

Study on the Measurement Error Factors of the Accelerator **Building Alignment Network Survey at KOMAC**

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Introduction

The alignment network points have been measured for checking the alignment of accelerator machines at KOMAC.

As a result of measurements for many years, we confirmed that there was an error in the measurement of the alignment network

point comparing with HLS results.

We assumed there are three types of error factors.

- 1. The station interval error
- 2. The laser tracker error (the angular error)
- 3. The lack of reference network points

Test Method



For measuring the aliment network points, it have to move the laser tracker. In this case, it is required to overlap measure points. At least 3 points for the laser tracker position should be overlapped with previous ones in order to match the position of the laser tracker.



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- We measured 3times network changing the points bv intervals of the laser tracker station. case 1 : 5 m interval.
- case 2 : 7.5 m interval.

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- case 3 : 12.5 m interval.

Result TUR01 - TUR10 TUR03 - TUR10 **TUR11 - TUR27** TUR11 - TUR21 TUR22 - TUR27 1805.000 845.00 1835 50 1847 800 844,000 1834 500 -1807.000 1847.300 843.000 1900.000 1833.500 1846.800 1832 500 -1811.000 622.00 1846 30 -1812.00 624.00 1831.500 840.00 626.00 1830 500 -1815.000 1845.300 1839.000 628.00 1817.000 829.50 1844.800 838.00 1828.500 -1819.000 632.00 Pure P 1827.50 1821.00 634.000 1826.500 1823.000 축 제목 TUR22 TUR23 TUR24 TUR25 TUR26 TUR27 TUPO3 TUPO4 TUPO5 TUPO6 TUPO7 TUPO8 TUPO9 TUP1 Ctation 10 V(mm) - Ctation 16 V(mm) - Ctation 22 V(m Etation 16 V/mm) _____Ctation 22 V/r - Station 16 X(mm) - Station 23 X(mm Comparison of the station intervals Case 1, 2, 3 (TUR01 - 27 Y axis (left), TUR03 - 27 X axis (right))

Interval	Case 1 5 m (Station 23)	Case 2 7.5 m (Station 16)	Case 3 12.5 m (Station 10)
A3 to A1 (Z-axis) [mm]	134794.444	134795.961	134794.760
Measurement of the total length (A3 to A1)			

The difference between the longest and shortest total length values was 1.517mm. This value is smaller than X and Y compared to the total length. If the station interval error had been applied equally to the X (horizontal, 6.4 m range), and Y (vertical, 2 m range) values, the Z (length, 135 m range) values should be significantly larger. So, we assumed that the station interval difference is not critical more than other errors.

Conclusion

- We conducted this measurement to find out how the laser tracker station interval affects the network point value. As a result of the measurement, we found that the laser tracker station interval and data value had no significant effect.
- In the future, we have to find a method of compensation to errors from measurement like to use the theodolite and add reference network points.