

## EMS 3D Scans Nuclear Plants

The Electrical Power Research Institute (EPRI) is an organization funded by the electric power industry here in the US. One group at EPRI is focused solely on research for nuclear power plants and providing valuable information to them.

### The Problem

The nozzles which allow water to flow in and out of nuclear reactors require periodic ultrasonic inspection to ensure that there are no cracks which could cause a disastrous leak. In order for the ultrasonic inspection to be accurate, the sensor probe must fit accurately to nozzle surface. Since nozzles are welded to the reactor vessel in the plant, there is no accurate record of the weld shape, causing a poor fit between the sensor and the weld surface. Without an accurate reading, nozzles are sometimes repaired or replaced long before they need to be, causing excessive maintenance costs.

### The Solution

EPRI contacted EMS to 3D scan some nozzles at one of their plants. Using their Z Scanner Z800 3D Scanner, EMS was able to get into some very tight spaces to 3D Scan the nozzles. Once the scan data was captured EMS could analyze this data.

Using RapidForm XOR and XOV software, EMS compared the 3D scan data to the original CAD model. This allowed EPRI to closely monitor critical wear areas of the nozzle. RapidForm XOV can create both 2D and 3D comparisons. 2D sections can be created by sectioning through the scan data and CAD data and creating "whisker plots". These whisker plots have vectors that vary in length and color depending on how far in or out of tolerance the scan data is from the CAD data. This makes it easy to see very specific differences along any section.

3D comparisons can also be used as pictured to the right. The 3D comparison color codes the tolerances based on user settings input in RapidForm. The 3D comparison is very helpful in identifying trends in accuracy across an entire part. The user can then further investigate these areas of interest in greater detail.

### Conclusion

An accurate 3D model of the as-built condition of the nozzle weld allows for the redesign of the ultrasonic inspection probes to ensure a good fit and an accurate reading. These readings prevent the unnecessary and expensive repairs to nozzles in the field, saving thousands of dollars per nozzle, ultimately lowering the on-going maintenance costs for the nuclear power plan.

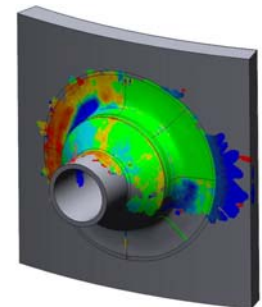
For more information visit [www.ems-usa.com](http://www.ems-usa.com)



3D Scanning of nozzle



3D CAD Model



Scan data compared to original CAD model via a color deviation map