

The Next Step in Maintenance Strategy Evolution





INTRODUCTIONS

Dan Phillips

- Technical Director of Lifecycle Services for Regal Beloit
- Mechanical Engineering from the University of Maryland Baltimore County
- 15 years of experience in Oil & Gas and Heavy Industries
- Published numerous technical articles on machinery health management, vibration analysis, torque monitoring, and fatigue life prediction

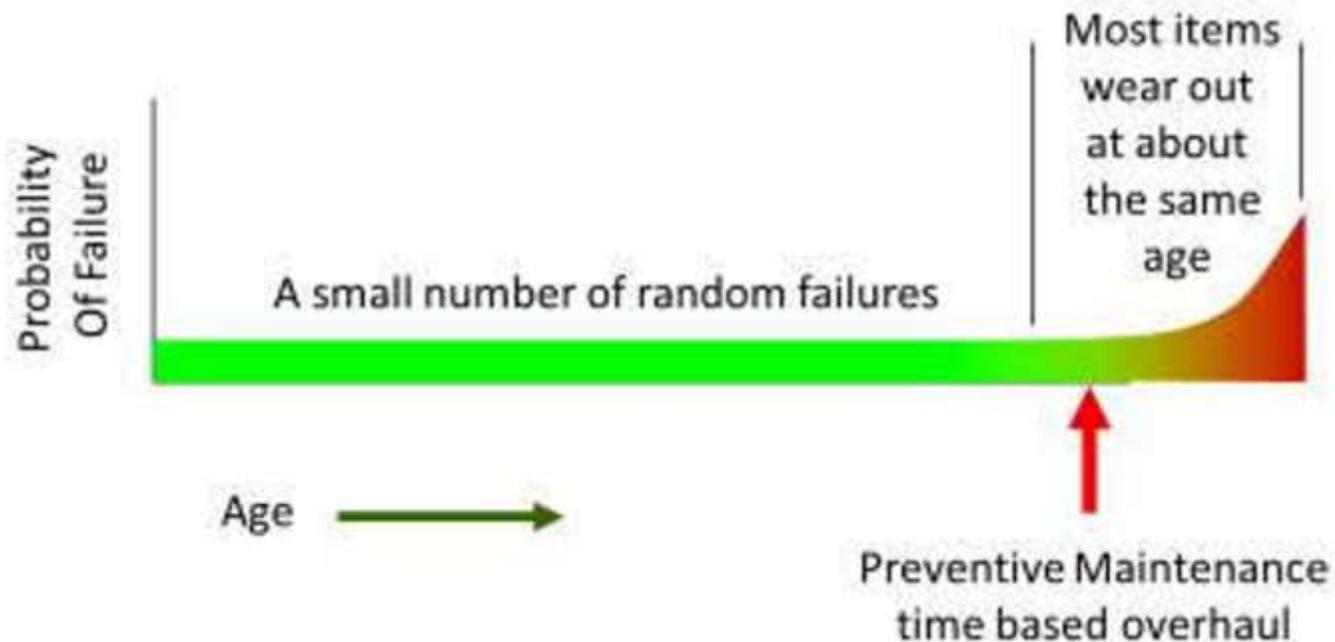
Kevin Jones

- CEO and lead strategist at Ectobox, Inc., an IoT and software consulting company in Pittsburgh, PA
- Certified IoT Professional
- Active in multiple industry organizations

TRADITIONAL VIEW OF MAINTENANCE

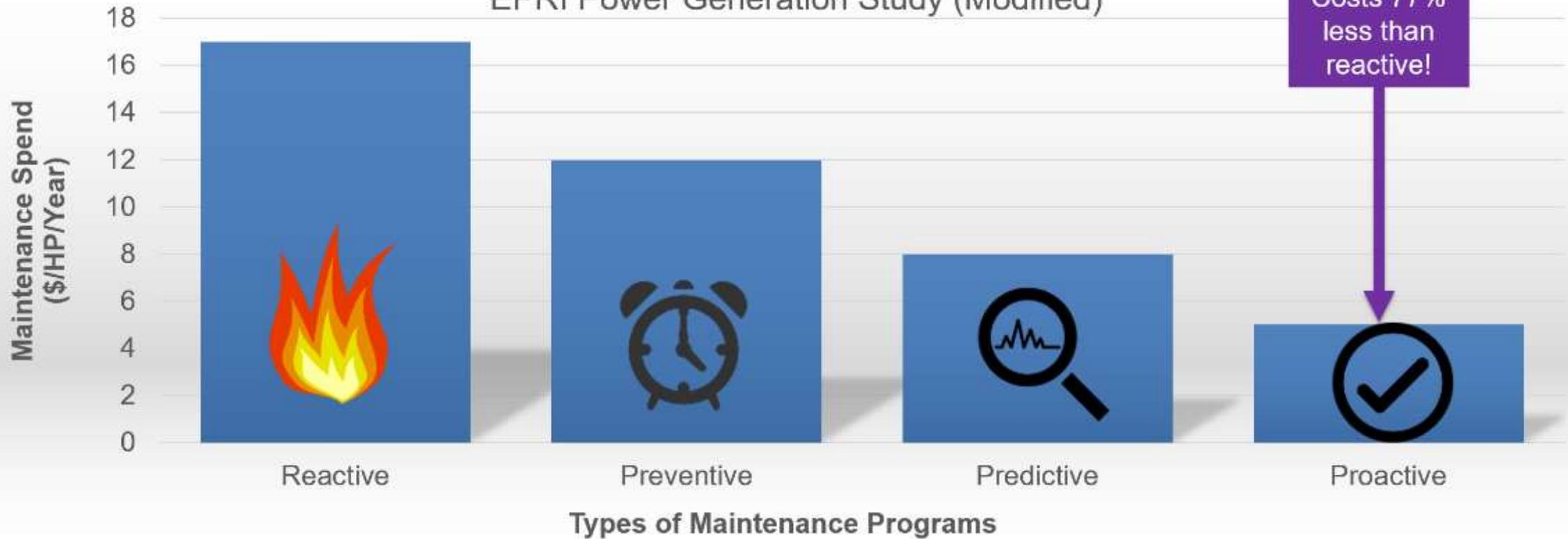
Nowlan and Heap

When the Boeing 747 was introduced, it was soon realized that traditional maintenance strategies would not be cost effective.



IMPACT OF PROACTIVE

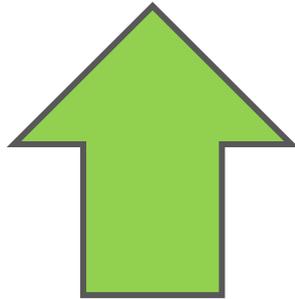
Cost of Maintenance
EPRI Power Generation Study (Modified)



MAINTENANCE IS CRITICAL

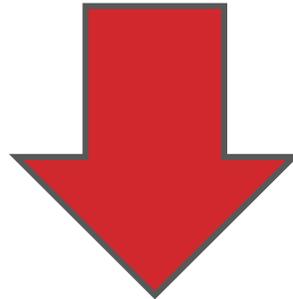
“5 to 20% of overall plant production capacity is influenced by its maintenance strategy” --May 2017 Deloitte article

**Availability,
Throughput,
Quality**



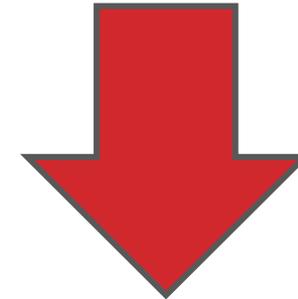
Largest gains typically from increased availability

**Safety &
Environmental
Incidents**



Increased employee welfare, fewer environmental releases

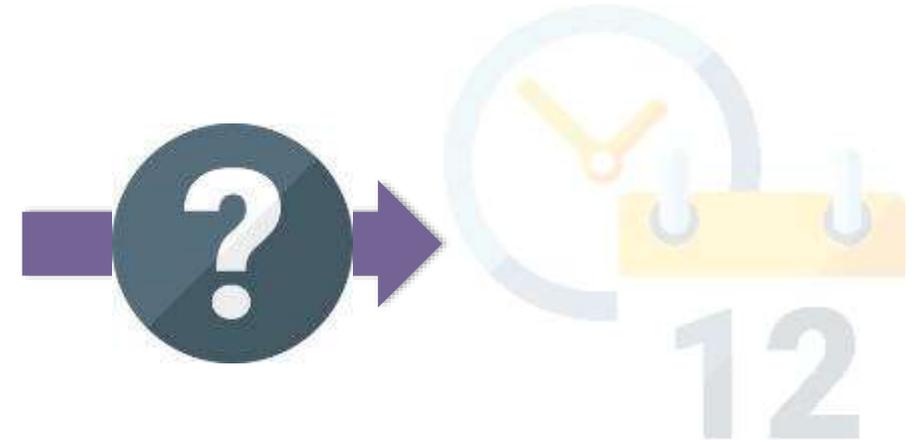
**Inventory &
Capital
Replacement**



Stocking less MRO, reducing carrying costs (can be upwards of 20%)

CBM MAINTENANCE CHALLENGES

- **Limited effectiveness with traditional route-based methods**
 - Being phased out and replaced with online/continuous monitoring solutions
- **Information from monitoring systems typically not integrated throughout organization**
 - Contextual information to discern between degradation and operation missing
- **'Predictive' Maintenance is a misnomer**
 - Usually difficult/impossible to predict *when* corrective actions need to be taken



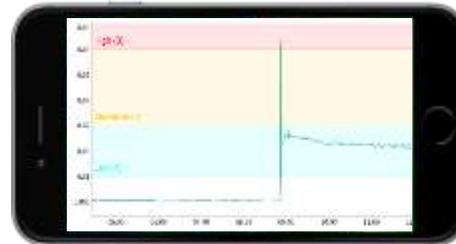
NEXT STEP IN EVOLUTION

Chilled water pumps in the basement that no one ever looks at...

Reactive

Unexpected failure at 2 am

- Find or salvage a spare motor
- Mitigate safety hazards that occurred due to the catastrophic nature
- Clean up environmental spills and releases
- Mobilize rigging, mechanic, and electrician on emergency basis.
- Restore equipment function in 24 hours.
- Report lost production figures and high scrap rate to management.
- Move on to the next emergency.
- Suffer the same failure next quarter because root cause was never determined and addressed.



Proactive

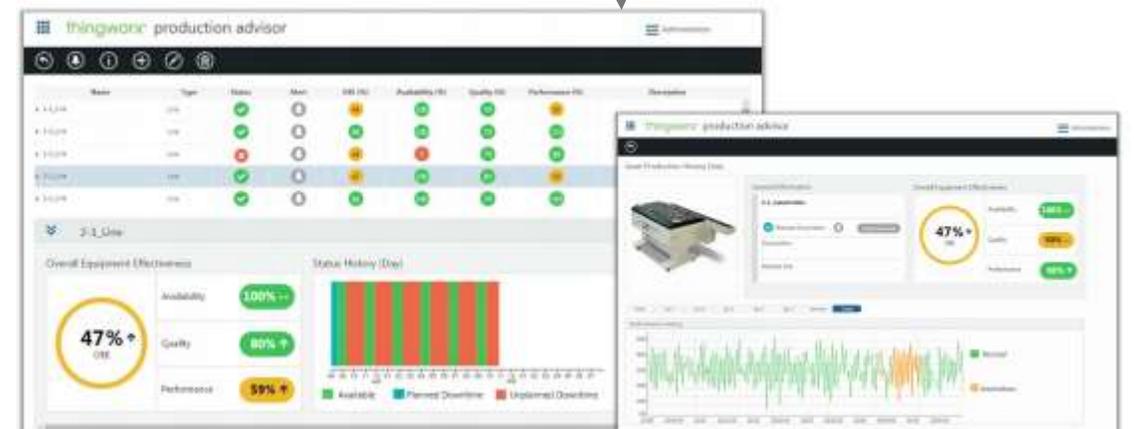
Real-time data on system performance

- Monitoring system provides an immediate alert of worsening vibration.
- Real-time analytics determine there is an increase in misalignment and estimate remaining useful life.
- Work order notification is automatically generated.
- Spare parts are allocated at nearest distributor in case production supersedes maintenance.
- Technician is scheduled and corrects problem, taking only 2 hours.
- Report savings to management, who can focus capex on expanding production rather than replacement parts.

PROACTIVE + IIOT

Add IIoT to Proactive Maintenance

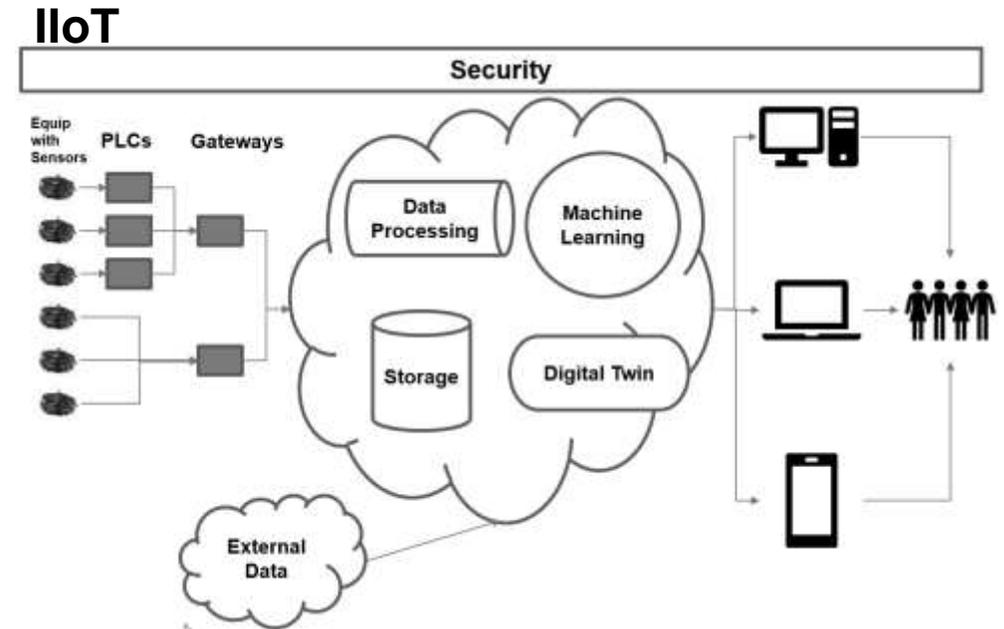
- Proactive is difficult without technology
- What is IIoT
- IIoT enables Proactive
 - Machine Inspections
 - Condition Monitoring
 - Data Analysis
 - Connect to ERP/CMMS



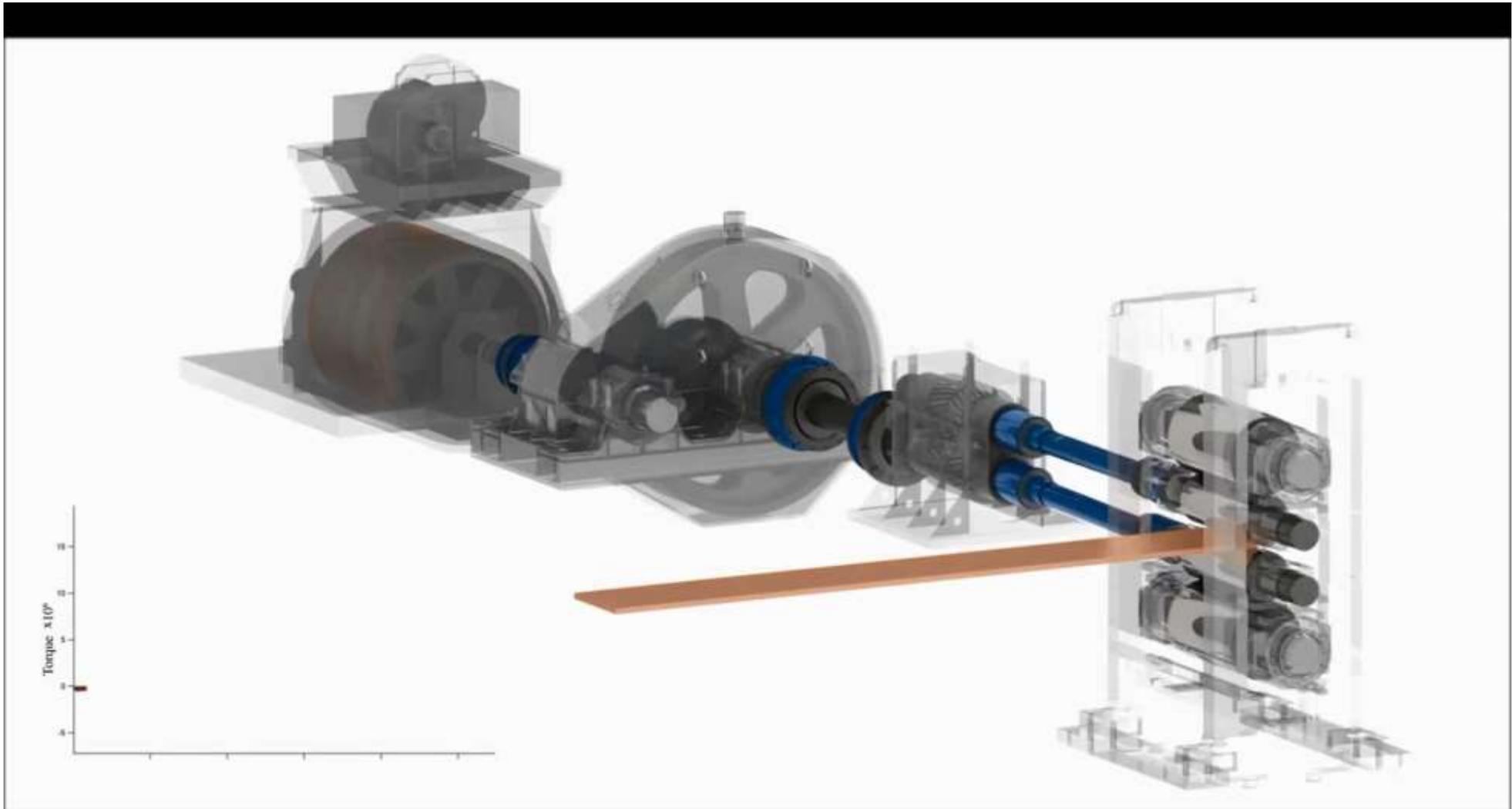
PROACTIVE + IIOT

Start a small IoT Proof of Concept project

- Create business case for project
- Decide on problem to solve, what insights are needed
- Decide on data to gather
- Create simple project plan
- Execute Proof of Concept
- Review results, learn
 - More equipment
 - Better insights
- Expand the solution



CASE STUDY

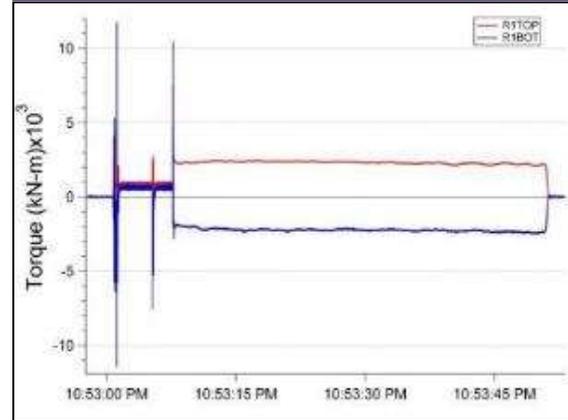


CASE STUDY

Reactive



Reactive (Torque) + IoT



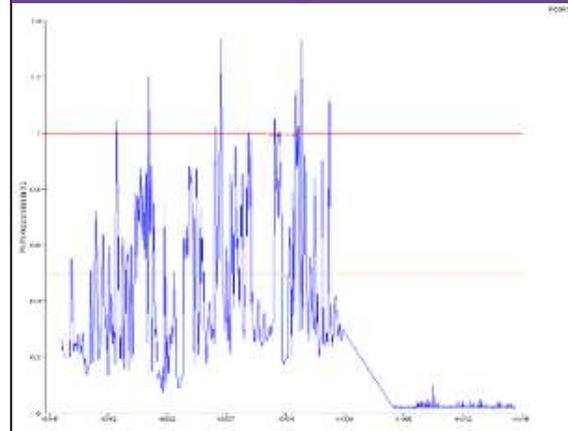
\$400K USD saved thru early detection



Reactive



Reactive (Vibe) + IoT



\$1M USD Savings thru early detection





SUMMARY

Proactive Maintenance

- Big financial performance impact
- Start your journey to Proactive Maintenance
- It will "help you see the future, and change it"



digitalbridge²⁰¹⁸

PITTSBURGH'S INDUSTRY 4.0 CONFERENCE

