

These two areas provide the foundation for an installed system to become an operating system on a daily basis.

The computerized maintenance management system (CMMS) or enterprise asset management (EAM) system has become a common tool for maintenance. The deployment of software and hardware to support different areas in facilities and plants, especially with fewer personnel, is no longer the exception; it is the rule. The number of plants and facilities with CMMS/EAM software has been increasing each year, but there are varying levels of reported results with each new system deployed. This is of concern because new computerized systems often replace old systems that were perceived as not living up to their advertisements.

It was once thought that programming errors, hardware/software mismatches, and other similar problems could take the blame for implementations with only temporary or limited successes.

Although there are many important factors leading to successful implementation, this article will discuss two that work well in manufacturing and facility operations: administration and training. These are two areas that often do not garner commitment of necessary resources for the on-going upkeep of the maintenance system. In other words, proper training and administration are the preventive maintenance for the CMMS/EAM system.

System administration

Maintenance system training typically includes all system functionality for a select group of users, and then functional training in certain areas or modules related to an individual's responsibilities. It also must include administration of the system and be:

- Coordinated with need and function
- Specific to function and include why change is necessary and where it must come from
- Coordinated with implementation
- Coordinated with immediate usage

Having a successful administrative system involves understanding the life cycle of the work order (and other process flows that contact the CMMS/EAM), and having a general idea of the work that takes place in the facility. There is an inherent conflict between the level of detail and

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the level of complexity required in administrative systems (procedures, forms, work orders, etc.). Obtaining the proper mix is required for good administrative systems.

Additionally, it is necessary to accommodate purchasing, invoicing, and other internal functions through the CMMS or application program interfaces (APIs). This activity is designed to create more online collaboration and decrease the number of islands of information which maintenance has often been accused of harboring.

Begin with the end in mind

If you begin with the end in mind, what might the end look like? The end should be a time of continuous improvement based on numerous factors including maintenance information. Maintenance information should be derived from analysis of preventive and nonpreventive maintenance work order events, labor, and materials histories, and transactions created in conjunction with them. This will include a vast array of information including the cost of maintenance per machine in terms of downtime, incidents, and causes of repairs that are emergency or nonemergency, labor and material, etc.

On the surface, this is an attempt to begin to actually utilize the CMMS to identify areas for change, and possibly quantify the value of this change. It is also to continue to achieve greater knowledge of where the maintenance dollar is actually going, in terms of both labor and materials.

The roadmap to a good startup

Before looking at the end result, take a brief look at what it takes to get there.

An assessment and analysis should initiate the justification process, and help to define the functionality and sizing requirements for the system. Additionally, it should identify prime manual and/or automated processes that can receive change now, before the system is even selected.

Modifications prior to system selection will lessen the chance of selecting a system that emulates an undesirable process currently in use. Computerizing a chaotic process will increase the problem geometrically or worse.

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Any justification necessary should be completed here as well. This will provide direction and priority for implementation, since it will be imperative that the justification items be addressed to recover the investment in a timely manner.

System selection should result in choosing an existing product and version that has been on the market for some time, unless the company's size and special needs allow custom authoring or purchasing a system with source code to be modified.

Once selected and purchased, the system must be installed. This includes necessary hardware and software, and typically is followed closely by training employees in critical areas initially, and then periodically to support the implementation in multiple areas as needed.

Then comes the arduous task of data installation—the physical inventory of plant machinery, preventive maintenance development, an inventory of parts, and the development of the necessary codes to support the required fields and those that will be used in analysis.

Although data installation is one of the areas that takes the longest, and is often stalled due to the large amount of resources expended to get this far, it is imperative that this be completed to get to the next step. The old adage "garbage in, garbage out" still applies.

This does not mean it will be necessary to identify every piece of machinery down to the last armature and bolt. But by the same token, a furnace, packaging line, tank farm, or paint shop is too broad a description. It is necessary to find a middle ground that supports the implementation and functional capabilities of the system. Remember, there will be some level in the equipment hierarchy where most (if not all) work orders will be generated.

The problem now is how to get from having initial data in the system to having actual results data available that is reliable, and extracting results data out of the system. This is accomplished with good training and deployment of good administration systems.

Training helps to insure personnel understand the systems in place and can use them consistently, including the administration systems.

Training

Training of personnel cannot be overemphasized, but can easily be overdone. More often, it is less effective than it should be. During CMMS implementation, training is often concentrated on the software and covers far too much for far too many.

The areas most often overlooked are in system administration. The original assessment and analysis should cover workflow analysis. The path of a work order should now be known, as well as other workflows in contact with the CMMS/EAM. Training must be completed for all personnel along the path and cover the skills required as well as explain the need for change. This (why? along with how? and what?) helps to incorporate education into the training.

Training on handling the work order from start to finish should be done for all involved, including the originator. It is especially important to educate. Bad historical data can be found easily. Take a walk around the plant and look at repair work order problem descriptions. Descriptions of "down" or "doesn;t work" etc., will typically be followed by a repair description of "done" or "fixed," etc.—not very useful for analysis. Train the originator to indicate what he observed and why he called.

Numerous other opportunities for improvement exist in training methods. (See accompanying section ["Training"](#))

Administration

The administration systems should document the life cycle of the work order, and procedures should be in place to identify who needs to be involved at what level and in the most effective manner. A sample workflow is shown in Fig. 1.

The administration of the CMMS will share some resources with other systems. Overall, from the CMMS perspective, the organization may be broken up into four or more discreet areas:

- The computer center maintains the computer hardware, backups, and large processing of work orders and reports (including collating, sorting, etc.).
- The data center typically handles input of completed work orders, and maintains manual records as needed for disaster recovery, regulatory compliance, or other reasons.

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- The engineering group often is called upon to handle analysis of the data returned on work orders and data in the system over short and long terms. These activities are coordinated in support of the maintenance operations. Engineering also will be called upon for evaluation of preventive maintenance effectiveness, system integration, and implementation of changes as recommended by analysis.
- The maintenance group will handle the planning, scheduling, assigning, executing, reporting, and analysis of both preventive and nonpreventive maintenance work orders. This will often coincide with field review of work completed, on-going training, and coordination with the engineering group for detailed analysis.
- The functional and technical organizations will be responsible for customizing, configuring, tailoring, and maintaining the CMMS. This typically will be the area to which the other four areas must contribute, and typically resides in the functional areas, or the functional side of the information services/technology group, as a hybrid of functional and technical personnel working together to bridge the gap between organizations.

Summary

Training and administration provide the foundation for an installed system to become an operating system on a daily basis that contains good quantity and quality of data, representative of plant operations, that can be used for analysis. When executed well, both areas will be considered at the beginning of installation, and through every upgrade, expansion, and change in overall business operations. The better the planning initially and along the way, the greater chance the CMMS will have of continuous usage, and delivering long-term and continuous improvement, through the information it provides.

When does data become information? For example, 28 percent by itself is data; 28 percent of the total maintenance expenditures for the period is still data.

But when 5 percent of the machinery is found to take 28 percent of the maintenance dollar just to repair them (preventive maintenance excluded), the disproportion of resources becomes information.

How is re-allocation of resources to more problematic or costly areas justified? The computerized maintenance management system exists for this purpose. **MT**

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Training

- Training must be coordinated with need and function.
- Do not train everyone on everything. Only a limited number of personnel require OEM-like knowledge.
- Training should be specific to function and include why change is necessary and where it must come from.
- Do not train too early; coordinate with implementation. Trainees should leave class and use what they have learned immediately.
- Train as close to the beginning of the turn as possible.
- Try for short sessions that end early in the turn.

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