Accurate Measurement Best Practices for the Laser Tracker

Overview

This document addresses best practice guidelines for FARO Laser Tracker warm-up, Pointing CompIT, long duration measurements, surveys, and the use of frontsight-backsight averaging.

Tracker Warm-up

The Tracker is ready to measure after a ten-minute laser stabilization. For highest accuracy, a one-hour warm-up is recommended. For details, refer to the Tracker User Manual, Thermal Stabilization section. Find the user manuals in the See Also section of this article, download the manual for your model Tracker, and search for stabilization.

If immediate measurement is required, Pointing CompIT should be run prior to measurement, and backsight checks should be made over the next hour to ensure the Tracker stays within specification during the remainder of the one-hour warm-up period.

Pointing CompIT

Pointing CompIT is a quick and easy way to check the accuracy of the tracker and compensate it if necessary. The standard Pointing CompIT takes three interim test points to check accuracy and six points to compensate. The compensation points are at 2, 4 and 6 meters and will bring the Tracker into specification at all ranges.

For the highest accuracy at ranges over 20 meters, Pointing CompIT can be customized to use the maximum range required for the measurement job.

Pointing CompIT should be run immediately before starting a measurement job. The interim test will report whether the Tracker is within specification. For the highest accuracy, the compensation can be performed even if the interim test passes.
A Pointing Interim Test or Backsight Check can be run at any time to determine whether the tracker is measuring within specification. These tests provide a pass/fail result that is based on the Tracker specifications. A detailed report of the results can be viewed and saved.

### Long Duration Measurements

Long duration measurements, or measurement jobs that last over two hours, typically experience global drift. This drift can be caused by vibration or temperature changes in the environment. Changes in temperature can affect the part being measured, the floor, the tracker stand and the Tracker. Because of these environmental effects, drift must be checked throughout the duration of a measurement job.

At the beginning of a measurement job, several fixed reference points should be measured over the full volume of the part. These points should be checked periodically for drift. When drift is noticed, a device position move (Relocation in Insight) should be done to re-fit the tracker back into the coordinate system. The device position move should be executed with auto-scale to allow for growth or shrinkage of the part. This allows the Tracker to continue to measure a part accurately over a long measurement session.

Backsight Checks or a Pointing Interim Test should be run periodically throughout a long duration measurement job to verify accuracy. If the checks do not meet specification, a 5-minute Pointing CompIT should be run.

### Surveys

Surveys are used to measure a set of targets repeatedly. The most accurate method for running a survey is to use Relocation between each cycle and frontsight/backsight averaging on each point (Insight only). Relocation eliminates part, environment, and tracker drift during the survey, and the frontsight/backsight cancel out any beam and gimbal errors.

### Frontsight-Backsight Averaging

Frontsight-Backsight averaging is a method of measuring points in frontsight and backsight mode and averaging them. This method can only be used in jobs that measure individual points. Features cannot be measured with this method. When measuring a frontsight-backsight job, every point must be measured in both frontsight and backsight.

For the highest accuracy jobs, this method is desirable because beam errors (errors associated with the 6 pointing compensation parameters) are canceled. This allows the Tracker to retain highest accuracy, even if the pointing compensation drifts.

Frontsight-backsight measurements are recommended for surveys and high accuracy point-only applications.
See Also

- User Manual for the Vantage Laser Tracker
- User Manual for the ION Laser Tracker
- User Manual for the X and Xi Laser Tracker
- Optimal Measurement Accuracy from the Laser Tracker or TrackArm

**Keywords:**

tips, tricks, measurement accuracy