

## Tough Tubes

### Background

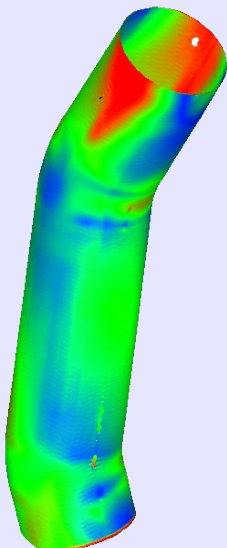
When a client was reviewing 3D tube scanning technologies, we put together a quick overview of our capabilities to demonstrate just how well 3D scanning works to measure tubes and tubular assemblies. We took a look at two samples, a welded assembly, and a partially finished large diameter tube.

### Our process

We brought the samples into our studio and made a series of scans on our automated scanner. Tubes can be particularly tricky to measure on a traditional CMM machine. Even purpose built tube measuring devices won't pick up on bend radii, welded brackets, or other non-cylindrical features, which can miss important information. Our scanning process sees it all.

### The results

When we compared the tube assembly scan to the original CAD assembly, it was immediately clear which tubes were out of tolerance and why. The color map on the right shows the red areas of the larger diameter tube that were not meeting the design criteria. The 3D scan also allowed us to see that the problems began at the first bend location from the bottom and affected the rest of the tube. By the third bend, the tube was 2mm from the original design target.



When investigating the 3D scan of our second sample, we were able to see the crush zone resulting from the clamp used during the bending operation (red areas near the top), as well as some of the wrinkling on the inside of the bend radius. This type of visualization helps the manufacturer understand just what is happening during the forming operation and make educated decisions to improve the part quality down the road.

