itself
- THDA technology analysis change in the harmonic distortion content of a superimposed signal

Customer Benefits

- Instrumentation effort is relatively small and of **low complexity** → 2 channel measurement → **cost effective** (no cell voltage measurement required)
- New extended functions enables **identification** of different **causes for critical conditions** e.g.
  water flooding / membrane drying / cathode- or anode effect