



The
Science
of
EDGE
THE KNOWLEDGE TO MASTER THE NEW SUPPLY CHAIN

**Focus Asset Management:
Park the Fire Truck & Develop a Reliability Program**

Track 6 Session 2

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Abstract

Troubleshooting and measuring uptime are all about hindsight. In this instructional class, we will learn the importance of planning for reliability and how it contributes to operational excellence. You will learn how to build a program with a structured maintenance strategy, how to manage your physical assets and use your resources wisely. We will discuss who should be involved, what steps are needed, what key metrics can best measure your progress as well as the lifecycle ROI you can expect for your effort.

Agenda

- **What is Maintenance?**
- **High Performance Maintenance Organizations (HPMO)**
- **Components for Success**
- **Costs of Maintenance**
- **Focused Asset Management**
- **Taking the Leap**
- **Key Takeaways, Conference Cloud, Questions**

What is Maintenance?

What is Repair?

- **Maintenance** – maintaining or being maintained
The work of keeping a infrastructure, building, machinery, etc., in a state of good repair.
- **Repair** – to put back in good condition after damage, decay, etc.; mend, fix.

The Vision Should Be...

- **Maintain in a “Like New” Condition**
 - Maintain as designed
 - Design speed and operation
 - Design quality
 - Design efficiency

The Maintenance Process

- **The Maintenance Process**

- A Proactive process developed and managed by the maintenance organization which will enable it to maintain assets in a “like new” condition.

High Performance Maintenance Organizations (HPMO)

- **What do they look like?**
 - Complete understanding of the value of maintenance
 - Continuously updating the maintenance vision and master plan
 - 100% of all critical assets are included in the preventive and predictive maintenance program
 - Operations involvement in basic maintenance and care of assets
 - Functioning repair parts and supply system

High Performance Maintenance Organizations (HPMO)

- **What do they look like?**
 - 100% of all man-hours are documented on well-written work orders
 - Detailed work order management system is maintained with discipline
 - 80-90% of all man-hours are proactive
 - 40-50% wrench time of craftsmen
 - Detailed work order plan for 80-90% of all man-hours

High Performance Maintenance Organizations (HPMO)

- **What do they look like?**
 - 60% of all man-hours are completed from a written weekly work schedule
 - >5% of total man-hours spent on employee training
 - Comprehensive hiring practices designed for technical employees
 - Maintenance supervision on floor or in field 70-80% of day
 - Maintenance program performance measured weekly, monthly, quarterly, etc...

High Performance Maintenance Organizations (HPMO)

- **What does it take to realize a HPMO?**
 - A culture of continuous improvement and the idea a world class culture is obtainable and understood by all
 - A maintenance team that is able and willing to implement the fundamentals
 - A system of audits and measurements that will monitor the performance and progress of the process

High Performance Maintenance

SUCCESS LINE

High Downtime & Low Quality

Low Downtime & High Quality

Higher Cost

Lower Cost



Chaos

HPM

100%
Reactive

80-90%
Proactive

Where is Your Organization?

How do you determine where you are?

9 - Components for Success

1. Management Support and Culture
2. Organization and Staffing
3. Asset Data Management System
4. Preventive and Predictive Maintenance
5. Maintenance Control Function
6. Training and Staff Development
7. Supplies and Repair Parts
8. Operations and Maintenance Coordination
9. Performance Measurements

9 - Components for Success

1. Management Support and Culture

- **Corporate Wide Vision for Growth, Profit, and Environmental Quality Performance**
 - Long-Range Vision for Organization
 - What Do We Want to Look Like in 5 Years?
 - Long-Term Vision for Asset Management
 - Culture for Continuous Improvement
 - Maintain Assets in a “Like New” Condition
 - Convert Maintenance Image from Being a “Cost Center” to being a “Reliability or Revenue Center”

9 - Components for Success

1. Management Support and Culture

- **Knowledge of the Maintenance Process**
 - Maintenance of Assets, Not Repair
 - Purpose of Maintenance Organization
 - Service Oriented Mission
 - Part of the Solution, Not Part of the Problem
- **Communicate and Train All Levels of Organization in Maintenance Strategies**

9 - Components for Success

2. Organization and Staffing

- Organization

- Are you structured properly for the task?
- Written and posted organization chart
- Maintenance by committee is not successful

9 - Components for Success

2. Organization and Staffing

- **Staffing**

- Do you have the right skills in the proper locations?
- Are your craft staffing levels adequate?

- **Supervisor to Technician Ratios**

- 15-20 technicians to one (1) supervisor

9 - Components for Success

2. Organization and Staffing

- How do we know if we have enough craftsmen?
 - Historical evidence
 - Work order distribution (historical data)
 - Scorecards and KPIs
 - Preventive and predictive requirements
 - Reactive work requirements
 - Construction and project requirements

9 - Components for Success

3. Asset Data Management System

- **Implementation**

- Must be Installed Properly
- Must be Completely Populated
- Detailed and Comprehensive Training Must be Included
- Must be Maintained with Discipline
 - Work Orders for All Maintenance Work

9 - Components for Success

3. Asset Data Management System

- **Asset Data Collection**

- Identify critical assets
 - Determine extent of component documentation
- Determine asset identification and coding strategy
- Gather asset and component data and populate data base
 - Spare parts and supplies
 - Equipment history and birth certificate

9 - Components for Success

3. Asset Data Management

- **Utilization**

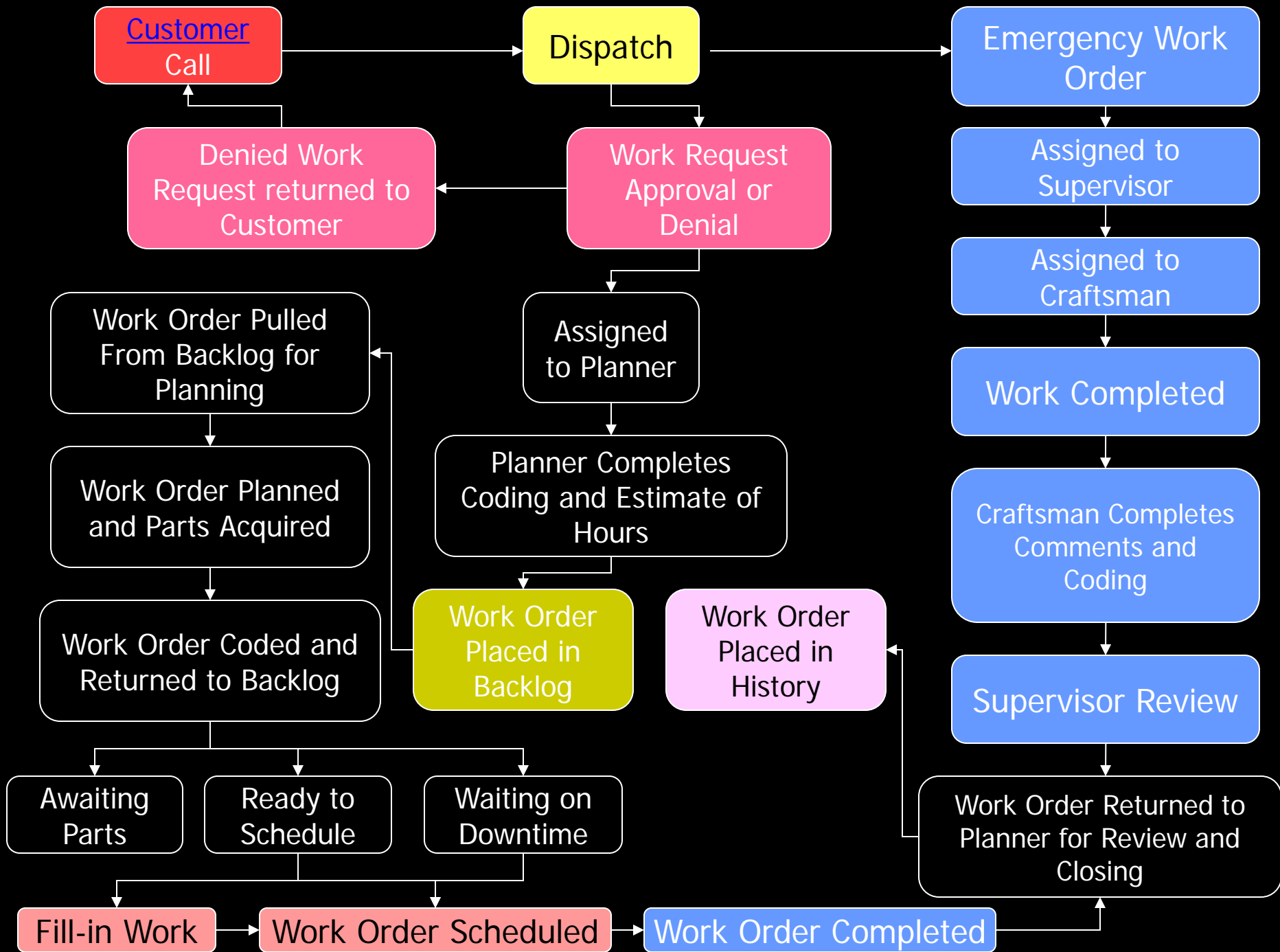
- Define a well written work order
 - Establish work order content SOPs
- Define work order creation procedures
 - Who can write work orders?
 - Approval methods

9 - Components for Success

3. Asset Data Management

- **Utilization**

- Establish system management strategy
 - Back log, sorting, special queries, approval methods
- Dispatching methods
 - Automatic, supervisor, wireless, radio, cell
- System must be maintained with Discipline!



9 - Components for Success

4. Preventive Maintenance

- **Inspections**
 - Run time inspections
 - Operator interview
 - Downtime inspections
- **Inspections must be detailed**
 - What to check?
 - How to check?
 - What is an acceptable result?

9 - Components for Success

4. Predictive Maintenance

- **Infrared**
 - Electrical distribution
 - Energy systems
 - Manufacturing and Utility processes
- **Vibration analysis**
 - High speed components
 - Critical equipment

9 - Components for Success

4. Predictive Maintenance

- **Ultrasonic**
 - Compressed air
 - Vacuum systems
- **Lubrication Oil analysis**
 - High Volume reservoirs
 - Critical equipment

9 - Components for Success

5. Maintenance Control Function

- **Maintenance Planning**
- **Why Plan Work Orders?**
 - North American average for maintenance wrench time is 25-30%
 - Unplanned work cost 4 times that of planned maintenance work
 - Planned work improves maintenance quality

9 - Components for Success

5. Maintenance Control Function

- **Maintenance Planning**
 - Planned work lowers labor costs
 - Planned work lowers material costs
 - Improves maintenance efficiency
 - Optimizes staffing levels
 - Improves Communication and cooperation

Professional Planning vs. Planning On-The-Run

Typical Job Planned as Work Progresses



Planning activity disorganized

Work stops as parts or design is needed

Frequent starts and stops

Completed job is 4 times as long as planned work

Same Job Planned by Trained Maintenance Planner




Job Scope is completed up front

All parts are on hand prior to work start

All special equipment organized and scheduled up front

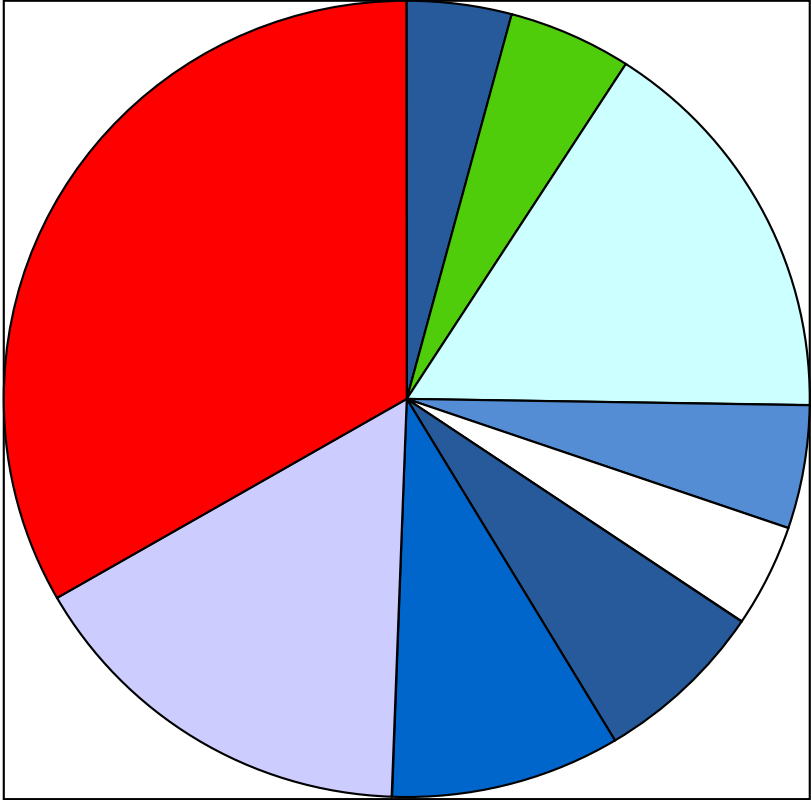
 = Planning Activity

 = Work Activity

Where the Maintenance Dollar Goes

Activity	Minutes	% of 8-hr Day
Getting instructions	21	4
Picking up tools and parts	25	5
Travel	77	16
Waiting on machine	22	5
Late starts/early quits	21	4
Excess personal time	35	7
Idle time	44	9
Miscellaneous losses	78	16
Sub-total	323	67
Available to turn wrench	157	33

Where the Maintenance Dollar Goes



How Do I Fill and Justify the Planner Function and Position?

Existing Maintenance Crew Without Planning and Scheduling	Weekly Man-Hours	Current Wrench Time	Total Man-Hours Per Week
15 Craftsmen at 40 hrs per week=	600 man-hours	30%	180 man-hours
Reduce Maintenance Crew by 1 Craftsman and Add 1 Maintenance Planner	New Weekly Man-Hours	New Wrench Time	New Total Man-Hours Per Week
14 Craftsmen at 40 hrs per week=	560 man-hours	33%	185 man-hours
14 Craftsmen at 40 hrs per week=	560 man-hours	35%	196 man-hours

9 - Components for Success

5. Maintenance Control Function

- **Maintenance Scheduling – Why?**
 - Craftsman efficiency
 - Decreased idle time
 - Increased wrench time
 - Reduced overtime costs
 - Take advantage of downtime
 - No lost time looking for work

9 - Components for Success

5. Maintenance Control Function

- **Maintenance Scheduling – Why?**
 - Craftsman work quality
 - Parts available when equipment is ready
 - Parts, plan, and downtime come together
 - Customer satisfaction
 - Work is completed when maintenance promised!
 - Improved morale and cooperation

9 - Components for Success

5. Maintenance Control Function

- **Maintenance Scheduling**
 - Work must be planned first
 - Weekly written schedule
 - Listed by craftsman
 - Listed by day
 - Listed by hour
 - 60% of all man-hours scheduled weekly
 - Performance must be tracked

*[See](#) Weekly Work Schedule

9 - Components for Success

6. Training and Staff Development

- **Areas of Management and Supervisory Training**
 - Leadership fundamentals
 - Safety, HR, Compliance, etc...
 - World Class maintenance practices
 - Maintenance management concepts
 - Time management
 - Technical skills
 - Planning and scheduling

9 - Components for Success

6. Training and Staff Development

- **Technicians and Craftsmen**
 - Maintenance management overview
 - Planning and scheduling overview
 - Safety, HR, Compliance, etc...
 - Skill or Craft training

Heard in the Board Room:

“What if we train them and they decide to leave the company?”

Response:

“What if we don’t train them and they stay?”

9 - Components for Success

7. Supplies and Repair Parts

- **Reduced downtime**
 - Parts ready for maintenance
 - No searching
 - Rapid emergency ordering (when needed)

9 - Components for Success

7. Supplies and Repair Parts

- **Improved maintenance efficiency**
 - Reduced wait time
 - Less time spent searching for parts
 - Lower “let’s make it fit” time
 - Faster repairs with correct parts
 - Lower labor costs

9 - Components for Success

8. Operations and Maintenance Coordination

- **Operations is involved in work request and approval process**
- **Operations and maintenance on same team**
- **Operations owns preventive maintenance process (as appropriate)**

9 - Components for Success

8. Operations and Maintenance Coordination

- **Operations is involved in weekly and daily work schedules**
- **Long range forecasting exists as team effort**
- **Operations and maintenance goals and performance are developed together**

9 - Components for Success

9. Performance Measurements

- Scorecards
- “You cannot Manage what you cannot Measure”

9 - Components for Success

9. Performance Measurements

- **What are Maintenance Scorecards?**
 - Key Performance Indicators (KPIs)
 - Measures of the Day-to-Day Maintenance Success
 - Method to Trend Long-Term Maintenance Changes
 - System for Justifying Processes and Programs
 - Process for Justifying Equipment Overhauls and Capital Expenditures
 - Justifying and Optimizing Staffing Levels

9 - Components for Success

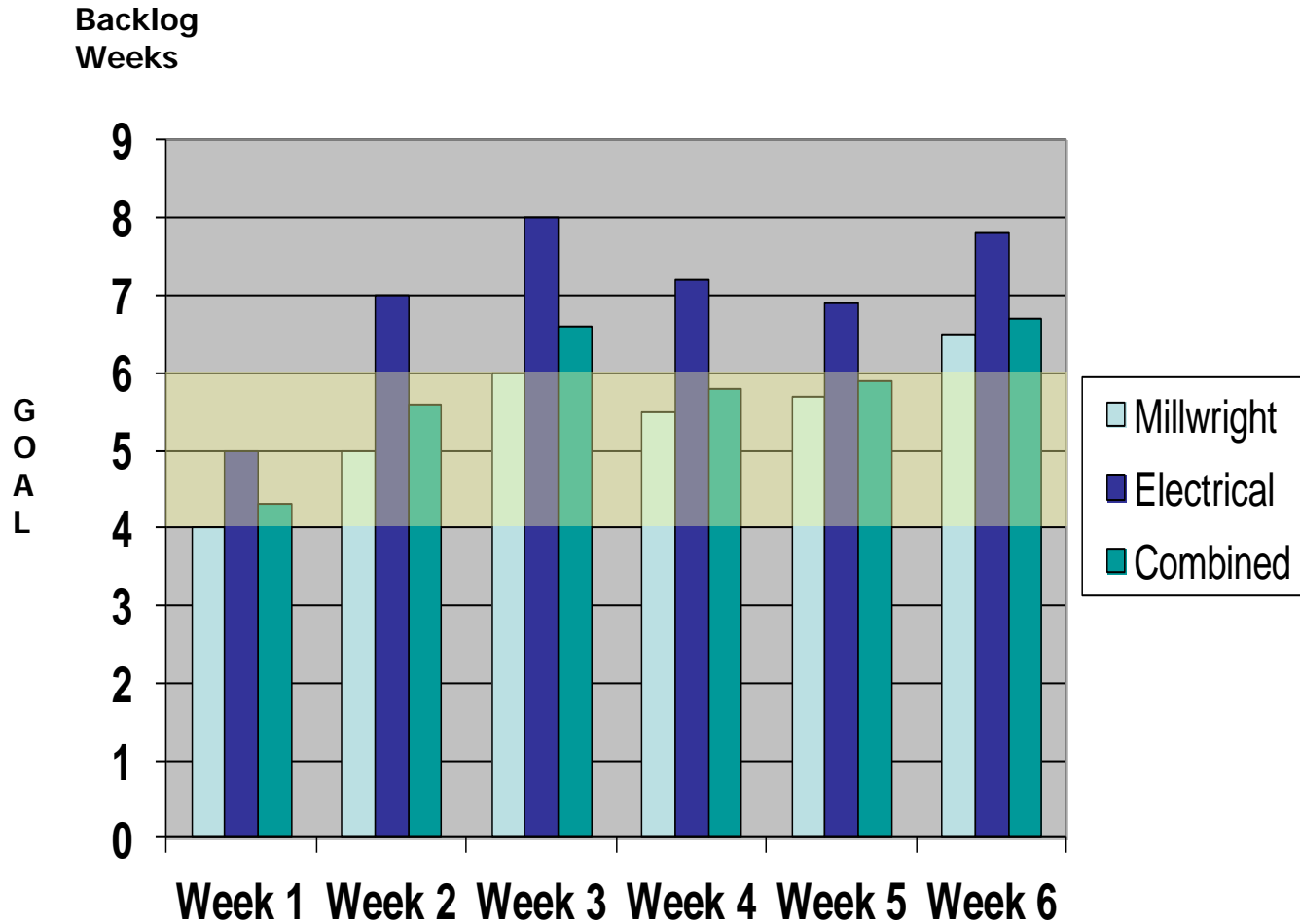
9. Performance Measurements

- **Prerequisites**
 - Disciplined CMMS
 - Work order for all maintenance work
 - Capture the “Total Cost of Maintenance”
 - Labor Costs
 - Supply Costs
 - Contractor Costs

Maintenance Scorecard Summary

Measurement	Goal	Actual
Backlog of Differed Work	4-6 Weeks	7 Weeks
Response Time	2 Hours	2.85 Hours
Downtime or Unavailability	<5%	4.3%
Preventive Maintenance Jobs	>40%	45.6%
Late Preventive Maintenance	<1%	0.5%
Scheduled and Planned Work	>55%	58%
On Time Completion	>95%	88%
Return Visits-Same Problem	<2%	86%
Reactive Work Requests	<20%	28.0%

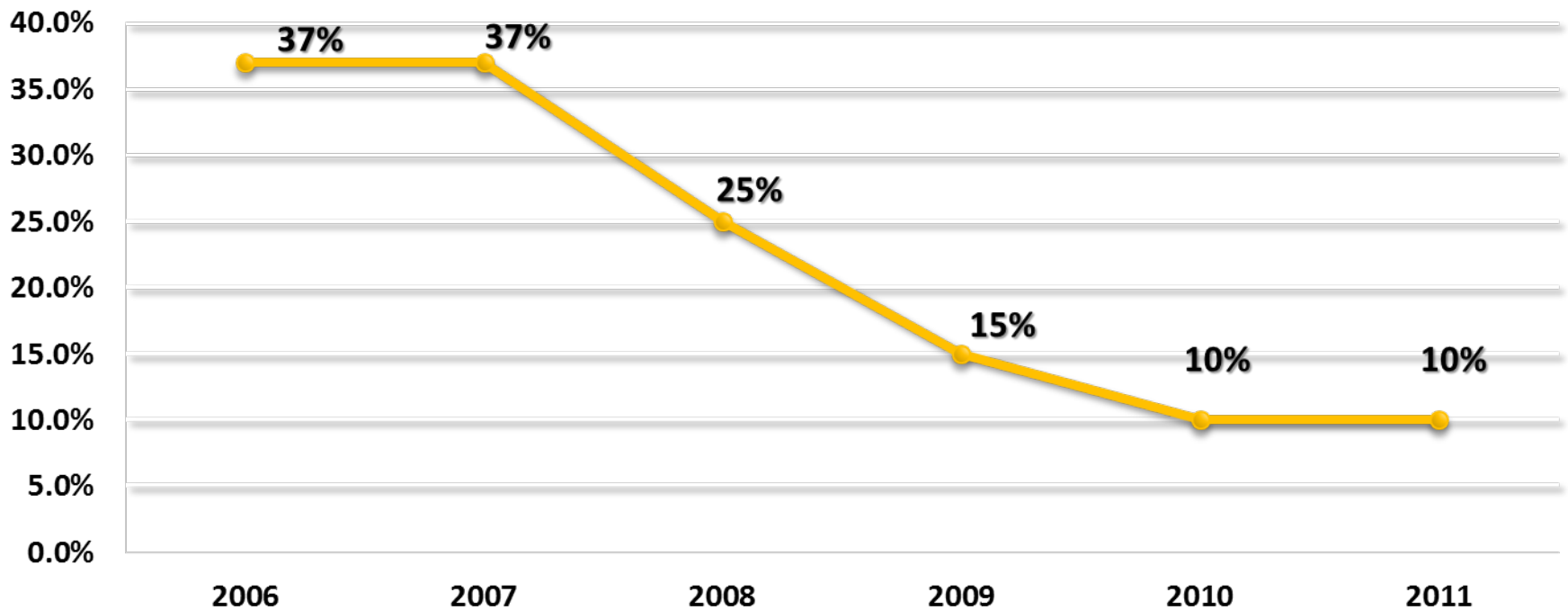
Backlog Weeks



Interrupts – Emergencies - Breakdowns

- Listed by Department, Machine, Craft
- By Priority E-1-2-3-4
- Tracked in Work Order Man-Hours

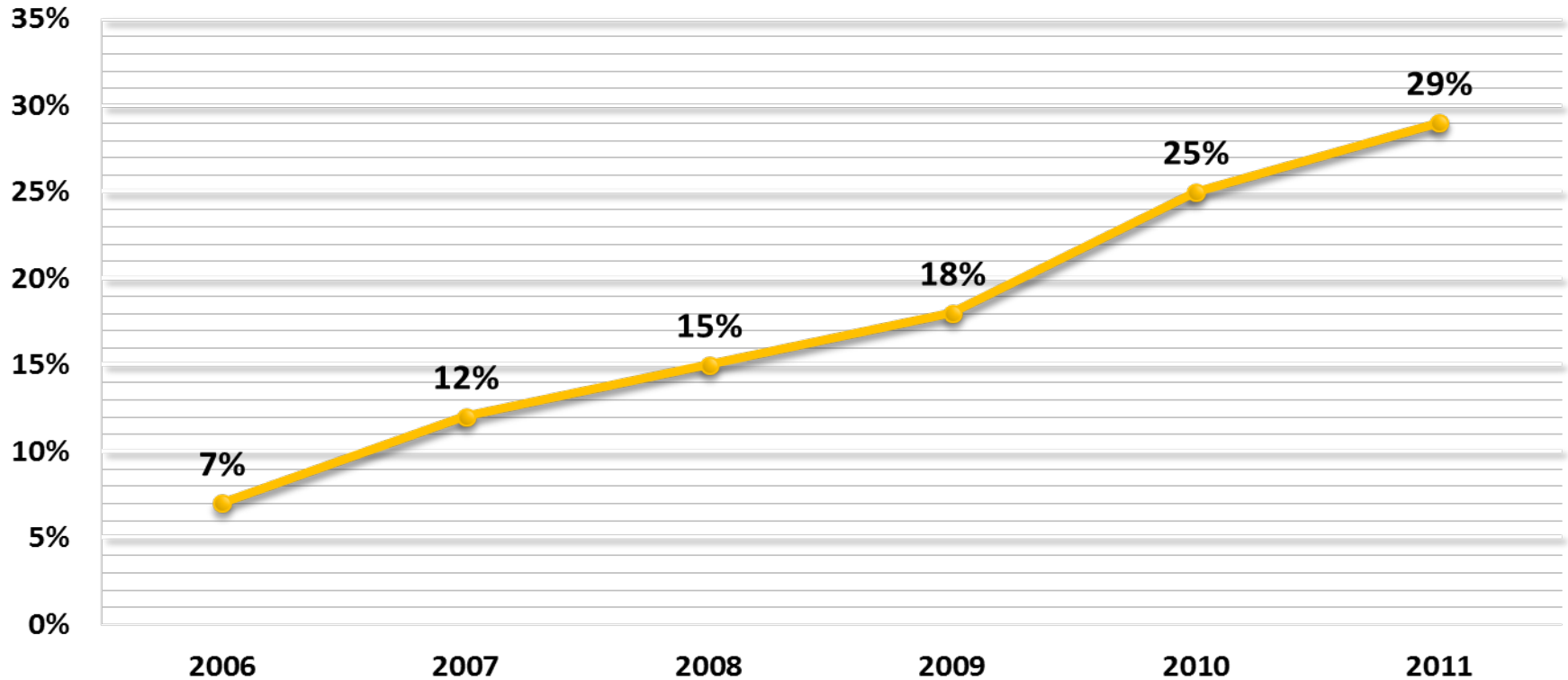
Emergency Man-hours



Preventive Maintenance

PM - Inspections and Lubrication

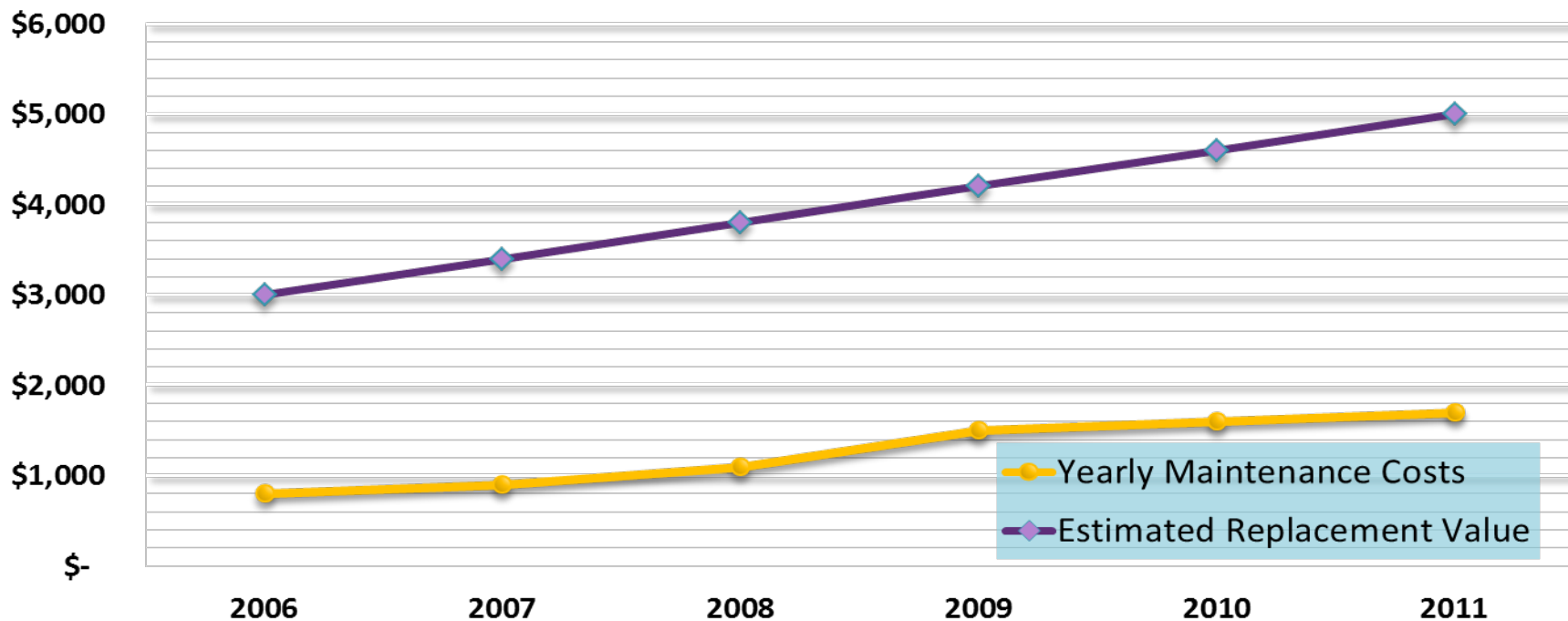
- PdM - Infrared - Ultrasonic – Vibration Analysis
- Listed in % of Total Maintenance Man-Hours Available



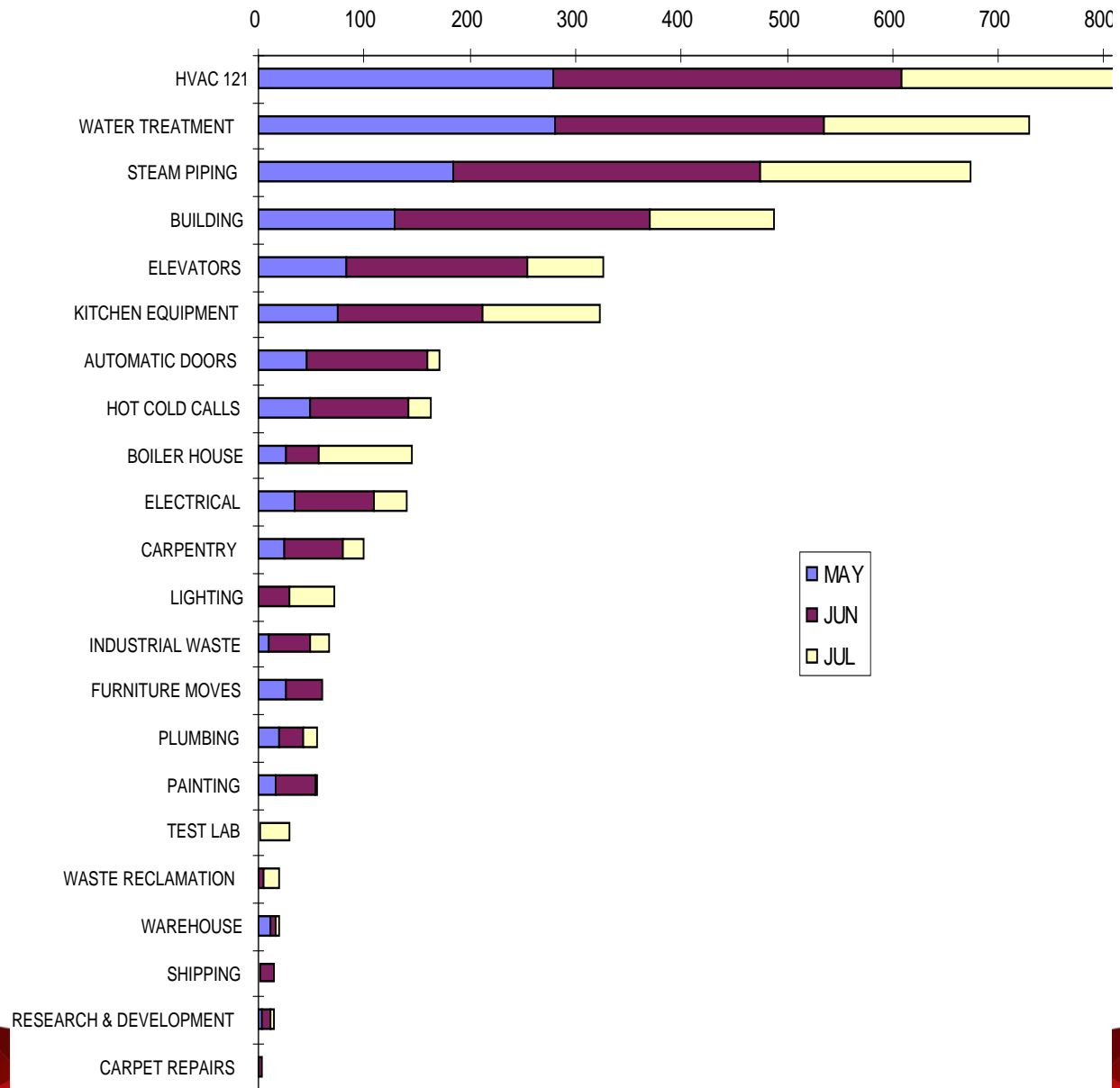
Total Cost of Maintenance

Total Cost of Work Order

- Tracked by Machine, Department, Production Line, or Area
- Supplies and Labor
- Contractor Costs



Pareto Analysis of Interrupts



Focused Asset Management

Why Change?

- Regulatory climate
- Challenging financial times
- Customer demands
- Increasingly complex equipment and processes

Focused Asset Management

What Will it Cost Me?

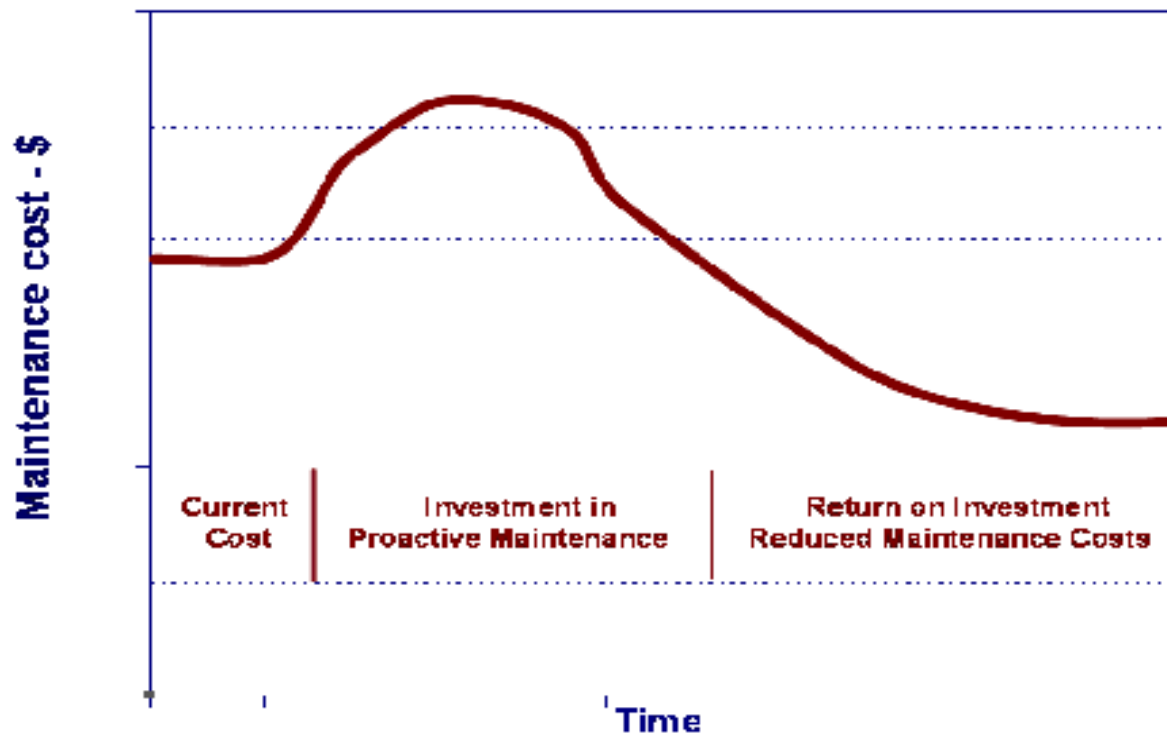
- Increases in the beginning
- Reduce costs long-term
- Long-term operating costs lower than current operating cost levels

Focused Asset Management

What Do I Get in Return?

- Lower life cycle costs for assets
- Reduced capital and operating costs
- Improved communications between operations and maintenance - morale
- Improved customer satisfaction
- Sustainable and reliable operations

Cost of Maintenance Proactive vs. Traditional



Taking the Leap – How do I get started?

- **Create the vision**
 - **What do you want out of your maintenance organization?**
 - High quality
 - Rapid response
 - Low cost
 - Higher asset reliability
 - Process improvement
 - Customer satisfaction

Taking the Leap – How do I get started?

- **Assess where you are today**
 - Complete facility wide assessment
 - Maintenance organization
 - Maintenance customers
 - Support organizations
 - Ask the tough questions
 - Attitudes, accountability, sense of urgency, teamwork, leadership abilities
 - Assess the maintenance process
 - ▶ CMMS, work orders, PM/PdM system, planning, scheduling, organization, parts, equipment, etc.

Taking the Leap – How do I get started?

- **Develop the Master Plan**

- List all the items identified in the assessment that are sub-standard
- Agree on how to fix or change
- Identify who is responsible
- Develop sequence of change items
- Be willing to add and subtract from list quickly and frequently if needed

Taking the Leap – How do I get started?

- **Create the Road Map**

- Develop detailed Gantt
 - Determine completion dates
 - Assign responsible person or team
 - Review on regular basis
 - Publish for all involved to follow
 - Change often as needed
 - Don't be afraid to change,
 - ▶ this is a complex and dynamic process

Taking the Leap – How do I get started?

- **Implement the process**
 - Identify target start date
 - Organize a group kick-off with top support
- **Re-assess and revise the master plan and road map**
 - Re-assess semi-annually at first and then annually to insure continuous improvement

Transform Your Cost Picture Through Improved Maintenance

In Review:

- **The maintenance function is part any organizations Revenue and Sustainability Picture**
 - You need a plan
 - “If you do not know where you are going, any road will take you there.”
 - You need a process
 - Organized approach to reach your goals

Transform Your Cost Picture Through Improved Maintenance

In Review:

- **The maintenance function is part any organizations Revenue and Sustainability Picture**
 - Method to measure your progress
 - Maintenance scorecards (KPIs)
 - Program audits
 - Never settle for the status quo, always challenge the norm

Final Thought

“The significant problems we face cannot be solved with the same level of thinking we were at when we created them.”

Albert Einstein

Conference Cloud

Additional Resources

- [CE Maintenance Website](#)
- [How to Debunk the Biggest Maintenance Myths Video Interview](#)
- [Top Maintenance Goal Make Technicians Better Firefighters](#)
- [Maintenance Scorecards](#)



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Questions



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