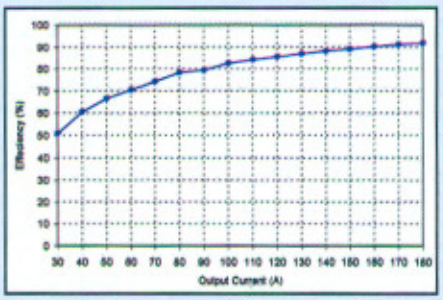
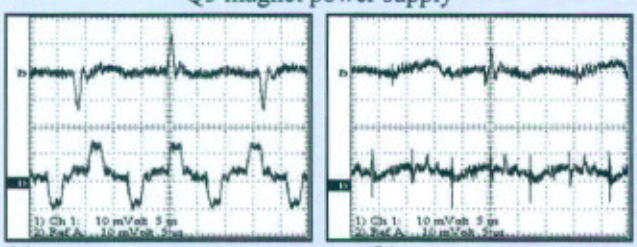


Fig.A.3.2 Conversion efficiency of Indus-2 Q3 magnet power supply



(a) (b)

Fig. A.3.3 CM current injection observed on (a) before, and, (b) after cancellation. Upper traces are for I_o=180A and Lower traces for I_o=40A

(Contributed by M.B.Borage.S.R.Tiwari; sunil@cat.ernet.in)

A.4 Laser profile cutting for quadrupole magnets of Indus-2

Particle accelerators utilize different types of magnets in limited number. Quite often prototype magnets have to be developed and tested before finalizing the design. It is not always practical to make die and punch for developing these magnets. High precision profile cutting of metal sheets could be exploited to have flexibility in magnet design and its prototype development. Indigenously developed high power CW CO_2 laser was utilized for profile cutting of 1200 numbers of 1.5mm thick steel sheets for the fabrication of Quadrupole magnets of Indus-2. Dimensional accuracy of dross-free profile cut was within ±50μm limited by the CNC workstation and the surface roughness of the cut edge was less than 5μm.

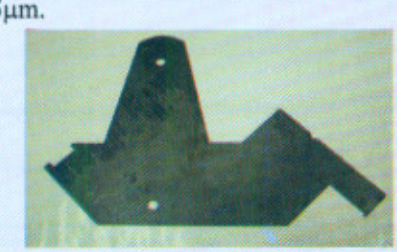


Fig.A.4.1 Laser cut-profile

(Contributed by: Dr. AK Nath; aknath@cat.ernet.in)

A.5 Open-type quadrupole magnets for Indus-2

The open-type quadrupole magnets for Indus-2 are slowly ramped from 3.84T/m to 16T/m in 300 seconds and require stringent magnetic field quality. In these magnets both of the outer vertical sections of the steel are removed in order to take out the emerging synchrotron radiation beam lines, in the region immediately adjacent to the main dipole magnets. In addition, a group of magnets, which are powered by a single power supply, need to be uniform. To meet these specifications, the critical features (pole aperture diameter and symmetry of poles) of the magnet geometry were precisely controlled. The magnet cores were made from 1.5mm thick decarburized steel sheets and their excitation coils were made from hollow oxygen free copper conductors. The core is an assembly of four pole pieces, which are made by laser-cut laminations, using 1kW-CO_2 laser and consolidated into laminated core by welding.

Fig. A.5.1 Open- type quadrupole magnet assembly

The pole tip profile was machined to finish by wire-EDM. The excitation coils were made using a semi-automatic coil-winding machine. The wound coils were consolidated with vacuum pressure impregnation followed by epoxy encapsulation for ground insulation. All open type quadrupole magnet cores and coils have been made successfully and the variation in magnet core geometries are within ± 0.05mm. The variation in the electrical parameters among the coils is within 3%. Few magnet assemblies (assembly of magnet core with coils) were completed and the balance magnet-assembly work is in progress.

(Contributed by: K. Sreeramulu; sreeram@cat.ernet.in)

A.6 Beam profile monitor for Indus-2

A fluorescent screen beam profile monitor (BPM) has been designed and fabricated for electron storage ring Indus-2. This monitor is an interceptive device, which serves as useful tuning aid during the initial commissioning stage or re-commissioning after a major shutdown of Indus-2 ring. Critical design features of the monitor are: minimum beam coupling impedance, UHV compatibility, uniform internal