CASE STUDY

LASER ALIGNMENT

Sector: Food and Beverage

Asset: 132 kW motor + gearbox + main drying fan, with belt drive at the final stage. This is a critical assembly for the operational continuity of the process, since any loss of mechanical stability in the train directly affects drying capacity, maintenance planning, and the risk of unplanned shutdown.

Initial situation: The plant was experiencing recurring vibration, premature belt failures every 4–6 months, and elevated temperature at the motor drive-end support. The observed pattern was especially significant because, after several belt replacements, the problem reappeared without a clear cause and without sustained improvement in equipment performance.

During the review, it was identified that the degradation was not due to a single isolated element. The findings showed a combination of geometric and mechanical deviations that explained the abnormal stress on the train:

- Soft foot on one of the motor's rear feet.
- Angular misalignment at the motor–gearbox coupling.
- Pulleys out of coplanarity and uneven tension between belts.
- Secondary signs of accelerated wear associated with lateral transmission stress.

Work methodology:

- Laser alignment of the motor–gearbox assembly, correcting angular and parallel deviations.
- Laser pulley alignment on the belt drive, verifying the actual coplanarity of the system.
- Soft foot verification, with correction by adjusting supports and shims.
- Inspection of base condition and anchor tightening, to ensure mechanical stability and repeatability of the adjustment.
- Belt tension check, correcting load irregularities between belts.
- Recording of the initial and final condition, leaving a reference of verified tolerances for subsequent follow-up.

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Identified technical findings:

- The methodology applied was based on shaft alignment criteria accepted in ANSI/ASA S2.75 and on good practices for installation, adjustment, and mechanical verification after intervention. The technical approach was not limited to "aligning the coupling," but rather to validating the system as a mechanical assembly: support, geometry, transmission, and mounting condition.

- As a result of the intervention, the necessary shims were corrected, lateral displacements affecting the transmission were eliminated, and the asset was left in a verifiable and repeatable geometric condition for future inspections.

Conclusions: The case showed that the main problem was not only the belt or only the coupling, but the combination of deficient support, incorrect installation geometry, and misaligned transmission. This combination generated lateral stresses and additional mechanical loads that accelerated deterioration of the assembly.

Laser alignment, performed with a precision maintenance approach and accompanied by basic mechanical verifications, made it possible to stabilize the asset, reduce vibration severity, and decrease the recurrence of the failure. Beyond correcting a specific deviation, the intervention addressed the physical root cause of the problem and established a technical basis to sustain equipment reliability in operation.

Impact indicators:

- Reduction in overall vibration of the assembly: 25–45%.
- Temperature decrease at the critical support: 8–15 °C under steady-state conditions.
- Estimated increase in belt service life: 1.5 to 2.5 times.
- Decrease in corrective incidents in the train: 30–50% in subsequent operating cycles.
- Expected improvement in maintenance planning: lower recurrence of non-resolving replacements and better traceability of mechanical condition