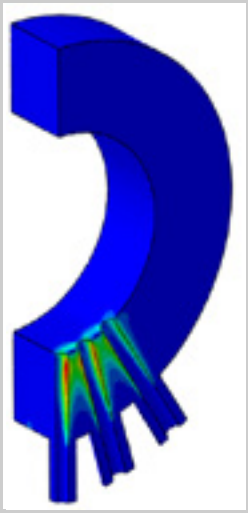
Structural Integrity Associates, Inc.®

HEADER ONLINE DAMAGE TRACKING APP

Temperature gradients in outlet header

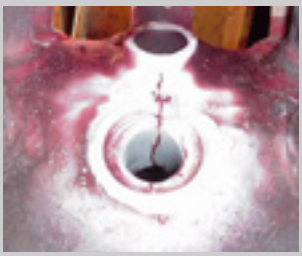


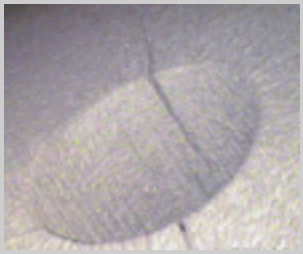
Stress concentrations along header ligaments

THE PROBLEM

There are many features in boiler or HRSG headers that are susceptible to damage due to temperature fluctuations and imbalances. Cyclic (start/stop) operation can result in accumulation of fatigue damage at tube stub connections, or ligament cracks between tube bore holes. Periods of steady operation can result in accumulation of creep damage in header ligaments, branch connections or seam welds. Stub/terminal tubes entering the header can also suffer creep and fatigue damage, as well as wall loss due to oxidation.

Periodic nondestructive examination can be performed to assess if damage has accumulated enough to be detected, but this is expensive, and, often only gives indications close to end of life. Prediction of useful lifetime, therefore, requires tracking of thermal transients, pressure, and temperature. Typically, this is accomplished with snapshots of typical operating data that are used to guide stress analysis. In many cases, however, the snapshots of operating data may not capture damaging conditions.





THE SOLUTION

Tracking creep and fatigue damage in real-time, based on SI's algorithms that use actual operating data and available information on material conditions, combined with component geometry to provide accurate life consumption estimates. This allows trends in damage accumulation to be tracked to guide life management decisions, such as the need for targeted inspections, or more detailed "off-line" analysis of anomalous conditions.

The Header Online Damage Tracking App includes a number of algorithms for creep and fatigue damage at header ligaments, stub tubes and branch connections. It also provides life consumption estimates for terminal tubes including the effects of creep and wall loss due to oxidation. To accomplish this, existing operating data for pressures, temperatures and flow rates, and temperature data from terminal tube thermocouples, are extracted from the data historian. The Header Online Damage Tracking App continuously calculates Creep and Fatigue life consumption. Projections of remaining life are provided based on damage trends.

The quantitative information can then be used to plan for needed action, or allow for justification to reduce required inspection scopes, which were previously determined based on schedule, rather than on actual asset condition. Our software can be configured to provide email alerts when certain absolute damage levels are reached, or when a certain damage accumulation over a defined time frame is exceeded. In this way, the Header Online Damage Tracking App can run hands-off in the background, and notify maintenance personal when action might be required.

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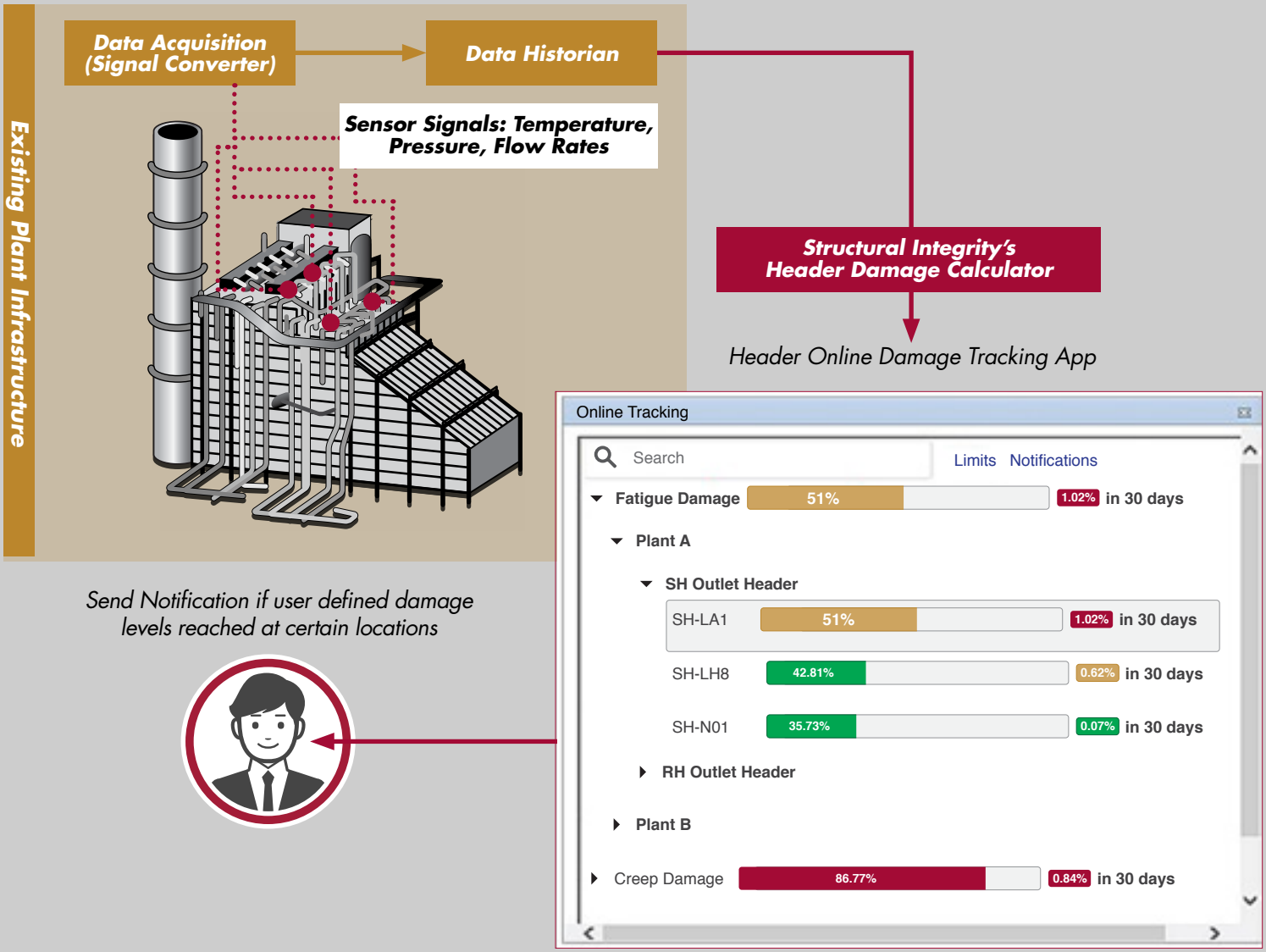

PlantTrack Online

Online provides a suite of real-time damage tracking applications for common plant components: piping, headers, tubing, attemperators, etc. These applications interface to common DCS / Historian systems allowing for easy implementation, including analysis of historical data where that exists.

PlantTrack Offline

Offline provides web-based graphical data management of design, configuration, inspections, failures, repairs, etc.

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