

# PLS Alignment and Other Activities

(Y. C. KIM, K. W. SEO, B. I. MOON, M. S. HWANG, C. W. CHUNG)

## Abstract

This poster presents the PLS survey and alignment results of last year. And we took part in the national science project, KSTAR (Korea Superconducting Tokamak Advanced Research). The alignment states of tokomak assembly with high precision will be showed also.

## Storage ring deformation and accelerator components alignment

The total amounts of storage ring tunnel floor deformation have reached 34 mm (hill to valley) for 14 years after the first measuring the elevation survey as shown in Figure 1. The ground motion changes (2 mm per year) were stable during 6 years from 1999 but it became unstable situation during recent 3 years.

# Uneven settlement of PLS storage ring tunnel

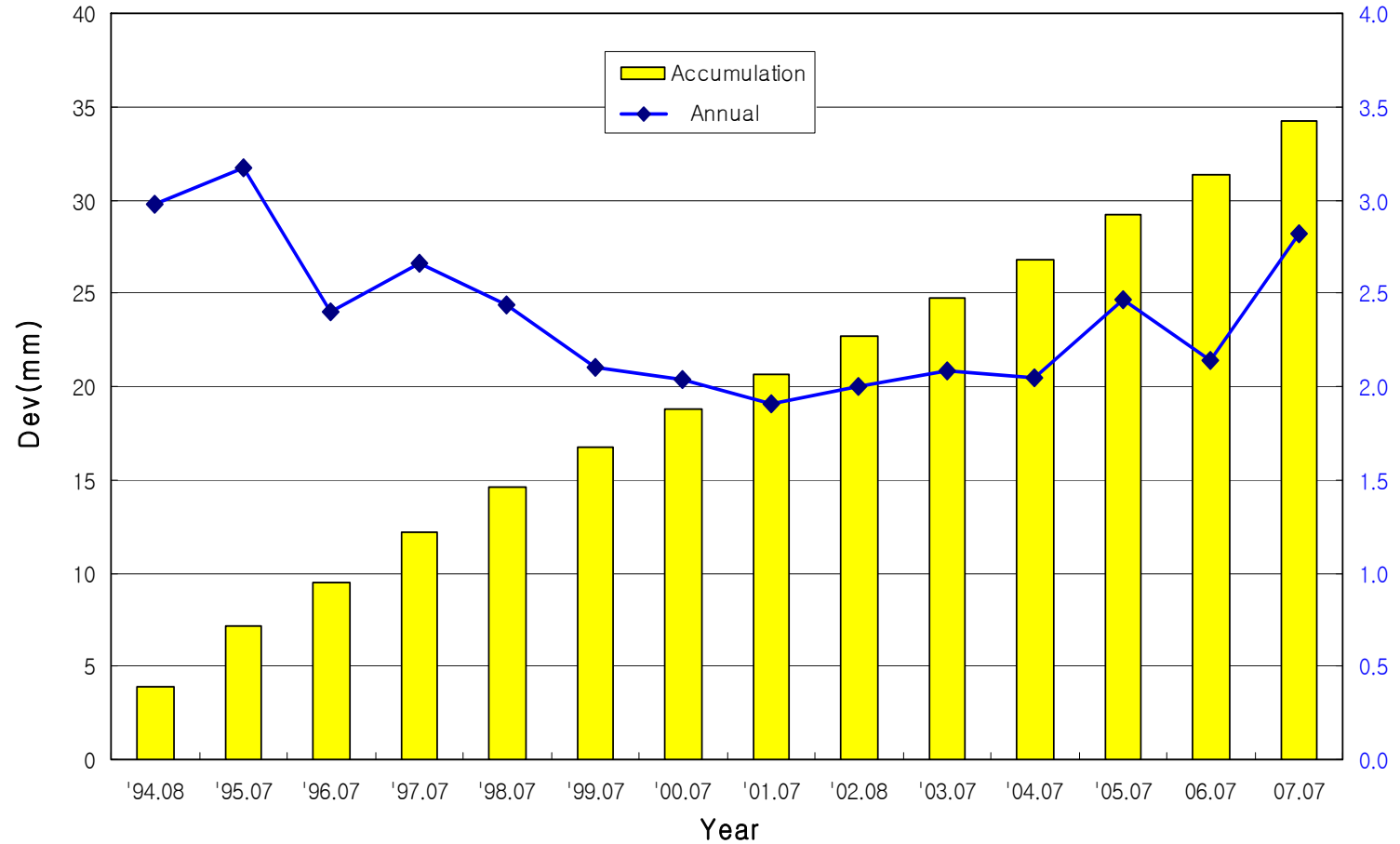


Figure 1 PLS storage ring tunnel deformation

ADJUSTMENT OF QM 2007S SURVEY (AFTER)

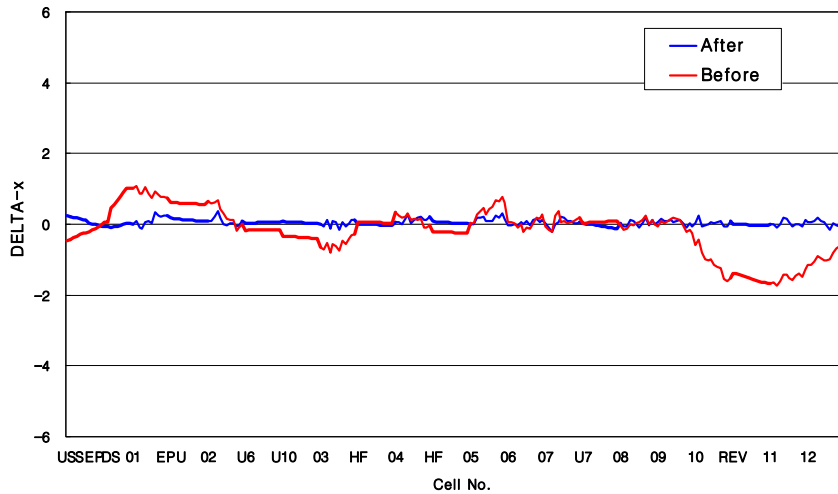


Figure 2 QM survey results (horizontal direction)

ADJUSTMENT OF QM 2007S SURVEY (AFTER)

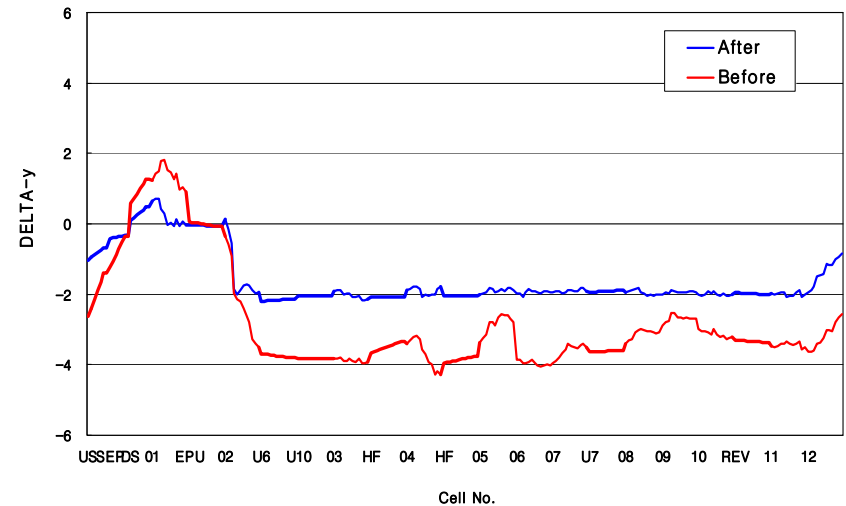


Figure 3 QM survey results (vertical direction)

Figure 2 and Figure 3 are showing the survey results of storage ring quadruple magnets and insertion devices. They were aligned within  $\pm 1$  mm in vertical and horizontal direction. In this graph, red line shows before adjustment, blue one after adjustment. Storage ring alignment results show a similar tendency annually.

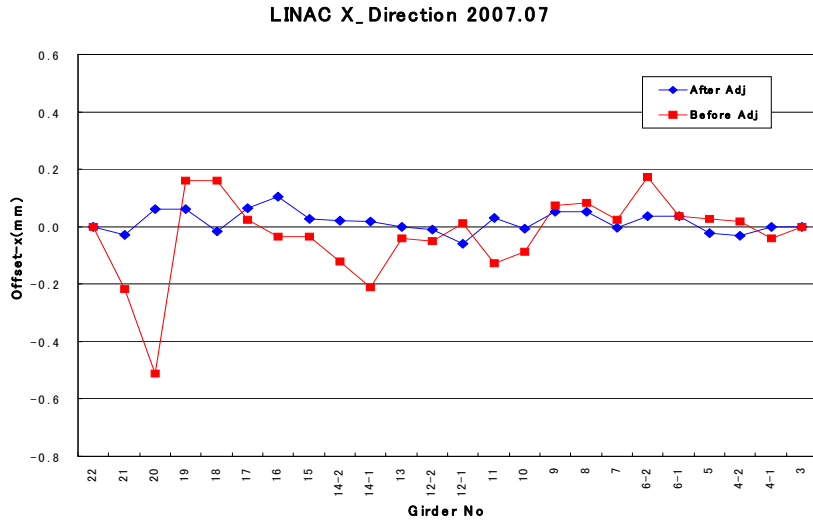


Figure 4 linac alignment results (horizontal direction)

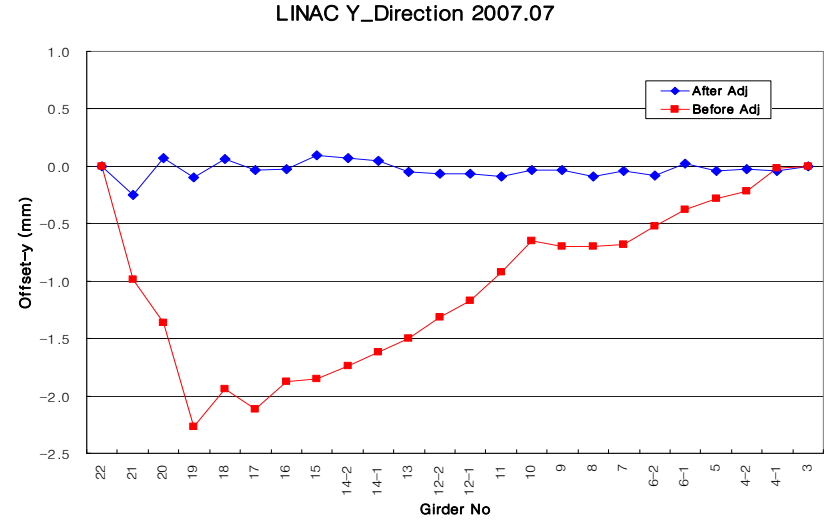


Figure 5 linac alignment results (vertical direction)

Figure 4 and Figure 5 are the alignment results of PLS linac. The peak deformation showed from the midsection to the last of linac (girder # 11 ~ #20) in the vertical direction, and in the end of linac (girder #20) in the horizontal direction.

# Absolute elevation survey results

In order to monitor vertical movement of PAL site and accelerator building, the four PAL absolute elevation bench marks (aBM1 ~ aBM4) were established in November 2004. The four footings of these elevation bench marks placed on the rock under the PAL site for a high accuracy guarantee.

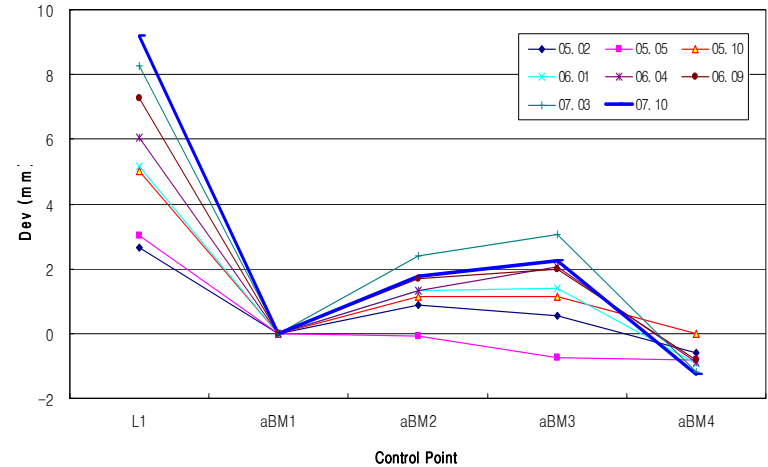


Figure 6 the absolute elevation survey results

Figure 6 is the absolute elevation survey results of PAL area. According to 3 years measuring results, the storage ring tunnel floor datum (L1) have risen up year by year with comparison to the absolute elevation bench marks. The reason of this phenomenon is presumed that the location of storage ring tunnel was cutting region. The storage ring reference point (L1) has risen 3 mm a year in comparison with aBM1 (Jamyung bench mark).

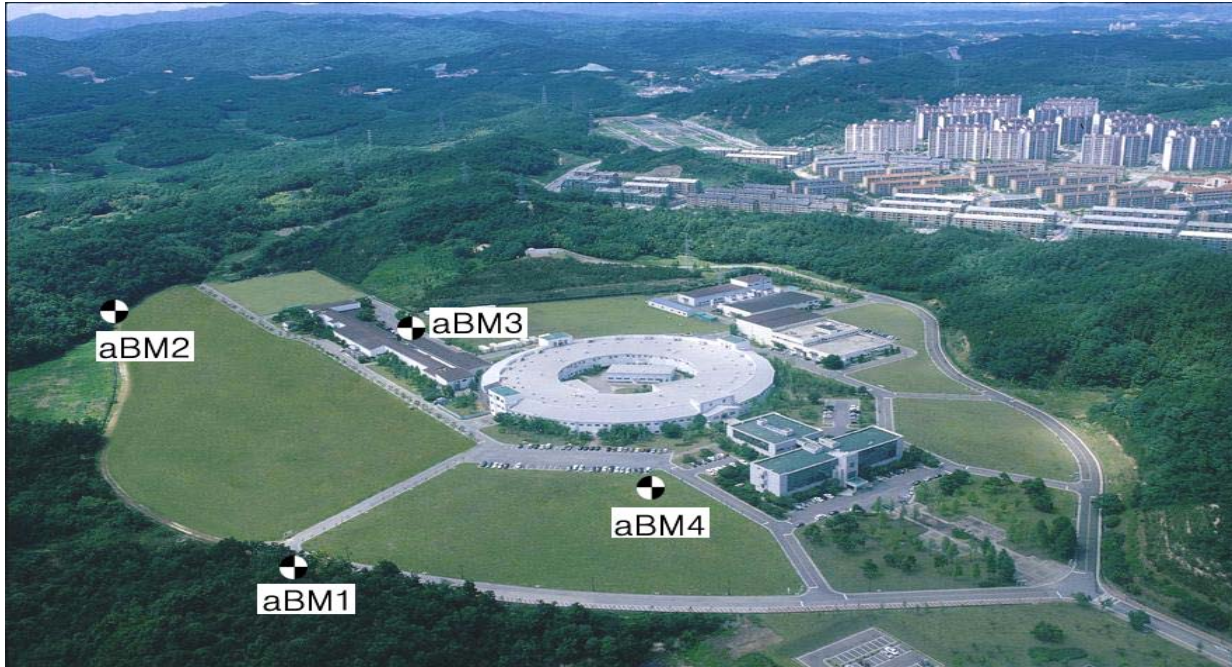


Figure 7 the location of PAL elevation bench marks

Figure 7 is the location of PAL absolute elevation survey bench marks. The absolute elevation database construction will be useful not only to monitor the vertical direction ground movement but also to prepare the next generation project.

# KSTAR Project

\*KSTAR : Korea Superconducting Tokamak Advanced Research

KSTAR is the world-class Superconducting Tokamak developed and constructed by Korean technology. The skill of accelerator alignment put into practice in this project.

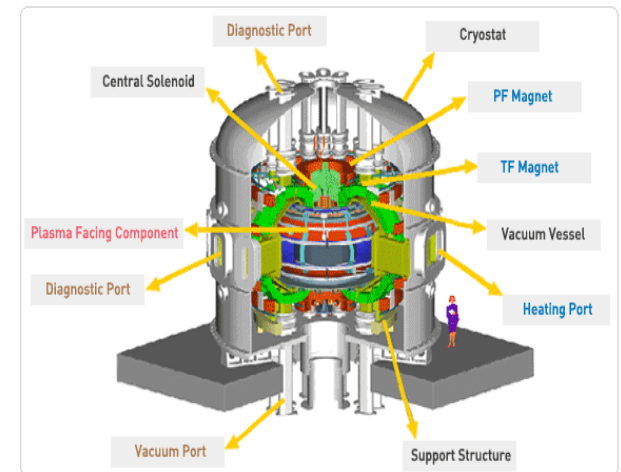
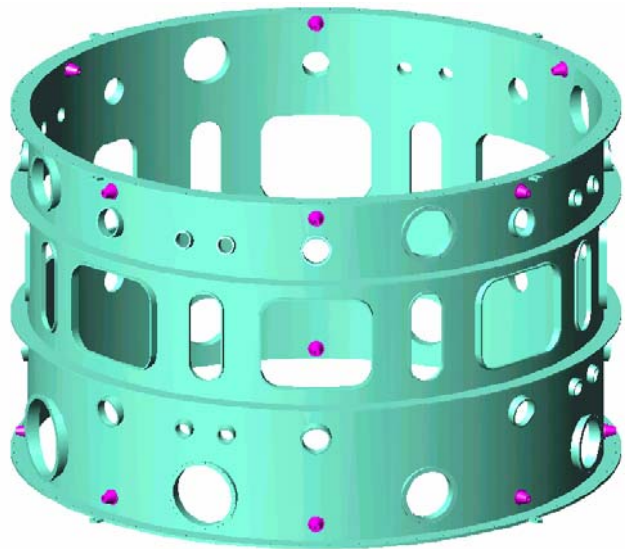


그림 14. 초전도 토카막의 구조

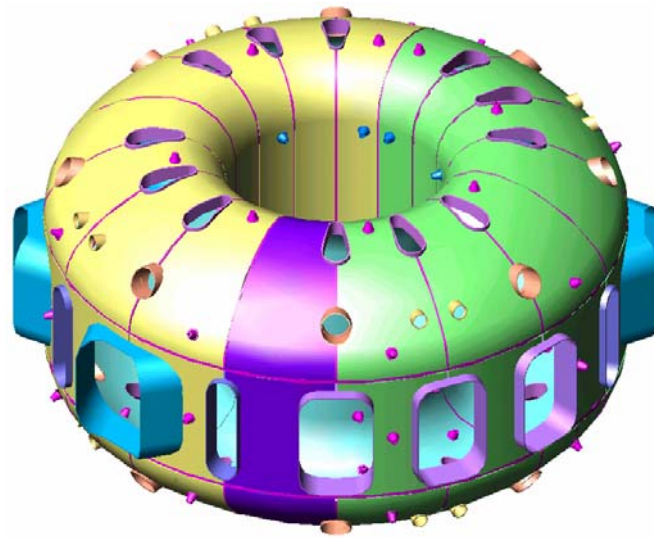


# KSTAR Parameters

ITEM	KSTAR
Major Radius(m)	1.8
Minor Radius(m)	0.5
Toroidal Field(T)	3.5
Plasma Pulse(s)	300
Plasma Current(MA)	2.0
Plasma temperature	1~3hundred milion°C
Superconductor	TF : Nb <sub>3</sub> Sn, PF : NbTi
Magnet Weight(t)	270
Dimension	H : 8.6m, D : 8.8m

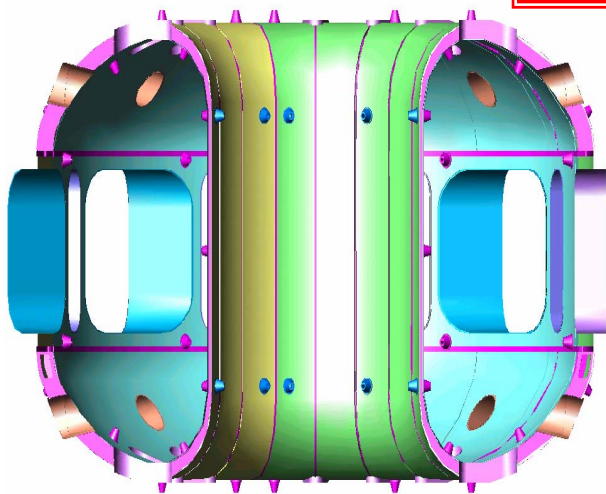


Cryostat

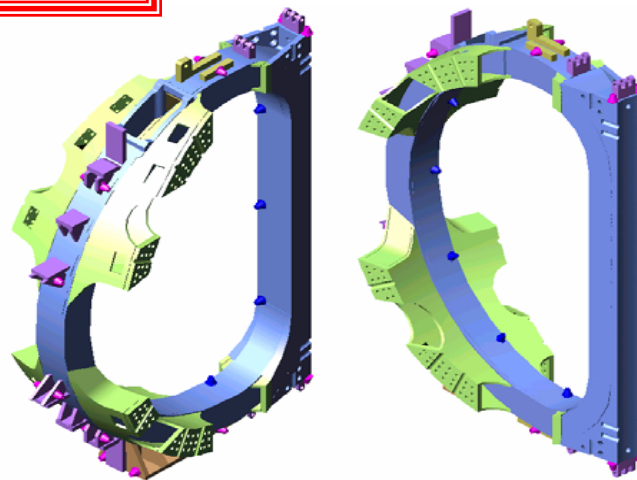


Vacuum vessel

FIDUCIALIZATION



Vacuum vessel (Inner)



TF Structure



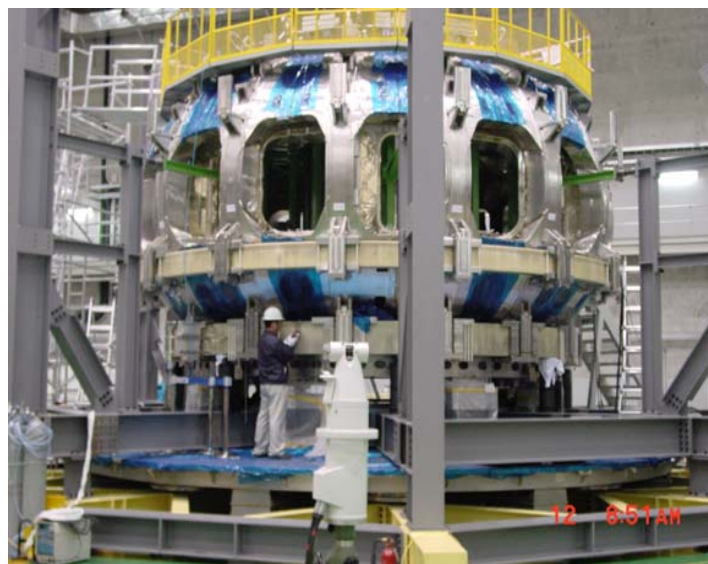
PF Coil



Vacuum vessel



Diagnostic coil marking



Assemble measurement

# Participate company

