Emerson Vibration Monitoring Solutions

Early Detection Improves Power Plant Rotating Equipment Reliability

Increased cycling of power generating units amplifies the stress placed on rotating equipment which can introduce premature component wear and other thermal-related issues. If left undetected, misalignment, imbalance, looseness or other mechanical wear problems can escalate and eventually cause significant equipment damage, machine failure or even an unplanned outage.

Emerson's Ovation™ automation technology provides both native protection and condition monitoring of rotating assets to identify developing faults well in advance of a costly breakdown.

The high-performance Ovation Machinery Health™ Monitor module plugs directly into a standard I/O base for continuous online supervision of vibration and other machinery health parameters. Orbit, waveform and spectrum analysis display capabilities make it easy to quickly determine the root cause of rotating equipment issues.

Ovation's integrated vibration monitoring solution reduces the complexity of machinery analysis, helping to alleviate operational, integration and maintenance issues typically associated with standalone systems.

Operation

Actionable Ovation operator alerts and intuitive displays enable proactive identification and diagnosis of vibration issues before they escalate into expensive problems.

Integration

Embedding vibration monitoring directly into the Ovation system increases reliability, reduces maintenance and safeguards data by eliminating integration risks.

Maintenance

As part of the Ovation platform, machinery health monitoring is supported by Emerson's comprehensive lifecycle programs for cybersecurity and long-term service.

OVATION™

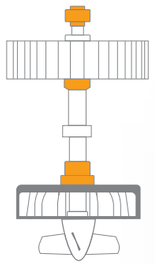
EMERSON™

One Platform Delivering Control, Protection and Condition Monitoring

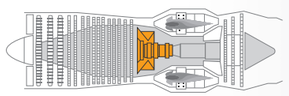
Vibration events can develop slowly over time and then quickly escalate to failure with little to no warning, putting the safety of your plant operations and staff at risk. Ovation technology brings vibration data into the control room by continuously monitoring the health of critical power plant rotating equipment such as gas, steam or hydro turbines; condensate or boiler feedpumps; FD, ID or PA fans; reciprocating engines; and cooling tower fans and gearboxes. And, unlike protection-only systems that typically alarm only after damage has occurred, Ovation HMIs display smart alerts with actionable information that engage operators early in the failure process.

Alerts are generated based on analysis parameters calculated by the Ovation system using sensor peak and phase values as well as Emerson's patented PeakVue readings for rolling element bearings. The parameters are displayed on Ovation workstations in the form of alarm lists, trends and vibration plots for quick troubleshooting and diagnosis of emerging issues, without the need for a specialized analyst or separate training. With early vibration detection, equipment can be taken offline in a planned fashion and maintenance proactively scheduled, substantially reducing costs.

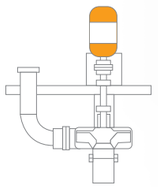
Hydro Turbine



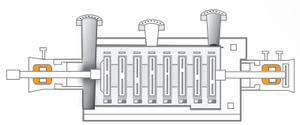
Gas Turbine



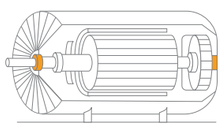
Condensate Pump



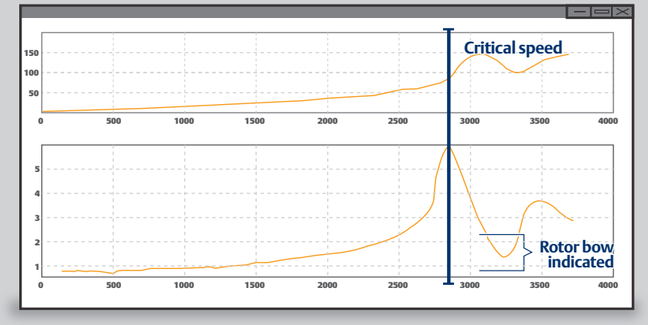
Boiler Feedpump

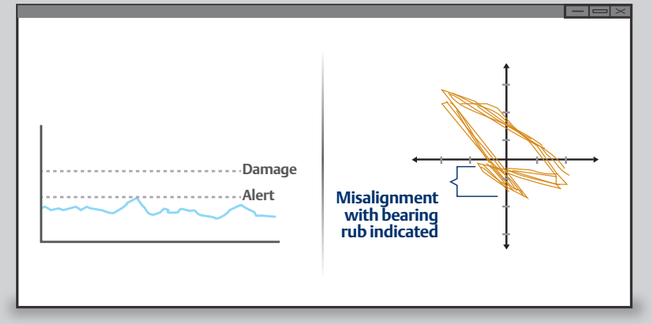


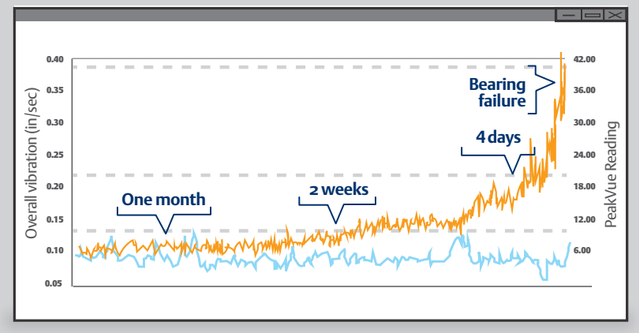
Generator/Motor

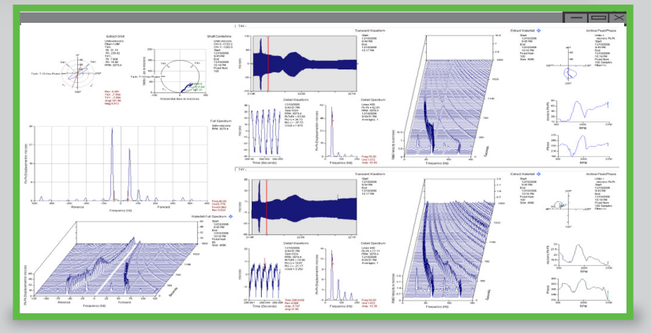


Ovation Alert - Potential Vibration Issue







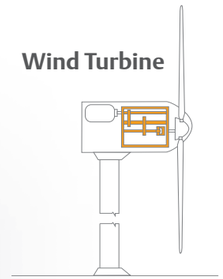


Ovation System Display
Protection & Prediction

AMS Machine Works Display
Advanced Condition Monitoring

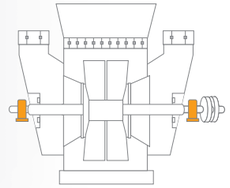
Legacy System Display
Protection-Only

Wind Turbine

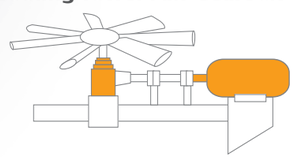


Steam Turbine

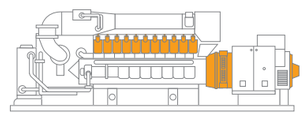
FD-ID-PA Fan



Cooling Tower Fan-Gearbox



Reciprocating Engine



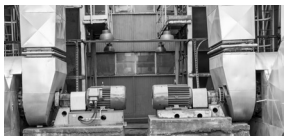
OVATION™

EMERSON™

Integrated Solution Reduces Downtime and Associated Costs

In today's increasingly cost-conscious environment, Ovation's advanced warning of developing vibration issues helps to reduce the business impact of maintenance downtime including lost revenue, Equivalent Availability Factor (EAF) and unit derate. Protection-only systems that alert upon failure result in escalated costs due to extended outages and more substantial repairs.

Below are a few examples of power plant rotating equipment vibration issues that compare the consequences of running to failure versus early operator intervention in response to an Ovation alert.

Issue	Factor	Run to Failure	Ovation Alert
Bearing Lube Oil Clog FD fan *20MW unit derate* 	Repair downtime	6 weeks	2 weeks
	Lost revenue	~$2.2M	~ $730k
	EAF	11.5%	3.83%
Thrown Turbine Blade Coal-fired steam turbine *600MW plant derate* 	Repair downtime	12 weeks	6 weeks
	Lost revenue	~$131M	~ $66M
	EAF	23%	11.5%
Generator Bearing Tilt Pad Wear Combined cycle steam turbine *150MW plant derate* 	Repair downtime	12 weeks	6 weeks
	Lost revenue	~ $33M	~ $16M
	EAF	23%	11.5%
Bearing Fretting Combined cycle boiler feedpump *150MW plant derate* 	Repair downtime	1 week	1 day
	Lost revenue	~ $685k	~ $98k
	EAF	1.9%	0.3%

BENEFITS

- Reduces downtime
- Decreases maintenance costs
- Minimizes revenue loss
- Decreases unit derate
- Improves EAF

OVATION™

For more information:
www.Emerson.com/Ovation

EMERSON™