

Technical Article

Productivity and ROI

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Real Gains Through Improved Material Management

Introduction

Market conditions have changed. Globalization is a reality. Speed is everything. Increasing productivity gains are required to grow. Growth requires cash; cash for growth or market share gain. Through automation and the application of new technologies, companies are focusing on those areas and events that will lead to reduced direct production costs and improved process efficiencies. In our process world, however, the underlying methods to manage bulk material resources have not kept pace.

Companies continue to rely on historical data that is often no longer valid in today's competitive and uncertain marketplaces. As business units expand into new arenas, the problem worsens, as aging inventory models cannot adapt fast enough. Within major companies in and beyond our immediate industry, however, we find some innovative methods and models that are potentially breakthrough principles:

- Walmart
- Honda, Sony, Dell
- Dupont, Philip Morris

These companies have strategically focused on supply chain coordination to establish new business models that have resulted in significant financial and market share gains. They have enabled these business models through real time information that is shared throughout the chain. Many believe that this type of supply chain optimization is only for hi tech industries, but that is just not true - it is just a matter of believing and implementing.

How Does This Apply to Dry Bulk Materials

Technology improvements have led to increased productivity, quality and reduced costs (QDC), but the primary focus for the improvements is aimed at the plant process itself. The next major changes in our industry will occur up front of the process – at *the material supply and ingredient* stages. Although hardware and software components are available to tie things together, speed and flexibility are hampered with cumbersome handling, reporting and system configuration. Centralized IT/ IS is essential, but people need to make more informed decisions based on what it is they need to know 'now'; they need information, not mere data. They want to make the right decisions quickly; they have no choice. They are searching for answers so they can perform. Such changes are evident in the retail markets and can be used as the model for improvement.

One direction retailers could have taken was to warehouse as much inventory as possible in a huge facility. However, the accounting side of the business quickly points out the downside of costs associated with such a plan - floor space, storage racks, environmental controls for the warehouse, cost of handling internally, distributing the goods, receiving & shipping, inventorying, etc. that need to be added onto the raw cost of the goods. As a result, a lot of capital is tied up with the goods sitting in a warehouse, money that can be better used in other places.

The actual trend has been towards JIT (just in time), to decrease inventory to bare minimum levels, keeping only on hand what is needed and keeping material in transit to fulfill demands – all towards increasing inventory turns. An upside in the retail market is that fewer inventories reduce the risks of getting stuck with merchandise from an often-fickle consumer whose tastes can change daily.

For years, the mass-flow model was the predictor used by purchasing to order raw materials to the facility. In its simplest terms, finished units out triggered a raw material delivery in. What makes this model supreme is a predictive product demand. This is based on having a fixed customer base and/or a fixed product that can be trended year after year based on past historical usage. Demand ebb and flow is minor and is usually accommodated within the natural bottlenecks of the system.

Life is Good

An example of a mass-flow model can be reviewed at a particular egg producer who owns a feed mill. The feed mill is basically the company store for the corporate farmers surrounding the plant in a three-state area. There are so many hens based on the barn size. The feed to each hen is tightly controlled to produce a certain yield of eggs. Too little feed and the production drops. Too much feed causes dire consequences for the hens. The competition for the end product (eggs) is mature and the market demand is readily predictable based on historical factors. Marketing efforts results in a slow ramp increase in sales. The feed is highly specialized to the company's needs and the current mill setup does not present an opportunity for expansion into other types of feed. The plant manager has stated simply, "We count the number of trucks out, and when it hits XYZ, I put in the order for another rail car (raw material)."

The silos are sized to hold slightly more than a full rail car. As the raw material silo empties, they switch to the second one.

If there were a decision to increase egg production, it would require additional barns that would take months to permit, build and stock. The quantities required and the feed demand would have been calculated in the initial ROI planning stage, offering ample opportunity for the feed mill to adjust. No problem. At worst case, an additional raw material receiving silo at the site may be required to support an increase in egg capacity. This system works at this time because demand is relatively fixed, expansion is controlled, variety is limited and there is no need to market excess capacity outside of the home circle.

Enter a Brave New World

Let's now look at 'Best Donuts', a common, real-life example and see how they determined expenditures to improve productivity. Best distributes a dry mix in 50-pound bags to a number of franchise locations from their mix plant. The lack of an automated raw material inventory was actually hampering their productivity. A mass-balance model worked successfully for a number of years – '*so much*' bulk flour produced '*so many*' 50-pound bags and fit into '*so many*' trucks. The Mix Department Manager had been with the company for years and was responsible for the entire production inventory. Their experience over the years allowed them to anticipate peak demands and slowdowns.

Then, things changed in a big way! Suddenly, the regional franchise 'exploded' into a nation-wide phenomenon. The mix plant shifted from standard 5x8 workweeks to 24x7 to meet demand; even still, they were lagging. Best opted to forego a much-needed new plant expansion for what was considered the quickest remedy of all: to upgrade the existing process for increased throughput and productivity. Soon, the plant was upgraded with the latest in high-speed blending, material handling and packaging equipment to keep pace with demand – basically replacing older equipment with the latest and fastest. Today, the Mix Manager devotes 100% of his time to orchestrate the upgrades and direct the mix operations.

The dramatically increased volume buys of flour and other ingredients were shifted to a new full time Purchasing and Logistics organization. The group was responsible for bringing in over 2,000,000 pounds of flour per week, 24x7.

Demand soon outstripped their mass flow methodology causing other symptoms of the problem to surface:

- They manually taped and monitored 17 receiving silo levels daily, sometimes more often; bin inventories never matched the throughput.
- Operations increasingly needed more information but found it was incorrect or obsolete. Breaking someone away from another job to take inventory readings was a problem. Records were manually maintained and often misread which lead to further costly delays and mistakes.
- More material would be ordered than possible to store. Multiple trucks sat idle waiting to offload when capacity was available.
- When material usage rates were overestimated and silos overfilled, flour plugged the bag filters and caused a material spill which needed special handling cleanup.
- And so on. Sound familiar?

Solving the symptoms of the problem lead to more costly problems. Maintenance was called to repair the transfer system, only to discover that there was no more material to convey. They then had to expedite material in (at a premium) so the line could continue to operate. A fallback system was established using bags, but the material costs were much higher than the bulk truck purchases, were harder to handle and store, empty bags needed to be disposed of, plus this method would not provide sufficient material to allow the line to operate at its peak efficiency. Manual inventory accounting methods also were causing problems for Purchasing and Accounting. Receiving shipments were double booked, tickets accidentally lost, causing more time to reconcile the inventory differences and costs.

Enough!!

For a \$75,000 investment, they soon discovered they could eliminate that much wasted resource in less than 3 weeks!

The decision was made to install a continuous, automatic inventory system. Cost was initially justified based on plant production interruptions due to outages and maintenance costs due to overfills. Material run-outs were a weekly occurrence, which idled production for 3-5 hours. Overfill costs included the hours required to physically clean up and dispose of the wasted material and fix the bag filters. Incidental costs were noted as lost maintenance hours for production line maintenance, hours required by purchasing to coordinate expediting material, time required to record tank levels, time required to resolve month end inventory discrepancies and insurance risks for access to high areas.

The final needs assessment was that a bulk inventory system was required for a cross section of departments:

- Operations: available production runtime to minimize downtime.
- Purchasing: reorder purposes to eliminate expediting costs.
- Maintenance: more uniform material flow for reduced maintenance and downtime.
- Accounting: reliable month-end financials to eliminate demurrage & haul back charges.
- Receiving: directing the filling and emptying of the silos for an orderly receiving flow.

You're Not an Island

3,000-miles away in a completely different industry, a vinyl window manufacturer had very similar problems to Best Donuts. Various materials are shipped from over 2,000-miles and arrive at a local railhead in tanker cars. A local trucking company who performs the hauling was actually acting as intermediary storage. The company goal was zero inventory with JIT delivery. This presented an extreme challenge to their Finance department where a railcar delivery date carried a 10-day window after its order.

ROI: 30 Days

Justification for automating the inventory system and providing access to the data through the company's intranet was focused on three areas:

- 1 Maintenance was charged with gathering and formatting the data for dissemination throughout the plant. If this piece could be automated, they could gain a full day of productivity elsewhere in the plant.
- 2 Purchasing was spending 20 hours a month analyzing the inventory needs data and coordinating deliveries. They would often be in on weekends to review and check delivery schedules both with the rail company and trucking firm. In spite of this effort, they were spending an estimate of \$3000 per month in demurrage charges – paying for a railcar to sit while storage space at the plant was made available.
- 3 The transport company was given access to the data for them to coordinate the deliveries from the railcars to the main plant. This effected savings to them as they can keep tighter control on the inventory, better utilize their existing truck fleet and deliver material at the most cost effective times to them. A shift from peak to off-peak receiving times cut their transportation costs by 300%. The experience of the trucking firm has been so successful that plans are now underway to tie the raw material suppliers, located 2,000 miles away, into the network data for them to better anticipate production modeling, shipping times and evaluate rate alternatives.

Summary

Justification for automating the inventory system and providing access to the data through the company's intranet was focused on three areas:

ROI gains cut across all departments:

Maintenance, Operations, Receiving, Logistics, Accounting and Finance. Key to the productivity gains is automating the bulk material information process and making it possible for all levels of the organization to have quick, accurate and specific information to make firm decisions to eliminate waste. The need extends to all members up and down the supply chain. This effort improves the both the ability to react to market changes and cash flow: from improved inventory information comes the ability react to demand changes quickly, better capacity utilization, increased run-time, less disruptions and lower maintenance costs (e.g. damage from machinery running dry or plugged as well as costs from spill cleanups and physical labor for disposal). All departments are using the same information but in different ways so they need accurate, accessible and flexible means to network and execute daily work. As this process evolves, plants will eliminate wastes and calculate their efficiencies, which will fuel even further refinements.

Suppliers benefit from better utilization of their delivery fleet and the ability to serve their customers. This all puts to work otherwise 'sidelined' capital for more productive improvements during uncertain times and beyond. The paybacks for these improvements are amazing which suggests the advent of new tools and technologies evolving to meet these real, exciting needs.

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