Laser Tracker Measures Steel Making Machinery

At rare moments, an idea comes along that makes people rethink how jobs are done from that point on. The engineers at Falk PLI Engineering & Surveying have hit on such an idea for one of the most basic concepts of all: measuring.

The larger-than-life nature of steel making would seem to belie a need for precision. But secondary forming processes depend on tight dimensional tolerances. Precise alignment of primary molding and shaping equipment is critical for optimum throughput and scrap reduction.

The reality is that machine elements built in one location at one temperature and shipped to and assembled in another location rarely retain their original size. Even the act of transporting can change the dimensions. Compounding the problem is the fact that the equipment may not have been built using precision measuring equipment. During assembly, this "dimensional delta" becomes a major headache for machine riggers trying to get the final alignment right.

Equipment already in service experiences a similar but slightly more complex problem. Not only does it undergo thermal expansion/contraction, but dimensions shift due to heavy usage; a fact of life in most metal-forming processes.

Falk concluded that machine alignment was beyond a three-dimensional problem, and began to incorporate the 4th dimension of time into the analysis. "Years ago, alignment was seen, at best, as a 2-D problem. The surveyor would use optical equipment to perform verifications. But now we know that machine components have a 3-D spatial relationship, and alignment must be done in a reasonable period of time to ensure good fits." Optical systems are more labor intensive and less accurate in handling the third and fourth dimensions.

With this in mind, alignments must be done thoroughly — and fast. Falk's work introduced him to a laser measuring system that bounces a beam off a movable target, and then automatically calculates the position of the target to a 3-D single point accuracy of .001 in. The system, the FARO Laser Tracker, can be set in almost any manufacturing environment and gathers data in a matter of minutes.

During a survey, data collected by the Tracker is processed by a computer and compared to embedded CAD drawings of the equipment. Locations that are out-of-spec are noted on the computer's display and the data is used to bring the sections into alignment.

The quality of an alignment depends on thoroughness, but survey time greatly affects project costs. Because the Laser Tracker gathers data so rapidly, engineers are able to complete measurements quickly and more efficiently. Projects that normally take 36 to 72 hours with optical equipment can be done by the Tracker in just a few hours. With rapid measurement speed comes increased accuracy; from roughly .060 in. with optical tools to about .005 in. using the Tracker. The Laser Tracker has allowed Falk to do the same work in less time and with more accuracy.