

FACTS

Cooperative Research Program

Project Summary

Performance Evaluation of 70 MPa Hydrogen Station Breakaways, Hoses, Fittings, and Nozzles to Assist in Standardization

Purpose

Fuel cell vehicles powered by hydrogen have the potential to change the future of transportation. Developing the supporting infrastructure is just as important as developing the vehicles. The SAE Fuel Cell Interface Working Group of the SAE Technical Standards Development Program is conducting research and testing of existing hydrogen station dispenser fittings, hoses, breakaways and nozzle assemblies under expected service conditions to ensure their performance meets industry requirements.

Project Scope

Testing is performed in two separate phases:

- The pre-qualification of components for baseline performance
- Full assembly testing to examine the performance of existing hydrogen station dispenser breakaway to nozzle assemblies against current draft standards and to perform tests designed in actual service conditions.

During testing, the following issues are to be addressed:

- The effects of multiple Hydrogen gas cycles
- Quality of the sealing interface after repeated assembly
- “Thermoshock” condition or the flow of pre-cooled hydrogen through an ambient or warm component which can lead to unexpected leakage
- Electrical conductivity

- Kink resistance – examine hose fatigue resistance under normal bending and pressure cycling conditions
- Thermal cycling – examine the life over rapidly changing temperature conditions
- Separation test – determine the force required to separate the breakaway and its ability to control gas flow once separated

Role of SAE*Project management*

- Provide a legal framework for industry discussion, meeting space and meeting facilitation
- Develop statement of work, project milestones and schedules

Subcontract administration

- Identify key testing organizations
- Acquire proposals and bids from subcontractors
- Develop and administer contracts with all testing subcontractors; monitor deliverables and schedules

Organization of funding and fiscal management

- Budget development
- Prepare required agreements to obtain funding
- Solicit funding
- Develop proposals for and acquire government funding
- Establish escrow accounts, account for all funding, and disburse project funds as required

Performance Evaluation of 70 MPa Hydrogen Station Breakaways, Hoses, Fittings, and Nozzles to Assist in Standardization (cont'd.)

Subcontractor/Partner/Affiliate Organizations

- Project fully funded by the US Department of Energy
- Powertech Labs, INC provided
 - Consulting
 - Lab Usage
 - Procurement of components and assemblies
 - Field tests
 - Reporting

Final Deliverables

A presentation detailing a compilation of findings will be delivered to the SAE Fuel Cell Standards group. A final report will include all data, test results, analysis of all test results, and conclusions will be made available to committee members.

The results of this effort will be shared with the SAE Fuel Cell committee and the CSA America HGV committee including representatives of International Organization for Standardization (ISO), American Society for Testing and Materials (ASTM), American Society of Mechanical Engineers (ASME), and the Environmental Protection Agency (EPA).

Results of this work will be shared with a broader industry audience via conferences and other venues. SAE maintains a direct interface with the National Highway Traffic Safety Administration (NHTSA) ensuring results from this work are considered for future rule making.

Project Budget: Approximately \$364,000.00

Project Timeline: June 2008 – December 2008

Project Participants

<i>Industry</i>	Nissan Technical Center NA Inc
Adam Opel AG	Nitto Kohki Co Ltd
Air Liquide	Ovonix Hydrogen Systems LLC
Air Products & Chemicals Inc	Pacific Gas & Electric Co
Alion Science & Technology	Parker
American Honda Motor Co Inc	Powertech Labs Inc
Alion Science & Technology	Proteus Services Group LLC
Battelle Memorial Institute	Quantum Technologies Inc
BMW AG	Siemens VDO
BMW of North America LLC	Sion Power Corporation
California Air Resources Board	Sofco-Efs Holdings LLC
CATARC	Staubli
Chart Inc	Swagelok Co
Chevron Learning & Resrch Center	Synaptics Inc
Chrysler LLC	Technology Transition Corp Ltd
Coupled Products	Toyota Motor Co Ltd
CSA America	Toyota Motor Engineering & Manufacturing
CSA International	Toyota Technical Center USA Inc
Daimler AG	US Dept of Transportation
Diversified Computer Engrg & Devel	US Fuel Cell Council
Energy Conversion Devices Inc	UTC Fuel Cells
FAB Industries	Versa Power Systems
Ford Motor Co	W L Gore & Associates Inc
General Hydrogen Canada Inc	WEH GmbH
General Motors Corp	<i>US Government</i>
GWS Solutions of Tolland LLC	US Department of Energy (DOE)
Honda R&D Americas Inc	National Renewable Energy Laboratory Division (NREL), a facility of the US Department of Energy for renewable energy and energy efficiency research, development and deployment
Honda R&D Co Ltd	
Inergy Automotive Systems LLC	
Intertek Automotive Research	
Japan Automobile Research Institute	
Mercedes-Benz Technology	
Motor Vehicle Fire Research Institute	
Millennium Cell Inc	
MLH Consulting	
Motor Vehicle Fire Research Institute	
National Hydrogen Association	
National Renewable Energy Laboratory	
Next Energy Center	
Nissan Motor Co Ltd	