Test Station for Fuel Cell Development at IAV

High-performance test station for fuel cell stacks and systems

Fuel cell drive systems provide a promising option for meeting the targets set for reducing CO_2 emissions. In particular, the technology's greater traveling range and shorter refueling time over battery electric vehicles are benefits the consumer really notices. IAV's test station in Gifhorn is capable of simulating accelerated life cycles as well as driving cycles for evaluating the performance of the device under test.

Characterizing the fuel cell stack

Characterizing the fuel cell stack on the test station provides information on operating behavior in the fuel cell system for automotive use. Knowing the parameters that influence this, for example, operating modes can be optimized for increasing life and performance of the overall system. Dynamic controllability of the operating parameters makes it possible to test the fuel cell stack under dynamics conditions close to real-life vehicle operation.

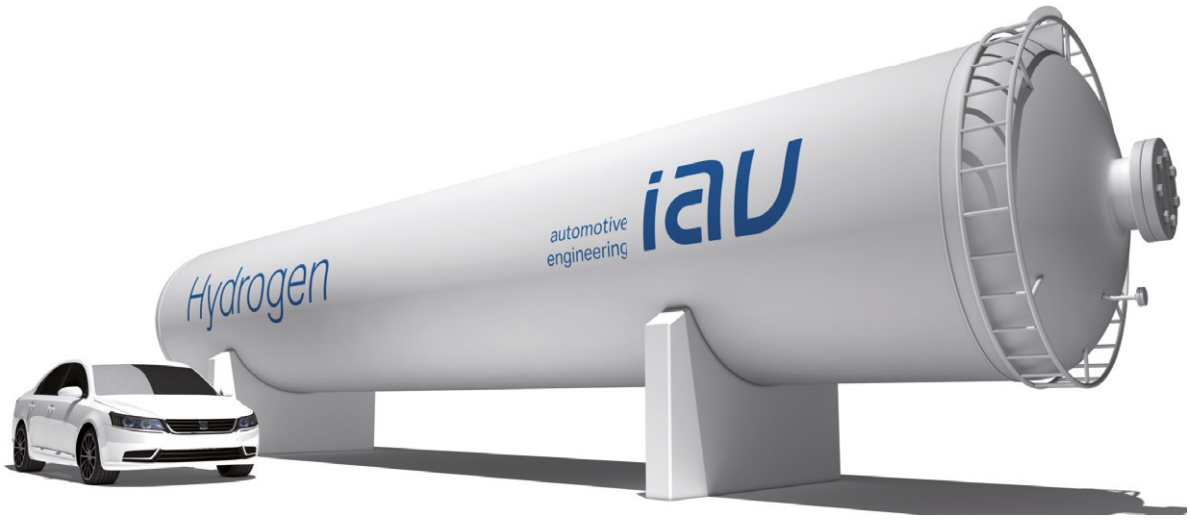
Algorithm development for the fuel cell system

Findings from testing the fuel cell stack provide a direct basis for developing system-relevant algorithms. Implementing and validating new algorithms as well as generating models and comparing them with existing ones are core activities of development work at IAV. The start of testing operations will open up a broad range of options for IAV customers to test the components of the fuel cell system. Within this framework, IAV works on development questions for mass production as well as on topics relevant to advance engineering and research.

Testing the future

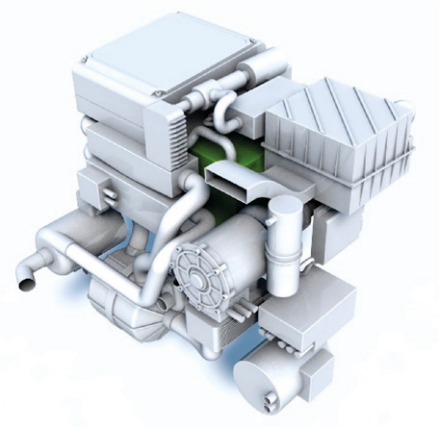
IAV's test station for fuel cells is modular in design. This not only provides the capability of operating either fuel cell stack or system individually but also of examining specific components of the fuel cell system.

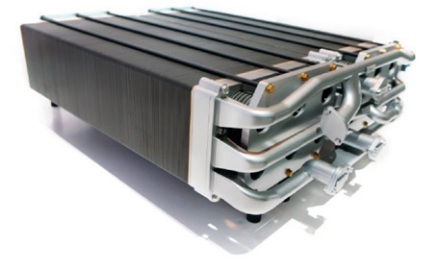
Fuel cell stacks up to 180 kW
Fuel cell systems up to 150 kW



IAV GmbH
Carnotstrasse 1 · 10587 Berlin · GERMANY
ralf.waschеck@iav.de
+49 5371 80-53745
katharina.schuette@iav.de
+49 5371 80-53 220

Test Station for High-Performance and Dynamic Tasks





Validation on the test station is an important step towards introducing future technologies, like the fuel cell, into mass production. With the specifications outlined below, the test station for developing fuel cells at IAV in Gifhorn is ideally prepared for carrying out the development work required. For example, the supply of media can be conditioned across broad operating ranges for determining the influence of pressure, temperature and humidity management on fuel cell stack performance. In the test station hydrogen circuit, it is also possible to add nitrogen to analyze the effects of nitrogen diffusion occurring in the fuel cell system. A highly dynamic system for measuring the voltage of individual cells is available for detailed analysis of stack characteristics, such as internal resistances. Different hybrid strategies and their influence on vehicle parameters, such as hydrogen consumption and traveling range, can be analyzed by linking the test station to IAV's own simulation of the overall vehicle.

Overview of key test station specifications:

Peak output, fuel cell system: 150 kW
Peak output, fuel cell stack: 180 kW

Maximum voltage:	1,000 V
Maximum current:	1,000 A
Maximum cooling capacity:	250 kW
Maximum possible volumetric air flow:	10,000 Nl/min
Maximum possible volumetric hydrogen flow:	4,100 Nl/min
Dew point of the media supplied:	up to 80 °C
System operation:	
Media pressures, system operation	
Hydrogen, Nitrogen	1–20 bar_{abs}
Air	0.6–1 bar_{abs}
Stack operation:	
Nitrogen admixture up to	1,500 Nl/min
Media pressures, stack operation	
Hydrogen, Nitrogen	1–4 bar_{abs}
Air	1–4 bar_{abs}