Freight Quote

**Project:** The freight for an order value <$500 is paid by the customer. I am trying to find a way to estimate the shipping cost instantly, so it can be displayed during their checkout process on Laddawn.com.

**Proposed Process:**

1. Inputs: In order to estimate cost we should know:
	1. Items and their quantity to be shipped
	2. Shipped from
	3. Shipped to
	4. Carrier to be used
	5. Master Pack sizes
2. Pack Items: We can use a 3D bin packaging API to optimize how we pack items(<https://www.3dbinpacking.com/en/login> ). This API will tell us which items should be packed In which box, and how they can be packed together. I have used this to create the packing instructions (sample attached). As a result we know the weight and dimensions of every master pack in an order
3. Estimate shipping: We can connect to UPS or FedEx API (when one is picked) and pass in the details of the shipment to get an estimate of cost
4. Physically pack items: The shipping team will get the packing instructions (as attached) and they can pack items as per the sheet.

**Tests done:**

I have performed two rounds of shipping tests. For these tests I create packing slips for a few orders, describing how Items should be master packed, and then check whether the instructions worked in a real life setting and to identify improvements.

I am happy to say that the packing instructions work for the most part. It does have some break points and below are my observations:

1. The box dimensions tend to change if we change the vendor. As we do not keep track of the inventory sizes, the packing algorithm is likely to not work in some cases
2. For the most part, the weight on file for an item is near about what is expected, however, we should once verify that weights are accurate.
3. The algorithm is designed to minimize the number of boxes used under constraints of overall Box wt (the current constraint is <=65 Lbs). This has led to the system picking the largest box, especially for odd shaped items (which are long in just one dimension). This in turn led to  a lot of empty space in boxes. Our shippers sometimes mitigate this problem by combining 2 end caps together.
4. It created a few packages with only one item per box. These items can be mailed as is with ought packing. This is an easy override and can be fixed.

**Other Observations and Notes:**

1. As the shipping team cuts and resizes boxes, the actual weight almost always is > the dimensional weight (Except for certain BOR Items. These items are not master packed). This means that if the packing can just ensure that items be grouped together as per the packing slip (and not necessarily packed in the exact box as the algorithm) we should have a good estimate

**Action Plan:**

1. Verify data on file
2. Improve packing algorithm
	1. Include sizes of boxes that can be formed by combining two end caps
	2. Reduce the box size for individual end caps in the system to account for the extra flaps
	3. Estimate-stack height, to reduce dimensional wt.
	4. Run next test
3. Pre-Launch: provide shipping the packing slips and provide the quoting system to CE. This will allow us to test this system.

**Cost Benefit:**

Cost of the New System

1. Number of stock orders a month <$500 on web : ~ 6,000 -> API cost $ 105
2. Number of total orders on Web : ~10,000 -> API cost $ 140
3. Number of Abandoned carts: ?

Cost of Current System:

CE time spent on Quotes a month: 220 Hours (rough estimate)

**Other benefits:**

1. Better responsiveness on website
2. Easier purchase decision for customers

**Estimated Freight vs. previous Freight:**

There is a difference between the values that the UPS API returns

|  |  |  |  |
| --- | --- | --- | --- |
| **Shipment ID** | **Freight Paid** | **Freight Estimated** | **Observations** |
| 419967 | 22.32 | 26.14 | This is primarily due to the difference between the UPS API and clipper ship calculations |
| 419852 | 17.11 | 19.37 | Same packing method used. There was difference in actual wt vs calculated wt |
| 419961 | 33.37 | 39.71 | This is primarily due to the difference between the UPS API and clipper ship calculations (This shipment was on dimensional weight) |
| 419994 | 141.1 | 207.55 | This order contained 5 items weighting 35.7 Lbs each. As per packing constraints of <65 Lbs per masterpack we estimated them as shipping individually, as against grouping. |
| 420234 | 12.71 | 14.11 | This is primarily due to the difference between the UPS API and clipper ship calculations |

**Questions:**

1. Is it alright to provide this packing instructions for only the pre pay and add orders
2. Can we print out a shipping instruction sheet, as attached for our shipping department