



EMERSON EXCHANGE 2025

# ACCELERATING INNOVATION



ACCELERATING  
INNOVATION

# Maximize Field Device Management using AMS Device Manager and AMS Trex

4-1828

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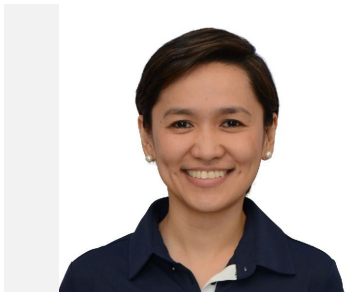
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# Agenda

**The Importance of Reliability**

**Focus on Instruments and Valves**

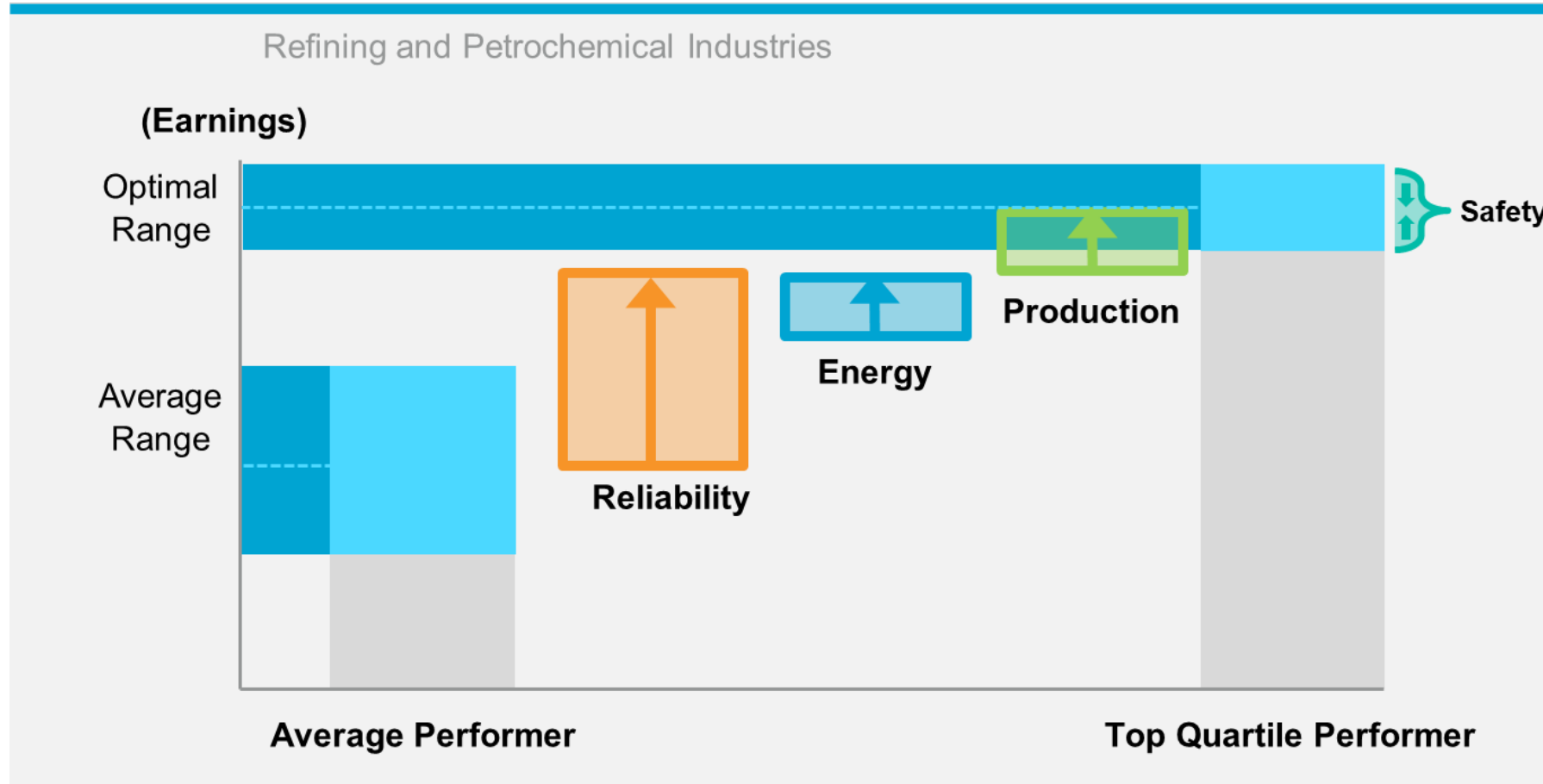
**AMS Device Manager**

**AMS Trex**

# The Importance of Reliability

# The Biggest Opportunity is Reliability

## Comprehensive Improvement Program

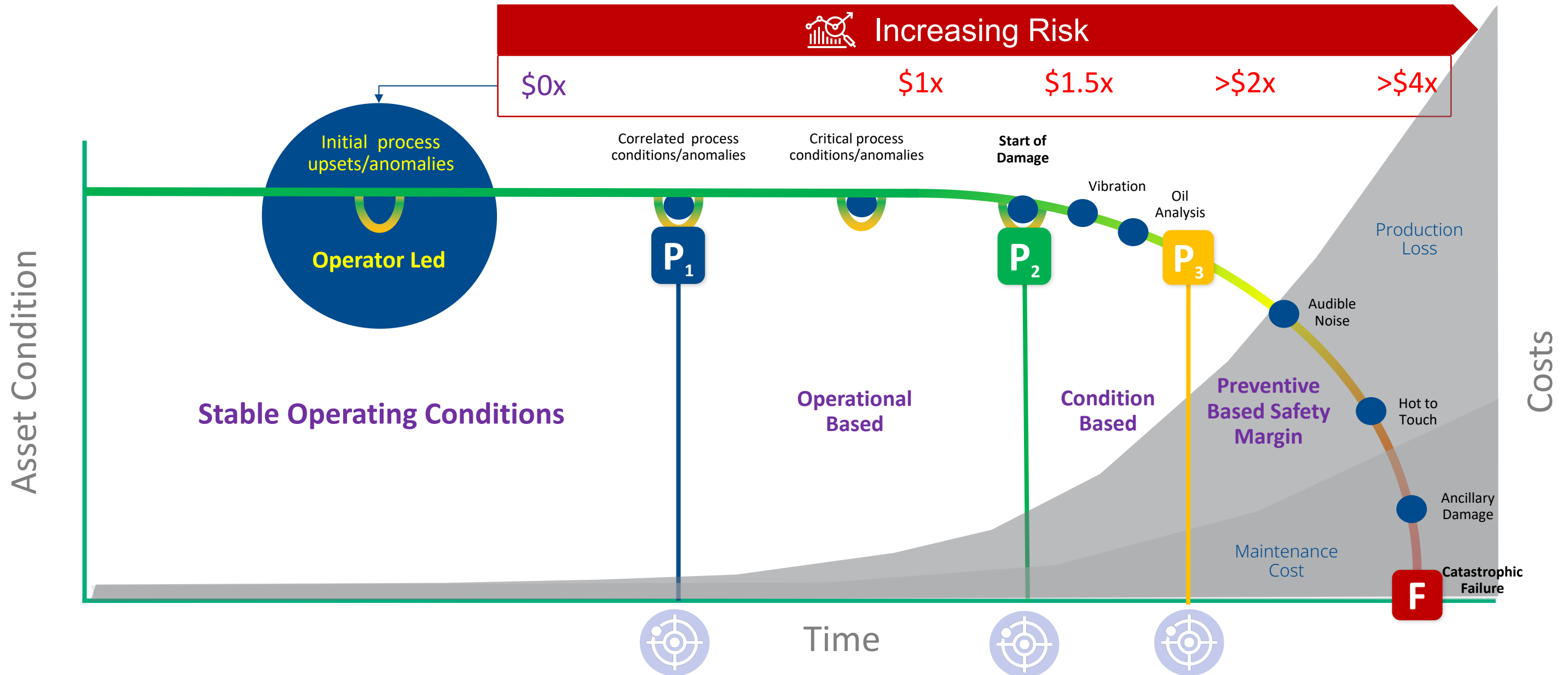


Source: Benchmarking Data & Internal Estimates; Note: EBITDA has been used as a proxy for Business Performance (Earnings)

## Opportunity Breakdown




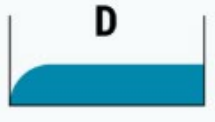


<b>Reliability</b>		
Data Architecture & Management	▶	7 - 10%
Work Management & Practices		
<b>Production</b>		
Feed to Product Optimization	▶	3 - 5%
Enhanced Decision Support		
<b>Energy &amp; Emissions</b>		
Monitoring & Targeting	▶	3 - 5%
Utilities Management		
Consumption Optimization		
<b>Health, Safety, Security &amp; Environmental</b>		
Mitigate Personnel Exposure	▶	Mitigate Variability
Real-Time Operational Awareness		

# Assets Fail



# Failure Patterns and Percentages Haven't Changed Much

- Most failure patterns are NOT age related (categories A, B, C)
- Most failure patterns are a random (categories D, E, F)
- Time-based or Usage-based maintenance (PM) is NOT for most equipment

Failure Pattern	Distribution				Description	
	UAL 1968	Broberg 1973	MSP 1982	SUBMEPP 2001		
Age related		4%	3%	3%	2%	An initial failure period, followed by the main lifespan of the item, which shows a constant probability of failure. This is followed by a wear-out zone in which the probability of failure increases dramatically.
		2%	1%	17%	10%	As "A" but without the initial early failure period.
		5%	4%	3%	17%	The probability of failure increases gradually, but there is no clearly identifiable average lifespan of the equipment.
Random		7%	11%	6%	9%	The equipment is satisfactory when new, but the failure probability increases rapidly up to a level, which remains constant.
		14%	15%	42%	56%	This type of equipment shows a random failure pattern and again has no identifiable lifespan.
		68%	66%	29%	6%	A high infant mortality is superseded by a rapid drop in failure probability, which then remains constant or increases very gradually.
<b>Age related</b>	<b>11%</b>	<b>8%</b>	<b>23%</b>	<b>29%</b>		
<b>Random</b>	<b>89%</b>	<b>92%</b>	<b>77%</b>	<b>71%</b>		

Bathtub

Wear Out

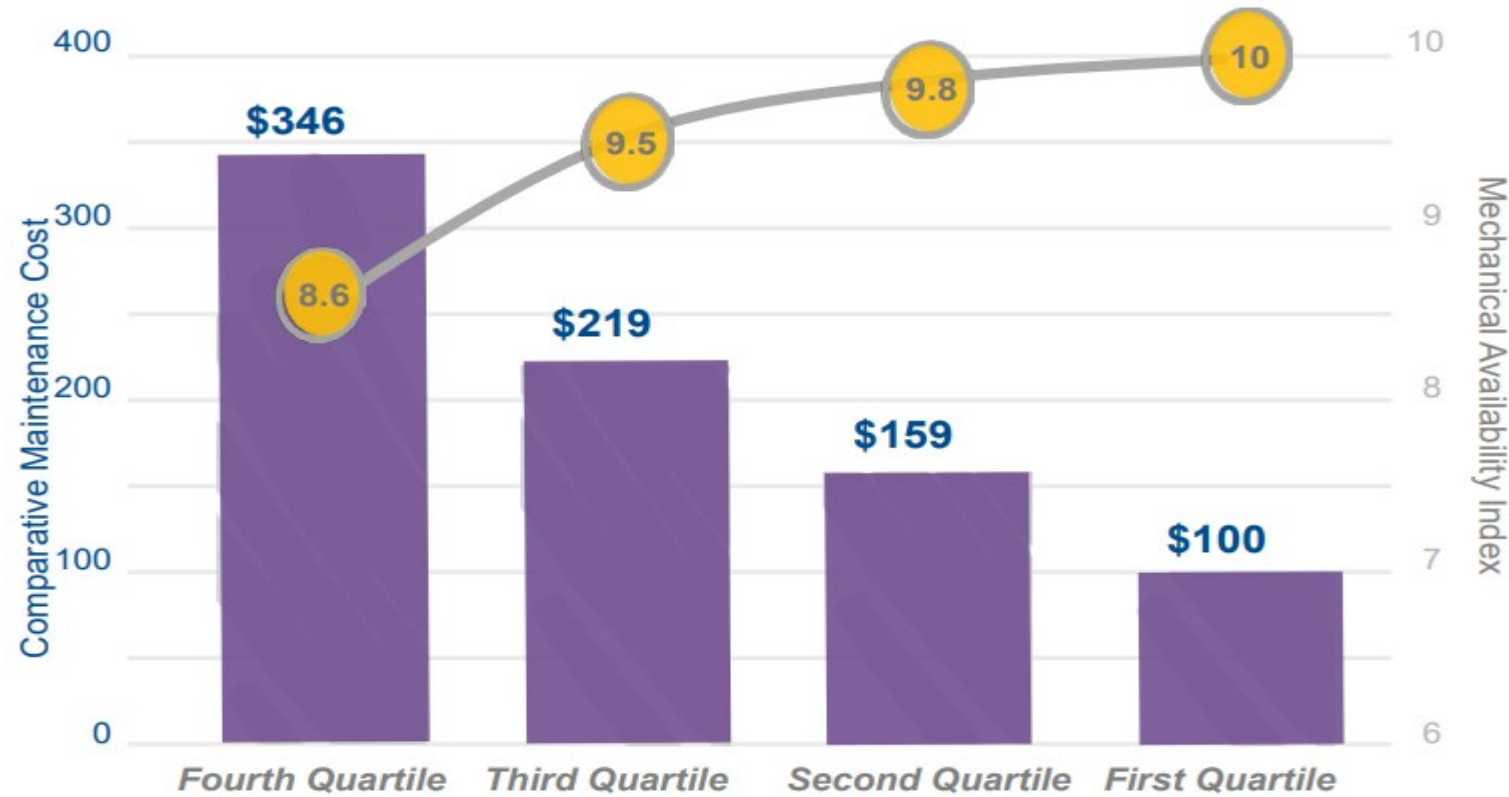
Fatigue

Break-in

Random

Infant Mortality

# It Costs 3.46 Times More Money to Run Unreliably



Based on 2013 Solomon RAM Study, Solomon Associates LLC

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## Reliability-focused organizations have two common characteristics:

- A relentless desire to understand the operating condition of their assets, so they are not surprised by an unexpected failure.
  - The firm expectation that the equipment is not supposed to fail. Any failure is caused by a correctable error that, if understood, can be eliminated in the future.
-

# Focus on Field Devices

# Average Tags by Industry

- Chemical 819 instruments and valves
- Food & Beverage 692
- Life Sciences 434
- LNG 957
- Metals & Mining 454
- Oil & Gas 916
- Power 598
- Pulp & Paper 709
- Refining 768
- Water & Wastewater 371

You have hundreds  
if not thousands of  
instruments and  
valves at your site

# Typical Units and Systems by Industry

## Chemical

6+ key units

- Reactors: 10-20 instruments and 5-10 control valves
- Distillation Columns: 15-25 instruments and 10-15 control valves
- Heat Exchangers: 5-10 instruments and 3-5 control valves
- Absorbers and Strippers: 10-20 instruments and 5-10 control valves
- Evaporators: 5-10 instruments and 3-5 control valves
- Mixers and Blenders: 3-7 instruments and 2-4 control valves

## Food & Beverage

10+ systems and units

- Mixer/Blender: 5-10 instruments and 2-4 control valves
- Conveyor Belts: 3-7 instruments and 1-2 pneumatic control valves
- Refrigeration and Freezing: 4-8 instruments and 2-3 expansion and solenoid valves
- Ovens and Cookers: 6-12 instruments and 2-4 control and pressure relief valves
- Filtration and Separation: 5-10 instruments and 2-4 gas and steam control valves
- Cutting and Chopping: 3-6 instruments and 1-2 pneumatic control valves
- Pumping and Conveying: 4-8 instruments and 2-3 flow control and pressure relief valves
- Canning and Bottling: 5-10 instruments and 2-4 fill and pressure control valves
- Extrusion: 4-8 instruments and 2-3 pressure and flow control valves
- High-Pressure Processing (HPP): 5-10 instruments and 2-3 high-

## Life Sciences

6+ units

- Bioreactor: 10-20 instruments and 5-10 control valves
- Fermenter: 5-20 instruments and 3-5 control valves
- Centrifuge: 5-15 instruments and 3-5 control valves
- Chromatography System: 5-15 instruments and 3-5 control valves
- Lyophilizer: 5-15 instruments and 3-5 control valves
- Mixer/Blender: 5-15 instruments and 3-5 control valves

## LNG

6+ systems and units

- Feed Gas Pretreatment: 10-15 instruments and 3-5 pressure and flow control valves
- Refrigeration and Liquefaction: 15-20 instruments and 5-7 expansion and control valves
- Heat Exchangers and Cooling: 10-15 instruments and 3-5 flow and pressure control valves
- Compression: 10-15 instruments and 3-5 flow and pressure control valves
- Storage Tanks: 8-12 instruments and 2-4 pressure relief and control valves
- Loading: 10-15 instruments and 3-5 flow and pressure control valves

# Typical Units and Systems by Industry

## Metals & Mining

10+ systems and units

- Crushers: 5-10 instruments and 2-4 hydraulic control valves
- Grinding Mills: 8-12 instruments and 3-5 control valves
- Conveyors: 5-10 instruments and 2-4 pneumatic control valves
- Flotation Cells: 6-10 instruments and 2-4 pneumatic control valves
- Smelting Furnaces: 8-15 instruments and 3-5 air flow and dosing valves
- Hydrometallurgical: 6-12 instruments and 4-6 control and pressure relief valves
- Thickeners and Clarifiers: 5-10 instruments and 2-4 control valves
- Electrolytic Cells: 6-10 instruments and 3-5 control valves
- Heavy-Duty Excavators: 5-10 instruments and 2-4 hydraulic control valves
- Drilling Rigs: 5-10 instruments and 2-4 hydraulic control valves

## Oil & Gas

8+ systems and units

- Wellheads: 8-12 instruments and 2-4 control valves
- Separation: 10-15 instruments and 3-5 control valves
- Compression Stations: 10-15 instruments and 3-5 control valves
- Pumping Stations: 8-12 instruments and 3-5 control valves
- Pipeline Monitoring: 10-15 instruments and 2-4 control and pressure relief valves
- Gas Processing: 12-18 instruments and 4-6 control valves
- Storage: 8-12 instruments and 2-4 pressure relief and control valves
- Flare: 6-10 instruments and 2-4 emergency shut-off and pressure relief valves

## Power

9+ systems and units

- Boilers: 10-15 instruments and 3-5 control valves
- Steam Turbines: 8-12 instruments and 2-4 bypass and control valves
- Generators: 6-10 instruments and 2-3 control valves
- Condensers: 5-10 instruments and 2-4 control valves
- Cooling Towers: 6-10 instruments and 2-4 control valves
- Heat Exchangers: 8-12 instruments and 2-4 control valves
- Transformers: 5-8 instruments and 1-2 control valves
- Pumps: 6-10 instruments and 2-4 control valves
- Flue Gas Desulfurization: 8-12 instruments and 3-5 dosing and control valves

## Pulp & Paper

6+ units

- Pulper: 5-10 instruments and 3-5 control valves
- Paper Machine: 10-20 instruments and 5-10 control valves
- Recovery Boiler: 10-20 instruments and 5-10 control valves
- Bleaching Tower: 5-10 instruments and 3-5 control valves
- Evaporator: 5-10 instruments and 3-5 control valves
- Digester: 10-20 instruments and 5-10 control valves

# Typical Units and Systems by Industry

## Refining

7+ units

- Crude Oil Distillation (CDU): 20-30 instruments and 10-15 control valves
- Vacuum Distillation Unit (VDU): 15-25 instruments and 10-15 control valves
- Fluid Catalytic Cracking (FCC): 20-30 instruments and 10-15 control valves
- Hydrotreater: 15-25 instruments and 10-15 control valves
- Reformer: 15-25 instruments and 10-15 control valves
- Sulfur Recovery Unit (SRU): 10-20 instruments and 5-10 control valves
- Isomerization: 15-25 instruments and 10-15 control valves

## Water & Wastewater

9+ systems and units

- Screening: 3-5 instruments and 1-2 control valves
- Grit Removal: 3-5 instruments and 1-2 control valves
- Sedimentation Tanks (Clarifiers): 5-10 instruments and 2-4 control valves
- Aeration: 5-10 instruments and 2-4 air flow control valves
- Filtration: 5-10 instruments and 2-4 backwash and flow control valves
- Disinfection: 4-8 instruments and 2-3 chemical dosing valves
- Sludge Handling: 5-10 instruments and 2-4 control valves
- Pumping Station: 5-10 instruments and 2-4 control valves
- Chemical Feed: 10-15 instruments and 3-5 control valves

# Field Device Management Solutions

# AMS Device Manager

- All registered HART and Foundation Fieldbus devices from every manufacturer
- Integrate up to 30,000 devices so you only need a single database to manage your smart devices
- Connect to 20+ BPCS, SIS, PLC, gateway interfaces, modems, and field communicators
- One system to combine many standalone systems to have a single interface, database, user security, as well as a single system for training, product support, and upgrade



# AMS Trex

- Any HART or Foundation Fieldbus device. Anywhere. Anytime.
  - Commission, provision, configure, diagnose, and troubleshoot
- Take it everywhere – it's intrinsically safe
  - ATEX, CSA (US & Canada), FISCO, and IECEx, there's no need to shut a process down or pull a hot work permit
- Get more done with less
  - No power supply, No digital voltmeter, No resistor
- There's an app for that!
  - Loop Diagnostics, Fieldbus Diagnostics, ValveLink Mobile, WirelessHART Provisioning, Radar Master
- Auto-sync changes made in the field with AMS Device Manager
  - Wi-Fi or USB



# AMS Device Manager

# AMS Device Manager

## Start-up & Commissioning

### *Dupont Saves 20 Days During Commissioning*

Chemical manufacturer (North America)

- Bulk configure devices
- Simulate outputs
- Verify interlocks
- Document work



## Configure

### *Lonza saves 1 hour per instrument*

- Individual or Bulk
- Compare
- Multivariable flow calculations
- Radar level tank setup
- AMS Trex auto-sync
- Document work
- Print reports

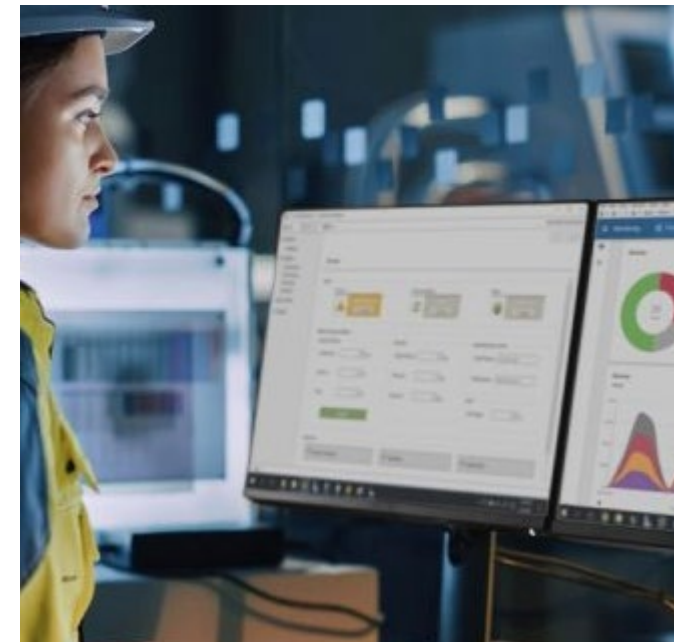


## Monitor

*"If you have the latest instrument technology and AMS Device Manager to monitor them, you don't even need preventive maintenance – or you can push it out from four to seven years."*

**-Lyondell**

- Credible alerts
- Custom alerts
- Manufacturer corrective actions



## Advanced Diagnostics

### *We Energies Improves Control Valve Reliability*

Power manufacturer (North America)

- Valves
- Meter Verification
- Custom Alerts



# AMS Device Manager

## Troubleshoot

"Troubleshooting time has been cut by about 75 percent just by viewing the diagnostics from these smart devices. Everything is right there in front of you."  
- Nu-West Industries

- Manufacturer corrective actions
- AMS Trex auto-sync
- Replace failed devices
- Document work

## Streamline Calibration

"We saved 2,000 maintenance man-hours by streamlining instrument calibrations using AMS Device Manager."  
- Eli Lilly

- Interface with smart documenting process calibrators
- Download test procedures
- Upload results
- Document work
- Reports

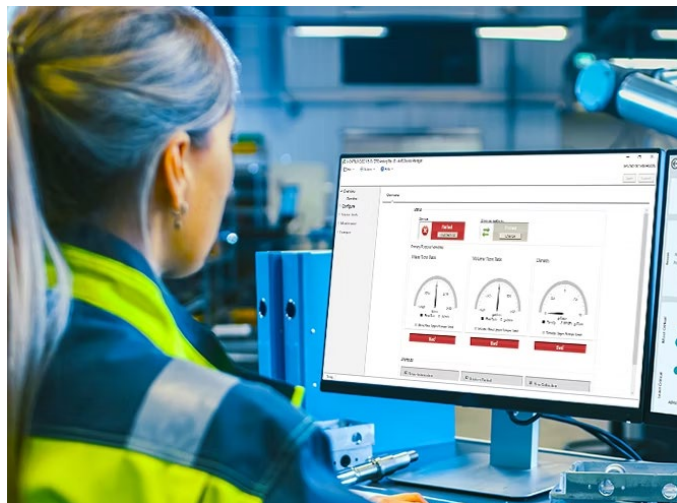
## Documentation

**Appleton Reduces Documentation Man-Hours by 50%**  
Paper manufacturer (North America)

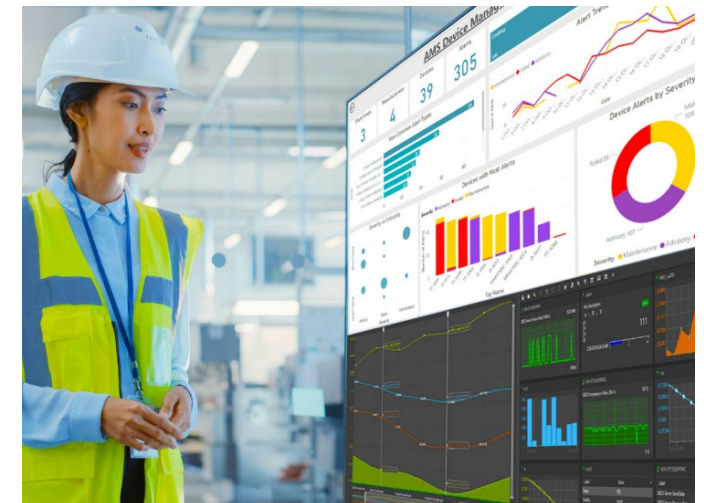
- Actions, alerts & events
- Who Did What & When
- As Found / As Left
- By serial number & tag
- Print, save, and export

## Data Access

- Securely pass data upward to custom dashboards or reports
- Uses MQTT, a lightweight, publish-subscribe, machine-to-machine network protocol



Date	Time	AMS Tag	User	Event Type	Reason
11/8/2023	4:43:15 AM		SD-753...	Application	Successful login of user: SD-753\amsadmin to AMS Device M...
11/8/2023	4:49:07 AM		PS SD-753	Application	AMS Device Manager has been started
11/8/2023	4:47:50 AM		PS SD-753	Application	AMS Device Manager has been shutdown
11/8/2023	4:45:13 AM		SD-753\...	Application	Rebuild Hierarchy performed on USD-753\10.164.192.95
11/8/2023	4:44:52 AM		SD-753\...	Application	Successful login of user: SD-753\amsadmin to AMS Device Ma
11/8/2023	4:44:43 AM		PS SD-753	Application	AMS Device Manager has been started
11/8/2023	4:43:24 AM		PS SD-753	Application	AMS Device Manager has been shutdown
11/8/2023	4:32:48 AM		SD-753\...	Application	Rebuild Hierarchy performed on USD-753\10.164.192.95
11/8/2023	4:31:31 AM		SD-753\...	Application	Successful login of user: SD-753\amsadmin to AMS Device Ma
11/8/2023	4:31:15 AM		PS SD-753	Application	AMS Device Manager has been started
11/8/2023	4:29:25 AM		PS SD-753	Application	AMS Device Manager has been shutdown
11/8/2023	4:27:45 AM		SD-753\...	Application	Rebuild Hierarchy performed on USD-753\10.164.192.95
11/8/2023	4:26:22 AM		SD-753\...	Application	Rebuild Hierarchy performed on USD-753\10.164.192.95
11/8/2023	4:23:06 AM		SD-753\...	Application	Successful login of user: SD-753\amsadmin to AMS Device Ma
11/8/2023	4:23:05 AM		PS SD-753	Application	AMS Device Manager has been started
11/8/2023	4:22:57 AM		PS SD-753	Application	AMS Device Manager has been shutdown
11/8/2023	3:52:18 AM		SD-753\...	Calibration	Default External Lab: Routine Service
11/8/2023	3:35:39 AM		SD-753\...	Calibration	Calibration
11/8/2023	3:25:32 AM	SWITCH_CONV	SD-753\...	Calibration	Disable allow use of test equipment which is past due for calibra
11/8/2023	3:25:53 AM	SWITCH_CONV	SD-753\...	Calibration	Calibration
11/8/2023	3:25:47 AM		SD-753\...	Calibration	Disable allow use of test equipment which is past due for calibra
11/8/2023	2:31:28 AM	SWITCH_CONV	SD-753\...	Calibration	Calibration
11/8/2023	2:29:11 AM	TEST_EQPT	SD-753\...	Configuration Change	Defaulting values
11/8/2023	2:29:11 AM	TEST_EQPT	SD-753\...	Calibration	AMS tag assignment
11/8/2023	2:29:11 AM	TEST_EQPT	SD-753\...	Configuration Change	AMS tag assignment
11/8/2023	2:11:00 AM	SWITCH_CONV	SD-753\...	Calibration	Calibration
11/8/2023	2:11:00 AM		SD-753\...	Calibration	Calibration
11/8/2023	2:04:30 AM	SWITCH_CONV	SD-753\...	Configuration Change	Defaulting values
11/8/2023	2:04:29 AM	SWITCH_CONV	SD-753\...	Calibration	AMS tag assignment
11/8/2023	2:04:29 AM	SWITCH_CONV	SD-753\...	Configuration Change	AMS tag assignment
11/8/2023	1:58:45 AM		SD-753\...	Calibration	Disable allow use of test equipment which is past due for calibra
11/8/2023	12:05:53 AM		SD-753\...	Application	Scan All completed on USD-753
11/8/2023	12:05:52 AM	DVCS200	SD-753\...	Configuration Change	Field change



# AMS Device Manager

## Streamline Shutdowns, Turnarounds, & Outages

*Eli Lilly was able to reduce the number of control valves removed each year from 28 to 7. The amount of time needed for an annual shutdown was cut in half.*

- Run Diagnostics to determine work
- Streamline calibration tests
- Document work



***“10% reduction in routine maintenance.”***

– Alabama Power

***“Saved \$136,800 by avoiding unnecessary valve maintenance.”***

– Chevron/Texaco

***“Reduced nitrogen consumption by \$85,000/year.”***

– Tyco

***“75% reduction in installation and commissioning time.”***

– ExxonMobil Chemical

***“Greater than 10% increase in production.”***

– Cabot

***“Reduced man-hours required for device configuration by 50%.”***

– Agrium



# AMS Trex

# AMS Trex

## Start-up & Commissioning

- Configure devices
- Simulate outputs
- Perform loop diagnostics
- Provision WirelessHART devices
- Document work

## Configure

- Configure devices
- Save and transfer configurations
- Assign network ID and keys to WiHART devices
- Advanced configuration of radar level gauges
- Document work

## Troubleshoot

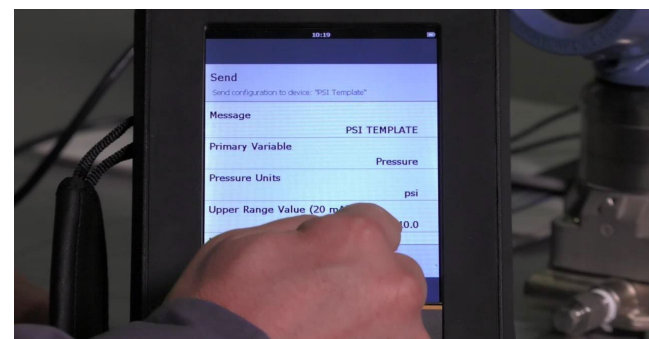
*North America Refinery technicians avoid extra trips back to the DSC room and the need to pull a “hot” work permit, saving them at least one hour of maintenance time and an estimated \$90,000 per year.*

- Access manufacturer provided corrective actions
- Auto-sync with AMS Device Manager
- Replace failed devices
- Document work

## Advanced Diagnostics

*North America Refinery technicians use the AMS Trex Radar Master App about three times per week to diagnose level radar gauges using the graphical echo curve capabilities to adjust radar gauges directly out in the field, saving an estimated \$11K per year*

- ValveLink
- Radar Master
- Loop Diagnostics
- Fieldbus Diagnostics



# AMS Trex

## Streamline Calibration

- Zero trim

## Documentation

- As found, as left data
- By s/n and tag
- Print, save, export
- Auto-sync with AMS Device Manager

## Streamline Shutdowns, Turnarounds, & Outages

- Run diagnostics to determine work
- Zero trim calibration
- Document work



**Device Configuration**

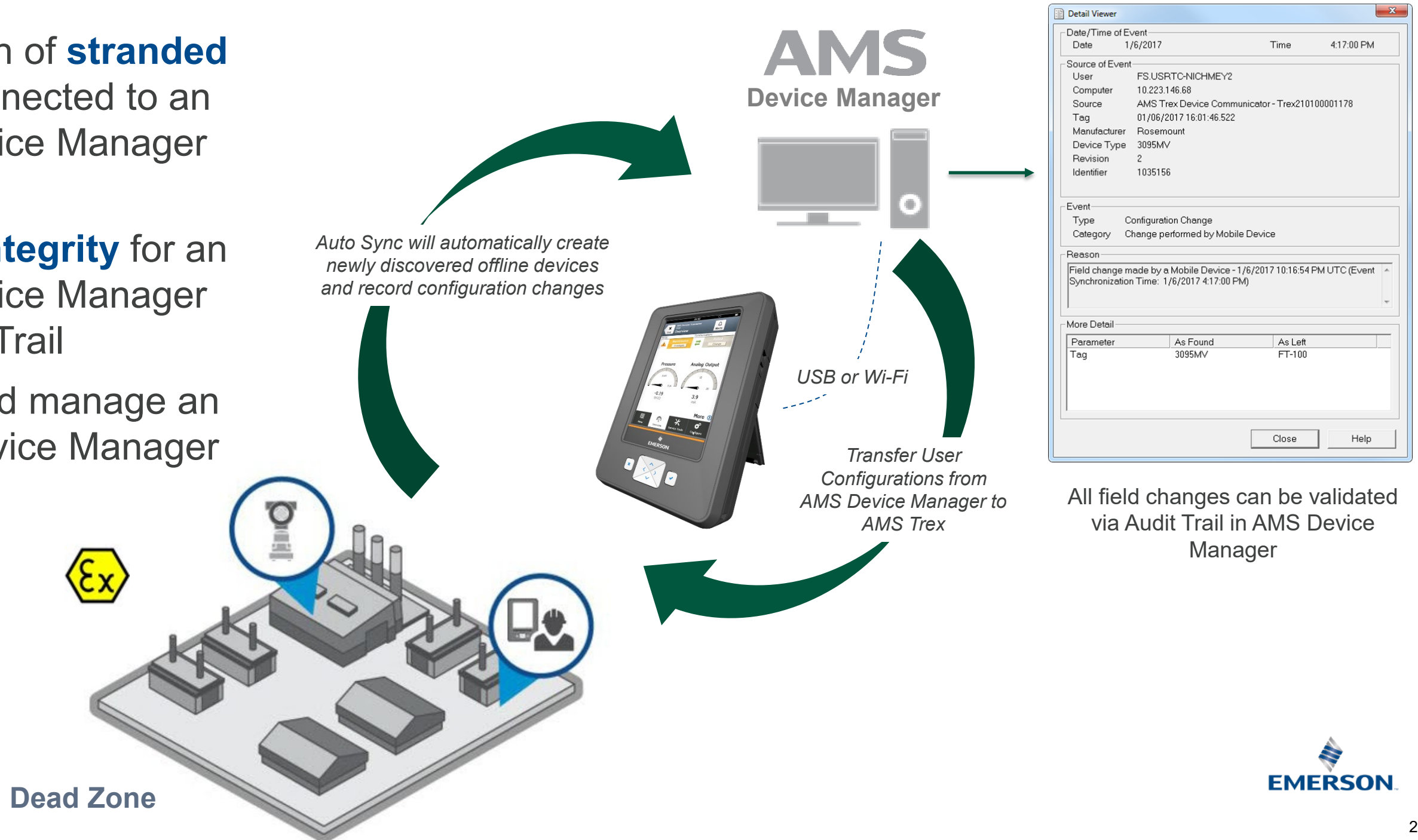
Tag: 87654321  
Device Type: 3051 Pressure Transmitter  
Manufacturer: Rosemount  
224 Variables  
Printed on: 3/20/2017 9:01:15 AM

Parameter	Value	Parameter	Value
(17453:Variable)	NaN	Description	C0FFFFFFFFEE
(17454:Variable)	0	Detailed Status Byte	0x06
(17456:Variable)	Enabled	Detailed Status Byte	0x00
(17484:Variable)	inH2O	Detailed Status Byte	0x00
(17523:Variable)	%	Detailed Status Byte	0x00
(17530:Variable)	mA	Detailed Status Byte	0x00
(17551:Variable)	Enabled	Detailed Status Byte	0x00
(17625:Variable)	*	Dev flags	0x00
(17660:Variable)	0x03	Dev id	16777215
(17661:Variable)	Enabled	Device Diagnostic St.	0x00
(17729:Variable)	00:00:00	Device family	Not used
(251:Variable)	0	Device family	Not used
ACK Count	34	Device family	Not used
Alarm Direction	High	Device Profile	Process automation
Alarm Saturation Typ.	User Specified	Device status	0x98
Analog Output	23.000	Diaphragm Material	Unknown
Analog Output	23.000	Distributor	Rosemount
AO Transfer Functio	Linear	Drain/Vent Material	Unknown
BACK Count	0	Ext dev status	0x02
Burst Message 1	0	External Buttons	Not Present
Burst Message 1	Disabled	Factory Trim Recall	0
Burst Message 2	Disabled	Family status	0 - Unknown Enumer
Burst Message 3	Disabled	Family status	0 - Unknown Enumer
Burst Trigger Class	Pressure	Family status	0 - Unknown Enumer
Burst Trigger Class	Pressure	Family status	0 - Unknown Enumer
Burst Trigger Class	Pressure	Family status	0 - Unknown Enumer
Burst Trigger Units	inH2O	Field Device	10



# Auto-Sync between AMS Trex & AMS Device Manager

- Extend the reach of **stranded devices** not connected to an online AMS Device Manager system
- Maintain **data integrity** for an online AMS Device Manager system in Audit Trail
- Easily create and manage an **offline** AMS Device Manager system



# Data Integrity with Auto-Sync

Auto Sync works exactly like your phone (easy)



## AMS™ Device Manager

Validated Audit Trail of all Changes via Auto Sync

Detail Viewer

Date/Time of Event		
Date	1/6/2017	
Time	4:17:00 PM	
Source of Event		
User	FS.USRTC-NICHMEY2	
Computer	10.223.146.68	
Source	AMS Trex Device Communicator - Trex210100001178	
Tag	01/06/2017 16:01:46.522	
Manufacturer	Rosemount	
Device Type	3095MV	
Revision	2	
Identifier	1035156	
Event		
Type	Configuration Change	
Category	Change performed by Mobile Device	
Reason		
Field change made by a Mobile Device - 1/6/2017 10:16:54 PM UTC (Event Synchronization Time: 1/6/2017 4:17:00 PM)		
More Detail		
Parameter	As Found	As Left
Tag	3095MV	FT-100

Close Help

Date/Time Stamp of Event  
*(date/time captured from AMS Trex)*

Detail about Device, User, and Station

Event Category

Reason  
*(includes synchronization time)*

As Found As Left Details

# Reliability Solutions: Exhibit Hall Booth 139 (Back Left Corner)

## Find More Information



<https://www.emerson.com/en-us/automation/asset-performance-management/field-device-management>

## Contacts

Eric Snyder

## Sessions

AMS Innovations Roadmaps [RDM-1819] Tuesday 10:15 and Wednesday 9:15

Asset Management: From “I Can’t” to “I Can’t Live Without”! [4-1490] Wednesday 11:15

Multi-Site Remote Predictive Maintenance and Control Valve Reliability (Nutrien Potash) [2-1661] Wednesday 1:15



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# Thank You