Radiation monitoring of area around the accelerator building when beam injection is turned on has confirmed the adequacy of radiation safety measures adopted. In the meantime, assembly of magnets in the ring, and vacuum envelope of Indus-1 synchrotron radiation source (SRS) is in progress.

15 kV/ 50 mA dual anode soft x-ray source power supply for BARC

The dual anode soft x-ray source power supply, developed by the power supplies group of the Accelerator programme, has been successfully commissioned at Metallurgy Division, BARC on Nov 30, 1994. The unit consists of a 0 to 15 kV, positive polarity, high voltage power supply with 0.05% stability at full load and a dual port; and a current controlled DC power supply with emission stabilisation for filaments I and II.

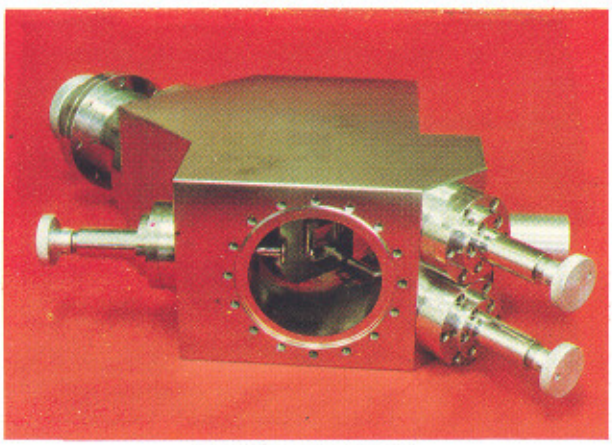
The primary controlled, thyristor based high voltage (HV) power supply has features like slow start, over voltage/over current protection, short circuit protection, and regulation against a wide range of load and line variations. The HV transformer is fed through phase controlled antiparallel thyristors on primary side and the secondary is rectified and filtered to give a variable HV dc output. The HV is connected to the X-ray tube through an indigenously developed 20 kV coaxial connector. A damping resistor of 10 kΩ at the output of this power supply prevents the propagation of dangerous HV transients towards control electronics. In addition to this, the damping coils and surge protection devices across the current sensing shunt and the output port of HV divider ensure a great deal of safety to control circuit. The on/off operation of HV is accomplished by two soft-touch momentary switches on the front panel. Initially the firing pulses are inhibited. With HV on command, first the contactor gets on and then, after a delay of about a second, the control circuit is enabled and firing pulses are released in a slow start manner. In case of fault detection HV is immediately put off and it can be restarted by a reset switch after a healthy condition is restored.

The dual filament power supplies, rated for 5V/8A, are series regulated to ensure stable emission current. The maximum limit on the filament heating current can be set by a front panel potentiometer. The emission current can be set by a digital reference circuit with the help of two up and down press switches on the front panel. With HV supply off, the filament current is regulated at its maximum set value. The moment HV is applied to anode, emission stabilising loop is activated by sensing the emission current. Now the filament current is controlled by this loop as per the requirement of emission current. Both the filaments can be selected simultaneously or alternatively by a mechanically interlocked latching type gang switch on the front panel. A maximum upto 25 mA of emission can be taken from each filament at a time. Both the power supplies have interlocking with water flow and vacuum status. The unit operates on single phase, 230 V, 50 Hz mains.

INFRASTRUCTURAL DEVELOPMENT

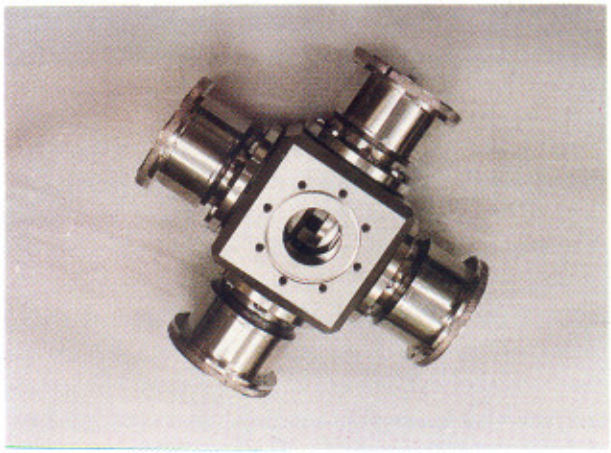
Beam line components

The Workshop has developed several beam line components which are essential for use in the various beam lines of Indus-1 and Indus-2. All these components are UHV compatible and can be baked. Laser alignment system, beam slit assembly and beam aperture control assembly are some of the important devices developed and these are briefly outlined below:

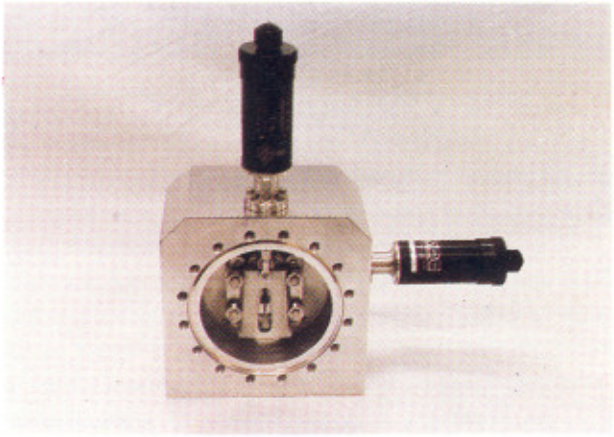


Laser alignment system.

Laser Alignment System: The length of a typical beam line of Indus-1 is about 12m to 15m long. The entire beam line axis with all its components has to be in alignment with the axis of the synchrotron radiation beam emerging from the bending magnet chamber port of the storage ring. For this purpose a laser alignment system which uses a helium neon laser in place of SR beam has been developed. The system consists of a mirror placed at an angle of 45^{o} which can be placed on the axis of the beam or completely withdrawn to clear the beam path when required. A He-Ne laser positioned perpendicular to the beam axis is reflected in the line of the beam by a mirror after its axis has been precisely adjusted to coincide with that of SR beam. The entire beam line can be aligned using the He-Ne laser. All the movements are bellow sealed to ensure UHV compatibility.



Beam aperture assembly



Beam slit assembly.

Beam aperture assembly: The beam aperture assembly is required in the beam lines in order to prevent stray light entering into beam line. The beam aperture can be adjusted to the precise value required by positioning four shutters at right angles to each other and operating each shutter by a screwed shaft using highly flexible S S bellows for vacuum sealing. The aperture opening can be adjusted to obtain any size required from zero to a maximum size of 35mm x 35mm.

Beam slit assembly: The beam slit assembly is a precision device which is essential to control precisely the beam size before it enters components like monochromator in the beam line in order to maintain the desired resolution. The slit assembly consists of spring loaded shutters which are opened by the operation of a UHV compatible micrometer through a wedge and roller mechanism. Two pairs of shutters are positioned at right angles to each other to control the slit size independently in both the axis. A minimum change in size of 2 μm is possible in a range of zero to a maximum size of 2mm x 2mm.

New machinery installed

A large horizontal boring machine model COOPER CBH 100 has been commissioned in the workshop. The machine with a spindle diameter of 100 mm and a table size of 1200 mm x 1200 mm can hold jobs of weight upto 5 Tonnes. The machine is manually operated and is fitted with a 3 axis Heidenbein make DRO. The machine will be used in machining large jobs like magnets, RF cavities, required for the Accelerator Programme.

Optical polishing

A major concern in polishing of optical surfaces is to reduce surface microroughness since it causes light scattering. With extended-pitch polishing one can get better results than with conventional slurry-based polishing, but the residual microroughness (15 Å for fused silica) is still quite high for reflecting optics for VUV, and for applications such as laser-gyro. Using a technique called "bowl feed technique", residual microroughness as low as 6to7Å for fused silica substrate has now been obtained.

Polishing of nonlinear optical materials and laser rods is also being carried out. $LiNbO_3$ has been polished to good surface figure and finish using indium polisher and diamond paste. A suitable alternative matching material for use in the jig for Nd:YAG rod polishing has also been found.

Computer facility

First nodal computer centre has started operating in the Accelerator Development Laboratory (ADL). This centre has an ANUPAM machine in addition to the System-E and System-F (RISC R3000 based machines) along with the terminals, laser printer, high speed dot matrix printer and a line printer. All the machines in the centre are on a network CATNET and are operational round-the-clock. About 20 PC's in the ADL have been hooked on CATNET. The network is also being extended to the Laser R&D Block-A and Laser R&D Block-D.

Construction activity

The construction of infrastructural facilities such as the Library, Computer and Administration blocks is progressing well. The unique architectural features of these buildings pose lot of constructional challenges particularly with the inter-dependency of activities related to electrical and A/C works. It is noteworthy that the Library and Computer buildings house RCC supply- and return-air ducts close to floor level.

The building for Medical Centre has been completed and the extension of the school building is nearing completion. Sixty-six new housing units have been handed over during the last six months.