



WHITE PAPER

Profiling vs. Slotting: Continuous Optimization of Your Picking Operation

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INTRODUCTION

Has everyone gotten used to the idea that \$2 gas is here to stay? Unfortunately, even for money misers such as myself, I've already gotten used to paying in excess of \$2/gallon for gas and even got mildly excited over recent pump prices in the \$2.50 range. My, oh my, how times are changing.

Fortunately, the vehicle I drive delivers relatively good fuel economy and runs just fine on lower-grade fuel. It makes me laugh to think back when I had my first car in high school (think \$1K clunker) and thought I could make it run like a hot rod if I put the premium fuel in it. On the flip side, I'd be embarrassed today if I pulled up to the pump in a performance sports car or sedan and opted for the lower grade fuel over the recommended premium. Whereas most cars out on the market function just fine on the lower grade fuels, performance tuned engines will tend to ping or knock with the lower rated fuels and will experience a reduction in performance. For example, take the following statement that comes directly from a brochure for an aforementioned performance sedan in relation to performance...“Ratings achieved using required premium unleaded gasoline with an octane rating of 91 or higher. If premium fuel is not used, performance will decrease.”

Now, I'm not attempting to educate on the benefits, or lack thereof, of using the proper fuel for your car of choice. However, when taken into context with DC operations and specifically with the opportunities that exist with DC profiling and on-going slotting maintenance activities, I will point out how properly performed SKU/Order profile when coupled with regular slotting maintenance activities will enable DC operations to rev' up their picking performance.

FIRST THINGS FIRST

Numerous conversations I've had over the years with DC practitioners have indicated that many individuals and operations use the terms “profiling” and “slotting” interchangeably. While these are definitely complementary activities, I will argue they are different in terms of scope and value to the overall operation.

In order to set the record straight, let's start with basic definitions to set the direction for the remainder of the discussion.

SKU/Order Profiling: the analysis of historical and future/forecasted SKU and order data to gain an understanding of the impact of picking and replenishment to a sub-line level (each, case, pallet). Objectives include (1) gain an understanding of customer order profiles e.g.

lines per order, units per line, etc. (2) determine proper order picking methodologies and (3) determine optimal storage media profiles for the SKU population.

- Additionally, think of profiling as a planning function
- The data set reviewed for profiling activities mainly focuses on historical SKU and order data to set the baseline for future operations.
- SKU/Order profiling should be performed as necessitated by overall business changes such as acquisitions, shift in order fulfillment dynamics, SKU growth, etc. Normally speaking, this is an annual activity at best but more likely once every 2 – 3 years.

Slotting: the ongoing analysis and maintenance of current individual SKU placement within a defined set of storage media.

- Think of slotting as an ongoing maintenance function
- The data set review for slotting mainly focuses on future sales forecasts or advanced order information attainable through an order management system.
- SKU lifecycles and/or seasonality aspects of the SKU base will determine frequency.

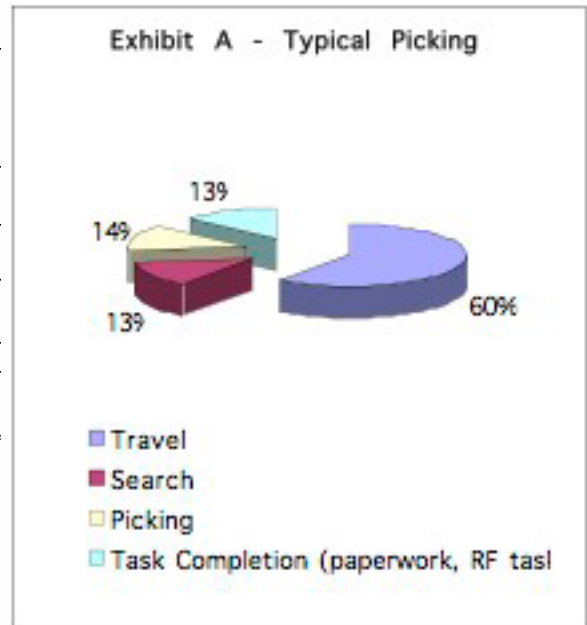
As seen in these definitions, there's a clear correlation between the two activities. The next step is to clarify why each of these activities are necessary for a finely tuned operation.

WHY PROFILE?

I think it would be a safe assumption to say the majority of distribution professionals are or should be striving to reduce internal DC operational costs. This makes perfect sense in light of continuous improvement initiatives and other activities affecting the balance sheet. If this is indeed the case, what activity is typically the primary cost driver in most DC's? If you guessed picking, then you're correct. Furthermore, when you look at the components that drive picking costs, travel time to the pick face typically comprises upwards of 60% of the overall cost – Refer to Exhibit A.

When taking this into consideration, the obvious call to action is to attempt to eliminate all unnecessary travel time. The fine line however is that depending on the SKU base and order volumes, congestion in the picking area may cause productivity robbing bottlenecks.

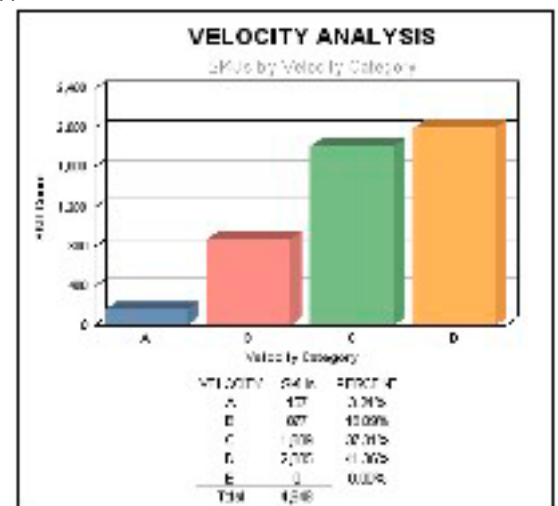
There are several factors that may nega-



tively impact travel distance and/or overall picking costs. Some of these may include:

- Poor picking methodologies
 - What's correct for the operation? Discrete, batch, zone, wave, continuous, etc.
- Improper storage media mix based upon SKU and order characteristics
- Lack of active slotting maintenance
 - Dead SKU's occupying valuable pick faces
 - SKU seasonality / lifecycle

Examining these factors in depth reveals that profiling can help alleviate each of these issues. Matching the picking methodology to the operation is a topic in of itself as is the proper allocation of storage media based on actual SKU characteristics – while both are very important profiling aspects, they aren't the focus of this article. However, rest assured, when examining order profile information (e.g. daily orders, daily lines, daily units, units per order, lines per order, units per line, etc.) and slotting profiles (SKU velocity, cubic volume



movement, etc.) will help paint a clear picture of the valid picking methodologies and storage media requirements.

Next, how in the world can individual SKU seasonality impact the DC footprint and ultimately travel time? In order to answer this question, I'll include a series of exhibits to help "paint the picture". Please note each of the exhibits is based upon an identical data set that was representative of twelve months of SKU/Order data and for the sake of ease, I'll take the vantage point of reviewing only the highest velocity SKU's. This will change on a case-by-case basis but in this sample, it's also worth pointing out that an "A" SKU was picked in excess of 20 lines/day, "B" SKU's 1 line/day, "C" SKU's 1 line/month, "D" SKU's < 1 line/month.

Exhibit B-1

Exhibit B-1 illustrates a SKU velocity analysis. As you can see in the legend, the data set contained a total of 4,848 SKU's. Of these SKU's, only 157 or 3.24% were deemed to be the highest velocity SKU's or "A" SKU's.

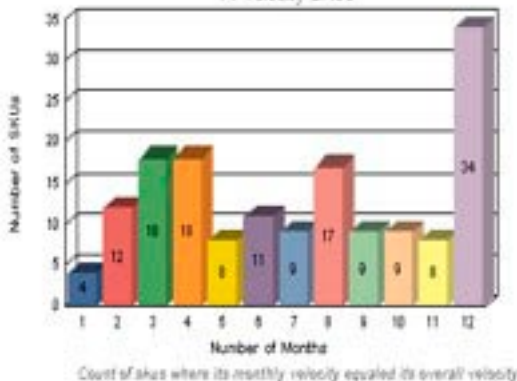
Next, in Exhibit B-2 we look at the 157 "A" velocity SKU's to determine how often they actually acted like an "A" SKU over the course of a year. To further help orient you, it should be clear that out of the 157 "A" SKU's, only 34 of them actually displayed characteristics of an "A" SKU for the entire year and 8 SKU's for 11 months, 9 SKU's for 10 months and so on.

Finally, Exhibit B-3 is a different view of Exhibit B-2 and shows the aggregation of the "A" SKU's across the year and how they behaved on a month-by-month basis. Hopefully, this is where the picture begins to clear up a little. At the maximum, 110 SKU's behaved as an "A" SKU in the month of July with approximately 75 SKU's

Chart B-3

SEASONALITY

'A' Velocity SKUs



behaving as an "A" SKU in the month of August. Also revealing is the fact that the yellow colored bars indicate zero activity within the respective month - meaning in the month of August, approximately 65 - 70 "A" SKU's had absolutely no picks against them. In other words, think in these terms...if these 65 - 70 SKU's were permanently slotted during the month of August, how many times did my pickers needlessly walk past those locations to get to their intended location?

Based on this analysis, should the forward pick area designated for "A" SKU's be large enough for 157 SKU's plus a buffer for additional growth and to facility reslotting efforts? Or should the baseline number be closer to the 110 SKU's represented in the busiest month of July? One of the key factors that may influence this are the cubic dimensions of the representative "A" SKU's. If the cubic volume requirements to sustain the appropriate amount of forward stock and thus minimizing replenishment activities is minimal, then the cost associated with increased travel time will be preferred over the cost of maintaining the necessary reslotting activities. On the flip side, if the cubic volume requirement is significant, then the footprint required for the "A" SKU's would definitely increase relative to the number of SKU's that are slotted.

Please remember, reducing travel time is only one of many potential benefits of conducting an accurate SKU/Order profile for your DC.

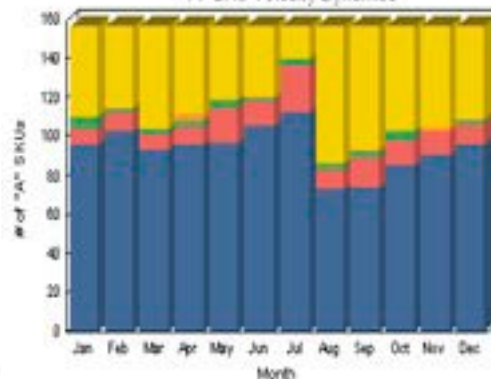
HOW TO GET STARTED?

The first requirement is need for ideally twelve full months of actual SKU and Order historical data. Please note, if the profiling engagement is being utilized to evaluate the entire DC operation, then other data relating to inbound activity should be included. At a minimum, the

Chart B-2

Velocity Analysis

'A' SKU Velocity Dynamics



following data should be available:

SKU Item Master

- SKU
- SKU Class
- SKU Description
- Unit of Measure
- SKU Dimension (L x W x H) plus weight
- Inner quantity (if applicable)
- Inner Dimension (L x W x H) plus weight
- Master Carton Qty
- Master Carton Dimensions (L x W x H) plus weight
- # of Master Cartons / Pallet
- # of Master Carton / Pallet Layer (Tie)
- Pallet Dimension (L x W x H)
- Conveyable (Y / N)

Order Header

- Order #
- Order Print Date
- Order Ship Date

Order Detail

- Order #
- SKU
- SKU Description
- SKU Order Quantity

**Additional information such as carton header and carton detail information, if available, is extremely useful in helping determine carton rates and thus automation options, proper SKU/Volume balancing, etc.

OK, YOU'VE COLLECTED THE DATA, NOW WHAT?

In order to get the clearest picture, the SKU and Order databases will need to be cross profiled to gain an understanding of the sub-line level (each, case, pallet) activities. This will shed light on the true picking activities and opportunities. For example, the data sample revealed the top "selling" SKU sold 100,000 units. In absence of actual order line detail, does this represent one order for 100,000 units; one order for 100,000 units; ten orders of 10,000 units; one hundred orders of 1,000 units; one thousand orders of 100 units; ten thousand orders for ten units; one hundred orders for one unit; or most likely, some mix of the above? Bottom line, by cross profiling the databases, you will gain insight into opportunities where some order lines could be most efficiently picked by some combination of pallet, cases and/or eaches. Not only will this answer go a long ways towards determining the footprint for your picking operation, but also towards determining the picking methodologies and storage media requirements.

Long story short, good luck performing this analysis with a spreadsheet tool. Proper cross

profiling of the aforementioned data sets will preclude the use of a data base tool. Additionally, I just may be a dull person, but I think the seasonality analysis presented above is some pretty cool stuff! Most anything is possible, but either you are way smarter than most people and you have a lot of time on your hands if you can do this analysis with in Microsoft Excel.

HOW DOES SLOTTING FIT INTO THE EQUATION?

Go back to the initial definitions and notice that slotting is defined as “an ongoing maintenance function”. Just like any other maintenance function, let it slip and performance will most likely suffer. There’s obvious exclusions to this rule but going back to the initial analogy, try driving your performance car and never changing the oil or giving it a sip of the good ole’ premium fuel. It’s pretty clear what’s going to happen.

The same holds true for your DC operation. Unless your operation is comprised of a static SKU base with extremely long life cycles, then chances are your DC could benefit from regular slotting maintenance. How regular you reslot as well as how you conduct the analysis will depend once again on the actual SKU dynamics (number, life cycles, seasonality, etc.). Bottom line, there are tools that can be internally used and/or developed or if you’d prefer to not recreate the wheel, packaged slotting software solutions are available. If you choose the latter, I’d advise to do so in a methodical manner. It’s my sense that while the number of installations is growing, the user community is still quite small. This can be attributed to a number of unmentioned reasons, but if this is the solution of choice, do yourself a favor and become an informed buyer – rarely is there a “silver bullet”.

OPPORTUNITIES REVISITED

- Reduction in DC footprint
- Reduced travel time to pick face
- Reduced replenishment activities
- Reduced stock outs due to incomplete replenishment activities
- Increased picking performance
- LOWER COST per line picked
- And many others...

Can you live with the pinging and knocking in your operation? Due to constantly changing business requirements, some pinging will naturally occur; however, if this is a frequent and on going issue, then you may want to look at your profiling and slotting activities to see if you can rev’ up the performance of your picking operation.

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