Single Point Lesson

Steps to Optimize Maintenance Planning and Scheduling in any Organization

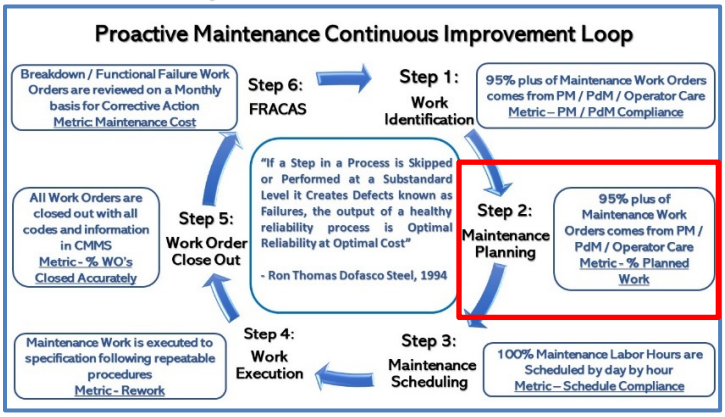
By Ricky Smith CMRP

Maintenance Planning and Scheduling is critical to success of any Maintenance Organization resulting in a significant increase in Wrench time (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**



- **Maintenance Scheduling is the process by which all proactive maintenance activities are scheduled by day by hour in coordination with Production at least one week in advance.**
- **Maintenance Scheduling requires the following:**
  - **Maintenance Scheduling Meeting is managed by the Maintenance Planner/Scheduler**
  - **Production and Maintenance leadership agreement of schedule by day by hour one week prior to scheduled work execution**
  - **The Maintenance Schedule is agreed upon by all parties prior to scheduling meeting.**
  - **A Maintenance Scheduling Meeting, typically held every Thursday for 30 minutes, lead by Maintenance Planner/Scheduler to ensure nothing has changed for next week's schedule.**
  - **Personnel to attend Scheduling meeting:**
    - **Maintenance Planner/Scheduler**
    - **Maintenance Supervisor**
    - **Production Supervisor / Manager**
    - **Plant/Reliability Engineer (Optional – dependent on potential interference with next week's schedule due to contractor, project interference with schedule)**
  - **Measurements (prefer a dashboard posted in the plant)**
    - **# Breaks to the schedule by type of break, ie. Production could not release equipment on time, No parts, Maintenance Labor not available, etc.**
    - **Schedule Compliance**
    - **PM Compliance**
    - **OEE**

Maintenance Planning and Scheduling Scorecard

November 2020

Total Backlog	Ready Backlog	Planned Work	Schedule Compliance	Rework	EM Labor Hours	Maintenance Cost as % of RAV
6 Weeks	2 Weeks	75%	88%	14	234	14.3%

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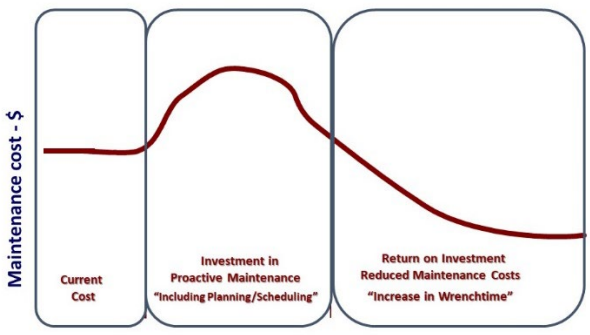

Planning and Scheduling is an Investment, not an Expense

Planning and Scheduling Vision, Mission, and Guiding Principles

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Planning and Scheduling Vision Statement

To plan and schedule maintenance work in order to optimize asset and process reliability at optimal cost.

"doing the right work at the right time"

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Planning and Scheduling Mission Statement

Maintenance Planning and Scheduling is to enable proactive maintenance through increased "wrench-time" enabling optimal production process reliability at optimal cost.

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Planning and Scheduling Guiding Principles

1. Scheduling uses a combination of Defect Severity and Asset Criticality to determine scheduling work orders.
2. Maintenance Planners focus on Future Work only, todays issues are handled by Maintenance Supervisor or Lead Person
3. Maintenance Planners plan and schedule "MAINTENANCE WORK"
4. All work "Scheduled" which require parts / material are kitted in a secure area
5. 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
6. All Work Scheduled is scheduled by day and by hour
7. Scheduling meetings are held on Thursday for FINAL review of the following week's maintenance schedule with Production, Maintenance, and others as required (ie. Contractors, Safety)
8. Maintenance Planners facilitate the meeting and typically last 30 minutes
   > Required attendees, Maintenance Planner, Maintenance Supervisor, Production Supervisor, Contractor (optional), Maintenance / Reliability Engineer
9. Leading and Lagging KPIs are used to manage the Planning, Scheduling, and Work Execution Process.

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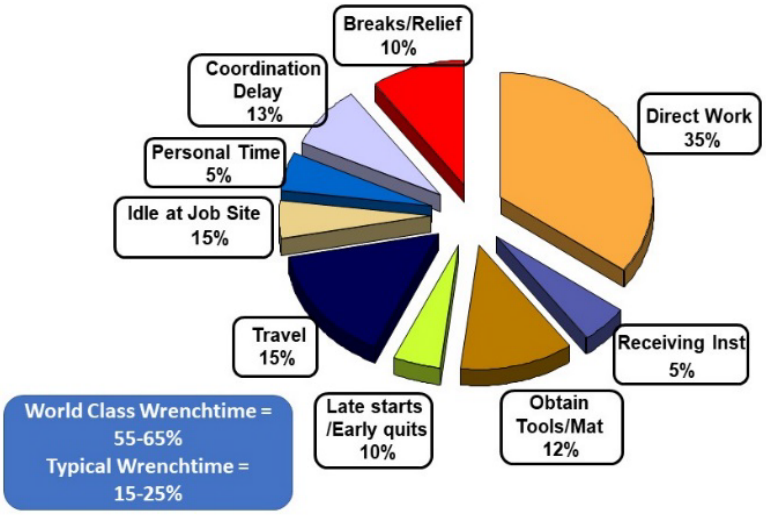
Wrench-Time

"Hands-On Tool Time"



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

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Steps to Success in Maintenance Planning and Scheduling

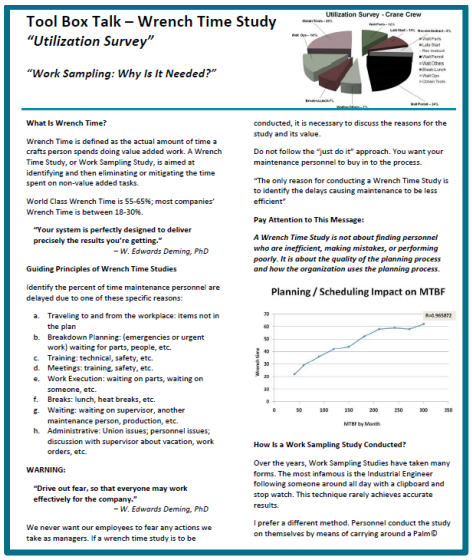
<u>Step 1: Identify External Distracters</u>

- **Poor spare parts and inventory controls**
- **Conflicting ideas of what planning *is***
- ***No planner (if you have no planner, assign your best maintenance technician to become your planner, send them to formal training) Write a Work Order scheduling the technician to this position until the company creates a new position)***
- **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

"If you send a Maintenance Planner to Training be sure you send you best technician or maintenance supervisor as well, change is never easy"



Tool Box Talk – Wrench Time Study

"Utilization Survey"

"Work Sampling: Why Is It Needed?"

Utilization Survey - Crane Crew

What Is Wrench Time?

Wrench Time is defined as the actual amount of time a crafts person spends doing value added work. A Wrench Time Study, or Work Sampling Study, is aimed at identifying and then eliminating or mitigating the time spent on non-value added tasks.

World Class Wrench Time is 55-65%; most companies' Wrench Time is between 18-30%.

"Your system is perfectly designed to deliver precisely the results you're getting."
– W. Edwards Deming, PhD

Guiding Principles of Wrench Time Studies

Identify the percent of time maintenance personnel are delayed due to one of these specific reasons:

a. Traveling to and from the workplace: items not in the plan
b. Breakdown Planning: (emergencies or urgent work) waiting for parts, people, etc.
c. Training: technical, safety, etc.
d. Meetings: training, safety, etc.
e. Work Execution: waiting on parts, waiting on someone, etc.
f. Breaks: lunch, heat breaks, etc.
g. Waiting: waiting on supervisor, another maintenance person, production, etc.
h. Administrative: Union issues; personnel issues; discussion with supervisor about vacation, work orders, etc.

WARNING:

"Drive out fear, so that everyone may work effectively for the company."
– W. Edwards Deming, PhD

We never want our employees to fear any actions we take as managers. If a wrench time study is to be conducted, it is necessary to discuss the reasons for the study and its value.

Do not follow the "just do it" approach. You want your maintenance personnel to buy in to the process.

"The only reason for conducting a Wrench Time Study is to identify the delays causing maintenance to be less efficient"

Pay Attention to This Message:

A Wrench Time Study is not about finding personnel who are inefficient, making mistakes, or performing poorly. It is about the quality of the planning process and how the organization uses the planning process.

Planning / Scheduling Impact on MTBF

MTBF by Month

How Is a Work Sampling Study Conducted?

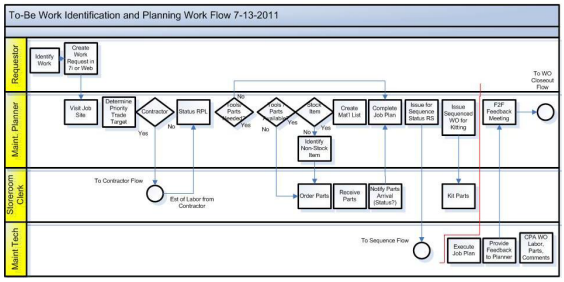
Over the years, Work Sampling Studies have taken many forms. The most infamous is the Industrial Engineer following someone around all day with a clipboard and stop watch. This technique rarely achieves accurate results.

I prefer a different method. Personnel conduct the study on themselves by means of carrying around a Palm©

Step 3: Create 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 / nonfluid Criticality Index

Step 4: Define the Planning and Scheduling Processes



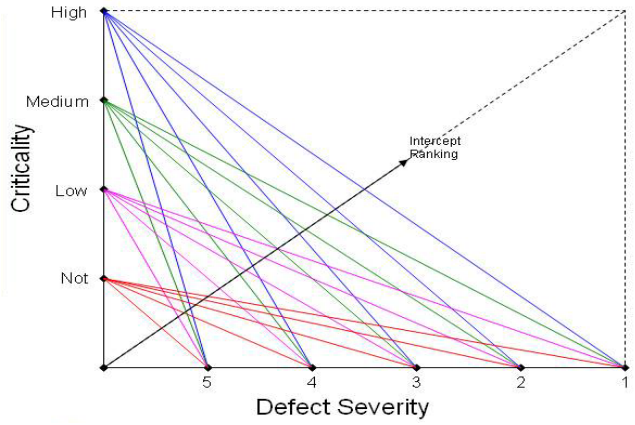
Step 5: Define Roles and Responsibilities

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 6: Prioritize Work to be Planned based on Asset Criticality and Defect Severity



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

Step 7: Develop Repeatable Procedures for all Maintenance Work in order to:

- Ensure repeatability and reduce variation in execution
- Capture Knowledge based on past issue/failures
- Train New Employees with Repeatable Procedures
- To Reduce Human Error

Human error refers to something having been done that was "not intended by the actor; not desired by a set of rules or an external observer; or that led the task or system outside its acceptable limits".

Human Error Rate

Description	Probability
General rate for errors involving very high stress levels	**30%**
Complicated non-routine task, with stress	30%
Supervisor does not recognize the operator's error	10%
Non-routine operation, with other duties at the same time	10%
Operator fails to act correctly in the first 30 minutes of stressful emergency situations	10%
Errors in simple arithmetic with self-checking	3%
General error rate for oral communication	3%
Failure to return the manually operated test valve to the correct configuration after maintenance	1%
Operator fails to act correctly after the first few hours in a high stress scenario	1%
General error of omission	1%
General error rate for an act performed incorrectly	0.3%
Error in simple routine operation	0.1%
Selection of the wrong switch (dissimilar in shape)	0.1%
Selection of a key-operated switch rather that a non-key-operated switch (EOC)	0.01%
Human performance limit: single operator	0.01%
Human performance limit: team of operators performing a well-designed task	**0.001%**

Step 8: Create a Maintenance Planning and Scheduling Dashboard for all to see every day. People are motivated by knowing their score in any process which is critical to an organization.

Maintenance Planning and Scheduling Scorecard

November 2020

How to Create a Maintenance Planning and Scheduling Dashboard

1. Assemble a cross functional team, Maintenance Planner, Maintenance Supervisor, Production Supervisor, Storeroom Manager
2. Determine the steps in the Maintenance Planning and Scheduling Process
3. Create a metric for each step in this process
4. Agree on the goal of each metric and how it will be measured effectively
5. Determine Roles and Responsibilities if specific metrics are meeting expectations.
6. Use Root Cause Analysis (5 Whys) to identify why specific metrics are meeting expectations if this occurs

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