

## ***Application White Paper by New River Kinematics***

# **6D-Tracking Probe CMM Delivers Accurate Cost Effective Solutions**

Laser Trackers with 6D-Tracking Probes are displacing large-bed CMM's in the industrial metrology market. They deliver flexible, tighter precision metrology solutions in large volumes where a large fixed bed CMM is prohibitively expensive to implement. 6D Laser Trackers bring direct CAD Build and In-Process Verification to an organization's capabilities where fixed CMM's are typically limited to quality inspection tasks.

### ***How It Works***

A tracker with a 6D probe dynamically measures the position of a retro-reflector and the orientation/direction of a probe stylist. 3D position of a retro-reflector is acquired by measuring the horizontal and vertical angles plus the range from the tracker. 3D position is dynamically updated by a servo-driven control system which continuously drives the tracker's gimble mounted laser pointer into the retro-reflector. Orientation of the probe and stylus is measured by tracking the orientation of rigidly mounted light sources on the probe or using integrated tilt sensors within the probe.

### ***Primary Advantages***

Advantages of the portable Laser Tracker with the 6D-Tracking Probe are numerous. They are several times less expensive when compared to a large volume CMM. 6D-Tracking Probe measurement solutions are portable allowing them to be taken to the object. The traditional fixed CMM solution requires that the object be transported to the CMM. Transporting large objects risks flow time, potential damage, and possibly distorting the object which leads to errors and more risk. 6D-Tracking Probe measurements of the object when it's on the machine or being positioned within an assembly are more valuable. The probe/stylus expands the applications of traditional 3D Laser Trackers. The 6D-Tracking Probe enables trackers to measure holes and features that are hidden from the line of sight. When the 6D-Probe is attached directly to a measured object its current position and rotation relative to a nominal location is available for closed-loop process control. Closed-loop control with 6D feedback offers significant advantages when automating assembly processes.

Lead time to deliver and implement a Laser Tracker with a 6D-Probe to the factory floor is typically measured in weeks verses months/years with a traditional fixed large-bed CMM solution. Comparative system up time is typically 90% or higher for the laser tracker with a 6D-Tracking Probe. Large-bed CMM's up-time is typically less than 70% due to maintenance and calibration. Laser trackers are a proven and time tested technology.

Flexibility in the data acquisition methods of a 6D-Tracking Probe offer several important advantages to leverage in applications. Data collection rates with a 6D-Tracking Probe are considerably higher when compared to traditional CMMs. Building assemblies and verifying as-built configurations are typical applications for 6D-Tracking Probe systems. Fixed CMM's typically inspect configurations and therefore offer limited value towards delivering product. The acquisition modes the 6D-tracking systems offer cover the applications of CMM's and also enable product assembly and in-process verification. When integrated with real-time Measurement Plans the 6D-Tracking Probe solution delivers conformance data and as-built configurations to integrate in down stream assembly steps. 6D-Tracking Probes are fast and portable allowing verification processes implemented more comprehensively into assembly processes providing confidence and minimizing risk. Augmenting assembly processes via real-time feedback with a reliable and easy to use metrology solution makes sense.

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