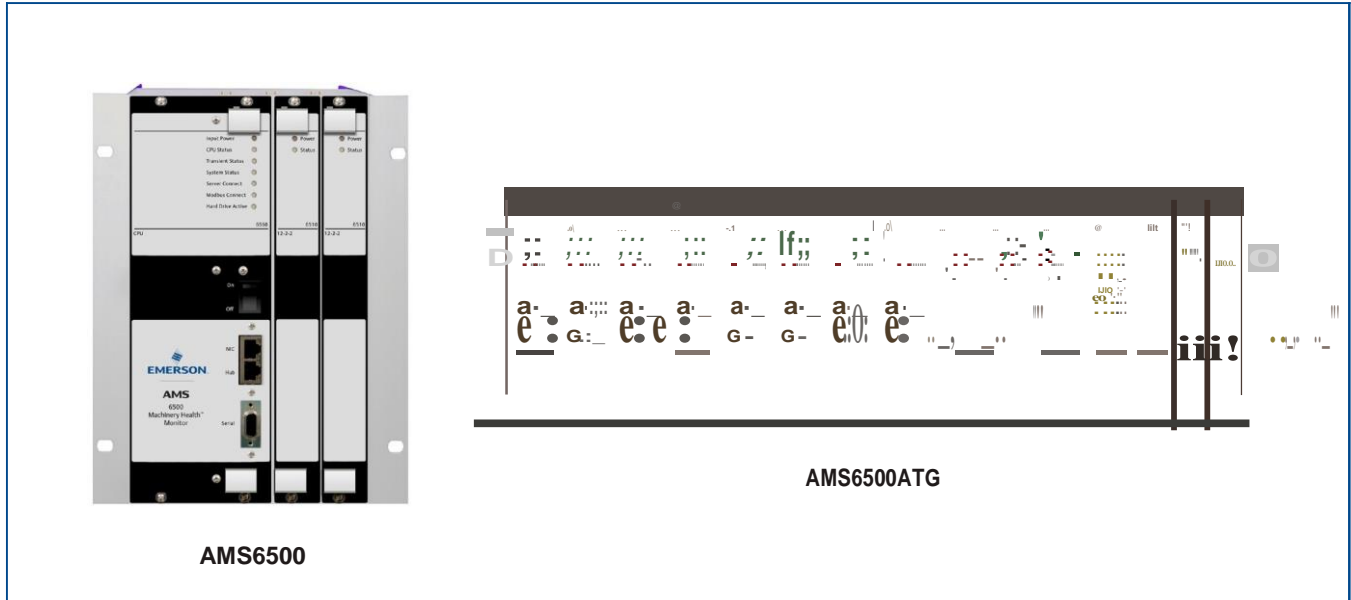


AMS 6500 and AMS 6500 ATG Balance of Plant Prediction Monitors



Flexible condition monitoring systems with PeakVue™ mechanical stress detection.



Overland Mining Conveyor- Typically the conveyor drives and tension roll bearings are the components monitored. When one drive on this conveyor is down the whole mining operation is down.

Online Vibration and Process Monitoring

Every facility has assets and processes that fall into different reliability criticality categories, and most can be monitored using periodic manual data collection. For rotating assets, the most effective data collection is bearing and casing vibration readings with typical data collection once per month. But for some assets and the processes associated with them, this approach is insufficient to characterize the asset or the process health. Not knowing the moment-to-moment state of particular assets and processes could result in an unscheduled failure that brings the process to a halt, causing lost productivity.

Online monitoring provides frequent measurements 24/7 so you are "always aware" of asset health. Online monitoring is always in place and ready to collect data, especially during transitional states such as start-ups, during commissioning and coastdowns. Online measurements are collected from permanently installed sensors to provide more accurate, repeatable measurements.



Frequent data collection associated with online monitoring requires an applied intelligence in the system to know what data is meaningful and what data is not. To be relevant, the data must be collected correctly and grouped appropriately- for example; mixing data collected at different speeds can lead to inaccurate diagnosis. Data from different machine set points such as different running speeds and process loading should be segregated so the data makes sense. To address this issue, Emerson's condition monitoring systems provides:

- Adaptive monitoring technology using state-based acquisition and state-tracked history
- Order tracking analysis
- Flexible prediction monitoring setup with a wide selection of analysis features



Cooling Tower Fans- typically the fan motor and gearbox are candidates for monitoring. Loss of a cooling tower fan gearbox could limit available cooling and reduce production capacity.

Online data should be collected frequently to allow analysis that includes details from every state the asset experiences. It is not enough to collect data every few hours, once a day or longer. Data should be collected every few minutes, or more frequently depending on the asset. The data should be vetted to determine if there is a notable change, and if no change has occurred only a predefined storage interval should be archived.



Vertical Water Pumps- pump drive and pump bearings are the components monitored. Loss of one pump could affect the ability to meet peak water demands.

Data showing alarms or significant percent changes should be stored more often. Emerson condition monitoring systems address these challenges using:

- Fast data collection- each Emerson online system is equivalent in speed to the AMS 2140 route-based collector with all channels updated in as little as a few seconds
- Data vetted against multiple collection types:
 - Alert-based collection
 - Percent change-based collection
 - Periodic collection
 - State-based collection, such as speed
- Transient data collection such as the on board DCR (Digital Condition Recorder) that acts as a "black box" with FIFO archiving of data, or permanent storage of short transient events based on alert, scheduled or manual selection.
- Live data mode for reviewing data in real time.

Online data collection should also be effective in describing the mechanical severity of the machine being monitored. An analyst should not have to wade through massive amounts of data to determine the asset health status and what assets are nearfailure. To simplify asset mechanical health analysis, Emerson provides:

- Transient data collection
- PeakVue'M technology for detecting mechanical failure using PeakVue values and waveforms.
- Exception Reporting

Emerson's unique PeakVue technology was developed by in-house experts, and has been field-proven to be a most effective and reliable indicator of mechanical damage severity. Based on an easy to understand severity scaling, PeakVue technology provides the earliest indications of machine degradation.

An online system should be able to be deployed in a wide variety of applications. Emerson's condition monitoring systems are able to be installed as:

- Traditional wall-mounted cabinets
- 19-inch rack-based cabinets
- Portable systems for temporary installations and trouble-shooting
- Mod bus transmitter- based in the field
- Layered prediction on top of existing protection systems



SAG and Ball mills at an ore processing facility- typically the mill drives, the mill gearbox and mill bearings are monitored. Loss of one SAG mill could result in a significant production shortfall.

In addition, an online monitoring system should be able to deliver data in whatever format is required for analysis, such as:

- Single or double-integration for working between acceleration, velocity and displacement signals.
- Fast measured (seconds apart) and calculated values such as NX amplitude and phase over several orders of running speed and many other parameters.

Online monitoring systems should be able to withstand corrosive and extreme environments while meeting safe component standards. Emerson's condition monitoring systems meet the following standards:

- CSA C1 02, ATEX Z2, Marine for the AMS 6500 ATG
- RoHS/REACH compliance
- Conformal coated electronics
- Shock and Vibration tests



Large Centrifugal Fan -typically the fan drive and fan bearings are the components monitored. This fan does not have a backup.

AMS6500ATG

Emerson's AMS 6500 ATG introduces a new ground-breaking approach for machinery shutdown protection. The ATG release comes with an easy two card measurement card set, embedded OPC UA and Mod bus RTU, Machine Studio advanced setup software, multiple agency approvals and basic prediction capabilities including PeakVue technology. Emerson expands on this basic prediction to full prediction capability with AMS Machinery Manager version 5.7 or higher. Existing AMS 6500 ATG users will need to install an Emerson supplied prediction enablement kit to implement the full prediction capabilities.

This new ATG prediction application allows AMS Machinery Manager software to communicate directly over Ethernet to the ATG to provide full waveform and spectrum analysis as well as event-based transient data based on alert, schedule or demand. Protection measurement security is maintained by using Machine Studio as the sole configuration source.

ATG prediction provides a rich trend, spectrum and waveform history for an analyst to evaluate machinery health status. The full functionality of AMS Machinery Manager is available including the transient Advanced Analysis Tools.

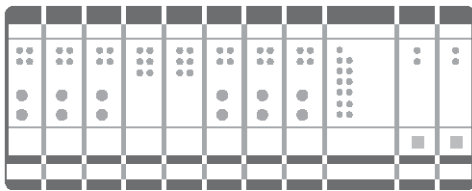
The AMS 6500 ATG is the perfect choice to deliver full prediction and shutdown protection to such BOP assets as 10 and FD fans and BFP (boiler feedwater pumps). The combination of the ATG and AMS Machinery Manager is ideal for more common BOP assets located in dangerous environments and therefore requiring agency approved monitoring solutions. And this combination can be part of a plant-wide reliability approach which includes AMS 6500 prediction, AMS 9420 wireless prediction and AMS 2140 portable route-based prediction.

AMS 6500 ATG- the Bottom Line

AMS Machinery Manager reads the waveform and spectral data from the AMS 6500 ATG and handles it as it would data from any other Emerson vibration data collection device. The full capabilities of AMS Machinery Manager can be applied, including bearing and gear analysis, and all reporting capabilities.

The AMS 6500ATG is a versatile condition monitoring system with built in logic for special measurement setup, Modbus RTU and OPC UA communications, event transient data capture, multiple agency approvals and the ATG View mobile application. Whether deployed as a full online protection system or a full prediction system, the AMS 6500 ATG can deliver everything you need for asset or process protection and health analysis.

Select a Prediction System

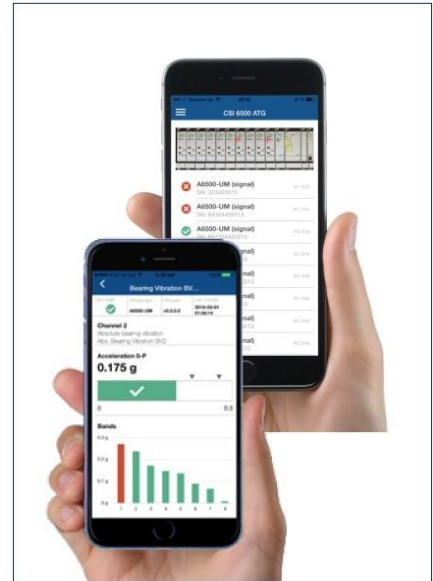


Use AMS 6500 ATG Prediction for	Use AMS 6500 Prediction for
Hazardous rated areas; CSA C102, ATEX Zone 2 and Marine	Safe, non-hazardous rated areas
API 670 critical turbomachinery protection	Prediction assets without critical shutdown criteria
Prediction on an ATG protection system	Prediction layered on top of existing protection
AMS 6500 ATG system expansion	AMS 6500 prediction system expansion
Event, scheduled or demand based transient	100 hour, Digital Condition recorder FIFO transient

Analog Channels	up to 44 (2 full ATG racks)
Tachometer Channels	Same as analog
Fmax /Sampling Rate	18.75kHz /48k samples per second
ADC Resolution	24 bit
Data Available	Spectrum, Waveform, PeakVue Waveform
Lines of Resolution/ Samples	400 /1 024 Modbus based
Voltage Input Type /Impedance	±24V AC+DC (A6500UM) / >100KQ (diff)
Sensor Power (ICP)/Impedance	0 to 8ma at 25V / >100 KQ (differential)
ChannelScan	All channels simultaneous
Units	English, Metric, Hz, CPM, order
Scaling	Linear and Log
High frequency detection	PeakVue Value and PeakVue Waveform
Hardware Communications	OPC UA, Modbus RTU & TCP/IP
Operating Temperature	-20°C to 70°C (-4°F to 158°F)
Vibration IEC60068-2-6 (operating)	2g @ 55-150Hz, 3 axes
Shock IEC60068-2-27 (operating)	10g, 4000 shocks per axis, 3 axes
Relative Humidity	5 to 95% non-condensing

AMS 6500 ATG Advanced Prediction and Transient (requires Machinery Manager V5.61 or higher)

Analog Channels	up to 44 (2 full ATG racks)
Tachometer Channels	Same as analog
Fmax /Sampling Rate	37.5kHz /96k samples per second
Lines of Resolution	200 up to 51 200
GRAB Event Length	960k samples per channel
ChannelScan	All channels simultaneous
GRAB Prediction/Transient Trigger	Alert/ Scheduled/ Demand
GRAB Transient Trigger (abrt)	Pre/ Postconfigurable
GRAB Software Viewing Modes	Replay with speed control, up to 11 chan.
GRAB Software Analysis Tools	Bode/ Nyquist and many more



AMS 6500 ATG features the ATGView mobile application, allowing you to be "always aware" of asset and online system health

AMS6500

The AMS 6500 is a versatile condition monitoring system whether deployed as a standalone Modbus transmitter, a full online prediction system, or embedded or layered on top of an existing machinery protection system. The AMS 6500 delivers everything you need for asset prediction or process health analysis.

All AMS 6500 systems are available with optional Transient DCR 100-hour data recording. With the 100 hour DCR, you can see on Monday morning a replay of what happened at any time during the weekend. The AMS 6500 comes in a portable version- the AMS 2600. Many consultants find a AMS 2600 with Transient to be very useful for machinery and structural analysis. Transient files can be downloaded into ME'Scope Modai/ODS software to perform detailed cross channel modal analysis.

The updated AMS 6500

The AMS 6500 has many improvements over prior releases. The AMS 6500 processor card has been completely redesigned around a modern FPGA processor which runs faster and cooler on less power. The new electronics are RoHS and REACH compliant. The new AMS 6500 is compatible with all prior versions of the monitoring system as long as they are all managed under AMS Machinery Managerv5.61 or higher with the latest patch. The A6560R processor card functions as a "monitoring" card and the A6560RT provides "transient" functionality by adding the transient hard drive and enabling the transient functionality in the firmware. The transient hard drive has evolved to SSD (solid state drive) mSATA technology, making it more compact and reliable with more capacity. Emerson has made a significant investment to update the AMS 6500 technology to deliver on our AMS 6500 lifecycle commitment for many years to come.

Contact your local Emerson sales person to receive a demonstration of prediction capabilities or to get a quote on your condition monitoring requirements.



*A6500MS-12-L1 with 12CH, PeakVue, Modbus
A6500MS-24-L1 with 24CH, PeakVue, Modbus
ALSO:
A6500TS-12 Transient 12 channel version
A6500TS-24 Transient 24 channel version
PeakVue and Modbus are options for these transient models
Wall Mount Cabinet:
A6500MS-24-ENCL-IC(24" tall x 16" wide x 12" deep)*



*A6500MR-12 monitoring 12 channel version
A6500MR-24 monitoring 24 channel version
A6500MR-36 monitoring 36 channel version
A6500MR-48 monitoring 48 channel version
Also available as "A6500TR" Transient versions
PeakVue and Modbus are options for these models
Wall Mount Cabinet:
A6500PRE-SS-WM-IC (36" tall x 24" wide x 12" deep)*



*Protection with Embedded Prediction (NOTE:
all protection cards sold separately)
A6500PM-12 monitoring 12 channel version
A6500PM-24 monitoring 24 channel version
ALSO:
A6500PT-12 Transient 12 channel version
A6500PT-24 Transient 24 channel version
PeakVue and Modbus are options for these models
Custom cabinet designs are available*

AMS 6500 ATG General	
Analog Channels	12or24(1 or2A6510)
Tachometer Channels	2 or 4 (0.1-2kHz, to 60kHz divided to ,2kHz), (0.5V to 24V)
Relay Channels	2 or 4 (SPOT 24V at 0.5A dry contact)
Fmax \dot{f} Sampling Rate	40kHz /102.4k samples per second
ADC Resolution/Dynamic Range	24 bit /100 dB conservatively measured
Lines of Resolution	100 up to 6400
Voltage InputType /Impedance	\pm 24V AC+DC /1 MQ (differential)
Sensor Power (ICP) /Impedance	4ma at 22V /500 KQ (single ended)
Channel Scan	2 Channel simultaneous
Channel Scan Rate Example	1 second; 2CH, 400 LOR, 400Hz, 1 average
Gross Scan	All channels continuous
Units	English, Metric, Hz, CPM, Order
Scaling	Linear and Log
Windows	Hanning, Uniform
Averaging	Summation, Exponential, Time Synchronous Averaging, Order Tracking, PeakVue
High frequency detection	PeakVue
Hardware Communications	Modbus
Operating Temperature	-20oc to 60oc (-4oF to 140oF) active cool above 49oC (120oF)
Vibration IEC60068-2-6 (operating)	5g@ 57-500Hz, 3 axes
Shock IEC60068-2-27 (operating)	30g @11ms, 3 axes
Shock IEC60068-2-27 (non-oper.)	50g @8ms, 3 axes
Relative Humidity	5 to 95% non-condescending

AMS 6500 OCR (Digital Condition Recorder)Transient Option	
OCR Analog Channels	12 or 24 (1 or 2 A6510-T)
DCR Tachometer Channels	2 or4
DCR Fmax \dot{f} Sampling Rate	2kHz \dot{f} 5120 samples per second
DCRADC \dot{f} Dynamic Range	16bit / >80dB
DCR Lines of Resolution	200upto51200
DCR Length	100 hours all channels \dot{f} FIFO
DCR Channel Scan	All channels simultaneous
DCR Transient Auto/Manual Archive	Up to 60min. from Alert/Scheduled/Demand
DCR Viewing Modes	Replay with speed control, up to 11 chan.
OCR Advanced Analysis Tools	Bode \dot{f} Nyquist, Shaft Centerline, Full Spectrum and many more



AMS2600
Portable AMS6500
20.25" x 16" x 8.25", 30 LB



A 48-channel AMS 6500 deployed in a A6500PRE-SS-WM-/C wall mount enclosure, monitoring SAG and Ball mills at an ore processing facility

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