

How Distribution Centers can Reduce Shipping Costs and Improve Visibility From a Variable Product Mix

No industry seems to be immune to the changing dynamics of shipping a highly variable product mix while serving today's online purchasing obsessed customer base. Consumers can get virtually anything shipped from almost anywhere in the world. In a marketplace where ecommerce is changing business models from fashion to groceries, and where consumers have largely pulled away from the standardization in everything from McDonalds to automobiles; manufacturers, brick and mortar and online retailers, and fulfillment distribution centers are challenged with adjusting to the new paradigm of buying and selling.

The result of changing consumer behaviors and preferences is greater customization and options for any given product mix, adding complexity and variability to each shipment and creating challenges throughout the packing and shipping process. "...the 2016 survey [Annual Warehouse and Distribution Center Operations Survey] certainly suggests that complexity is here to stay. This year, only 9% of the respondents handle full pallets on the outbound side..." (Michel, Roberto, Editor at Large, MMH, Ready to Confront Complexity, Nov. 2016, pg. 54) For many companies and fulfillment centers, dealing with product shipment variability means evaluating the manner in which current packing processes are managed. While changing these processes may initially be daunting, studies show it will be worth the added effort because online sales are not projected to decline. A recent study focused on the projected growth of E-commerce states, "Internet shopping will continue to expand as it gives consumers access to a wider range of goods, including products that may not be available in some local areas. The increasing ease of merchandise returns will promote customer loyalty as well" (The Freedonia Group, Retail E-Commerce Packaging Market in the US, Nov. 2016, pg. 19). Exhibit 1 from The Freedonia Group study outlines the projected growth in E-Commerce across common industries in B2C related retail.

As online sales continue to grow across consumer and industrial market sectors, the focus of effectively packing and shipping variable goods orders will remain critically important.

One Size Does Not Fit All

Fulfillment centers are now familiar with DIM charges established by commercial carriers in late 2014. DIM or dimensional weight fundamentally changed the way shippers were charged for freight. Now, the size of the shipping box matters. "Remember that the charges for excess dimensional weight will come back to you after

Exhibit 1

Item	2005	2010	2015	2020	2025
Retail Sales	4086	4286	5330	6270	7350
% e-commerce	1.7	3.3	5.5	7.8	10.2
E-Commerce Retail Sales	68.2	142.0	293.9	491.1	750.0
Apparel & Accessories	9.5	23.4	55.5	101.1	162.5
Computers & Electronics	17.4	29.8	43.2	59.4	78.5
Multimedia & Software	6.6	17.2	31.5	43.7	57.6
Home Furnishings	5.6	11.3	28.6	51.6	82.0
Health, Personal Care, Beauty	4.3	10.9	22.5	42.2	68.7
Recreation Goods	4.1	8.8	21.3	36.2	56.8
Food & Beverage	1.6	3.4	7.3	12.0	20.4
Other Merchandise	13.8	26.9	57.5	97.8	150.2
Nonmerchandise Receipts	5.3	11.2	26.5	47.1	73.3

Source: The Freedonia Group

the shipment as part of our invoice, and you will have a dilemma if you have already charged your customer for a shipment based upon an incorrect dimension", notes Peter Moore in his February 28th post on the Logistics Management website titled Increasing Complexity in Parcel, (http://www.logisticsmgmt.com/article/increasing_complexity_in_parcel). This could be the reason not all manufacturing-based companies or fulfillment have made a shift in the way they handle variable product mix shipments. Perhaps only at the end of the quarter or full year do they realize the overages they have paid in shipping fees. Compounding this issue is the fact that many shippers are not directly collecting freight costs in the first place but rather covering, at least in part, the cost of shipping.

In addition to shipping charges distribution centers and 3PL's are also facing logistic capacity issues coupled with shortened delivery time expectations. "No matter how difficult to execute, retailers must recognize shoppers expect delivery on their terms. Consumer psychologist Dr. Kit Yarrow coined the mentality as I want what I want when I want it" (<https://www.forbes.com/sites/kathleenkusek/2016/05/14/walmart-tries-to-capture-iwwiwwi-shoppers-with-free-delivery/#33334c1f1ae5>). Retail and ecommerce alike are delivering on the consumer expectation of fast and free shipping resulting in continued rise in demand which in turn has created some strain in the logistics pipeline.

On Demand Meets Right-Sized

The key element for fulfillment centers to change current operating dynamics related to the increase in variable shipments is to lower shipping and labor costs by reducing the overall size of each package and improving the packaging process flow. Making right-size boxes on demand is the method in which DC's can better manage variable shipments because they are able to produce corrugated shipping boxes that fit the exact dimensions of the product or products. In addition, some or a majority of pre-made shipping box inventory is eliminated.

Key Metrics for DC/Fulfillment Box On Demand Usage

Reduce transportation cost

increased packaging flexibility

Decrease or eliminate void fill

Decrease shipping damage

Improve customer experience

Distribution Centers run on efficiency. From inbound receiving through inventory management, to order picking, and to outbound shipping; the overall processes in each area are monitored, measured, automated, and evaluated for continuous improvement. Regardless of this high-level of efficiency, there is invariably a portion of the shipments that do not fit into the standard category of orders. Products which are too large for padded envelopes, oddly shaped, cannot be conveyed, or are not a good fit for pre-made boxes normally get funneled into a separate special handling packing area. Sometimes these products may also require extra care or packaging due to their size or fragile nature. The special handling section may only represent 3% to 10% of the overall volume of a given DC; therefore, these orders typically do not get the highest managerial priority level. In addition, finding a viable, easy-to-apply solution has proved difficult. This dynamic changed with the introduction of right-sized on demand box making technology.

Starting in Europe more than 30 years ago, the box making machine technology largely served the furniture industry. The concept worked well providing a method for making shipping boxes as needed and to the size and protection requirements of individual furniture pieces. Since this time, the concept of right-size box making on demand is becoming more understood and necessary in North America. The 2016 Deloitte and MHI Annual Industry Report highlights some of the top supply chain challenges in their survey of more than 900 industry respondents across supply chain. 41% saw customer response times as very

challenging coupled with increased in volatility of demand. 40% recognized a somewhat challenging environment for customer demands for more customized products and services. In kind, is the sentiment of 34% of the respondents who see customer demands for smaller, more frequent shipments as challenging. (The 2016 MHI Annual Industry Report, Accelerating change: How innovation is driving digital, always-on supply chains pg. 4). To overcome these challenges, fulfillment centers need to find better internal operating mechanisms for special order packing to react quickly to the changing demand or mix of products in customer orders. These applications are the places where Box On Demand® technology supports cost reduction and improves labor allocation.

The process of making right-sized boxes on demand involves an evaluation of current packing flow, estimated product mix and variability, history of purchased die-cut boxes, and product details related to fragility, weight, and other special handling requirements. Using this data, a packaging specialist will recommend the best size machine and range of corrugated fanfold widths. The machine is installed on site to make the required right-size boxes. Installation and set-up is provided by certified technicians and is usually completed in about 2 to 3 business days. The machine is not purchased, only the corrugated fanfold. Operator training, annual preventative maintenance, and 24/7 technical support for the machinery is provided for the site where the machine is installed.



Box On Demand® box making machine Compact 3.0 with integral ILG5 Gluer and Matrix™ Dimensioning Scan Table.

Typically in a fulfillment environment the on demand box making system would include a box making machine with a range of 1 to 6 bales of fanfold corrugated in various widths.. The machine automatically selects the right size fanfold to make each required box. A Matrix™ Dimensioning Scan Table is typically also included in a Box On Demand® system. The scan table allows a single operator to quickly and easily scan individual or a multiple item

order for the dimensions using a hand-held scan gun. The dimensions, along with the desired box type are sent electronically to the box making machine. The average rate of the machine is about 3 boxes per minute or 5 to 6 per minute in a batch operation. A typical system also includes an automatic gluer which is placed on the discharge of the box making machine. The operator retrieves the box from the machine and inserts the glue tab into the gluer. A quick press of a start button and the tab is glued in seconds. Once the box is made, it is usually placed with the products in a packing station or packed right at the machine. Pick-to-Box, pick-to-cart, and pick line are just a few of the many packaging configurations that are optimized for variable product shipments.



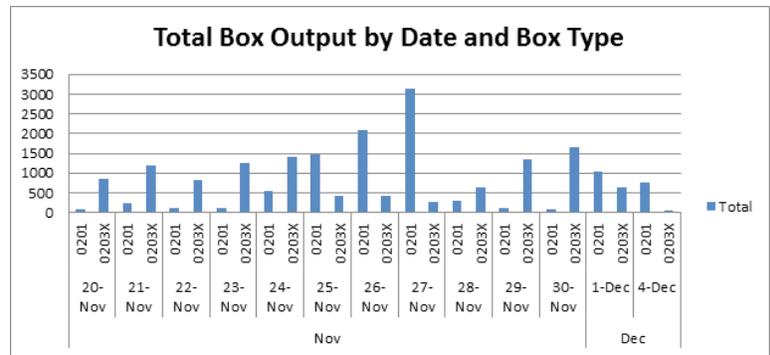
Corrugated Fanfold provided for a Box On Demand[®] machine in widths designed to optimize box size and type

An Industry Focused on Reduction

The on demand box system can communicate with a WMS using an Optimums[™] type platform. The communication link provides for seamless integration into operations and order management. Machine box data and history allow for usage, variation, loads by date, corrugate type usage, man hours and more.

The data from the machine allows for on-going management of the special handling area of fulfillment operations. WMS data can be coupled with the box data to evaluate overall cost savings related to DIM charges, labor allocation, and pre-made box usage cost avoidance.

The ability to manage operations and improve cost structures stems not only from the physical output of the on demand box machine but also from the available data. Data from the machine provides a window into the day-to-day output and labor hours. Coupling this data with data from a WMS system gives the ability to make educated decisions and take action.



Box On Demand[®] machine usage analysis highlights peak- and off-peak loads broken down by day and box type

The data also supports the efforts of fulfillment centers to curb the overall volume of packaging while improving product protection. Many of the large chain retail stores and fulfillment centers are not only focused on the corrugated shipping box but they are also working with OEM's to improve and reduce their product packaging. This effort makes shipping and packaging easier and more cost effective, reduces waste at the product and packing level, reduces costs, and improves customer satisfaction.

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Kevin has 10 years of software and on demand packing experience in the fulfillment sector. Kevin provides on-site analysis of current state, suggests order flow and process improvements, and delivers special handling order proposals using Box On Demand solutions. Kevin works with DC and fulfillment centers at the corporate and site-level providing support and recommendations toward the achievement of deliverables and metrics.



About Box On Demand®

Box on Demand is a global provider of equipment and systems for producing right-sized boxes on demand. Our technology delivers consistent, reliable operation backed by more than 30 years of field service. The wide-range of Box On Demand machines deliver quantifiable savings across fulfillment and manufacturing through optimization of the various packaging processes such as; pick-to-box, pack station, pack line, and other packaging arrangements. Our customers span markets from; distribution center, warehouse, and fulfillment, to furniture, cabinetry, and printing/graphics, to metalworking, medical device, electronics, home furnishings, and more. Our team of packaging specialists works with on-site teams to select the right Box On Demand system to meet throughput needs.