

Maximizing Maintenance Operations for Profit Optimization: The Journey to Maintenance Excellence

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**Establishing a Strategy for Profit-Centered Maintenance
By
The Maintenance Excellence Institute**

Division of Ralph W. Peters and PEOPLE Inc.

Part III: Developing Your CMMS/EAM as a True Maintenance Business Management System

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Introduction: A fully utilized Computerized Maintenance Management System (CMMS) to support the business of maintenance is an essential information technology tool. Effective physical asset management is also a mission-essential total business management requirement. Also the lack of integration with higher level or even parallel financial, accounting, procurement, inventory or timekeeping systems can waste valuable technical and administrative resources. Part III introduces the second benchmarking tool and the improvement process for your current information technology *The CMMS Benchmarking System*. This tool is introduced as a means to evaluate the effective of the current CMMS, to define functional gaps and to define how to enhance current use, to help upgrade functional gaps. It is also a methodology to help develop and justify a replacement strategy. *The CMMS Benchmarking System* which has 9 evaluation categories and 50 evaluation items is easily adaptable and can be specifically tailored to all CMMS systems and to their intended application. *The CMMS Benchmarking System* is an internal benchmarking tool that is becoming an IT industry standard and model process for benchmarking effective IT utilization.

Recommended Next Steps after the Scoreboard for Maintenance Excellence Evaluation

Document Results: After *The Scoreboard for Maintenance Excellence* evaluation has been completed, a written and oral report to top leaders will document the results with a presentation of recommendations and a plan of action. Key areas of the report presentation will help you to:

- ✓ Determine Strengths/Weaknesses and Priorities for Action
- ✓ Benchmark Your CMMS Installation
- ✓ Maximize Benefits of CMMS
- ✓ Develop Maintenance and Maintenance as a Profit Center
- ✓ Define Potential Savings
- ✓ Develop Recommended Plan of Action (and Implement)
- ✓ Develop Method to Measure and Validate Results
- ✓ Initiate a Maintenance Excellence Index

We will now take a look at each of these topics to see how you can progress quickly from the evaluation to the point where measurable results are being received.

Determine Strengths/Weaknesses and Priorities for Action: After an objective evaluation is completed, it is very easy to identify strengths and weaknesses, which then leads to defining the priorities for action. In some operations it is very often back to the basics such as:

- ✓ Preventive maintenance has been neglected, no time to do it
- ✓ Understanding predictive technologies is limited

- ✓ Application of continuous reliability improvement never initiated
- ✓ The parts storeroom was never been given the proper attention it needed
- ✓ Accountability for craft time is not being done
- ✓ Charge back to customer not done or incomplete
- ✓ A reactive, fire-fighting repair strategy is in place
- ✓ Valuable craft time is wasted, chasing parts/materials, waiting, unplanned work
- ✓ Never time to do the job right the first time
- ✓ Asset uptime uncertain and manufacturing operation not reliable
- ✓ Quality inconsistent due to maintenance processes
- ✓ Never time for craft training
- ✓ The CMMS was purchased as “the solution” not “the tool”
- ✓ The existing CMMS functionality is not being fully used

Very often the system for computerized physical asset management whatever the brand name takes the hit as the cause of all the weaknesses. The CMMS/EAM is blamed for not being able to do this and that and causing all types of problems and extra work. This attitude will generally always be the case when the CMMS was purchased as “the solution” not “the tool”. Bottom line here is that most systems are under utilized and when fully used with all their intended functionality will serve their primary IT purpose.

So just as we can benchmark a total maintenance operation and its best practice application with a 27 category scoreboard in Part II, we also need to do the same basic process with whatever CMMS is in place. However here we need to evaluate the CMMS and its current application as to its effectiveness in making those best practices happen. Is the CMMS enhancing current and future best practices or not? Are we getting maximum value from this IT investment? How can we improve current use of the system? We will now take a look at how to get answers and take action on these key questions.

Benchmark Your CMMS Installation: *The CMMS Benchmarking System* is another tool developed by The Maintenance Excellence Institute and is to be used with *The Scoreboard for Maintenance Excellence*. It is used to evaluate the utilization of an existing CMMS installation. It is designed as a methodology for developing a benchmark rating of your CMMS (Class A, B, C, or D) to determine how well this tool is supporting best practices and the total maintenance process. It is not designed to evaluate the functionality of various CMMS systems nor is it intended to compare vendors.

The system provides a methodology for developing a benchmark rating of your existing CMMS to determine how well this tool is supporting best practices and the total maintenance process. It can also be used as a method to measure the future success and progress of a CMMS system implementation that is now being installed. Maintenance best practices are the key and the CMMS is the information technology tool that links it all together. A summary of *The CMMS Benchmarking System* is shown in Figure 4 with the 9 evaluation categories that include a total of 50 evaluation items for benchmarking your CMMS installation.

CMMS BENCHMARK EVALUATION CATEGORIES	EVALUATION ITEMS
1. CMMS Data Integrity	6
2. CMMS Education and Training	4
3. Work Control	5
4. Budget and Cost Control	5
5. Planning and Scheduling	7
6. MRO Materials Management	7
7. Preventive and Predictive Maintenance	6
8. Maintenance Performance Measurement	4
9. Other Uses of CMMS	6
TOTAL CMMS EVALUATION ITEMS	50

Figure 4: Summary – The CMMS Benchmarking System

The complete CMMS Benchmarking Rating Scale is shown below:

CMMS BENCHMARKING RATING SCALE	
Class A	180 - 200 points (90% +)
Class B	140 - 179 points (70% to 89%)
Class C	100 - 139 points (50% to 69%)
Class D	0 - 99 points (up to 49%)

Conducting the CMMS Benchmark Evaluation?

The CMMS Benchmark Evaluation can be conducted internally by the maintenance leader or via an internal team effort of knowledgeable maintenance people. Other options include using support from The Maintenance Excellence Institute as an independent and objective maintenance benchmarking resource. Used by over 5,000 operations, the “Scoreboard for Excellence” process and the five scoreboard versions have proven to be today’s most comprehensive benchmarking tools for evaluating the total maintenance process. In combination, the CMMS Benchmark Evaluation and results from the “Scoreboard for Maintenance Excellence” can help achieve greater value-added service in all types of maintenance operations. Qualified external resources are also recommended for this activity as well.

Let’s now take a look at each of the CMMS Benchmarking System evaluation items and comments related to the evaluation items for each category.

CMMS DATA INTEGRITY	Comments
1. Equipment (asset) history data complete and accuracy 95% or better	⇒ This category evaluates key areas related to data integrity; equipment, spare parts and preventive maintenance.
2. Spare parts inventory master record accuracy 95% or better	⇒ It assumes that databases for these two areas have been established and that the level of accuracy for equipment and parts master records are measured and accuracy is 95% or better
	⇒ Critical spares designated in database as part of equipment bill of materials This category also evaluates whether the maintenance best practice for PM has task and frequencies at least 95% complete
4. Preventive Maintenance tasks/frequencies data complete for 95% of applicable assets	⇒ This category also evaluates whether the maintenance best practice for PM has task/frequencies 95% complete

5. Direct responsibilities for maintaining parts inventory database is assigned	⇒ Database integrity is supported by having direct responsibilities assigned for maintenance of both the parts inventory and the equipment/asset databases
6. Direct responsibilities for maintaining equipment/asset database is assigned	
<u>CMMS EDUCATION AND TRAINING</u>	
7. Initial CMMS orientation training for all maintenance employees	⇒ This category addresses the important area of CMMS education and training for crafts people, storeroom personnel and operations employees. ⇒ An ongoing training program is in place along with a designated systems administrator and a qualified backup.
8. An ongoing CMMS training program for maintenance and storeroom employees	
9. Initial CMMS orientation training for operations employees	
10. CMMS systems administrator (and backup) designated and trained	
<u>WORK CONTROL</u>	
11. A work control function is established or a well defined documented process is being used	⇒ This category addresses the best practice area of having an established process for the work management of work requests and work orders with either an on-line or manual process. ⇒ All craft hours are accounted for and visibility of backlog is available by type of work with estimated hours. ⇒ Work order procedures include well defined priority system that operations understands and uses to support proactive, planned maintenance
12. On-line work request (or manual system) used to request work based on priorities	
13. Work order system used to account for 100% of all craft hours available	
14. Backlog reports are prepared by type of work to include estimated hours required	
15. Well defined priority system is established based on criticality of equipment, safety factors, cost of downtime, etc.	
<u>BUDGET AND COST CONTROL</u>	
16. Craft labor, parts and vendor support costs are charged to work order and accounted for in equipment/asset history file	⇒ Equipment/asset history includes all related costs for repair. Maintenance expenditures by specific equipment system/subsystem and by operating departments are available ⇒ Documented cost improvements are available to validate the original CMMS justification process ⇒ Budgeting process provides management a complete picture of all deferred maintenance and potential consequences. Monitoring of repair costs to replacement value supports life-cycle-costing
17. Budget status on maintenance expenditures by operating departments is available	
18. Cost improvements due to CMMS and best practice implementation have been documented	
19. Deferred maintenance and repairs identified to management during budgeting process	
20. Life-cycle costing is supported by monitoring of repair costs to replacement value	
<u>PLANNING AND SCHEDULING</u>	
21. A documented process for planning & scheduling has been established	⇒ This category addresses the best practice area for planning and scheduling. Has a formal process been established and is planned work increasing? Are emergency repairs being analyzed for reduction? ⇒ This category evaluates whether or not the planning process has improved craft utilization and increased hands on wrench time. ⇒ Work schedules for planned work are being used and there has been increased scheduling coordination between maintenance and their customers. ⇒ Parts availability and status is visible to effectively support the planning process.
22. The level of proactive, planned work is monitored and documented improvements have occurred	
23. Craft utilization (true wrench time) is measured and documented improvements have occurred	
24. Daily or weekly work schedules are available for planned work	
25. Status of parts on order is available for support to maintenance planning process	
26. Scheduling coordination between maintenance and operations has increased	
27. Emergency repairs, hours and costs tracked and analyzed for reduction	

<u>MRO MATERIALS MANAGEMENT</u>	<u>COMMENTS</u>
28. Inventory management module fully utilized and integrated with work order module	⇒ Work order module is fully integrated with parts inventory management module.
29. Inventory cycle counting based on defined criteria is used and inventory accuracy is 95% or better	⇒ True cycle counting is being used with the target of 95% accuracy or better
30. Parts kiting is available and used for planned jobs	⇒ Electronic requisitioning capability is used along with kiting of parts for planned jobs.
31. Electronic requisitioning capability available and used	⇒ Reorder decisions based on recommended reorder notification report. Inventory master record has critical and/or capital spares denoted. Warranty information for equipment and components is being maintained and status readily available
32. Critical and/or capital spares are designated in parts inventory master record database	
33. Reorder notification for stock items is generated and used for reorder decisions	
34. Warranty information and status is available	
<u>PREVENTIVE /PREDICTIVE MAINTENANCE (PM/PdM)</u>	
35. PM/PdM change process is in place for continuous review/update of tasks/frequencies	⇒ PM/PdM best practice fully supported by CMMS with long range scheduling and level loading as required. Change process is well established with PM/PdM compliance measured and 98% or better
36. PM/PdM compliance is measured and overall compliance is 98% or better	⇒ Reliability data is available to include MTBF, MTTR , reasons for failure etc.
37. The long range PM/PdM schedule is available & leveled loaded as needed with CMMS	⇒ Lubrication program database is established an part of the overall PM program.
38. Lube service specifications, tasks and frequencies included in CMMS database	⇒ CMMS has obviously enhanced the overall PM/PdM program with documentation of tasks, measurement of compliance and better information for continuous reliability improvement.
39. CMMS provides MTBF, MTTR , failure trends and other reliability data	
40. PM/PdM task descriptions contain enough information for new crafts person to perform task	
<u>MAINTENANCE PERFORMANCE MEASUREMENT</u>	<u>COMMENTS</u>
41. Downtime (equipment/asset availability) due to maintenance is measured and documented improvements have occurred	⇒ This category evaluates the overall measurement process and how well improvements are being documented. It recommends that the CMMS installation and best practice implementations be measured using multiple indicators. Baseline performance values for the selected metrics are established to measure progress.
42. Craft performance against estimated repair times is measured and documented improvements have occurred	
43. Maintenance customer service levels are measured and documented improvements have occurred	
44. The maintenance performance process is well established and based on multiple indicators compared to baseline performance values	
<u>OTHER USE OF CMMS</u>	<u>COMMENTS</u>
45. Maintenance leaders use CMMS to manage maintenance as internal business	⇒ This category includes a number of other evaluation areas. It addresses the general use of CMMS to manage maintenance as an internal business and how well the customer understands and uses the system.
46. Operations staff understands CMMS and uses it for better maintenance service	⇒ Are the engineering changes that are important to the maintenance process being effectively implemented? Has the equipment numbering system been set up to provide data at the level of system/subsystem detail that is needed?
47. Engineering changes related to equipment/asset data, drawings and specifications are effectively implemented	⇒ Has a failure coding process been established that will support continuous reliability improvement and reliability-centered activities?
48. Hierarchies of systems/ subsystems used for equipment/asset numbering in database	⇒ Has a database for standard tasks and repair procedures been established for recurring planned jobs?
49. Failure and repair codes used to track trends for reliability improvement	
50. Maintenance standard task database available and used for recurring planned jobs	

Develop a “Class A” CMMS Installation:

Your starting point for developing a “Class A” CMMS installation begins taking shape many months and often years prior with decisions on the evaluation and selection of the actual system, the CMMS implementation plan, the team and the original projection of benefits. It requires decisions on maintenance best practices that change the way you do business - your internal maintenance process business. Hopefully the decisions were the right ones that have brought you to a point in time where you now need to assess “where you are” and to determine a path forward. Taking the next step to benchmark your current CMMS installation will be an important one. Regardless of where you are now on the rating scale, make the necessary commitment to develop your plan for achieving a “Class A” CMMS installation. As you document your progress with using your CMMS, the many potential benefits can start to be received and the investment in CMMS can also be maximized.

Maximize Your Benefits from CMMS: Today’s information technology for CMMS/EAM offers the maintenance leader an exceptional tool for managing the overall Maintenance operation and maintenance processes as an internal business and “profit center”. However, maintenance surveys and benchmark evaluations conducted by The Maintenance Excellence Institute and others validate that poor utilization of existing CMMS systems is a major improvement opportunity. What are some of the typical benefits of an improved CMMS that could be missing from your operation?

- **Improved Work Control:** Better work management with improved control of work requests by craft, monitoring of backlogs, determining priorities, and scheduling decisions for overtime effectively. Full accountability of craft time/labor cost to work orders, which accrues to asset history and ensures charge backs to customers/tenants.
- **Improved Planning and Scheduling:** The systems and procedures to establish a more effective day-to-day maintenance planning and scheduling process contribute to improved craft labor utilization and customer service. Better planning and scheduling with our customers is an important benefit. We must plan for maintenance excellence because it does not occur naturally.
- **Enhanced Preventive and Predictive Maintenance (PM/PdM):** Automatic scheduling of repetitive PM activities with PM tasks and inspection frequencies documented on the PM module and printed as part of the PM work order. CMMS enhances PM by providing a method to monitor failure trends and to highlight major causes of equipment breakdowns and unscheduled repairs.
- **Improved Parts and Materials Availability:** Well-organized stockrooms with accurate inventory records, a stock locator system, accurate stock levels, and a storeroom catalog can significantly improve the overall maintenance operation. Having the right part at the right time is the key to effective maintenance planning, increased maintenance customer service, and reduced downtime.
- **Improved MRO Materials Management:** The means for more effective management and control of maintenance parts and material inventories. Information for decisions on inventory reduction is readily available to identify parts usage, excess inventory levels, and obsolete parts.

- **Improved Reliability Analysis:** The means to track work order and equipment history data related to types of repairs, frequencies and causes for failure. It allows maintenance to have key information on failure trends that leads to eliminating root causes of failures and to improving overall equipment reliability.
- **Increased Budget Accountability:** Provides for greater accountability for craft labor and parts/materials through the work order and storeroom inventory modules. Increased level of control, greater visibility and accountability of the overall maintenance budget by individual piece of equipment and by using department or work order. Replacement and renovation decisions for facilities and other building systems can be supported by cost information from the CMMS.
- **Increased Capability to Measure Performance and Service:** A vast source of maintenance information to allow more effective measurement of maintenance performance and service to provide measurement of improvements in areas such as craft labor productivity, PM compliance, downtime, store inventory control, backlog, level of maintenance, service, reliability, etc.
- **Increased Level of Maintenance Information:** A major benefit of CMMS comes from developing the historical database that becomes readily available as critical maintenance information. An effective CMMS helps turn data into information you can use to manage maintenance as an internal business.

Understand the Power of CMMS/EAM to Support Potential Savings: The evaluation of your CMMS using *The CMMS Benchmarking System* will identify improvement opportunities that translate into direct savings. It is important that these areas be highlighted and that the future process for performance measurement is focused upon these specific areas which may have been used initially for CMMS/EAM capital project justification. The opportunities to realize both quantifiable and qualifiable benefits are numerous. Maintenance must be given the best practice tools, the people resources, and capital investments to address the improvement opportunities and in turn are held accountable for results. As summarized in Part II, there are 12 key areas where direct savings, cost avoidances and gained value can be established, documented. Effective CMMS/EAM will contribute to all of them and help to increase:

1. Value of asset/equipment uptime providing increased capacity and throughput
2. Value of increased quality and service levels due to maintenance
3. Value of facility availability or cost avoidance from be non-available
4. Value of increased direct labor utilization (production operations)
5. Gained value from increased craft labor utilization/effectiveness via gains in wrench time
6. Gained value from increased craft labor performance/efficiency
7. Gained value of clerical time for supervisors, planners, engineering and admin staff
8. Value of MRO materials and parts inventory reduction
9. Value of overall MRO materials management improvement
10. Value of overall maintenance costs reductions with equal or greater service levels
11. Value of increased facility and equipment life and net life cycle cost reduction
12. Other manufacturing and maintenance operational benefits; improved reliability and other reduced cost

Use CMMS to Develop Your Maintenance Operation as a Profit Center: A fully utilized CMMS is your business management system to support the business of maintenance. It is a mission-essential information technology tool and effective physical asset management and maintenance is also mission-essential and a core requirement for success. Often we see the CMMS being purchased as “the solution”, never really integrated with the business system or the necessary basic best practices initiated to really make the IT investment work. Often maintenance is only viewed as a “necessary evil” and not as a valid “profit center” and internal business. Many times the maintenance leaders cannot sell management on doing maintenance the right way or to convince them that the right thing to do is to shut down for preventive maintenance. Conversely, when maintenance is viewed as a “profit center” the opportunities to realize both quantifiable and quantifiable benefits are numerous. In turn, maintenance support to the profit optimization process continues when CMMS is used effectively to develop your maintenance operation as a profit-center.

You Can Get Maximum Value from Your Maintenance Operation: You can maximize your CMMS and your total maintenance operation for profit optimization. To find out the best approach for your organization, for help with planning the pilot evaluation and to receive a complete copy of this five-part series contact.

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Bio of Ralph W. "Pete" Peters

President and founder for **Ralph W. Peters and PEOPLE Inc.** a consulting firm with three divisions for total operations improvement; The Maintenance Excellence Institute (maintenance), The Manufacturing Excellence Institute (manufacturing) and The Institute for Public Service Excellence (governmental). His practical engineering experience and technical leadership in the maintenance, manufacturing and governmental productivity consulting fields has helped hundred of operations achieve manufacturing operations success and maintenance excellence in plant, fleet and facility maintenance operations.

His scope of experience in governmental operations productivity has firmly established his personal capabilities and that of The Institute for Public Service Excellence to support value added government services. Pete is a senior member of the Institute of Industrial Engineers, the Association of Facility Engineers and the Society of Maintenance and Reliability Professionals He has been involved in manufacturing operations management, systems implementation, facilities management, maintenance and governmental productivity consulting for more than 30 years. He is retired from the US Army Corps of Engineers/NC Army National Guard (1995) with 28 years of service and serving in Viet Nam and during Desert Storm.

Pete is author of the upcoming books; *Profit-Centered Maintenance: The New Millennium Strategy for Maintenance Excellence* and *PRIDE in Maintenance*. He is editor/primary author for *The Guide to Computerized Maintenance Management Systems*, Scientific American Newsletters LLC, author of the maintenance chapters in *The Warehouse Management Handbook* and *The Future Capable Company* from Tompkins Press and John Wiley's new *Handbook of Industrial Engineering, 3rd Edition*. A recognized leader in the areas of implementing manufacturing and maintenance best practices, profit-centered maintenance, performance measurement, productivity improvement for government operations and providing value-added total operations consulting, He is also the author of over 200 articles and publications and as a frequent speaker has delivered presentations on manufacturing and maintenance-related topics worldwide. He received his BSIE and MIE from North Carolina State and is a graduate of the US Army Command and General Staff Course and the Engineer Officers Advanced Course.

Clients from the manufacturing and maintenance sectors have included operations in the petrochemical, aerospace, manufacturing, mining, pharmaceutical, hand-tool manufacturing, utilities and automotive industries, in addition to construction fleet management, public transit operations and facilities management for healthcare, educational and governmental facility complexes.