- Minimize vibration in the field
- Reduce equipment downtime

Field balancing

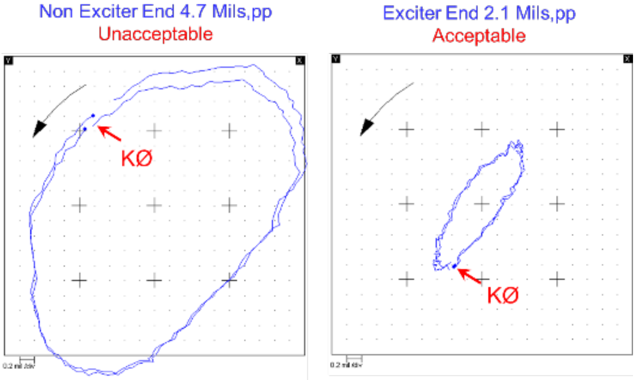
Sulzer is your global partner with reliable and sustainable solutions for your key operations. We offer repair and maintenance services for turbines, compressors, pumps, generators and motors. We also offer OEM and aftermarket parts. With one of the largest service networks in the industry, we are close to our customers with over 180 production facilities and service centers worldwide. Our cutting-edge engineering services provide unique and innovative solutions customized to your equipment needs.

Balancing 2-pole air cooled synchronous generator driven by a steam turbine

The customer was operating a natural gas fired power plant consisting of three virtually identical units. Each generator was rated at 114 MW, and contained a double extended shaft. On the South side of the generator, a turbine was directly coupled through a quill shaft. The generator shaft on the North end contained an integral exciter and it was hard coupled to the bull gear of a single helical gearbox. Finally, an HP turbine was coupled to the pinion.

The generator rotors each weighed 60,400 pounds, and they all contained offset half journal bearings with nominal 23 mil diametrical clearances, and an 11 mil splitline offset. Over a period of several months, the vibration amplitudes on the #2 unit non exciter (South) generator bearing gradually increased at a constant phase angle. At this point, Sulzer was commissioned to perform a vibration analysis and identify the probable cause for the increasing vibration trend.

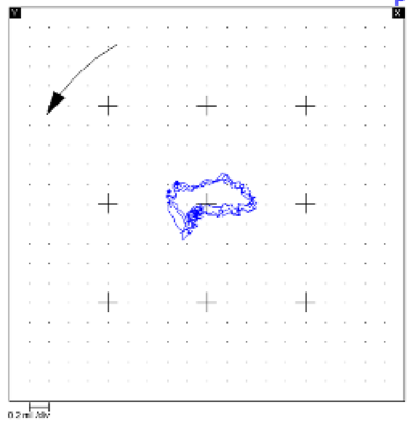
The transient startup and steady state vibration response characteristics of this generator were sampled and examined. For example, the adjacent diagram documents the unfiltered orbit plots at 90 MW. It is clear that the non exciter bearing vibration amplitudes were dominant and higher than desired. It was also determined that the generator ran above the pivotal (2nd) critical speed. This characteristic was evident on the transient plots and it is visible on the adjacent diagram with Keyphasor dots on opposite sides of the orbits.



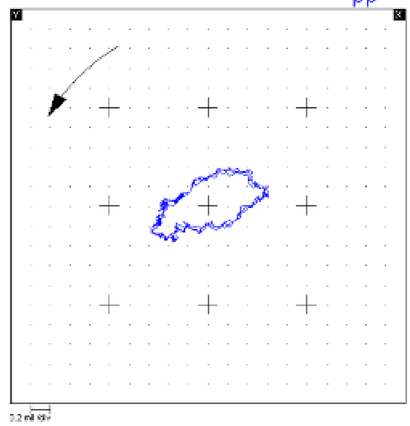
Based on the physical characteristics of the generator, a conservative 16 ounce calibration weight was installed at the non exciter end. The unit showed good improvement and balance sensitivity vectors were computed. Based on these vectors, a final correction weight was computed, and a 23 ounce weight was installed 60 degrees from the initial calibration weight. The positive results of this final weight addition are displayed in the adjacent orbit plots.

Overall, the generator responded in a linear manner and the pivotal rotor mode was successfully improved at both bearings by weight addition at the non exciter end. From another perspective, the final balance correction was performed with confidence and the adjacent table summarizes the shaft predicted versus the actual vibration vectors at load. This is considered to be excellent agreement. Finally, the balance sensitivity vectors from this project were used on an adjacent generator three months later. In that case, the generator was successfully balanced in one run.

Non Exciter End 0.9 Mils,pp



Exciter End 1.2 Mils,pp



	Y-Non Exciter Mils,pp @ Angle	X-Non Exciter Mils,pp @ Angle	Y - Exciter Mils,pp @ Angle	X - Exciter Mils,pp @ Angle
Predicted	0.58 @ 59	0.49 @ 297	0.41 @ 30	1.21 @ 285
Actual	0.40 @ 29	0.60 @ 264	0.64 @ 29	1.10 @ 265

Sulzer provides cutting-edge services and solutions for rotating equipment dedicated to improving customers' processes and business performances. When pumps, turbines, compressors, generators and motors are essential to operations, customers need a service partner they can trust. With our technically advanced and innovative solutions, we give our customers the assurance they need to focus on their operations.

Sulzer Turbo Services Houston Inc.
Houston Service Center
11518 Old La Porte Road
La Porte, TX 77571, USA
Phone +1 713 567 2700
sulzertshouston@sulzer.com

Engineering Services capabilities/service offering:

- Alignment tracking
- Machinery diagnosis
- Field balancing
- Performance rerates
- Technical upgrades (blade design improvements)
- Root cause failure analysis
- Rotordynamic analysis
- Turbomachinery engineering seminar series