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French-U.S. PEM Cab, Tiny Fuel Cells, Scooter Among H_2/Fuel Cell Trade Fair Highlights

A panoramic view of the Joint Hydrogen and Fuel Cell Exhibit at the Hannover Industrial Fair last month.

HANNOVER, GERMANY- A French prototype taxi powered by an American hybrid fuel cell system, the start of series production of a new miniature fuel cell by a Bavarian startup and a prototype assembly line for mass-producing tiny fuel cells, upcoming tests of a solid oxide fuel cell on light heating oil, and a fuel cell scooter prototype were among the highlights of the eighth Hydrogen and Fuel Cells Group Exhibit at the sprawling Hannover Industrial Fair here April 15-20.

A total of 96 exhibitors from ten industrial nations took up 3000 sq. m. (32,500 sq. ft) of floor space in Hall 13, one of two sprawling buildings reserved for energy products and services, almost ten times as many as when hydrogen first came to Hannover eight years ago (see Evers interview) - a respectable fraction of the 800-odd energy exhibitors' t-otal.

Prominent among the newcomers was General Motors via its German Opel subsidiary which presented a cutaway model of its HydroGen3 fuel cell minivan, along with a new a stationary fuel cell power plant, developed jointly with Giner and Quantum. BMW, in Hannover for the second time, displayed its liquid hydrogen-powered i.c-engined Series 7 sedans shown around the world last year in its Clean Energy World Tour (H&FCL March, Aug. 01). DaimlerChrysler exhibited a cutaway

version of one of its NECAR fuel cell vehicles. From Asia, Japan Steel Works demonstrated small hydrogen tanks for cars.

Eyecatching Peugeot Citröen / H Power Taxi

One of the most eye-catching debuts in Hannover was PSA Peugeot Citröen's black-and-yellow checkered fuel cell taxi demonstrator (the car was previously shown in Paris at a press conference and at the Frankfurt Auto Show last year). The car is powered by a 5/5 kW net/86 V PEM fuel cell from H Power, Inc, Clifton, NJ, fueled by 80 liters (1.5 kg) of compressed hydrogen stored at 300 bar in nine tanks made of carbon fiber composite, epoxy resin and aluminum. The tanks, manufactured by Composites Aquitaine, a subsidiary of Airbus manufacturer EADS near Bordeaux, are mounted on a rack underneath the trunk that slides out backwards into the open for easy refueling, said to take a few minutes.

A 36 kW (maximum) electric motor provides a top speed of 95 km/h (60 mph) with acceleration of 0-50 km (31 miles) in 8.4 seconds, and giving a range of 200-300 km (125-188 miles).

H Power's CEO H. Frank Gibbard told H&FCL the project started a couple of years ago when the French carmaker approached the American company and bought several of H Power's stacks. Both companies eventually signed a joint $22 million development agreement for the next 2-3 years to develop more capable fuel cell stacks. "We will be doing an evaluation about 2004 whether to take this forward as a commercial product," Gibbard said. If it does move forward, Gibbard expects a first vehicle to come onto the market about 2006.

"For us it's a nearly perfect example of finding a market for something that we are already doing," Gibbard added. "We are doing that more and more," citing as another example the sale of E-Packs, the core fuel cell stack inside this system. Says Gibbard, "2002 is the year of the direct hydrogen fuel cell."

Manhattan Scientifics / NovArs Scooter at Gore Booth

At the lower end of the transportation scale, Gore Fuel Cell Technologies, Elkton, MD had a nifty fuel cell scooter on display, powered by a 3 kW PEM fuel cell developed by NovArs GmbH, a unit of Manhattan Scientifics, based on an Aprilia model and first announced last fall (H&FCL Dec. 01). At the time, Manhattan Scientifics said a

possible production version would have a range of 120 miles and a top speed of at least 35 mph.

The stack, using a Gore Series 55 membrane first introduced 5 years ago, was mounted behind the rider in the scooter's small luggage carrier. The standard gasoline engine and tank had been removed to make room for a pressurized hydrogen tank.

Gore also showed a new stationary Nuvera stack that employs the new Series 56 membrane introduced last year that is said to be very long-lived. Gore says the membrane is the result of three years research into durability fundamentals, employing new catalyst, electrode, membrane and processing technologies.

The company also announced that H Power has tapped Gore as a supplier of MEAs for its commercial PEM fuel cells for at least the next 18 months.

Smart Fuel Cell GmbH, Munich, presented what it said was its first series-produced product, a "Remote Power System," as well as the prototype of a compact, high-performing direct methanol fuel cell "Mobile Office System." The startup company which first surfaced last year at another hydrogen exhibit in Hamburg, (H&FCL Nov. 01), demonstrated the 40 Watt (max.) office prototype system powering a laptop. The company says the system includes a 175 ml methanol cartridge enough to run a laptop all day. An executive removed the cartridge very slowly, but the laptop didn't stop running: there's enough fuel left in the system during the change to keep it going.

The remote system generates up to 80 Watt, and its 2.5 liter methanol tank stores up to 2.5 kWh of electricity. It is intended for road, construction site, road signage, environmental, camping and leisure applications: CEO Manfred Stefener says the company has produced "between 50 and 100" units since January and expects to ramp up to a monthly production rate of 200 units in the foreseeable future.

As to cost, Stefener only says that "even today" it is already about half of that of comparable lithium ion systems.

Fraunhofer Assembly Line for Miniature Fuel Cells

A few booths away, Germany's Fraunhofer Institute showed a prototype of an automated assembly line for the entire production chain of miniature fuel cells - mounting, assembly and handling. While fully or partially automated lines are already installed for larger fuel

cells at companies such as Ballard, this was apparently the first such line for miniature fuel cells.

Fraunhofer marketing executive Ulf Groos said the system can assemble 4-5 cells per hour, including bonding with adhesives instead of using screws: "So far, it takes a skilled technician all day to put one together," he said. The line is expected to be operational this fall and then will be shipped to the Fraunhofer Institute for Manufacturing Innovation, Brookline, MA for finetuning and, presumably, marketing to potential customers. Other Fraunhofer exhibits included a notebook design with a fuel cell system fully integrated into the housing, and, like last year, a camcorder operated by a fuel cell, the difference being that the camcorder continuously recorded images from the exhibit that were immediately broadcast by the group exhibit organizers over the Internet.

Sulzer Hexis Adapts SOFC to Light Home Heating Oil

Swiss fuel cell developer Sulzer Hexis, Winterthur, and German fuel retailer Aral, Bochum, announced a joint development and testing of a solid oxide fuel cell (SOFC) that will run on a new, extra light, sulfur-free variant of home heating oil instead of natural gas for residential single-family applications.

Sulzer Hexis first started development of a small natural gas-fired SOFC five years ago (H&FCL July 97). At a joint press conference executives said preliminary conversion tests of the first unit have been completed, a 5-25 kW prototype is currently being constructed for delivery to Aral by the middle of this year to start testing through 2004, when a go/no go decision on commercializing the device is expected.

Bernd Richter, of heating oil distributor Aral Waerme Service, said there are some 6.4 million conventional home oil heaters in use in Germany, of which about 2.2 million are due for refurbishing. Heating oil is more economical than natural gas, he says: Home owners have invested considerable amounts in items such as oil tanks which they are loath to give up, and, he says, they like the multiplicity of choice: "They don't want to be stuck at the end of a gas pipe from a single supplier, and they want to be able to buy fuel seasonally when prices are low."

Sulzer Hexis is fielding about 400 of its gas-fired units in field trials in various countries, also expected to be completed by 2004. One principal partner is German gas wholesaler Thyssen-gas which has

contracted for 42 units which it will in turn farm out to utilities and local installers.

Other new products:

- Hydrogenics, Mississauga, Ont., showed its brand-new HyPM 25 kW scalable modular fuel cell generator, completed only a couple of weeks before the opening of the Hannover show. Its much simplified compared to the previous version with fewer moving parts and lower parasitic loads. Net efficiency is claimed to be 45-53%. The company plans to add a 100 kW unit this fall.
- ChevronTexaco Technology Ventures, Bellaire, TX showed its new HALIAS fuel processor for converting pipeline-quality natural gas to PEM-grade reformate. The device is designed specifically as a laboratory device for testing and demonstration, but also for other uses. Startup time is 60 minutes, hydrogen efficiency is 75% LHV, hydrogen purity is >40%. Average CO is <20 ppm, sulfur input is <500 ppb, delivery pressure is 4.5 psi, and output is 120 standard liters/min.

The other headlights from the May 2002 issue of "The Hydrogen & Fuel Cell Letter":

- London: Launch of London Fuel Cell Buses Stirs Flurry of UK Hydrogen Activities
- Fast Forward: DaimlerChrysler hydrogen vs. methanol; Upcoming DoE Interim Fuel Cell Report.
- Washington, DC: House, Senate Differ in 2002 H2, Fuel Cell Requests, Conference Date is Uncertain
- Crystal City, VA: Difficult Time for Startups, But New Energy Technologies are Promising, Investors are Told
- DoE News: Government Leadership, Codes & Standards Emerge as Key Issues in DoE Workshop
- Stuttgart: DaimlerChrylser Joins Chemical Company in Renewable Biomass Fuels Project
- Hannover: Killer App Yet to Come, Says Hannover's Evers
- New York: H&FCL Editor Hoffmann to Moderate H2 Roundtable at June 20 New York Conference
- Concord, NH: New Hampshire is First State to Enact Limits on Carbon Dioxide Emissions
- Briefs: CaFCP Methanol Station, ChevronTexaco Acquires Dais-Analytic Components
- Events
- Transitions: Steve Chalk, Sir Mark Moody-Stuart, Peter Lyddon, Scott Weiner, David Haberman