

FRANCE PROPOSES MERGER OF NUCLEAR AND CONSUMER ELECTRONICS INDUSTRIES

The French government announced its intention on 18 December of breaking up the Thomson holding company: The intention is to separate its military and civil electronics divisions and to recombine Thomson Consumer Electronics with the Atomic Energy Commission's industrial arm. The reorganization is to take place during the first half of this year under the leadership of Jean Syrota, the chairman of CEA Industries and COGEMA, France's nuclear fuels company.

The reorganization will not involve or affect most of the CEA's research facilities, such as Saclay, and in fact the reasons for the merger of TCE with CEA Industries appear to be financial, not technical.

For a number of important reasons enumerated below, Thomson Consumer Electronics has been facing an increasingly desperate short-term cash crisis. The French nuclear industry, on the other hand, has been profitable. The reasons for that have to do with France's unwavering support for nuclear energy and its willingness to perform services for other countries, notably reprocessing of nuclear fuels, that hardly anybody else wants anything to do with.

The essential logic behind the merger, then, is that the French government plans to milk the CEA's profitable nuclear industries to support the country's long-range R&D program in consumer electronics, above all research on high-definition television. This anyway has been the conclusion drawn by both the international business press and the elite French press.

Why does the French government need to take profits from one state-owned company to support another state-owned company? Why not just provide direct government support for the ailing company? From *The Wall Street Journal* and the *Financial Times* to *Le Monde* and *Le Figaro*, the answer is the same: so as to circumvent European Community

regulations limiting state subsidies to industry.

In the very act of disputing that somewhat cynical interpretation of the reorganization, the French minister of industry appeared to confirm it. "Not at all," said Dominique Strauss-Kahn, denying that circumvention of European regulations was the ultimate goal. "The Treaty of Rome [of 1957, which established the European Communities] makes no distinction between public and private enterprises. Everything that is permitted for one is permitted for the other. [Thus, last year] when the German firm Siemens [took over and] used its resources to finance the losses of [the computer manufacturer] Nixdorf, Brussels [that is, the EC bureaucracy] raised no objection."

Last year the French government provided more than \$1 billion in emergency subsidies for TCE and Bull, the computer manufacturer, both of which were losing money. The EC traditionally was indulgent about such subsidies, where key high-tech industries were concerned. But in recent months it has hardened its position, amid the growing opinion that subsidies have tended to fragment the European market for computers, semiconductors and consumer electronics and have tended to promote an undesirable proliferation of companies and brand names.

Possible complementarities

The best case for the CEA-TCE merger may have to do with the respective life cycles of the nuclear and consumer electronics industries. The French nuclear industry, while profitable for now and the foreseeable future, faces a saturated domestic market for nuclear power plants and a very weak international market. In consumer electronics, in stark contrast, the general consensus in the industry worldwide is that current television is about to be replaced by something quite different and quite superior,

dubbed high-definition television, which will mean the replacement in the next generation of every television receiver in the world (see *PHYSICS TODAY*, March 1991, page 57 and April 1991, page 91). It may indeed make sense, then, to use funds generated in the nuclear industry, where new technology is not urgently needed, to support the creation of technology in consumer electronics, where it is urgently needed.

While synergies between the two industries are not obvious, it may also be the case that linking the two will facilitate a process in which some personnel in the nuclear industry are successfully retrained to work in electronics, others are encouraged to retire early, and nuclear engineers are generally replaced by solid-state physicists, materials scientists and computer and software experts.

All that said, the only specific synergy between the two industries in France that anybody has been able to cite is the CEA Laboratory of Electronics and Information Technology (LETI), which works on liquid-crystal flat-screen displays—a technology of great interest to the Thomson executives in charge of HDTV work.

Still, on the face of it, the synergies between commercial television and military electronics (radar, display technology of every kind, encryption and decryption, satellite transmission and so on) would appear to be more broadly impressive, and those synergies go by the by in the breakup of Thomson CSF and Thomson Consumer Electronics.

Sources of difficulty

Without doubt, the CEA-TCE merger was *not* the French government's preferred course of action. It was what economists call a second-best choice, taken in reaction to France's failure to find the support it hoped to get from Europe, both for television and semiconductor R&D.

In television, the French wanted

Europe to mandate introduction of D2-MAC, a transitional HDTV technology Thomson has developed with Philips and Bosch under the aegis of EUREKA for satellite transmission of wide-format images (PHYSICS TODAY, March 1990, page 67). But in Britain, which has the only well developed market for satellite-transmitted television in Europe, broadcasters and the government have resisted conversion to D2-MAC and its presumed successor, HD-MAC.

At a meeting on HDTV held in Brussels literally on the eve of the CEA-TCE merger, France had to settle on an agreement that requires only new satellite transmitters to use D2-MAC, starting only in 1995; and while both the European Parliament and the European Commission remain committed to HD-MAC as the ultimate standard for European television, the question of specific European financing for HDTV development was left to further negotiation.

France's aspirations have been equally thwarted in semiconductors. Here the hope was to build SGS-Thomson into one of the world's top-ranking manufacturers, working closely with Philips and Siemens in the framework of JESSI, the EUREKA organization created to develop sub-micron silicon chip technology, especially for applications in HDTV. But at the beginning of 1990 Siemens entered into a strategic alliance with

IBM to develop dynamic random access memories, replicating a similar and rather successful alliance that Siemens had forged with Toshiba. And then in late 1990 Philips withdrew from work on static random access memories, leaving the three-legged stool of JESSI badly disabled.

The Siemens-IBM agreement was not without benefits for France, in that the two companies have announced their intention of adding a \$700-million chip factory to the IBM complex at Corbeil-Essonnes, south-east of Paris, to manufacture 16 megabit DRAMs. And Philips too remains involved with France: Last November Philips and SGS-Thomson agreed to build a new research facility in Crolles, France, to develop logic chips, especially for HDTV.

But the fact remains that the major developments in semiconductors during the last two years, like the major developments in television, have left France on the sidelines. Siemens, not SGS-Thomson, has emerged as the major player in Europe, and Siemens's main priorities are the strategic alliance with IBM and a similar alliance with Toshiba, which covers reduced instruction set chips. In December, Siemens and IBM surprised the industry with the announcement that they had developed production prototypes for 64-megabit DRAMs—currently the cutting edge in circuit integration. —WILLIAM SWEET

was to produce chips as a means of improving manufacturing technology. But increasingly the emphasis has been on testing equipment and materials produced by US suppliers, who are represented by an organization known as Semi/Sematech. In addition, a greater share of the Sematech budget now takes the form of contracts to small companies to boost their R&D efforts. In 1988 external R&D contracts accounted for 53% of the budget, compared to 20% in 1989.

In addition to its R&D contracts, Sematech has funded research programs at 11 universities, known as Sematech Centers of Excellence, at about \$10 million annually. It also conducts joint projects with Sandia and Oak Ridge national laboratories. The Sandia project involves development of a software program that predicts system and component reliability. At Oak Ridge researchers are working on high-density plasma sources, which would yield higher etching rates and less damage during wafer processing.

But Sematech's strategy has a few weak spots, critics say. For one, in awarding contracts and testing equipment, the consortium must select which manufacturer and which machine to back; in so doing it may be giving the chosen few an unfair advantage. And even if Sematech is successful in helping a company improve its machine, nothing prevents that company from then selling to Japanese or European chip makers.

Mixed reviews

Sematech's performance to date has received widely different ratings from both insiders and outsiders. A review committee sponsored by Congress, the Advisory Council on Federal Participation in Sematech, gave the consortium generally good marks in a report released last year. The report characterized Sematech's main contributions to US industry as "indirect" and said benefits were "likely to come from the continued operation of commercially vigorous US-based manufacturing firms ready and able to exploit emerging technologies." The report also credited Sematech with improving communication between US chip makers and suppliers.

Although the council's report recommended that Congress continue Sematech's funding, it also questioned whether Sematech's goals rely too heavily on current-generation lithography techniques and pointed out that its move toward more external R&D activities has "exposed a division of interest among the consortium's participants."

SEMATECH PROPOSES NEW FIVE-YEAR RESEARCH PLAN

Sematech, the US semiconductor research consortium based in Austin, Texas, has proposed a new research plan, hoping to sustain the financial backing it now receives from the Federal government and its own members for an additional five years.

Founded in 1987, the consortium currently receives \$100 million per year—about half its budget—from the Department of Defense and another \$100 million from its 14 member companies. About 60% of its 380-person technical staff is drawn from member companies. Sematech's initial five-year charter expires at the end of this fiscal year (30 September), and next year the consortium is expected to receive \$80 million in Federal support—a 20% drop from fiscal 1992. But William J. Spencer, the president and CEO of Sematech, has said the consortium will remain in business even if the Federal government withdraws or decreases support.

The new five-year plan calls for the development of American-made equipment capable of handling 0.25-micron line widths by the end of 1994 and 0.18-micron technology by the end of 1996. The original five-year plan had a stated goal of a 0.35-micron capability, which the consortium says is close to being achieved.

Another major thrust of the new plan is to develop computer software to design and simulate chip-manufacturing equipment, so that the time between introduction of new generations of technology can be reduced by 25%. The software program would extend Sematech's current work on computer-aided chip design, with the intention of eventually modeling entire factories prior to construction.

Even before the new plan was announced, Sematech's research program had begun to evolve away from its original charter. As initially conceived the Sematech factory in Austin