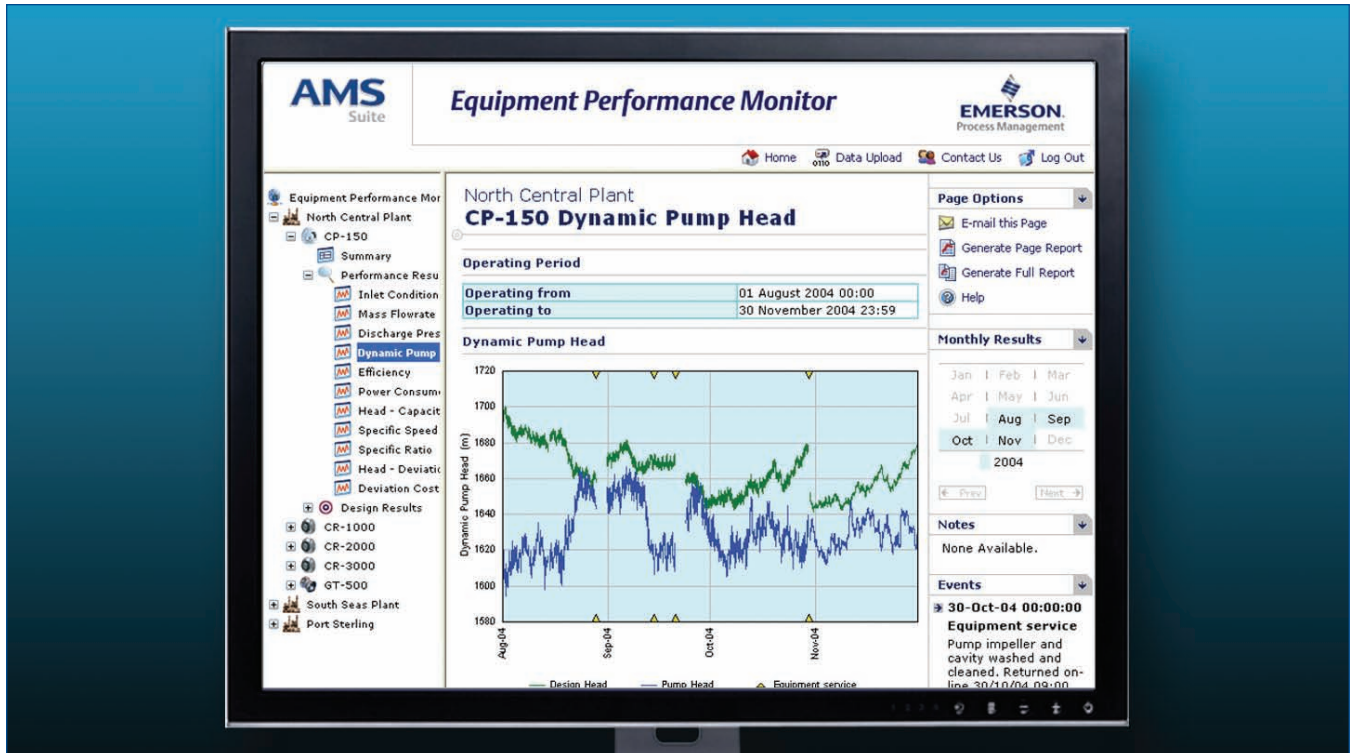


Performance Monitoring - Pumps



Dynamic head production of the pump, relative to design conditions.

- Increase equipment availability and reliability
- Reduce operating costs and maximize throughput
- Assess maintenance effectiveness
- Identify optimum capacity range
- Reduce unplanned maintenance expenditures
- Determine the underlying causes for operating deviations

Enable Predictive Maintenance

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

Equipment Categories

- Positive Displacement
- Rotary
- Centrifugal
- Dynamic / Kinetic
- Multi-stage

Success Stories

- Evaluated an optimum maintenance strategy, reducing the shutdown cycle from every 2 weeks to every 4 weeks.
- Identified and reduced pumping station power consumption levels for an annual utilities saving of \$813,400 per station.
- Determined pump performance from parallel trains to optimize load sharing, reducing unscheduled shutdowns by 80%.
- Identified impeller wear, enabling proactive part procurement, reducing outage and downtime costs.
- Determined optimum speed of pumps throughout lifecycle, allowing delivery of maximum capacity at required discharge pressures.

Capabilities

- Assess performance relative to manufacturer specifications or baseline.
- Conduct detailed thermodynamic analysis of machine operation.
- Indicate cavity and impeller fouling.
- Filter and reconcile process data using rigorous mathematical routines.
- Determine best operating practices for total pump capacity.
- Infer stage performance to highlight maintenance requirements.
- Evaluate the effect of operation on efficiency, head generation, and power consumption.
- Diagnose the root cause of performance degradation.
- Optimize load sharing of multiple pumps to minimize energy consumption.

Key Performance Indicators (KPIs)

The following are typically presented using ASME PTC 8.2 and 7.1 thermodynamic custom-built modeling techniques:

- **Pump Capacity** - The volumetric and mass flowrates achieved by the pump.
- **Upstream Conditions** - Trends the suction temperature and pressure of the pump.
- **Exit Pressure** - The exit pressures achieved for both the measured values and the values predicted by the model.
- **Exit Temperature** - The temperature rise of the process fluid, used to estimate operating efficiency where power consumption is not available.
- **Power Consumption** - The power required to drive the pump is modeled to determine pump efficiency.
- **Dynamic Pump Head** - Actual head production of the pump relative to design.
- **Head vs. Capacity** - Scatter plot shows the actual head generation against design curve, identifying degradation and optimum control regions.
- **Efficiency vs. Capacity** - Scatter plot shows the actual pump performance against design curve, identifying degradation and optimum control regions.
- **Operating Loss Cost** - Track cost of performance degradation (based on design/reference).
- **Deviation from Design** - Load-independent analysis of operation below design, enabling tracking of performance degradations.

Pump Demonstration available at www.AMSPerformanceMonitor.com

Emerson Process Management

Asset Optimization Division

835 Innovation Drive
Knoxville, TN 37932 USA
T 1(865)675-2400
F 1(865)218-1401

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