

storage rings (see CAT Newsletter, December 1988). Whereas the dipole magnets of the INDUS-I storage ring are made from forged steel blocks of very low carbon content; the other dipoles, quadrupole and sextupole magnets are made from precision punched CRGO (Cold Rolled Grain Oriented) steel laminations. For injection and extraction of beam in the rings, septum and kicker magnets are used. Because of the pulsed nature of their magnetic fields, these magnets require special materials which are also being developed indigenously.

Detailed design of the magnets for INDUS-I has been completed. The fabrication of these magnets is at various stages of completion. The excitation coils for all the magnets are under fabrication at CAT where facilities for winding, insulation and impregnation have been commissioned. Hollow copper conductors of various sizes upto 12 mm square with 7 mm diameter hole are being used for these coils. A setup for magnetic field mapping and instruments for field characterization are also being developed.

Vacuum System

The booster synchrotron vacuum envelope has been assembled with dummy pieces for equipments to be incorporated in the ring viz RF cavity, septum magnets etc. The envelope also has indigenously designed and fabricated bellow type vacuum chambers for the dipole segments. Various tests carried out on these segments show that they are adequately leaktight and rigid against atmospheric pressure. The envelope has been evacuated to 10^{-9} torr without the beam. This is adequate to get vacuum better than 10^{-7} torr in the actual ring with the circulating beam.

A large number of sputter ion pumps are required for these accelerators and other UHV applications at CAT. In order to meet this demand, sputter ion pumps, their power supplies and control units have been fabricated at CAT and a programme for production of these pumps is underway.

Control System

A programmable microprocessor based system to control a single power supply for feeding excitation current to a dipole magnet of the synchrotron has been developed. With this controller one can programme the output currents with 16 bit resolution and periodically monitor the same with 12 bit resolution. Further, a system for controlling and monitoring the pressure in the accelerator has been completed. It consists of a console, an equipment interface unit (EIU), a latch and a relay unit. A PC/XT and a colour monitor form the console. The software, developed in 'C' language, gets the status of different units from EIU and displays it on the monitor.

Power Supplies

A prototype power supply has been developed to feed a single dipole magnet of the synchrotron. Its current can be ramped from 30 A to 1000 A in 150ms at 1 Hz. Further, during the ramping down, the magnet current is reduced to 30 A within a time of the order of 200 ms so that the next injection cycle can start. This is achieved by feeding back the stored energy in the magnet to the AC mains using thyristor bridges in inversion mode. The power supply is rated to give regulation and long term stability of 0.01%. It has several special sub-systems viz. transistorised active filter, water cooled power transformer and Zeranin current shunt with very low temperature coefficient of resistance.

The other developments include a 400 VA, 20 kHz switched mode power supply for the filament of the 80 kV electron gun and a 5 kVA, 5kHz class A SCR inverter developed for use in x-ray power supplies and DC industrial accelerators.

CONSTRUCTION PROGRAMME

The construction group at CAT looks after civil, public health, electrical, air-conditioning, ventilation and maintenance works of the entire complex.

During 1989 the work on the construction of Laser Fusion Laboratory, Chemical cleaning and Glass Blowing Laboratory and the Prototyp Production Unit progressed very well and all these buildings are at various stages of completion. Several other development works in laboratory area notably development of approach roads has also been taken up. The colony now has 110 more houses of various categories. The school building has been completed and the school will soon be shifted to it from its present location. Construction of several other facilities like welfare centre, shopping centre has also been completed. Further, subsequent to the clearance of INDUS-I building design, work on this and the central airconditioning plant building has been started.

COVER: *A view of the vacuum envelope of the booster synchrotron.*