

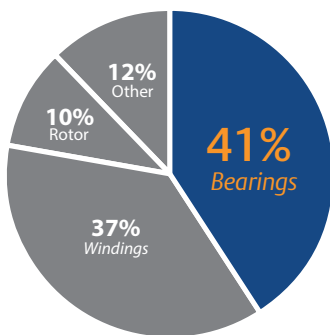
# Increase Cooling Tower Reliability and Operational Flexibility



## Today's Cooling Tower Operational Challenges

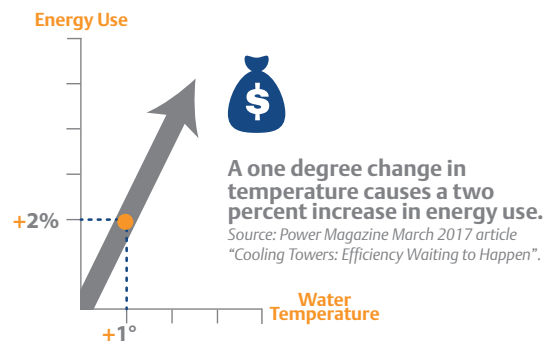
Cooling towers are essential to power plant operation but are often overlooked as a source of savings. If not properly monitored and maintained, the towers and the cooling water they provide can adversely affect the reliability, efficiency and cost of the power generating process.

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.



**Bearings are the leading cause of motor failures.**

Source: EPRI study



## 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

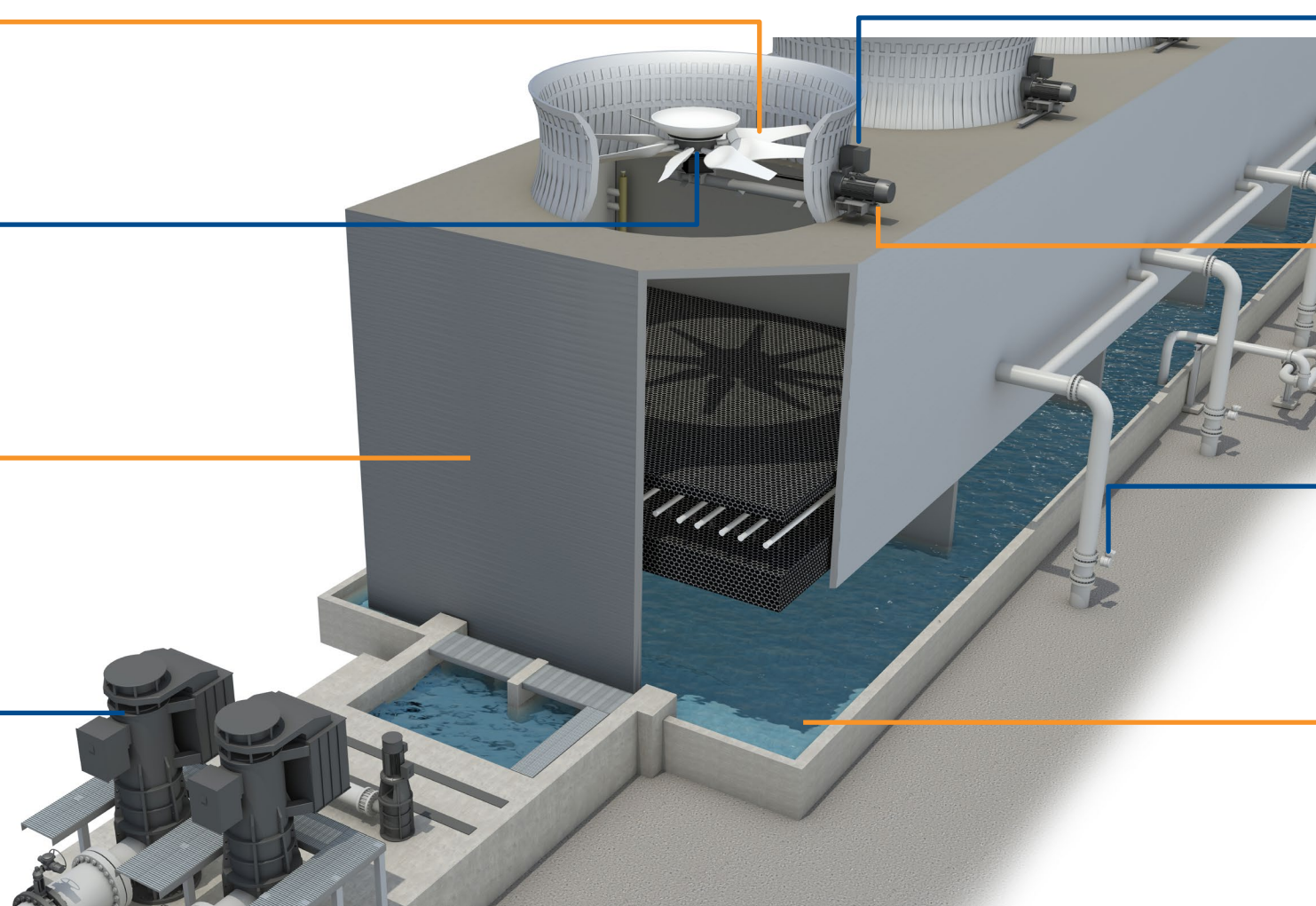
Automatically prioritizes cell operation to optimize maintenance intervals

## 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






\$450,000+  
annual savings

## 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

	APPLICATION	DESCRIPTION	BENEFIT
 <p><b>IMPROVE RELIABILITY</b></p>	Automatic cell balancing	Measures and controls water flow using a motor-operated butterfly valve and wireless pressure transmitters mounted on each upstream riser	Improves efficiency by evenly distributing water flow amongst cells
	Condenser backpressure control	Monitors circulating water temperature and condenser performance to determine cell operation and associated speed settings	Increases available steam turbine megawatts by improving condenser vacuum
	Distributed motor runtime	Automatically saves motor runtime and start/stop counts to prioritize cell operation	Assists with maintenance scheduling by optimizing cell start intervals
	Pump performance monitoring	Compares calculated pump efficiency with design to determine if the pump is meeting its performance curve within a given tolerance	Reduces pump wear from cavitation by operating within optimized performance limits
 <p><b>AVOID FORCED OUTAGES</b></p>	Blade balance 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
	Gearbox monitoring		
	Motor and shaft monitoring		
 <p><b>MITIGATE ENVIRONMENTAL RISKS</b></p>	Basin monitoring	Sensors monitor the cooling tower basin levels to prevent water overflow	Avoids reportable environmental events

## 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.