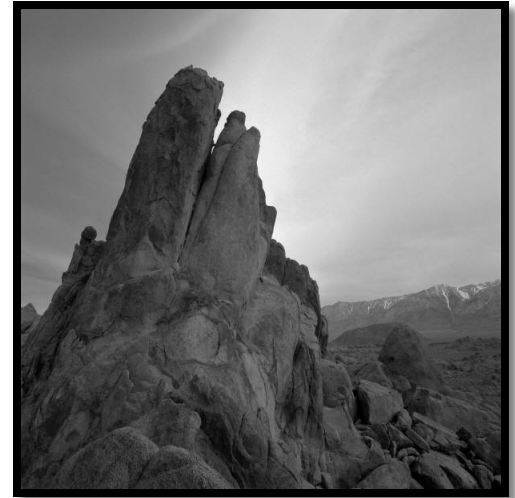


# Simple Tips to Improve Maintenance Planning and Scheduling in 30 days

By: Ricky Smith CMRP



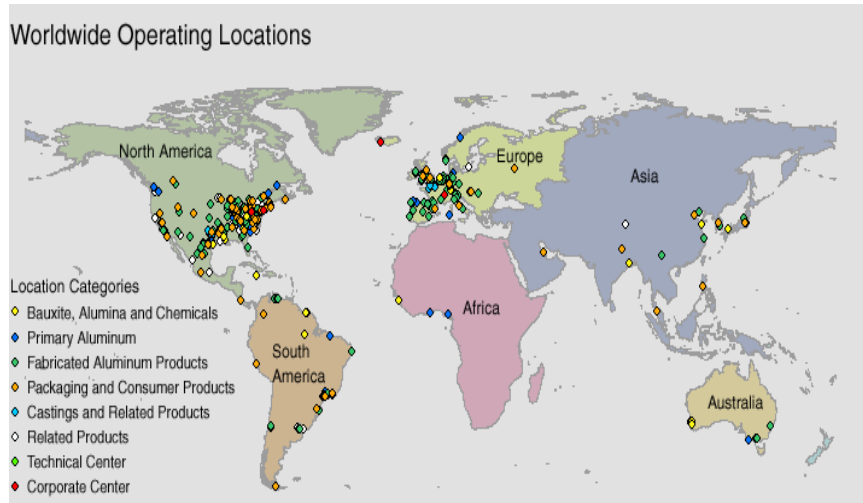
# Expectations of Maintenance Planning and Scheduling

- **Unsure?**
- **Decrease in Failures**
- **Effective Utilization of Maintenance Labor, Material, and Parts**
- **Reduction in Cost**
- **Less stress**
- **???**



# Source of Planning and Scheduling Best Practices

1. **Alumax Mt Holly – bought by Alcoa in 1990s**
2. **Alcoa Mt Holly – expanded to all Alcoa Plants Worldwide**
3. **Recognized as having a “World Class Maintenance” organization by HSBRT, Maintenance Technology Magazine, Reliable Plant Magazine, and many others**
4. **Created to effectively manage maintenance, labor, material, time and to minimize interruption to production**



# Objective of Maintenance Planning and Scheduling

1. To Optimize Maintenance resources: labor, material, and parts
2. To Optimize Asset Reliability through minimized unscheduled and scheduled downtime
3. To Optimize Cost

TABLE 7.2. Maintenance Costs in Typical and World-Class Companies

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%



# Best Practices Benchmarks

- **Schedule Compliance 80-90%**
- **Breaks to the Schedule (minimal)**
- **% of Planned Work 90%**
- **PM Execution – 15%**
- **Results from PM Execution – 15%**
- **PdM Execution – 15%**
- **Results from PdM – 35%**
- **Wrench Time typical company – 18-30%**
- **World Class Company – 55% +**
- **Maintenance Cost (Reactive) 3.5 – 9.0%/ RAV**
- **Maintenance Cost (World Class) 2.0 – 3.0% / RAV**

Data Source;  
Alcoa's World Class  
Maintenance Global  
Initiative



# Work Order Requirements

## “Not an Option”

A Work Order is critical to ensure:

- A Planned/Scheduled Work Order is Repeatable
- What work is to be done
- What work was done
- Step by Step Instructions
- Actions required of the work
- Maintenance KPIs are accurate
- The % of Maintenance Work assigned to;
  - Reactive Work
  - Proactive Work
  - Project Work

WO # 12033	Asset # 12332 – Line 1					
Job Description: Lubricate Bearings						
Frequency: Monthly						
Estimated Craft Hours: 1 x 1.0	Estimated Production Downtime: 0					
Originator: Bill Hill	Origination Date: 01/11/2019					
Owner: Maintenance Dept	Version #: 1					
Previous Version(s) Modification:	Approval: RAS					
Version #: 1.0	Version #: 1.0					
Cautions: Failure to follow PM Requirements could result in equipment failure						
Personal Protective Equipment Required: Gloves, hearing protection						
Part # (Stores ID)	Part Description	Quantity	Quantity Description			
C-1295	Synthetic Lube	1	Each			
Consumables Needed: Lint Free Towels						
Special Tools Required: Single Pump Grease Gun - Type 237 (Synthetic Grease Gun)						
Mobile/Special Equipment: None						
Required Departmental Coordination: Production Lead will be notified before execution of Lubrication						
ID	Description	Craft Type	# of Crafts	Craft Hours	Initial	Stop
1	Ask Operator if any issues with asset	M	1	3	KL	
2	Inspect asset for any leaks or abnormalities	M	1	3	KL	
3	Clean grease fitting with lint free rag	M	1	1	KL	
4	Insert grease into 4 "Zerk fittings" (2 Pumps per fitting)	M	1	1	KL	
5	Notify Production work is complete	M	1	1	KL	
6	Complete Work Order	M	1	1	KL	
Total Hours						

Condition (As Found): (Required)  
Leak coming from #1 Gearbox

Condition (As Left): (Required)  
Clean up oil, notified production leader to keep area clean of oil

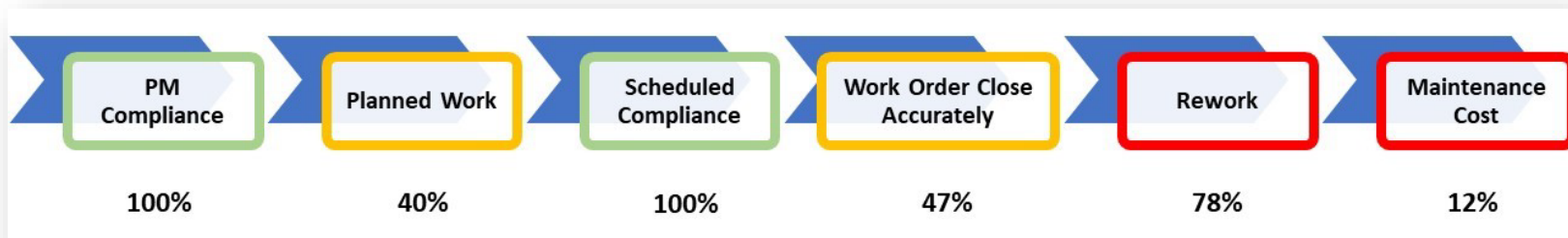
Comment(s): (Optional)  
None

Craft's Feedback on Procedures: (Optional)  
All Good

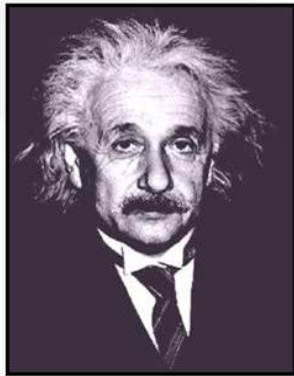
Craft's Signature(s): (Required)  
*[Signature]*

Date:  
10/11/2019

**“Repeatable Procedure Example”**



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



- Albert Einstein





# Maintenance Issues

**Most maintenance staff actually work 2-4 hours a day**

- Effective Direct work is low
- Caused by Lack of effective Planning
- Caused by Lack of effective Scheduling

**70-80 % of equipment failures are Human-INDUCED**

- Not using a Torque Wrench
- Not knowing specifications
- Not having the right part at the right time
- Improperly handling and installing bearings (parts)
- No Repeatable, Effective PM, Corrective, Lube Procedures





# Root Causes of Equipment Failure

## A Few Causes of Equipment Failures:

1. Lack of repeatable PM and Corrective procedures
2. Lack of discipline in Maintenance Work Execution
3. Lack of discipline in Production Operating Equipment to Specifications
4. Lack of effective Maintenance Leading and Lagging KPIs
5. No formal process for Maintenance Planning and Scheduling
6. No formal training in Maintenance and Reliability Best Practices for all critical players

***"IF YOU CANNOT REPEAT IT, YOU CANNOT IMPROVE IT"***

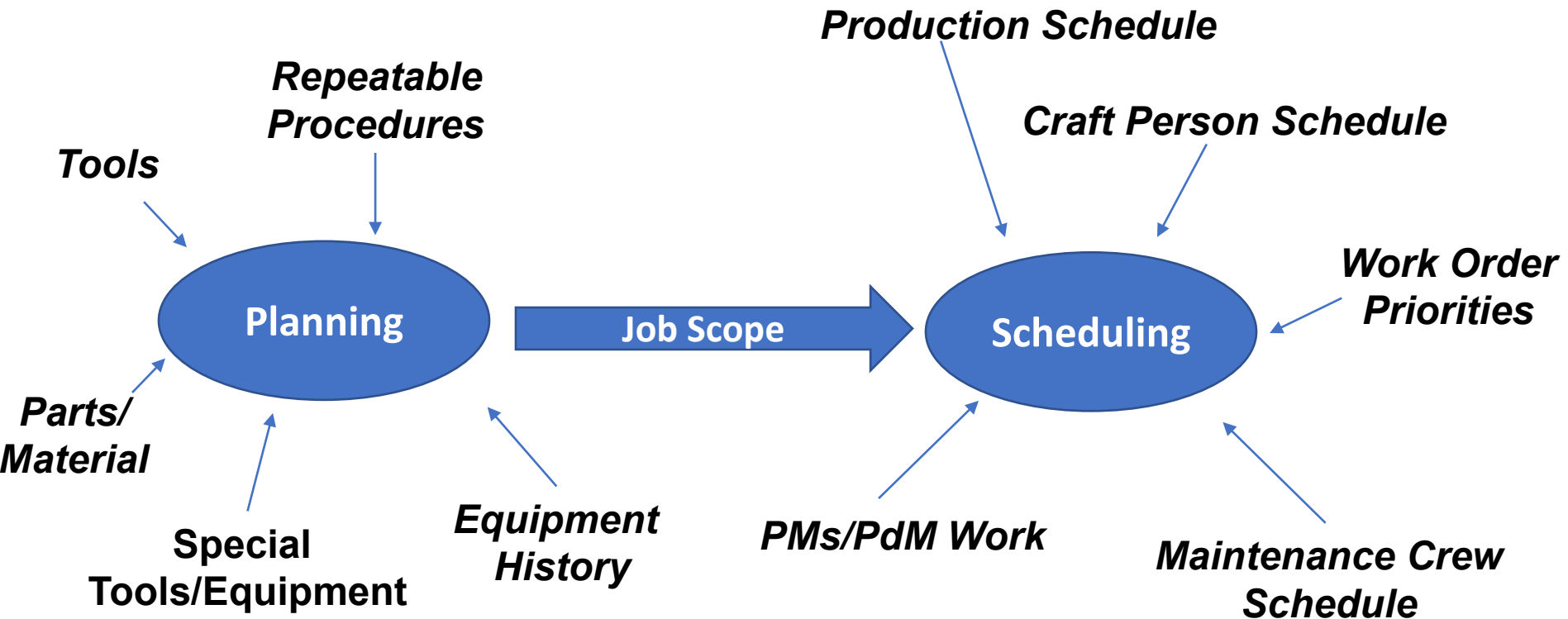
# World Class Maintenance Benchmarks

## Alcoa Mt Holly – World Class Maintenance

	Mt . Holly	Typical
<u>Planned/scheduled</u>	91.5%	30–50%
<u>Breakdowns</u>	1.8%	15–50%
<u>Overtime</u>	0.9%	10–25%
<u>Inventory level</u>	½ normal	Normal
<u>Call-ins</u>	1/month	Routine
<u>Off-shift work</u>	5 people	Full crew
<u>Backlog</u>	5.5 weeks	Unknown
<u>Budget performance</u>	Varies, 1–3%	Highly variable
<u>Capital replacement</u>	Low	High
<u>Stock outs</u>	Minor	Routine

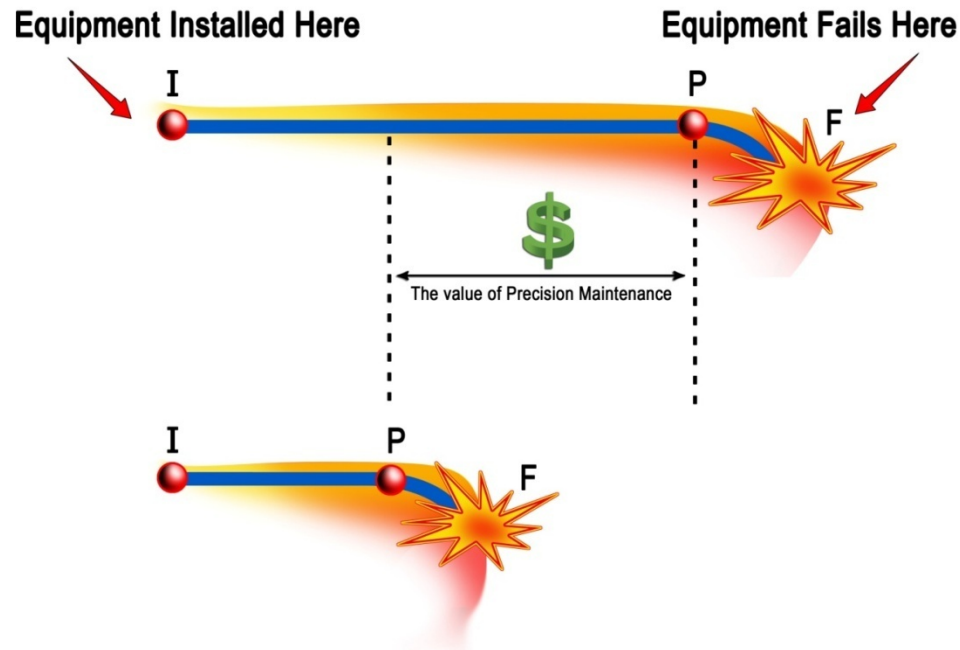


# Maintenance Planning Enables Maintenance Scheduling



# Maintenance Planning:

Identifying the parts, tools, procedures, standards, and specifications required for effective maintenance work, increasing wrench time.



***“Planning is key to the success of Precision Maintenance”***



# Maintenance Scheduling:

Scheduling of maintenance, operations, contractors, engineering synchronized which is intended to minimize interruption to operations and production.



***“Performing the right work at the right time”***

# Work Order Requirements

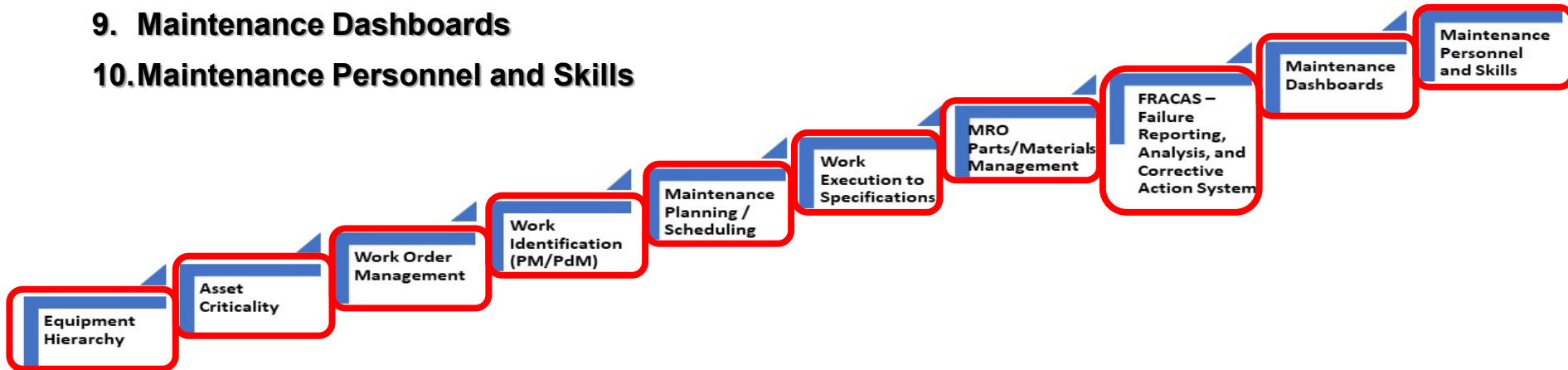
- All work must have a Work Order and must be **charged to an asset**
- **Standing Work Orders should only be used for meetings which a tech is present**, ie. Safety, Corporate, Site, etc., however time *must* be charge to these specific work orders in case we need to retrieve this information in the future.
- All work orders must reviewed before close of business each day by Maintenance Supervisor.
- All work orders must be closed out by the Maintenance Planner to ensure all information is accurate.

*“Without Good Data we are Lost”*



# CMMS Functions/Requirements

1. Equipment Hierarchy
2. Asset Criticality
3. Work Order Management
4. Work Identification (PM / PdM)
5. Maintenance Planning and Scheduling
6. Work Execution to Specifications
7. MRO Parts and Material Management
8. Failure Reporting, Analysis, and Corrective Actions
9. Maintenance Dashboards
10. Maintenance Personnel and Skills





# Wrench-Time (or utilization time)

**“The time a Maintenance Person actually has their hand on a tool”**

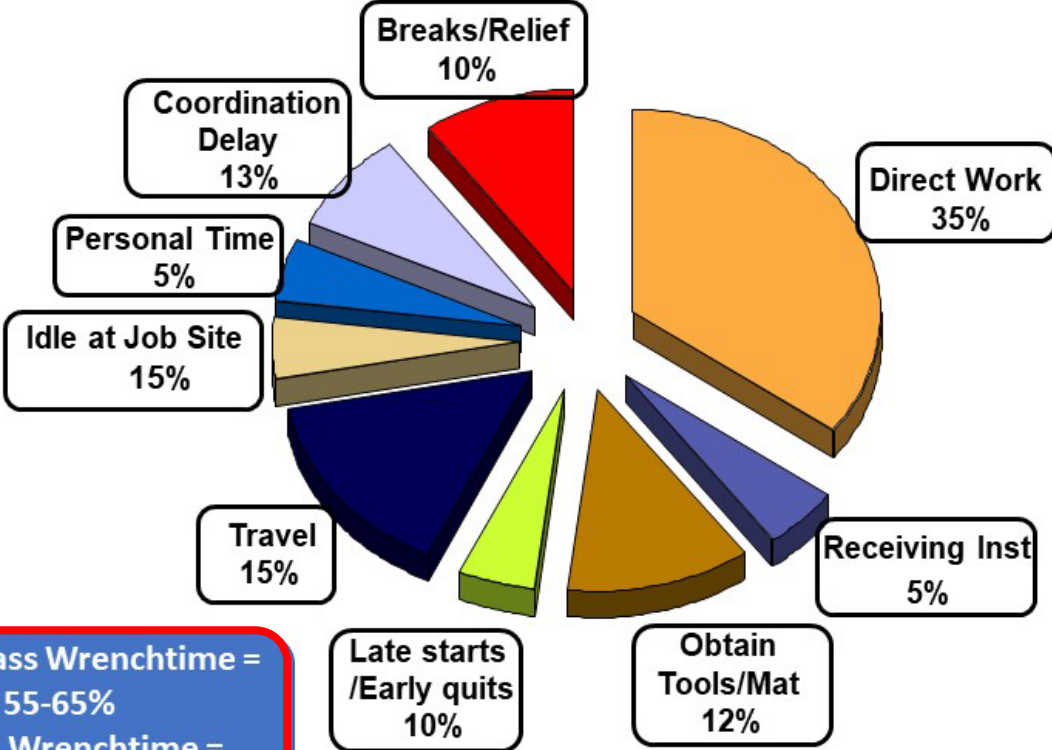
**Typical Wrench-Time 15-35%**

**World Class 55-65%**

- Wrench time is a measure of crafts personnel at work, using tools, in front of jobs.
- Wrench time does not include obtaining parts, tools or instructions, or the travel associated with those tasks. It does not include traveling to or from jobs.
- It does not include time spent obtaining work assignments.



# Current Labor Utilization in “good or typical” maintenance organizations

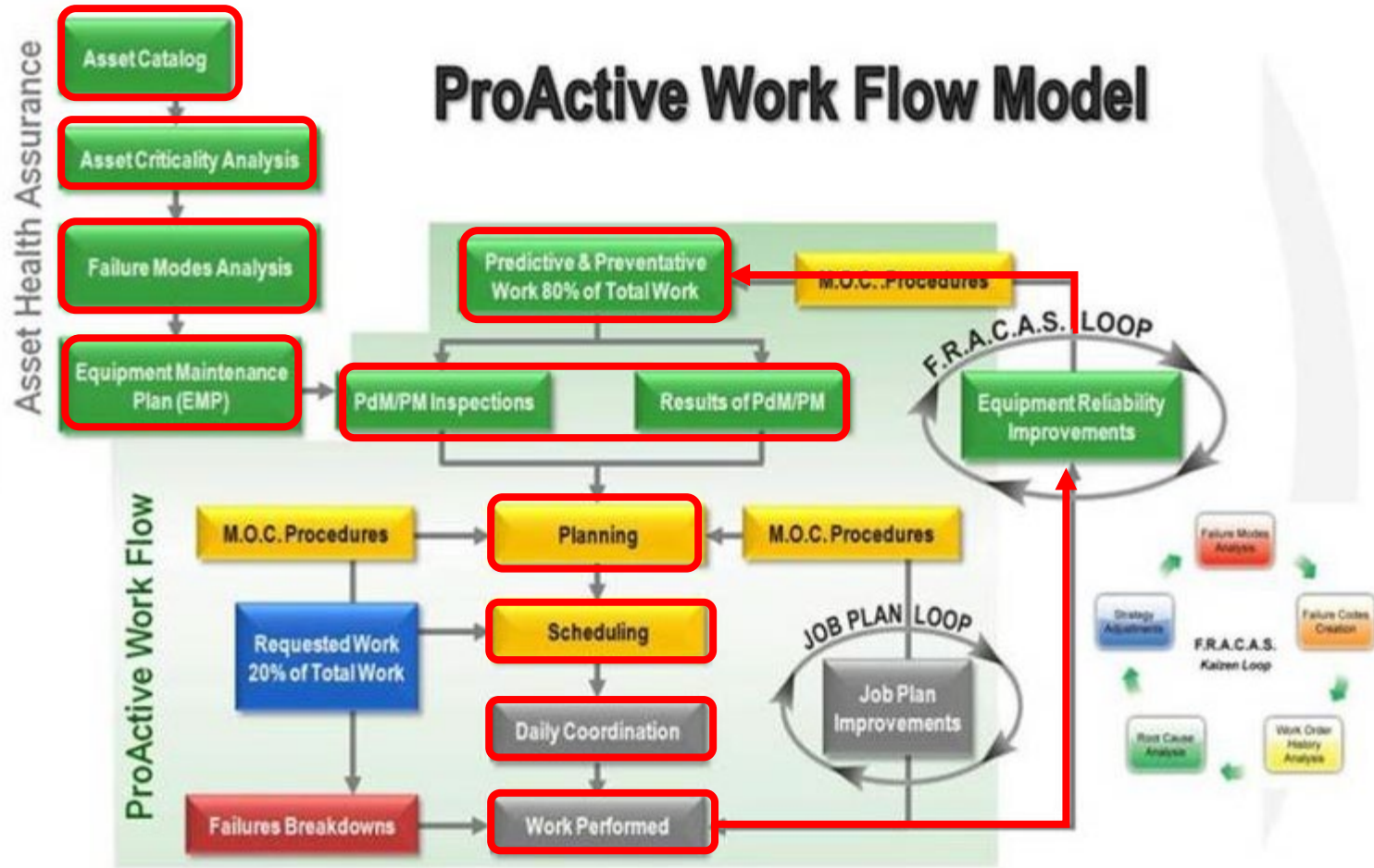


**World Class Wrenchtime = 55-65%**  
**Typical Wrenchtime = 15-25%**

# Impact of Planning & Scheduling on Labor Resource Utilization

If this were your current state where would you want to be?	Percent of Day Spent	
	Typical Current	Target
Receiving Instructions*	5	?
Obtaining Tools and Material*	12	?
Travel*	15	?
Coordination Delays*	8	?
Idle at Job Site	5	?
Late Starts and Early Quits	5	?
Authorized Breaks and Relief	10	?
Excessive Personal Time	5	?
<b>Subtotal</b>	<b>65</b>	<b>?</b>
<b>Direct Work</b>	<b>35</b>	<b>?</b>

# Proactive Maintenance Process Map



Source: Allied Reliability

# Reactive Maintenance Process Map

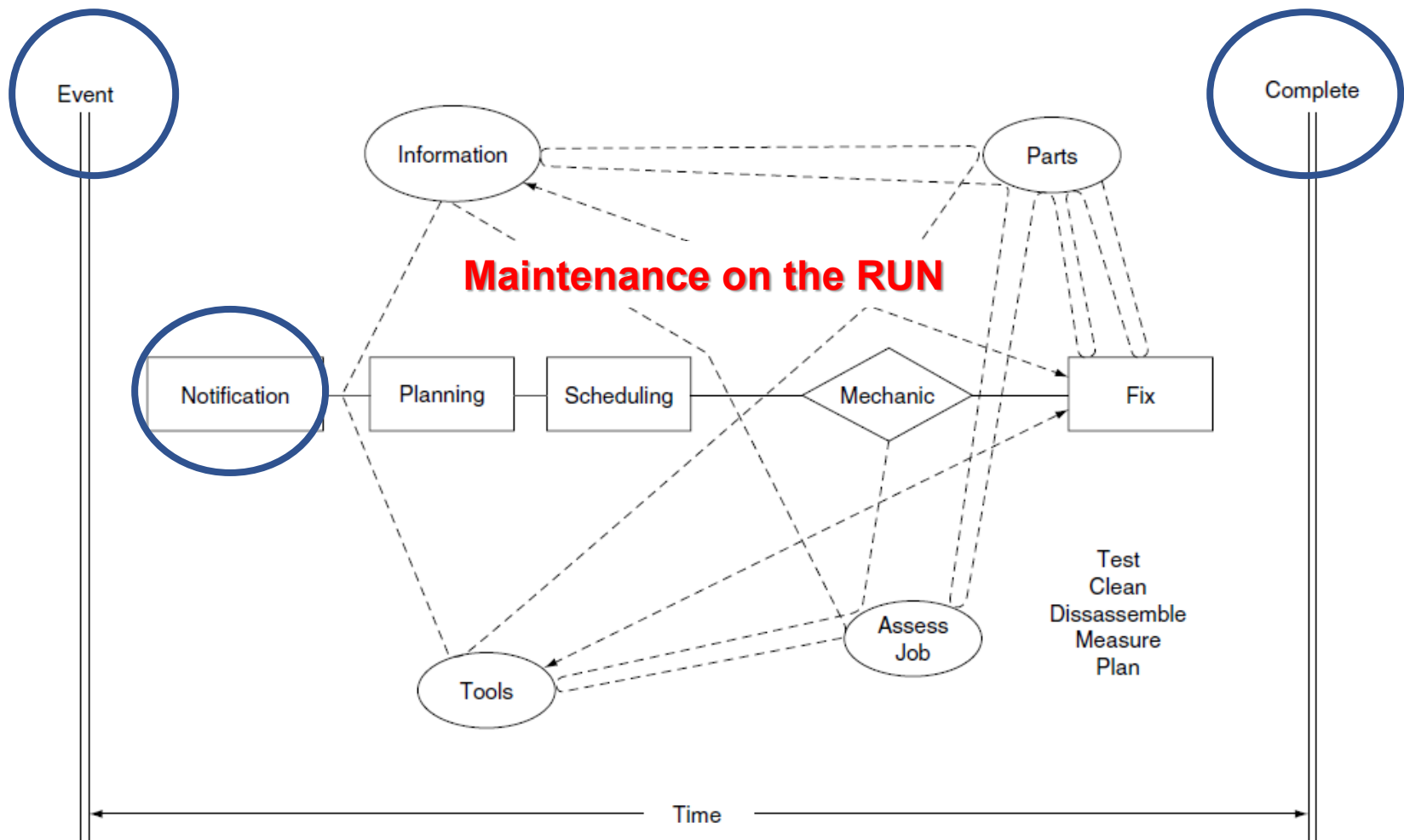
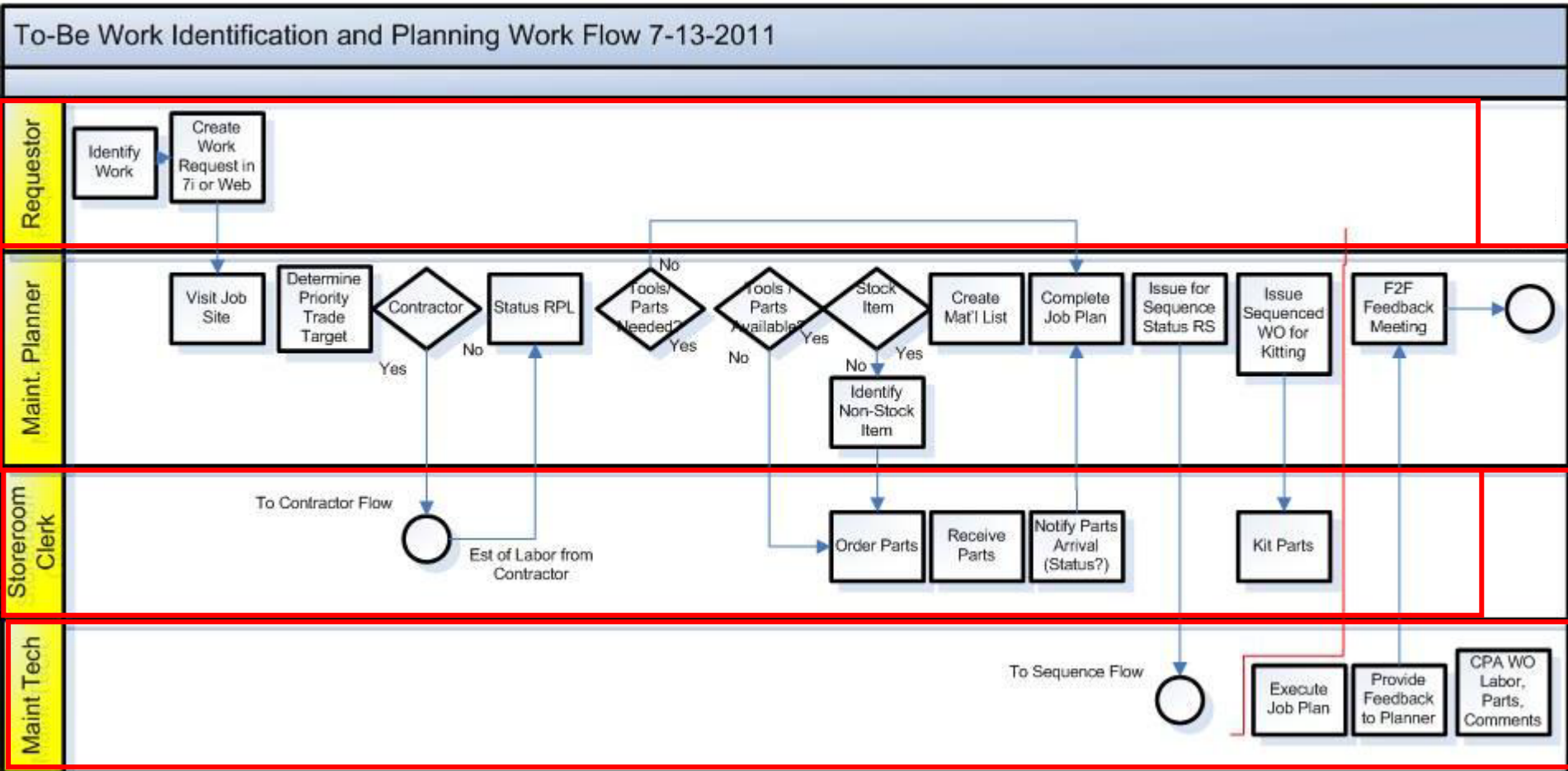


FIGURE 1.1. Reactive maintenance model.

# Maintenance Planning Workflow Process Map







# Where do you start?



# Step 1: Identify External Distracters

- **Poor spare parts and inventory controls**
- **Conflicting ideas of what planning *is***
- **Planners taken off job, put on tools, or involved in daily activities (parts chaser, facilitating daily work)**
- **Maintenance and Production not acting as a team**
- **No planning process, unclear expectations, unclear roles and responsibilities**
- **Maintenance leadership not following the plan**
- **Emergency / Urgent Work too High**
- **Lack of Discipline**
- **The CULTURE**



# Step 2: Education of the Team

*“Coaching is not just for Planners Anymore”*

- Plant / Operations Leadership
- Frontline Production Leadership
- Maintenance and Reliability Leadership (all levels)
- Planners
- Maintenance Personnel
- Operators

## Tool-Box Talk

### Maintenance Planning and Scheduling

#### “Best Practices”

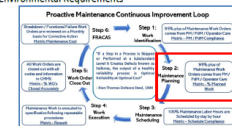
By Ricky Smith CMRP

Maintenance Planning and Scheduling is critical to success of any Maintenance Organization resulting in a significant increase in Wrenchtime (Hands on Tool Time). Planning and Scheduling are two distinct functions which are dependent on each other.

Wrench-time is a measure of maintenance personnel's time accomplishing proactive work on time, on schedule, and on budget.

Wrench-time does not include time obtaining parts, tools or instructions, and work associated with those tasks, traveling to or from job sites, or time spent obtaining work assignments. It is about only focused on “hands on tool” time.

- Maintenance Planning is a highly skilled function that requires a basic knowledge of the maintenance work processes, operations expectations, project management, computerized maintenance management system (CMMS) and related systems, as well as a practical understanding of the work to be performed.
- Planning is the “what's required” and “how to” part of any maintenance job.
- Planning typically includes the following:
  - Parts/Materials
  - Specifications
  - Instructions (Repeatable)
  - Coordination requirements
  - Estimated time
  - Repeatable procedure
  - Safety/Environmental Requirements



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# Step 3: Develop RACI Chart for Maintenance Planning and Scheduling

## MAINTENANCE PLANNING AND SCHEDULING

Tasks Decisions/Functions	Maintenance Supervisor	Maintenance Planner / Scheduler	Maintenance Manager	Production Supervisor	Tradesman	Storeroom	Operator
Work ID PM/PdM/OpCare	R	I	A	A	R		R
Planning	C	R	A		C	C	
Scheduling	C	R	A	C		C	
Scheduling Meeting	I	R	A	C	I	I	
Work Execution	A		I		R		R
Work Order Close Out	A	R	I		R		R
FRACAS	A	R	R	R	R	R	R

**R**esponsibility

“the Doer”

**A**ccountable

“the Buck stops here

**C**onsulted

“in the Loop”

**I**nformed

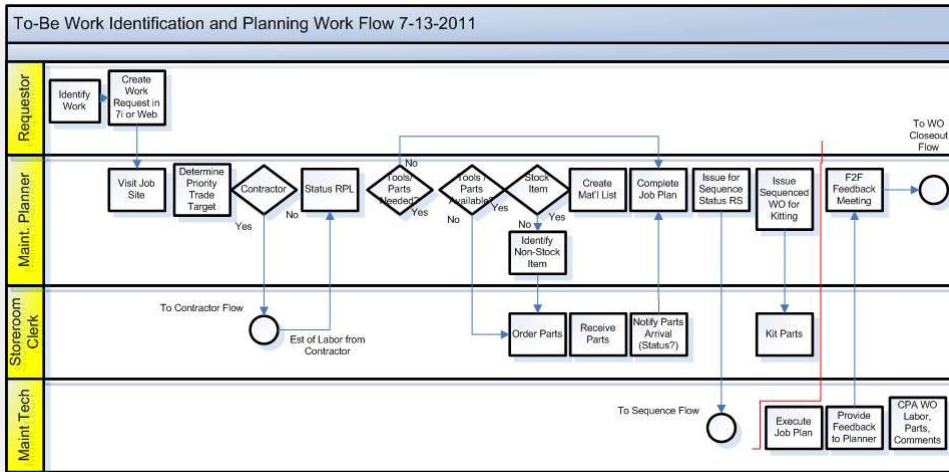
“kept in the picture”

# Step 4: Develop Guiding Principles for Planning and Scheduling

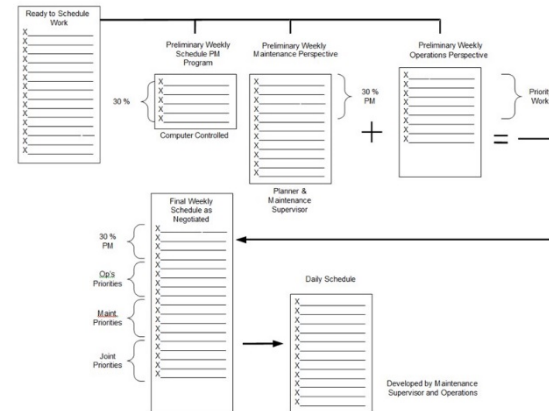
- The planners focus on future work and maintain at least two weeks of work backlog that is planned, approved, and ready to schedule / execute.
- Planners Do Not Chase Parts for Jobs in Progress
- Supervisors and Crew Leads Handle the Current Day's Work and Problems - Coordination
- Scheduling Does Not Occur Until Parts are Kitted
- We will maintain a stable / no fluid Criticality Index



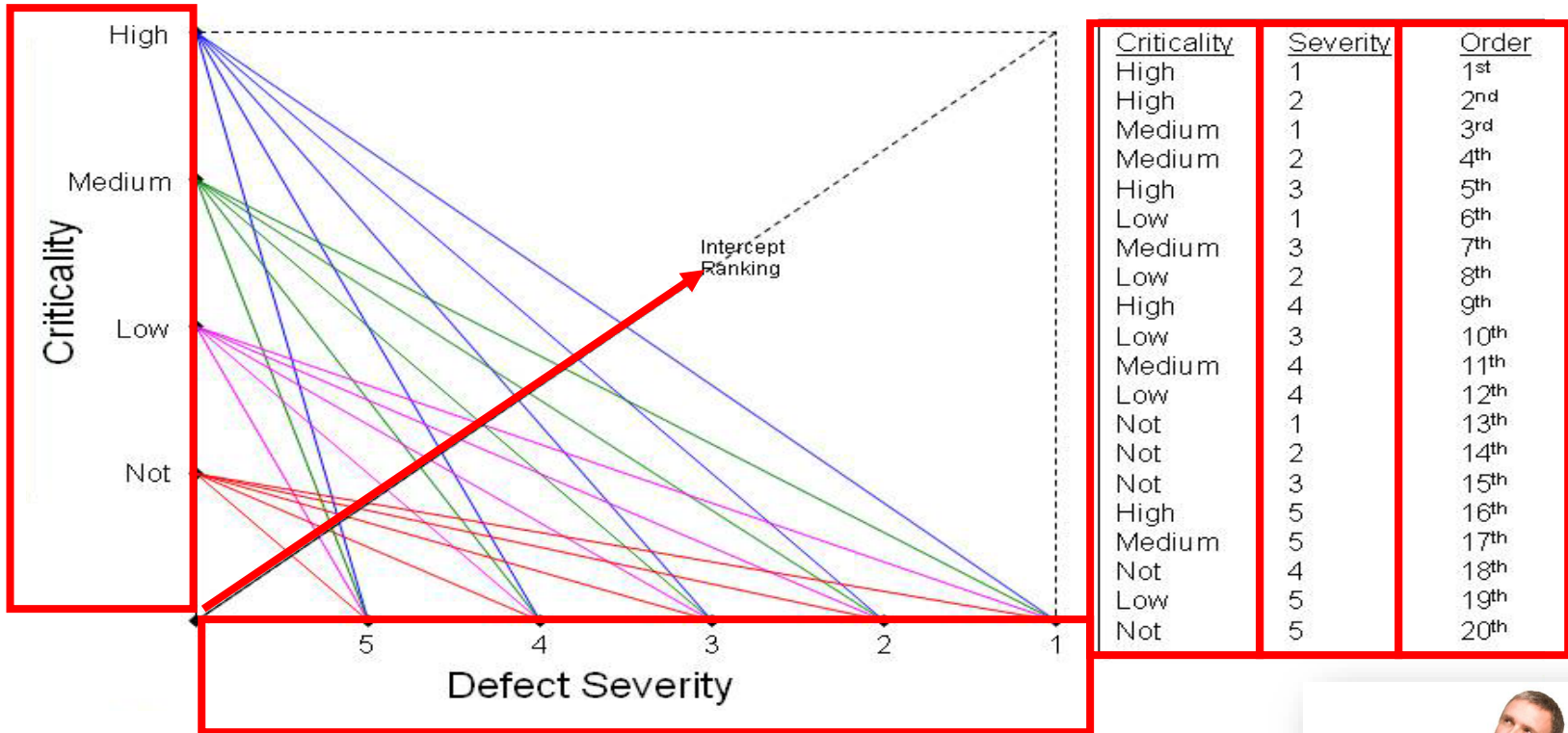
# Step 5: Define the Planning and Scheduling Process



## Maintenance Scheduling Process



# Step 6: Prioritize Work to be Planned/Scheduled



**What work do you plan and schedule first?**

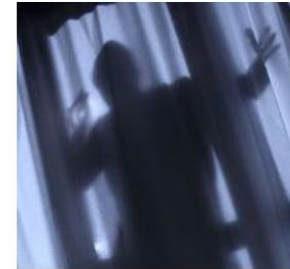




# Step 7: Develop Effective / Repeatable Procedures

- Repeatable Process
- Capture Knowledge
- Train New Employees
- Reduce Human Induced Failures
- Requirements for a Repeatable Procedure...

## Variation - A Deadly Killer

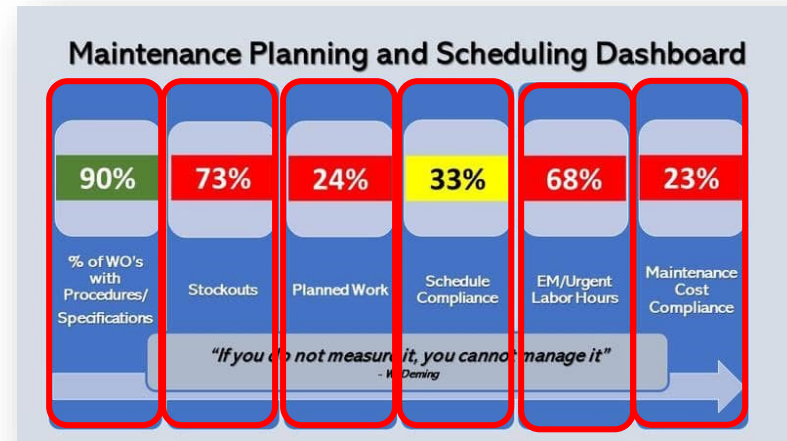


WO # 12033		Asset # 12332 – Line 1			
Job Description: Lubricate Bearings					
Frequency: Monthly					
Estimated Craft Hours: 1 x 1.0		Estimated Production Downtime: 0			
Originator:	Bill Hill	Origination Date:	01/12/2020		
Owner:	Maintenance Dept	Version #:	1		
Previous Version(s) Modifications:					
Approval:	RAS	Version #:	1.0		
Cautions: Failure to follow PM Requirements could result in equipment failure					
Personal Protective Equipment Required: Gloves, hearing protection					
Part # (Stores ID)	Part Description	Quantity	Quantity Description		
C-1395	Synthetic Lube	1	Each		
Consumables Needed: Lint Free Towels					
Special Tools Required: Single Pump Grease Gun - Type 237 (Synthetic Grease Gun)					
Mobile/Special Equipment: None					
Required Departmental Coordination: Production Lead will be notified before execution of Lubrication					
ID	Description	Craft Type	# of Crafts	Craft Hours	Initial Steps
1	Ask Operator if any issues with asset	M	1	.3	KL
2	Inspect asset for any leaks or abnormalities	M	1	.3	KL
3	Clean grease fitting with lint free rag	M	1	.1	KL
4	Insert grease into 4 "Zerk fittings" (2 Pumps per fitting)	M	1	.1	KL
5	Notify Production work is complete	M	1	.1	KL
6	Complete Work Order	M	1	.1	KL
Total Hours				1	KL

Condition (As Found): (Required) Leaks coming from #1 Gearbox
Condition (As Left): (Required) Clean up oil, notified production leader to keep area clean of oil
Comment(s): (Optional) None
Craft's Feedback on Procedures: (Optional) All Good
Craft's Signature(s): (Required) <i>Jim Jimbo</i>
Date: 10/11/2019

# Step 8: Measure Effectiveness of Planning and Scheduling

- % of Work Orders Planned (Trending Up)
- % of Planned Work (90%)
  - Proactive (90%)
  - Reactive (2%)
  - Requires no Planning (8%)
- % of Work Orders with Estimated to Actual Labor Hours (+/- 10%)
- Backlog - measured in labor hours by week
  - Ready to Schedule (2-4 Weeks)
  - Total Backlog (6-8 Weeks)
- % of WOs with Comments/Recommendations
- PM Compliance (Critical Assets – 100%)
- PdM Compliance (Critical Assets – 100%)
- Critical Asset - Mean Time Between Failure

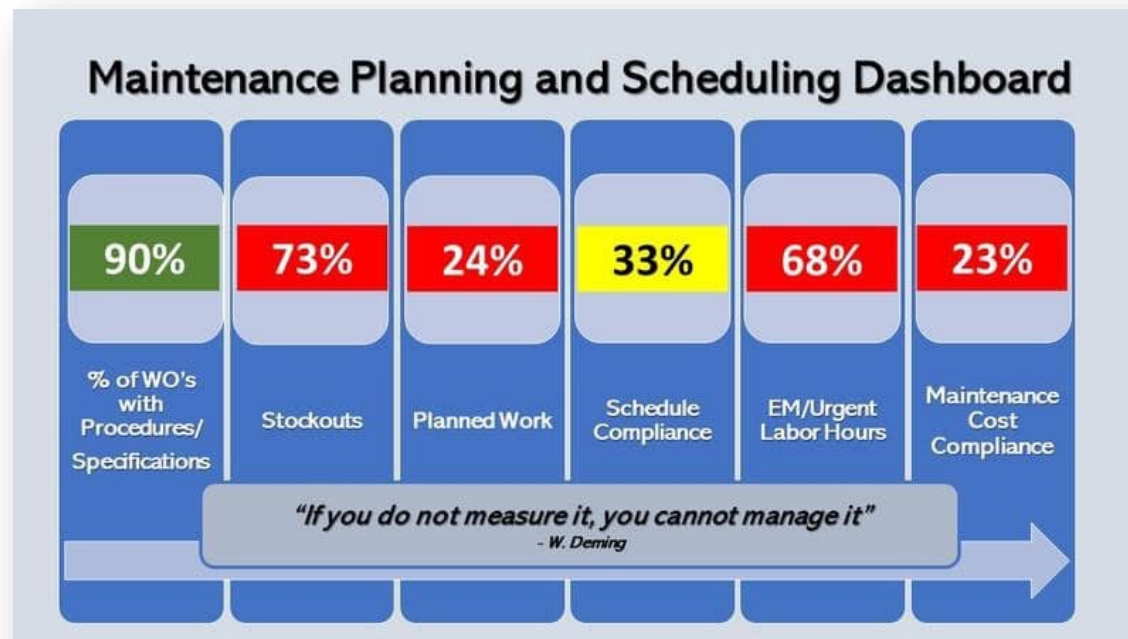


# What are your thoughts?

**Can make a change in your Maintenance Planning and Scheduling in 30 days? Yes or No?**

**Remember this;**

- **Focus on quick wins**
- **Begin measuring today with a Maintenance Dashboard**
- **It isn't about Maintenance Planning and Scheduling, it is about improving life for everyone**



# Questions



## 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 LINK  
TO JOIN EACH DAY

IN-PERSON: SOUTHERN WESLEYAN UNIVERSITY,  
CLEMSON, SC

---

\$750.00 USD per person

[rsmith@worldclassmaintenance.org](mailto:rsmith@worldclassmaintenance.org)

[www.worldclassmaintenance.org](http://www.worldclassmaintenance.org)