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SSRF Shanghai Synchrotron Radiation Facility

THE ONLINE ADJUSTMENT MECHANISM FOR KICKER MAGNET

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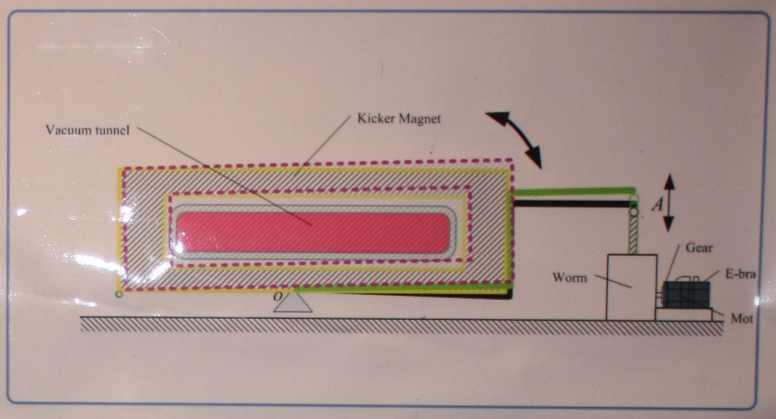
Introduction

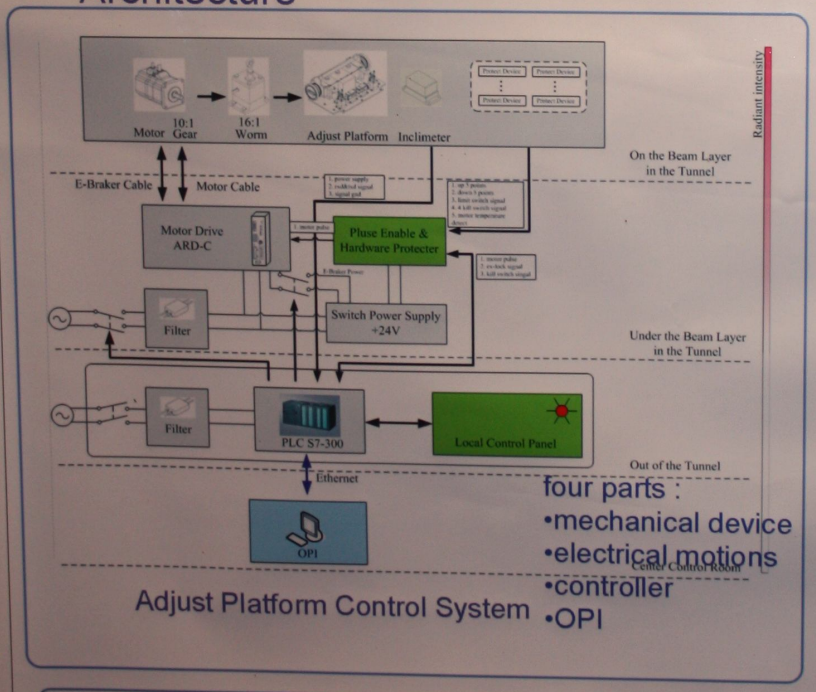
The kicker magnet adjustment mechanism in SSRF is to improve the efficiency of injection by changing the magnet real-time, especially in the top-up mode. The mechanism mainly consists of Programmable logic controller (PLC), stepper motor, reducer, worm and transmission. PLC controls the stepper motors for adjusting the azimuth of the magnet, monitors and regulates the magnet with inclinometer sensor. This paper mainly introduces related mechanical structure and electric control designs for this device.

Mechanical structure



Feedback control and software design

Architecture



Adjust Platform Control System

four parts :
- mechanical device
- electrical motions
- controller
- OPI

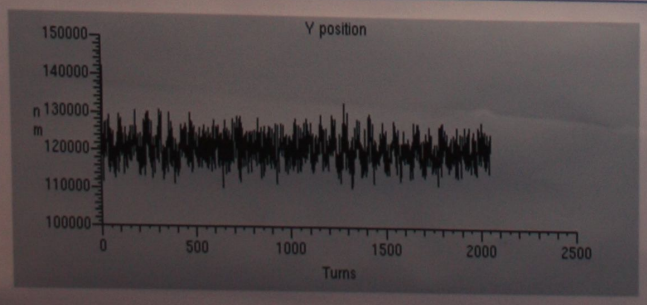
Feedback control

- Position feedback is derived from inclinometer through optical fiber through which PLC's SM340 module can acquire the high-precision position information.
- The controller based on SIEMENS S7-300 PLC has so fast scanning speed and the adjusting range is so small that it can use close-loop control technology while the inclinometer is not very fast. During motors keep moving, PLC judges continuously whether motors have got to the destination position set by user through comparison between destination angle and current angle from inclinometer.

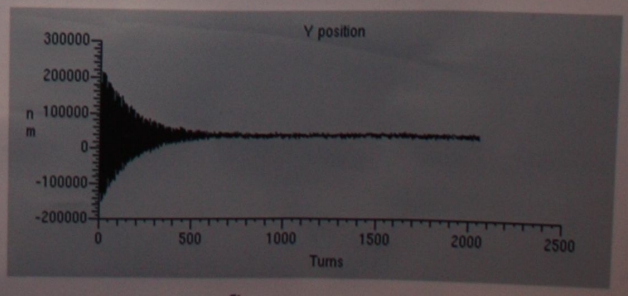
Software design

- one is based on PLC
- the other is based on EPICS.

Result



before



after

By using this device to tilt the magnet, the rms value of the first 200 laps Track is less than ±4μm, which one can reached ±100μm before tilt optimized.