The Case For Maintenance Excellence

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FUSS & O'NEILL
Manufacturing Solutions, LLC

The Case For Maintenance Excellence

Scarce maintenance resources dictate a need for getting more from your existing staff:

- **Planned, as versus reactive work increases 'wrench time'**
- **Reactive maintenance jobs can take up to 10 times as long as a planned maintenance job**
- **Precision maintenance techniques increase component life**
- **Maintenance value stream mapping, identifies and reduces waste**
- **Total Productive Maintenance empowers production employees to take part in equipment care – and supplements your maintenance staff**

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How Much Does Poor Maintenance Cost?

Machine Type	Highest Velocity mm/s	Dollars Spent Last Year	Lowest Velocity mm/s	Dollars Spent Last Year	Savings with Precision
Single Stage Pumps	5.6	$3,200	2.0	$650	80%
Multi Stage Pumps	4.8	$6,100	1.5	$1,100	82%
Major Fans & Blowers	9.0	$900	2.8	0	100%
Single Stage Turbines	3.8	$8,200	1.0	$2,000	76%
Other Machines	7.8	$11,850	3.0	$3,700	69%

Table 1 - Machine Vibration to Maintenance Cost

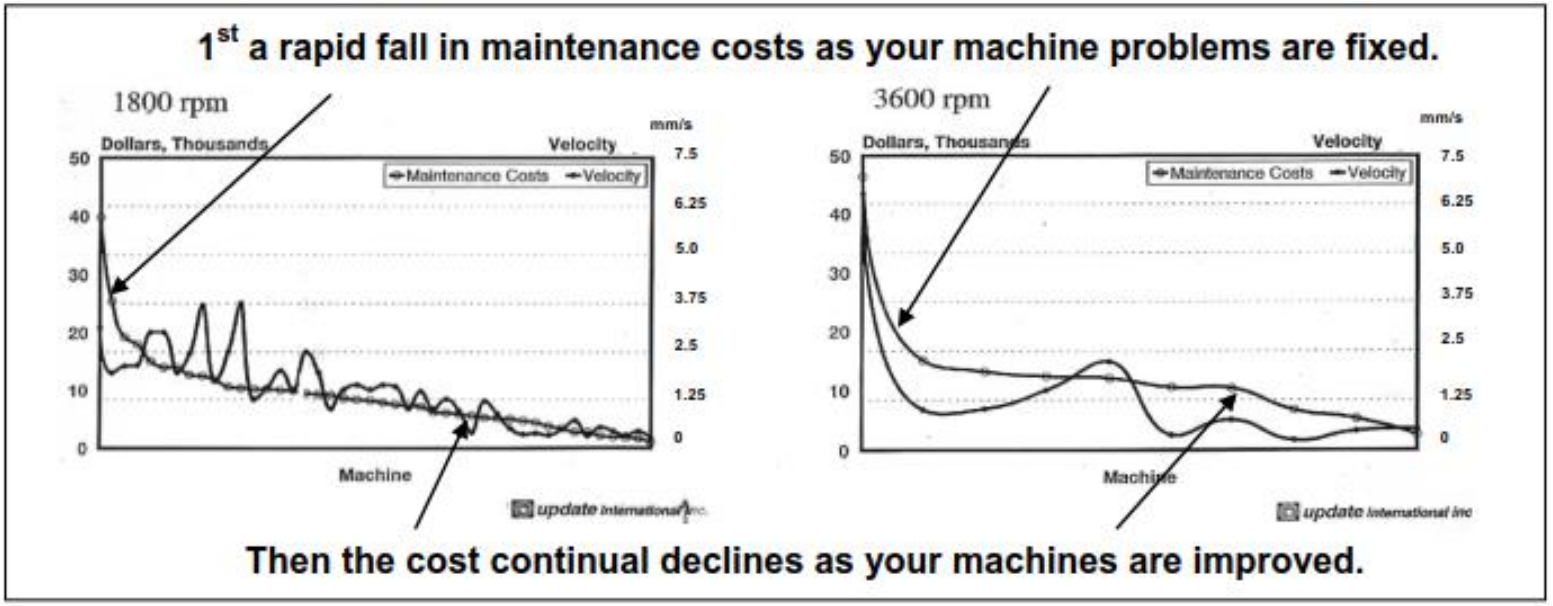

Figure 1 - Maintenance Costs Fall When Machine Vibration Levels Fall

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Step 1: Assessment

- How do you compare to established Maintenance Excellence best practices?
- Where is your "low hanging fruit"
- How does it intersect with your business needs?
  - Safety
  - Quality
  - Cost
  - Delivery
- If you don't have the maintenance staff to support your needs, maybe the answer is developing your existing maintenance staff

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Step 2: Execute An Improvement Plan

- Maintenance Planning & Scheduling
- Maintenance Waste Mapping
- Precision Maintenance
- Total Productive Maintenance

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Planned versus Reactive Maintenance:

A Case Study

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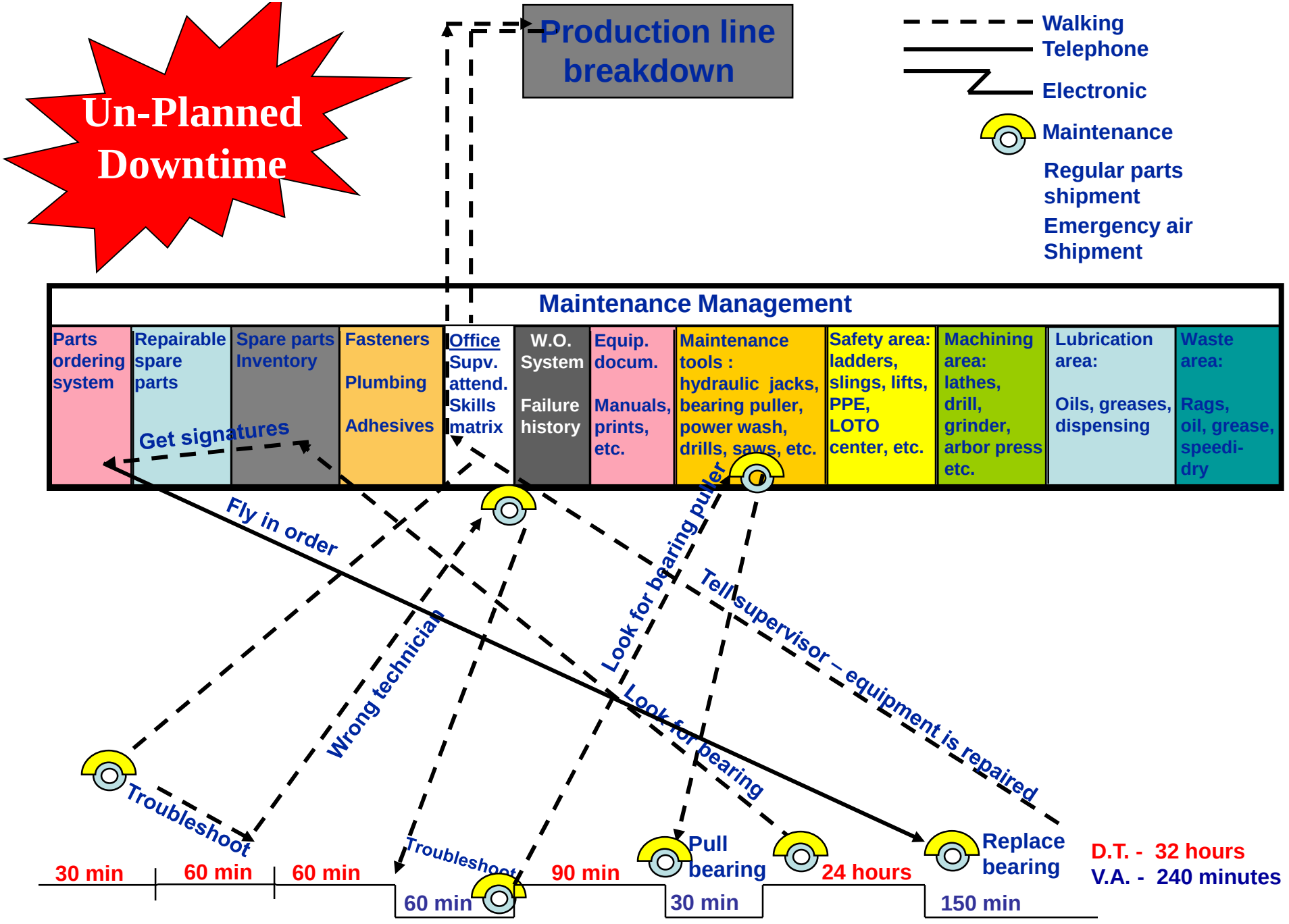
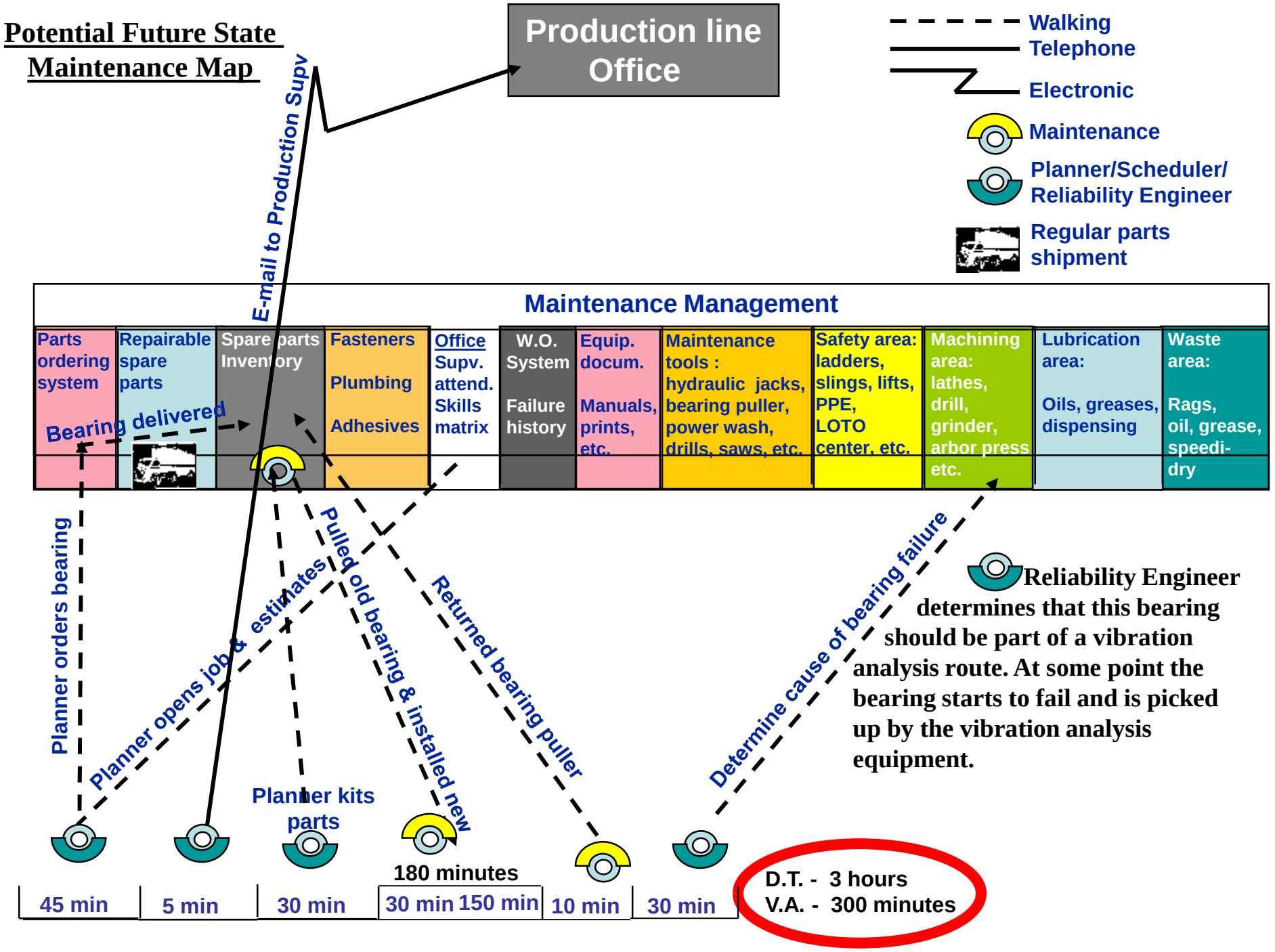

Un-Planned Downtime
Production line breakdown
Walking
Telephone
Electronic
Maintenance
Regular parts shipment
Emergency air Shipment
Maintenance Management
Parts ordering system
Repairable spare parts
Spare parts Inventory
Fasteners
Plumbing
Adhesives
Office
Supv. attend.
Skills matrix
W.O. System
Failure history
Equip. docum.
Manuals, prints, etc.
Maintenance tools : hydraulic jacks, bearing puller, power wash, drills, saws, etc.
Safety area: ladders, slings, lifts, PPE, LOTO center, etc.
Machining area: lathes, drill, grinder, arbor press etc.
Lubrication area:
Oils, greases, dispensing
Waste area:
Rags, oil, grease, speedi-dry
Get signatures
Fly in order
Wrong technician
Look for bearing puller
Tell supervisor – equipment is repaired
Look for bearing
Troubleshoot
Troubleshoot
Pull bearing
Replace bearing
30 min
60 min
60 min
60 min
90 min
30 min
24 hours
150 min
D.T. - 32 hours
V.A. - 240 minutes

Potential Future State Maintenance Map



Maintenance Mapping Summary

Value Stream Mapping:

- **Eliminates maintenance waste**
- **Gets more maintenance work done with the same staffing**
- **Increases production capacity**

The Value of Precision Maintenance

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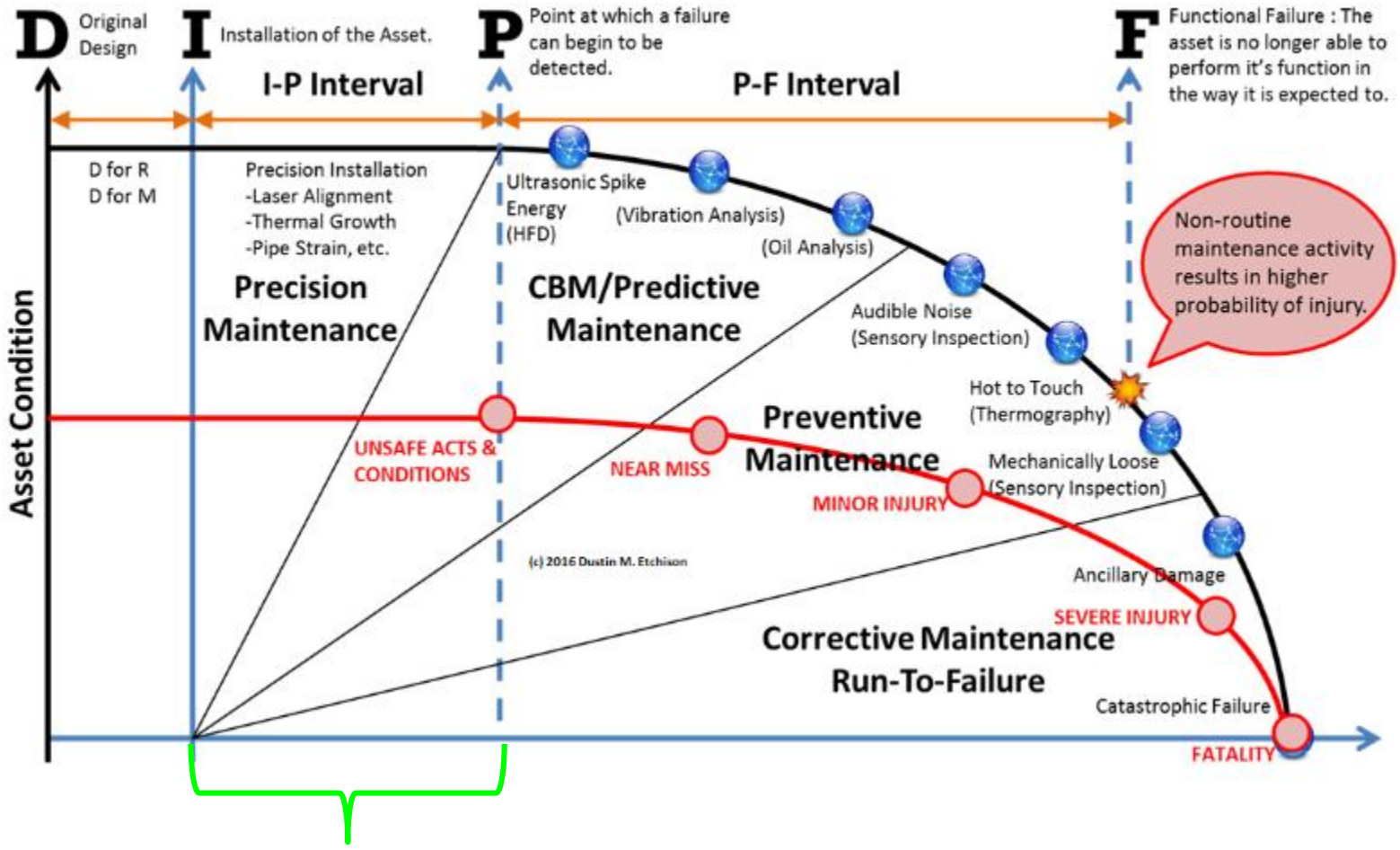

Extension of component life: This is the $ Value of Precision Maintenance

What is Precision Maintenance?

Machines and equipment are repaired and rebuilt so that they will not fail prematurely!

They reduce the need to use subcontractors

They maximize first pass quality production and stop scrap

They have fewer stoppages and slowdowns

Fewer spares are used since their machines don't need them

Plant availability and productivity is maximized

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Why is Precision Maintenance important?

MAINTENANCE STRATEGY	TECHNIQUE NEEDED	COST PER HP PER YEAR*
Proactive Maintenance	Monitoring and correction of failure root causes, e.g., contamination	$0.10
Predictive Maintenance	Monitoring of vibration, wear debris	$8
Preventive Maintenance	Periodic component replacement	$13
Breakdown Maintenance	Large maintenance budget	$18

*Power Generation Example

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Total Productive Maintenance

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Old versus New Thinking…

The old attitude of:
I operate it and you fix it!

Is replaced with the new attitude that:

We are all responsible for <u>our</u> equipment!

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Lumber Products, New England

- Trained all manufacturing employees on TPM and performed focused improvement events at all 3 sawmills that allowed identification and resolution of equipment defects
- Developed daily, weekly and monthly operator maintenance tasks to supplement maintenance resources and develop a culture of true equipment ownership

Construction Products, Southwest US

- Performed focused improvement 'clean to inspect and repair' events on punch presses, coining presses and laser fabrication equipment that allowed identification and permanent correction of defects
- Identified and corrected extensive losses due to poor set ups and changeovers by developing detailed procedures

Packaging Products, Midwest US

- Performed a series of 5 TPM focused improvement events over a 13 week period resulting in an average production rate increase of 30% on bag sealing equipment
- Developed tremendous level of ownership by equipment operators to resolve minor defects as soon as they are found
- Create a preventative and predictive maintenance program to sustain success

Automotive Components, Northeast US

- Developed TPM as PMG's operating culture through establishment of a company steering committee
- Performed multiple focused improvement events resulting in productivity gains exceeding 35%
- Implemented a computerized maintenance management system (CMMS) to support and sustain success

Primary & Fabricated Metals, Midwest US

- Performed 12 TPM focused improvement 'clean to inspect and repair' events over 3 years in all areas of the facilities
- Significantly reduced overtime in their manufacturing operations by increasing equipment uptime through preventative and predictive maintenance
- Reduced maintenance costs by 10-15% each for a period of 5 years

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Keys to Success

Active Steering Committee

Qualified TPM Coordinator

Good Plan (published)

Senior Management Participation

Overview for Shop Floor

Shared Learning

- Leaders as Teachers
- Single point lessons
- “good catch” board
- Word of mouth

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Keys to Success

- Maintenance & Operator Training
- Gather, Analyze and Use Data!
- Allocate Time & Resources!
- Audit Your Processes – Use Leader Standard Work
- Focused Improvements – Hot & Heavy!
- Establish Autonomous Improvement Teams
- Root Out Competing Objectives
- Emphasize GOOD maintenance over FAST maintenance

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Summary

- Removing waste from the process allows companies to perform more maintenance activities with the same number of resources
- Precision maintenance reduces the amount of repairs your resource constrained team struggles to stay ahead of
- TPM leverages the capabilities of all manufacturing employees to supplement your maintenance team
- Maintenance excellence drives improvements in safety, quality, delivery and cost

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Final Thoughts…

Fuss & O'Neill Manufacturing Solutions provides workshops and training in all of these areas and more.

Our team of professionals have extensive industrial maintenance experience accomplishing these goals.

Let's chat and discuss how we can provide a customized solution to help you!

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