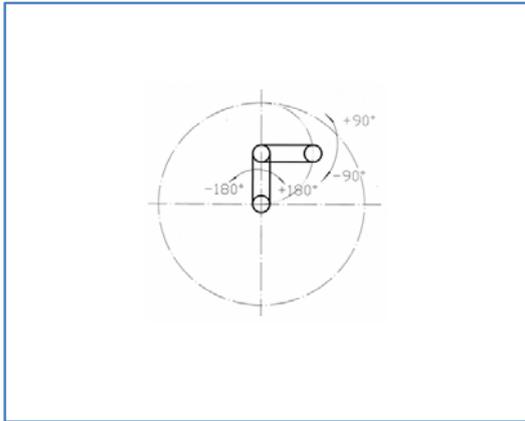


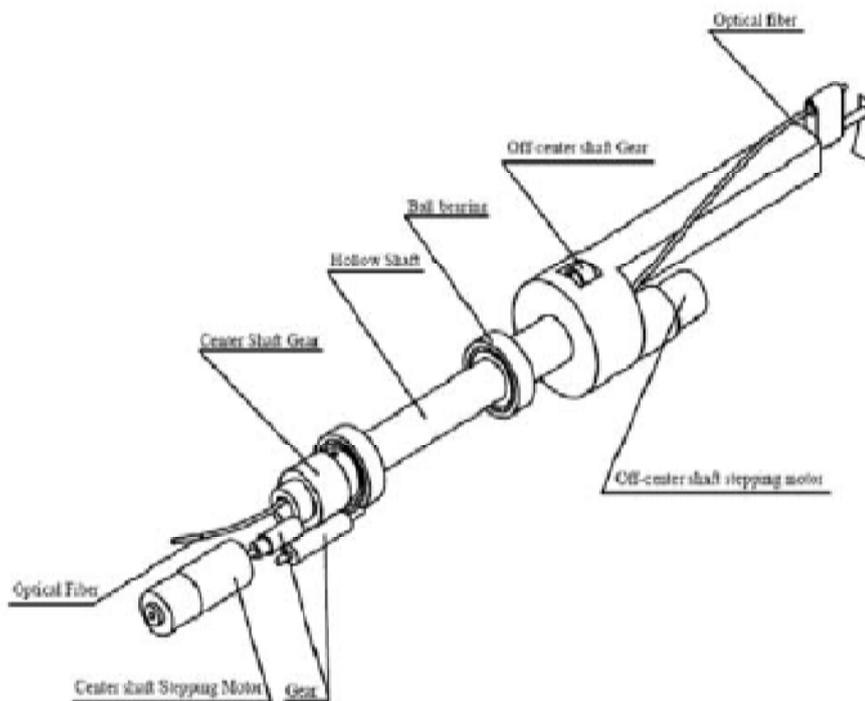
## Progress of Fiber Positioner

Design:

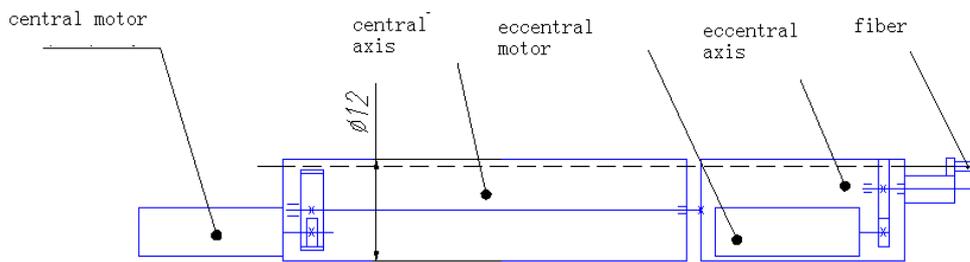
Principle of fiber positioner movement : Theta-theta



The principle of fiber positioner

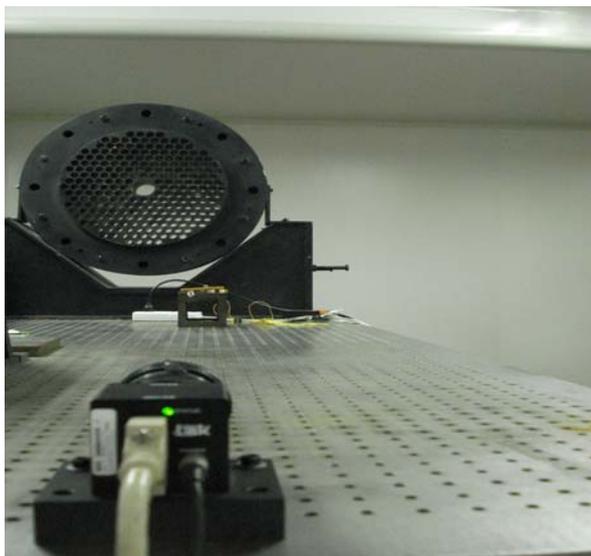
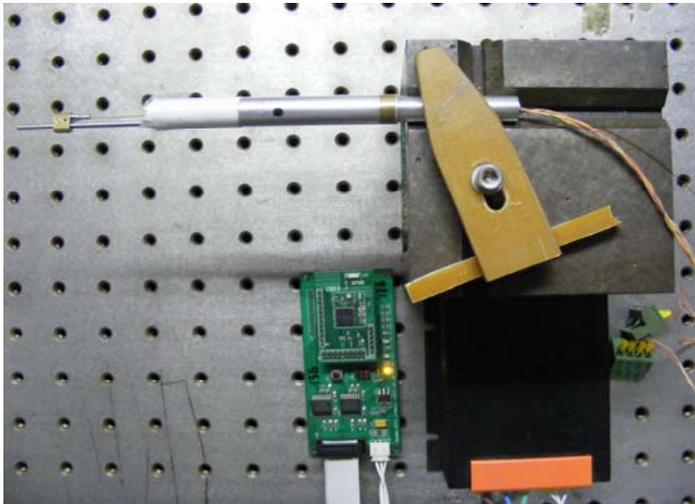


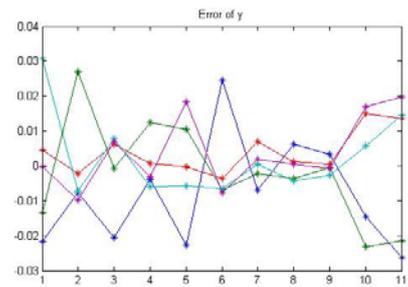
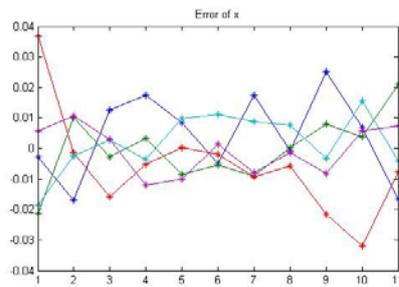
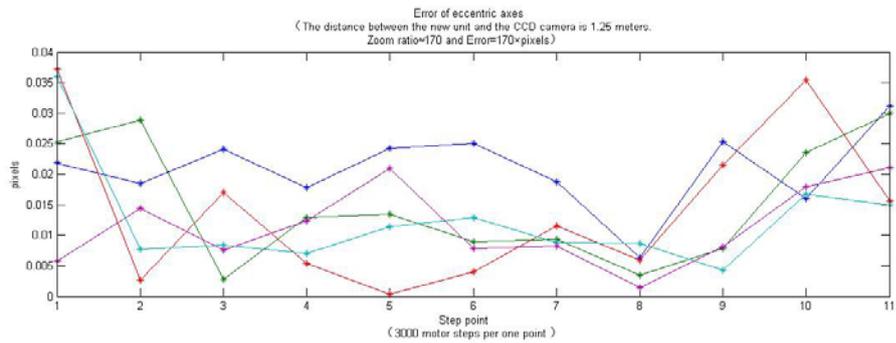
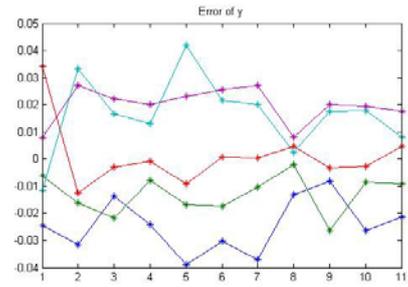
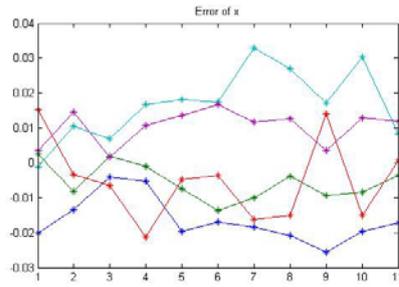
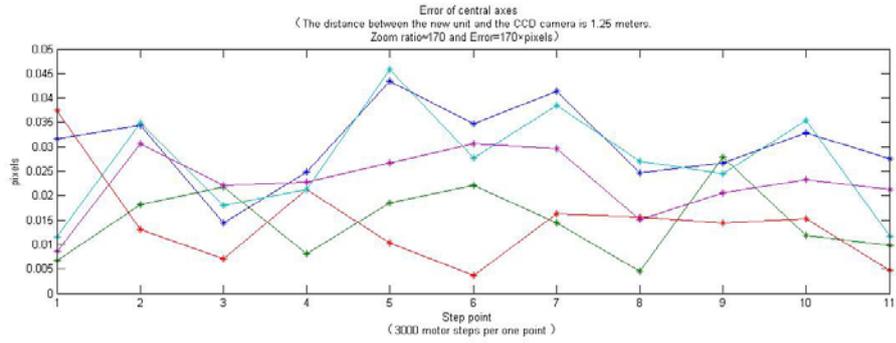
The design of positioner for LAMOST, size is  $\Phi 25.5\text{mm}$ , patrol range is  $\Phi 33\text{mm}$



The design of positioner for BIGBOSS, size is  $\varnothing 12\text{mm}$ , patrol range is  $\varnothing 14.4\text{mm}$

After LAMOST we have done three size of fiber positioner,  $\varnothing 15\text{mm}$ ,  $\varnothing 10\text{mm}$ ,  $\varnothing 12\text{mm}$ .  $\varnothing 15\text{mm}$  positioner is similar as that of LAMOST,  $\varnothing 10\text{mm}$   $\varnothing 12\text{mm}$  is the same style: two motors are placed on same line. Following pictures are the testing of  $\varnothing 12\text{mm}$  and the result.





(Normally, the accuracy of CCD is 5% of pixel)

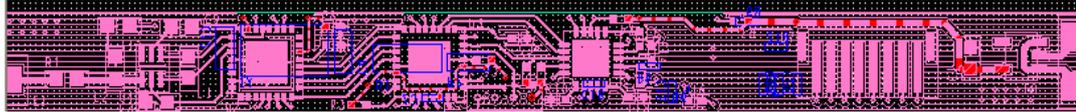
This tests the repeatability of positioner, but the accuracy will rely on the feedback of fiber view CCD. In LAMOST, the accuracy of fiber positioner is rely on the calibration because the focal plate is too large to measure quickly.

Repositioning time: 12mm positioner use 6mm motor which speed much high than the motor at LAMOST fiber positioner, it need only 2 minutes from end to end.

Control system:

There have two kinds of control styles for LAMOST, wire and wireless. Wire is stable and little heat generation, but it is very difficult to assembly, wireless system had much more disturbance and more heat generation on the focal plate, LAMOST selected the wireless. BIGBOSS has more density of fiber that LAMOST, that means wire system will be more difficult and wireless will have more disturbances, we recommend wireless system but still need middle-term experience.

The size of control unit on the positioner should much more narrow than that of LAMOST, following picture is the new design of control unit. The width is 7mm, 4 layers.



**The accuracy of fiber is determined by fiber positioner, focal plate, guiding system , CCD view camera.**

**Power and Control distribution**

25kw power source is needed.

**Fabrication plan**

At least 1.5 year was needed to fabrication and testing all 5000 positioner, but determine the design and pre-research and test perhaps need more times.