

Maintenance Scheduling 101

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I've read and seen a lot of material about advanced maintenance scheduling techniques, but the reality is that most maintenance people are still struggling with the basics.

As a former Operations/Maintenance Coordinator who was sick and tired of operating in a reactive fire-fighting mode, I understood potential benefits of proper maintenance scheduling - the challenge was getting everyone on the same page. Industry experts suggest that in order to move from reactive to proactive maintenance, at least 80% of the work should be planned on a weekly basis and compliance to this schedule should be at least 90%.

For many, attaining this level of scheduling and execution of planned maintenance work is an imposing challenge. I too was a skeptic. I had seen my maintenance organization fall into a quagmire of never-ending emergency work and constantly struggling to keep our heads above water. Scheduling planned work seemed like a distant planet. But this was about to change.

A new maintenance manager was hired and his first decree was that planned preventive maintenance (PM) work was going to be the order of the day. When creating weekly schedules we had to schedule all due PM's first and then distribute the remaining man-hours according to priority. Having grown accustomed to the daily regime of fire fighting maintenance activities, I saw this as nothing more than a motherhood statement that was not achievable; however, the new manager had other plans.

His first order of business was to sit with Operations and explain what he was trying to do and the potential benefits the Operations group could achieve. His plan was to involve the Operations group in performing routine repetitive PMs as part of their normal rounds. While doing area walk-downs, Operators could check lubrication globes to ensure oil was present and replace it if it was down. They could also perform visual inspections as well as touch and feel components for heat, vibration, abnormal noise, smell, and any process leakage. As a result, Operations started playing a more active role in ensuring the proper performance of their equipment. They would inspect safety guards around couplings and shafts and would report any abnormalities to the Shift Mechanic or Shift Electrician who would determine the severity. They would also set up air blowers to aid a hot piece of equipment if the Shift Mechanic was busy on another job. They would even change out filters on air supply coolers for key motors. A new policy also came into place that anyone could enter a request for work. No longer was this the realm of Maintenance or Production Supervisors, anyone could initiate the procedure.

Utilizing a team approach, monthly meetings were held involving representatives from Operations, the Operations Superintendent, an Operations/Maintenance coordinator, Planner, Maintenance Supervisor, Maintenance Area Technician, E&I Supervisor, E&I Area Technician, Area Engineer, Process Control Technician, and Quality Control Technician. At these meetings a process was established for reviewing the PM program. PM Jobs were reviewed for suitability to the current operating conditions that existed in the plant. Many of these PMs were the original Manufacturers recommended PMs and the frequencies were reviewed to determine if they were still relevant. Could a weekly, or monthly PM become a 3-month PM or a yearly PM? Could weekly visual inspections be handled by Operations when it came to equipment such as HVAC?

Maintenance would still be required to attend to major PM's such as semi-annual inspections and when Operations detected a discrepancy from the expected norm, Maintenance would handle the subsequent work order.

As a result, maintenance slowly but steadily moved from a reactive to a proactive mode and maintenance efficiency was drastically improved. Equipment availability and reliability increased and downtime and all its inherent costs decreased. Schedule compliance was consistently around 90% and, when it wasn't, the reason could be easily identified and documented.

The Key Ingredients

Communication is key to successful maintenance scheduling – this involves everyone from the Planner, Scheduler, Maintenance Supervisor, Craftsman, Storeroom personnel, Operations Superintendent, to the Operator who is responsible to have the equipment secure and ready for maintenance. Any breakdown in this communication diminishes the probability of success.

The role of each stakeholder needs to be clearly identified – what's expected from them and what do they bring to the table:

Planner – ensures the work is properly planned with trade requirements, stores material, direct purchase material, and specialty service(s) identified on the work order. Any safety concerns or requirements are documented, as is the description of the work to be carried out.

Scheduler – ensures that the trades are available to conduct the work during the schedule duration. The Maintenance Supervisor attends to the specifics as to who-what-where-when. The Scheduler also ensures that the material and/or services are available. He also communicates this information with all concerned parties in Maintenance and Operations et al.

Maintenance Supervisor – looks after the day-to-day activities comprised in the weekly schedule. He assigns his Technicians in a best-fit fashion to the various Work Orders. He also determines the trade availability for the week using a simple Excel Spreadsheet and forwards that on to the Scheduler. (This spreadsheet can be downloaded from www.pop-ware.com)

Craftsman – carries out the assigned work and communicates the results as well as any discrepancies in planning or scheduling of the work back to Maintenance for further analysis.

Storeroom Personnel – notify Maintenance of receipt of goods and any deviation from the expected standards such as damaged packaging. This affords Maintenance an opportunity to job stage and inspect the material prior to executing the work order and then finding out it is damaged.

Operations Superintendent – must be informed well in advance so that the equipment can be released to Maintenance. This individual is aware of production schedules and can determine the opportune time with Maintenance to release the equipment.

Operator – is the person responsible for securing the equipment by performing the proper lockout and any block and bleed requirements as well as any vessel entry preparations such as purging and gas detection.

Short daily scheduling meetings must be held to update the schedule and communicate deviations from the schedule. Planning and scheduling are crucial to maintenance management. Being proactive as opposed to reactive cannot be stressed enough.

Doc Palmer, a noted authority in the area of Maintenance Scheduling, cites six points that comprise good scheduling principles.

1. Job plans providing number of persons required, lowest required craft skill level, craft work hours per skill, and job duration information are necessary for advanced scheduling.
2. Weekly and daily schedules must be adhered to as closely as possible.
 - Proper priorities must be placed on new work orders to prevent undue interruption of these schedules.
3. A Scheduler develops a one-week schedule for each crew based on craft hours available, forecast that shows highest skill available, job priorities, and information from the job plans.
 - Consideration is also made of multiple jobs on the same equipment or system and of proactive and reactive work available
4. The one-week schedule assigns work for every available work hour. The Schedule allows for emergencies and high priority, reactive jobs by scheduling a significant amount of work on easily interrupted tasks.
 - Preference is given to completing higher priority work by under-utilizing available skill levels over completing lower priority work.
5. The crew supervisor develops a daily schedule one day in advance using current job progress, the one-week schedule and new high priority, reactive jobs as a guide. The crew supervisor matches personnel skills and tasks.
 - The crew supervisor handles the current day's work and problem even to rescheduling the entire crew for emergencies.
6. Wrench time is the primary measure of work force efficiency and of planning and scheduling effectiveness.
 - Work that is planned before assignment reduces unnecessary delays during jobs and work that is scheduled reduces delays between jobs.
 - Schedule compliance is the measure of adherence to the one-week schedule and its effectiveness.

Doc Palmer: Maintenance Planning and Scheduling Handbook: McGraw-Hill: New York: 1999 Page 3.2

Making It Work

The Area or Crew Supervisor completes the Trade Availability Spreadsheet and forwards it to the Scheduler.

Trade Availability Spreadsheet							
Scheduled Week of:		DEC 16 - 20					
Maintenance Crew		MR Crew					
Supervisor		Joe Brown					
Trade	Number Available	Total Hours	Vacation	Training	Other	Carry-Over	Available Hours to Schedule
<u>Millwright</u>	3	120	12	3	12	21	72
<u>Mechanic</u>	15	600	12	4	6	23	555
<u>Hi-Pressure Welder</u>	0	0	23	4	12	1	-40
<u>Welder</u>	1	40	6	6	8	2	18
<u>Machinist</u>	1	40	0	7	0	5	28
<u>Electrician</u>	2	80	12	8	12	10	38
<u>Instrument Technician</u>	1	40	10	9	0	0	21
<u>Apprentice</u>	3	120	12	10	12	1	85
<u>Helper</u>	2	80	12	11	12	9	36
Total Hours		1120	99	62	74	72	813

Based on the Available Hours to Schedule by Trade the Scheduler is now able to schedule jobs that are “ready to schedule”.

The Scheduler first Schedules all “due PMs” for the period. Once that is complete he can view the remaining hours available to Schedule Work Orders by Priority. Many EAM and CMMS systems have the ability to track trade availability and the remaining hours after Work Orders have been scheduled and highlights in red where the trade has been overbooked. The Crew Supervisor working with the Scheduler is in the best position to make decisions as to which trades are appropriate for each PM. In some cases an Apprentice or Instrument Tech could perform some of the Electrical PM’s. Similarly a Mechanic or Apprentice could be assigned the Millwright PM tasks.

Work Orders by Priority are added until the EAM/CMMS system indicates that the Trade Time has been fully utilized for this particular Crew. Many CMMS/EAM systems provide the option of exporting the Schedule to MS Project for further manipulation. However, it is not necessary for users to use MS Project to perform scheduling. The Crew Supervisor can simply take the list of scheduled Work Orders and simply assign the Work Orders to the tradesmen on a daily basis.

Scheduling cannot happen in a vacuum - it is imperative that **weekly** scheduling meetings take place involving the following individuals: Scheduler, Maintenance/Electrical Supervisor(s), Operations Supervisor (or representative), and Engineering. Communication between these individuals in determining which Work Orders make the schedule as well as the availability of the equipment to be released to Maintenance is crucial. Production runs and demands are vital; just ask a marketing manager who has had to deal with an irate customer as a result of a delivery being late because of poor scheduling or worst – equipment breakdown!

Daily scheduling meetings help plan for the upcoming day and provide a means to review the events of the past 24 hours. This allows for any new “urgent” work orders to be addressed. This meeting involves the following individuals: Scheduler, Maintenance/Electrical Supervisor(s), Operations Supervisor (or representative), and Engineering. The communication that takes place at this meeting allows first line Supervisors to assign the work for the day and provides Operations direction as to which equipment needs to be released to Maintenance. Contingency plans are formulated where equipment cannot be released.

Following this meeting the Maintenance Supervisor can hand out the Work Orders to the Crew for the day and post a daily Schedule of the work that is taking place. Bear in mind that maintenance technicians are not sitting idly by waiting for work assignment from the morning meeting. They will be performing PM Work Orders or working on carry over work from the previous day.

The daily Schedule provides collaborative information as to what is happening or about to happen on the plant floor. It helps formulate a big picture view of what’s happening and the potential impact of each individual maintenance technicians’ activities.

Conclusion

Many organizations have tried to address their maintenance scheduling woes by introducing new and sometimes very advanced technologies. The reality is that trying to automate something that’s broken will cause even more frustration and finger-pointing. The potential benefits of scheduling automation are best achieved by first establishing a sound communication foundation that supports scheduling business processes. By sticking to these basics, most organizations can achieve significant improvements in their maintenance scheduling capabilities.

While attaining 100% maintenance schedule compliance may seem as difficult as pushing string uphill, it should still remain an ultimate goal. It all starts by putting together an effective PM program with cross-functional communication – so everyone is in the loop. By moving closer to this goal, organizations will become more proactive in their approach to maintenance.

Lorne MacDonald has over 27 years experience in maintenance and manufacturing in various roles including contingency planning and scheduling, primarily for major pulp and paper companies. During the past 6 ^{1/2} years at PopWare, Lorne has been actively involved in Enterprise Asset Management consulting engagements at a number of large North American and European manufacturers. For more information please visit www.pop-ware.com.