Today’s Cooling Tower Operational Challenges

Cooling towers are essential to power plant operation but are often overlooked as a source of savings. If not properly monitored and maintained, the towers and the cooling water they provide can adversely affect the reliability, efficiency and cost of the power generating process.

Equipment failures within a cooling tower can be costly to fix, cause forced outages and create an unsafe environment for plant personnel. Additionally, a decrease in cooling tower efficiency raises the tower’s water temperature which degrades performance and increases costs.

Is component vibration detected before it becomes problematic?

Despite the relatively slow rotational speed, cooling tower fans driven by motors and gearboxes create a large amount of inertia. Failures in any one of these components can translate into a destructive force that can significantly damage the tower, put people in harm’s way and cause an extended process shutdown.

Are the cooling tower cells operating in the most efficient manner?

Optimal cooling tower performance is crucial for proper power plant heat exchange. Even the smallest increase in water temperature can adversely affect the rest of the generation process while escalating energy consumption and costs.
Cooling Tower Solutions

Emerson’s cooling tower control and monitoring solutions can enhance a plant’s performance through improved equipment operation and streamlined maintenance. Automated strategies help to identify potential problems, schedule maintenance and prevent unplanned downtime. Applications and their associated benefits are highlighted below.

**Blade balance monitoring**
Monitors blade balance and looseness to reduce the risk of blade fatigue.

**Gearbox monitoring**
Provides early detection of bearing wear for preventative maintenance before equipment failure.

**Condenser backpressure control**
Optimizes cooling tower cell operation for increased megawatt production.

**Pump performance monitoring**
Calculates pump efficiency to ensure optimal operation.

**Motor and shaft monitoring**
Provides early warning of alignment, bearing and looseness issues for corrective action in a safe and cost-effective manner.

**Distributed motor runtime**
Automatically prioritizes cell operation to optimize maintenance intervals.

**Automatic cell balancing**
Equally distributes water flow across all operating cells for efficient heat removal.

**Basin monitoring**
Prevents basin overflow that can result in a reportable environmental event.

**Generate Savings**
Emerson estimates that the average utility can save more than $450,000 annually through automated cooling tower monitoring and optimization. Savings are attributed to reduced water temperatures, decreased power consumption and optimized use cycles.

Source: Emerson Maintains Water Quality and Throughput
## Cost-Effective Automation Solutions that Improve Cooling Tower Performance

### One Platform Delivering Infinite Solutions.

Ovation™ goes well beyond the bounds of traditional distributed plant control. In addition to native advanced applications for optimizing plant operations, Ovation now supports integrated machinery health monitoring and generator excitation as well as embedded simulation and enhanced cybersecurity solutions.

<table>
<thead>
<tr>
<th>APPLICATION</th>
<th>DESCRIPTION</th>
<th>BENEFIT</th>
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<tbody>
<tr>
<td>Automatic cell balancing</td>
<td>Measuring and controlling water flow using a motor-operated butterfly valve and wireless pressure transmitters mounted on each upstream riser</td>
<td>Improves efficiency by evenly distributing water flow amongst cells</td>
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<tr>
<td>Condenser backpressure control</td>
<td>Monitors circulating water temperature and condenser performance to determine cell operation and associated speed settings</td>
<td>Increases available steam turbine megawatts by improving condenser vacuum</td>
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<tr>
<td>Distributed motor runtime</td>
<td>Automatically saves motor runtime and start/stop counts to prioritize cell operation</td>
<td>Assists with maintenance scheduling by optimizing cell start intervals</td>
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<tr>
<td>Pump performance monitoring</td>
<td>Compares calculated pump efficiency with design to determine if the pump is meeting its performance curve within a given tolerance</td>
<td>Reduces pump wear from cavitation by operating within optimized performance limits</td>
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### IMPROVE RELIABILITY

- **Blade balance monitoring**
- **Gearbox monitoring**
- **Motor and shaft monitoring**

**Integrated machinery health monitor with PeakVue™ detects various issues associated with blade looseness, alignment, bearing defects and coupling**

Provides advanced warning of issues for implementing corrective actions in a safe and cost-effective manner to prevent equipment fatigue, damage or failure.

### AVOID FORCED OUTAGES

- **Basin monitoring**

**Sensors monitor the cooling tower basin levels to prevent water overflow**

Avoids reportable environmental events.

### MITIGATE ENVIRONMENTAL RISKS

- **AVOID FORCED OUTAGES**
- **Blade balance monitoring**
- **Gearbox monitoring**
- **Motor and shaft monitoring**

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For more information:
www.Emerson.com/Ovation