



ALMA - IT Solution for Leakage Detection in the Steam Generator

With ALMA – Advanced Leakage Monitoring & Alerting, STEAG Energy Services GmbH has developed a system for early and reliable notification about boiler leakages, as an add-on to acoustic sensor systems. ALMA reduces false alarms of acoustic sensor systems and even can detect leakages before other systems detect them.

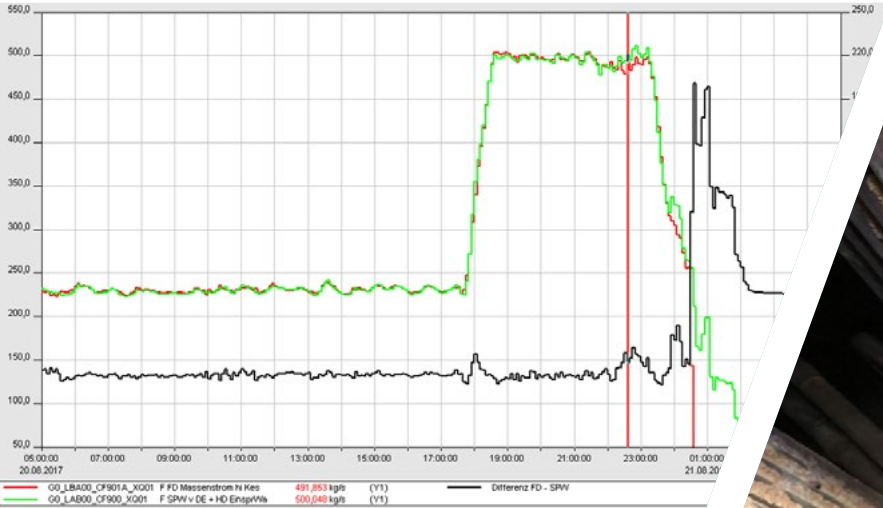
Boiler tube leakages are a frequent cause of plant downtimes and generation losses in thermal power plants. The independent statistics show, that depending on a steam generator's operation time, fuel and design, between two and 15 tube leakages per year will occur. To prevent secondary damages on pressure parts like water wall tubes, superheater tubes, and reheater tubes, the operating engineers constantly have to watch out for leakages. A leakage may damage further tubes; therefore damage increases over the

time. The costs caused by consequential damage can be very high as the repairs take time - this means losses in the sale of the generated electricity.

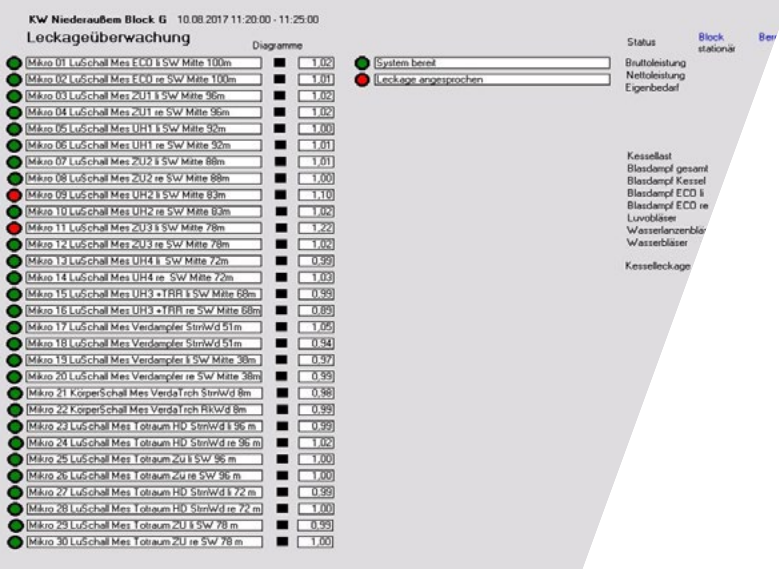
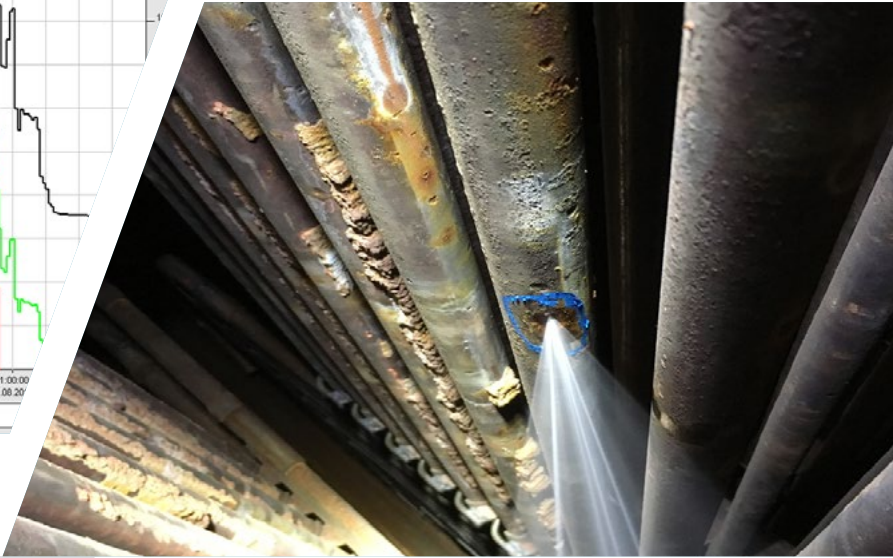
Where acoustic sensors are applied for detecting leakages these systems may cause a relatively high number of false alarms. ALMA is a solution based on SR::SPC, software for predictive analytics and statistical filtering developed by STEAG Energy Services GmbH, that is designed to provide alarms only if statistically significant. ALMA combines an (existing) acoustic sensor system with additional operating data, neural networks, and statistical filtering methods. This intelligent combination of various systems allows to drastically reduce the number of false alarms. Often, leakages are indicated by ALMA before acoustic systems detect them.

Only in the event of concrete indications of a leakage, the plant operators are informed by ALMA. This happens via a graphic display in the dashboard, in the corresponding system for data visualization and analysis, and by sending an alarm signal into the distributed control system (DCS).

In a pilot project at Neurath Power Plant of RWE Power, ALMA was tested with the goal to eliminate false alarms from an acoustic leakage detection system. The trial operation was very successful and meanwhile ALMA is permanently applied for leakage detection at two sites of RWE in six power plant units altogether.



Analysis of events in the ALMA Visualization



Status overview in the ALMA Visualization

ALMA's strong points

- Detection and immediately alarming in the event of a sudden increase of acoustic signals, as supporting information in the sensor data interpretation for the exclusion of other operational causes
- Detection of leakages that cannot be detected by means of evaluation/balancing in the DCS – for example in the reheater bundles
- Early detection of creeping changes

Increasing the plant availability by applying ALMA:

- Early alarming
- Smaller primary damage
- Less consequential damage on adjacent pipes
- Shorter downtimes
- Reliable alarming supports the decision to shut down or continue operation
- Automatic notification by e-mail
- Long-term data archive with comfortable user interface enables easy analysis of the history