Planning and Scheduling for Routine Maintenance

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By

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Introduction

Most, if not all, commercial and industrial enterprises depend on some form of Routine Maintenance. Routine Maintenance can include the following kinds of activities:

- Regular lubrication of machinery
- Painting
- Repairs to deterioration and breakdowns
- Adjustments and tuning
- Cleaning
- Etc.

In some cases the required work is so intermittent that it is accomplished on a spot basis by an outside or contract resource. In other cases, the work is of sufficient frequency and volume that it justifies a continuous resource made up of either employees, contractors or both.

When the frequency and volume of the work requires a full-time workforce and when the workforce becomes sufficiently sizeable that it justifies proactive management (or management by objectives rather than just being reactive) it is time to apply Planning and Scheduling to ensure the workforce is utilized in the most effective manner.

This course will provide the student with an understanding of the key elements of Planning and Scheduling for Routine Maintenance. While a comprehensive understanding of the techniques needed to manage Routine Maintenance typically requires years of personal experience learning how to best use the particular skills of each individual, the elements of Planning and Scheduling can be described as separate elements. Achieving the characteristics that make those elements effective is quite separate from personal strengths and weaknesses and are based only on clear definitions.

It is possible to restate the above comments in another way using an example. When beginning an initiative to improve the Planning and Scheduling being used at a specific facility, it is not uncommon for there to be an argument over the amount of details that should be included in the plans and specifically how directive the schedule should be. Often it is argued that too much detail in work plans tends to be a “slap in the face” for experienced crafts who already know how to perform the work and need no further help. It is also argued that experienced foremen and supervisors know best how to manage their crews to keep them busy and accomplish the greatest amount of work.

While in some cases those points may have merit, in most cases they are simply ways of saying that people do not like to lose flexibility and self-control. If past work has been accomplished in a standard, repeatable manner, the individuals performing the work will not lose control over the

work they are performing. On the other hand, if jobs have not been performed in a standard, consistent and repeatable manner, it is worth the effort to make work uniform so results are certain and work duration is certain. Further, while the schedule conceived in the head of a foreman or supervisor may seem optimum, more often, it seems more subjective and inefficient to others who fail to see work being addressed according to priorities and see resources moved from job-to-job in an apparently random manner.

Conformance to a well designed plan yields superior, more reliable and more consistent results. Conformance to a well-thought-out schedule yields greater results and greater confidence that the work being done has the highest priority and is, in fact, ready to be started.

Background

It seems like the term “Planning and Scheduling” slips off the tongue of most people as if it referred to a single activity. In fact, planning is one thing and scheduling is something else entirely.

Planning is an activity associated with a single job. The work plan for each single job is distinct to the current condition of the asset at the beginning of the job and the desired condition of the asset at the completion of the job. When people say they are performing “the same job” on two different assets or assets in different conditions or using different resources, they are confused and are likely to create more confusion.

Most jobs are distinct and justify discrete plans. Even when a piece of equipment fails in a similar manner on a repetitive basis, time after time, there is value in reviewing the plan stored in archives to identify what differences might justify fine tuning before releasing it to be scheduled. Later in this course, the student will be provided with more details concerning work planning.

Scheduling is an activity involving a large number of individual plans all being accomplished in a manner that requires some kind of “sharing”. The sharing may be the result of:

- Work being done at the same time
- Work being done using the same resources
- Work being done in the same space
- Work being done that all contribute to the same result
- Some combination of the above

If sharing is not required, there is no particular reason that two jobs should be listed on the same schedule.

The key characteristics that need to be extracted from the individual job plans to incorporate into a schedule include the following:

- The task name for each step of the job
- Predecessors and successors for each task
- The name of the resources involved in performing the work

- The amount of each kind of resource (crew size) and the duration the resource will require to perform the task
- The relative priority of each task
- Other issues or milestones that are necessary to trigger the start of any task (e.g. the delivery of materials or issuance of work permits)

A schedule is an assembly of all the information described above in a manner that ensures tasks are performed in the proper order, at the proper time and with the necessary resources. As you will see from information provided later in this course, assembling a schedule requires only a portion of the information needed for a complete work plan. But the information needed to assemble the schedule is not available until after all the work plans that will be integrated into a single schedule are complete.

In other words, planning comes first then comes scheduling. If even one job out of twenty that is integrated into a specific schedule has not been completely planned before the assembly of the schedule, the accuracy of the schedule is jeopardized. It is possible that the unplanned or partially planned job will take longer than expected or will rob resources from other jobs resulting in the overall schedule being upset.

In the past, studies comparing the impact of planning and scheduling have shown that unplanned and unscheduled work can consume as much as four times the resources of well planned and scheduled work. The information held in the following sections of this course will explain to the student how that dramatic difference is indeed possible.

Objectives for Planning

How is it possible to tell if a job has been adequately planned? There are probably a variety of ways that one might use to indicate if a job has been adequately planned or not:

- A well-planned job has considered the exposures to unsafe situations so it is likely to be a safer job.
- A well-planned job has considered the exposures to situations that might result in an environmental insult so it is likely to be an environmentally cleaner job.
- All the work steps have been identified and all tools, materials and information needed to complete each step have been identified so it is likely to be more efficient.
- The steps needed to achieve the desired results have been considered in some detail so the job is likely to be more effective.
- Well-planned jobs can be more effectively integrated into a “tight schedule” so a well planned and tightly scheduled grouping of jobs are less likely to interfere with the execution of other jobs and is less likely to have other jobs on the schedule interfere with its execution.

While all of these features are true, they are not directly measurable. One characteristic that is directly measurable is the need for the craft to leave the jobsite to obtain something to keep the

job moving ahead. The "things" that might be needed include tools, materials, instructions or any number of things needed to complete the job.

A job that has been adequately planned is one for which the craftsman performing the job can go to the jobsite and complete the job without needing to leave the jobsite for any reason. If the person performing the work has needed to leave the jobsite to obtain something that was not covered in the work plan, it can be said that the plan was not sufficiently complete. (If the worker needs to leave the jobsite to obtain something that was covered in the plan but just ignored while the job was being staged, the problem is not in the planning. The problem is in the staging.)

As a result, the measure used to assess the adequacy of an individual plan is a black-or-white choice. Either the job was completed without interruption or it was not. Considering a large number of jobs, the assessment of planning adequacy can be based on the percentage of jobs that are completed without interruption. Unlike the five characteristics described above, the measure of completion with or without interruption is one that can be easily determined and measured.

Objectives for Scheduling

There are two measurable objectives associated with scheduling. The first objective is to complete the required activity (or group of activities) within a desired timeframe. The second objective is to provide an agenda that will use all the available resources as efficiently and effectively as possible.

The first objective is by far the simplest to explain. Let us suppose there is an objective that all "emergency" work be started on the same day it is identified and that it be worked on a continuous basis until complete. Let us also assume that "high priority" work be completed within a week of when it is first identified. Finally, let us assume that "routine priority" be completed after emergency work and high priority work but still within one month of being identified.

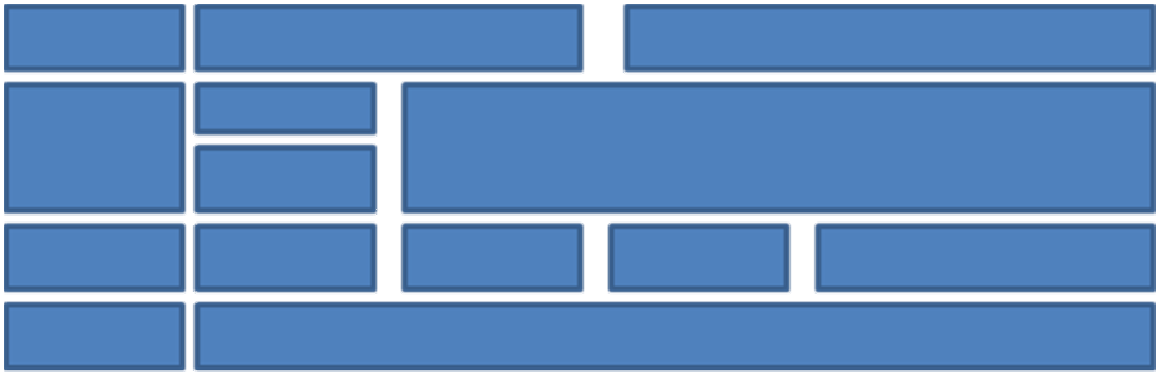
The first objective concerning completing work within the desired timeframe would be achieved if the scheduling system provides an agenda that ensures all work is completed in a manner consistent with the timeframes described above. It would be possible to create a measurement system to evaluate "schedule conformance" simply by tracking the completion of work according to the work priority. Each incident in which the work is completed within the desired timeframe is an incident where this objective has been met. All incidents where the completion was not completed as described above would be an incident in which the scheduling failed. It would then be possible to calculate a percentage of scheduling conformances by dividing the number of incidents meeting the scheduling objectives by the total number of jobs completed.

The second objective is somewhat more difficult to explain but somewhat easier to calculate.

Let's assume that creating a schedule is like building a brick wall with bricks of different sizes. Each point in the wall where a solid brick exists is a point where useful work has been scheduled to gainfully employ the available resources. Each place in the wall where there is a void is a point where available resources are being wasted.

The following represents an inefficient schedule:

A schedule like the one above may be less than 85% efficient. The following represents a much more efficient schedule:



Since both cases are roughly the same area, they would represent the same amount of resources available and consumed. The second case would represent more actual work being completed using the available resources.

In this analogy, the total area covered by the wall is the total resource available. The area covered by the solid surface is the portion of the resource that has been gainfully applied. The scheduling efficiency would be the area of the solid surface divided by the entire area of the wall.

Obviously, the objective is to make the scheduling efficiency as high as possible. The more time lost between finishing one job and starting the next, the lower the scheduling efficiency will be. Obviously, the accuracy of this measurement scheme depends on how tightly and accurately each job is planned. If jobs have lots of "slop" or built-in travel time and other forms of inefficiency, the measurement will provide a poor measure of resource efficiency. The actual

gaps in resource use will not be apparent in the measurement because, the planning will give "credit" for periods when no useful work is being done.

The author has made no attempt to describe what an acceptable target for scheduling conformance or scheduling efficiency should be. Those numbers will tend to change over time and with experience. If an enterprise has just started scheduling, grades of 60% or 70% might be acceptable. With several years of experience, both measures may exceed 90% or more.

One important point to keep in mind is that tight scheduling alone cannot ensure efficient use of resources. A "tight" schedule for "loose" plans will still be inefficient. Another way of making that point is that if the tasks being assembled into the schedule contain lots of slop, the schedule will contain that slop. For instance, if a job that should be accomplished with a crew of two in three hours is scheduled to use a crew of three for four hours, there will still be inefficiency in your work place. This will be the case despite the fact that you assemble the schedule without any gaps.

Comprehensive Work Pack

While performing work planning, it is useful to have a model for the elements that should be contained in a comprehensive or complete work plan. A useful model is to think of the work plan as a manila folder containing all the information needed to perform each job. In some situations, planners may actually use manila folders to contain hard copies of all the needed information. In other cases, some or all of the needed information may exist only in electronic files that are a part of the facility's Computer Maintenance Management System (CMMS). In either case, it is important to consider how the information will be communicated with the individuals performing the work and how those individuals will be able to recall important details once they have travelled to the worksite.

Independent of how and where the information is stored, there is certain information that is needed to perform each job without interruption. That information can be different for different jobs. For instance, jobs requiring the placement of heavy loads at extreme heights or large distances may require a lift plan (describing the specific crane to be used, the required rigging and the calculations needed to ensure that no portion of the lifting system is being overloaded). Small jobs using only hand tools and small parts need no such plan.

A comprehensive work pack can contain some or all of the following elements;

- A complete list of the steps needed to perform the job
- A complete list of the tools needed to perform the job
- A complete list of the materials needed to perform the job
- Drawings describing the finished product
- Safe work permits, confined entry permits and hot work permits
- Scaffolding, lighting and other job staging requirements
- Lift plans

- Crew size and special skills
- Welding procedures and qualifications
- Ventilation requirements
- Personal protective equipment
- Anything else needed to complete the job without interruption

The work planner will need to evaluate each specific job to determine the needs for that job. Keeping the objective of avoiding all forms of interruption in mind, the planner should choose the elements that should be in each work pack and prepare those elements.

Increasingly, systems are being used that archive job files so they can be used again and again in the future. This approach minimizes the amount of planning that is needed each day. Clearly, a work pack for a specific equipment item and for a specific form of maintenance will be directly applicable to repeated jobs. Also work packs covering related or similar jobs can be used to provide useful examples that will save the work planner some time.

On the other hand, planners need to pay special care that they are not re-using elements of an earlier work pack that does not apply to the current case. For instance, if a work pack was built to cover a seal failure for an earlier event and the current event is a bearing failure on the same piece of equipment, some elements of the work pack will be applicable while others will not. The planner must avoid allowing his activities to become so robotic in nature that he simply duplicates the content of an earlier work pack when it only partially applies. This mistake will lead to confusion and possibly longer delays than having no work pack at all.

Comprehensive Schedule

It is best to create a work schedule each day that shows how all resources are being used. In most cases, 100% of the available resources are not consumed performing specific jobs. Some portion of the available workforce is consumed in the following pursuits:

- Breaks
- Safety huddles
- Training
- Worksite clean-up
- Etc.

In order to track total resource man-hours, it is necessary to identify all “known” resource consumers on the schedule. While this might seem cumbersome, it is an important aid in determining when and where “unknown” resource consumers exist. For instance, let’s assume that your workforce includes 800 paid man-hours each day. Let’s assume that the “known” consumers of man-hours from the list above consumes 100 man-hours each day and that the total man-hours charged to scheduled jobs amounts to a total of 600 man-hours. The total man-hours going to known activities are 700 man-hours. In this case, 100 man-hours or 12.5% of the total resource availability is being lost to unknown and unidentified activities.

The reason for the lost man-hours may be easily justified (e.g. travel to and from the job-site, standing in line for tools and materials, etc.), it is impossible to understand and manage those resource consumers unless they are identified and quantified. It is important that they not simply be grouped in with the most closely related task. That approach adds "slop" to the planning system and hides the workforce inefficiencies.

Key Performance Indicators

While most people believe they are performing their job as well as they can and as well as the job can be performed, it is important to use some approach to measure performance as a way of ensuring adequate performance. Occasionally, individuals are performing their job the best way they know, but they are lacking critical skills needed to perform their job. Once provided with those skills, their performance and the performance of the work place will increase significantly. Also, occasionally, the "systems" that exist in the work place prevent individuals from performing as well as can be. In these cases, it is important to identify the performance shortcomings and the root causes of those shortcomings so they can be addressed.

It is important that performance measures be produced continuously so that situations that produce lapses in performance can be identified. For example, it is not uncommon that when the normal first line supervisor goes on vacation, the replacement does not do as well. That situation can easily be addressed by providing additional training for the replacement. (Occasionally, the replacement out-performs the normal first line supervisor. In this case, more dramatic steps are needed.)

In any case, the measures of performance described above are typically referred to as Key Performance Indicators or KPIs. There are several rules that apply to KPIs covering routine maintenance:

- They should be produced on a continuous basis
- There should be just a few KPIs. Too many tend to dilute their effectiveness.
- The calculations used to produce the KPIs should be easily understood and they should be readily accepted. KPIs that are vague or abstract will result in individuals minimizing their importance.
- KPIs should be plotted on trend charts and posted in conspicuous locations
- KPIs should be regularly discussed at meetings at all levels of the organization so their importance can be emphasized by leaders at all levels
- KPIs should be linked to appraisals and compensation
- It is important to identify specifically who can impact each KPI. In most organizations, there are several individuals who have an impact on the KPI for a specific plant area. The work planner, the scheduler, the first line supervisor from the maintenance department and the maintenance coordinator from the operations department can either positively or negatively impact the results being shown by each KPI. If performance is poor, it is important to determine which of the team members is at fault or if the entire team is at fault.

The following are a few of the KPIs that are most useful. More KPIs may be possible, but it is important to evaluate their costs versus their benefits. It is important to keep in mind that KPIs are not free. There is a cost associated with tracking the data in a manner that produces useful measurements. It is also important to keep in mind that you should be ready and able to respond to all KPIs. In other words, KPIs are intended to trigger a specific response. If personnel simply look at the KPIs posted on the wall and or contained in reports without taking action, the time and effort spent producing the KPIs has been wasted. If a KPI indicates that things are on track, responsible individuals should be praised. If not, immediate corrective action should be taken.

Adequacy of Planning

Defining adequate planning as the lack of any interruptions while a job is being worked, it is quite simple to identify jobs that are inadequately planned, i.e. they have experienced an interruption. While determining the planning adequacy of a single job is simple, determining how best to accumulate the results is not so simple. It should be expected that random jobs will experience interruptions. These interruptions become a concern when the percentage of job attempts that experience interruptions becomes too high. There is a value in measuring interruptions for a variety of individuals who may have either a positive or negative effect on job flow. The following is a list of individuals or categories for which the percentage of adequately planned jobs (jobs with no interruptions) should be tracked:

- Work Planner
- First Line Supervisor
- Craftsperson
- Work Area

When the percentage of interruptions is too high, the problem can be associated with any of the sources described above. If the planner is producing totally adequate plans for one area while another area is experiencing too many interruptions, the planner is likely not the source of the problem. If several crafts persons working for a first line supervisor have no problems with interruptions and one specific craftsperson does, the problem is more likely with the one craftsperson experiencing the interruptions than the first line supervisor.

Adequacy of Scheduling

As described above, one objective of scheduling is to meet the job completion guidelines that are associated with the work priority system being used. For instance, a typical priority system may define the scheduling and work completion guidelines as follows:

- Emergency or Critical – Start Immediately
- Urgent – Complete within five days
- Routine – Complete within one month

Clearly, some priority systems include different requirements or priority descriptions. Some priority systems ask for the need-date to be defined for urgent work. Some priority systems do not attempt to identify a required completion time for routine work (and the routine work can trail on for months until it is removed because of aging).

In any case, the work is either accomplished in a manner that fulfils the requirements associated with the approved priority or it does not. When work does not fulfill the requirements, it is possible that the workforce is too small or that work is being handled improperly. In either case further investigation and action is required.

Estimating Accuracy

In order for the planning and scheduling system to function properly, the work estimates must be accurate. If there is too much slop (more man-hours than necessary) in estimates, the productivity of the workforce will be low and maintenance will be more costly than necessary. If estimates are too tight (fewer man-hours than are needed to complete the work), jobs will not complete on time, the last job will not be finished before the next job is scheduled to begin and, at the end of the day, all scheduled jobs will not be completed. The unfinished work will need to be completed using overtime or the unfinished jobs will run over into the next scheduled work period.

Estimating accuracy is calculated by comparing “planned work hours” to “actual work hours”. For each individual job, the estimate can be too high or too low. As an example, the estimating accuracy can be plus 25-percent or minus 25-percent. Either situation will create problems to the workforce. If the estimating accuracy of two jobs were simply added together and averaged, the result of the calculation could be misleading. For instance, if one job was +25% and the other was -25%, the average inaccuracy would be zero.

In order to obtain an accurate portrayal of the estimating accuracy, it is important to use the absolute value of the estimating inaccuracies. In the case described in the last paragraph the average estimating inaccuracy would be 25%. While allowing the highs to offset the lows may make the estimator look good, the inaccuracies will adversely affect the manner in which work is supervised and ultimately lead to additional costs.

When evaluating the estimating accuracy, the primary person being evaluated is the work planner. On the other hand, if a planner produces estimates that are accurate for most of his clients, but inaccurate for one particular first line supervisor or crew, the results might point to poor performance for that supervisor or his crew.

The objective is for the estimating inaccuracy to be as close to zero as possible. On the other hand, it is better for estimates to be a little too low than too high. There is a saying that people will always work to what is expected of them. If estimates are too high, people will find things to fill the allotted time and the workforce will become less effective.

Conformance to Schedule

Just like following a road map, in order to achieve the expected results, the directions described by the schedule must be followed if the required work is to be completed with the allowed resources. It is not uncommon for crews to decide they know more about the work than the scheduler and to perform the work in a different sequence or with different resources. When outside resources have been coordinated with the schedule, it is likely that performing work out of order will result in confusion and inefficiencies. Outside resources that need to be integrated with schedules include the following:

- Material deliveries
- Heavy mobile or lifting equipment
- Scaffold builders
- Shop work that is associated with field activities
- Etc.

While the objective is to have all work precisely match the schedule by starting at the time described by the schedule, finishing at the time described by the schedule and consuming the exact resources described by the schedule, our ability to measure schedule conformance to that level of detail is somewhat limited. Simpler ways to measure Schedule Conformance is to compare starting times to those listed in the schedule or completion times to those listed in the schedule. For instance, if a job completed more than one-hour past the scheduled completion time, it would be viewed as not having conformed to the schedule. In this case, Schedule Conformance would be a simple measure of the number of jobs that conform to the schedule to the total number of jobs.

Most computerized CMMSs can be set up to track jobs completed as scheduled and those that are not, and to produce a calculated percentage of schedule conformance.

Percent PM/PdM

Many, if not most, plants have an objective of increasing the percentage of proactive work as compared to reactive work. All maintenance work is simply a way of “buying” the utility of an asset. For, instance after a major overhaul completed on the heels of a catastrophic failure, an asset can be expected to reliably operate for a given period of time. On the other hand, it is also possible to provide the same period of utilization (or an indefinite period of utilization) by performing the appropriate predictive and preventive maintenance. In addition, this maintenance costs far less and removes the asset from service a far shorter period of time.

The starting point on the path from reactive maintenance to proactive (predictive and preventive) maintenance is frequently a ratio of 80% reactive maintenance to 20% proactive maintenance. The goal is frequently 20% reactive maintenance to 80% proactive maintenance. Achieving this goal requires implementing a significant amount of “effective” proactive maintenance. Effective proactive maintenance is not simply maintenance that is accomplished

without a failure to drive it. Effective proactive maintenance is maintenance that prevents reactive maintenance by eliminating failures.

In the path from reactive maintenance to proactive maintenance there are several stages:

- The first stage is the current condition in which there is a relatively small amount of proactive maintenance and it is based on generally accepted practices and OEM recommendations.
- The second stage is the stage in which current failure modes are identified, the failure mechanisms driving those failure modes are identified and predictive or preventive maintenance needed to eliminate the failure mechanisms or identify deterioration before it has a chance to cause a failure, is identified. This stage may be completed using tools like Reliability Centered Maintenance to perform the analysis.
- The third stage is when the work identified above is implemented. In this stage, the total amount of work increases because the new predictive and preventive maintenance has not had an opportunity to eliminate any failures yet. (Many senior managers expect that the total amount of work will immediately reduce as new proactive work is introduced. This belief is unrealistic because the failure mechanisms being eliminated have been at work for a long time and the resulting deterioration is already present. Failures caused by deterioration that existed before new proactive maintenance was introduced will continue to occur until all that deterioration has worked its way out of the assets.)
- The fourth stage is when the amount of reactive or repair work begins to creep down. This is when the effectiveness of the predictive and preventive maintenance finally begins to take hold. If this does not occur within a reasonable period of time (a few years) it is likely that the new proactive work is not effective. In that case, the PM/PdM being done on equipment that is failing should be specifically reviewed.
- The final stage is when the percentage of proactive work to the percentage of reactive work has finally flipped. By this time, the total amount of work has gone down so the amount of maintenance resources should be reduced or more reactive work should be replaced with PM/PdM.

The percent proactive work is a simple calculation that compares the amount of predictive and preventive work to the total work being done. This percentage can be monitored to see that it is successfully passing through the stages described above. It is also important to see that the total amount of work being accomplished is taking a rational trend. If proactive work continues to be added and the total amount of work also grows without a reduction in the amount of reactive work, the proactive work is of limited value. The objective is not to simply create new PM/PdM, but rather to use it to eliminate failures.

Percent of Work by Priority

Another useful measure is the percentage of work being done in each of the priority categories. The usefulness of this measure comes from knowing if the priority system is being used to force the maintenance organization to be a “reactive organization”. The most effective organizations

are those that thoroughly plan and tightly schedule all work. Typically emergency work has very limited amount of planning. Also, it is not uncommon for the parts and materials needed to perform urgent work to be expedited resulting in added costs. The least costly way to perform work is to perform it on a routine basis with parts and materials being delivered using the most cost effective method of shipment. It is also more efficient to group items of work together that require the use of rental equipment or special contract skills.

Generally speaking, the greater the portion of emergency and urgent jobs, the more inefficiency will exist. As a result, it is useful to set goals with limited amounts of emergency and urgent work, and then actual results be compared to the goals. Typical goals are as follows:

- Percent emergency work = less than 5%
- Percent emergency and urgent work = Less than 15%
- Percent routine work is equal to or greater than 85%.

First Job Starts

A specific element of schedule attainment that deserves special considerations is "first job starts". First Job Starts is a measure of the portion of time that the job scheduled to start first each morning was actually started first. This measure applies to each individual in the crew or each separate working entity. First Job Starts is an important measure because:

- The rest of the workday frequently reflects the way the day got started.
- First jobs are typically assigned on the previous day so they are ready to go the next morning. Other jobs are not nearly as well prepared.
- Frequently when the assigned first job is not started, it is replaced with an "emergency" job. If the replacement job was really an emergency, it should have been started during the previous night. The fact it was not started makes one question if it was truly an emergency.

Frequently, the percentage of first job starts that were accomplished in a manner consistent with the schedule requires a tracking system that is outside of the CMMS. While the question if a first job started as scheduled can be answered with a simple yes or no, it is not always obvious to the CMMS how the workforce is broken into discrete working entities.

Break-Ins

Another element that is closely akin to schedule attainment is schedule breaks or "break-ins". A break-in occurs when one or more jobs are being worked but are incomplete when the assigned resources are removed or assigned other tasks to perform. "Break-ins" are examples of the organization causing interruptions that negate the value of planning and scheduling. In the case of "break-ins" this is particularly true because:

1. The break-in adversely affects the job that was interrupted.

2. The job being worked using the resources pulled from the broken job is typically poorly planned and clearly was unscheduled.

Break-ins provide a good explanation why unplanned and unscheduled work creates a situation in which work requires four times the resources of well planned and tightly scheduled work.

The number of break-ins can be simply expressed as a raw number. When break-ins occur, the individuals causing and allowing them to happen should be expected to investigate and report why the break-in occurred. The reason for the investigation and report is to make break-ins cumbersome so they are avoided.

Workforce Productivity

Possibly the most significant but least measured Key Performance Indicator is Workforce Productivity. Workforce Productivity is simply a measure of how hard your workforce is working. It is possible for all the other measures to appear quite positive and still have a situation in which the workforce is not fully engaged. Said another way, if the estimates used in the plans contain sufficient fat and the organization has become accustomed to individuals not putting in a full days work, it is possible to have favorable KPIs and an inefficient workforce.

As a result, it is important to have a process that regularly measures the productivity of the workforce. One useful way of measuring workforce productivity is to simply walk through the workplace with a counter in each hand. For every person you see with a tool in his hands actively engaged in work, count one productive person. For every person who is not actively engaged in work, count one unproductive person.

Obviously this approach takes an extreme view of what constitutes “work”. It does not count individuals travelling to or from jobsites. It does not count people waiting in line to get tools or materials. It does not count individuals obtaining instructions or permits. It only counts individuals actively engaged in work.

The fact that this approach is so critical makes it useful only when applied as a trend. For instance if the count shows only 15% of the workforce actively engaged in work during this measurement while past measurements showed that 25% of the workforce were actively engaged in work, you can assume that the activities drawing individuals away from “hands-on” work have increased. Since the ultimate objective is to have as much time performing “hands-on” work as high as possible, it is important to address distractions and minimize them. In the example provided above, to achieve the same amount of actual “hands-on” work, it would be necessary to increase the workforce by more than 50%.

All too often people focus their attentions on the “paper measures” and ignore the true measures of workforce effectiveness. It is important to always keep track of how well your effectiveness and efficiency initiatives are working at the actual point of contact.

Conclusion

While many people tend to view planning and scheduling as a single entity, they are actually separate and distinct. The final objective of improving planning and scheduling is to reduce or eliminate the interruptions to work at the workplace. In the final analysis, the effectiveness of planning and scheduling and the efficiency of your workforce is measured by determining what portion of your workforce's time is spent with tools in their hands performing work.