HOW TO DECREASE EQUIPMENT FAILURES BY FOLLOWING A FEW SIMPLE TIPS

BY: RICKY SMITH, CMRP, CMRT, CRL

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How you know if you are in Reactive Maintenance?

You know you have a Problem when you hear after equipment failures:

- **We need to write a New PM**
- **Who worked on the Equipment Last**
- **We never have parts in the Storeroom**
- **We do not have time for training, to many problems**
- **We have a problem with Technician Morale**
- **We cannot afford to hire a Maintenance Planner**
- **Our storeroom never has the parts we need**
    - **We do not need a Maintenance Planner; we need our people to “step up”**

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What Constitutes a Failure?

Equipment failurerefers to any event in which anyequipmentcannot accomplish its intended purpose or task.

It may also mean that theequipmentstopped working,isnot performing as desired, orisnot meeting target expectations.

Two Types of Equipment Failures:

- **Total Functional Failure**
- **Partial Functional Failure**

Primary Causes of Equipment Failures

1. **Maintenance is Reactive (requires admitting you have a problem)**
2. **Improper Operation (Operator Error)**
3. **Failure perform Corrective and Preventive Maintenance to Specifications**
4. **Doing too much Preventive Maintenance.**
5. **Ineffective or No Predictive Maintenance Application to Critical Assets**
6. **Maintenance Planning and Scheduling is dysfunctional (Wrench-Time Low)**
7. **No Scorecard / Dashboards to ensure everyone knows their score in their specific**
8. **position Roles and Responsibilities are not clearly defined**
9. **Wrench-time is LOW**

- **World Class Wrench-Time = 55-65%**
- **Typical Wrench-Time = 15-25%**
- **Worst in Class Wrench-Time = 5-10%**

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Cause #1 -Maintenance is Reactive

Root Causes of Maintenance being in a Reactive State…

- Lack of Proactive Maintenance Knowledge or Experience
- Lack of Knowledgeable Leadership in Maintenance Best Practices (Production and Maintenance)
- The Environment in the Organization is reactive, and everyone knows it however no one knows how to move out of it
- Everyone knows Maintenance Cost is out of control, but they are not certain what to do about it.

Metric	Typical	World Class
Maintenance cost/replacement asset value Maintenance cost must include labor (including overtime), materials, contract maintenance, and capital replacements, and maintenance (replacing worn-out assets because they were never properly maintained)	3.5–9%	2.0–3.0%
Maintenance materials cost/replacement asset value Maintenance materials cost must include material in storeroom stock plus material in other locations (maintenance shop, plant floor, etc.)	1.0–3.5%	0.25–0.75%

Cause #2 -Improper Operation (Operator Error)

Root Causes of Operator Error…

- **Lack of Leadership**
- **Lack of Discipline**
- **Lack of Training**
  - **No Operator Care program integration with the Maintenance PM Program**
- **Lack of a Scorecard that is seen and accurate**

Operator Care Leading and Lagging KPIs

Cause #3 –Failure to perform Corrective and Preventive Maintenance to Specifications

Root Causes of Failure to perform Corrective and Preventive Maintenance to Specifications…

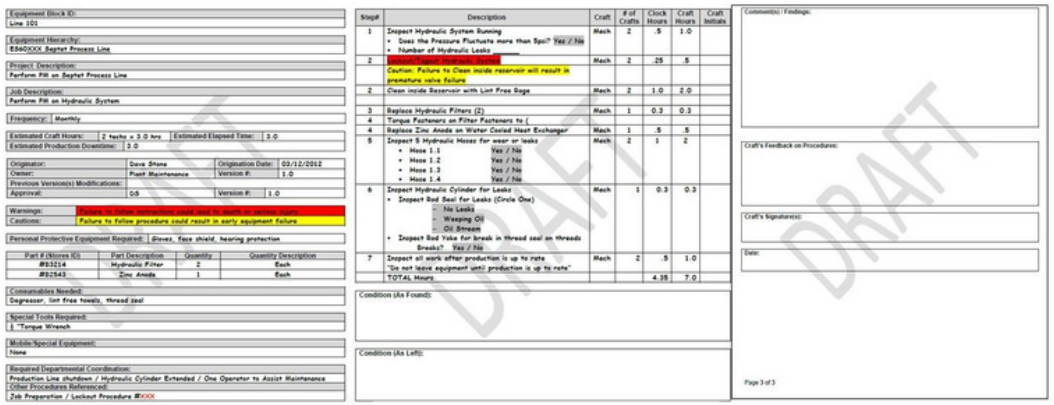
- **Lack of Knowledge what is Maintenance Best Practices and how to manage as a Proactive Organization**
- **Lack of Resources**

√ **Money**

The Right People

Leadership from top to bottom Lack of TRAINING DOLLARS

PM Procedure Example



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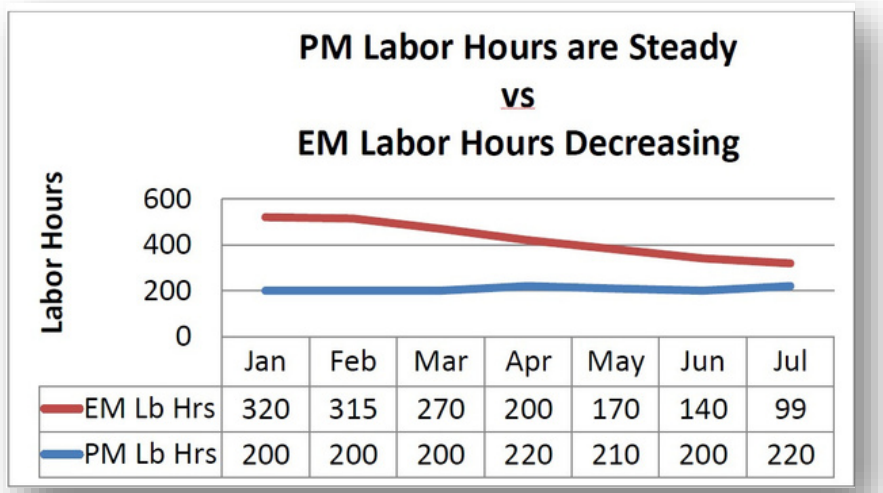
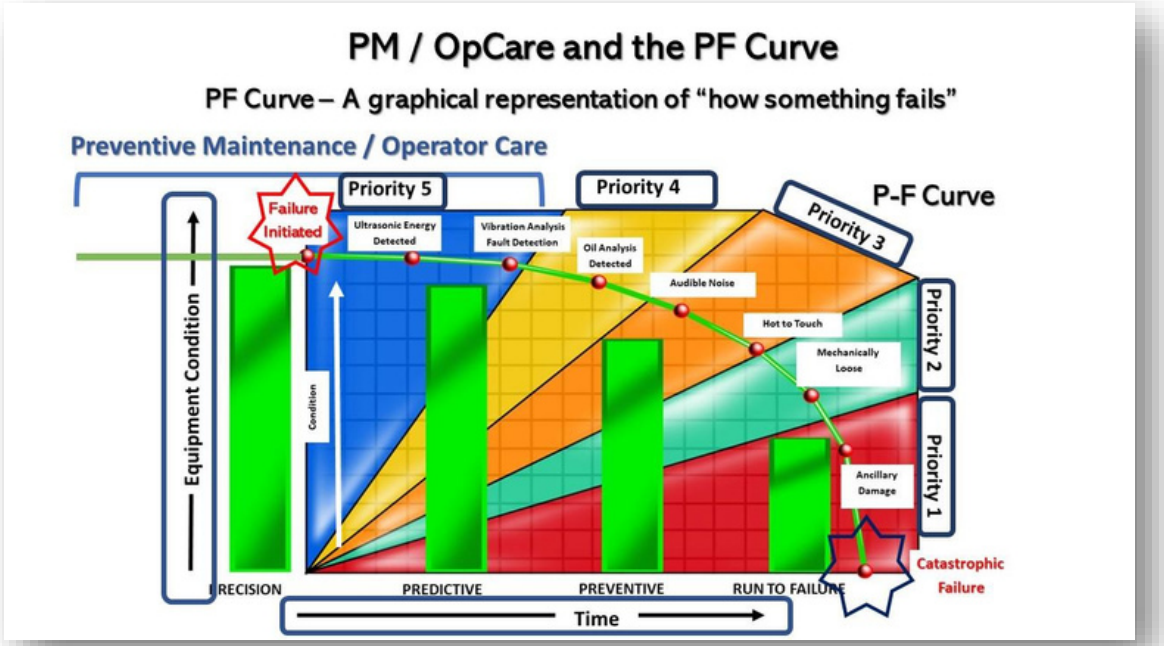
Cause #4 –Doing too much Preventive Maintenance

Root Causeswhy you are doing too much Preventive Maintenance…

- No training in Preventive Maintenance, all knowledge has been passed down over the years
- Not knowing how to perform Preventive Maintenance as a “Controlled Experiment”
- Equipment not in a “Maintainable Condition”
- Measuring the wrong thing
- No one understands the PF Curve

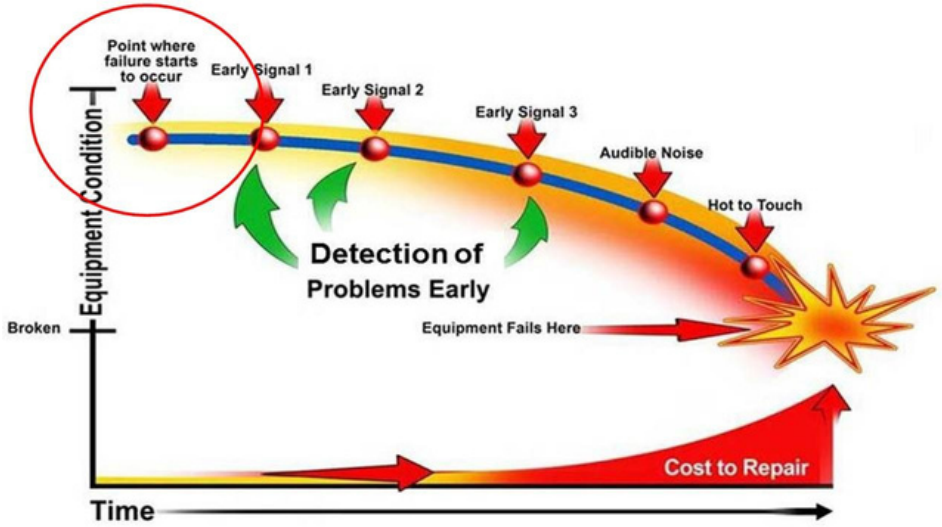




Cause #5: Ineffective or No Predictive Maintenance Application

Root Cause of Ineffective or No Predictive Maintenance:

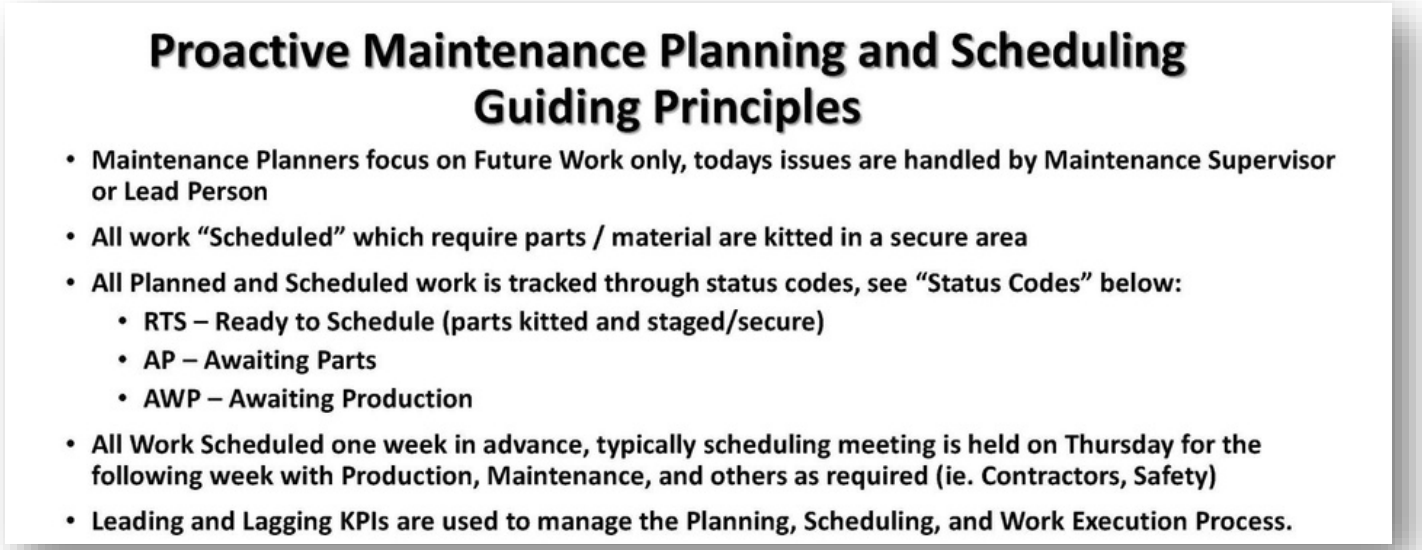
- **No one understands how to detect Failure Modes early**
- **Predictive Maintenance only used to satisfy the insurance company without regard to the enough money being loss on a daily basis**
- **No one has heard of the PF Curve**



Cause #6: Maintenance Planning and Scheduling is dysfunctional (Wrench-Time Low)

Root Cause of Dysfunctional Maintenance Planning and Scheduling

- **Maintenance Leadership has never been trained in Maintenance Planning and Scheduling**
- **No one knows how bad the organization wrench time is**
- **Maintenance Planners are trained however no allowed to Plan and Schedule the "Right Way"**
- **Maintenance is Reactive –Maintenance Planner is chasing parts**



Proactive Maintenance Planning and Scheduling Guiding Principles

- Maintenance Planners focus on Future Work only, todays issues are handled by Maintenance Supervisor or Lead Person
- All work "Scheduled" which require parts / material are kitted in a secure area
- All Planned and Scheduled work is tracked through status codes, see "Status Codes" below:
  - RTS – Ready to Schedule (parts kitted and staged/secure)
  - AP – Awaiting Parts
  - AWP – Awaiting Production
- All Work Scheduled one week in advance, typically scheduling meeting is held on Thursday for the following week with Production, Maintenance, and others as required (ie. Contractors, Safety)
- Leading and Lagging KPIs are used to manage the Planning, Scheduling, and Work Execution Process.

Cause #7: No Scorecard / Dashboards to ensure everyone knows their score in their specific position

Root Cause of NO Maintenance Scorecards / Dashboards

- **Leaders do not have time to identify how to create a Maintenance Score / Dashboard**
- **No one knows how to create one**
- **Maintenance is data rich, but no one knows how to assimilate the date to help everyone know their score in their position**

" You cannot manage what you do not measure"
- Peter Drucker

Cause #8: Roles and Responsibilities have not been defined

Root Cause of Un-Clear Roles and Responsibilities

- **Reactive Plant Culture**
- **No one has roles and responsibilities defined by position for any process**

Lean Maintenance

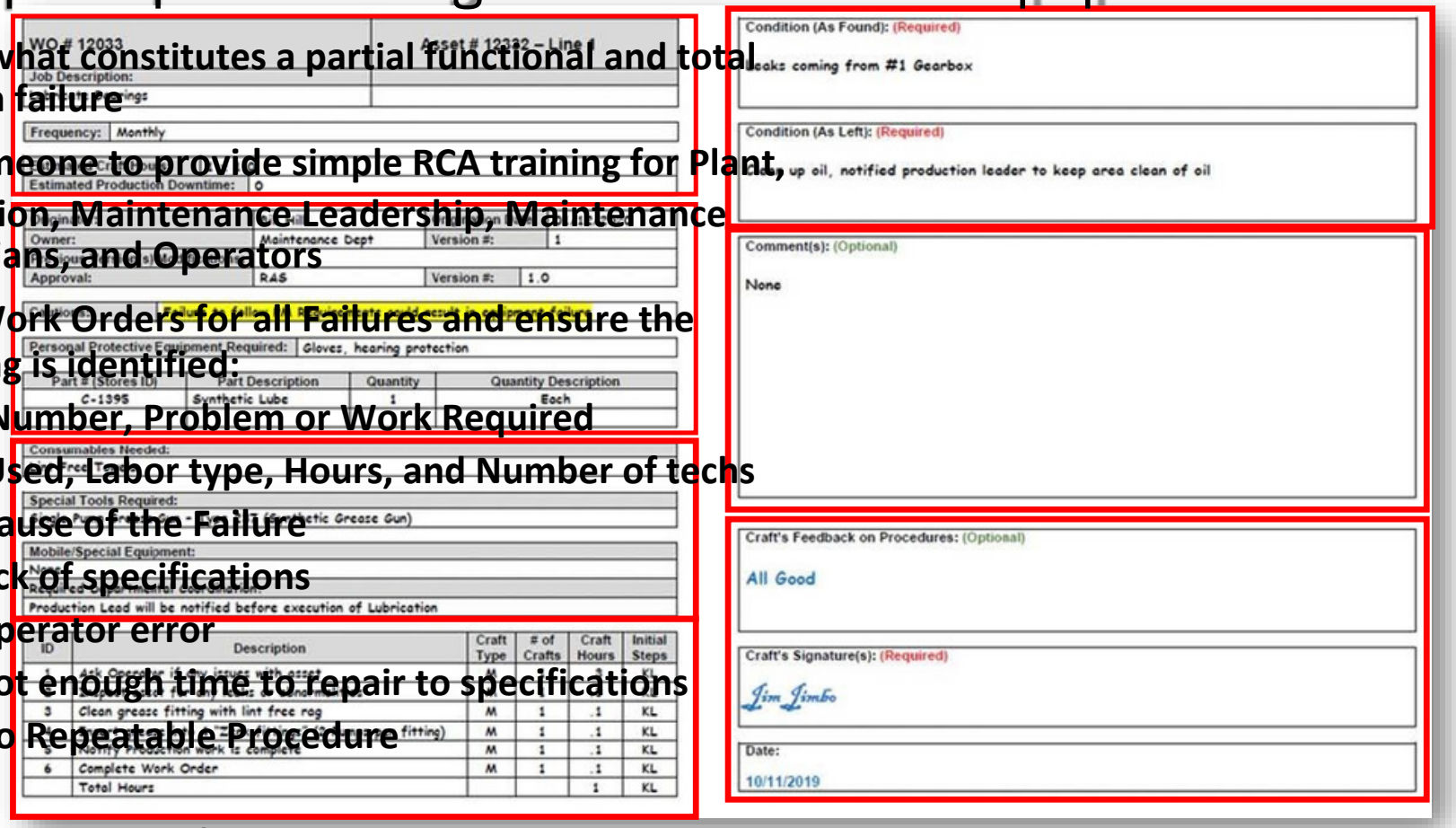
"Roles and Responsibilities"

Task ⬇ Position ➡	Plant Mgr.	Prod Mgr.	Maint Mgr.	Stores Mgr.	Maint Tech	Maint Super	Maint Planner	CMMS Admin
CMMS Management	I	I	C	C	I	C	R	A
Lean Leading and Lagging KPI Management	I	I	A	C	I	C	R	R
Preventive Maintenance	I	I	A	I	R	C	C	C
PM Evaluation/Optimization	I	C	A	C	R	R	R	R
Maint. Planning/Scheduling	I	R	A	I	I	R	R	I
Work Execution	I	I	A	I	R	C		I
Maintenance Rework	I	I	A	C	R	C	C	C
Production Rework	I	A	I					
Failure Reporting, Analysis, Corrective Action Process	A	R	R	C	I	C	C	C

Responsibility "the Doer" (could be more than one)
Accountable "the Buck stops here" (One person only)
Consulted "two-way communication" (in the Loop)
Informed "one-way communication" (kept in the picture)

Simple Tips Resulting in a Reduction in Equipment Failures

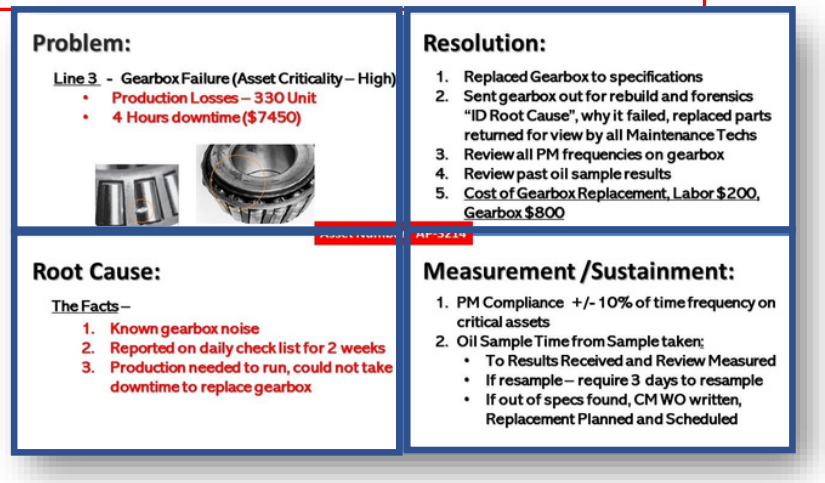
1. Define what constitutes a partial functional and total function failure
2. Hire someone to provide simple RCA training for Plant, Production, Maintenance Leadership, Maintenance Technicians, and Operators
3. Write Work Orders for all Failures and ensure the following is identified:
   - •Asset Number, Problem or Work Required
   - •Parts Used, Labor type, Hours, and Number of techs
   - •Root Cause of the Failure
   - –(LS) Lack of specifications
   - –(OE) Operator error
   - –(NT) Not enough time to repair to specifications
   - –(NP) No Repeatable Procedure
   - – Etc.
   - •Condition as Found
   - •Condition as Left
   - •Recommended Changes to Procedures



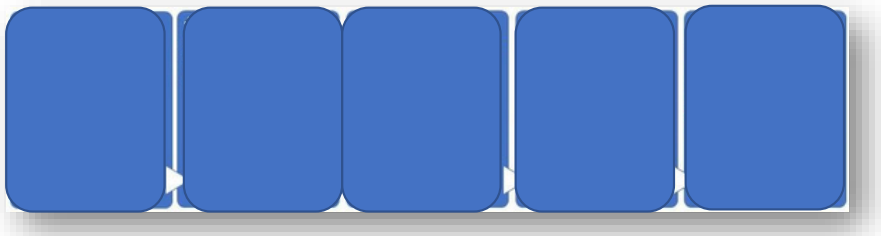
Simple Tips to Resulting in a Reduction in Equipment Failures

4.Track and Manage Failures

- **Cost of the Failures**
  - **–Loss Production ($)**
  - **–Parts Expedited Cost**
  - **–Parts/Material Cost**
  - **– Etc.**
- **Create a A3 Failure Board to share failures with everyone**

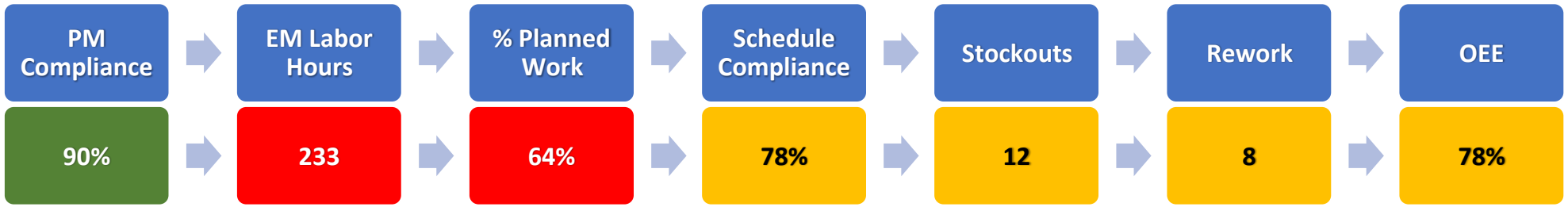


5. Create a Dashboard to measure a reduction or increase in failures by area or asset or overall



Final Thoughts

1. **Keep the Maintenance Storeroom Locked and Secure 24/7**
2. **Ensure 90% plus of Maintenance Work is Planned and Scheduled**
3. **Ensure 100% of Scheduled work has repeatable Procedures**
4. **State "Equipment Failures" are unacceptable and must be eliminated unless RTF (Run-To-Failure) is the Maintenance Strategy for a specific asset or assets**
5. **Train Maintenance Leadership in Maintenance Best Practices**
6. **Train all Maintenance Planners (plus one technician) in formal Maintenance Planning and Scheduling Best Practices**
7. **Provide Formal Training to "2" Maintenance Technicians in "Root Cause Analysis"**
8. **Create a New Position –"Maintenance Engineering Technician" (this technician only focused on Failure Mitigation and Elimination**
9. **Post a Scoreboard to Provide all Levels of Plant Personnel to the status of the Maintenance Process**



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Questions

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MAINTENANCE PLANNING AND SCHEDULING

THREE DAY WORKSHOP WITH RICKY SMITH, CMRP, CMRT, CRL

DATE: JANUARY 19-21, 9:00AM - 4:00PM EST
VIRTUAL: EACH PERSON WILL JOIN A ZOOM LINKTO JOIN EACH DAY
IN-PERSON: SOUTHERN WESLEYAN UNIVERSITY,CLEMSON, SC

QUESTIONS CONCERNING THIS TRAINING

How can I attend? 2 Options.

OPTION 1: "Zoom" is just an internet tool that allows anyone to meet, learn, or teach a workshop, all you will have to do is have the internet and click on the link sent to you the morning of each day.

"Zoom allows everyone to interact with the instructor, work with others virtually in "hands on" exercises."

OPTION 2: Live at Southern Wesleyan University in Central, SC (4 miles from Clemson, SC).

All attendees will socially distance in a very large training facility.

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#1 Software for Maintenance & Reliability Teams

UpKeep is a service-first company that builds software designed to make maintenance easier for technicians and managers everywhere. Reduce downtime up to 18% by switching over to a preventative maintenance solution!

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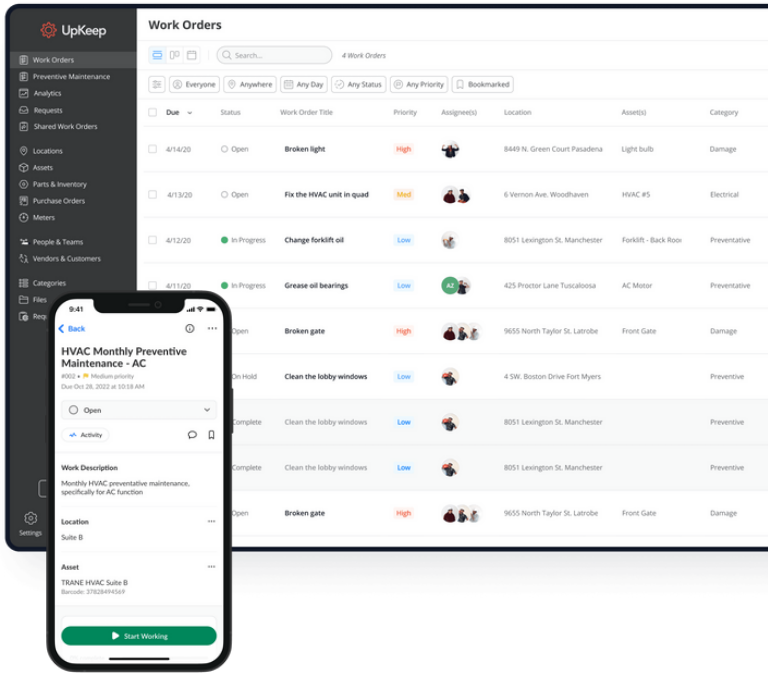

Our Products

UpKeep

Mobile-first maintenance management and collaboration across all location, assets, and teams

"With nearly 340 different machines in our work environment, it's an impossible task to manually assign and track PM's. With UpKeep we can schedule regular maintenance without overlapping tasks with other critical jobs."

★★★★★ **Paul D, Health and Safety Coordinator**

edge by UpKeep

An end-to-end solution for remote condition-based monitoring

Connected and secure IoT sensors for real-time remote condition asset monitoring

DATAHUB UpKeep

Integrated & Centralized Data Ecosystem for World Class Asset Operations

The only purpose built Asset Data Platform. Asset Focused ELT Solution for advanced analytics and integrated, real-time asset data.

TMCC THE MAINTENANCE COMMUNITY COALITION

The Maintenance Community Coalition was founded on the belief that working together will benefit everyone within our community

Committed to helping each other thrive in our individual professional journeys by sharing resources and expertise, granting scholarships, hosting events, and unlocking knowledge – always at no cost.