

Green Automobiles?

It appears that rumors of the death of the electric vehicle may be greatly exaggerated. In fact, automobile companies are in a race to market fuel-cell powered cars in the foreseeable future. Daimler Chrysler has set a deadline to sell a fuel-cell version by 2004 and the other automakers are not far behind. Batteries are also being considered for the powerplant in EVs; Toyota is planning shipment of their EVs powered by NiMH (manganese hydride) batteries while Nissan has a version using Li ion polymer batteries. Daimler Chrysler and Ford Motor Co. together have forged an alliance with Ballard Power Systems Inc. to develop automobile fuel-cell technology. Meanwhile General Motors Corporation and Toyota Motor Co. are discussing their own partnership to enter into the EV foray. Fuel-cell technology still must surmount many hurdles (both technological and economic) before consumers begin routinely seeing vehicles with no internal-combustion engines.

Hybrid Cars Fill the Void

In the meantime, gasoline and electric power have teamed up in an automobile product called Prius that is manufactured by Toyota Motor Co. The knock on electric cars — apart from the cost — is their limited range. Few buyers are willing to take frequent pit-stops for recharging the batteries. On the other hand, the Prius has no plug-in provision. It is a parallel hybrid that has two separate drivetrains, one traditional, and the other electric run by NiMH batteries. All electric charging is done by the gasoline-powered engine. The advantage of the hybrid approach is that when a gasoline engine is particularly inefficient — idling in traffic, for example — the car operates on the battery and the engine is shut off. The battery power supplements the small gasoline engine when major acceleration is needed. About 18,000 Priuses were built in 1998. The target is 40,000 per year in 2000, half for export to the U.S. and Europe. In Japan, it costs about \$18,400 and the U.S. price at this writing is undecided.

Whither the Chlor-Alkali Industry?

The chlor-alkali process, namely the electrolysis of brine to produce chlorine and sodium hydroxide, has been a veritable workhorse in the chemical industry. However, the next couple of years will be critical in deciding whether production in northern U.S. and Canada will become a casualty of the green revolution. This is because the consumption of chlorine by the paper and pulp industry has steadily declined since the mid-80s. On the other hand, this industry continues to use substantial amounts of caustic soda. The continued viability of northern U.S. and Canadian chlor-alkali plants will hinge on finding alternative homes for chlorine such as in drinking water-treatment and PVC manufacture.

Diode Lasers Lead the Way

The growth in the use of diode lasers in fiberoptic telecommunications is the optoelectronic success story of the 90s. The telecommunications laser market consists of two major applications: signal transmission and signal amplification.

The market for both types of laser applications has benefitted from the spectacular growth of fiberoptic networks. The growth in Internet traffic doubles every six months according to some estimates. This expanded capacity has been the driver for many optoelectronic innovations such as VCSELs. The vertical-cavity surface emitting laser (whose nomenclature is now evolving from VCSEL to simply VCL) is a revolutionary concept in the fabrication of semiconductor lasers. As the name implies, VCLs are processed vertically into the semiconductor wafer surface and light is emitted perpendicular to it. Edge-emitting laser diodes, in contrast, have their light propagation and emission parallel to the wafer surface. Unlike the latter case, no cleaving of the wafer or etching is needed for testing and measurement of VCLs. The resultant process automation capability is a major cost reducer leading to the possibility of VCL arrays. Technology is now in hand for transmission of 64 Gb, 1 Gb per channel x 64 VCLs in the total module. While these massively-parallel optical links are feasible with the conventional edge-emitting laser diodes, VCLs have the potential for achieving much lower cost per channel and per Gb of information transported. A final crucial advantage of VCLs relates to their beam profile which is circular rather than elliptical as in an edge-emitting laser. This has important consequences in interfacing the diode to a fiberoptic core. Other applications of laser diodes, especially related to applications requiring high power output (e.g., printers, medicine) will be featured in these magazine pages in the months ahead. Stay tuned.

Acquisitions and Spin-offs

Frenetic corporate developments have not been confined to the automotive industry that has witnessed several mega-mergers and acquisitions during the past couple of years. The semiconductor and analytical instruments industry has also seen its share of major changes the past few months. Varian Associates Inc. has taken a major step in completing its reorganization into three publicly traded companies. The instruments entity will be henceforth known as Varian Inc. Its semiconductor interests will be looked after by Varian Semiconductor Equipment Associates Inc. The original company will be renamed Varian Medical Systems Inc., and will supply products that include radiotherapy systems for cancer treatment. EG&G Inc. is buying the analytical instruments division of Perkin-Elmer Corp. including the Perkin-Elmer brand-name. Perkin-Elmer in turn changes its focus to genetic instrumentation and biotechnology under the name of PE Corp. Finally, Hewlett-Packard Co. is splitting into two entities to better focus on its core computer and printer business. The other entity (test/measurement products, medical equipment, electronic components, and chemical analysis) will be spun-off as an independent company. Interestingly, and to varying extent, the developments in each case have served to formally divest the parent company from the core business on which it was founded. The causal factors underpinning this trend and the bewildering changes in the corporate world deserve a fuller exploration that is planned for a future issue.

IndustryWatch was compiled by the Editor, Krishnan Rajeshwar and by Contributing Editor, Tetsuya Osaka.