



Kitting of Maintenance Work Orders

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In the ideal world of routine work execution, when the crew arrives to perform the work at the job site, they would find a pallet with all of the required repair materials shrink wrapped and identified with the correct work order. Having all of the material for the job delivered in this fashion has the potential to contribute to improved effectiveness and efficiency.

On the surface kitting of work order material appears to be something that is not difficult to accomplish. After all, as the planners are developing the work plan they can order the material for delivery the day that the work is scheduled to be executed. Unfortunately, many organizations have attempted work order kitting without a full understanding of the potential problems associated with not having the proper work process in place.

Without the proper work process, over time the warehouse can experience an overabundance of palletized kits for jobs that have been deferred or canceled. Not only is this a problem of space utilization, but many kits go unused as parts are ordered in duplicate due to the fact that kits get lost or work execution doesn't realize a kits exist. This is also a problem for field execution because many kits that get delivered to the job have their work orders superseded, delayed or canceled. The result is wasted material as parts deteriorate from being left in the weather or kits are pirated when mechanics see parts they need for other jobs rendering the kit useless.

Kitting related problems also extend into the planning process. A good work order computerized maintenance management system (Cmms) will allow for the creation of asset related bills of material. This raises several problems in the planning area related to kits. First, planners without detailed knowledge of how to repair specific assets can create

bills of material with the wrong parts or lists that do not have all of the necessary parts. Second, without experience in repair, the planner may order kits with too many or too few parts from the Bill of Material. The former results in material waste, the latter, ineffective work execution. Third, if the field execution organization does not provide adequate feedback to the planners to allow them to adjust the bills of material the problem of inadequacy will be perpetuated.

So the question needs to be asked, if kitting can vastly improve work execution, what problems need to be corrected to make the kitting process work properly. There are several;

1. Schedule Compliance

Reactive maintenance organizations in many cases spend an inordinate amount of time developing a work schedule listing the jobs to be completed in the next day or even the next week. The problem is the reactivity of the work effort which on a day-to-day basis sees many jobs on the schedule either canceled or delayed. If you are going to develop material kits for work execution you must have a high degree of schedule compliance otherwise you fall into many of the problems that I've identified. Conversely if there is a high degree of schedule compliance delivering kits to the field makes a great deal of sense. A correlation between a successful kitting effort and schedule compliance can be shown in the following chart.

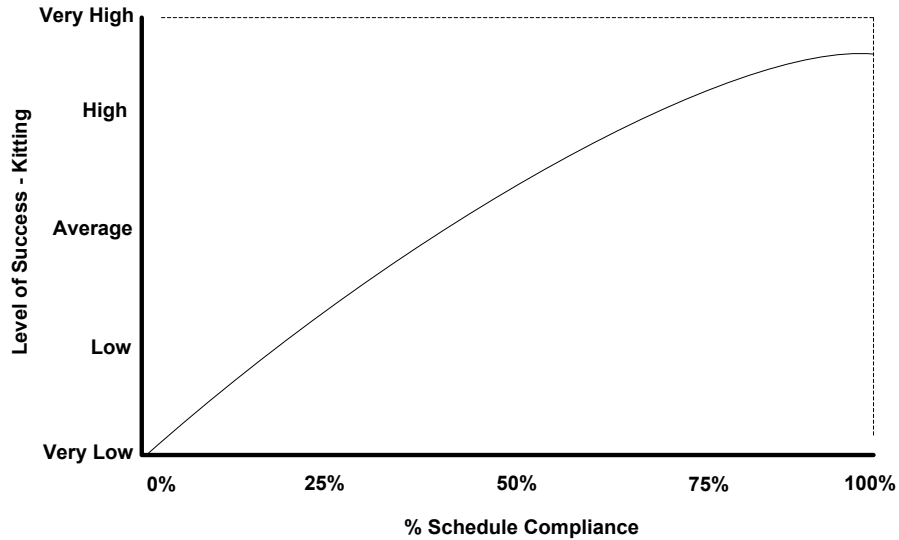


Figure 1
Schedule Compliance Correlated to Kitting Success

As you can see the only way to achieve a successful kitting effort is to have a high degree of schedule compliance. If you attempt to implement a kitting process without your compliance being extremely high the kitting effort is doomed to failure on many fronts and is not worth your effort.

2. Planning and Bills of Material

While it is entirely possible for your maintenance planners to order material from the warehouse or nonstock independently for each job, having asset related bills of material saves an enormous amount of time and money.

In a well created computerized maintenance management system (Cmms) all of the equipment in the plant has associated with it a location identifier and an asset number. The former identifies where a specific physical asset is located within the plant, the latter is a unique number assigned to that specific asset regardless of where it resides. In a Cmms, your planners can create bills of material associated for the specific plant assets. If done correctly whenever that asset requires the development of a work order the planner can use the Bill of Material to order the material required for the kit. The issue here is that the Bill of Material must be comprehensive and accurate. This is accomplished by having experienced planners

develop the bills of material so that they can incorporate in this list all the parts required to perform the work.

3. Field Execution

The part of the process associated with field execution is a little more difficult. It involves "end of job" coordination between field execution and the planning organization. Since we're all human, errors in part selection for the bills of material can occur. Additionally there are times when changes are made in the field that have a direct impact on the parts required for future jobs. The only way that the Bill of Material can be maintained at 100% accuracy is if the execution organization provides feedback to the planners about the kit at the end of the job so that they can make any changes. This is a simple feedback loop that is often not present in the maintenance work execution

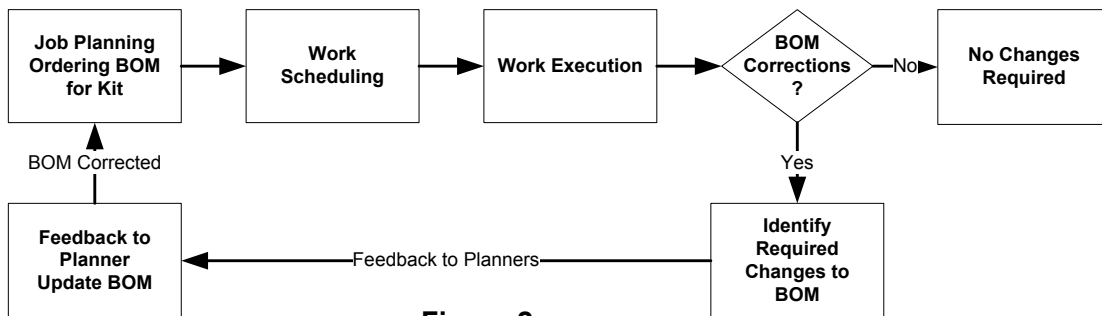


Figure 2

Bill of Material (BOM) Feedback Workflow

processes. What needs to be developed looks like the following work process diagram; and

4. Warehouse

In the world of kitting there is also a potential problem for the warehouse. When material is removed from stock in order to create a kit it is typically charged out against an active work order. This removes from inventory the amount of material placed in the kit. If a minimum reorder quantity is recognized by the computer system after this inventory has been removed, it will trigger a reorder. However if the kit is not used and the material is returned to stock very quickly it will create an overstock problem with it associated unacceptable high inventory value.

A Kitting Solution

Kitting has value if your schedule compliance is high, the planning organization is staffed with experienced personnel who can support the bill of material effort and there is a parts feedback process at job completion. Unfortunately, all these elements are not always in place, and consequently you may think that kitting is something you want to avoid. That is not the case. There are modified versions of the kitting process that can help improve your work execution even with some of the problems I've noted in existence.

The solution is to take a different approach. Instead of trying to kit every job for the day that is on the schedule since some of these will not be executed, just kit the first one for each crew. I believe that Operations and Maintenance can agree on a "first job of the day" for each work crew. These jobs need to be prepared in advance by Operations, and Operations must be assured that these jobs will be worked as the "first job of the day." This means that kits prepared a day in advance can be delivered to the field and utilized by the technicians.

The other jobs that are planned for the rest of the day can be reviewed by Maintenance and Operations early in the morning of the day that they were planned to be executed. If there is still agreement that these jobs will actually be performed the warehouse using the Bill of Material can kit these jobs and deliver the material to the job site. If some of these jobs are not going to be performed, the kit will never be created.

With this approach a modified kitting process can be put into place. However, it is important to remember that feedback related to kitted parts from the field in order to correct the Bill of Material is critical. For many maintenance organizations post job feedback related to the work plan or the parts required is not often completed, and this needs to change.

Organizations with a high level schedule compliance and very experienced planners can find that a kitting process adds real value to work execution. Reactive organizations that typically do not have a high level schedule compliance can still benefit from job kitting by following the alternate approach described.