CASE STUDY

ULTRASOUND

Sector: Petrochemical.

Asset: Process steam line with a float and thermostatic steam trap installed at a critical heating point. Medium-high criticality asset due to its impact on energy efficiency, process thermal stability, and the risk of condensate not being properly managed.

Initial situation: The plant was showing high steam consumption in one of the process areas, with no clearly identified cause in the general instrumentation. Operationally, there was no evident failure, but there were thermal variations and efficiency losses in the system.

There was suspicion that one or more steam traps were failing under an internal leakage condition, allowing the continuous passage of live steam. The problem was that this condition is not always evident during a visual inspection and can remain undetected for long periods, generating energy overconsumption and affecting process stability.

Work methodology:

- Field survey: the trap was inspected in operation, together with upstream and downstream points.
- Ultrasonic acquisition: the signal was captured by contact to identify the acoustic discharge pattern.
- Condition analysis: signal continuity and its behavior relative to the expected cycle for this type of trap were evaluated.
- Technical validation: the finding was correlated with the equipment function, process conditions, and the thermal behavior observed in the line.

- Diagnosis: a condition consistent with internal live steam leakage was determined, because the ultrasonic signature showed sustained flow rather than a normal opening/closing or modulation cycle.
- Recommendation: planned replacement of the trap was prioritized during the next maintenance window to avoid continuous energy loss and potential impact on the system.
- Follow-up: expanding the inspection to the complete circuit was recommended in order to detect similar failures and establish a periodic ultrasound route.

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Conclusions: The ultrasonic inspection made it possible to confirm a condition that was not evident through conventional routine methods and that was causing sustained efficiency losses. The finding enabled intervention based on technical criteria, preventing the leak from continuing to affect steam consumption and the area's operational stability.

This case demonstrates the value of ultrasound not only for rotating assets, but also for auxiliary systems and utilities where small leaks can become recurring economic losses. The technique made it possible to prioritize intervention based on evidence and strengthen the system's energy management.

Impact indicators:

- Early identification of internal leakage in the steam trap.
- Reduction of unnecessary steam consumption in the inspected circuit.
- Lower risk of condensate carryover and events associated with unstable operation.
- Scheduled corrective intervention instead of reactive correction.
- Estimated savings: between USD 4,000 and USD 12,000 per year from reduced energy losses, depending on operating hours and the thermal load at the inspected point.