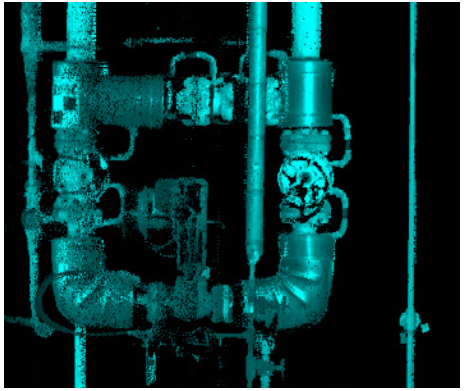
How It Works

Laser Scanning for Industrial Facilities

Land surveying is as old as engineering, with evidence of its use on such historic structures as Stonehenge, built in 2500 B.C., and the Great Pyramid of Giza, built in in 2700 B.C. It's only been in the past 15 years that the field has grown into two different industries: land and industrial surveying. Refineries, chemical plants, power plants and other industrial facilities are designed and measured to 1/16-inch accuracy and have construction tolerances of 1/4-inch — key drivers for developing laser scanning for accurate measurements.

Industrial surveying works similar to traditional surveying in which a surveyor views and assigns points to areas within a field of view to develop a map of existing structures or unoccupied land. But unlike the traditional method, which is manual and yields just 20 to 40 points per survey session, a 3.5-minute laser scan captures approximately 1 million points per second.

Each point is assigned an XYZ value through traditional survey techniques of strategically placed and uniquely numbered target tags. The output of the laser scanner is a 3-D cloud of points, which can be referenced into a 3-D plant design system (PDS) or SmartPlant 3-D model. The data is accurate to within 1/4-inch up to 80 feet away.



A point cloud created by laser scan data shows a rendering of an existing control valve station.

"So now you can gather most of the as-built conditions of any facility in a matter of days, which may consist of tens of billions of points in lieu of 50 to 100 points in the same time frame," says Kirk Knorr, a Burns & McDonnell piping department manager in the Burns & McDonnell and pioneer of laser scanning technology. "Plus, with the 3-D cloud of points referenced into the 3-D design model, an interference report can be run to assist with accurate fabrication and installation of pipe, steel, equipment, and instrument and electrical components."

"Prior to laser scanning, the industry experienced a 20 percent to 30 percent rework ratio," Knorr says. "With laser scanning, this can be reduced to as low as zero percent to 1 percent."

For more information, contact Kirk Knorr, 832-214-2915.