

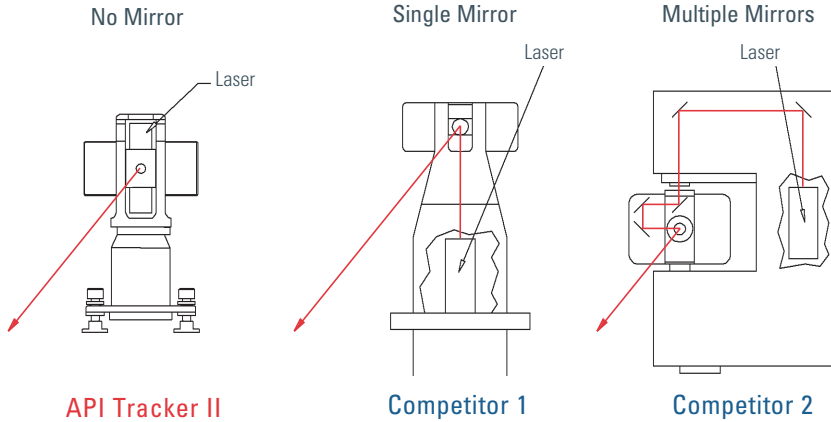
API Tracker II™

Laser Tracking System



- Faster inspection*
- Faster tool building*
- Eliminate tools*
- Reduce loss with in-process work*
- Highly reliable*
- Portable in one case*

Optical Path Comparisons



API Laser Tracking Systems

Measurement accuracy of a laser tracking system depends on the stability of the light path. A very small change in the position of a mirror in a tracker light path is greatly magnified at the point of measurement. This can stem from original installation or thermal changes during use.

The best optical path is the shortest path. API Laser Trackers use no mirrors.

The simplified diagrams show that by design API provides the most direct beam path with the least chance for mechanically or thermally induced errors.

Eliminating mirrors also reduces the periodic need to clean off dust and dirt found in most real world measurement applications.

Take the straight line approach to tracking accuracy.

System Description

TRACKER II Tracker System

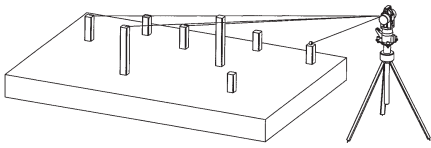
The TRACKER II tracker system is comprised of an advanced, compact tracker head, a controller, and cables to interconnect the system. Other items to support the use of the laser tracker system are also available from API, these include, a precision stand, spherically mounted retroreflectors (SMRs), and applications software. Third party measurement and analysis software is also available through API from a number of major providers.

TRACKER II Tracker Head

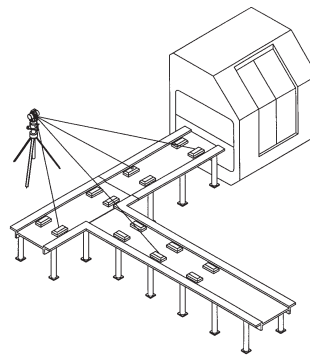
Two of the key attributes that set this second-generation tracker system apart from earlier tracker systems are the size and weight of the tracker head. The height being approximately 43cm (17") high and the width 22.8cm (9.0") makes this half the size of other laser tracker heads. The added benefit of lightweight (13Kg) (27lbs.) makes this approximately one third the weight of existing laser tracking heads. And since one of the key advantages of laser tracking systems is portability, the lighter weight and smaller size of the TRACKER II make this the most portable system available.

TRACKER II Laser Head

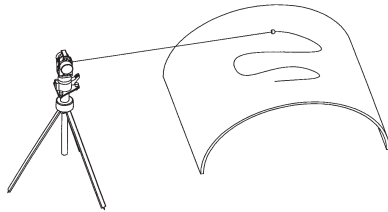
A very unique laser head design is at the heart of this advanced tracker. The laser head is actually contained within the elevation axis of the system. The complete laser interferometer, position sensing devices and optics are housed in this assembly. The magic of this packaging is that the critical light path originates and ends in this single assembly. Other tracking systems route the laser beam through a complex series of optics that are mounted in the various assemblies that make up the tracker. This subjects the laser interferometer to unnecessary errors as it passes from one assembly to another.



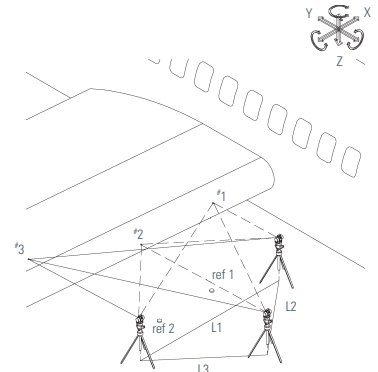
Precise Large Jig and Fixture Alignment



Precise Transfer Line Alignment



Precise Surface Contour Measurement



In-process Assembly Control

Typical Laser Tracker Applications

- ⊃ Dimensional measurement of large objects, tooling, fixtures, etc.
- ⊃ Position accuracy of machine tools, and other servo driven devices
- ⊃ Alignment of objects one to another, i.e., precision roll alignment, machine alignment
- ⊃ Real time position of a target
- ⊃ Reverse engineering

Typical Markets Served by Laser Trackers

- ⊃ Aerospace
- ⊃ Automotive
- ⊃ Castings
- ⊃ Tire manufacturing
- ⊃ Millwork
- ⊃ Shipbuilding
- ⊃ Tool and fixture fabrication
- ⊃ Many others

Lowest Cost System

Tracker II™ Components

- ⊃ Integrated laser interferometer and tracking unit
- ⊃ Electronic controller and control software
- ⊃ Environmental temperature and pressure sensor
- ⊃ Cables and manual
- ⊃ Optional laptop computer and reference level

The API second generation Tracker offers significant advantages.

- ⊃ Small size for hard to measure places
- ⊃ Quick set-up and rapid field calibration
- ⊃ Static and dynamic measurements
- ⊃ Compact single packaging for airline baggage
- ⊃ API quality and engineering



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Automated Precision, Inc.

About API

API is a world leader in supplying manufacturing and metrology solutions that involve the application of laser technology, software, and precision hardware. API is the developer of laser tracker technology and is responsible for the first successful commercial laser tracking systems.

General

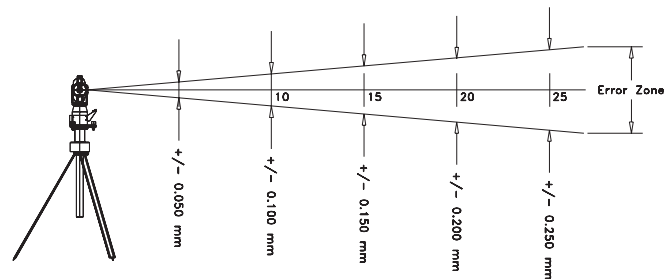
The TRACKER II laser tracking system is a second generation, high-precision relative distance measurement system that can accurately determine points in space. The TRACKER II combines a laser interferometer system with servo technology to measure the position of a target (probe) relative to the tracker.

A target is positioned on the features to be measured, in the line of sight of the Tracker, in order to measure the coordinates of the feature. Various target accessories are used to aid in a variety of measuring situations.

- Faster inspection
- Faster tool building
- Eliminate tools
- Reduce loss with in-process work
- Highly reliable
- Portable in one case
- Compact
- Light
- Accurate
- Quick response servos
- Quick warm-up
- Quick verification check

Specifications

Maximum target speed: >3.0 meters/sec
Maximum acceleration in all directions: >2 g
Range of Measurements:
Horizontal $\pm 235^\circ$
Vertical $\pm 45^\circ$
Distance 0.5 to 25 meters
Angle Resolution: 0.3 arc-second
Distance Resolution: $1\mu\text{m}$
Reproducibility of a coordinate: ± 5 ppm
Absolute accuracy of a coordinate:
Static ± 10 ppm
(i.e. $\pm 50\mu\text{m}$ at 5 meters distance)
Dynamic ± 20 ppm
(i.e. $\pm 100\mu\text{m}$ at 5 meters distance)



Maximum Possible Error vs. Distance



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