

Metrology Solutions

Background

The ability to measure is critical to the successful execution of any kind of project. Work of any kind requires precise measurement systems to provide repeatable, accurate measurements. Westinghouse, through its welding and machining group of companies, understands the importance of this need, and offers a wide array of metrology services.

Westinghouse metrology technicians are trained to provide customers with the industry's best knowledge and experience associated with precise and accurate installation of components and mechanized systems.

Description

Industrial dimensional metrology is the science of calibrating and using physical measurement equipment to quantify the physical size of or distance from any given object.

An industrial metrology process is used on industrial systems, components and objects to perform inspections, templating, alignment and as-built of existing or replacement equipment.

Metrology survey data collection is performed by using the appropriate equipment for the specific task.

Laser tracking interferometer, total station (theodolite), digital photogrammetry, portable articulate coordinate measurement machine (CMM) and the laser scanning systems are used to perform industrial metrology applications.

Laser Tracking Interferometer

Westinghouse uses a laser tracking interferometer system to perform measurements and surveys for the templating of steam generators and other vessel- or piping-replacement projects. This proven technology gathers target position information in a three-dimensional (3D) spherical coordinate system.

The accuracy of this system is equivalent to what can be achieved with a multiple theodolite-based coordinate measuring system. However, unlike the theodolite system, the laser tracking system does not rely on the operator's optical ability to sight the target in order to achieve this accuracy.

In addition, the system is based on a single-data-collecting instrument and greatly simplifies the setup and relocation of the system hardware in a congested work environment. Similar to digital photogrammetry, the laser tracking interferometer can collect a large number of data points in a short period of time, with the advantage that the data are collected "real time," with no post-processing required to ascertain validity.

Digital Photogrammetry

Westinghouse recommends and utilizes digital photogrammetry in areas that do not lend themselves to traditional measuring equipment. Areas where measurements need to be acquired from an unstable base, such as a boat or an object in motion, can now be frozen in the split second it takes to snap an image. Multiple images are taken of an object or area from different perspectives, and using known scale and reference points, Westinghouse is able to link together and create a 3D block or mosaic of the images. Once the blocking and bundling process is complete, measurements, locations and objects can be extracted from the imagery. Accuracy directly comparable to that of the theodolite and tracker survey can be achieved with the images. The advantage of the photogrammetry survey is the abundance of information captured during the survey. Once information is frozen in the image, it is captured and available to be computer-aided-design (CAD) modeled or processed as required.

Total Station (Theodolite)

Westinghouse uses the systems to incorporate an infrared distance meter with a motorized tracking movement. Accurate measurements can then be acquired without the optical human sighting error previously incorporated with other instruments of this type. Using an angular measurement on the horizontal and vertical axis, along with its distance meter, the total station theodolite can provide 3D coordinate measurements for targeted control points and features.



Laser scanner

Portable Coordinate Measurement Machine (CMM Articulating Arm)

Westinghouse uses high-accuracy portable CMMs to measure features on manufactured parts, fixtures and assemblies to support quality inspection requirements, reverse engineering, or CAD-to-part analysis. Other common applications include part alignment, tooling and mold certification.

Benefits

- This technology eliminates the need for mechanical measurement and templates previously used to collect measurement data on system components and equipment.
- Industrial metrology systems generate static and dynamic data that can be downloaded to create a graphical model.
- All measurements are taken electronically, reducing or eliminating human errors.
- Less human interface equates to less time in immediate work area. This is beneficial in radiation areas and other areas where human exposure should be limited.



Coordinate measurement machine (articulating arm)



Laser tracking interferometer



Total station (theodolite)



Digital photogrammetry