SIMPLE TIPS TO IMPROVE MAINTENANCE PLANNING AND SCHEDULING IN 30 DAYS

BY: RICKY SMITH, CMRP, CMRT, CRL

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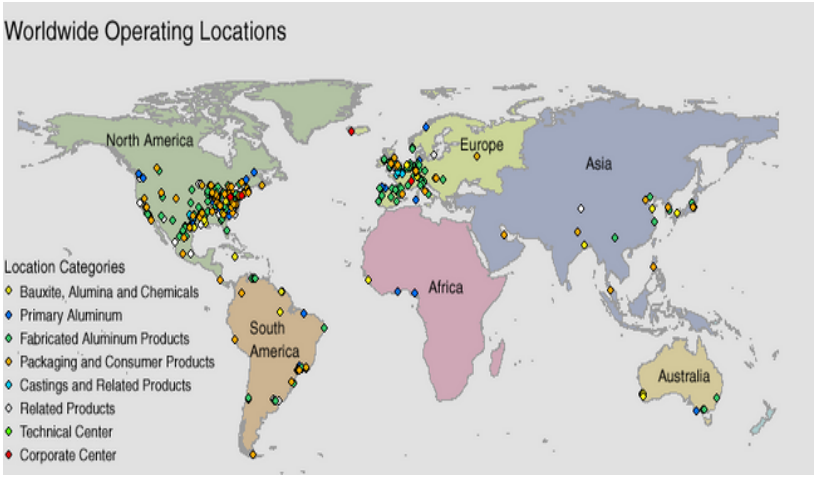
Expectations of Maintenance Planning and Scheduling

- **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

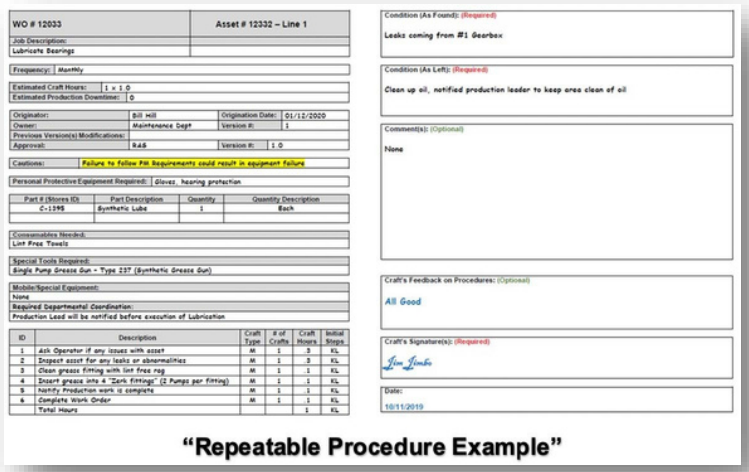
Data Source;
Alcoa's World Class Maintenance Global Initiative

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: 01/12/2020
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 227 (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	.5	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

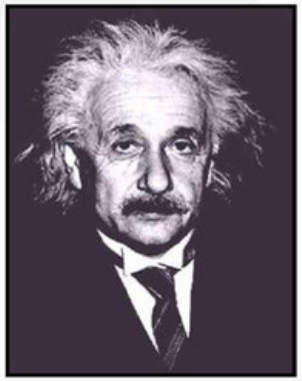
Craft's Feedback on Procedures: (Optional) All Good

Craft's Signature(s): (Required) Jim Jimbo

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

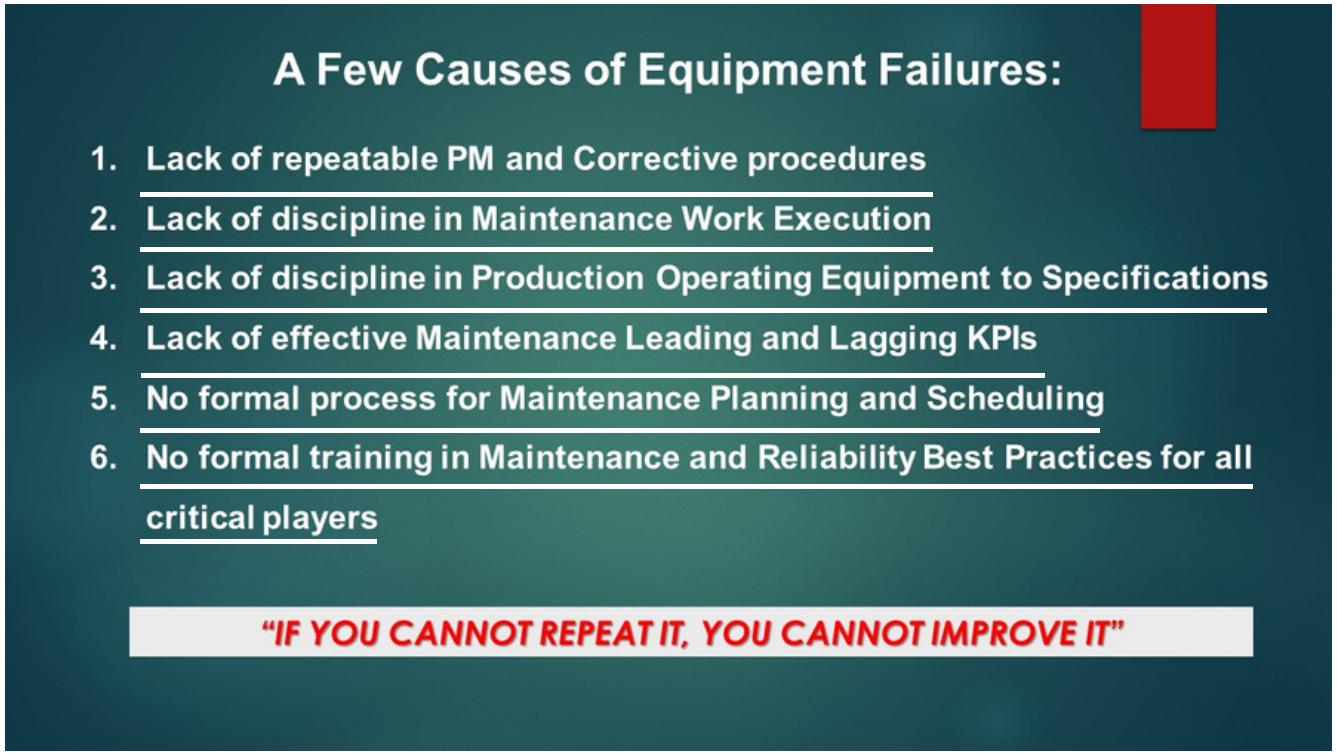
Most maintenance staff actually work 2-4 hours a day

- **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

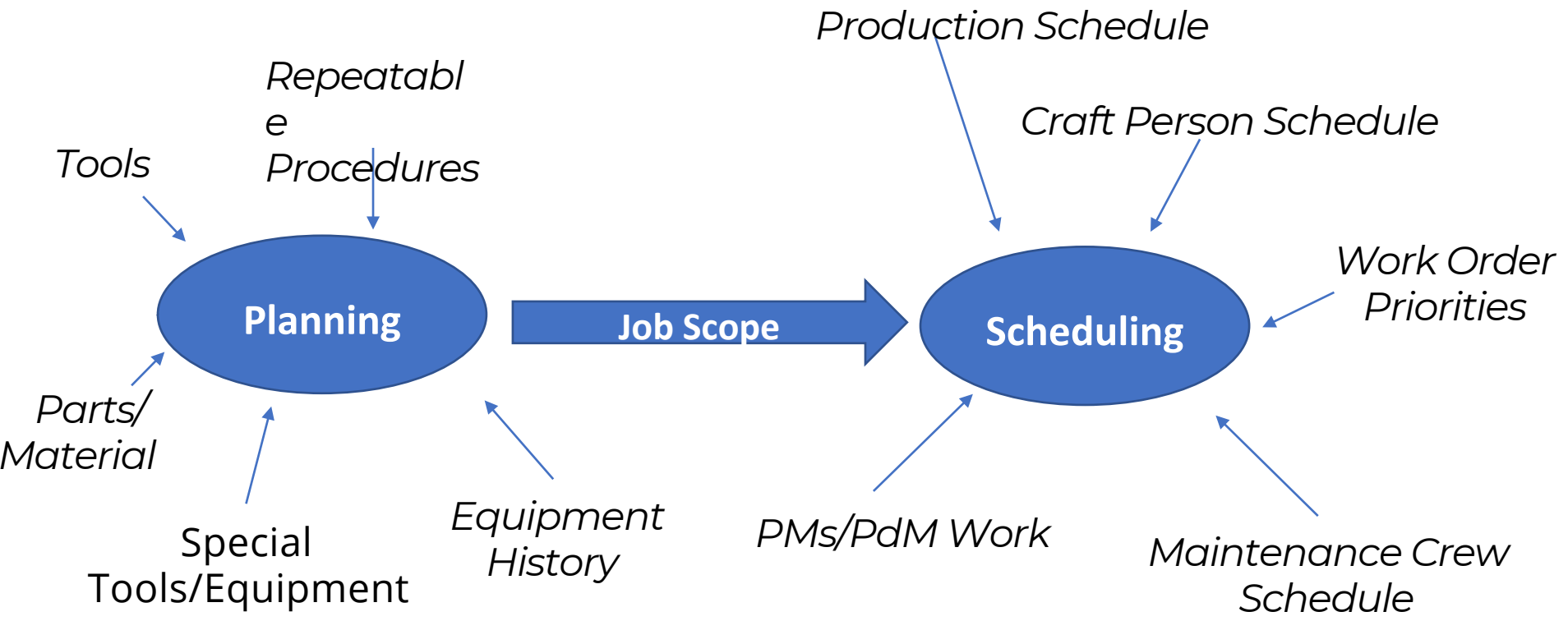


World Class Maintenance Benchmarks

Alcoa Mt Holly –World Class Maintenance

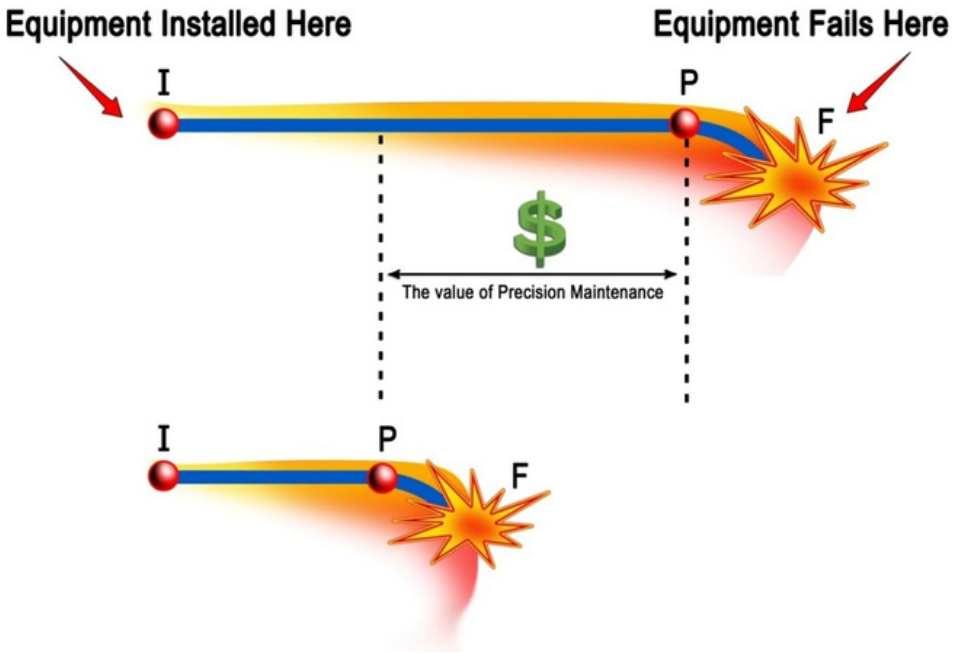
	Mt . Holly	Typical
Planned/scheduled	91.5%	30–50%
Breakdowns	1.8%	15–50%
Overtime	0.9%	10–25%
Inventory level	½ normal	Normal
Call-ins	1/month	Routine
Off-shift work	5 people	Full crew
Backlog	5.5 weeks	Unknown
Budget performance	Varies, 1–3%	Highly variable
Capital replacement	Low	High
Stock outs	Minor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

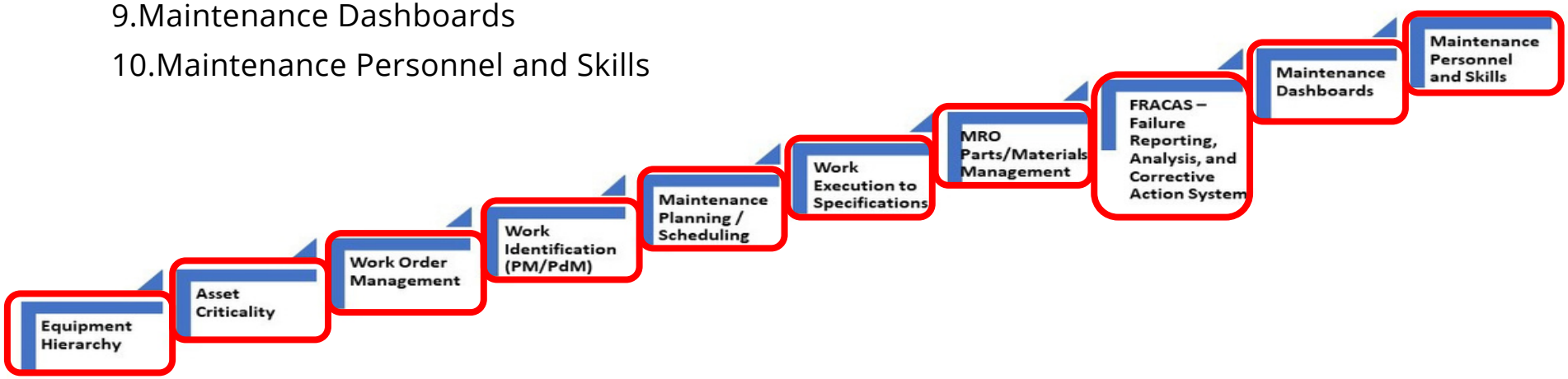
Work Order Requirements

- 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)

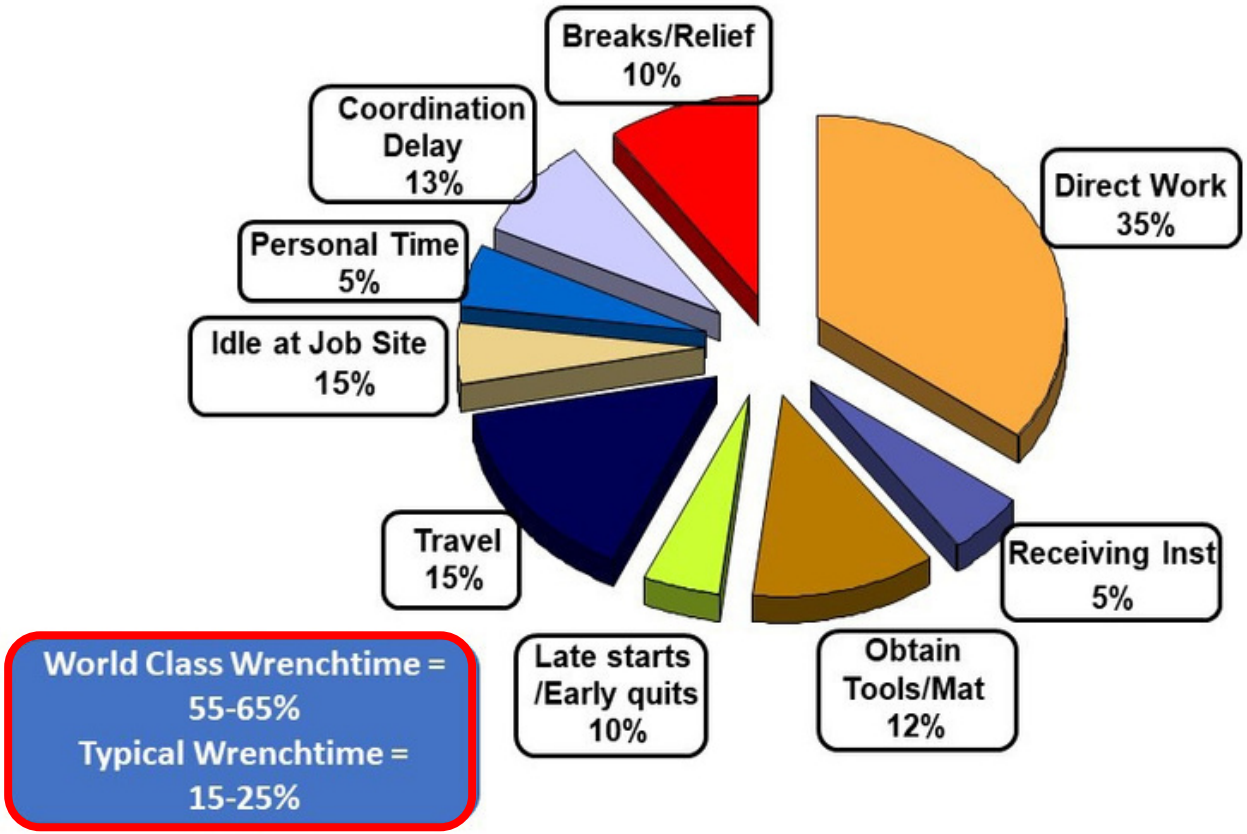
"The time a Maintenance Person actually has their hand on a tool"

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.

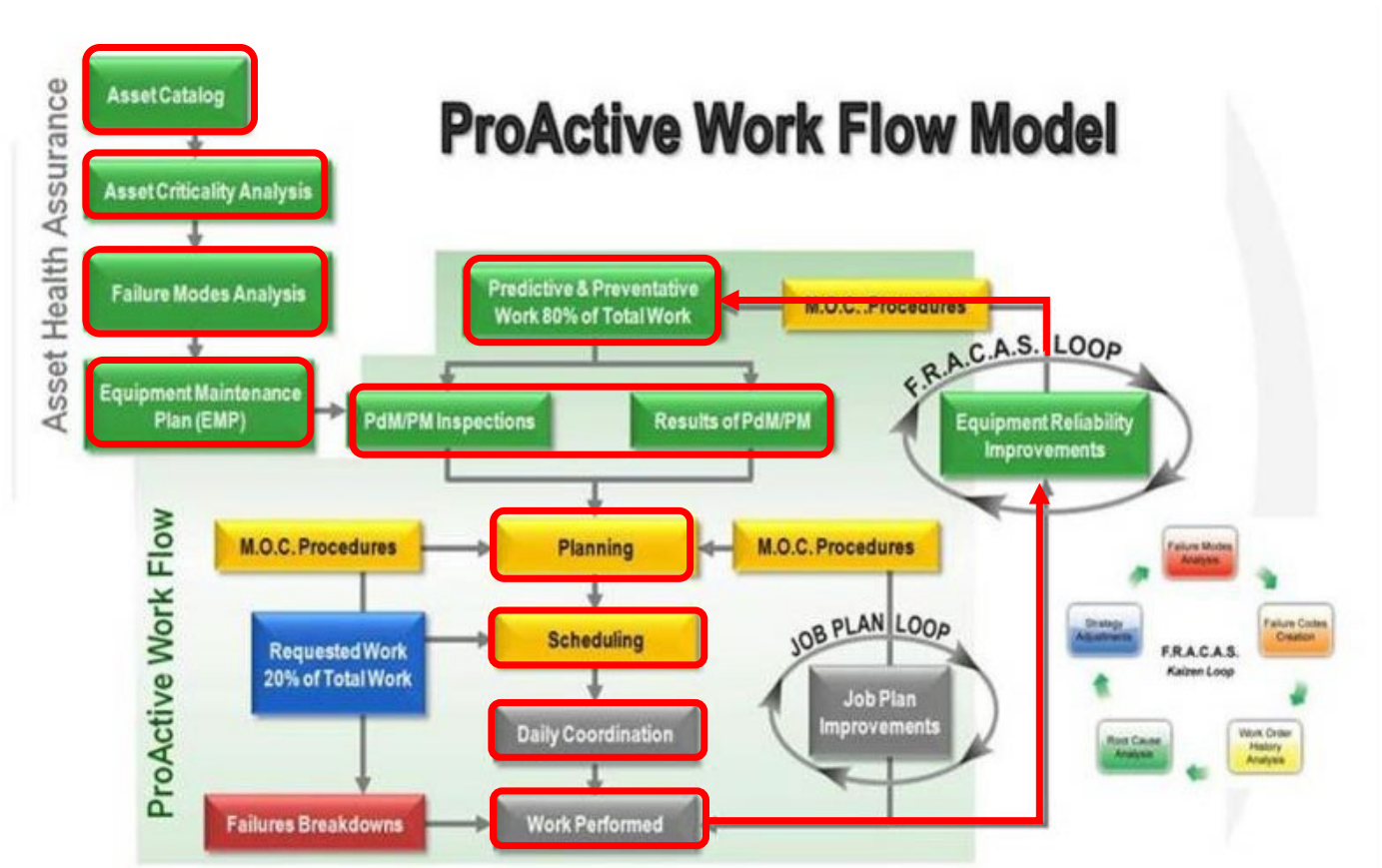
Current Labor Utilization in “good or typical” maintenance organizations



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	?
Subtotal	65	?
Direct Work	35	?

Proactive Maintenance Process Map



Source: Allied Reliability

Reactive Maintenance Process Map

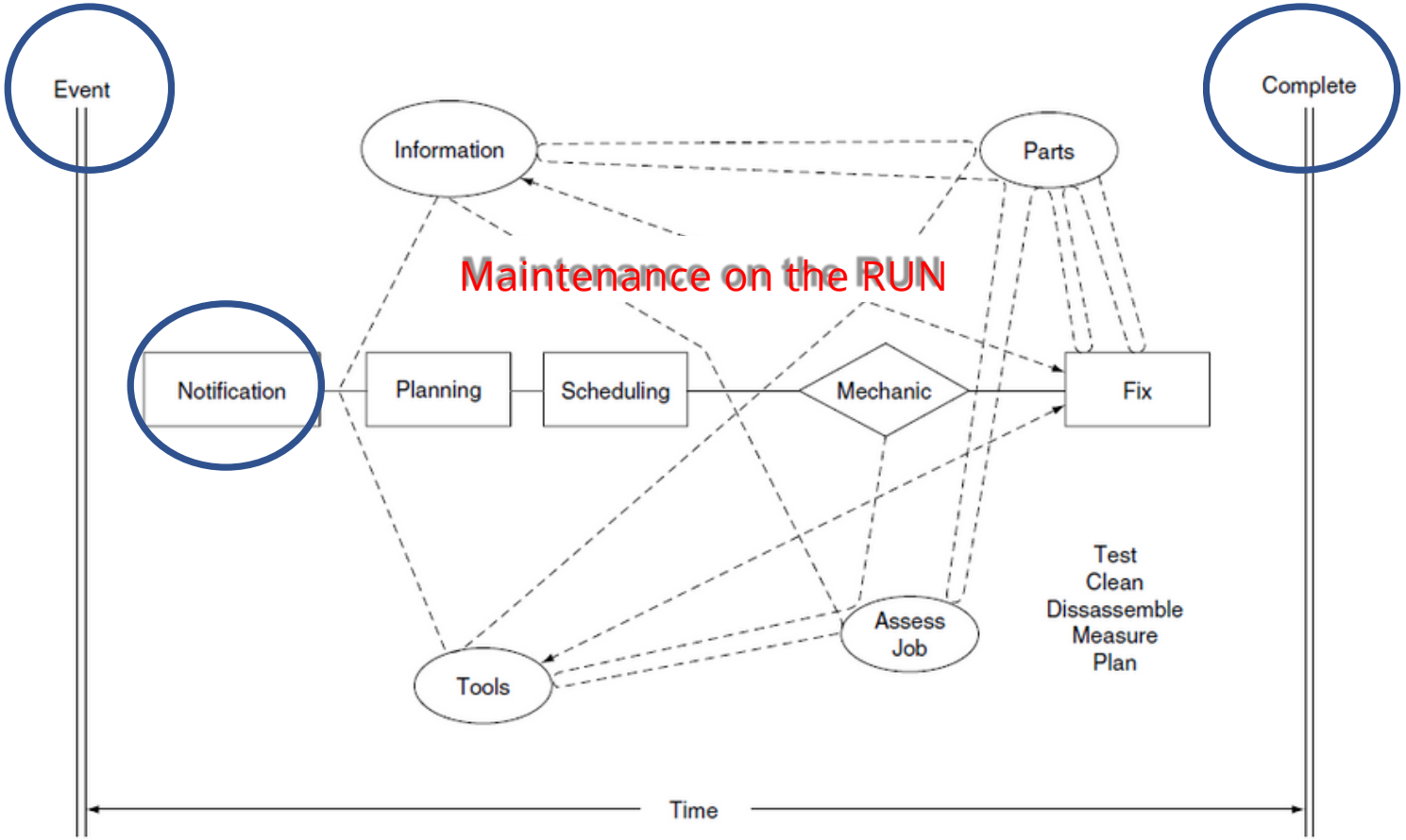
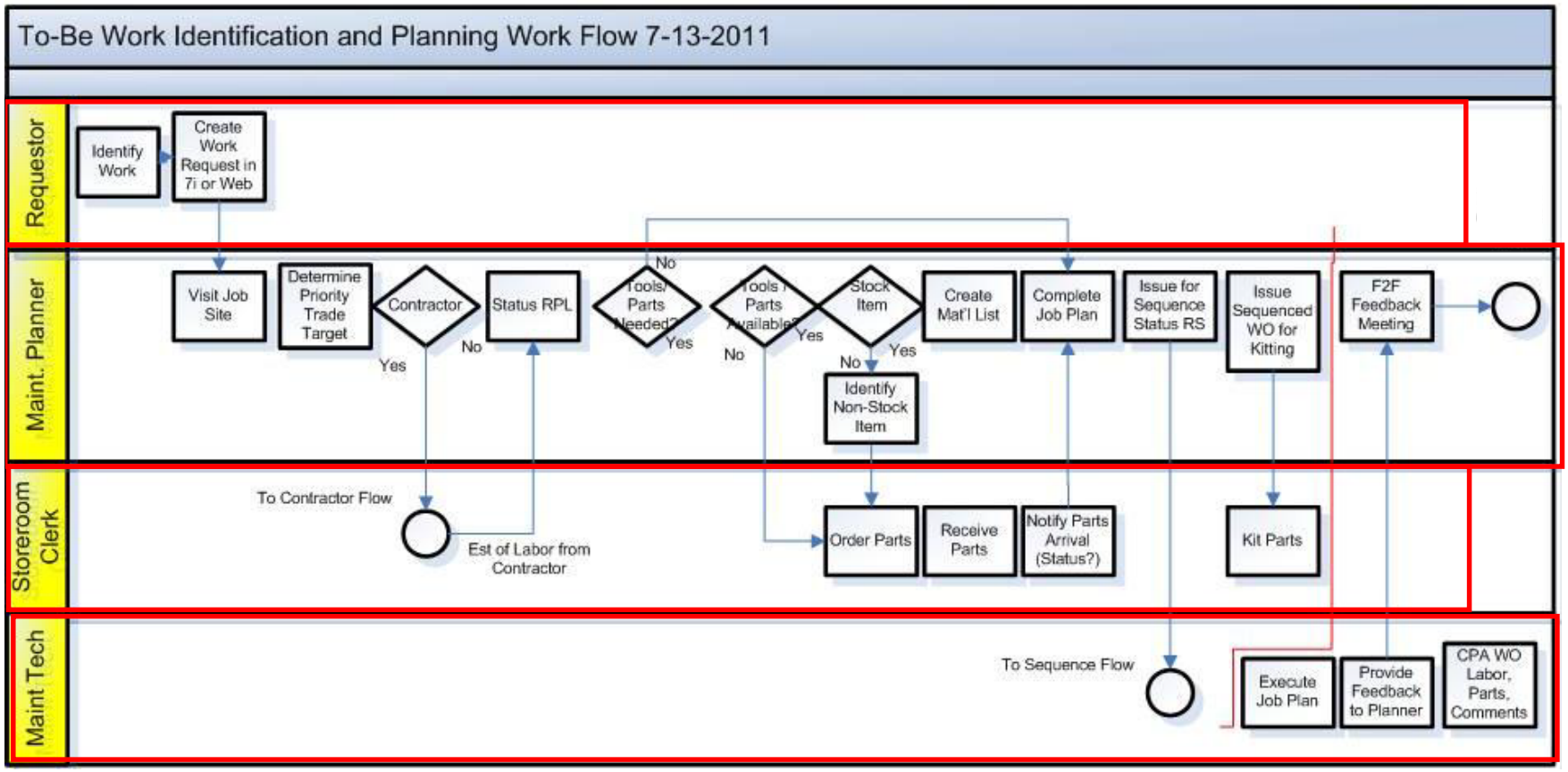
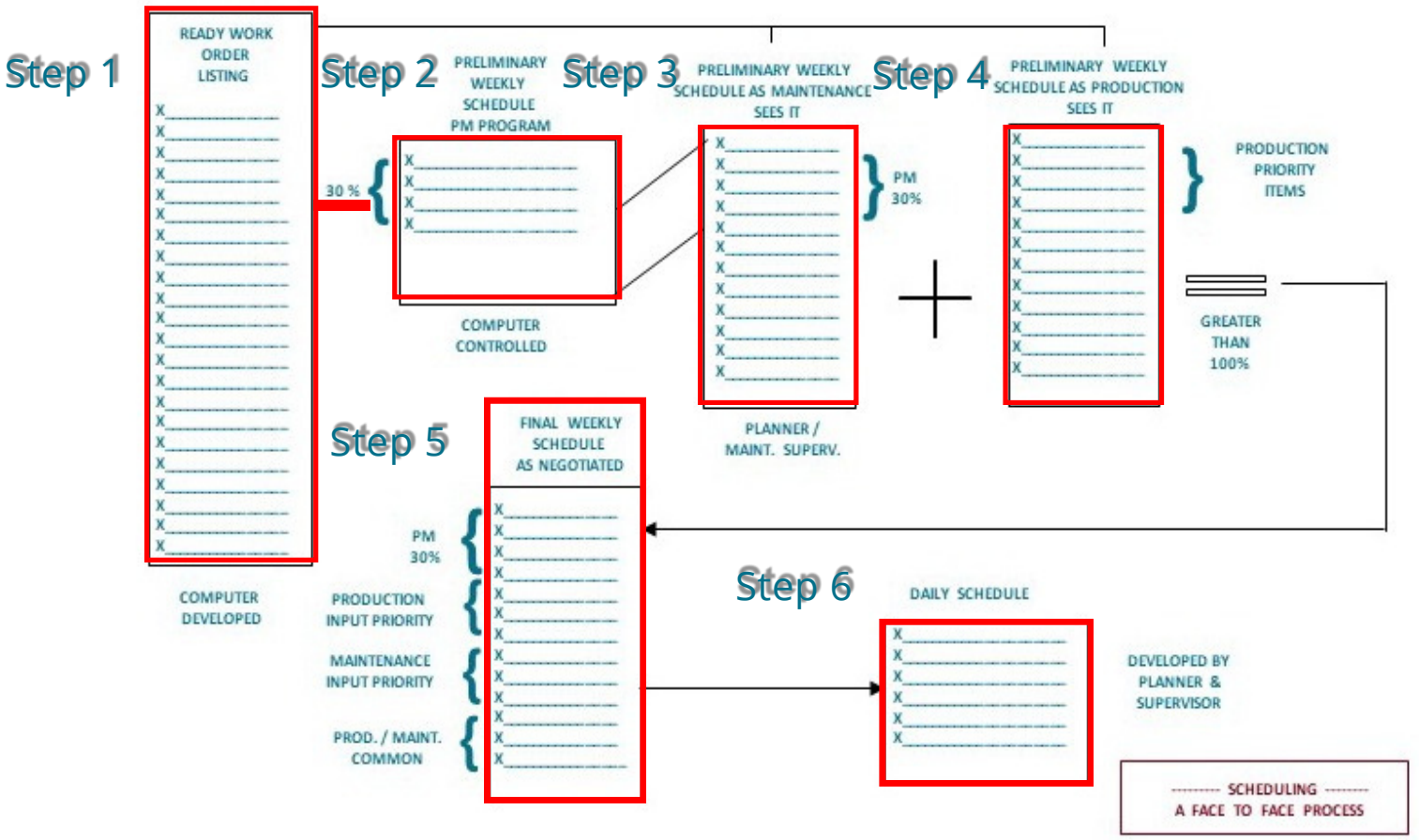


FIGURE 1.1. Reactive maintenance model.

Maintenance Planning Workflow Process Map



Maintenance Scheduling Process Map



Where do you start?

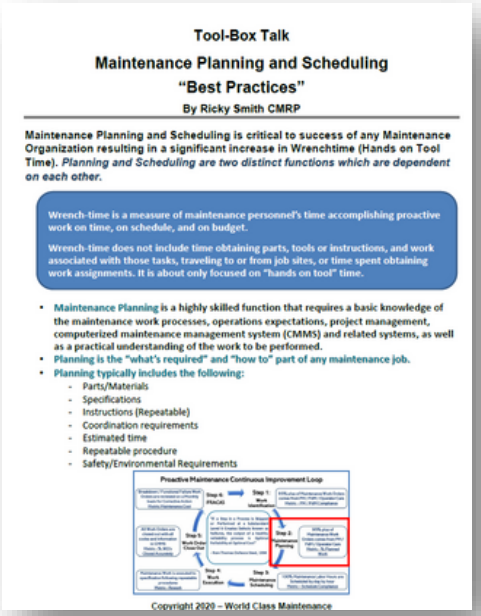
Step 1: Identify External Distracters

- 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.***

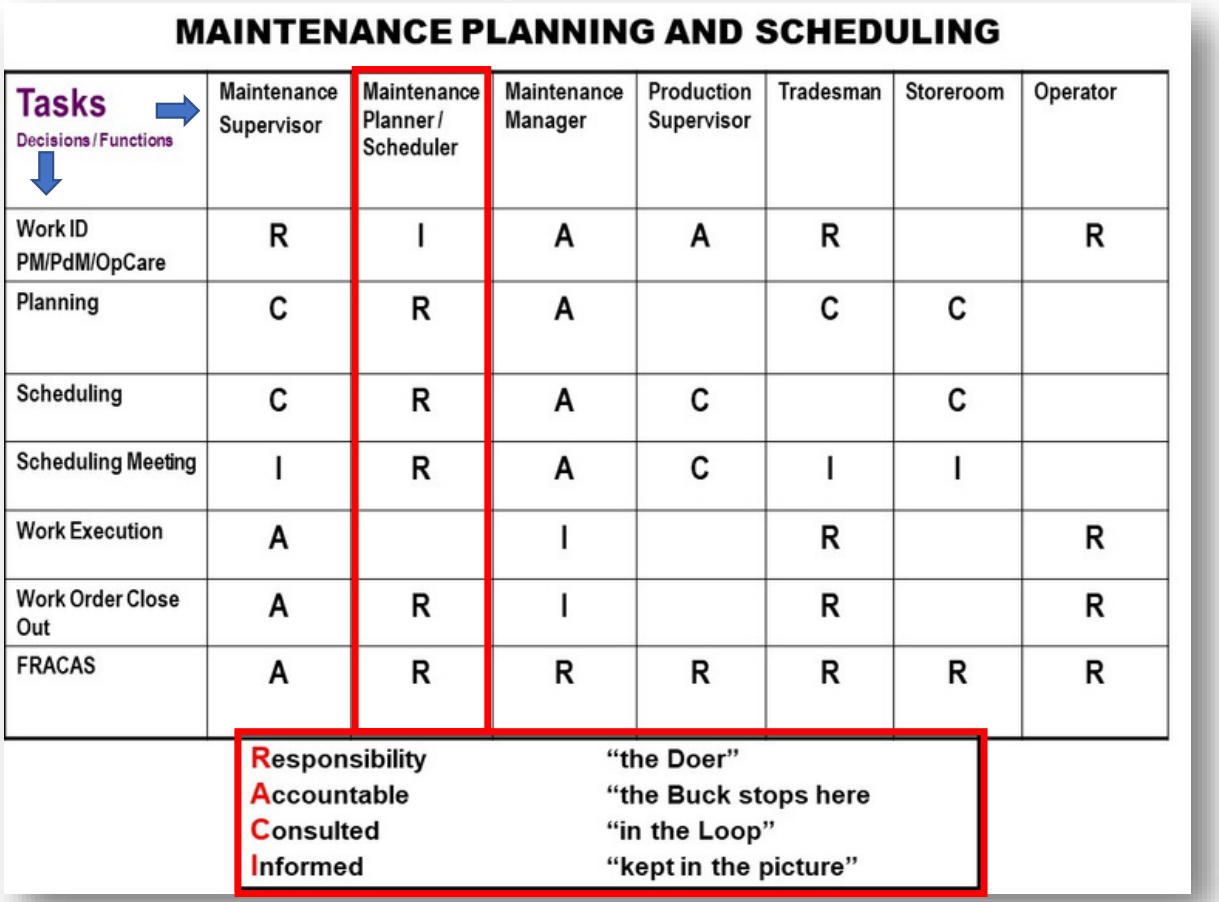
Wrench-time is a measure of maintenance personnel's time accomplishing proactive work on time, on schedule, and on budget.

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

Proactive Maintenance Continuous Improvement Loop

Step 3: Develop RACI Chart for Maintenance Planning and Scheduling



MAINTENANCE PLANNING AND SCHEDULING

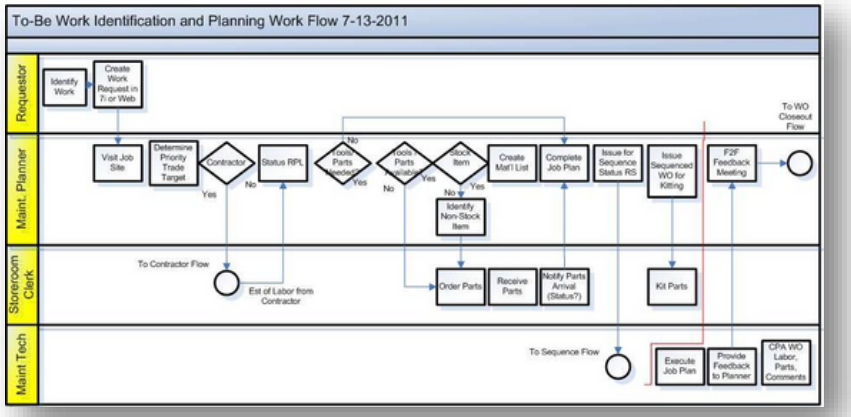
Tasks → / Decisions / Functions ↓	Maintenance Supervisor	Maintenance Planner / Scheduler	Maintenance Manager	Production Supervisor	Tradesman	Storeroom	Operator
Work ID PM/PdM/OpCare	R	I	A	A	R		R
Planning	C	R	A		C	C	
Scheduling	C	R	A	C		C	
Scheduling Meeting	I	R	A	C	I	I	
Work Execution	A		I		R		R
Work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

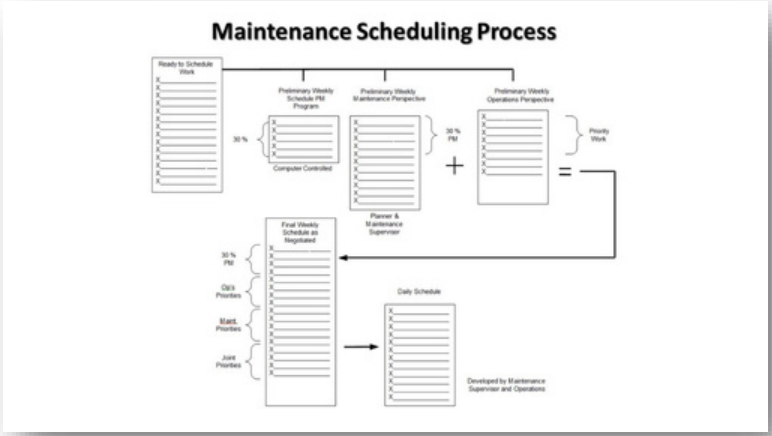
Responsibility	"the Doer"
Accountable	"the Buck stops here
Consulted	"in the Loop"
Informed	"kept in the picture"

Step 4: Develop Guiding Principles for Planning and Scheduling

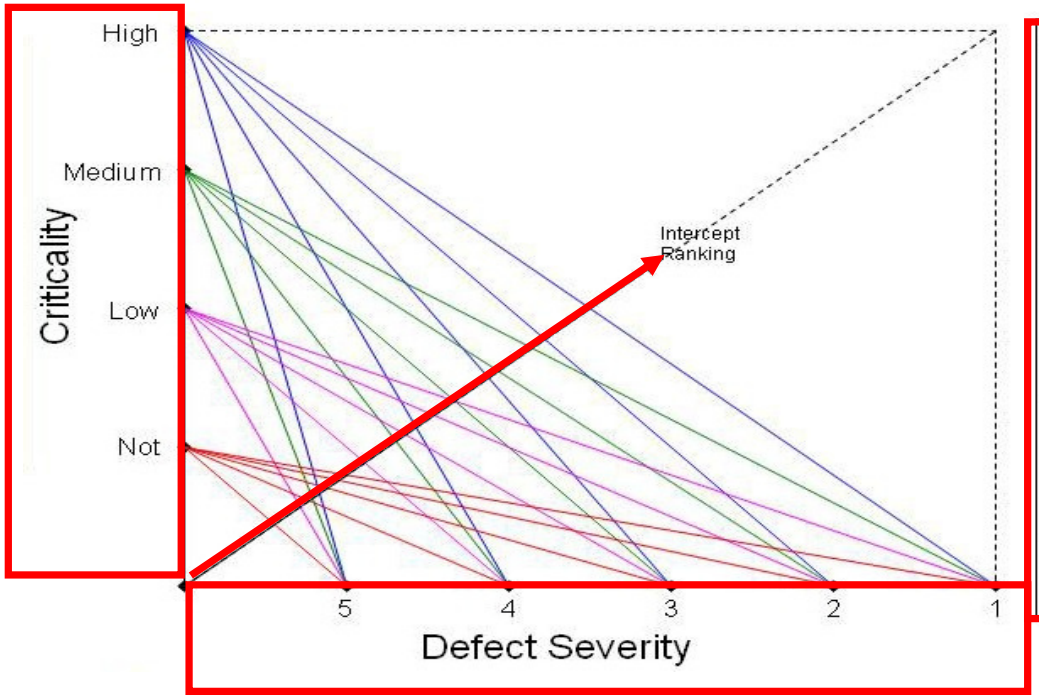
- The planners focus on future work and maintain at least two weeks of work backlog that is planned, approved, and ready to schedule / execute.
- Planners Do Not Chase Parts for Jobs in Progress
- Supervisors and Crew Leads Handle the Current Day's Work and Problems -Coordination
- Scheduling Does Not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

Step 5: Define the Planning and Scheduling Process





Step 6: Prioritize Work to be Planned/Scheduled



Criticality	Severity	Order
High	1	1st
High	2	2nd
Medium	1	3rd
Medium	2	4th
High	3	5th
Low	1	6th
Medium	3	7th
Low	2	8th
High	4	9th
Low	3	10th
Medium	4	11th
Low	4	12th
Not	1	13th
Not	2	14th
Not	3	15th
High	5	16th
Medium	5	17th
Not	4	18th
Low	5	19th
Not	5	20th

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…**

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

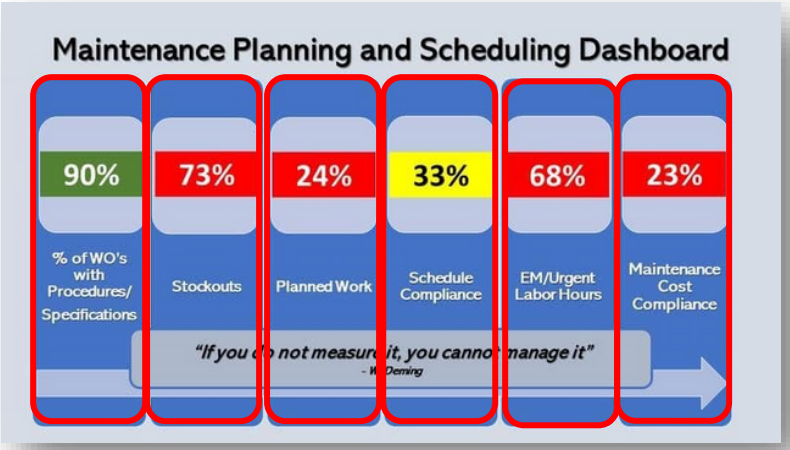
Craft's Feedback on Procedures: (Optional)
All Good

Craft's Signature(s): (Required)
Jim Jimbo

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

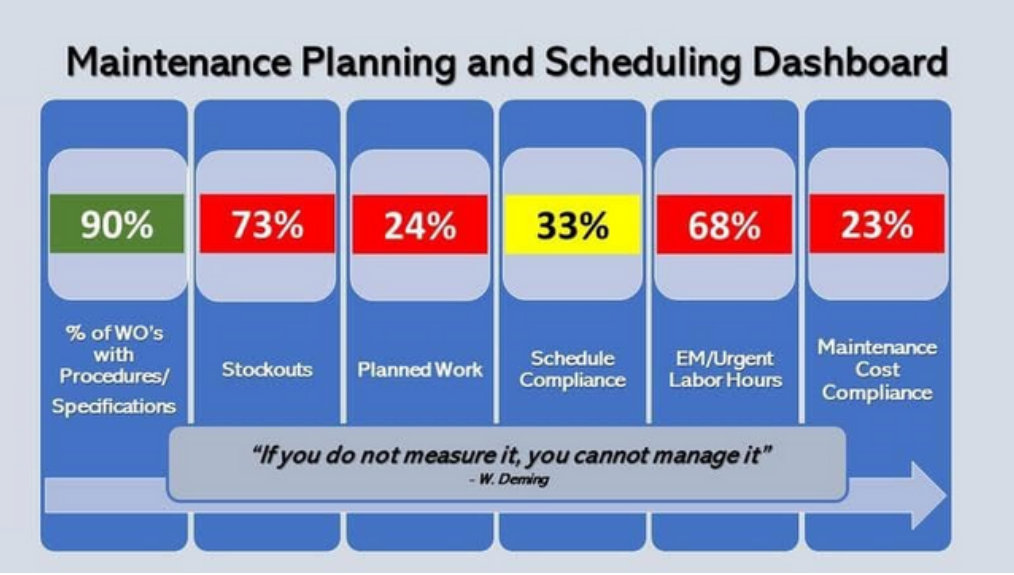


What are your thoughts?

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@w orldclassmaintenance.org

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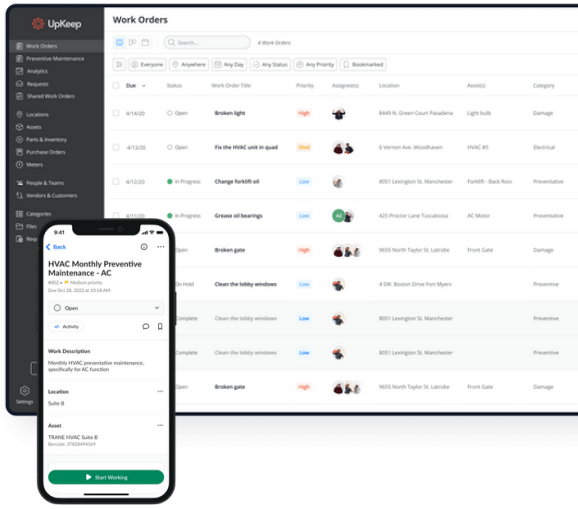

Our Products

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.

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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.