The Fuel Cell Engine

Fuel cell stacks need to be integrated into a complete fuel cell engine. A fuel cell engine must be of appropriate weight and volume to fit into the space typically available for car engines. Importantly, the operation of the entire engine must maintain the near zero emissions and high efficiency of fuel cells. Finally, all these requirements must be met with components that are both inexpensive and designed for low cost, high volume manufacturing.

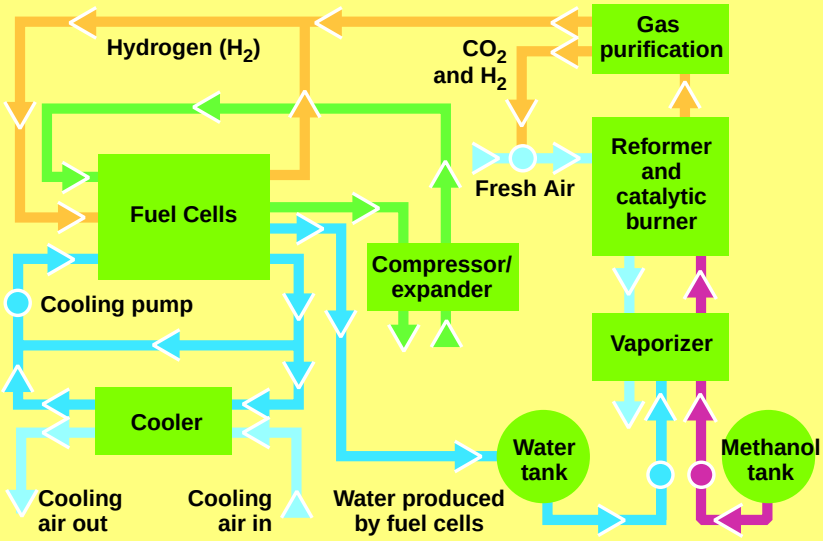

Diagram of reformate/ air fuel cell "engine" utilizing liquid methanol as fuel.

References:

Fuel Cell Handbook on CD (4th Edition), U.S. Department of Energy, Office of Fossil Energy, Federal Energy Technology Center. November 1998.

C.E. (Sandy) Thomas, et.al. Integrated Analysis of Hydrogen Passenger Vehicle Transportation Pathways. National Renewable Energy Laboratory, March, 1998.

Shimshon Gottesfeld. *Polymer Electrolyte Fuel Cells.* Advances in Electrochemical Science and Engineering, Vol.5, Wiley-VCH, 1997.

Fritz R. Kalhammer, et. al. *Status and Prospects of Fuel Cells as Automotive Engines.* Prepared for the State of California Air Resources Board, July, 1998.

Regenerative Fuel Cell System Testbed Program for Government and Commercial Applications. http:/ / www.lerc.nasa.gov/ www/ RT1995/ 5000/ 5420p.htm

Solar-Powered Plane Flies to New Record Height — One Step Closer to a Commercial Satellite Substitute. http:/ / www.aerovironment.com

Resources:

A.J. Appleby and F.R. Foulkes. Fuel Cell Handbook. Van Norstand Reinhold, New York: 1989.

S.R. Narayanan, G. Halpert, et.al. The Status of Direct Methanol Fuel Cells at the Jet Propulsion Laboratory. Proceedings of the 37th Annual Power Source Symposium, Cherry Hill, N.J., June 17, 1996.

Department of Defense Fuel Cell Demonstration Program http:/ / dodfuelcells.com/

Energy Efficiency/ Renewable Energy Network http:/ / www.eren.doe.gov

Hydrogen & Fuel Cell Letter http:/ / mhv.net/ ~hfcletter

Hydrogen and the Materials of a Sustainable Energy Future http:/ / education.lanl.gov/ RESOURCES/ h2

Karl Kordesh and Gunter Sinander. Fuel Cells and Their Applications. VCH Publishers, New York, 1996.

DOE Office of Transportation Technologies http:/ / www.ott.doe.gov

United States Council For Automotive Research http:/ / www.uscar.org/

Arthur D. Little http:/ / www.arthurdlittle.com