

7 WAYS TO MAKE YOUR MAINTENANCE PLANNING AND SCHEDULING MORE EFFECTIVE

BY: **RICKY SMITH, CMRP,
CMRT, CRL**



Expectations of Maintenance Planning and Scheduling

“Text which one is your expectation of Planning and Scheduling”

1. **Unsure?**
2. **Decrease in Failures**
3. **Effective Utilization of Maintenance Labor, Material, and**
4. **Parts Reduction in Cost**
5. **Less stress**
6. **???**



Root Causes of Equipment Failure

3

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"

MAINTENANCE VISION

The Maintenance Vision for the XYZ Plant is to always provide an efficient continuous operating facility through...

minimizing unscheduled / scheduled downtime

...and by approaching maintenance as an investment

with a goal of minimizing the cost over the long run.



Objective of Maintenance Planning and Scheduling

To Optimize Maintenance resources: labor, material, and parts through increased wrench-time

To Optimize Asset Reliability through minimized unscheduled and scheduled downtime

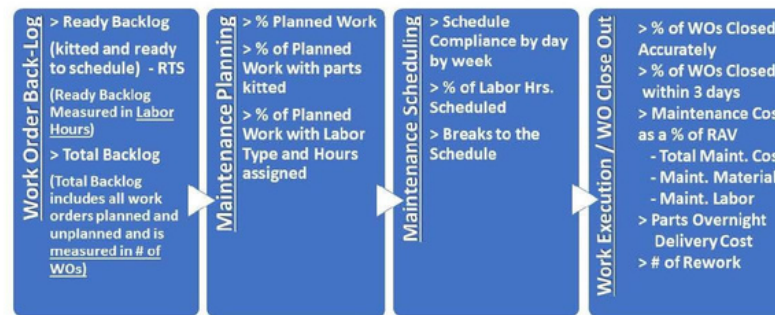
To Optimize Cost

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%

Proactive Maintenance Planning and Scheduling Guiding Principles

- Maintenance Planners focus on Future Work only, today's 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.



Best Practices Benchmarks

7

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% +



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: 01/12/2009				
Owner: Maintenance Dept	Version #: 1				
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-1195	Synthetic Lubd	1	Each		
Comments/Notes: Last Free Flow					
Special Tools Required: Engg 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	2	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)
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”



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



Maintenance Planning and Scheduling Impacts “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.



Wrench-Time Example Calculation

How a typical maintenance day is spent ... (%)

11

Direct Maintenance Labor Hours available: 10 techs x 40hrs = 400hrs

In-Direct Time

1.Traveling from point “A” to point “B”	67
2.Looking or Waiting for Parts	32
3.Looking for Tools	28
4.Looking for Information	24
5.Waiting on Production	79
6.Looking for Maintenance Leadership	22
7.Travel to and from job site	67
<u>TOTAL In-Direct Labor Hours</u>	<u>319</u>
Direct Labor Hours = 400 (Available) –319 (Indirect) =	<u>81</u>
<u>Wrench-Time = Direct Labor Hours 81 / Total Labor Hours 319 = 25%</u>	

World Class Wrench-Time = 55-65%



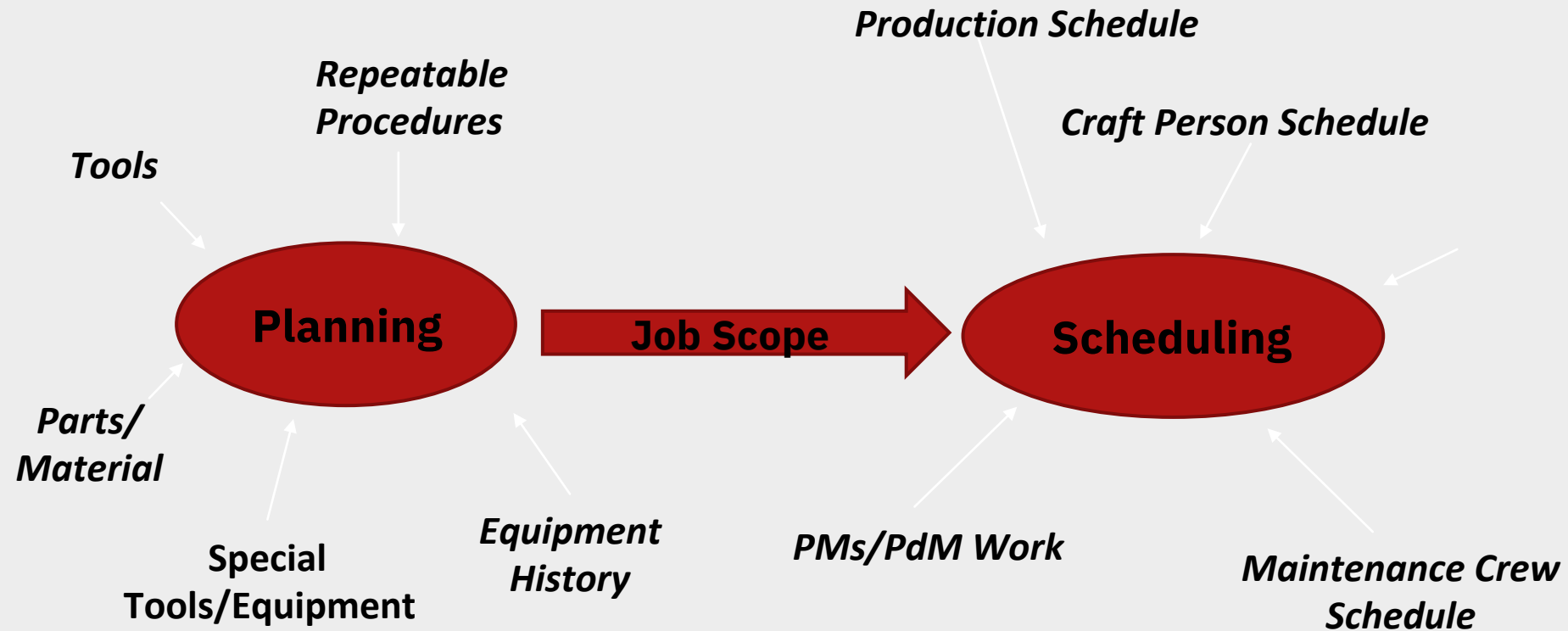
Maintenance Cost Impact – Typical vs World Class

“Maintenance Planning and Scheduling is critical to controlling Maintenance 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%

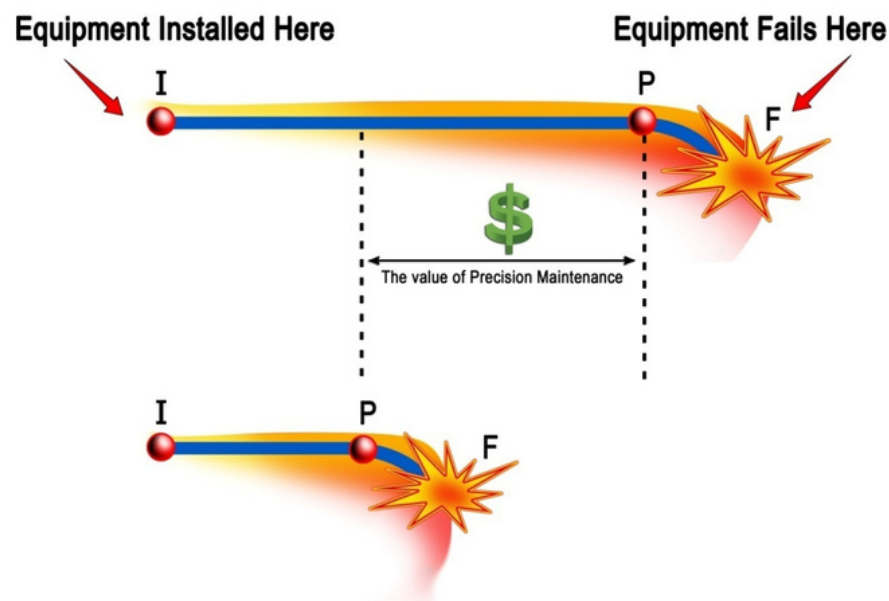
Maintenance Planning "Enables" Maintenance Scheduling



Maintenance “Planned Work”:

Work that has gone through a formal planning process to identify labor, materials, tools, and safety requirements. This information is assembled into a job plan package and communicated to craft workers prior to the start of the work.

Source: SMRP Best Practices



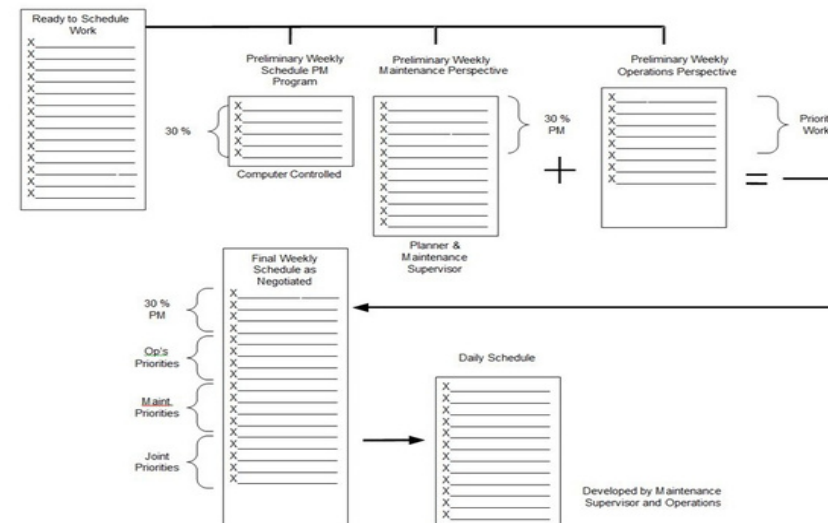
“Planning is Critical to the success of Precision Maintenance”

Maintenance Scheduling

Maintenance Scheduling is the “when” and involves assigning all required resources to perform the work at the optimum time to facilitate the most efficient execution of the work.

Source: SMRP Best Practices

Maintenance Scheduling Process



THE MAINTENANCE STRATEGY

16

JohnDay,Alcoa Mt Holly
WorldClassMaintenance Model

The Maintenance Vision will be achieved through a... Total Proactive approach to maintenance based on... CENTRALIZED, PROACTIVE MAINTENANCE PLANNING and DECENTRALIZED EXECUTION of the work.



7 Ways to Make Planning and Scheduling more Effective

- 1. Gain knowledge of Known Best Practices through formal training**
- 2. Maintenance Planners and Maintenance Supervisors should be trained in a formal Planning and Scheduling**
- 3. Assess the Maintenance Planning and Scheduling Process**
- 4. Perform a Wrench-time Study**
- 5. Create Proactive Maintenance Process Maps**
- 6. Define Roles and Responsibilities in Maintenance Planning and Scheduling**
- 7. Create Maintenance KPI Dashboard**



1. Gain knowledge of Known Maintenance Best Practices through formal training

Sources of Best Maintenance Practices Training

1. Live / Virtual Training (Preferred)
2. Webinars
3. Tool-Box Talk

Join me Friday, May 21st at 4pmET is for

"7 Ways to Make Your Maintenance Planning and Scheduling More Effective"

Registration link: <https://app.livestorm.co/upkeep/7-ways-to-make-your-planning-and-scheduling-more-effective>.

If you cannot attend register anyway and a recording of this presentation will be sent to you after this session is over.



Maintenance and Reliability Best Practices Workshop May 18-20

Facts concerning the training:

1. The training is held Virtual via Zoom (internet) and Live at (Southern Wesleyan University, 4 miles from Clemson, SC)
2. Training includes multiple hands-on exercises to enhance learning
3. Best Practices documents and templates will be provided so you can take back to your organization to assist in change
4. Each attendee will create a simple plan they will be able to implement when they return
5. Each attendee will create a Maintenance Dashboard which can be applied to their organization when they return ... and so much more

For more information email Ricky at:

rsmith@worldclassmaintenance.org



What you will Learn in this Great Workshop

1. What is Maintenance and Reliability Best Practices
2. How the following functions meet "World Class Maintenance" Standards
 - Preventive Maintenance
 - Predictive Maintenance
 - Maintenance Planning
 - Maintenance Scheduling
 - Work Execution using Repeatable Procedures
 - Closing out Work Orders to ensure an organization can manage "Proactive Maintenance" with Leading and Lagging KPIs
 - Failure Reporting, Analysis and Corrective Action
3. How to assess a Maintenance Process against World Class Standards and create a Plan to upgrade your current Maintenance Process
4. ...and so much more

Tool Box Talk – World Class Maintenance



"The Journey"

Attributes of a World Class Maintenance Operation

World Class Maintenance Operations require all maintenance and reliability processes to be optimized, repeatable, and effective.

1. PM/PdM program is effective. PM/PdM is where the Proactive Maintenance Process begins; without it you cannot plan or schedule proactively.
 - PM/PdM is focused on identification or prevention of specific "Failure Modes" or regulatory compliance
 - PM/PdM effectiveness measured using Mean Time Between Failure (MTBF) by:
 - o Site
 - o Area
 - o Asset
 - o Equipment/Component



2. Planning Process is effective.

Measure by:

- 15% Work is PM
- 15% Work from PM results
- 15% Work is PdM
- 35% Work from PdM Results
- 90% Planned Work

Definition: Percent of Planned Work; at the minimum, the following is required for a job to be defined as "Planned":

- Repeatable procedure with specifications and standards
- Estimated labor hours by craft
- Estimated time for work order execution
- Parts Required
- Potential parts identified and reserved
- Parts kitted/staged (Planner is watching parts)

3. Emergency/Urgent Labor Hours account for 2% of total labor hours
4. Maintenance Scheduling is effective
 - Maintenance Scheduling requires maintenance, operations, engineers, etc. to agree on the Maintenance Schedule, by work order, at least one week
 - Scheduling Compliance at least 85%, measured by labor hours
 - Scheduled Compliance is given to work completed on the day scheduled if it has been scheduled at least one week out



5. Work Execution is effective
 - Measured by percent of Rework

This process requires the following:

- Job to be planned and scheduled
- Repeatable procedures
- Parts kitted/staged
- Wrench time above 55%
- Time estimated +/- 10%

6. Work Order Close Out is effective
 - Over 100% of work orders are closed out to 100% of standard
 - Standard: Required Data Fields identified by Reliability Engineering and Maintenance Management
 - Data fields are identified based on Metrics, Key Performance Indicators (KPI), and failure reporting required to manage a World Class Operation

2. Maintenance Planners and Maintenance Supervisors should be trained in a formal Planning and Scheduling

19

Maintenance Planners and Maintenance Supervisors make the most impact on increasing wrench-time and thus need the same knowledge in Planning and Scheduling (One Team)

EXAMPLE OBJECTIVES:

The objectives of a Planning/Scheduling workshop

- Define how “Known Best Maintenance and Reliability Practices” impacts the Planning and Scheduling processes
- Define the Proactive Maintenance Process
- Obtain the ability to Execute Proactive Maintenance Planning and Scheduling
- Describe the objective, mission and attributes of Proactive Planning and Scheduling
- Plan and Schedule through numerous “hands on” exercises
- Learn how to Measure an organization’s current Wrench-time
- Define Methods to Optimize Maintenance Wrench-Time
- Create a Proactive Maintenance Planning and Scheduling Workflow Model which impacts Maintenance Wrench-time
- Create Leading and Lagging Planning and Scheduling Metrics
- Define how to transition from current state to a more Proactive Planning and Scheduling Process
- Define how to measure and manage Maintenance Backlog
- Learn to implement and manage a Proactive Kitting Process
- Gain first steps in how to Manage Change
- Create a Master Plan, with timeline for Proactive Maintenance Planning and Scheduling Implementation / Optimization



3. Assess the Maintenance Planning and Scheduling Process

Maintenance Planning/Scheduling Questions(answers are either YES or NO)

- a) Does most of the maintenance work scheduled have pre-planned job packages developed for them? (all specifications, procedures, parts, labor, etc. identified)
- b) Does the planner use the maintenance staff to assist in the development of pre-planned job packages?
- c) When is a planner/scheduler (or just a planner) performing their day-to-day job they are never called upon to rush parts in for a breakdown?
- d) Does your planner identify backlog based on categories? (i.e.. Ready to schedule, waiting on parts, waiting on engineering, waiting to be planned, etc) and measured by labor hours, weeks of backlog?
- e) Does the planner validate whether a work request is valid or not?
- f) Does the planner provide feedback to the requester when a work request or notification has been entered into the CMMS/EAM System?
- g) Does the planner visit the job sites of work to be planned on at least 30% of jobs?
- h) Can the planner check status of planned work parts on the CMMS/EAM within 5 minutes or less of any job?
- i) Does the planner validate work request in 3 days or less?
- j) Do you have at least one planner or planner/scheduler for every 7 to 25 maintenance personnel?
- h) Can the planner check status of planned work parts on the CMMS/EAM within 5 minutes or less of any job?
- i) Does the planner validate work request in 3 days or less?



5. Create Proactive Maintenance Process Maps

If you have Maintenance Process Maps. “Great Job”

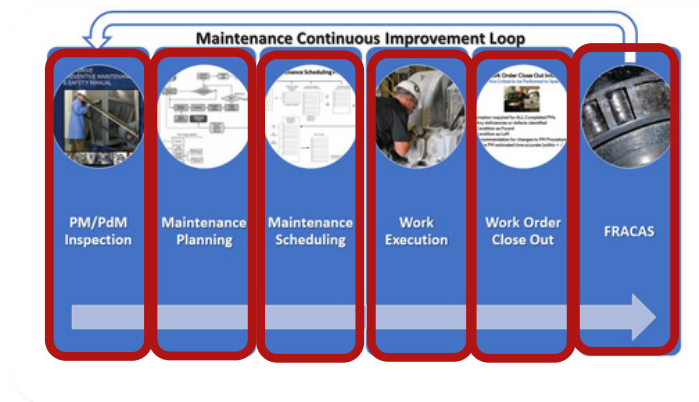
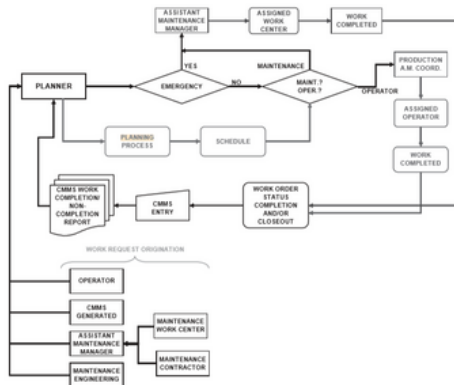
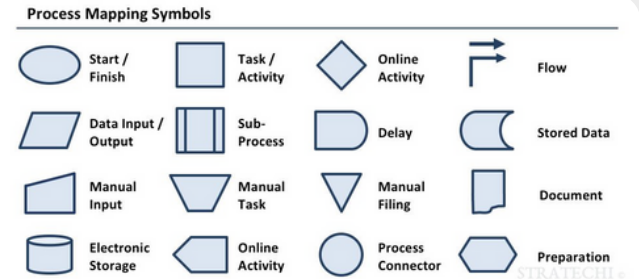
Step 1: Identify the steps, using a cross-functional team, in the Proactive Maintenance Process

Step 2: Figure out boundaries. (PM/PdM Inspection to FRACAS)

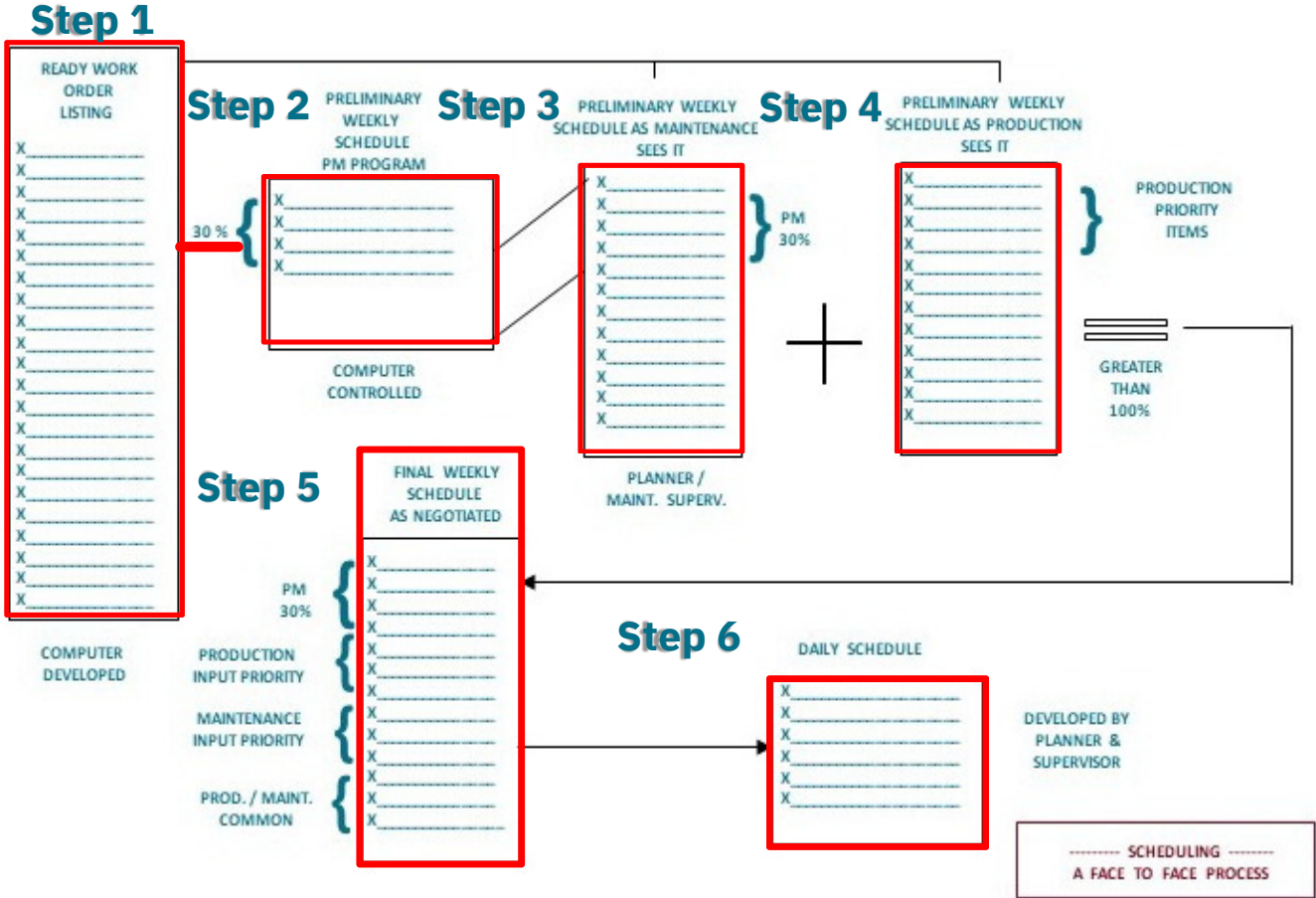
Step 4: Determine and sequence the steps.

Step 5: Draw basic flowchart using process mapping symbols.

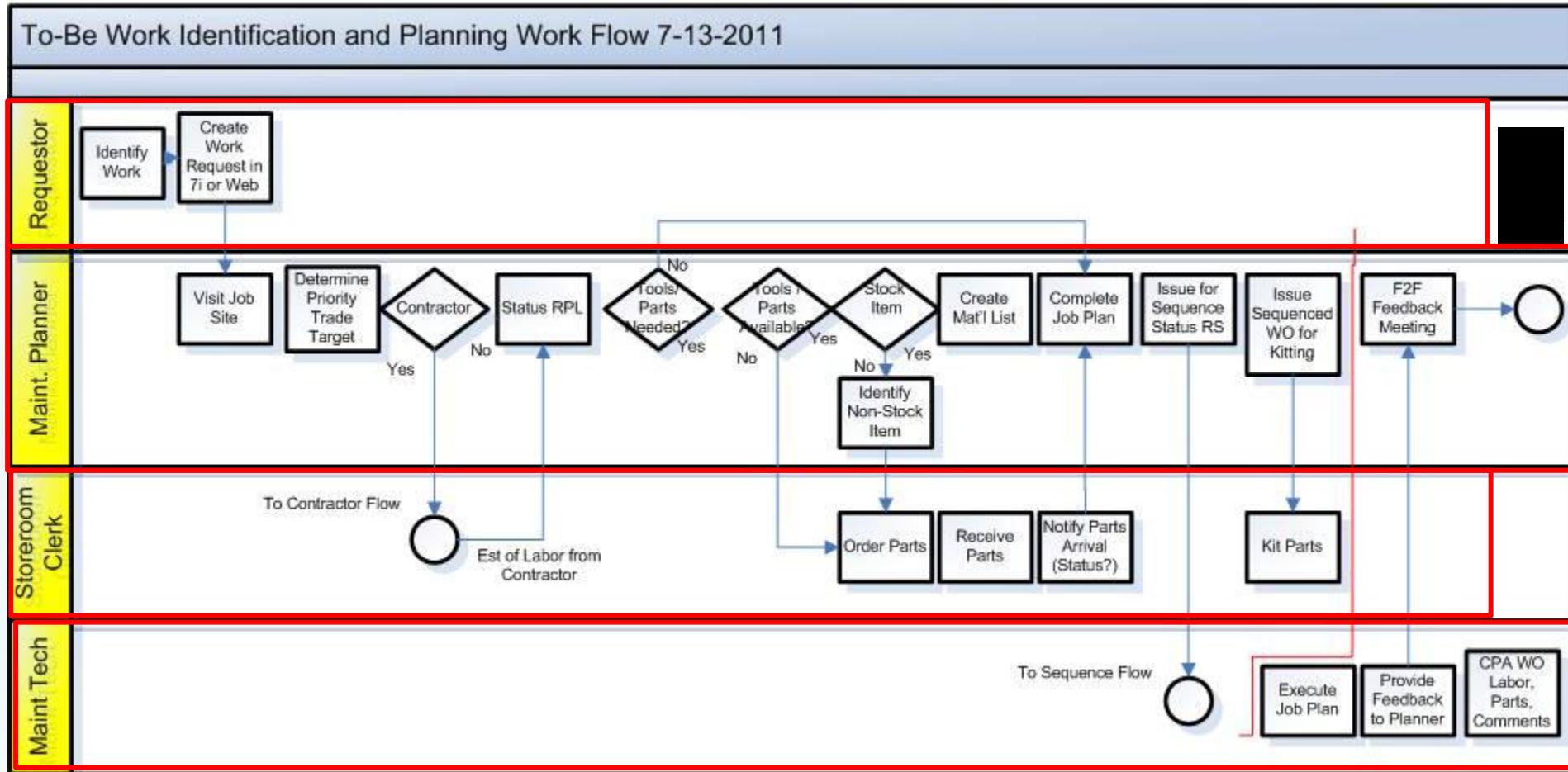
Step 6: Finalize the process flowchart.



Maintenance Scheduling Process Map



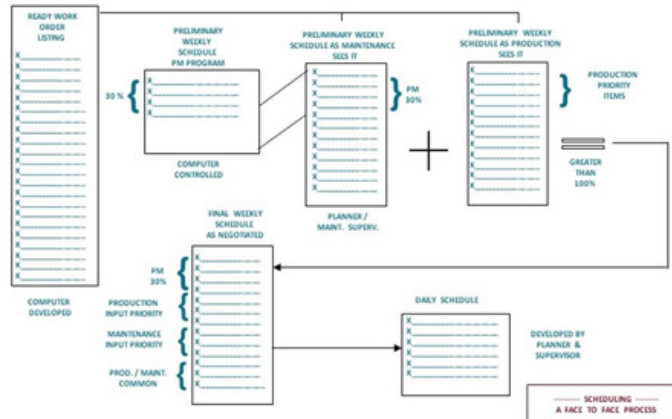
Maintenance Planning Workflow Process Map



6. Define Roles and Responsibilities in Maintenance Planning / Scheduling

- 1.ID Stakeholders/Positions
- 2.Review Scheduling Workflow
- 3.ID Task for Maintenance Scheduling
- 4.ID who is “R” –Responsible, “A” = Accountable, “C” = Consulted, “I” = Informed

Maintenance Scheduling Workflow



Maintenance Scheduling RACI
"Roles and Responsibilities"

Task ↓ Position →	Stores Mgr.	Maint Mgr.	Maint Sup.	Maint Techs	Maint Planner	Prod Mgr.	Plant Mgr.
Manage Asset Criticality	I	R	I	I	R	C	A
Identify Ready to Schedule Work Orders (RTS)		A	C		R	R	I
ID Parts Availability for Scheduled Work Orders	R	A			C	I	
Create a Preliminary Schedule		A	I	I			
ID Skill Requirements and Availability		A	C	C	I	C	
Review Preliminary Schedule with Production	C	C	C		R	R	C
Manage Scheduling Meeting		A	I		R	C	
Publish the Schedule	I	A	I	I	R	I	I
Adjust Schedule Daily as Needed		A	R	I		C	I
Manage Maintenance Dashboard (Leading / Lagging KPIs)	I	A	I	I	R	I	I

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

7. Create Maintenance KPI Dashboard

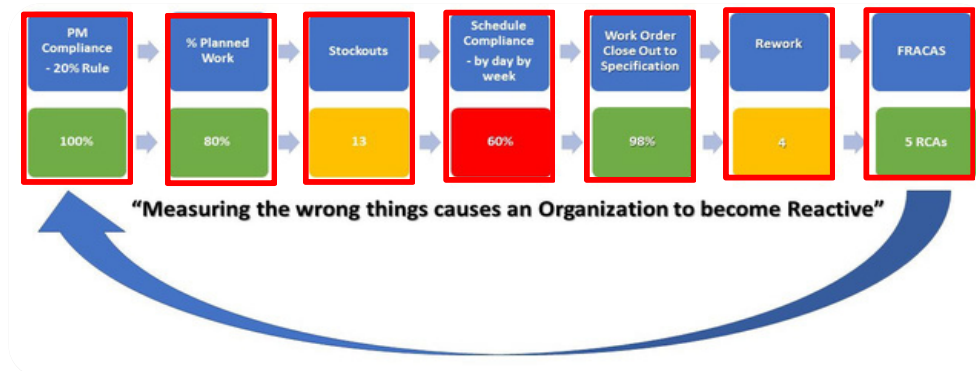
1. ID the Steps in the Maintenance Process

2. ID a Metric/KPI for Each Step

3. Educate everyone in how each metrics is critical

4. Post the Dashboard where everyone can see “THE SCORE”

“Warning: KPI Data comes from work order close out data, the data must be accurate and updated weekly”



QUESTIONS / COMMENTS

Maintenance Planning and Scheduling Workshop “Live” and “Virtual” at Southern Wesleyan University’s Bryant Lodge

June 22-24, 2021

If you are interested in attending “Live” let me know. I will be broadcasting live from Southern Wesleyan University at Bryant Lodge (great training location on a small lake and quiet) 4 miles from Clemson, SC.



Bryant Lodge



#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!

www.upkeep.com

Our Products



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



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.



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.

