Best Practices *to* Increase Efficiency *and* Productivity *while* Reducing MRO Spend

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MRO for a more connected enterprise

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MRO Best Practices

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Abstract

As Reliability Engineers, we are tasked to consistently improve an operation and life cycle of systems. Many of the improvements are derived from changes in materials we add or remove from the identified system. These materials are referred to as MRO or Indirect Spend. MRO costs can add up to a significant portion of expenses for a business.

Unfortunately, this is the cost a business pays to remain in operation. Without spare parts and other associated materials, operations would cease to exist. Reliability Engineers can focus on these expenses that will improve the bottom line. This paper will focus on what MRO is, and provide examples and case histories of successful Continuous Improvement projects that reduce MRO costs and improve Reliability.

This paper will focus on what MRO is.

MRO Best Practices

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Okay, so what is MRO?

MRO is an acronym for Maintenance, Repair and Operations. These are areas within a facility with a sustained usage of consumed materials and supplies. The three MRO areas require a significant amount of inventory items, that are not a part of the end product that a company produces, thus resulting in Indirect Spend. These materials are consumed in their effort to conduct a successful business, and may include consumables items like cleaning and office supplies and laboratory equipment. It can also include large industrial equipment to include compressors, motors, pumps and valves. Maintenance supplies of gaskets, lubricants and hand tools are other examples. In the office areas, MRO materials are computers, fixtures and furniture.

Companies look to reduce their MRO inventory in storerooms; due to the cost of the materials affecting the financial "bottom-line". Having the correct amount of inventory can be tricky. If a critical spare item is needed and is "stocked-out", what does this downtime cost the company? Non-Productive down-time costs in many industries can exceed $100K per hour. On the other hand, keeping minimal or no inventory of a particular item, may make more sense if the material is readily available at a local distributor,

Maintenance contractors that are solely used for this purpose can help to reduce the MRO inventory cost. These specialized contractors provide limited materials and services, but may not be the ideal solution for obtaining the best pricing available of materials. Maintenance contracts are limited in the amount of service areas and materials they can supply.

Larger companies and industries are choosing another way to resolve their MRO supply chain problems. The solution is working with a Supply Chain Integrator to manage their inventory requirements. The Supply Chain Integrator, sometimes called, "Outsourcing Procurement", can manage the MRO inventory of a client, to reduce the overhead costs that affect the gross profit of the company's operation. They have the ability and skills to leverage buying power, by negotiating reduced costs in materials. Additionally, they help reduce the unnecessary staffing requirements needed to maintain the MRO storeroom at facilities. Benefits include:

- Leveraging suppliers for increased purchasing discounts for the client
- Cost reductions in manpower, training and office space requirements to operate an MRO storeroom
- Maximizes lowering transaction costs associated with purchasing
- Integrators have knowledge to identify suppliers that are best qualified to provide the specific products for the clients, while maximizing cost savings
- Integrators have experienced and expert staffing to make purchasing decisions. Trained negotiators in the specific areas of expertise, produce more cost savings through effective deal making.

Okay, so what is MRO? *(continued)*

When a company hands over their MRO supply requirements to the Supply Chain Integrator, they maximize their efforts to reduce MRO associated costs. The client then can concentrate on producing the "End Product", which is their expertise.

"Best in Class", a small number of MRO integrators also provide the manufacturing sites with Reliability Engineers (RE's). RE's provide sites additional engineering knowledge to help increase efficiency and productivity at the facilities, saving time, energy, and reducing the total MRO spend.

RE experts in MRO, understand challenges inherent in storeroom management, maintenance operations, and production floor processes. RE's help identify cost improvement solutions both in maintenance, operations and store room inventory. They make informed recommendations for parts and products that will help reduce inventory excess and provide value-added benefits.

The case for placing RE's in the MRO environment has proven to be extremely valuable. Examples of Efficiency and Productivity savings is gained in OEM commercialization, BOM Improvements, Warranty Tracking and Repairs while using state-of-the-art tools for Engineering Services.

RE's help identify cost improvement solutions.

Efficiency: OEM Commercialization

What is OEM?

OEM is the "Original Equipment Manufacturer". Generally, when a company orders a machine or tool, the manufacturer of that system will offer a suggested spare parts list. The list may include items that can be procured locally, or the parts may be so unique that only the manufacturer can provide it. Manufacturers are not a "parts distributor" and almost always include large mark-ups to the materials purchased through them, with delays in receiving the part, due to the manufacturer not having stock.

MRO Engineering teams can look at OEM replacement parts, researching vendors to be locally sourced or resource them to a preferred vendor contracted with the Supply Chain Integrator. Many "like for like" materials are available, with very little effort in procurement to show a savings.

Additionally, parts that are not available can be re-engineered using 3D Scanner technologies, by providing drawings and diagrams, and working with tooling shops to re-manufacture, all working toward increasing the reliability and reducing costs. The OEM Commercialization effort to find cost savings, is a value-added benefit for the Supply Chain Integrator customers, along with increasing the overall Reliability of systems.

Parts can be re-engineered using 3D scanner technologies

Efficiency: BOM Improvement

BOM – Bill of Material

There are several types of CMMS programs to build a BOM. In our example, we will use SAP.

Functional Location, is an area where several pieces of equipment are located.

Unit of Measure, a physical piece of equipment in the area of the functional location.

There may be 1 to over 100 pieces in that functional location.

A Project Engineer, Reliability Engineer, or a Planner, interacts with schedulers and planners to discuss the engineering parts that are applicable to a BOM. An Engineer is responsible for the design, selection, drawings, purchase orders, contractors and setting up parts for the startup and BOM.

Creating the BOM

Starting with an assigned company equipment number, may also be called a "Unique Identifier", a Bill of Material, (BOM) is created. Proceed using a reference Serial number and Model number for exact specifics.

There may be 1 to over 100 pieces in a functional location

Completed BOM for New Equipment Number

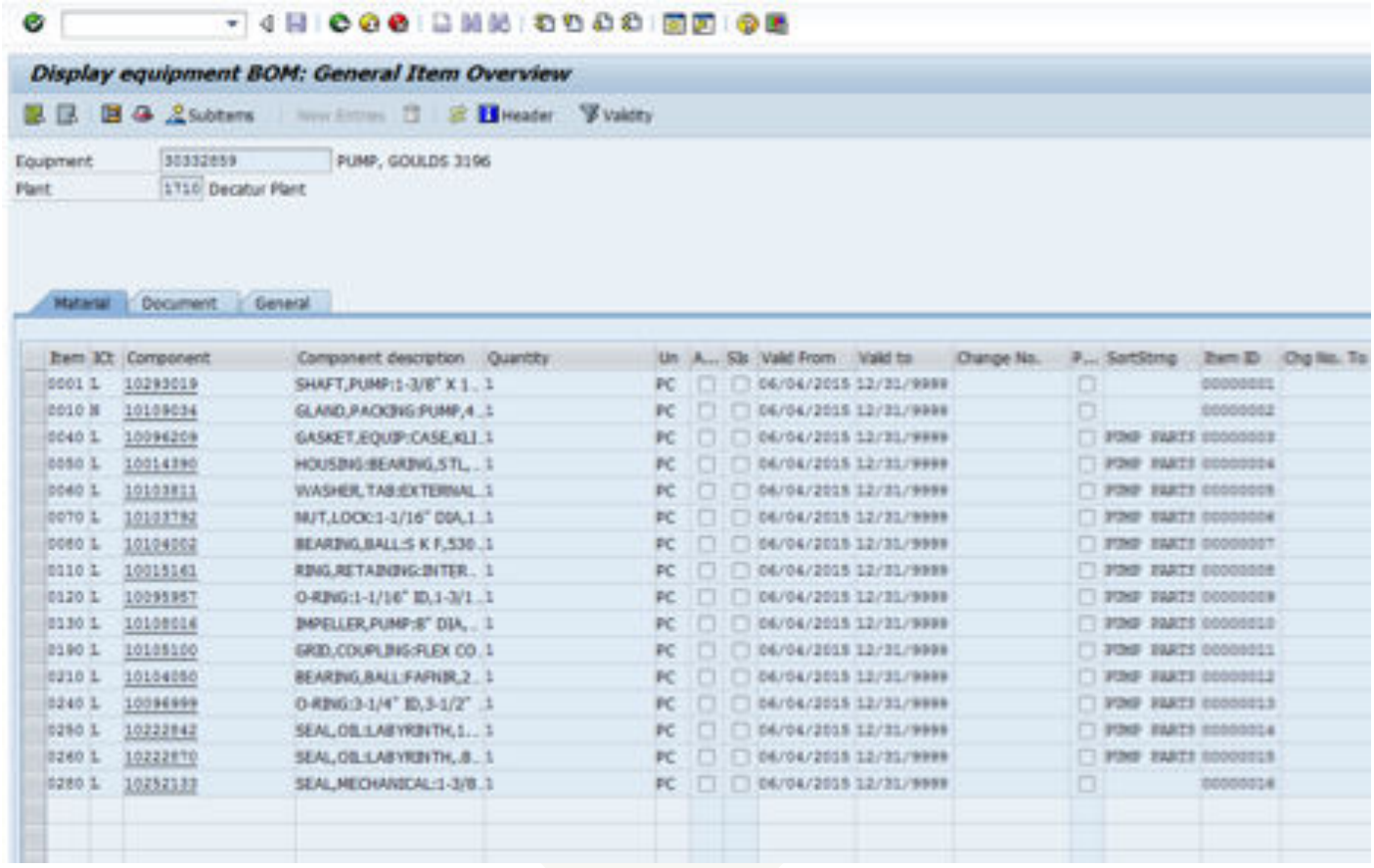
By using SAP, (or CMMS – computerized maintenance management system), you can check under a Functional Location and then using an Equipment Number to verify if a BOM has been established. If so – Changing or Adding parts is acceptable in a new SAP window for "changing".

Additionally, under the attachment section, attach a list of the description, and the quantity required from the vendor.

To accurately change or create a BOM, make sure the existing BOM on the equipment is valid.

Several factors in TIME SAVINGS

- Is there an existing BOM for same model?
- Is there an OEM sheet available?
- Do we currently have spare parts for this BOM in stores inventory?
- Do we classify as S01(Stock) / S05(Non-Stock) / S08(Critical)? Planners assist on this decision.
- Has there been parts ordered from a Capital Project that has parts available for review?



Productivity: Warranty and Repairs

Engineers use a variety of Asset Programs to monitor MRO items that are repairable or are under warranty. Keeping an accountability of the warranty period of assets and identifying eligible materials if they exceed a repair cost higher than 50% of the OEM price.

Example: ½" steam trap program

A total of 3500 – ½" steam traps on site of which 15% would fail annually. That's 525 units per year, or 43.75 units per month. The cost of materials for rebuilding the steam traps is $89.46. Calculating the monthly units – 43 X [($89.46 + $38.71 labor each) = $128.17] = $5,511.31 per month to rebuild. Purchasing new units costing $226.28 is calculated at 43 x (New Trap = $226.28) = 9,730.04 per month. ***Savings: $4,218.73 vs purchasing the new units.***

$4,218 savings versus purchasing the new units.

Repaired units have assigned a separate SAP number (10337729) "Repaired" and will be used prior to issuing the new units (10302901) out of the storeroom. Min/Max adjustments of the new units in stock reduce total inventory value.

Productivity: Re-Engineering Services

Reliability Engineers working with MRO parts and SOLIDWORKS training, have the ability to use state of the art 3D scanners and 3D Printers. Scanning and printing parts, quickly provides a "Solid"– a fully resolvable and rotatable image of the item to be evaluated for Re-Engineering possibilities.

The 3D scanner outputs the data to SOLIDWORKS or similar CAD programs. Modeling the materials, RE's are able to identify equipment design faults and then improve the design, using alternative materials and or strengthening weak and failure points that are identified.

The 3D Printer will replicate the item, providing a hard copy for inspection prior to any mass production of the part. 3D Printer manufacturers continue to upgrade the choices of material used for replicating parts, while increasing quality and speeds to reproduce the part.

The future of 3D Printers and Scanners used by the Reliability Engineers, has endless possibilities.

Example:

OEM – Graham; nozzles. Using a local supplier to fabricate. Having an item to be 3D scanned and then drawn out in detail, allows the opportunity to locally fabricate the product. This is one of a dozen nozzles that a storeroom had on hand. Prices range from $4,300 to $7,200 each. This particular nozzle is a vacuum nozzle. It has an OEM price of $5,500. Same 316 SS material, same hardness, exact same dimensions can be fabricated locally for $360.00. ***A savings of: $5,140.***

MRO Case Study: Lubrication Reliability Solution

Clean Oil Dispensing System

Initial design set-up at the client site – Pensacola, Florida. Removing particulates and moisture from new lubricants. Originally, the oils were delivered in 55 gallon drums from the oil distributor. The Supply Chain Integrator purchased the desired types of oil in larger quantities; 275 gallon totes, at a reduced price, providing the first stage of savings to help capitalize this project. The set-up costs were $40,000, with ***MRO cost savings of oil of over $50,000 the first year***.

The Reliability and longevity of the oil after cleaning is saving an additional $45,000 in reduced consumption with improved predictive maintenance after the introduction of "Conditional Monitoring". Further Reliability studies are underway to determine the savings in reduced bearing, seal failures and a reduction of unscheduled maintenance

MRO cost savings: $50,000+ the first year.

MRO Case Study: LED Improvement Solution

LED Installation at Client Site

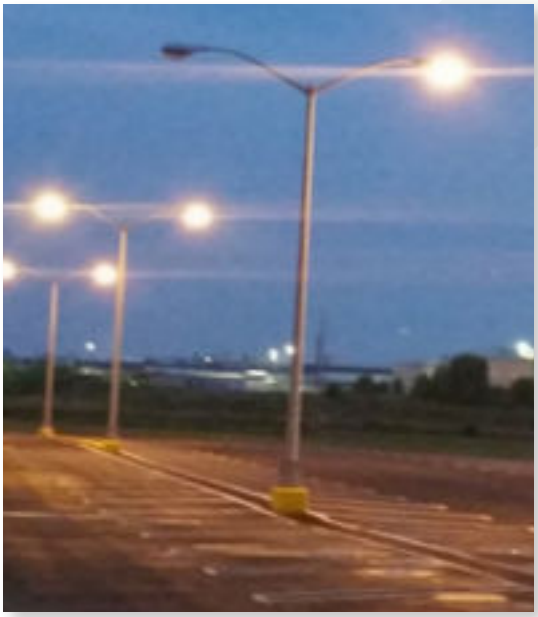
Decatur, Alabama.

Light improvements in Maintenance work areas and parking areas were key starting points. The development of the new LED lighting has been slowly progressing into all industries. The savings on kilowatts is substantial and varies according to each location based on the cost per kilowatt hour. In our case, in Decatur, Alabama the cost is only about $0.065 per kW.

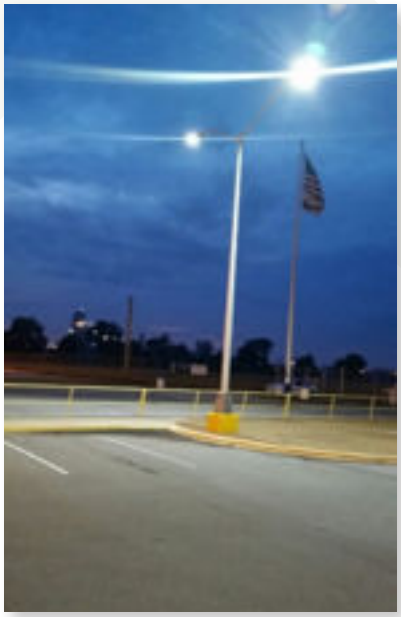
The Kaizan effect or Continuous Improvement is seen every day when entering the shop floor. With new LED lighting and new epoxy coating floor, the complete area changes your perspective of the cleanliness.

The savings on kilowatts is substantial.

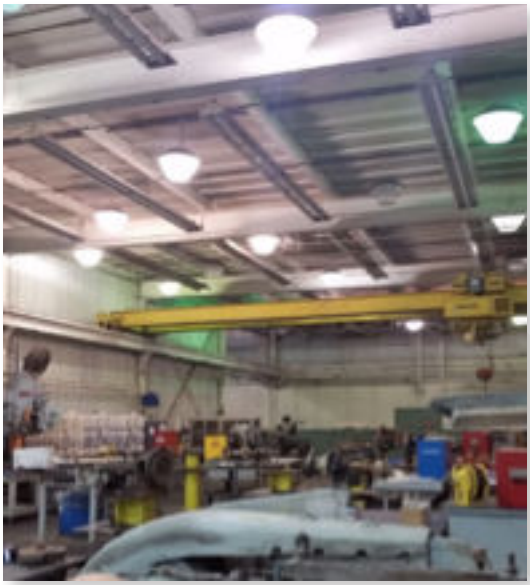
MRO Case Study: LED Improvement Solution



*Parking Lights **BEFORE***



*Parking Lights **AFTER***



*Central Maintenance Shop **BEFORE***

*Central Maintenance Shop **AFTER***

About the Authors

Harry Woodard

Harry has a Master Degree from Florida Technology Institute, BSME at University of Alabama, 36 years Industrial and government experience. Worked as maintenance engineer at Champion & International Paper, Courtland, AL & Bowater, Calhoun, TN; Consultant on Paper mills – Doctor blades; Automotive industry – Supervisor & Tool Engineer; Contractor at JAMS as Configuration Management analyst; Planner – Diakin, Decatur, AL; Reliability Engineer, SDI, Decatur, AL. Enjoys time with wife Deedee, woodworking, yard work, golf when he can, Continued love for Alabama football (cheerleader '79-80), and his 4 grandkids.

Robert Schwenck

Robert is the Regional Reliability Engineering Manager for the SDI Engineering Services Team. Robert is an Electrical Engineer, with expertise in Power Quality improvement of electrical motors. Robert's leadership in his current position has resulted the development of many new CI projects and improving customer relations with client Management. Prior to relocating from the East coast, Robert was employed at New Jersey's largest newspaper, The Star Ledger. Robert's career at "The Ledger" proved instrumental in numerous cost savings projects and operational improvements which enabled the newspaper to survive the Internet Boom. Robert is also a Veteran of the United States Air Force.