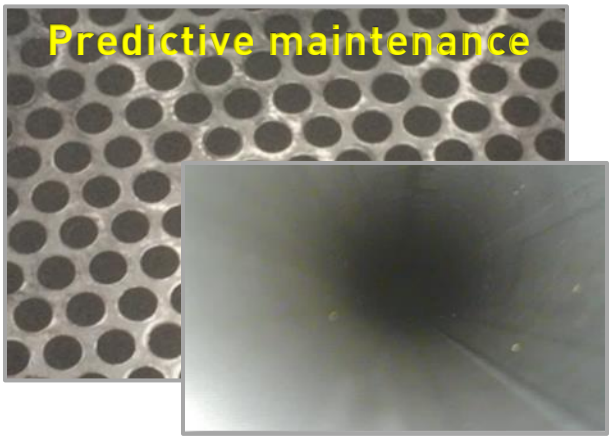
Water Technologies & Solutions
Capability Profile

IVAP* Ethanol Evaporator Analytics

InSight*-enabled monitoring and reporting to help achieve operational goals

Convert from reactive to predictive maintenance

InSight's IVAP analytics (patent-pending) go beyond time-based trending and provide predictive analyses of evaporator performance. IVAP optimizes evaporator maintenance cleanings by replacing traditional time-based scheduled clean-in-place (CIP) programs with performance-based CIPs. This results in reduced energy costs, decreased chemical usage, and increased production run-length.



Features and benefits

Measure – Continuous measurement of % Dry Solids profile across evaporator system

- Monitor system in near real time
- Monitor individual vessel performance
- Optimize distiller's corn oil (DCO) feed
- CIP effectiveness
- Track energy usage

Validate

- Effectiveness of process changes
- Chemical additives
- Verify performance improvements

Report – Intuitive GUI provides

- System KPIs
- Data-driven recommendations
- Health status update

Execute

- Optimize CIP
  - Reduced CIP frequency
  - Reduced chemical use
- Reduced cook water sodium
- Decreased manpower utilization

Predictive capability – Know when and where action is needed to predict and optimize evaporator performance

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CP1194EN.docx Apr-22

Optimized CIP operation

IVAP supports targeted CIPs to focus only on vessels that require cleaning. Typically, decision-making on cleaning evaporator systems can be hit-or-miss regarding when to execute. The IVAP analytics package, in conjunction with a customized chemical program, has delivered up to a 70% reduction in CIP frequency. This leads to a reduction in the use of CIP chemicals, less sodium contribution to the system from caustic, improved production run-length, as well as reduced health and safety risk exposure. With IVAP, CIP frequency is determined by machine learning and customer collaboration to execute action only when and where needed to achieve optimal process capability.

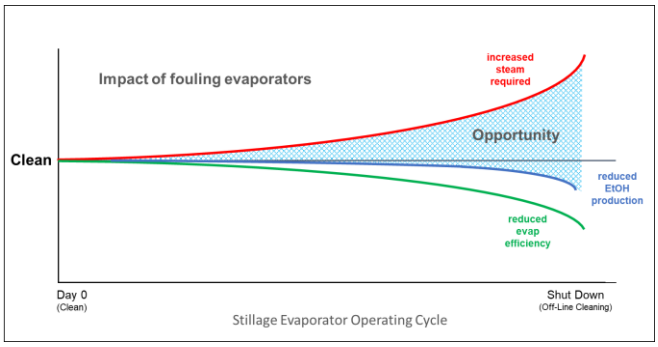

Figure 1: Typical Stillage Evaporator Operating Cycle

Customizable graphic user interface

The IVAP system includes the option to install a customizable graphic user interface (GUI), utilizing producer needs, directly on the producer's DCS (see Figure 1). The IVAP GUI highlights key operational details and provides a snapshot of the evaporator system performance. This can simplify decision-making and reduce the need to review multiple inputs while providing operations staff with actionable data.

Figure 2: Standardized Graphic User Interface (GUI)

Determine the effectiveness of chemical additives

Because IVAP provides a window into the overall performance of each evaporator vessel of the system, it allows measurement of the improvement impact of any products designed to improve performance. This allows for clarity in the cost/benefit analysis of improvement programs to ensure that the additional cost is offset by reducing the overall cost of operation of the evaporator system. IVAP can show performance improvements over and above the initial process entitlement achievable with a non-treated system.

IVAP equipment requirement

- 2" full port ball valves installed within 2 inches of the recirculating line on each evaporator
- 2" full port ball valve installed within 2 inches of the incoming thin stillage feed line to the evaporator system
- 9 sensor safety retraction assemblies (included in IVAP equipment list)
- 9 Emerson toroidal sensors and cable junction boxes (included in IVAP equipment list)
- 5 Emerson Model 56 dual channel transmitters (included in IVAP equipment list)
- 5 Emerson THUM Wireless Transmitters (included in IVAP equipment list)
- Emerson Wireless Gateway (included in IVAP equipment list)
- Emerson Wireless Field Link (included in IVAP equipment list)

IVAP data collection requirements

- Evaporator vessel kettle levels (%)
- Steam flow to the evaporator system (in lb/hr)
- Steam line pressure ahead of the desuperheat section (psig)
- Steam vapor pressure to the 1st effect (psia)
- 1st effect vapor pressure to 2nd effect (psia)
- 2nd effect vapor pressure to beer column (psia)
- Ethanol vapor flow to the evaporator system (gpm)
- Ethanol vapor temperature (°F) to the evaporator system
- Thin stillage feed (in gpm)
- Syrup draw (in gpm)