Tech Mahindra

INTEGRATED MANUFACTURING ASSET MANAGEMENT FOR CONSUMER GOODS

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Consumer Goods Companies today are spending, on an average, 20% more than their allocated budgets to manage their manufacturing assets. This excess is directly related to poor quality of asset information (master data) from the standpoints of both completeness and correctness. Master Data Management practices have to undergo an urgent transformation by looking at a more integrated approach to Asset Management.

Connected World.
Connected Experiences.

ABSTRACT

Asset management has traditionally been the Achilles heel for Consumer Goods Companies. With globally spread plants, multiple equipment vendors and thousands of SKU's to be manufactured in billions of volumes, CG companies typically run out of bandwidth to focus on managing their manufacturing assets in an efficient manner. With rapidly changing technology, manufacturing plants must upgrade their equipment and processes frequently. The way assets are managed through the manufacturing lifecycle plays a very important role in how efficiently and seamlessly the companies can adopt new technologies into their fold.

Consumer Goods Companies today are spending, on an average, 20% more than their allocated budget to manage their manufacturing assets. The excess-spend typically happens in areas such as,

- Expediting replacement component orders to ensure up-time of manufacturing lines
- Ordering the wrong component because of an incorrect / incomplete entry in the asset database
- Unclaimed warranties due to dis-jointed functions

This wastage can be arrested through an integrated approach to asset management within the manufacturing plant. While asset data remains central to the exercise, how the data is managed and maintained forms the crux of the whole initiative. Not just asset data, but completeness and correctness of the data are also equally important and critical to the success of the integrated approach.

BACKGROUND

Traditionally Consumer Goods (CG) companies have prioritized meeting volume and quality requirements of products manufactured in their plants. The focus of the plant is to ensure that the manufacturing lines are "up and running" to meet the volume numbers. This leads to companies neglecting how their manufacturing assets are being managed.

CG companies have long relied on Original Equipment Manufacturers (OEM) to supply and maintain the equipment in their plants. The equipment usually comes with limited warranty. Added to this are the huge costs associated with the necessary changes that are usually made. Moreover, The equipment is often tweaked from their intended design to "make-it-work" rather than looking for a reliable and long term solution.

It is estimated that CG companies spend 20% more than market price for component purchase because of poorly managed asset data. For major CG companies this could mean millions of dollars in capital expense every year. It is time for CG companies to start thinking about an integrated manufacturing asset management solution.

THE PLAYING FIELD

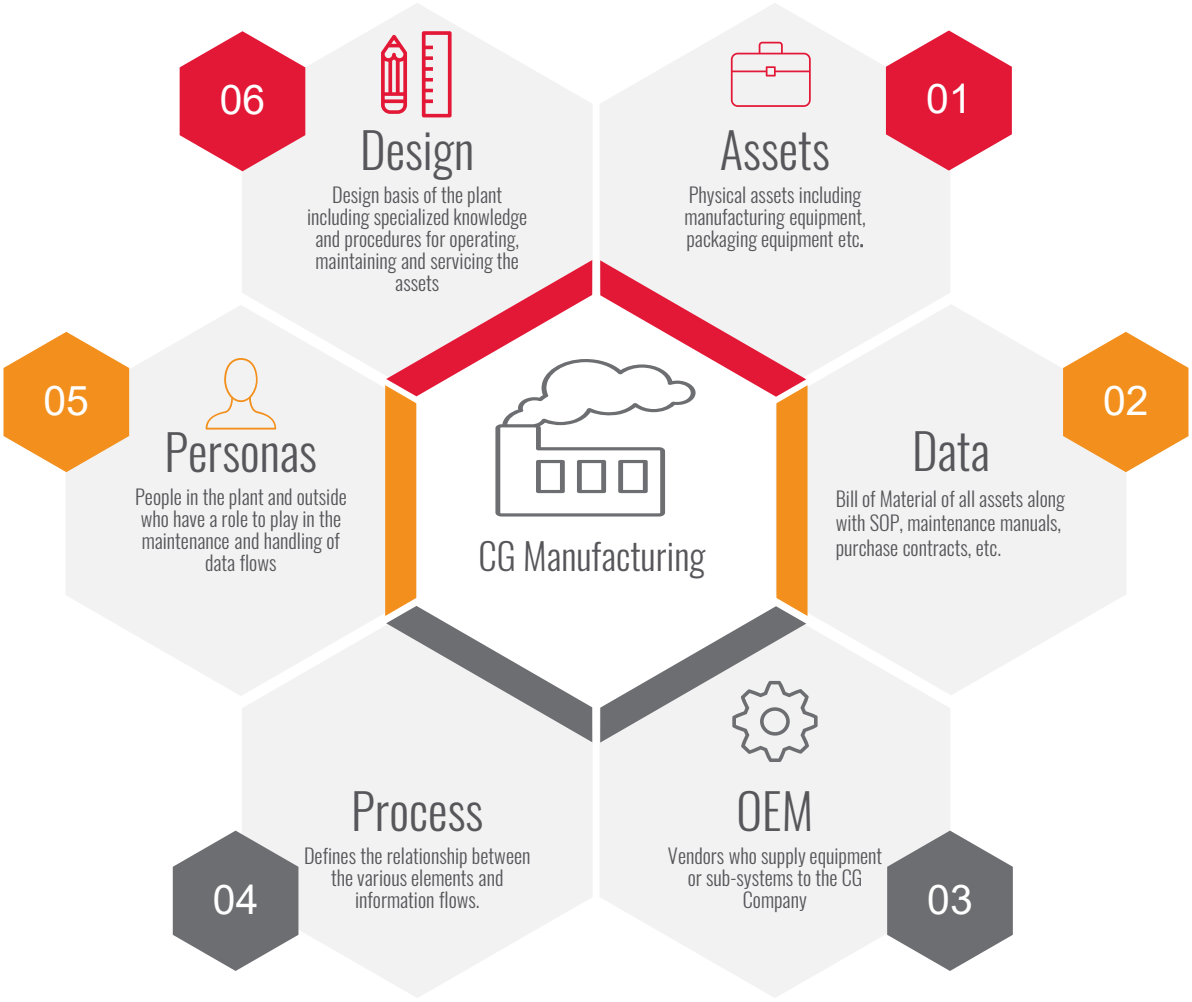
In CG manufacturing, incorrect or incomplete information could lead to serious issues like line shutdown, unavailability of replacement parts, design changes to avoid obsolescence, etc. Needless to say, any investment towards maintaining correct and complete information about assets, processes and personas is critical to the success and efficiency in manufacturing.

CG manufacturing is somewhat different than traditional manufacturing. CG companies are on contract with multiple OEM's to procure special equipment and components as a part of their manufacturing. This creates multiple scenarios which may potentially lead to failure at one or many levels. Some typical case-in-point examples are mentioned below.

- Since equipment procurement happens with multiple vendors, the CG Company may not be in possession of the complete design documentation and operating procedures of all equipments and systems. It relies heavily on OEM's to provide expertise and service in the event of failure.

- All equipment sub-systems and components have different warranty contracts. The purchase is made in different formats to accommodate taxes and commercial purposes. Unless the warranty and performance data of components are not integrated and viewable on the same system, it becomes difficult to apply warranty clauses on failed components.
- CG Company needs to rely on OEM for any changes to the equipment because the design documentation is still owned by the OEM. The CG Company needs to follow-up with the OEM for every change-over or design improvement of the equipment, thus wasting valuable time and effort.

The table below shows the various interfacing elements in the CG manufacturing scenario:



PROBLEM SITUATION

Some of the major challenges faced by CG manufacturing companies are as follows:

01

Bad Data

This involves incomplete, incorrect and/or irrelevant data in the asset database. Major CG Companies have estimated more than 20%-30% of their global data to be "bad" in some form or the other. Bad data often creeps into the system through uncontrolled/unstructured processes and practices. It results in the company buying wrong/unwanted parts because of incomplete/incorrect information in the database. Many CG companies are still holding onto legacy information on paper without any electronic backup.

02

Bad Process

CG manufacturing plants operating for more than 50+ years have seen major changes in technology and processes. They have gone from paper based tracking to imbibing computers and major ERP systems into their work procedures. It would be fair to say that "work processes", more often than not, evolve due to constant business expansion and changes in technology. This creates a lot of redundant processes, which could make transactions cumbersome and opaque.

03

Bad Integration

Traditionally information has resided in silos. It would take some amount of human intervention to connect the dots and complete the process. Also, many of the processes reside in different systems making it difficult to translate and transmit data. Bad integration of work processes creates redundancies and repetition of tasks.

04

Bad Connection

Asset management in CG companies needs to be constantly connected with the external OEM. If the asset management system is not set up to receive product change notifications from the OEM and trigger downstream changes the company loses valuable time and ends up spending more than the market price to make it happen in the last minute.

To summarize, CG companies today face diverse challenges in the way they handle assets in the manufacturing plant. Clearly a single dimension solution may not be sufficient to provide a sustainable answer to the challenges. The answer lies in creating an integrated asset management system that encompasses all the aspects of the manufacturing plant and provides a robust solution framework.

AN OPTIMIZED SOLUTION

The solution to such a diverse challenge lies in creating an integrated approach to manufacturing asset management. We need a framework that links various systems and processes and creates an information super-highway. As we discussed earlier, different CG companies may have different challenges. However, the solution to such challenges lies in understanding the interaction within the various elements and implementing an integrated framework.

Simply put, the framework needs to connect everything with everything. The connection needs to happen at multiple levels with multiple elements. Let us look at some key elements and the role they play in the integrated approach.

DATA INTEGRITY

Correct and complete information is the backbone of any manufacturing setup. Data integrity assumes primary importance in starting the integrated asset management journey. Some facets of data integrity are as follows:

- **Incorrect, incomplete or garbage data:** A systematic cleanup using intelligent business rules is required to clean-up the data. Once the database is freed of garbage information, an audit needs to be carried out to synchronize the physical assets and the electronic information about those assets. This process will eliminate duplicates and help remove entries of obsolete or discarded assets. It would also help in creating new entries of assets that are otherwise not listed in the database.
- **Diverse Legacy Systems:** Large CG manufacturing companies typically have information divided between many legacy systems. Some of the systems may be electronic while others may still be manual or paper based. Even the electronic systems may not be connected through a work flow process thus putting information in silos. Work process is like a stream of water that needs to flow through a connected arrangement of channels and ducts. Any barrier or change in format will stop or decelerate the flow of information.

STRUCTURE & CLASSIFICATION

Once data integrity is achieved, the onus falls on creating a robust framework that will sustain future requirements. It calls for creating a structure template in the asset database that helps classify information in an orderly fashion. The template must not be limited to maintaining the bill of materials but should be expanded to include many other parameters such as:

- Reliability or useful life information of components and sub-systems
- Receiving, processing and managing obsolescence notifications and triggering design changes
- Including warranty information and purchasing contracts of OEM equipment
- Link to maintenance records, service records and standard operating procedures (SOP)
- Link to technical specifications/data-sheets/cut sheets of the equipment
- Link to engineering drawings and design information
- Bill of material with right quantity, vendor information and material master record number (MMR)

SYSTEMS INTEGRATION

Systems integration calls for connecting various systems inside the organization that have, so far, existed and operated in silos. While a few of the systems may be inter-connected, a comprehensive management of assets can be achieved only when all systems are connected through a well-defined work flow.

A white-boarding session that lists major and minor processes and brings out the nature and mode of connection could be a great idea to get started. Companies that have undertaken such exercises have, on an average, been able to cut down more than one-third of the cycle time, reduce more than one-third of the redundant steps and optimize more than 20% of resources.

Some of the systems that need to be connected are;

- Asset database containing the bill of material for all physical assets in the manufacturing plant
- Engineering design database (PLM) system that tracks the design basis and technical specifications of the assets
- Procurement systems that document the purchasing and warranty contracts of the assets
- Reliability information that predicts the possible timeframe of failure of components and triggers a replacement exercise
- Product change notification management to process obsolescence information from OEM vendors
- Manufacturing execution systems (MES) to transmit critical performance data that is required to track the performance of equipment

ENGINEERING

We have so far discussed the procedural or operational aspects of data. Engineering information integration applies to extracting information from engineering documentation and making that data relevant and useful. Some critical engineering information packets are explained below

Reliability

Reliability applies to the useful life of a component or subsystem. Typically OEM vendors provide useful life information for the components or subsystems they supply. The information stays back on the technical documentation/user guides provided by the OEM and does not really get integrated with the rest of the engineering and plant data. If the useful life information of a component is tracked on a "live" basis, it provides much more control to the plant personnel to plan for a replacement when the component is nearing its end-of-life period.

Some OEM components or in-house designed components may not have useful life information because this information was not determined when it being designed. Every moving component undergoes wear and tear and has a finite life. It is important to understand how the useful life of different components affects the overall performance and life of the machinery and subsequently the quality of the product.

For example – Consider a knife cutter that is shearing trim for a high speed baby diaper making machine. The knife starts wearing out after a few million cycles. Slowly the process starts creeping and the knife is unable to cut the trim with the required quality. The manufacturing plant starts seeing more rejects at the end of the diaper manufacturing line and spends time in analyzing the root cause of the process creep. If the knife wear data is available online, it would help the line manager to replace the knife just before its useful life comes to an end.

Obsolescence

Obsolescence of components and systems is a continuous and persistent problem with all kinds of product and process industries. Typically , electronic and PLC (programmable logic controllers) components face frequent obsolescence due to constant upgrades in technology. Obsolescence cannot be avoided but better planning helps in mitigating the challenge.

Normally, OEM companies would publish a PCN (Product Change Notification) that informs its existing customers about future obsolescence of its components. In plain terms, it means that the component will not be available for purchase after a certain date. It could also mean that spare parts and tech support for those components may also stop after a certain period. OEM companies typically provide information about replacement components that may or may not seamlessly integrate with the existing set up in a manufacturing plant.

The onus is on CG companies to plan and act on the PCN to avoid any potential line shutdowns due to unavailability of replacement components. However, it is observed that 9 out of 10 CG companies struggle to integrate obsolescence changes into their process due to one or more of the below reasons:

- Lack of planning on how to react to a PCN – Many companies have not built strategies for anticipating obsolescence and developing procedures for countering the change. Lack of planning may result in last minute scampering to incorporate the changes or paying huge sums of money to buy and stock components for future use. Either of the above two knee-jerk reactions could potentially result in time, effort and revenue losses to the CG company.
- Lack of design knowledge of equipment – We have discussed about how many systems or sub-systems in the manufacturing plant may be procured from OEM vendors. CG companies usually fall short in integrating the design details of such equipment into the engineering database. Also the CG companies may not have the background knowledge of the working of the equipment and executing the obsolescence change. The lack of design knowledge usually results in procrastination of the appropriate action required to effect the change.

Interface Control

Interface control is an often neglected aspect of engineering. In simple terms, interface control refers to two components assembled together to perform a certain function. The two components could be procured from different vendors but they need to have the same assembly interface to enable them to come together for a common purpose. Capturing interface control information helps CG companies to quickly plan replacements and save time in reacting to reliability and obsolescence change requests. Creating an ICD (Interface Control Document) helps the manufacturing plant in quickly identifying and acting upon assembly requirements for a certain component or subsystem. It helps to create an ICD as a standard practice in situations where multiple OEM's are involved in supplying immediate assembly components.

KEY TAKEAWAYS

Efficient asset management is going to be the deal maker in the forthcoming decade and beyond. CG companies have to start looking beyond traditional techniques to solve their data problems and implement an integrated asset management system.

This white paper offers insights to design and implement robust framework. The hyper connected millennial customer demands higher quality at cheaper costs. CG companies cannot maintain low product cost without fixing their asset problems. The bottom line is critical to creating a differentiating factor in the market place.

Many CG companies are still living in the illusion that they have correct and complete asset data. This is simply not true since data properties change over time and the system that manages data has to be accommodative of the change. It is in the interest of the CG companies to act now by making the best use of solutions and partners.

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