Integrated Inventory Management for Maintenance, Repair and Operations (MRO) Materials
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1. Introduction

From an operational perspective, the primary goal of the Materials Management organization in an MRO environment is to provide unflinching material support to Maintenance and Production. In other words, have the right parts at the right place at the right time. Assuring supply can easily be achieved by stocking the shelves with every imaginable spare part in such enormous quantities that almost any combination of required materials is in stock at any given time. This will surely satisfy service objectives, but is this the best approach?

Unfortunately, nothing in life is free: materials cost money – not to mention taking up a lot of space – and very few Materials Managers have access to unlimited funds. Finance and Plant Management are responsible for making sure that purchasing budgets are monitored and controlled, and inventory investment levels are optimized.

Uncontrolled spending leads to bloated inventory, which in turn often results in mandated investment reductions. But managing inventory is not as easy as just setting the objective and then expecting it to happen all by itself. Nor is it simply a matter of cutting off funding or randomly eliminating parts from the storeroom. These may have the desired effect on investment, but what about service; and more importantly, the potential impact in terms of lost production?

This leaves Materials Management in the difficult predicament of having to concurrently maintain adequate levels of material supply while also prudently managing the company's resources. Some would consider these conflicting goals resulting in a dilemma – a situation that requires choosing between two different alternatives. But is it?

To effectively support Maintenance and Production, it is critical to have the required parts available when needed. Finance and Plant Management will generally support the purchase of materials necessary to keep plant equipment running in order to maintain production levels. However, "available" doesn't have to mean "on the shelf," and "when needed" doesn't necessarily imply "right away." There is a point at which both service and investment are optimized so that they become mutually achievable objectives.

Having said that, it is not a simple task to accomplish, and as with any significant challenge, the best way to begin is to understand the problem and develop a plan of attack.

Effective inventory management requires an understanding of the fundamental material management principles, data, and work processes that impact material supply and contribute to the total cost of the MRO operation. It also involves the establishment of realistic and measurable goals, along with disciplined approaches for achieving them. Most importantly, it requires a commitment of time from knowledgeable individuals to make informed, intelligent, and often difficult decisions.

The blueprint for success is Integrated Inventory Management. This methodology provides a vehicle that helps arrive at the right decisions about what to buy, when to buy it, what to keep in stock, and what to eliminate. It provides a disciplined process that effectively controls storeroom investment and associated inventory costs while maintaining an acceptable level of service.

This article provides an overview of the basic elements of Integrated Inventory Management and key linkages. Subsequent articles to be published on-line will provide additional details that further explain each of the specific activities involved.

2. The Integrated Inventory Management Model

The model shown below (see figure 1) may look complex, but essentially all that is required to implement an effective Integrated Inventory Management program is an understanding of basic inventory management processes, combined with an effective and disciplined application of associated Best Practices. With a good grasp of the underlying principles involved, a common sense approach to implementation, and a healthy dose of practice, almost anyone should be able to make prudent decisions about the best way to manage their inventory.

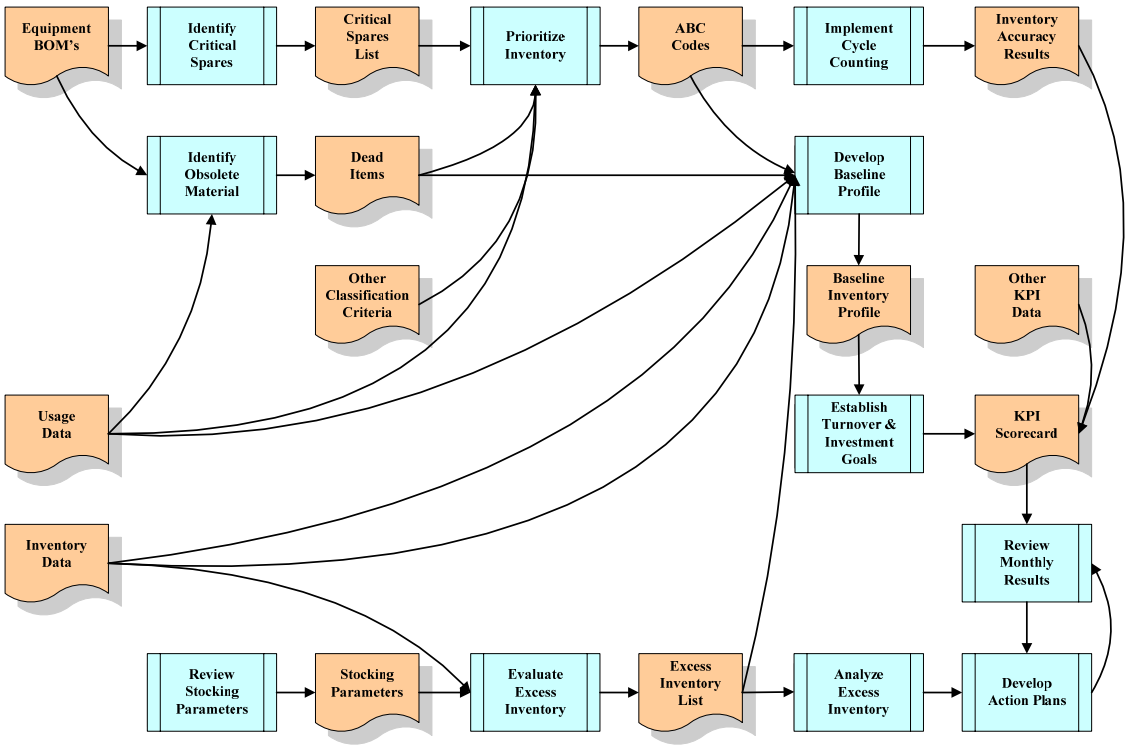

Figure 1 – The Integrated Inventory Management Model

In the model, the blue-shaded figures represent stand-alone inventory management processes. In subsequent articles, each of these will be discussed in detail, providing background information, a fundamental understanding of the process, some guidelines for implementation, and some helpful hints to maximize their effectiveness.

The tan-shaded figures represent input/output data, reports, or other electronic documents developed and/or used throughout each step to support the overall process. In most cases these will be addressed within the subject matter of the appropriate work process where they are used or produced. In other cases it will be necessary to address them separately.

Together, the work processes and associated information form a logical sequence of activities that build on each other. The overall Integrated Inventory Management model begins with a foundation that is focused on basic data integrity. From there the concentration is on practical application of work processes that rely on this data to establish a baseline for improvement. The next step is to develop realistic goals and action plans that will help control inventory and achieve those goals. The final step is to develop a periodic review process so that the Integrated Inventory Management model becomes self-sustaining through regular progress monitoring and continuous re-evaluation of objectives and action plans.

3. The Basic Elements

Below is a brief definition/description of the main elements of the model. As mentioned earlier, the purpose of this article is solely to provide an overview of the entire process and identify key linkages. Nonetheless, this information should provide sufficient background to give a sense of what the entire process involves.

Equipment BOM – A document showing the parent/child relationships of all repairable or replaceable components, assemblies and sub-assemblies that make up an asset.

Usage Data – Historical information based on material issues that reflects the dates, quantities, and dollar values of all storeroom parts issued for maintenance work.

Inventory Data – Basic Part Master data (primarily on-hand and dollar value) from the CMMS or other inventory control system.

Critical Spares – Key parts and/or components of an asset that, if required but not available, could result in an equipment or plant shutdown, and significant Lost Production Opportunity.

Obsolete Material – Any material that can no longer be used because of decommissioning, redesign, damage, deterioration, inactivity, or other causes.

Stocking Parameters – Lead times, min/max quantities, re-ordering methods, lot sizing data, or other information in the CMMS that controls the quantity and timing of replenishment orders.

Prioritize Inventory – Listing materials in order of relative importance based on set criteria, e.g. usage, unit cost, on-hand value, lead time, criticality, etc. In this model the recommended method is an ABC Analysis based on usage.

Excess Inventory – The quantity and associated dollar value of active, automatically replenished storeroom inventory that exceeds maximum projected inventory levels based on current ordering parameters. In simplest terms, it is the level of on-hand above the Max quantity.

Cycle Counting – An inventory verification technique where inventory is counted on a periodic schedule throughout the entire year rather than all at once in a short period of time as in an annual physical inventory.

Baseline Profile – A snapshot of investment, historical usage, and other inventory-related data that provides a starting point for evaluation of benefits from continuous improvement activities

Turnover and Inventory Goals – Targets for future storeroom investment levels and associated Turnover rates based on an assumption of future usage rates

Review Monthly Results – A periodic process for reviewing the accuracy of forecasts, assessing status of key activities, and analyzing recent results

Action Plans – New or revised short-term and long-term targets and/or activities required to achieve them.

4. Prerequisites and Caveats

As mentioned above, the cornerstone of the Integrated Inventory Management Model is data integrity. This by no means implies that a program cannot be started without 100% complete and accurate information. In fact, many of the work processes incorporate data collection, analysis, and correction. However, some level of data availability is essential in order to embark on this journey.

It should be noted, therefore, that this model is NOT intended for any organization that doesn't have reasonable control over its MRO inventory. It also requires a fairly well organized repository of Part Master and transactional data. As a result, there is a threshold of data below which it would likely be fruitless to put significant effort into this.

About the Author

Doug Wallace is a Materials Management Subject Matter Expert for Life Cycle Engineering. In that role he provides change management, analysis, development, implementation, training, coaching and other consulting services to Life Cycle's clients to identify areas of opportunity for process improvement, cost reduction, and increased revenue through Overall Equipment Effectiveness. His primary focus is on implementation of best practices in procurement; warehouse operations; inventory optimization; and utilization of associated business and information systems.

Doug has more than 25 years of combined experience in Supply Chain Operations and Management Consulting, specializing in the areas of global enterprise planning, production and inventory control, and materials management. He has provided his technical, leadership, and consulting skills to the semiconductor, cement, refining, specialty chemical, pharmaceutical, shipbuilding, and other manufacturing industries, where he has developed and delivered solutions to increase productivity and profitability through reduced operating costs and improved materials management and inventory control practices.