Achieving Value in Packaging Line Operations

Wonderware Industry Application for Packaging

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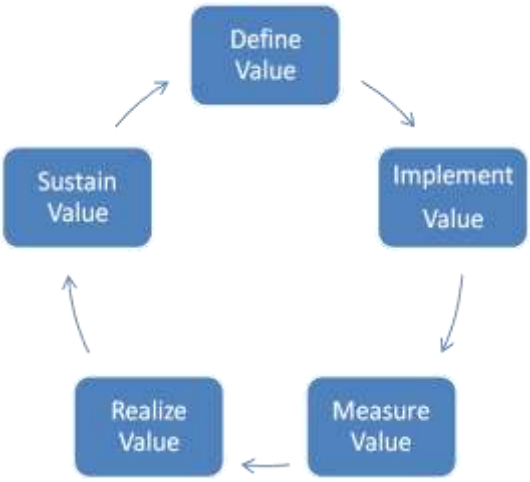
Operations Value Through Continuous Process Improvement

Continuous improvement is a journey, not an event. The following process generally describes how companies relentlessly seek continuous improvement initiatives. It revolves around the customer and its prime business drivers. At any given time and depending on several factors, companies seek better products, fast and agile delivery, cheaper costs, quality, compliance and governance.

Company drivers will be similar in a given industry since they are factors in the same market whether it is global, regional or local.



The manufacturing value chain comprises many steps. For any given step, value-add is the main opportunity to innovate and relentlessly aim at creating even more value.

Finally, continuous improvement includes a change management component. Improvements have to include people and mitigate risk or realized value will not be sustainable.

Many opportunities exist inside the manufacturing value chain. The general process steps usually will comprise material preparation, batching and packaging. When reaching the packaging process step, the final product is complete and only the end-consumer format is missing.

Packaging is the last manufacturing step that adds value to the consumer product. Packaging is demand driven.

Packaging is what the customer sees and how brand is recognized. And because consumer needs vary, packaging is a prime candidate for supply chain optimization and scheduling.

Line-of-business management will often have objectives that include the **reduction** of:

- Delivery time
- Start-up time
- Changeover time
- Product loss
- Overhaul and repair time

- Downtime

More recently, management expectations objectives have included an increase in:

- Packaging flexibility
- Throughput
- Mean Time Between Failures/MTBF

Significant value can be found and defined inside companies that are seeking improvement and consider the above objectives as critical success factors.
In this industry where retailers are the power players, prime shelf space dictates inventory turnover, which in turn affects return on gross margin, profitability and ultimately earnings per share.
Senior management will often need to see the business case showing increased customer service, better product mix, key customer retention and other factors to improve market position.

Packaging-Line Islands

A packaging line can be compared to islands of information as companies often assemble a line using different machine vendors or OEMs. On a typical high-speed packaging line, many line-configuration types[1] can be found. Equipment is connected through a common network (type 3) or simply to internal sensors indicating if the accumulator is full or empty (type 1). Since equipment vendors have to guarantee certain performance levels to their customers (unit rate per unit of time), very often they are reluctant to change their control system program.

Several surveys by *Packaging World Magazine*[2] have demonstrated that a typical manufacturing company will have packaging lines with the following characteristics:

- 50% of all packaging lines do not have a common network between equipment
- 50% of all packaging lines have between two to four control system vendors
- 50% of all packaging lines have between two to seven pieces of equipment or machines
- 50% of all packaging lines do not have a common standard to exchange data
- Machine vendors/OEMs typically do not account for a supervisory system; only production data is typically used.

Wonderware Industry Application for Packaging

The Wonderware Industry Application for Packaging software delivers a standard and normalized data layer for all packaging line types. The benefits derived from the Industry Application for Packaging address the main requirements expressed by both manufacturing companies and machine vendors/OEMs:

- All machine builders and control suppliers adopt a standard way of referring to and communicating packaging line data.
- Software to automatically convert production events (and equipment data) into actionable information.
- Making equipment or machine data available to supervisory systems and historian.

[1] OMAC line types
[2] Packaging World Survey, 2003

- Reducing the amount of data collected manually.

Defining Value

Value is defined as identifying those benefits that support the specific customer business drivers. Value can have many faces depending on who utilizes the data. The line operator and their supervisor will generally want real-time, actionable information since their goal is to ensure that packaging-line assets deliver products at planned rates.

Quality personnel will want to minimize give-away while maintaining product quality attributes. They also need to respond to process drifts before defects are produced. This will typically require using control charts on critical control parameters on the process. The product brand can never be compromised.

Production planners seek to optimize the supply chain while respecting the order fulfillment plan. Maintenance staff wants to maintain asset availability at all times, which is a challenge since there can be many different machine vendors or OEMs, all having different ways to diagnose problems.

The bottom line is different personnel have different information needs and how much value they identify is likely to be different.

Line Operators and Supervisors want to prioritize actions on the packaging-line asset. Visuals like Pareto charts works best for these individuals. Maintenance crews - electricians and mechanics - want a standard way to access machine-level information. Standardization means less training and faster problem resolution.

Production planners want flexibility in sequencing and dispatching orders to their respective lines. Flexibility means more orders with less quantity, so a fast change-over is a critical factor in measuring line productivity. They also want to wait as long as possible before they release orders. This gives them an edge in responding to ever-changing consumer/market dynamics.

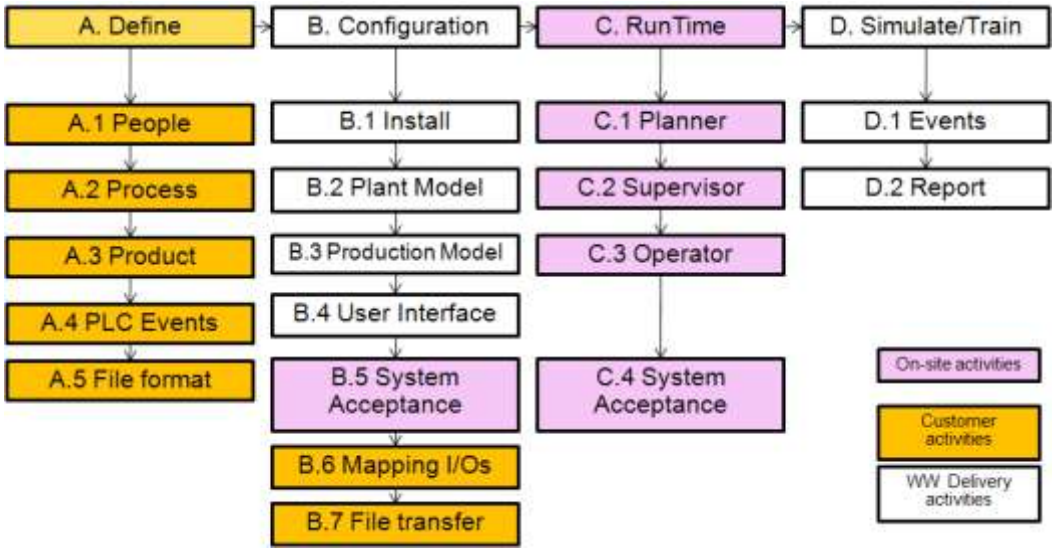
Implementing Value

Value can be implemented by deploying and commissioning a comprehensive solution that can deliver information for all personnel. Companies are also restructuring to meet market demands, and are now regrouping engineering and Information Technology resources. Total Cost of Ownership and risk mitigation are being closely examined. Those solutions that can scale and capture best practices are being evaluated and funded; manufacturing is not a tactical decision anymore, where only cost reduction is the driving criteria

Platforms must deliver basic services (security, diagnostics, messaging, alarming, connectivity, etc.) and enable incremental growth. This way, long-term strategic objectives are addressed, usually funded by corporate or plant budgets, and fulfilling short term needs that deliver value to personnel.

Change-management technique teaches the following strategy: to rally people around a positive change, one should have a quick win that clearly demonstrates the desired 'to-be' state. To achieve this, the implementation process should be tightly packaged to obtain this quick win.

The **Wonderware Industry Application for Packaging** delivers a standard delivery process based on realizing value for all staff members involved in packaging operations.



Measuring Value

Various personnel will need different metrics to define their value points. In the packaging industry, direct material typically accounts for over half of the consumer unit cost. What this means is by the time the process hits packaging, the majority of the direct costs are buried in the product. Any defects or product give-away translates into pure profit loss. The *Wall Street Journal*[3] recently published an article discussing this issue:

"… Previously, it was cheaper for a food company to purposely overfill some bottled beverages than to spend money on machinery, computer systems and staffing necessary to ensure that a 16-ounce bottle was filled precisely. Rising sugar, cocoa, and other food prices have convinced the company to 'wage a war on waste' and make those investments,…"
- Jeff Kurtenbach Nestle USA's Vice-President of Supply Chain

Production planners may want to measure a different kind of metric; one that determines adherence to the production plan.

Quality personnel may want to measure if the process is moving outside control limits and raise an alarm long before the packaging line starts producing defective parts or units.

In either case, to measure progress, one needs to baseline the 'as-is' situation. Only with a baseline can personnel monitor improvements or issues. Performance 'baselining' can be as simple as measuring a machine vendors' equipment uptime and downtime or it can extend into measuring composite indicators like overall equipment effectiveness (OEE).

[3] The Wall Street Journal, 'Weak links in the Food (Supply) Chain', by Ben Worthen, June 24, 2008

The **Wonderware Industry Application for Packaging** delivers **standard tools** to measure packaging-line performance:

- Basic State Model
- Downtime and Utilization
- Order Management
- Overall Equipment Effectiveness (OEE)
- Parameter Download; In-Line Quality

Realizing Value

According the ARC Advisory Group[4], industry leaders have the following characteristics:

- They empower their people
- Their processes rely on automated enterprise-wide line performance management systems
- Their technology networks machines together
- Their information supports evolving standards and guidelines

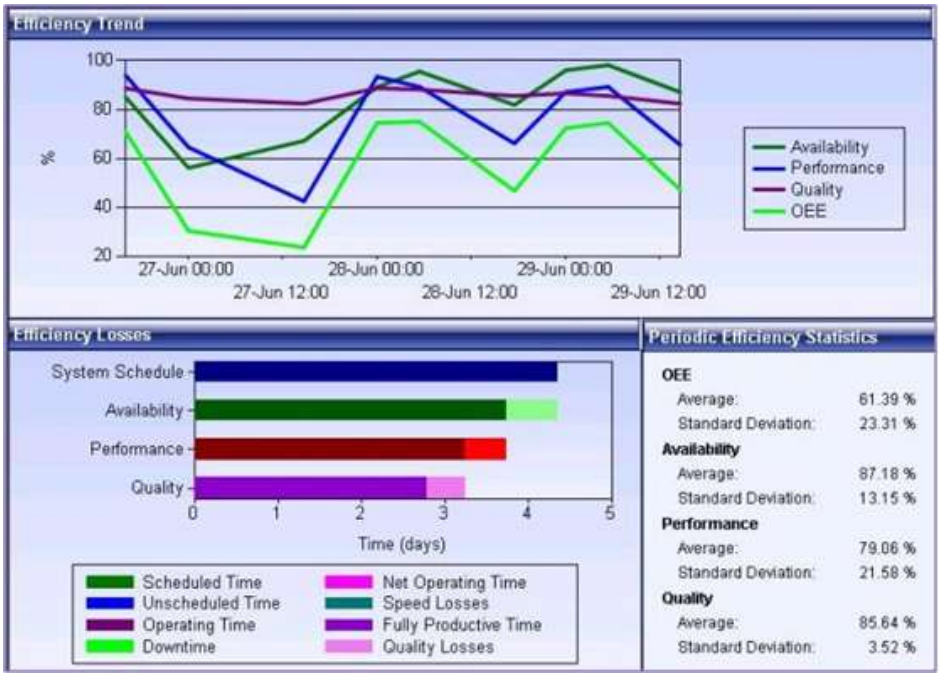
Realizing value should and must close the loop on the business drivers identified when defining value. Operators and supervisors collaborating together should be able to use the information from the computer systems to measure, improve and support their business processes.

Realizing the value also needs to include the platform technology to achieve economies of scale and economies of scope.

Economies of scale - deploying and supporting standards and guidelines which can be rapidly rolled out to many plants. It also means standards and guidelines can be shared with our partners, whether they are machine vendors or contract manufacturers.

Economies of scope - the technology or platform deployed uses a common set of services like high availability, security, messaging, alarming, common namespace and other parameters that can be leveraged across all manufacturing facilities. Economies of scope include third-party partners that develop their own solution on the same platform as your company does.

[4] Best Practices in Packaging Operations, ARC Advisory Group, September 2007 (we need permission from ARC to cite if you have used without changes)

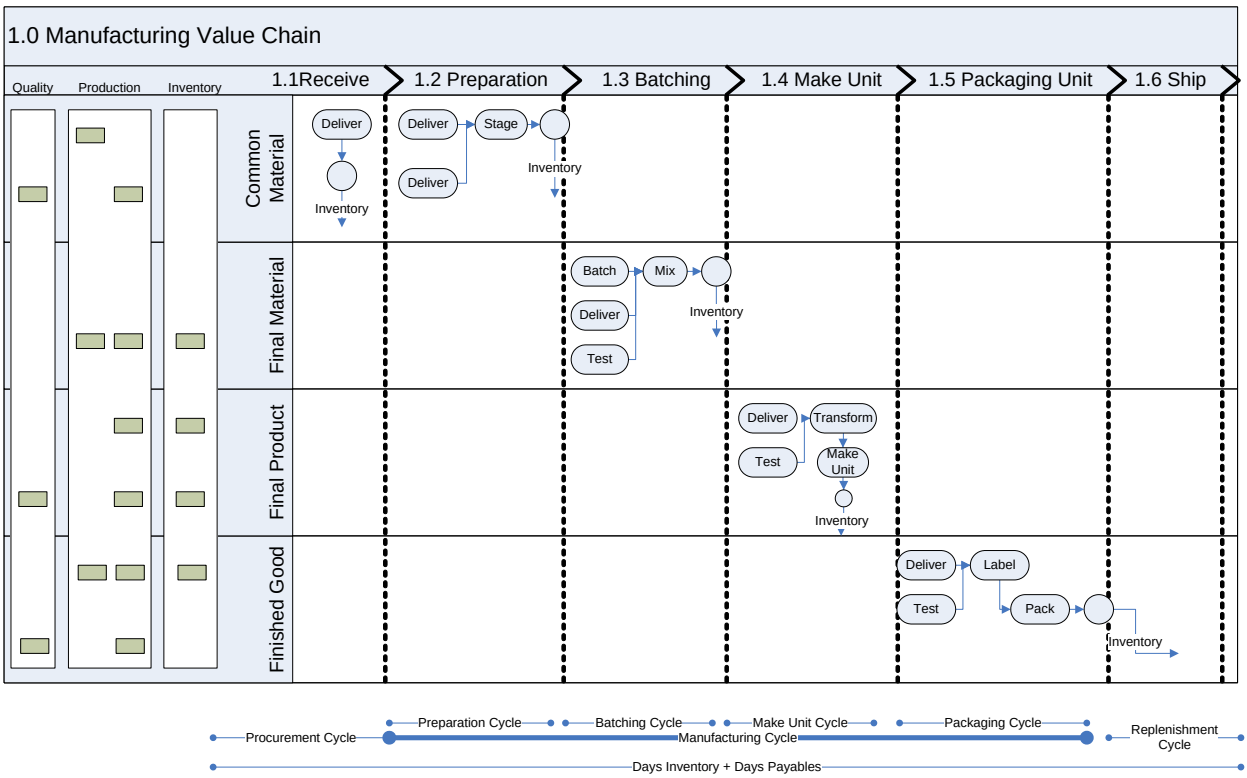


Sustaining Value

Value is sustained when incremental benefits are aligned with strategic objectives, such as protecting margins, increasing customer service or augmenting product mix in different regions. This can be achieved by using standards like OMAC or others. In addition, the same platform that delivers the core set of services can be extended in Packaging or also be used upstream into other process areas. Diminishing returns will be experienced once low-hanging opportunities are satisfied. However, continuous improvement is a journey and the same platform that drives process optimization should also be used to support process innovations.

The **Wonderware Industry Application for Packaging** leverages the same platform used for packaging continuous improvement initiatives and can extend into upstream processes like batching and material preparation.

In doing so, the manufacturing value chain will have the technology to make it a competitive advantage on quality, production and inventory for your company and a strategic lever to differentiate you from your competitors.


1.0 Manufacturing Value Chain
Quality
Production
Inventory
1.1Receive
1.2 Preparation
1.3 Batching
1.4 Make Unit
1.5 Packaging Unit
1.6 Ship
Common Material
Final Material
Final Product
Finished Good
Deliver
Inventory
Deliver
Stage
Deliver
Inventory
Batch
Mix
Deliver
Test
Inventory
Deliver
Transform
Test
Make Unit
Inventory
Deliver
Label
Test
Pack
Inventory
Procurement Cycle
Preparation Cycle
Batching Cycle
Make Unit Cycle
Packaging Cycle
Manufacturing Cycle
Replenishment Cycle
Days Inventory + Days Payables

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