Variation Tendency of the Align Network for the 100MeV Proton Linac

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1. Introduction

100MeV proton linac for KOMAC (Korea Multi-purpose Accelerator Complex) has been operated at the Gyeong-ju. Linac is composed of a 50keV proton injector, a 3MeV RFQ, DTL tanks and a beam dump [1]. The align networks were built to align the accelerator components. The survey work of align networks should be accomplished whenever need the alignment of the accelerator by using the laser tracker [2]. In this paper, the variation tendency of the align networks is checked and the survey results are considered to compensate the position of the accelerator components in the tunnel.

2. Survey

2.1 Align Networks

The align networks were installed on the tunnel wall as shown in the Fig. 1. The distance between each align networks is the 5m for right side and 10m for the left side on beam direction. The total number of the align networks is 42 and is positioned the 1.8m of height. This kind of align networks were also installed on the wall of beam-line halls, target rooms, the klystron gallery, the modulator gallery.

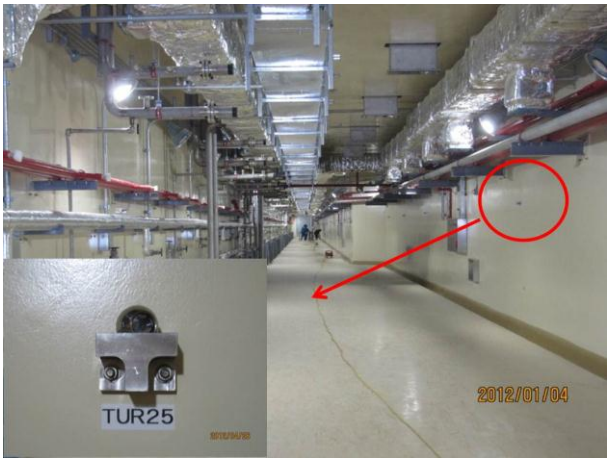

Fig. 1. An align network in the tunnel.

2.2 Coordinate System

To setup the coordinate system, the vertical axis (+Y) was setup by the NIVEL (Leica co.) which can be arranged on direction of gravity. The Z axis and the origin were determined by using two permanent references to link the construction coordinate system. In the Fig. 2, accelerator tunnel, A3 is the origin and the Z axis was setup by using the coordinate of A1. The coordinates of A1 and A3 are linked with the coordinate system used for the construction.

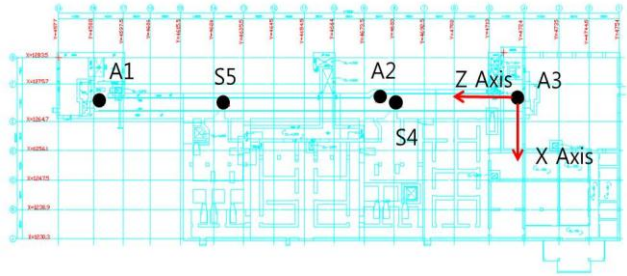

Fig. 2. Coordinate system of the 100MeV proton linac

2.3 Temperature Compensation

Thermal expansion rate, 1.2X10-5/℃-m for the concrete, was considered to compensate the positioning to determine the anchor bolt positions for supports of accelerator components. Fig. 3 shows the align network displacement when the difference in temperature is 20 ℃ [4].

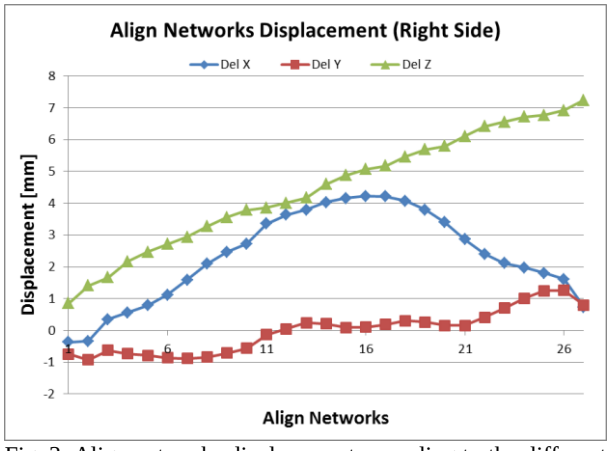

Fig. 3. Align networks displacement according to the different temperature on the right side of the tunnel before two years.

2.4 Survey Results

Fig. 4 and Fig. 5 show the align networks displacement which is compared with 26 ℃ of wall temperature. The wall temperature in this survey was about 25.5℃ in front of ion source, 26.5℃ in front of MEBT, 28℃ in front of DTL107. In case of right and

left side, it is similar to the variation tendency. The displacement of X and Y axis direction are deformed as a bow. To align the accelerator components, temperature compensation needs about +2mm of X axis direction and about -1mm of Y axis direction.

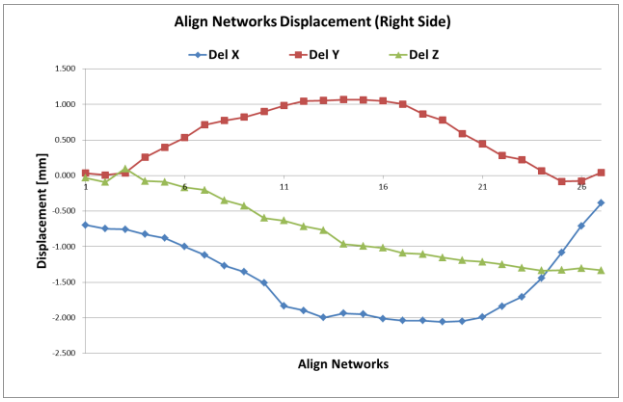

Fig. 4. Align networks displacement according to the different temperature on the right side of the tunnel.

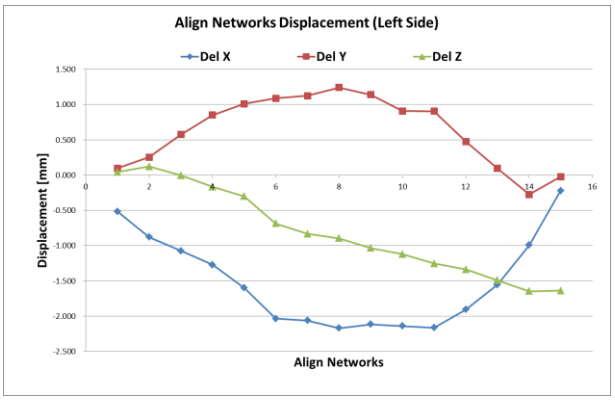

Fig. 5. Align networks displacement according to the different temperature on the left side of the tunnel.

3. Conclusions

Two years ago, the align networks on the tunnel were installed and checked to align the accelerator components. In recent survey of align networks, the displacement by temperature was confirmed according to comparison of the position. When the accelerator components are realigned, the displacement should be used to compensate position of the accelerator components.

Acknowledgment

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