

MRO Excellence- Equipment Available to Meet Customer's Expectations
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Introduction

A poorly operated maintenance or MRO storeroom can contribute up to 25% of the unplanned downtime in a factory. This downtime and cost can be eliminated with proper management of the storeroom.

This short training course will set a foundation of business basics, define the roles and responsibilities of different business functions, explain the MRO supply chain, provide some specific tools to improve storeroom performance and present a plan to implement sustained change in a storeroom.

Business Basics

Why does a business exist? A business exists to supply a service or product to meet a customer need. Different industries supply different products. Farmers supply produce. Plumbers provide their craft to home owners and industrial clients. Car manufacturers supply a range of vehicles to provide comfortable transportation. The end result is each business is meeting a need.

The customer defines their need at the “point of sale”. It is at the “point of sale” where the customer defines what is important by spending their money on products which will meet their need. The only way for a manufacturer to be successful is to have their product desired by a customer profitably priced and available at the “point of sale”. If a product is not available or is too expensive to meet the customer need, the competition wins.

The entire organization will contribute to the cost of the product and having the product available. The largest impact on performance, which is represented by life cycle cost and customer service levels, is reliable capacity. Unreliable assets drive reactive and corrective decisions which are wasteful and costly.

Roles and Responsibilities

Each business function has a responsibility for delivering reliable capacity. EAM's provide the means to effectively control the work being performed on an asset. This is done by providing clear work identification, control, history and cost allocations. This control begins at project concept and is sustained through the life of the asset. An organization needs to be careful of becoming consumed by business system requirements

and losing focus on being a reliable supplier to the customers. The business system is a tool which should be managed and configured so each function can manage their responsibility for achieving reliable capacity.

Let's look at the functions and the roles they play in delivering reliable capacity.

Sales and Marketing employs the asset capacity. They manage marketing dollars and sales initiatives which create or interpret customer demand.

Research and Development specifies capacity. R&D will conduct research and determine what the next generation of products will be to meet the changing needs of customers. R&D provides the specifications for the product, raw materials and processes required to make these products.

Engineering builds capacity. Engineering uses the specifications from R&D and develop the capital project plans. They justify capital projects and then design, build and install assets which are reliable to meet R&D specifications and the customer's need.

Operation Planning and Logistics optimizes capacity. This is function which balances the cost of available capacity with inventory costs. They optimize the use of capacity by ensuring the products are available. This may lead to more change overs which lower overall capacity but results in lower raw material and finish goods inventories.

Commercial Supplies Capacity. Commercial is the agent of the company which can commit dollars to purchase specified components or services to ensure equipment availability and performance is achieved.

Operations Deliver Capacity. Operations are the owner's of the equipment performance to ensure production schedules are met. This can only be accomplished by knowing the performance of the equipment and assisting in eliminating all issues which impact availability, performance or quality.

Maintenance Assures Capacity. Maintenance assures capacity by keeping and preserving, the assets at the designed capability. This can only be done by proactive methods of preventing failures and improving the equipment performance.

Storeroom's Role

How does all this relate to a MRO storeroom? Most storerooms report to either the Commercial or Maintenance functions. Independent of the reporting structure the MRO storeroom has two key roles: supplying capacity and assuring capacity. This is accomplished by achieving the storeroom's primary purpose which is to have the correct part, in the correct quantity, at the correct time, at the correct place, and at the correct price to minimize downtime. If this is accomplished the MRO storeroom directly contributes to lowering the life cycle cost of an asset and the cost of goods sold.

Life cycle cost is the total cost which can be attributed to a specific machine or piece of equipment. Life cycle costs include: maintenance, downtime, energy, training, purchase, installation, disposal and operating costs. It is easy to see that the capital cost is usually a small portion of the total cost, but an unreliable design would have a major impact on total cost.

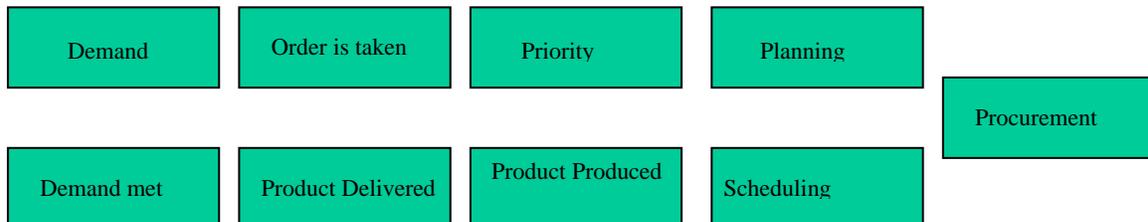
How does the MRO storeroom affect the life cycle cost of an asset? We are going to discuss three different scenarios:

1. A critical spare part is stocked for several pieces of equipment. The number of stocked parts was decreased because of an inventory reduction initiative. A part fails on asset #1 and the spare is used to return asset #1 back to operation. The same part fails on asset #2 during the time it takes to replenish the stock. Asset #2 has downtime due to a stock outage. What happens to life cycle cost? It increases.
2. A part which has a \$5000 value is stocked at Min/Max level of 2 and 3, respectively. The part is used on one asset in one location and one at a time. The MTBF is over 3 years. There is an inventory carrying cost for all parts which are stocked. This carrying cost will range 25% to 40% of inventory value. This cost is part of the life cycle cost of the assets. Carrying excess inventory will only increase the life cycle cost. In the example given, attrition of one part from the existing inventory would be a good first step.
3. A part has a low Mean Time Between Failure (MTBF). The part usage and downtime to replace the part adds to life cycle cost. Storeroom personnel were discussing the issue with one of the strategic suppliers who currently are not supplying this particular part. They suggested an equivalent part which they provide because of the mounting feature. The storeroom recommends it to Maintenance and the part is tested. MTBF increased 4 fold and life cycle cost decreased.

The issue which many organizations are facing is the attrition of knowledgeable MRO storeroom personnel who understand the role of supplying and assuring capacity. With reorganizations, downsizing and outsourcing initiatives over the last 20 years, the skills and knowledge around managing storeroom performance has diminished. In order for a business to compete, MRO storeroom needs to be an integral part of the commercial, operation and maintenance strategies and managed by competent and trained professionals.

MRO Supply Chain

MRO supply chain is the process which defines the flow of work, information and people to meet a demand. MRO supply chain demand is determined by “the assets”. When a component is failing, a MRO demand has occurred. How well the different functions manage the MRO supply chain will directly impact the reliable capacity of an asset. A simple version of the supply chain is shown below. Most modern CMMS and EAM systems can be configured to manage this work flow very effectively.



Forecasting MRO demand is the responsibility of Operations and Maintenance. This is done by inspection PM's, noting unplanned failures or by tracking machine cycles. Once the demand has been identified the order is entered into the system and is properly categorized: planned, unplanned or improvement work, the asset requiring the work, who entered the order, date order was entered and the date requested to complete the work, etc. Once the order is entered into the system it is prioritized. Prioritization occurs with emergency or unplanned work on a critical asset given the highest priority. This work is usually managed by specific resources assigned to address emergency issues. The planned work goes through a more careful analysis and are prioritized based on risk of failure, criticality of the asset, consequence of failure, and availability to make a repair. Planning is the next step and is the responsibility of the maintenance planner/scheduler. During the planning stage a detailed job plan will be developed specifying resources, skills, parts, procedure, tools and permits required to complete the work safely and efficiently.

Once the parts have been identified, MRO storeroom personnel will procure the parts. If a part is stocked, the item will be reserved and one ordered to replenish it. The spare parts in a MRO storeroom are to manage the risk of unplanned downtime and not intended to manage planned work. The ideal state is to carry no inventory, provide the correct part, at the correct time, and deliver the parts to correct place. The reason to use the stocked part for a planned work order is to ensure the component's shelf life is not exceeded. Any part which is not stocked or cannot be reserved should be identified and ordered from the Bill of Material information in the CMMS or EAM. An accurate Bill of Material for an asset should be a goal of Storeroom and Maintenance personnel. If the bill of material is not complete, storeroom personnel will need to work with commercial to determine the proper supply of the part or material.

To ensure a smooth flow of work and information through the MRO supply chain, clear and accurate work instructions should be followed by MRO storeroom personnel. Table 1.0 shows a partial list of Standard Work Instructions (SWI) for a MRO storeroom. Table 2.0 shows the information which will make an effective Standard Work Instruction.

Table 1.0 – Standard Storeroom Work Instructions

- | | |
|----------------------------|---------------------------------|
| • Part Issuance | • Obsolescence Procedure |
| • Add New Part | • Vacation Coverage |
| • Delete Part | • BOM development |
| • Assembly Checkout | • Vendor Assurance |
| • Purchase Order | • Relocation of Parts |
| • Emergency Purchase Order | • Return of Parts |
| • Contract Releases | • Vendor Specific Procedures |
| • Receiving | • Commodity Specific Procedures |
| • Cleaning PM's | • Vendor Manual Management |
| • Rebuild vs. Purchase | • Free Issue |
| • ABC Analysis | • Production Parts |
| • Spares Naming | • Return to vendors |
| • Battery Disposal | • Remote Storage Facility |

Table 2 – Standard Work Instructions Content

- Title
- Revision Date
- Approval
- Value of the procedure
- Procedure overview in a process flow
- Pre-check list
- Safety precaution and required Protective Equipment
- Specific detailed tasks
- Digital pictures or screen shots will aid
- Post Check list

Why do we need to take so much care in the proper work instruction? To ensure all sources of error and waste are eliminated in the storeroom operation. Errors or indecision is a waste and waste occurs in seven forms: Defects, Motion, Inventory, Over Processing, Transportation, Waiting and Overproduction. The role of the storeroom personnel is to minimize and then eliminate waste in the storeroom operation. This is done by eliminating the root cause of the waste. Some of the most common root causes of storeroom inefficiencies include:

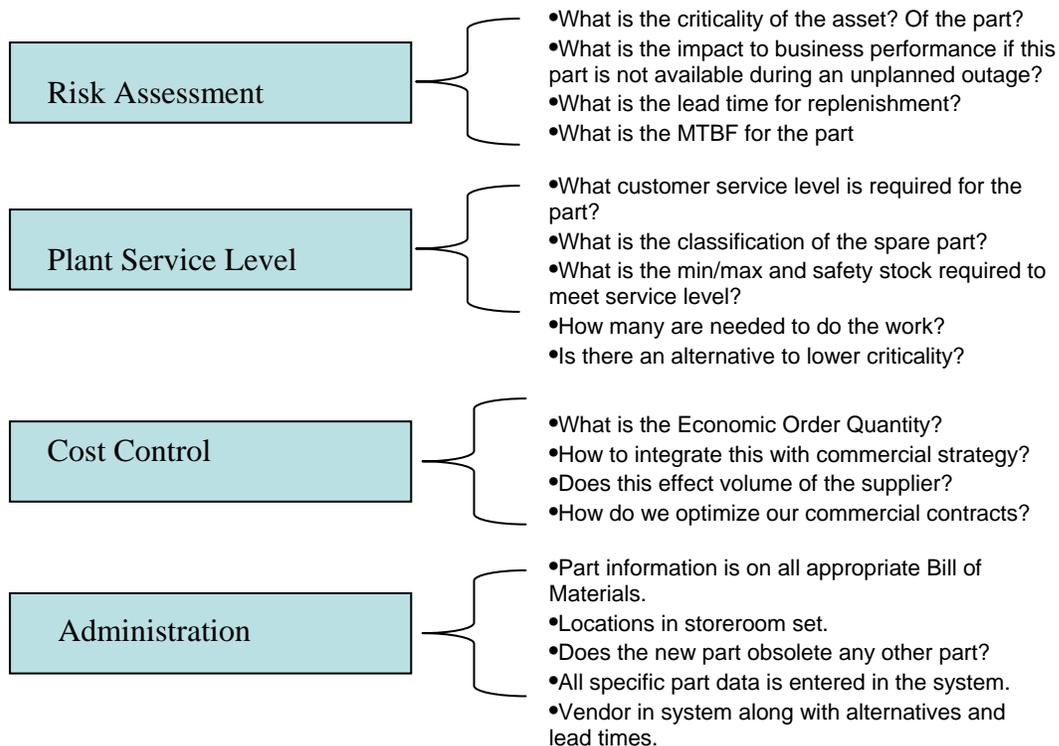
- Part Numbers are not established.
- Part information is inconsistent and hard to sort.
- Equipment BOMs are not entered into the system.
- Storerooms have open access resulting in high attrition and data errors.
- Planned Work orders are not managed.
- Planning does not include timing or parts list.
- Purchasing cards are out of control
- Procurement policies are not defined.
- Emergency purchase orders are abused
- No understanding or expectation for kitting
- Skills and knowledge of storeroom attendants (storeroom and technical) is low.
- Improper storage equipment of parts and materials.
- Unorganized layout (fast moving parts close to window, proper aisle spacing, etc.)

A,B,C and D Analysis

At this point and time, we understand the need to balance downtime risk with inventory carrying cost to ensure the lowest life cycle cost. What is a rule of thumb or an effective way of managing this balance? It starts with categorizing spare parts into A, B, C, or D classifications. Table 3 defines the category of spare parts, required service level by category, percent of category to total number of parts stored and percent of category to total stores value.

Category	Description	Service Level	% of total Parts	% of total value
A	Insurance spares and critical spares which are required to ensure revenue producing assets are available.	100%	20%	80%
B	Standard Replacement Parts or parts common to multiple pieces or equipment or assets.	95%	30%	15%
C	Hardware, small tools, fittings, operation supplies, cleaning supplies	90%	50%	5%
D	Discontinued or assembly items	90%	Trace	Trace

With classification of A, B, C and D, complete we need to set proper min/max levels. This is done by managing the decision process through four areas: risk assessment, plant service level, cost control and administration.



The storeroom personnel have developed a kit for the job plan. The work crew assigned to perform the work will use the kitted material, complete the work, meet the demand and return the equipment to operation. All excess material from the kit will be returned to the storeroom for restocking and issuance of a credit to the work order and cost center. The Planner /Scheduler will update the job plan and close the work order ensuring the historical data is accurate.

To minimize life cycle cost, MRO storerooms must be considered a good investment and strategic in managing available capacity. With twenty five percent of the unplanned downtime attributed to the storeroom operation and the inventory carrying cost being up to 40% of inventory value, the storeroom contribution to business performance cannot be underestimated.

Improvement Process

By following a simple structured process for implementing change in a MRO storeroom, the MRO storeroom will increase its contribution to the business and will compliment the other business initiatives such as TPM, Lean or IT system implementations.

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|--|--|
| 1.0 Form a project team | 13.0 Standard Work Instructions |
| 2.0 Planning and Preparation | 14.0 Role definition for the Storeroom |
| 3.0 Role definition for the team | 15.0 Critical asset implementation and analysis. |
| 4.0 Current Business Process | 16.0 Obsolete and Inventory spare part analysis. |
| 5.0 Ideal Business Process | 17.0 Data Cleansing |
| 6.0 Complete a gap Analysis | 18.0 Update Bill of Materials for equipment. |
| 7.0 Review Critical Asset performance | 19.0 Review Stores layout |
| 8.0 Where is the money spent? | 20.0 Stockroom consolidation |
| 9.0 Agree on KPI's | 21.0 Vendor management/ performance |
| 10.0 Develop the scope and IRR
and get approval | 22.0 Celebrate the success |
| 11.0 MRO training | |
| 12.0 Organization | |

Summary

We have discussed the importance of managing the storeroom as an investment and how all functions have an integrated effort to manage asset performance and capacity. By defining the MRO Supply Chain, we can develop our organization to address equipment demands and ensure capacity. An important part of managing the MRO supply chain is the MRO storeroom function. This function needs to be part of the company's strategic initiatives and provided resources to improve performance by eliminating waste.

About the Author

Kevin Lewton, CMRP, C.P.M, CPMM, CPS is the Vice President of MET DEMAND, LLC, a Reliability and Maintenance consulting company. Previous to this position, Kevin worked 20 years with MasterfoodsUSA, a division of Mars Inc., where for the last four years he managed the regional “Reliability Excellence” project involving 15 North American Sites. His responsibilities included managing a team to provide functional specification for SAP PM Implementation, standardizing maintenance, TPM and reliability work practices for the region. Kevin has held several position including: Site Technical Manager, Operation Management, Engineering/Project Management, Process Engineering, Plant Quality Services, Start-up Manager, Vendor Assurance, Research and Development Manager, and Maintenance Manager. Kevin is currently an Academic Liaison for SMRP and active member of AFE and ISM. Kevin can be contacted through www.metdemand.com or kevin@metdemand.com.

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