

Cornell has successfully transferred to B&W the technology of superconducting cavities: the development of sound fabrication practices and the control of parameters critical to cavity performance. B&W sent key team members representing project management as well as sheet metal forming, machining, and welding operations to Cornell

learn procedures. Cornell made available design drawings, a fabrication procedures document, and assembly fixtures. Final tuning, chemical treatment, and superconducting r.f. tests were carried out at Cornell.

The first tests of the two initial industrial prototype cavities reached accelerating fields of 6.5 MeV/m at quality factor (Q) values of 3×10^9 , both in excess of design parameters for the intended application in the Continuous Electron Beam Accelerator Facility (CEBAF) now under construction in Newport News, Virginia.

While the workhorse material niobium will continue to serve the generation of accelerators now under construction, the r.f. superconductivity community is keeping a watchful eye on the new high temperature superconductors. Radio-frequency properties of high quality crystals prepared by AT&T Bell Labs are being measured by the Cornell group. Results provide the first encouraging signs for possible microwave applications of the compound YBaCuO in future accelerators.

CHINA Key project *

The BEPC Beijing electron-positron collider, defined as a key national project by the government with a budget of 240 million yuan (about \$80 million), required special equipment, most of which called for advanced technologies.

*** On 16 October, first electron-positron beams in the new BEPC machine at Beijing collided at a total energy of 1.6 GeV.**

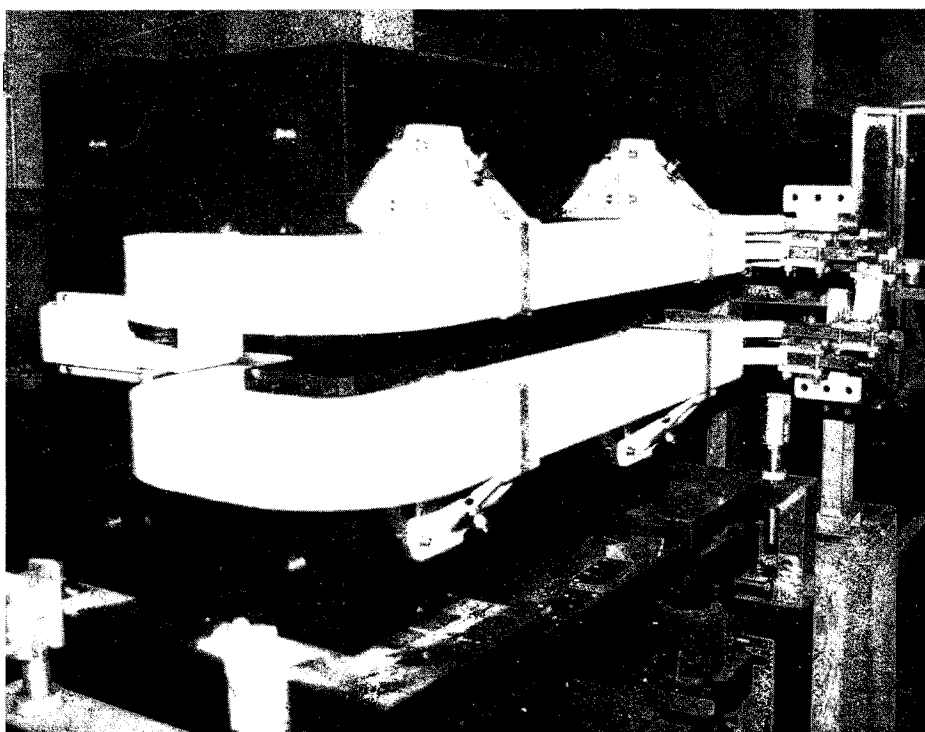
Cooperation between the Beijing Institute of High Energy Physics (IHEP) and industry was organized by a committee under the State Council, and went on to involve more than 200 enterprises all over China, covering machinery, electronics, precision instruments, radiofrequency, ultra-high vacuum, control systems, etc.

In recent years, under China's reformation and 'open door' policies, profits became a major goal of Chinese firms. Although the profits from BEPC might be less than in other areas, nevertheless firms were attracted to such a prestige project, hoping also that the technology would go on to be useful in other areas.

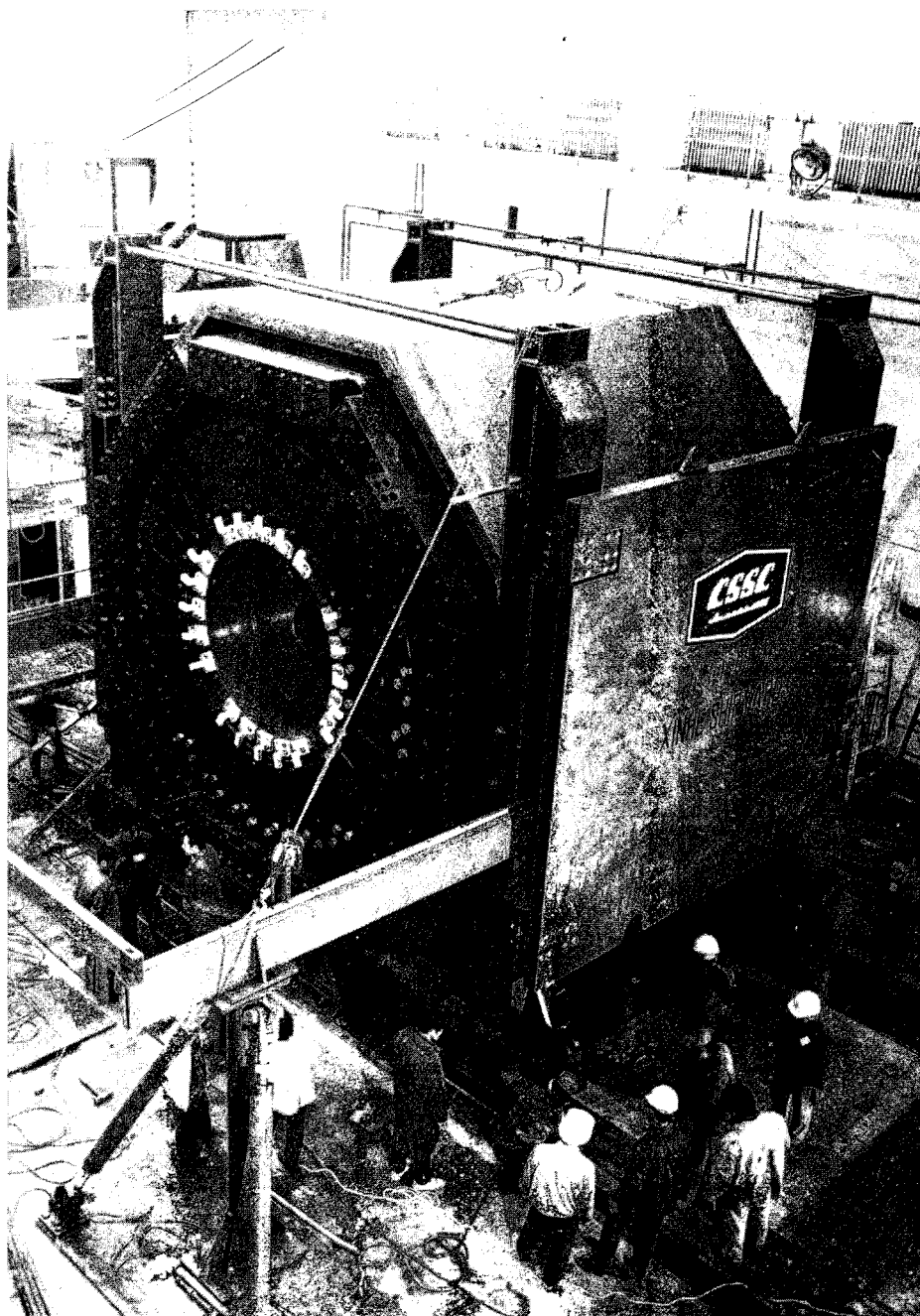
Sixteen S-band klystrons for the BEPC injector linac were manufactured in a factory in Hubei province in middle south China, far from the industrial centre. The upper limit of Chinese klystrons had been 16 MW, far below the 30 MW needed for BEPC. Thanks to cooperation with IHEP, the design power was reached with lifetimes estimated at 6000 hours.

Most of the BEPC dipole magnets were made in the Shanghai Pioneer electrical machinery plant, with its tradition of supplying accelerator laboratories. Plant managers were confident from the outset that the stringent specifications could be met, and skilled workers produced the precision die vital for magnet production.

The frame of the drift chamber for the BES Beijing Spectrometer (the detector being built to study the BEPC collisions) was manufactured in an aerospace factory in Guizhou province in south-west



This BEPC dipole magnet was made in the Shanghai Pioneer electrical machinery plant.



China, taking care of the precision machining of 40,000 4-mm holes with 0.05 mm accuracy.

The Shanghai aircraft factory looked after the frame of the BES shower counter, rolling a 40-mm thick aluminium plate into the 2.4 metre diameter inner barrel. A

machinery factory owned by the Shanghai petrochemical company welded the gap, and Jiannan shipyard, over a century old and one of the oldest manufacturing plants in China, lathed the outer circle.

The priority of the BES shower counter at the Shanghai aircraft fac-

tory was second only to assembly of MD-82 McDonnell-Douglas aircraft.

During all this work many experienced IHEP engineers, technicians and scientists went to the factories to give assistance and to supervise quality tests.

In parallel, IHEP's own workshop was upgraded. To provide the accelerating sections for the BEPC linac to the required specifications and within the allotted schedule called for a special production line. As well as meeting the deadlines, the workshop went on to supply equipment for the 50 MeV Accelerator Test Facility electron linac at Brookhaven in the US, and to construct the quadrupole magnets for the BEPC ring.

The iron yoke of the spectrometer to study the collisions at the BEPC Beijing electron-positron collider (now being commissioned) was made by Xinhe shipyard in Tianjin, north China.

NIKHEF Magnets for HERA

In 1981 what turned out to be a highly successful collaboration between the Dutch NIKHEF-H Laboratory and Dutch industry was set up to produce two types of superconducting correction elements – sextupole/quadrupole (S/Q) and dipole correction magnets – for the proton ring of the HERA electron-proton collider, now nearing completion at the German DESY Laboratory in Hamburg.

The HERA proton ring is equipped with superconducting dipole and quadrupole magnets (see page 21). Adjustment of the working