Magnet Mass Production and Field Measurements Results for TPS

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Abstract

The three-dimensional TOSCA code was used to design the magnetic geometry and pole profile for the magnets of storage ring and booster ring in the 3-GeV Taiwan Photon Source (TPS). This work was performed by NSRRC, however, the magnet mass productions were contract to BSL. The magnets were manufactured by CNC and wire cut machine and the mechanical tolerance is 20μm. The characteristics of the magnetic fields were measured with a fixed-angle Hall probes and the rotating-coil systems to verify the field quality of magnet. The field centers of the magnets were shimmed by shim's block according to the mechanical measurement and the field measurement. Consequently, the field center can be controlled within 10μm and the magnets will be aligned on the girder with precisely machined rails. The magnets have no provision for adjustment on the girder. The features of the main field and homogeneity of these magnets are described and analysed to reveal the satisfactory magnetic performance. The statistics of the magnet quality and the trade-off between the construction precision and the tolerance as well as the relative issues of the magnet construction will be discussed herein.