

Day 5 at Hannover Messe 2007

The fifth and final day of the Hannover Fair 2007, and the last chance to talk to exhibitors and find out general market progress and prospects.

First up was H-tec, a producer of fuel cell education products since 1997, who announced yesterday that they had sold 10,850 educational units over the course of last year. The company has established a reputation over the past decade for high-quality, cost-competitive fuel cell education products for schools, universities and demonstration purposes. Their main markets are Japan, the USA and Germany. The UK is not considered to be a big market for fuel cell demonstration kits, perhaps reflecting the traditionally limited science budget in education. H-tec has priced its demonstration units very competitively, with its basic unit priced at 19 Euros. With pressure constantly on education budgets, H-tec sees its continued production of low-cost innovative demonstration units key to reaching more customers.

H-tec's industrial fuel cell division, established in 1999, plans to achieve major growth over the next few years. The industrial division has already produced prototype PEM-electrolyzers and low-power PEM-fuel cell systems. Spurred on by recent impressive sales in H-tec education, H-tec industrial plans to develop PEM and DMFC units of less than 5kW for the portable, stationary and automotive sectors. With their history of innovation, recent funding gains, and continued investment in fuel cell education, there are exciting times ahead for H-tec. We will report on formal announcements of H-tec industrial as and when they arise.

The German Centre for Aerospace and Institute for Thermodynamic Technology (DLR) are working with Airbus on developing a fuel cell system to replace aircraft Auxiliary Power Units (APUs). APUs are typically used to power the, so called, hotel loads which include air conditioning, in-flight entertainment, and catering facilities. The APU also helps to power the aircraft when it is on the ground, and is responsible for much of the noise and pollution associated with aircraft ground-running. Replacing engine-powered APUs with fuel cell-powered units would go some way to reducing emissions and improving the efficiency of aircraft. APUs have a power output of up to 1 MW.

DLR is concentrating on PEM technology using reformed kerosene, the conventional fuel for aircraft. Fuel cells on board aircraft are subject to certain problems not experienced on land, such as extremes of pressure, temperature, and considerable vibrations. All of these problems are being modelled by DLR, and the challenges of weight, heat transfer and the variable quality of kerosene are being addressed. DLR is still some way from a working prototype, but fundamental research will continue with long-term funding from the EU and Airbus.

In the past year IdaTech, the developer of fuel processors and fuel cell systems for portable and backup power, were bought by UK investment company Investec. Their new owners are supportive of IdaTech's long-term pursuit of niche markets for portable, backup and remote power applications in the telecommunications, utilities and military sectors. On display at the fair was IdaTech's new small (250W) unit, powering lights on the stand and due to be launched later this year. Potential applications of this unit include domestic backup power and military uses – the unit, weighing around 14 kg, is eminently portable. Also on display was the larger ElectraGen 5, capable of 5kW of continuous power output which, together with the 3kW ElectraGen 3, has been installed in over 60 locations across Europe. The future for IdaTech's development activity will focus on further development of their patented methanol reforming technology for both high- and low-power output PEM systems.

Like many fuel cell companies, Proton Motor is in transition from being a project based company to a product based company. Emerging in 1998 from Magnet Motor, an electric hybrid vehicle propulsion specialist, the company received in 2006 its first major cash injection, of £4.7M, through the flotation of its holding company Proton Power Systems on AIM. Interestingly, the restrictions on company literature imposed as a result of flotation (through a holding company) caused some confusion in the market about the company's future and are Proton are keen to emphasise that there has been no change in the company management or its work. Proton currently numbers 30 and will be moving into larger premises this year.

Proton is both a PEM stack manufacturer and a systems integrator. Their product offering has three strands, all based on the same stacks in 5, 10, 50 & 150 kW incarnations. The PM Basic range comprises stacks with only core balance of plant and is aimed at the OEM market. The PM Package range comprises a growing selection of off-the-shelf power plant, including products for forklifts and buses. Finally, Proton Motor engages in the development of turnkey solutions for new markets; with the intention that such solutions open new markets for PM basic and PM Package sales.

To date, Proton Motor has successfully completed 2 demonstration projects in buses and has another demonstration project underway. Next year they have another bus demonstration project planned which will incorporate their now market ready 50 kW PM Package. Proton have also completed one forklift trial, with another planned this year and are developing a 150 kW boat propulsion system for the City of Hamburg.

Nedstack, the Dutch PEM stack manufacturer, was spun-off from Akzo Nobel in 1998 to develop fuel cell technology developed over the preceding 9 years. The creation of the company is interesting in that it is best described as a 'research buyout', in which the core technical team bought back IP they had developed at Akzo Nobel; and worked outside-office-hours for 4 years to develop technology, before taking on regular staff in 2002. The company secured 4 million euros through venture capital in 2003 and is in negotiation for a further 12 million Euros in 2007. The staff currently number 50.

Nedstack's primary target market is the chlor-alkali industry, where substantial quantities of by-product hydrogen is generally flared or vented. The global market, at ultimate competitive prices, is estimated at 200M Euros, with individual chlor-alkali plants producing between 15 and 90 MW of by-product hydrogen. Nedstack, last week, switched on a 50 kW demonstration unit, the latest in a series of trials, at an Akzo Nobel plant in the Netherlands. The unit will run for 6-12 months to prove reliability, safety and control technologies. The balance of plant for the system is designed to accommodate multi-MW scale-up.

Nedstack are also supplying stacks to telecoms back-up power providers; and following demonstration of one 55 kW CHP system and two 7 kW telecoms back-up systems at the winter Olympics in February 2006, currently have 50 units in the field. Nedstack are able to provide units of 2-10 kW within 4 weeks of order.

Attending trade show such as the Hannover Fair, market watchers such as us always hope to spot emerging trends in the industry. These are rarely readily apparent, but if you talk to enough companies, you can assemble the facts and draw your own tentative conclusions. In this respect, and in many others, Hannover has been a great success.

So what trends have we observed? Five main themes appear:

First, tightly defined early markets are being identified and targeted to an extent not previously realised. A prime example of which is the forklift truck market - fuel cells have a great prospect for rivalling the existing battery-based forklift power systems as they present lower total costs of ownership than the incumbent technologies deployed and have quick refuelling (recharging conventional batteries is a lengthy process, and for each forklift you require two batteries for continuous operation, one in use, one recharging, and maybe even one dedicated charging unit). Also infrastructure requirements are relatively easy, as multiple forklifts can refuel be refuelled by one fuel supply point. Companies working in the fuel cell field have noticed this opportunity and are moving fast. Plug Power recently acquired Canadian company Cellex, who have specifically targeted the forklift market. Hydrogenics are also heavily involved. At Hannover, Julich unveiled their latest product, a forklift based on DMFC technology.

Another early market is that based on chlor-alkali production, using industrial by-product as a source of hydrogen. The chemicals industry currently vents by-product hydrogen in the atmosphere. Companies like Nedstack have spotted an opportunity, and realised that there is a sound business case for installing fuel cells on site in these industries, hence sidestepping the problems associated with installing complex and expensive hydrogen distribution systems.

Second, companies which are established players in other, non-fuel cell sectors are investing in developing fuel cell activities. At the Fair we heard from Dana Corporation, who have lengthy experience as a component manufacturer for the automotive industry, Cell Impact, who make heat exchanger plates, and Iwaki, who have decades of experience making pumps. These companies bring to the fuel cell industry experience in commercial practices, design, quality assurance and (perhaps most importantly) manufacturing capacity already in place. They are investing in developing fuel cell aspects to their business, with no prospects of turning a profit in the short term, in the belief that early losses will transform into later dividends.

Third, and linked to the point just made that OEM manufacturers are moving in to the fuel cell sector, the big fuel cell car developers seem to have moved out. Although they were conspicuous by their absence at the Fair, many people we spoke to suggested that this was in fact a positive thing: the big car companies have their fuel cell supply chain established, their partnerships made, and are now ready to embark upon early market preparation activities. As such, they no longer need to attend fuel cell industry shows, but instead will concentrate their efforts on attending the big mainstream automotive shows. Whilst it is unlikely that they will be seeking actual sales of their cars at this stage, they will be seeking column inches and editorials in advance of mass market penetration. Note that all this is highly contentious - the large car companies were exhibiting in force at the FC Expo in Tokyo in February. We'll be sure to ask them about their absence next time we meet them.

Fourth is the growing importance of regional (as opposed to central government or private company) fuel cell development efforts. At the Fair were representations from Ohio, South Carolina and Massachusetts from the US, as well as Piemonte from Italy. The importance of the German Lander to the fuel cell industry are also well known. Although there are commonalities to all of these regional efforts (notably technical agnosticism, and synergistic effects of clustering and critical mass such as those famously associated with the emergence of Silicon Valley in California), there are different approaches to the regionalisation of the hydrogen and fuel cell industry. The US regions tend to focus on attracting inward investment and job creation, whilst Piemonte is more concerned with establishing a hydrogen infrastructure. One of the principal benefits of regional industry organisation is that of local 'champions'. A number of Senators in the US work very hard to persuade companies to locate in their State, both behind the scenes and in public, and the companies we've spoken to that are involved in regional organisations are evidently very pleased to have their help.

Finally, there was a very strong representation from Russia at this year's show. The International Science and Technology Centre (ISTC) and New Energy Projects (NIC-NEP) are both strongly represented, with a combined staff presence at the Fair of over 30 people. NIC-NEP announced themselves to the international fuel cell in some considerable style last year with the purchase of around 34% of Plug Power's shares. They are now partnering with German company Fumatec, and are in the process of negotiating a partnership with UTC of the US. They have a clear, 4-stage development plan, focussed on different fuel cell applications, and they have significant funding with which to make it happen. NIC-NEP has significant technological experience, and is now making rapid inroads into the commercial side of the fuel cell sector through forming strategic partnerships.

And that brings us to the close of the Hannover Fair 2007. It has been a busy week (particularly towards the end), and always interesting. The quality of the exhibitions has been high, and as always with this event the organisation has been excellent (our thanks to Tobias Renz and his team). Fuel Cell Today will be back next year to review the conference again.