UK manufacturing

Cambridge Instruments upturn

The British-based Cambridge Instrument Co. Ltd (CIC) appears successfully to have weathered the storm that almost drove it out of business three years ago. The latest half-yearly figures show the company to have made a remarkable return to profitability. The company now hopes to capture a major part of the future market for robotic vision systems and for manufacturing equipment for gallium arsenide semiconductor devices. An average annual loss of £3 million in the three years to 1979 has been converted to a pre-tax profit of £1 million on a £22.7 million turnover in the year ending 31 March, and profits for the first half of the current year are double those for the same period last year.

This dramatic change in the company's fortunes is attributed by people in the company to the management skills brought in by Terence J. Gooding, a "company doctor" from the United States who bought a substantial shareholding in 1979. As the Cambridge Scientific Instrument Company, CIC was in the early 1960s the first to produce a commercially viable scanning electron microscope, and this type of equipment remains the largest part of the business. In the late 1970s, however, the company appeared to some to be resting on its laurels and to have lost sight of some commercial realities; it produced a scanning electron microscope which was far in advance of its competitors in specification but which was also so expensive to build that it could not be sold profitably.

The lessons of that expensive error seem to have sunk in. Now, the company is concentrating on feeding back information about customers' requirements to the development teams and is once again increasing its share of the market for scanning microscopes. As an example of customer-inspired development, the company cites its new large-chamber microscopes, used in the semiconductor industry for the examination of large wafers. Now, a US factory is planned to cope with increased demand.

The company has also recently introduced new products in its range of electron-beam microfabricators. The new system, called "Chiprite", promises to double throughput in integrated circuit manufacture, with very high resolution. Together with what the company calls a "revolutionary" new integrated circuit checking system, CIC hopes by these means to expand its already large share of the market for semiconductor manufacturing equipment.

Robotic vision, on the other hand, seems to have arisen as a spin-off from the existing technology of image analysers. By the simple expedient of fitting these machines with zoom lenses, CIC finds itself able to apply existing software to the control of industrial production processes.

Another major market that CIC hopes to exploit is that for machinery for the manufacture of large crystals of gallium arsenide. This semiconductor has the substantial advantages over silicon that circuits can be packed more densely, partly because of the lower power dissipated, and that switching times are up to ten times faster.

Gallium arsenide is at present used largely in military applications, but civil applications are likely to flourish in the coming decade, in satellite television links for example. Gallium phosphide and indium phosphide, two other potentially important semiconductor materials, are also produced on CIC equipment. In this area, the company claims the lion's share even of the coveted Japanese market.

Tim Beardsley

Technology drive

Korea

South Korea is to launch an "aggressive drive" to upgrade its technology to international levels. Reporting to a recent technology promotion conference, chaired by President Chon Tu-hwan, the Science and Technology Minister Yi Chong-o described his ministry's new eleven-point plan, which includes the introduction of foreign technology on a "new scale", the promotion of joint research and development projects by Korean institutions and their foreign counterparts and the encouragement of the private sector to set up small and medium-sized technology-intensive corporations in advanced countries. An "active recruitment" programme will be launched by the ministry to encourage South Korean scientists now working abroad to return home and take part in the technology drive.

Vera Rich

Heavy ion research

France finds niche in GANIL

French heavy-ion physics took a step forward on 19 November when GANIL, the national heavy-ion accelerator at Caen in Normandy, produced its first beam. The accelerator's two principal cyclotrons were coupled and, with the help of a smaller injection cyclotron, accelerated a beam of argon ions to 1.8 GeV (45 MeV per nucleon). The first experiments will begin in January.

The decision to build GANIL (Grand Accelerateur National d'Ions Lourds) was taken in 1975 by the then industry minister, Michel d'Ornano. The project was delayed by an early lack of finance but the now completed facility remains within the initial cost estimates of about FF500 million at current prices. According to the director, M. Claude Detraz, the first experiments should start on 10 January; six months' worth of experiments have been planned.

According to its director, GANIL will carry physicists into an intermediate energy and intensity range of unique interest, making it in some ways complementary to other leading heavy-ion accelerators at Berkeley in California, Dubna (near Moscow) and Darmstadt. The Berkeley Bevalac accelerator is capable of accelerating the heaviest nuclei to energies of 1,800 MeV per nucleon. At such relativistic energies, according to current theories, the 3-quark bags that make up each of the protons and neutrons in the nucleus will, it is hoped, break up, leaving quark matter. At lower but still relativistic energies, collisions between heavy nuclei involve interactions between their constituent nucleons. Models for such collisions are comparatively well developed in West Germany.

The Gesellschaft für Schwerionenforschung (GSI) at Darmstadt in West Germany devotes much of its efforts to lower energy regimes, near the Coulomb barrier at 6–7 MeV per nucleon. In this regime, the nuclei undergoing collisions are left in internal equilibrium. By careful experimental arrangement, the heavy nuclei can be made either to rotate at very high frequency — thus allowing investigation of newly discovered angular momentum states — or to collide gently and form new superheavy elements, the most recent being element 109, which was first synthesized a few months ago. (The accelerator at Dubna is also devoted to such experiments.) Successful models have been established for collisions at these energies that treat the nuclei as "collective" bodies.

GANIL will concentrate on the energy regime between GSI and Dubna, producing sufficient intensity (10^{13} nuclei per second) for rare species such as neutron-rich nuclei far from stability to be investigated (such as ^{20}C). In the next six months, ions of neon, argon and krypton will be accelerated at all energies (the highest for Ar, for example, being 80 MeV per nucleon). Preliminary experiments at CERN in Geneva have given some idea of what may be expected. For instance, there seems to be a limit to the amount of linear momentum that can be transferred to the target nucleus as the beam energy is increased. The reasons for this phenomenon are not known. Such glimpses apart, however, GANIL will be taking nuclear physicists into unknown territory.

Philip Campbell

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