

DYNAMIC BALANCING

Sector: Power generation / industrial utilities.

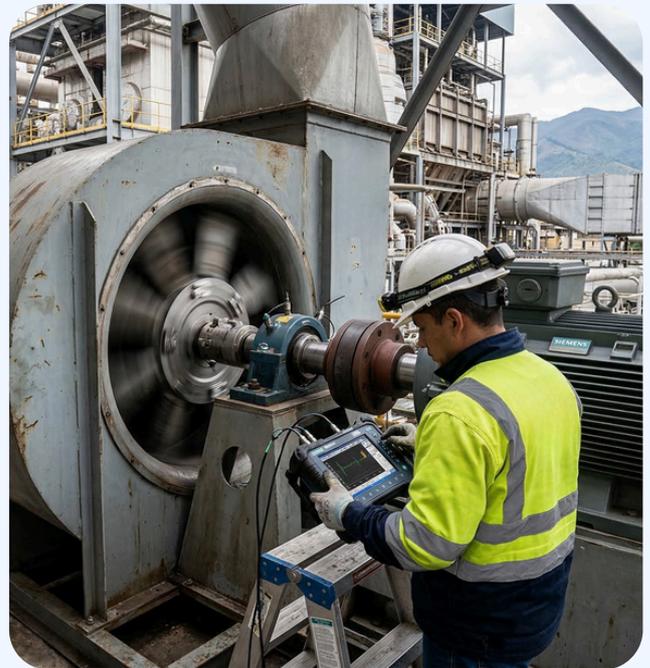
Asset: Induced-draft centrifugal fan, coupled to an electric motor, installed in continuous service. Equipment classified as highly critical due to its direct impact on process operating stability and line availability.

Initial situation: The asset showed a sustained increase in overall vibration at the fan free-end support and at the drive end, with a clear predominance of the 1X running-speed component. The historical trend showed a progressive deterioration in condition, accompanied by increased mechanical noise and reports of higher loading on bearings and supports.

The equipment remained in operation, but its condition indicated a growing risk of accelerated bearing damage, structural looseness, and reduced service life of the rotor-support assembly. Operations was concerned about a possible unplanned shutdown, especially because this was a critical asset with very little margin for unavailability.

Work methodology:

- Review of the initial condition through overall and spectral vibration measurements, confirming 1X predominance and phase stability consistent with unbalance.
- Elimination of more probable concurrent causes, such as dominant misalignment, severe mechanical looseness, or structural resonance, based on the observed vibration pattern and the equipment behavior under steady-state conditions.
- Definition of an in-situ dynamic balancing strategy under a technical criterion aligned with ISO 21940 practice for a rigid rotor.
- Placement of a trial weight, acquisition of amplitude and phase data, calculation of the correction vector, and determination of the final mass/position.
- Application of the correction on the fan rotor and subsequent verification with a new vibration data acquisition.
- Issuance of a technical recommendation for condition follow-up, inspection of fasteners, and periodic trend monitoring.



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Technical findings identified:

After the correction, 1X vibration was significantly reduced and the equipment returned to a more stable operating condition. The post-correction vibration signature was consistent with a clear reduction in the unbalance effect, allowing the asset to remain in service with less exposure to secondary mechanical damage.

Conclusiones: The case confirmed that the dominant failure mode was rotor unbalance, detectable and correctable in the field through a structured methodology of measurement, analysis, and mass compensation. The intervention made it possible to restore the fan's mechanical condition without the need for an extended shutdown or complete disassembly of the assembly.

From a business standpoint, in-situ dynamic balancing provided a high cost-benefit solution: it reduced the risk of functional failure, improved asset reliability, and enabled more controlled maintenance planning.

Indicadores de impacto:

- Reduction in overall 1X vibration: 40% to 70%
- Reduction in the risk of premature damage to bearings and supports: high.
- Potentially avoided unplanned shutdown: 1 critical event.
- Savings from avoiding a major unplanned intervention: EUR 6,000 to EUR 18,000.
- Expected improvement in operating stability and service life of the rotor-bearing assembly: moderate to high.

