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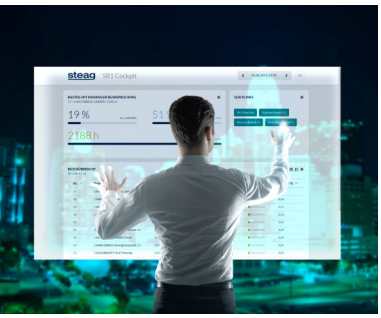
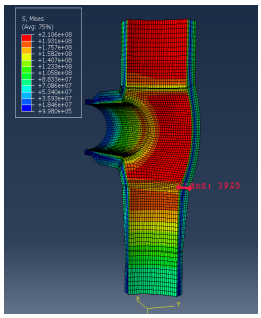
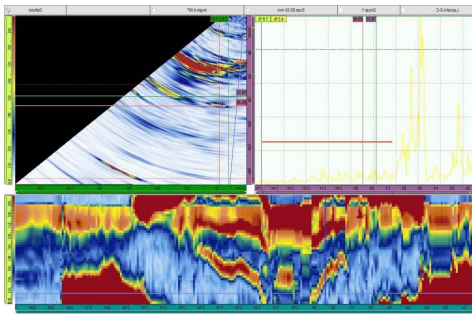
Increased Transition to Flexible Unit Operation in Power Plants



Due to the increasing share of renewable energies in power generation, lignite and hard coal fired power plants need to react more and more flexibly. In various areas of the plant, this leads to increased component wear due to faster load changes and more frequent start-up and shutdown procedures of the power plant units. New methods for assessing the component condition are necessary to continue to ensure the plant safety. Optimal start-up procedures and condition-based inspection intervals are prerequisite for a flexible as well as economically efficient plant operation.

Comprehensive Start-up Monitoring

The solutions by STEAG Energy Services enable a comprehensive start-up monitoring of power plants and are the basis for optimizing the processes. The central goal is to design an optimal start-up procedure from an economic and technical point of view to be able to develop ideal application strategies for the unit.

The following criteria are monitored per start-up procedure:

- Lifetime consumption of components and the related costs
- Fuel consumption
- Start-up time

Wear costs and fuel costs are compared in order to determine optimal start-up transients. The start-up monitoring identifies deviations from the ideal condition and indicates savings potentials. It thus provides an important prerequisite for the decision support at the site – e.g. for new application strategies of the unit, an automation of start-up procedures or a prevention of faults.

Smart Inspection Assessment for a Safe and Flexible Further Operation

High speeds of load changes in combination with maximum and thus economically efficient test cycles can only be ensured if the component condition is known. The flexible operation of today's plants was not considered at the time of the design. Thus it cannot be assumed that the lifetime consumption of the components occurs as originally assumed. Moreover, inspections in the past were mainly limited to creep damage. For a safe and flexible further operation, the component condition has to be determined in terms of low cycle fatigue.

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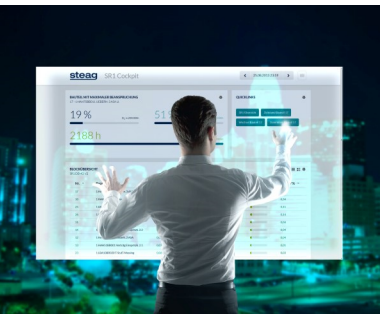


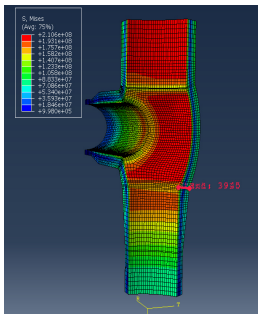
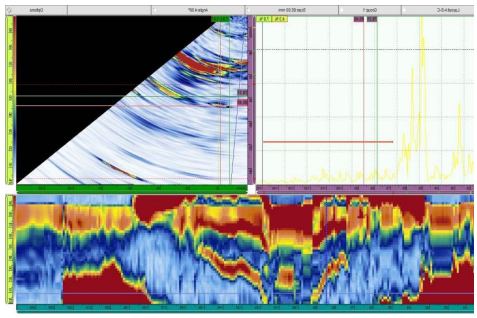

The system SR1 by STEAG Energy Services allows for a realistic calculation of the lifetime consumption and has been in use worldwide since 1989. Conservative assumptions of the design can be replaced in the system by realistic form factors (determined in the context of an FEM calculation). The results are calculatory component reserves that legitimize a more flexible operation.

With SIA (Smart Inspection Assessment), STEAG Energy Services and TÜV NORD SysTec have additionally developed a procedure for enabling a substantiated acceleration of the start-ups and load changes. Here the highly flexible further operation of the components is ensured on the basis of crack projections – even if the history of the operation is unknown. Modern testing and calculation methods are perfectly combined in the process. Based on ultrasonic testing on undamaged components, a formation of cracks is assumed first, and the further expected crack growth is projected online considering records on the mode of operation of the plant. The result: SIA allows defining condition-based inspection intervals to reduce the maintenance costs and ensure the further operation.

Benefits of the Solutions for an Increased Transition to Flexible Unit Operation

- Mastering the balancing act between flexibility and wear by systematically checking the fitness of highly stressed boiler components
- Detecting and utilizing potentials for a flexible operation by means of online monitoring of thick-walled components
- Optimizing inspection cycles and reducing costs by means of condition-based maintenance intervals for ensuring the further operation
- Keeping track of component conditions at all times by means of continuous trend forecasts
- Tapping component reserves by means of modern calculation methods
- Systematically planning the optimal unit operation from an economic and technical point of view
- Reducing the costs of maintenance and repair by means of an improved projection of the component condition
- Reducing emissions owing to an optimized fuel consumption

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