

PRESENT STATUS OF THE SECTOR MAGNETS  
OF THE RIKEN SSC

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Abstract

Measurements were made on the excitation characteristics, detailed field distributions with the two sector magnets and the magnetic fields produced by some trim coils at the factory of Sumitomo Heavy Industries (SHI) in August 1982. It was found that the sector magnets have a good performance in accordance with the design and do not require a serious modification.

Fabrication of the sector magnets started in 1981. The first and the second ones of the four sector magnets were completed in March and July 1982 one by one. The remaining two sector magnets are currently being manufactured by SHI. The detailed design study on the sector magnet is described in the previous report<sup>1)</sup> Measurements on the mechanical accuracies of the sector magnets and their mechanical deformation due to the magnetic force<sup>2)</sup> were made by the manufacturer. The fabrication and assembly accuracies that have been achieved for the two sector magnets are as follows:

Gap distance	0.04 mm	Sector angle	0.006 deg
Shaping of pole edge	0.13 mm	Parallel setting of	1 mm
Flatness of pole face	0.02 mm	trim-coil assembly	

Fabrication and assembly of the trim coils were successfully completed. We made a test of rise in heat by supplying a current of 680 Amps to a trim coil and found that it causes no serious problem at all. Figure 1 shows a photograph of a trim coil being coated with  $Al_2O_3$  using a fused-frash method.

The magnetic field of 15.5 kG, which is a maximum of base fields required for the RIKEN SSC, was achieved with the magnetomotive force of  $1.28 \times 10^5$  AT. The excitation characteristics of the sector magnet are shown in Fig. 2. The measured values were found to agree with calculations within 1 %. Detailed field measurements for orbit calculations were carried out with the two sector magnets that were set perpendicular to each other<sup>3)</sup>. Typical results of the base field distribution along the hill center-line are shown in Fig. 3. Figure 4 shows the angles obtained by the effective boundaries of the magnetic field distribution. Optimization of the trim coils' currents for the isochronous field is performed using these field distributions together with the trim coils' fields. Orbit calculations are currently being made in detail.

The whole sector magnets will be delivered at the end of 1983. The complete field measurements with the whole magnets system are scheduled to start in the beginning of 1984.

References

- 1) S. Motonaga et al.: RIKEN Accel. Prog. Rep., 15, 162 (1981); Proc. 9th Int. Conf. on Cyclotrons and their Applications, p.379 (1981)
- 2) H. Saito et al.: "Distortion Measurements for the RIKEN SSC Magnet", this conference.
- 3) H. Takebe et al.: "Magnetic Field Measuring System for the RIKEN SSC Sector Magnet", this conference.

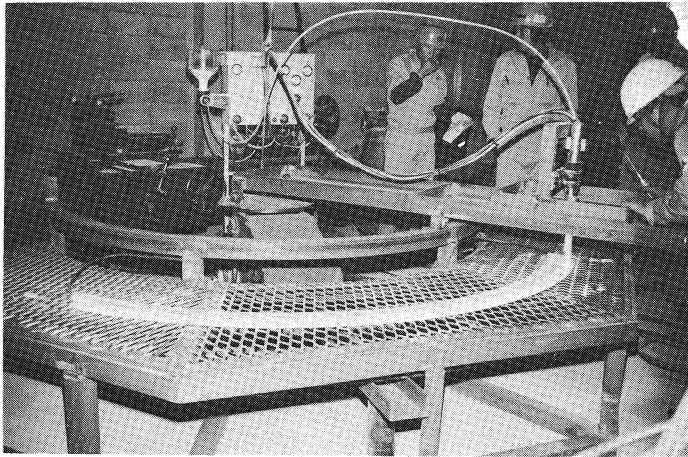


Fig. 1. Trim coil being coated with  $Al_2O_3$ .

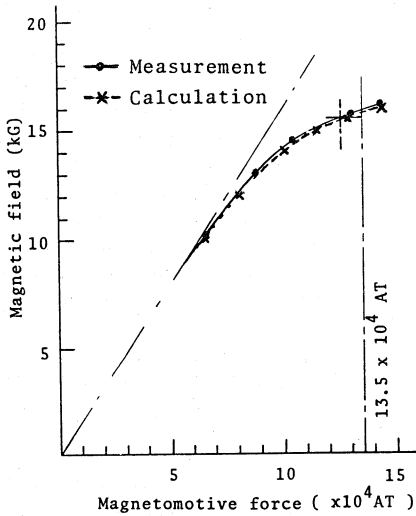


Fig. 2. Excitation characteristics of the sector magnet.

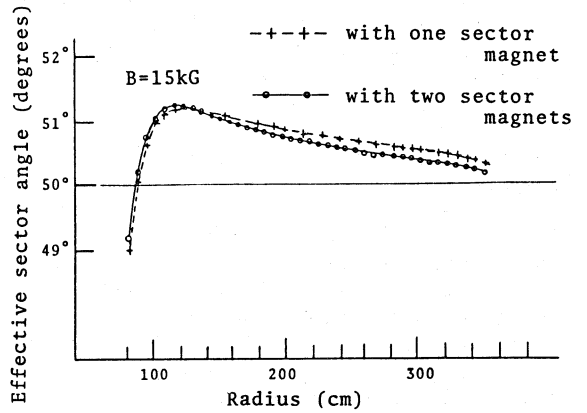


Fig. 3. Changes of effective sector angles along the radius.

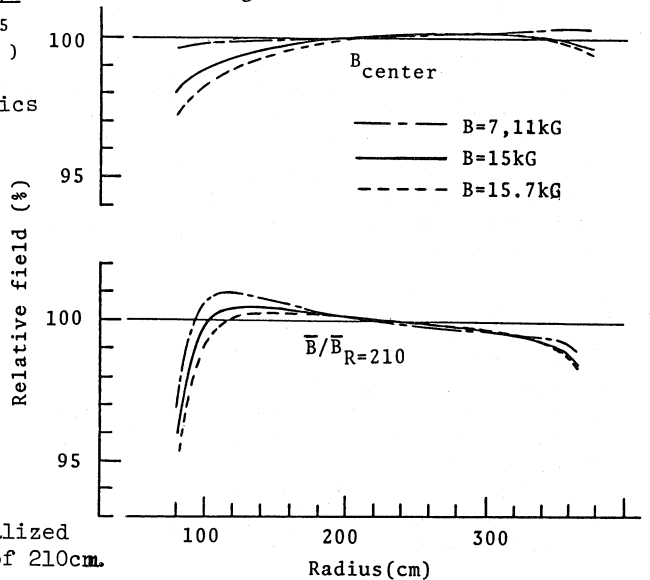


Fig. 4. Radial distributions of the magnetic field normalized to the field value at a radius of 210cm.