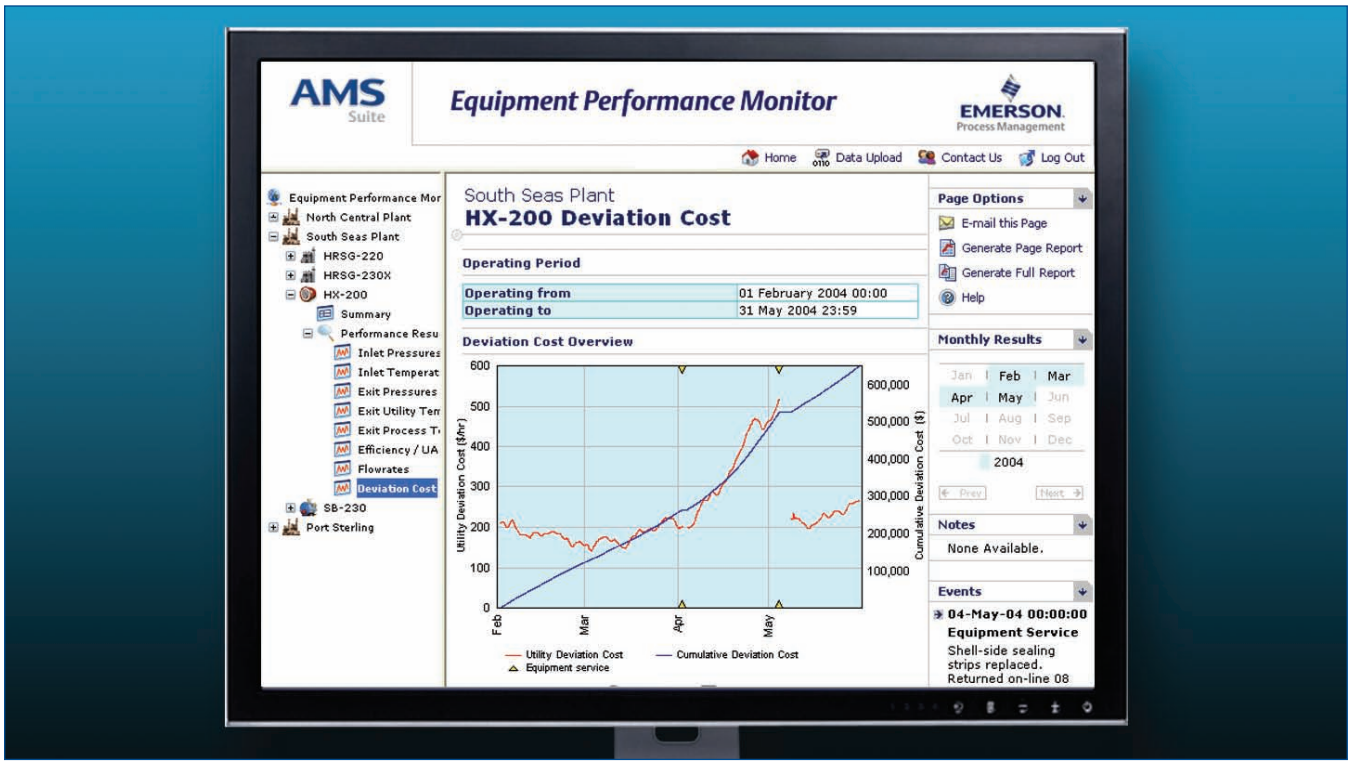
Performance Monitoring - Heat Exchangers



Fiscal effects of degradation, based on performance at design/clean operation.

- *Improve heat transfer efficiency and effectiveness to reduce operating costs*
- *Monitor exchanger surface fouling*
- *Increase exchanger availability*
- *Tighten existing temperature control loops*
- *Reduce downtime by targeted maintenance*
- *Apportion optimal heat recovery on exchanger networks*
- *Make best use of available process and utility heat*
- *Evaluate maintenance effectiveness*

Enable Predictive Maintenance

AMS Performance Monitor helps achieve peak performance of Heat Exchangers. It facilitates the move to predictive and proactive maintenance programs, maximizing equipment performance.

Equipment Categories

- Process-Utility Heaters/Coolers
- Process Exchangers
- Steam Condensing (including sub-cooling)
- Water Boiling (heat recovery/quench)
- Multi-Pass
- Air-Cooled
- Direct Contact

The list is not exhaustive due to the many variants of exchangers. AMS Performance Monitor can monitor any exchanger, provided it is adequately instrumented.

Success Stories

- Monitored the effects of upstream disturbances on operation and implemented appropriate changes to control scheme, achieving 1% increase in throughput.
- Quantified fouling effect on performance and scheduled targeted maintenance, saving downtime and maintenance expense.
- Modified operations (control) within heat transfer network based on operating characteristics to reduce utility consumption by 2%.

Capabilities

- Continual assessment of heat exchanger performance relative to design.
- Quantify effects of fouling on exchanger thermal and hydraulic performance.
- Determine load independent performance.
- Filter and reconcile process data using rigorous mathematical routines.
- Assess impact of operation on heat exchanger networks.
- Quantify effect of upstream conditions on exchanger operation.

Key Performance Indicators (KPIs)

The following indicators are typically presented based on thermodynamic, custom-built models for each heat exchanger:

- **Heat Exchanger Duty** - Heat exchange between streams, based on process load.
- **Heat Transfer Coefficient** - Determined by thermodynamic balances. Includes effect of fouling on heat transfer surfaces.
- **Heat Transfer Effective Index** - Heat transfer coefficient corrected for changes due to exchanger loading, allowing comparison at different operational rates.
- **Operation Percentage of Design** - With respect to heat transfer coefficient.
- **Process / Utility Side Pressure Drop** - Determine pressure drop across tubes and indicate fouling.
- **Tube-Side Fouling Coefficient** - Based on pressure drop, with correction for flowrate, to quantify actual surface fouling.
- **Inlet Conditions** - Effects of inlet conditions on performance.
- **Exit Conditions** - Effect of performance on target parameters of exchanger operation.
- **Heat Transfer Degradation** - Determine the effect of degradation on the heat transfer achieved within the exchanger.
- **Flow Fouling Degradation** - Quantify the effect of fouling on the flow characteristics.
- **Cost of Degradation** - Determine cost impact of increased utility consumption due to heat exchanger efficiency reduction.
- **Specific Utility Usage** - Show usage of utility per unit flow of process stream, and reference to expected utility usage.

Heat Exchanger Demonstration available at www.AMSPerformanceMonitor.com

AMS Suite: Equipment Performance Monitor

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