Steam Turbine Pedestal Installation Alignment

Introduction

This is an example of the ACQUIP process of applying laser tracker technology and 3D CAD software to a steam turbine installation.

Challenge

Steam Turbines are required to be positioned in tight tolerances. The expected time to complete the installation is getting shorter while locating personnel with the skill set to complete the process is more difficult than ever.

Benefits

ACQUIP Procedures and Experience combined with laser tracker technology and 3D CAD software increases the accuracy and speed of the pedestal location. The quality of the installation is improved by assuring each soul plate is level and in the exact location, thus reducing the chance of rework during the installation process. Less time is required to locate the components which creates the opportunity for the project to finish early. Documentation and reports can be created in the CAD program that are used to locate the pedestals to the drawing. This produces a paper trail that can be used as records of the job that was performed. The alignment portion of the installation is delegated to the alignment engineers, thus allowing the project manager to focus on other tasks.

Overview

The pictures, graphics and data below are an example of the pedestal alignment installation process. The pictures show the pedestal bores and reference locations. The graphics are created in the 3D software from the actual measurements taken on the components. The data is an example of the output from the 3D CAD software used to align the pedestals.

Call or email ACQUIP today to see how we can provide this technology and procedure for your steam turbine and pedestal installation and alignment.
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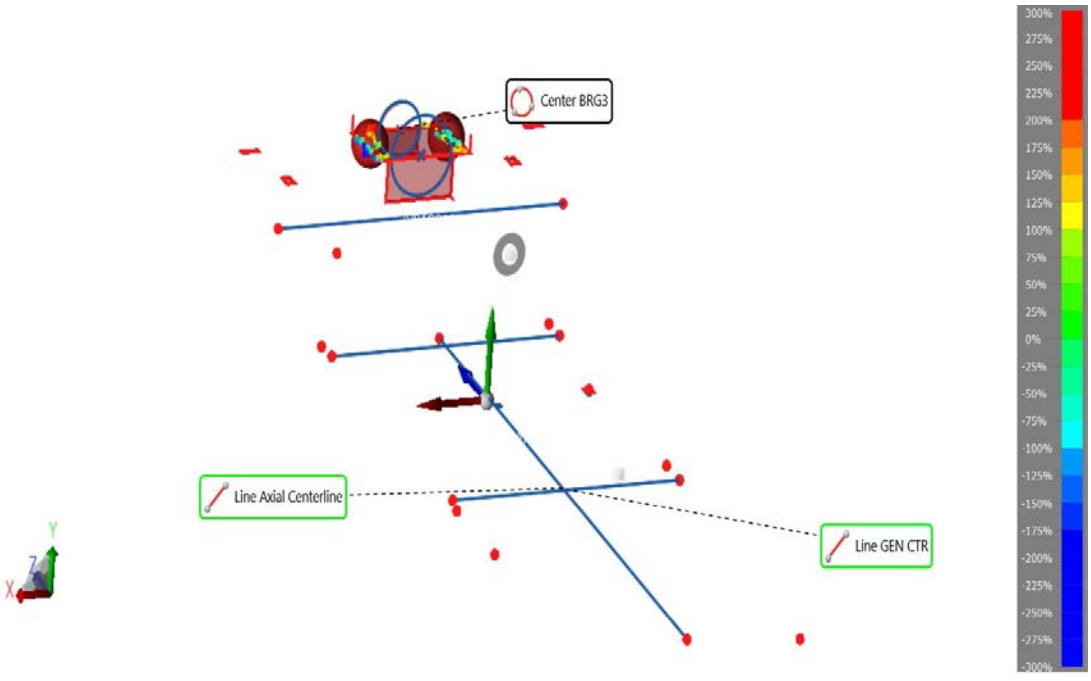
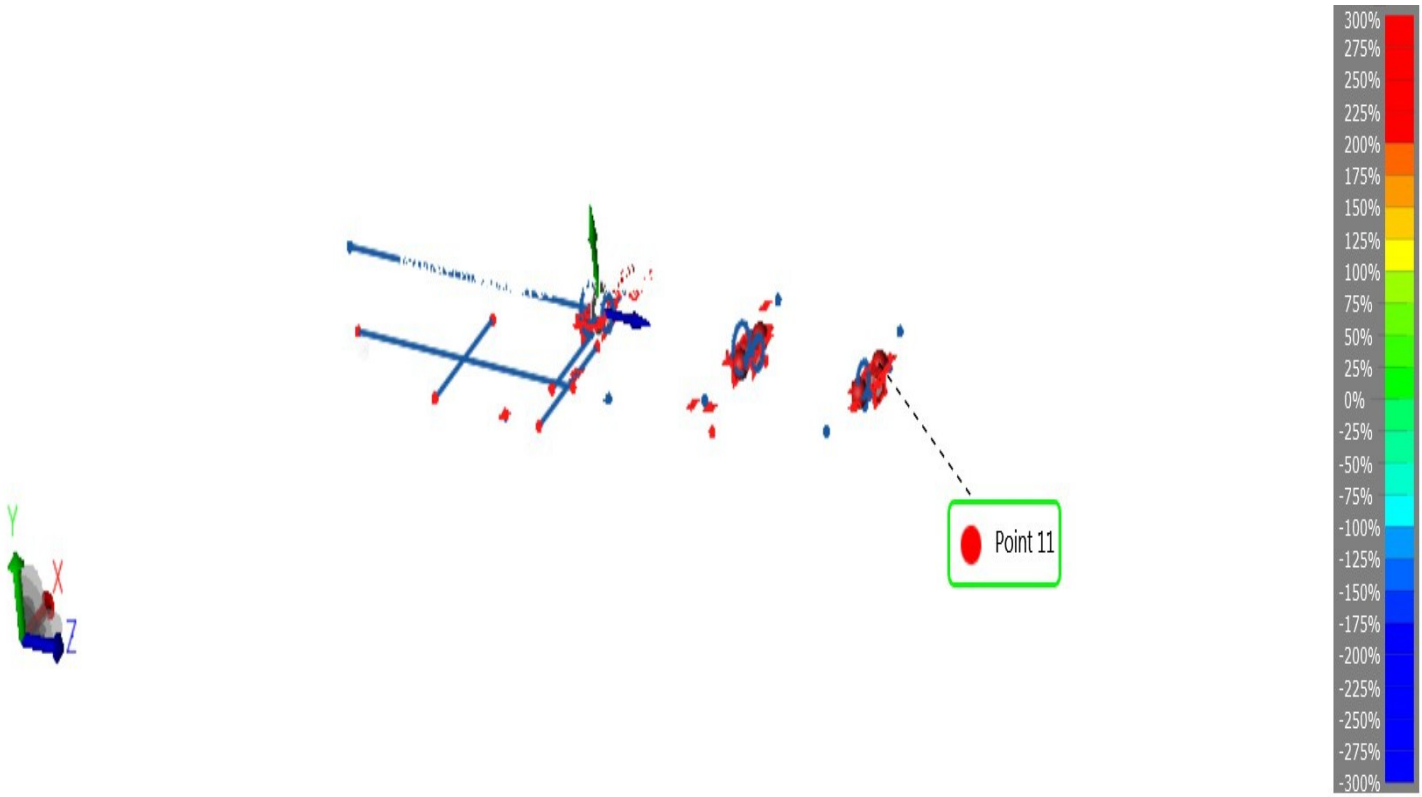
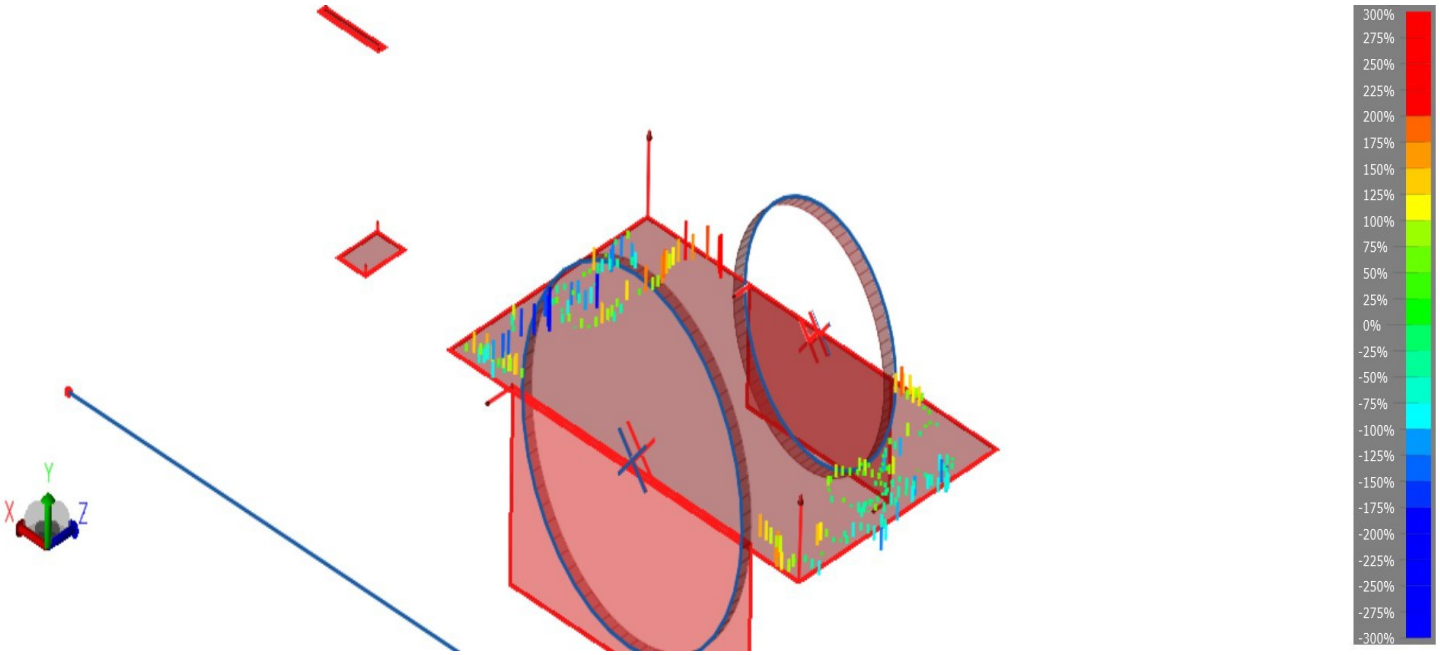
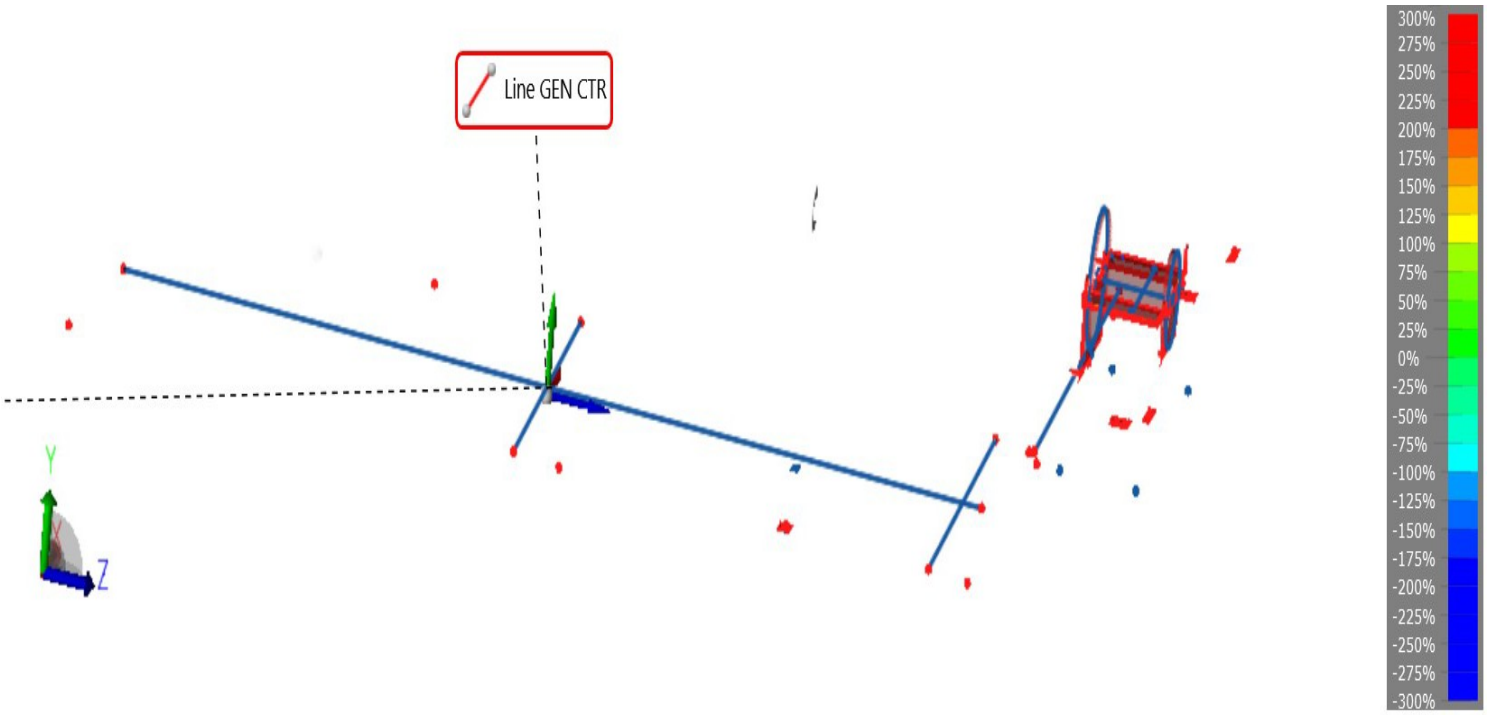
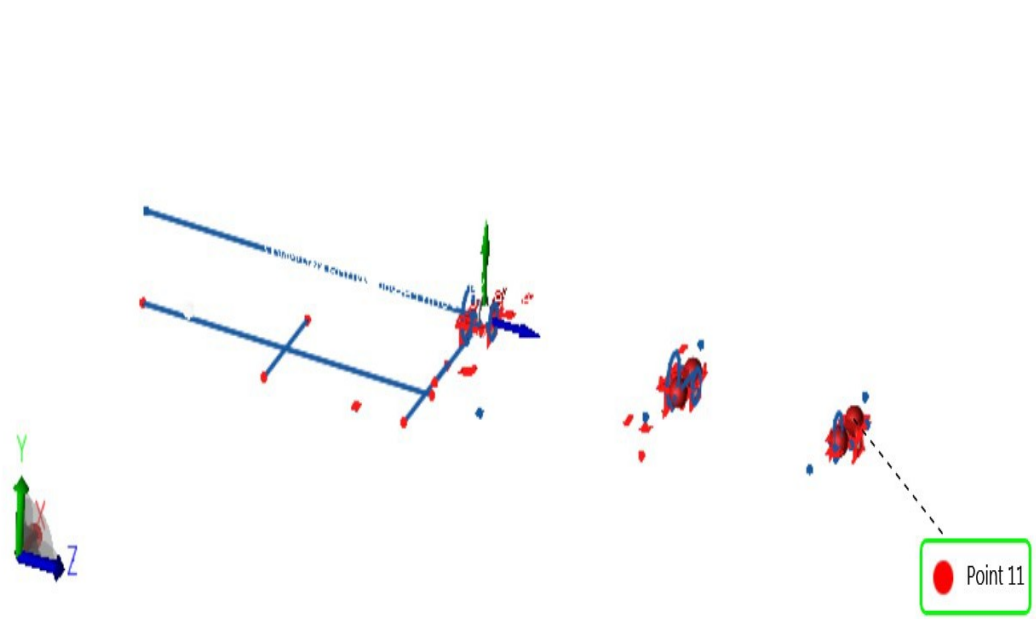
Pedestal Bore and Elevation Measurements

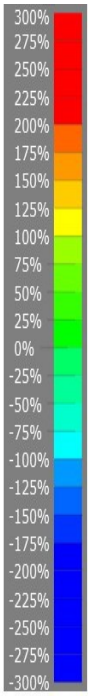












In Process Data Analysis

L2 Elevation and Axial Points

L2 Right Elevation Reference Point

	actual	nominal	dev	- tol	+tol	oot
Horizontal (X)	650.384mm			-0.050mm	0.050mm	
Elevation (Y)	2.867mm	1.800mm	1.067mm	-0.050mm	0.050mm	1.017mm
Axial (Z)	7,229.874mm	7,230.000mm	-0.126mm	-1.000mm	1.000mm	0.000mm

L2* Right Elevation Reference Point

	actual	nominal	dev	- tol	+tol	oot
Horizontal (X)	650.384mm			-0.050mm	0.050mm	
Elevation (Y)	2.581mm	1.620mm	0.961mm	-0.050mm	0.050mm	0.911mm
Axial (Z)	6,811.874mm			-0.050mm	0.050mm	

L2 Left Elevation Reference Point

	actual	nominal	dev	- tol	+tol	oot
Horizontal (X)	-649.620mm			-0.050mm	0.050mm	
Elevation (Y)	2.843mm	1.800mm	1.043mm	-0.050mm	0.050mm	0.993mm
Axial (Z)	7,229.825mm	7,230.000mm	-0.175mm	-1.000mm	1.000mm	0.000mm

L2* Left Elvation Reference Point

	actual	nominal	dev	- tol	+tol	oot
Horizontal (X)	-649.620mm			-0.050mm	0.050mm	
Elevation (Y)	2.571mm	1.620mm	0.951mm	-0.050mm	0.050mm	0.901mm
Axial (Z)	6,811.825mm			-0.050mm	0.050mm	

L2 Horizontal (Radial) Alignment

L2* GEN Bore Center

	actual	nominal	dev	- tol	+tol	oot
Horizontal (X)	0.020mm	0.000mm	0.020mm	-0.050mm	0.050mm	0.000mm
Elevation (Y)	2.452mm			-0.050mm	0.050mm	
Axial (Z)	6,784.564mm			-0.050mm	0.050mm	
Diameter	1,019.884mm			-0.050mm	0.050mm	

L2 TE Bore Center

	actual	nominal	dev	- tol	+tol	oot
Horizontal (X)	-0.022mm	0.000mm	-0.022mm	-0.050mm	0.050mm	0.000mm
Elevation (Y)	3.060mm			-0.050mm	0.050mm	
Axial (Z)	7,585.254mm			-0.050mm	0.050mm	
Diameter	700.021mm			-0.050mm	0.050mm	

L2 Measured Components

L2 Support Horn Right

Readings:12.

	actual	nominal	dev	- tol	+tol	oot
Elevation PointonPlane (Y)	-214.833mm	-215.640mm	0.807mm	-0.050mm	0.050mm	0.757mm
Flatness	0.039mm		0.039mm	0.000mm	0.050mm	0.000mm

L2 Support Horn Left

Readings:26.

	actual	nominal	dev	- tol	+tol	oot
Elevation PointonPlane (Y)	-214.872mm	-215.640mm	0.768mm	-0.050mm	0.050mm	0.718mm
Flatness	0.059mm		0.059mm	0.000mm	0.050mm	0.009mm

L1 Elevation and Axial Points

L1 Right GEN Elevation Reference Point

	actual	nominal	dev	- tol	+tol	oot
Horizontal (X)	675.106mm			-0.050mm	0.050mm	
Elevation (Y)	63.518mm	63.400mm	0.118mm	-0.050mm	0.050mm	0.068mm
Axial (Z)	12,979.342mm	12,980.000mm	-0.658mm	-1.000mm	1.000mm	0.000mm

L1* Right TE Elevation Reference Point

	actual	nominal	dev	- tol	+tol	oot
Horizontal (X)	675.106mm			-0.050mm	0.050mm	
Elevation (Y)	63.645mm	63.570mm	0.075mm	-0.050mm	0.050mm	0.025mm
Axial (Z)	13,414.342mm			-0.050mm	0.050mm	

L1 Left GEN Elevation Reference Point

	actual	nominal	dev	- tol	+tol	oot
Horizontal (X)	-674.916mm			-0.050mm	0.050mm	
Elevation (Y)	63.466mm	63.400mm	0.066mm	-0.050mm	0.050mm	0.016mm
Axial (Z)	12,979.779mm	12,980.000mm	-0.221mm	-1.000mm	1.000mm	0.000mm

L1* Left TE Elevation Reference Point

	actual	nominal	dev	- tol	+tol	oot
Horizontal (X)	-674.916mm			-0.050mm	0.050mm	
Elevation (Y)	63.463mm	63.570mm	-0.107mm	-0.050mm	0.050mm	-0.057mm
Axial (Z)	13,414.779mm			-0.050mm	0.050mm	

L1 Horizontal (Radial) Alignment

L1 GEN Bore Center

	actual	nominal	dev	- tol	+tol	oot
Horizontal (X)	0.062mm	0.000mm	0.062mm	-0.050mm	0.050mm	0.012mm
Elevation (Y)	3.374mm			-0.050mm	0.050mm	
Axial (Z)	12,644.474mm			-0.050mm	0.050mm	
Diameter	700.047mm			-0.050mm	0.050mm	

L1* TE Bore Center

	actual	nominal	dev	- tol	+tol	oot
Horizontal (X)	0.239mm	0.000mm	0.239mm	-0.050mm	0.050mm	0.189mm
Elevation (Y)	3.516mm			-0.050mm	0.050mm	
Axial (Z)	13,425.006mm			-0.050mm	0.050mm	
Diameter	700.071mm			-0.050mm	0.050mm	

L3 Elevation and Axial Points

L3 Left Elevation Point

	actual	nominal	deviation
Horizontal (X)	-650.161mm		
Elevation (Y)	0.036mm	0.000mm	0.036mm
Axial (Z)	0.039mm	0.000mm	0.039mm

L3 Right Elevation Point

	actual	nominal	deviation
Horizontal (X)	649.862mm		
Elevation (Y)	-0.011mm	0.000mm	-0.011mm
Axial (Z)	-0.039mm	0.000mm	-0.039mm