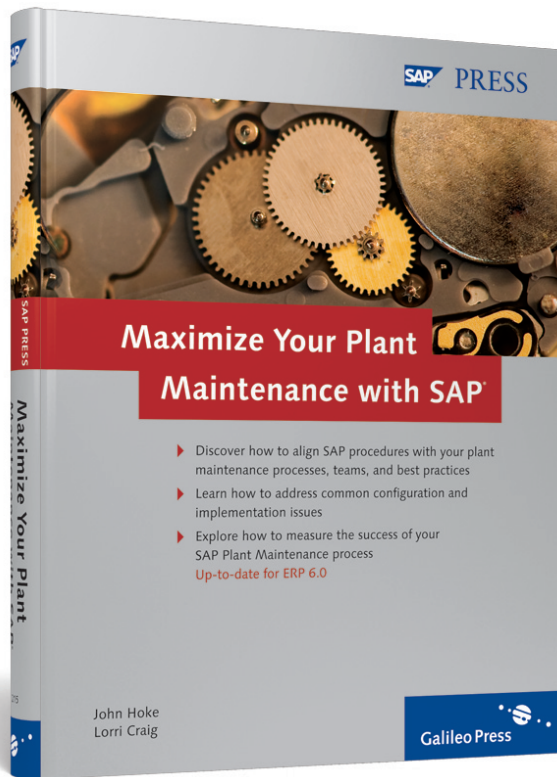


John Hoke, Lorri Craig

# Maximize Your Plant Maintenance with SAP®



**Galileo Press** 

Bonn • Boston

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*The root of every successful SAP Plant Maintenance (PM) implementation is the firm foundation provided by the organization's maintenance and reliability best practices. In this chapter, we will discuss how the best practices and SAP PM are linked, and how to recognize what the firm foundation looks like.*

## **1 The Maintenance Health Assessment**

Every project begins with a statement of the present state and the opportunity to improve. Prior to attempting to gain reliability value, it is important to do a zero-based budgeting assessment of the maintenance processes and understand what your organization is trying to accomplish with equipment reliability. Computer systems do not correct problems; they just optimize what already exists.

In this book, we will assume that increased equipment reliability is the goal. The most important things to understand before starting are the tools and capabilities needed to even start the journey. This chapter will address what to assess prior to combining a reliability improvement effort with an SAP Plant Maintenance (PM) implementation. SAP PM is a powerful tool to use to achieve consistent reliability improvement, but maintenance organizational readiness is an often overlooked step in the implementation process. For those who keep the equipment running, we will discuss how to build the firm foundation of Reliability Improvement with the SAP PM tool.

The first discussion focuses on why the computer plays such a large role in today's maintenance organization and the context under which manufacturing organizations operate today. From there, we will discuss the mindsets, or organizational soft skills, required to support a reliability improvement focus. Next, an overview of the classic maintenance best practices will be discussed. To complement the processes, the skills to execute those processes are examined. With all of the assessment concepts reviewed, the task of testing for readiness concludes the maintenance health assessment process. When the plant solidifies these attributes, the SAP PM implementation goes beyond a successful startup. It will consistently fuel the reliability improvement effort across the plant and across the company.

## 1.1 Maintenance Needs a Computerized Maintenance Management System

Many of us started our maintenance careers executing work orders based on verbal requests, or even with carbon-papered written work requests. In that day and time, that was all we needed. We will explain why computers are now a vital part of the tool belt for the 21st century maintenance professional.

### 1.1.1 The 21st Century Role of Maintenance

The speed of change in the manufacturing environment is nearly exponential, and it's not just the new technologies that are moving the targets. We are now all part of a global manufacturing world where technology that is available to us and our competitors is also available to people who want to be our competitors. The profit security that once existed has been replaced with the drive to stay competitive – with product cycles now being months instead of years. With this as our challenge, maintenance organizations need to better understand their roles in the 21st century manufacturing and service provider world, a world where technology is available to everyone, with a transportation system in place to deliver anywhere. It is important to learn about the two paradigms that have changed recently.

#### **Our Job is Not to Fix Things; It's to Keep Equipment Running**

Nearly every manufacturing plant bulletin board has proudly displayed a memo from the plant manager or production manager that congratulated a team of maintenance craftsmen for repairing or replacing a bottleneck piece of equipment in record time. Mechanics live for the thrill of the fix under pressure; that is what gets the adrenaline going. The praise only reinforces the behavior. On the other hand, it is rare to see a similar congratulatory note for a daily preventive maintenance route that has resulted in no equipment downtime over an operating period.

The paradox is that if effective preventive maintenance was performed, the whole situation would have been avoided. When equipment does not perform, we have to admit each incident as a failure of the goal to keep the equipment running. In today's manufacturing environment, all downtime is painful to the bottom line, and there are too many manufacturing lines waiting to take your market share.

## Those Really Were the Good Ole Days

A very common comment in manufacturing plants with regards to entering failure codes and text, as well as feedback on work order operations improvement is, "Why do I need to type in all of this information? Those new guys should have to learn the hard way, just like I did." In this case, we often relate a personal experience of accidentally causing plant downtime during a time when it cost the plant a loss of close to half a million dollars out of a \$40 million monthly profit. Today, the same mistake may come closer to eliminating the entire monthly profit of \$1 million, given the global marketplace in which we all work. So to avoid this type of human error, the least a senior craftsman can do to leave a maintenance legacy is to leave the younger mechanics with an advantage in technical knowledge, because their profit margin is much more sensitive. The challenge now is to replace the paper or verbal work order processes with a methodology that provides maintenance intelligence at the point of planning and execution. This is where SAP PM fits in.

### 1.1.2 We Are Deemed to Repeat History If We Do Not Use It

The only situation worse than having an critical equipment failure happen is having it happen twice, for the same reason. It was not that long ago that maintenance people were renowned for their repair expertise. Just to be practical, the need for repair skills will always exist, and for that reason, it will always be important to document every task and every preparation to each repair. As equipment runs better, the practice at repair will become less frequent, and the need to refer to the instruction set will become more important. If you, as a maintenance person, say that you do not need to be told how to fix this equipment, it is possible that the poor reliability has provided you the opportunity and repetition to memorize all the steps and nuances to execute a good repair. As competition between manufacturing plants increases, the plants that run well enough to not remember how this equipment is fixed will succeed. These are the plants that will need the documentation of the tasks the most to build that database.

The types of information that will add value to the reliability improvement effort are:

- ▶ Detailed work steps with labor counts and durations
- ▶ The materials needed to execute those steps

- ▶ The history of what that equipment has done in the past
- ▶ The damage that was done
- ▶ The root cause for the damage
- ▶ The specific part of the equipment that was damaged
- ▶ The symptoms that first indicated a problem

All of this information will be helpful any time a work order is created and executed. The only issue is that someone needs to actually write all that information down, and make it accessible to you as either a planner or a craftsman. Multiply this number by the number of equipment in the plant (thousands to hundreds of thousands in most plants), then multiply this by the different repair processes and failure modes, and then make sure that the information is up to date and in real time. It becomes evident that all of this information will create a very large database — and no one will have the ability to review comprehensively. At some point, users think that of the thousands of inputs, missing a few data entries will not make a difference and no one can possibly review it all. The reality is that it is the sum of all the data creates the pattern that determines where to look for the detail of individual inputs. The data seed will bear fruit at some point in the future only if the organization is disciplined and dependable.

The argument made above was about getting better at preventing failure rather than accepting failure. The argument should take the failure information listed above and be more proactive. You should take the information above and:

1. Design preventive maintenance inspections and repairs that eliminate the failures.
2. Assemble the collective failure information so reliability priorities are clear and data based, so limited resources can be focused where the best return is.
3. Learn from this vast amount of information how not to let this problem happen again, from the engineer who specifies the next piece of equipment, to the predictive maintenance team, to the preventive maintenance mechanic.

As maintenance people, we all need access to this information in real time. SAP PM is designed to do this for you, and in this new age of maintenance and the global marketplace, there is no other way to compete. Knowledge is the power to succeed.

## 1.2 The Required Mindsets for Reliability Success

Part of any improvement effort is to establish and publicize the goals, but to establish some maintenance and reliability mindsets needed to be successful, or in other words, the “How.” The goal is clear — to increase equipment reliability; the challenge is now how to accomplish that. Part of the how is what the principles are that will guide the reliability improvement effort. Very often, this step is not implemented, and often not even discussed in the process of improvement and SAP PM implementation.

Before tackling any mindsets, it is very important to acknowledge and inherently accept the premise that every manufacturing facility has the two fundamental goals to ensure a safe working environment and to follow all regulatory requirements within the plant's jurisdiction. With safety and legal responsibilities as absolute requirements, the goal of every manufacturing and service organization is to make money.

### 1.2.1 The Passion for Improvement and the Culture of Accountability

The energy to improve begins with the leadership of the organization. The vision must be clear, the expectations understood, and the accountabilities enforced. The rails upon which improvement rides are the numerical metrics that are used to describe the vision, set the standards of performance, and establish the measuring stick of the gap closing improvement (or inactivity). All three of the characteristics are required for reliability improvement to progress, and the absence of one creates a significant barrier for the other two. Back in the good old days, we did not have to hold accountabilities, or even measure performance for that matter, but now it is a different story. Holding accountability, the hardest of the key success traits to execute, is most often the biggest barrier. With the SAP tool, the accessibility of the numerical performance metrics is more than abundant, and establishing a vision with expectations can be easily implemented and tracked. However, metrics without the discipline to act are hollow. It is important to acknowledge the notion of the computer data age of management. Organizations will typically fail when the data is used punitively without attempting to support removing the barriers or even failing to understand them.

The successful strategy is to use the data with the intent to teach and learn. Many mechanics report that all of this data primarily exists to catch them doing some-

thing wrong. It can also be used to create the fanfare of success, and if the passion for improvement is to exist at every level, then that passion has to be supported and rewarded, and proving that accountability is designed to create improvement, not punish failure. It is important to understand, however, that there is a part of the bell curve that cannot or will not perform according to expectation. Leadership has no choice in this maintenance environment but to help this individual find a more successful role in another position. Skills and effort have to be a prerequisite for executing maintenance improvement.

### 1.2.2 Being Able to "Take One for the Team"

Most experts claim that standardization is the key to success in today's corporate environment where synergy and economy of scale is needed to compete. A question lacking in that discussion is "Is the maintenance organization willing to suboptimize some of their maintenance processes to optimize the overall manufacturing process?" With stand alone maintenance computer systems, we became comfortable with our jargon and processes to the exclusion of the rest of the business. In the transition to enterprise computer systems, maintenance will have to share the jargon of the other parts of the business, financial and otherwise.

It should not be possible to define a kilogram for an equipment weight as a different entity from a kilogram of a finished manufactured product. It should not be possible to name a storeroom part what it is uniquely locally called, as opposed to agreeing company-wide whether to call a welding rod a *welding rod* or an *electrode*. These standardizations allow for the free calibrated flow of information across the entire organization. The challenge that fundamentally exists within this standardization is the need to dedicate the effort to learn these standardizations, also called "Taking One for the Team." It is even more difficult when a company is slow to take advantage of the standardization and realize the synergistic potential.

Even if the synergy is realized, every organization will, at the very least, have a transitional phase that will create barriers, but if coordinating a large company as one, and realizing the economy of scale makes a difference to the bottom line, it will be a wise investment. An important twist on this principle is avoiding the "*Not Invented Here*" syndrome, which is best described as when organizations reward utilizing processes and products developed from other corners of the company over home-grown ingenuity, the practice will become common, and more importantly expected and rewarded.

### 1.2.3 The Production and Maintenance Partnership

This concept is often addressed as a maintenance best practice, but we include it in mindsets based on the behaviors that are experienced in plants that struggle with reliability improvement. Teamwork is also the mantra of every plant, but its success can be hampered because it is not just about tolerating the other players on the team, but also about being committed to the team's success, sometimes at the expense of an individual's. One example that speaks volumes to this principle is the downtime tracking process. Most production lines today have a reliable detailed process to track exceptions to bottleneck capacities. The energy that maintenance and operations expend to debate who should be charged with the downtime sometimes outweighs the energy to solve the actual reliability issue.

In most cases, the production department should own the downtime tracking process, and their perception is what should go on record, but maintenance should have the opportunity to add their input. We are all there to make product or deliver a service. We share the same goal and need each other to help maintenance with process issues and production with equipment issues. Partnership is not just about having regular meetings or even good communication; it is about doing what is necessary to help achieve the overall goals.

### 1.2.4 Equipment Does Not Have to Fail

A principle that is not lost on many maintenance organizations is the self-fulfilling prophecy. One of the most spirited questions to ask any training session is, "Do you believe that equipment is going to fail at some point?" The involuntary response is typically that failure is the nature of all equipment. The follow-up question will be, "Where does the mechanic sit on the airplane to be in the best position to work on an engine malfunction?" The point is made. It's a mindset that it is possible to run the critical equipment 100% of the time between scheduled outages, and for production managers and operators, this should be the expectation.

### 1.2.5 The Only Two Success Parameters that Really Matter

The key to success is to focus on what is paramount to success. Maintenance organizations have typically focused on hours, backlogs of open work orders, completed orders reports, and many other types of performance metric units. Quite frankly, there are only two metrics that are universally used and valued by the entire manufacturing organization: time and money. SAP is based on tracking time

and money, and as maintenance people, we need to understand and utilize the universal business language.

Maintenance typically focuses on adherence and backlog numbers. While they are very important to maintenance processes, they are process metrics, not bottom line metrics. One of the best examples of cost awareness in any plant was a plant that actually put price tags on storeroom parts to increase awareness. Maintenance spending is a direct deduction from the profit bottom line. Equipment downtime can be a very large contributor to cost and profit avoidance. The rest of the metrics are informational. Time has a dual role in the equation. Time is the business wide common denominator that will be used to coordinate and align resources to most efficiently execute any task that requires multiple resources (and minimize the cost) as well as be the first derivative of cost itself, the time value of money.

### **1.2.6 Data-Based Decision-Making**

There is one more organizational characteristic that will tie all of the elements above into a cohesive business process, and will be the commitment to the use of data based decision-making. It is not just the fact that decisions are made from management report data; the success of utilizing data requires that every level of an organization understands and is focused on the metrics of success, not just what the plant manager sees. The real value of possessing real time, and in most cases predictive maintenance models, allows those doing the work to measure the progress of goal attainment on a daily basis, rather than waiting for the month-end summary reports. The days of hoarding information within the plants, and even between plants, should be in the past. The most direct route to the bottom line is helpful information to the mechanic in a maintenance organization.

The psychological aspect of data-based decision making is often the tougher barrier to overcome. If the goals, metrics, and reporting achieve the business decision-making needs, there is no longer a dependence on emotional, prophetic, or lucky "gut feels" that maintenance sometimes was forced into in the past. Just as mechanics were rewarded for fixing equipment, managers and supervisors were rewarded for being lucky or having a feel for just what to do. With a solid data-based decision-making process in place, the right answer is more likely more obvious to everyone supporting the solution.

## 1.3 The Methodology of Reliability Success

One of the greatest misconceptions of SAP PM is that SAP will add structure and define maintenance processes for the user. This is almost a fatal assumption for reliability improvement. Even though we will spend most of this book explaining the flexibility and capability of SAP PM, it is vital to understand the requirement to implement SAP PM on top of solid maintenance and reliability business processes. If an organization does not require the business process of planning corrective maintenance orders, SAP cannot make a planner plan an order, just allow him the tool to plan.

### 1.3.1 Roles and Responsibilities

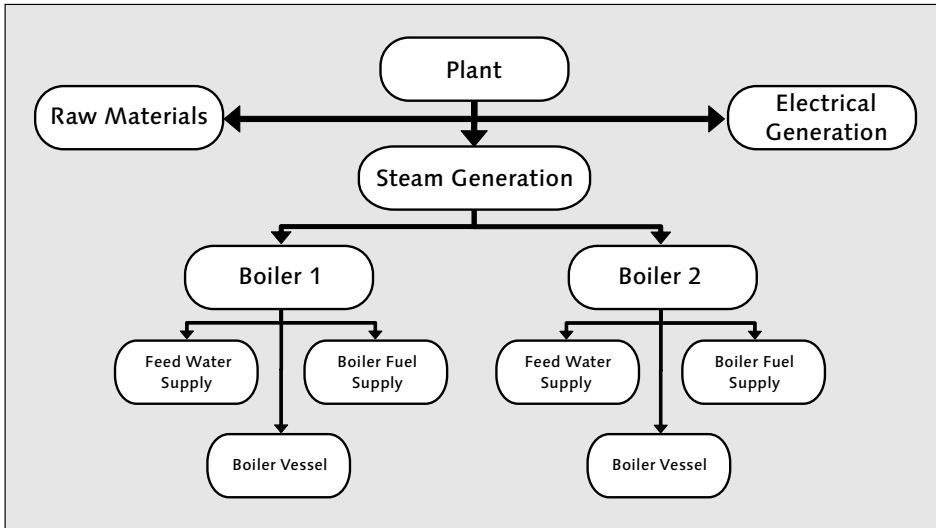
When there is more than one person involved in executing a task, there needs to be a clear definition and understanding of each person's role. This is certainly true within a complex plant maintenance organization. When craftsmen depend on the quality work package from the planner, the handoff of the deliverable is seamless, and in terms of the bottom line, wastes no time and no money. Reliability Engineers depend on the quality of failure data submitted by a craftsman at the end of the work process. The quality of the business decisions that emanate from the data analysis should produce more lucrative improvement opportunities. The additional opportunity with SAP is that permissions to execute specific transactions are categorized by role also. Role and transaction combinations are configurable, but without role clarity, within SAP, the transaction capability will be greatly hampered. Figures 1.1 and 1.2 are examples of maintenance business practices flow diagrams that detail the steps required to identify and process maintenance corrective and preventive orders.

The work process diagrams represent how maintenance should be performed. The example in Figure 1.1 details the work steps that identify what maintenance order needs are required to maintain reliability and how to prepare these orders for execution. The value of this document is that it allows for consistent communication to all of the equipment reliability stakeholders of the road map of how to review order progress and how to support the maintenance process. Figure 1.2 provides a similar view of the work execution and feedback process.



### 1.3.2 Organization and Accounting of the Asset

The central nervous system of asset reliability is the structure on which the equipment hierarchy is based. Figure 1.3 demonstrates a typical asset structure of a portion of a utility plant, from the plant general level down to a boiler vessel level. This structure is important because it allows you to understand the operating and maintenance costs for Boiler 1 versus Boiler 2.



**Figure 1.3** Process and Accounting-Based Asset Structure

We would also want the ability to drill down into the structure to compare maintenance and operation costs in feed water supply processes for internal benchmarking, especially when there was foresight to standardize on feed water systems. The costs and reliability history flow according to the structure, and with an effective design, informational views into the hierarchy can localize opportunities for manageable action plans. An increase of the Feedwater reliability is more manageable than an increase in steam generation reliability.

It is important to follow the accounting and process rules within the structure. For example, in Figure 1.3, Boiler 1 is a plant-owned asset, and therefore requires a separation of hierarchy from the vendor-owned Boiler 2. However, for those who maintain the equipment regardless of accounting rule boundaries, easy access to all of the reliability history and costs is provided so you can compare Feedwater

Supply Systems within the SAP PM reporting capability. The ability to separate and conjoin histories even on top of a rigid accounting structure satisfies the organizational needs to identify cost and profit centers, but also allows the cross referencing of comparative operating areas for benchmarking. If the Feedwater Supply on Boiler 1 is a high-cost process, then there should be a concurrent effort to include Boiler 2's Feedwater Supply process.

### **1.3.3 Work Identification and Control**

The riskiest maintenance activities are based on incomplete information. Much time is wasted trying to understand the interpretation of the original reliability problem, and the problem description is often delivered to maintenance as an assumed solution. Besides the uncertainty of whether or not the solution is correct, the fact that the symptoms are not captured creates a void in the reliability history that is often vital to root cause analysis and reliability improvement. With the size of work order backlogs and limited resources, it is important that the descriptions allow for a distinction between which activities should get approval to proceed, and which should be deferred or canceled.

### **1.3.4 Planning**

Planning work is the bellwether approach for maintenance and reliability improvement, and for clarification we would like to offer a clear definition of planning. Planning in this context is not scheduling. Scheduling is when to execute. Planning is about preparation and designing what to do. The logical maintenance sequence is to understand the scope (Planning) and apply the scope at the best time (Scheduling).

First off, to reduce the emergency work so that the opportunity to plan is available, and secondly, to take advantage of that time to prepare the execution of the work for success. Without planning, SAP at best can become a tracking mechanism for failures without a reliable means to implement improvement. Without a planning process, there is no proactive way to communicate parts requirements to the storeroom to allow them the best chance of parts supply success, and no way to reliably communicate time frames to anyone affected by the reliability opportunity who needs to support the maintenance process.

Unfortunately, there is no direct handoff possible from emergency work directly to performing planning on all corrective and preventive maintenance work. The

transition requires an increased work load until the planning effort begins to pay dividends. The quality variable to track is the quality of planning and the amount of effort planning while still responding to emergency break in repair needs.

There are some SAP PM installations that do not staff a planning position or do not expect the planners to plan the work. If this is the case, this plant has no right to expect reliability improvement and if SAP PM is installed, and any competitive advantage that SAP PM can offer will go unrealized.

### **1.3.5 Scheduling**

Success can be defined in degrees. Maintenance success can be defined as performing the work that was committed. To be competitive, a higher level of success requires, performing the work when it is scheduled to be done. This is important because production teams often can have only limited windows of low-cost opportunity to perform either corrective or preventive maintenance tasks. Secondly, coordination of materials, tools, and skilled resources deserve special consideration given limited resources that most plants have available.

### **1.3.6 Managing Change**

In theory, it is possible to have a stable enough environment that everything can be known or preplanned. Even if that utopia was achieved, change will inevitably happen and the ability to manage that change is the key to organizational success. Within maintenance, the ability to adapt to change is only exceeded by the need to document that change for any subsequent work, predictive, preventive, or corrective that will depend on that documentation to succeed.

It is also important to acknowledge the presence of the Reliability Centered Maintenance Methodology as a systemic approach to reliability improvement at this point. Many of the principles presented in this chapter can effectively feed a RCM methodology, but it is important to understand the foundational traits on which to rest an RCM process. Failure Mode Effects Analysis (FEMA) is a large part of the success of reliability improvement, but without the organizational discipline to capture the data and feed the improvement engine, the investment on these processes will come up short. As we mentioned in the preface, there are reliability applications that are state of the art that provide enormous control of the equipment reliability process. And every one of those successes has mastered the traits that are mentioned in this chapter.

Many publications exist on maintenance and reliability best practices. As users of SAP PM or implementers of SAP PM, these business practices are the foundation on which SAP PM has to be based. Just adding a computer system on top of disjointed maintenance best practices is akin to putting a Porsche engine in a dune buggy.

## **1.4 The Skills that Drive Reliability Success**

There has never been a maintenance system that was able to flourish without some basic skills to succeed. Some skills are basic and classic; some are new and have evolved with the technology of the day. The best of the best learn how to balance all of these skills, but one fact will almost always be true, all of these skills are acquired over time and not by chance. Some people pick it up faster than others, but because a chain always breaks at the weakest link, all of these skills will need to pull their own weight in the maintenance effort required today. As the work force ages into retirement, it is important that this transfer of skills and knowledge become an expectation. Today we need every competitive edge we can salvage.

### **1.4.1 Craft Skills**

The most basic, and also the most endangered of the skills, for two divergent reasons, are the journeyman craft skills. The risk of losing the depth and breadth of being a journeyman mechanic or electrician reflects the evolution of the modern craftsman, and to some degree the evolution of society and technology. The days of the shade tree mechanic are fading, and the expectation of modular repairs, have had an effect on the maintenance craftsmen as a whole. Listening to bearings with a screwdriver has been replaced with highly sensitive and diagnostic vibration analysis equipment. This change presents a fear that the skills of reading a vibration signature analysis will overtake the pride of knowing how to properly install the bearing in the first place. In many manufacturing plants today, the older generation growls that the younger mechanics' lack of the basic journeyman skills, and their inability to execute effective preventive and corrective maintenance. It has to make you wonder if we are building a generation of mechanics that want the computer to troubleshoot, and eliminating the craftsman's cerebral troubleshooting skills. There is a place in maintenance technology for the artificial intelligence of the high-end maintenance diagnostic systems that are coming to

market, but in reality, there is a need to preserve the sanctity of the basic skills that are the foundation of maintenance excellence. Make no mistake about it, we will go to great lengths in this book to establish information and intelligence on how to make better maintenance decisions, but nothing will replace the skills and mental dexterity of a skilled millwright, welder, pipefitter, electrician, or instrument craftsman. If your organization is not expecting and testing for skills on an ongoing basis, then the gap between what business decisions you need to make and what you are capable of executing will grow larger every day.

### 1.4.2 Computer Skills

Sometimes the opposite of the previous argument occurs. Many of the newer maintenance technicians often complain of the inability of the older craftsmen to even attempt to utilize or master the computer skills necessary to execute the daily requirements of work execution and documentation.

A senior mechanic may refuse to use the computer, with the impatience that we show towards people that write paper checks at the checkout line. Many manufacturing organizations have let the computer skill deficit sneak up on them in the maintenance arena. An organization that would not dare to have a electrician work on a new AC variable speed drive system without spending thousands of dollars in training may not expect the mechanic to add computer capability to their skill set, much less offer training to become computer literate.

Many maintenance organizations are paying separately for skill levels and areas to develop those particular skills needed to perform effective maintenance. The best of the best require basic computer skills and SAP PM skills as part of the job requirement. Computer skills are no longer just nice to have; they should be a condition of employment in a maintenance organization. Without them, the mechanic is operating on limited information, not able to make the best decisions possible when tackling preventive or corrective maintenance work, and also not being able to account for the costs they incur accurately in a way that truly represents what is occurring in reliability performance. Checking a part out of the storeroom using a work order number that has been scribbled on a piece of paper that has been in the mechanic's pocket for weeks as a catch-all, bypassing the ability or desire to look up the correct work order number is a dangerous way to run a maintenance organization.

### 1.4.3 Process Knowledge

Some of the best maintenance mechanics are or were operators at some point in their careers. It does little to understand the workings of a pump in an ideal setting when cavitation problems appear as a result of an upstream process problem. Diagnosing mechanical, electrical, or instrumentation issues without process knowledge is ignoring the context of the problem. As we will demonstrate later in the process of reliability failure symptom documentation, it also is important to be able to recognize process issues through hearsay, because it is rare that the craftsman is present when a failure occurs. On the proactive side, when a mechanic performs a preventive maintenance route on a finishing line that is preparing to wrap 800 kg rolls when it typically runs 300 kg rolls, understanding how you adapt to the process variation is often the difference between uptime and downtime.

### 1.4.4 Equipment Knowledge

The complexity of equipment today presents a challenge that did not exist a few decades ago. Compensation for the increased complexity is sometimes modularity and diagnostic capability; however, there will always be basic equipment knowledge that is part of the skill set needed to ensure reliability. Preventive maintenance routes will not be and should not be so detailed that anyone off of the street could perform an effective route. Detailing to this level will create a certain amount of knowledge laziness. There is a delicate balance of equipment familiarity versus general knowledge. For those of us that have the ability to have the area concept of maintenance assignment, it goes without saying that a mechanic that can build an extensive knowledge of equipment history, and share that equipment history in SAP PM for others to utilize becomes a valuable asset to any maintenance organization. To balance the scales on this point, there is the perception that documenting everything makes the mechanic eventually replaceable and that concern will exist. The bottom line is that for the foreseeable future, the mechanics that apply the skill sets toward effective preventive maintenance will always be needed. Our evolution as craftsmen will include the skills to improve and apply what we learn with the information we use.

### 1.4.5 Common Sense

We mention this last skill set as a balance to all of the technical skills sets mentioned previously. With all of the data and reporting that will be at your finger-

tips, it will be important to put all information in context, and understand where common sense plays a part in equipment maintenance, as well as how SAP PM supports reliability. Common sense is practical judgment that is not based on any specialized knowledge. An example is designing preventive maintenance inspection routes in a geographic pattern that makes sense, left to right, top to bottom, etc. This concept should translate into the SAP PM notifications and orders being designed on the page to input fields from top to bottom, in a way that similarly satisfies SAP PM sequential needs (hint: SAP will have an amazing ability to automatically load fields if given the chance).

If you are setting up the screen layout for notifications and orders, it is always of value to review the layout for logical flow of the mechanics input process against the data requirements and defaults of SAP. We have seen illogical input flow for the floor user in many installations, which creates confusion on the intent of the notification and order. Confidently navigating a notification or order should be well within the skill set of a manufacturing operator or mechanic. Creating an SAP PM input maze is outside of what is sensible, and many mechanics are relegated to using simplified Graphical User Interfaces (GUI) for SAP PM as a substitute for good configuration design. GUIs simplify the input, but deny the craftsman the skill to use SAP for his own benefit.

The other facet of common sense that is extremely important is what we will call pattern recognition. An example of the data SAP PM will provide you as a reliability stakeholder at the end of an operation period is shown in Figure 1.4. The representation of downtime cross referencing equipment type and failure root cause in Figure 1.4 allows triangulation of the reliability improvement steps with the greatest value.

This particular formatting of data is a skill that is essential to deal with real time reporting processes. There is nothing in this report that specifically mentions that the focus for next year's reliability improvement effort is to develop better processes for DC Motor preventive maintenance, as well as rotating equipment in general, and bearings in specific, but this process should be self evident to a maintenance and reliability professional, at all levels of the organization.

The skill sets needed for maintenance in the 21st century demand more diversity than in previous years. No mechanic can afford to just be an expert in one area, because it is the combination of these skills that synergize the knowledge needed to do the best job possible to maintain equipment reliability. A common complaint

the supervisors get from craftsmen is “do you want me working on the floor or spending time at the computer.” The answer is both, and learn how to use the computer effectively so it does not dominate your workday.

|        |                         | Equipment Type |          |            |                       |
|--------|-------------------------|----------------|----------|------------|-----------------------|
|        |                         | Electrical     |          | Mechanical |                       |
| Code   | Code Description        | DC Motor       | AC Motor | Gearbox    | Pump                  |
| 1001   | Process Overload        | 0              | 0        | 0          | 232                   |
| 1002   | Lack Of Cleaning        | 211            | 123      | 0          | 0                     |
| 1010   | Process Other           | 33             | 25       | 11         | 45                    |
| 1100   | Misalignment            | 0              | 0        | 0          | Systemic Opportunity  |
| 1101   | Worn Gear               |                |          | 0          |                       |
| 1102   | Mechanical Seal Failure |                |          |            | 112                   |
| 1103   | Bearing Failure         | 333            | 612      | 1200       | 634                   |
| 1110   | Mechanical Other        |                |          | 0          | Equipment Opportunity |
| 1200   | Failed Winding          | 23             | 98       | ←          |                       |
| 1201   | Brush Failure           | 127            |          |            |                       |
| 1210   | Electrical Other        | 456            | 345      |            |                       |
| 1300   | Lack of Lubrication     | 340            | 600      | 234        | 456                   |
| 1900   | Do Not Know             | 112            | 454      | 23         | 45                    |
| Totals |                         | 1635           | 2257     | 1468       | 1532                  |

Figure 1.4 Reliability Downtime Failure Coding Pattern Recognition

### 1.5 Testing for SAP PM Readiness

Many manufacturing organizations are caught in the cusp of maintenance transition, from a repair mindset to a preventive mindset, from a paper-driven work order process to a computer-based order management system. The rate of change in manufacturing is exponential, and the primary test for readiness is agility of the organization to be talented and flexible. Agility is important because the target is always moving. “We have always done it this way” should be a statement of the past. It will never get easier, but the reward for success will always be there when the correct methodologies are used.

The proper assessment process consists of four stages for SAP PM success: the maintenance best practices assessment, the organizational readiness assessment,

converting maintenance best practices to SAP PM configuration, and the SAP PM readiness to go-live.

### **1.5.1 Maintenance Best Practices Assessment**

Assessing maintenance and reliability best practices is a common practice for many companies but many never understand the need for this assessment prior to an SAP PM implementation. Bypassing this effort is by far the biggest barrier to SAP PM implementation success. Classic maintenance best practices often include (but are not limited to) the following areas of assessment:

- ▶ Daily competency focus
  - ▶ Work initiation and prioritization
  - ▶ Planning
  - ▶ Order execution
  - ▶ Scheduling
  - ▶ Materials management
  - ▶ Production and maintenance partnership
- ▶ Equipment condition focus
  - ▶ Skills enhancement
  - ▶ Proactive maintenance
  - ▶ Condition monitoring
- ▶ Reliability improvement focus
  - ▶ Reliability analysis and improvement planning
  - ▶ Operator performed maintenance

Once the assessment and resulting gap closing activities are completed, the basis for a successful application of the SAP PM tool is in place to support reliability improvement.

### **1.5.2 Organization Readiness Assessment**

As maintenance professionals, spending any effort on the soft skills is uncomfortable territory. If from the beginning of the company's reliability improvement effort, there are clear expectations that the standardized processes will be reli-

giously followed, and that collective improvement will be rewarded over individual success, then the journey through SAP PM implementation will be much more bountiful. "Optional" is often not allowed. This barrier is by far the largest barrier for the company falling short of realizing the return on investment in SAP PM. The assessment process here consists of measuring the track record of major process changes within the organization and how the organization responded. A long history of steady state operations is not the best predictor of the cultural change success that significant equipment reliability improvement and SAP PM implementation will depend upon.

### **1.5.3 Converting Maintenance Best Practices to SAP PM Configuration**

There are many books and customers that will implement what their SAP PM configuration looks like in a good maintenance organization. SAP PM has the ability to set up a configuration that will support a company's specific business practice, as opposed to the other way around. The work processes such as the flow diagrams shown in Figures 1.1 and 1.2 need to be detailed in the SAP PM configuration and task ownership. This book will detail the configuration barriers that many times exist in creating effective maintenance, but like every other process, preplanning will remove those barriers.

The most frustrating example of where this process is not realized is the initial configuration of the notification and order types, mostly because these two particular configuration choices are among the most difficult to realize and change after go-live. Because notification and order types are control parameters within SAP, the importance of differentiating the types is critical to establish a differentiation that matches where you are, and what success looks like. If there is no distinction between emergency orders, corrective orders, and preventive orders in the order types, then there is a limited ability to measure if the reliability improvement effort is at all successful, because a fundamental barometer of maintenance success is reduction of emergency and corrective orders, and an increase in preventive orders.

### **1.5.4 SAP PM Readiness to Go-Live**

In all fairness, this assessment is the most performed of all the readiness activities because this addresses SAP PM functionality as opposed to maintenance and

reliability improvement. It is important to be able to account for all of the money and the resources within SAP, but to the maintenance person, this is only half of the battle, but still important. Maintenance people need to get work done, but the preceding steps are needed to make this SAP PM readiness really mean something. SAP PM Implementation Teams are very adept at this assessment process. One large advantage is the feedback for success or failure is immediate at go-live. The key elements for maintenance include (but are not limited to):

- ▶ Verification of the asset structure, including bills of materials
- ▶ Dealing with open work orders
- ▶ Stores materials availability process
- ▶ Accounting for resources used to pay the bills for:
  - ▶ Maintenance labor
  - ▶ Vendors and suppliers
  - ▶ Contractors

## 1.6 Summary

This chapter has detailed the major focus areas that comprise a health assessment of maintenance and reliability in an agile manufacturing organization. The focus areas that are addressed included:

- ▶ Establishing the business case for SAP PM
- ▶ Addressing the attitudes that drive reliability success with SAP PM
- ▶ An overview of methodologies of reliability success
- ▶ The skills that support the success of those methodologies
- ▶ The process to test for organizational preparedness

Take the time to notice that the criteria are diverse, from craftsmen skills to sacrificing for the greater manufacturing good. The common element throughout the assessment is the ability to capture and share across the entire company successes in preventive or corrective maintenance processes from and to all levels of the organization. Autonomy was coveted by most maintenance organizations 20 years ago, but their competitive abilities have been overtaken by organizations that have learned to collectively understand the shared goals, and have used the processes

and deliverables that made them successful. It is a combination of maintenance skills, teamwork, and vision that support reliability improvement, and provides the solid foundation on which SAP PM will flourish.

In the next chapter, we will take what we understand from the goals of maintenance and reliability, and add an understanding of how SAP, more specifically, how PM functions. Maintenance best practices drive SAP PM, not the other way around. They are vital to the success of the utilization of the SAP. Chapter 2 outlines how that flexibility exists to make that happen for your maintenance organization.

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