

ACCELERATOR PROGRAM

A.1 Magnetic Measurements on Indus-2 Quadrupole Magnets

The Indus-2 storage ring consists of total 72-quadrupole magnets, out of which 40 are closed type and 32 are open type. Quadrupole magnets have been tested using the rotating coil bench model 692, constructed by Danfysik (obtained on loan basis from ESRF, France). Open type quadrupole magnets are divided into 2 groups (Q3 and Q4, 16 magnets in each group). A pair of open type quadrupole magnets (Q3 family) will be energized in series by one power supply. The entire 16 open type quadrupole magnet (Q4 family) will be energized by a single power supply. Results of magnetic measurements of Q3 and Q4 type magnets are presented here.

The maximum specified gradient of 16 T/m is achieved at a current level of 166 A. The required current is 2.2% higher with respect to the ideal value. This is due to the saturation in the steel. As the non-linearity is low, tracking of the magnets will be easier during the ramping and will also help in minimizing tune excursion during ramping.

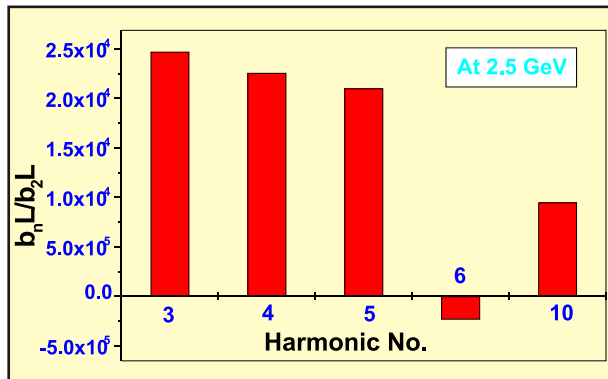


Fig.A.1.1 Harmonic contents in Q4 type Quadrupole Magnet.

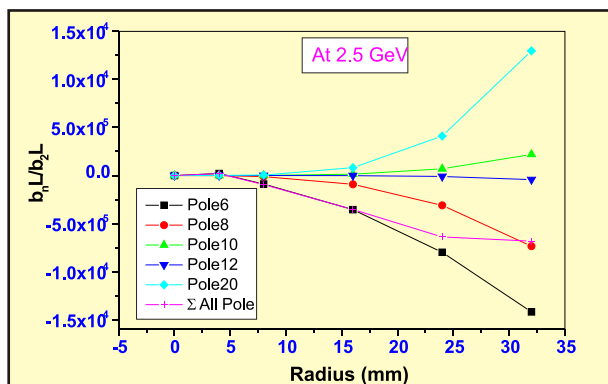


Fig.A.1.2 Transverse field quality of Q3 type magnet

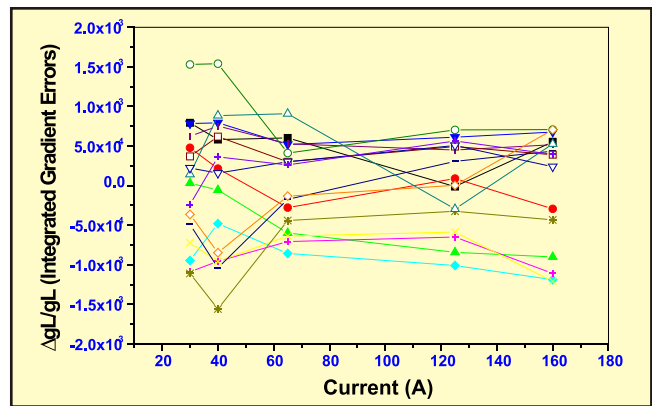


Fig.A.1.3 ΔgL/gL plot at various excitation levels for Q4 type Quadrupole Magnets.

Fig.A.1.1 shows the strength of higher order multi-poles, which are low and meet the beam dynamics requirements. The strength of the higher order multi-poles does not change significantly with excitation level. Fig.A.1.2 shows the transverse field quality in the useful aperture of the magnet. Fig.A.1.3 shows the relative variation in the integrated gradient of all the magnets in Q4 family.

(Contributed by: Kailash Ruwali; ruwali@cat.ernet.in)

A.2 Commissioning of 10 MeV, 10kW Electron Linac for Irradiation of Food and Medical Products

10MeV, 10kW electron linear accelerator for irradiation of food and medical products is setup in CAT. The LINAC structure is received from Russia whereas all the subsystems like microwave system, control system, power supplies, controls and safety system have been developed inhouse. The parameters and test results of trial run are shown in Table below. After getting approval from AERB, commissioning of this accelerator was started and beam current of 370mA was successfully obtained at 10MeV beam energy. Each subsystem was first tested individually and conditioning of the LINAC structure was done slowly by increasing the microwave power from low level. The 6MW peak power S-Band microwave system based on multi beam klystron (MBK) is developed at CAT to energize the LINAC structure and has worked satisfactorily. An electron gun modulator derived from the klystron modulator output is used to energize the 50kV electron gun of triode configuration. Other subsystems like supervisory control system, vacuum system,