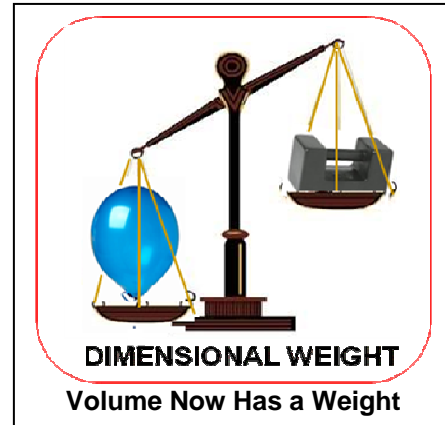


Dimensional Weight: Packaging and Shipping Tips

World of Dimensional Weight

Virtually every courier company is now calculating an allowable (dimensional) weight for the size of the package that you are shipping. The size of the package will determine the dimensional weight. If your dimensional weight exceeds the actual weight, you will be charged based on the dimensional weight¹.

It is important that you understand how dimensioning equipment works, how your courier company determines the dimensional weight and the impact of proper packaging to minimize shipping costs.



¹ For a detailed description of the mathematics of dimensional weight and DIM factors, read *Understanding Dimensional Weight and DIM FACTORS* included in your ExpressCube Operators Guide or obtain a free copy from the ExpressCube website (www.expresscube.com).

How ExpressCube Measures Packages

The ExpressCube product line obtains dimensions by measuring the dimensions of three faces of the package placed on the machine. Each measurement is taken 90° from the axis of the other two measurements.

The box must be pushed against the back of the machine to obtain the length measurement. The operator can slide the box to determine the box edges used for the remaining measurement (illustrated in red). This is useful when measuring irregular packages as explained later in this document.



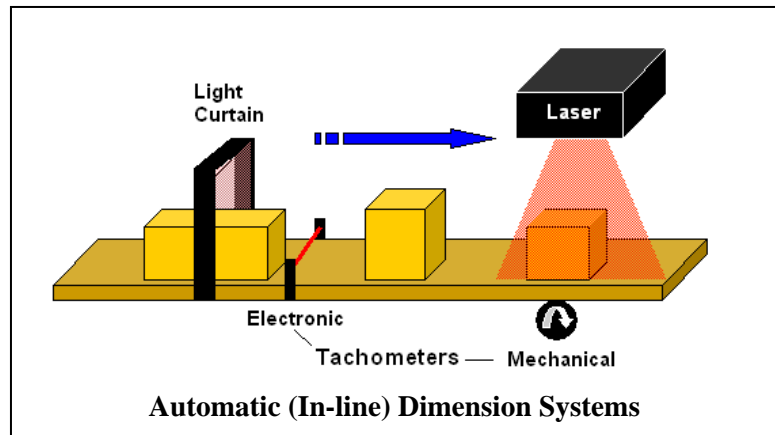
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How Laser & Light Curtain Conveyor Systems Measures Packages

Many large courier companies use automated (in-line) conveyor dimensioning systems to arrive at a dimensional weight. These systems may use a speed-based tachometer to measure the length of the parcel traveling on the conveyor and either a laser scanner or a light curtain (emitters/receivers) to determine height and width.

These automatic dimensioning systems are able to provide dimensions quickly. Without human intervention, automated devices measure the largest dimension on each axis irrespective if it is an actual part of the box, a fat packet of documents or a bulging flap. On a recent visit to a large courier depot, this author was able to change the chargeable weight indicated on a Laser dimensioning system by placing a marker on top of the parcel.



Appreciating the nature of the automatic systems allows shippers to package wisely and predict the effect of the deformed boxes.

Know Your Courier’s Method of Calculating Dimensional Weight

It is possible for two different courier companies to use the same DIM factor on the same package and arrive at two different dimensional weights for calculating courier charges.

The mathematical formula for determining dimensional weight for a package using a set DIM Factor is equal to volume (LxWxH) divided by the DIM Factor. The ExpressCube dimensional weight calculation utilizes straight mathematics obtained by multiplying the displayed dimensions and dividing by the DIM Factor.

The mathematical dimensional weight of a package 12¼ “ x 18½ “ x 24¼ “
DIM Factor = 194:

$$\frac{\text{Volume}}{\text{DIM Factor}} = \frac{\text{Volume}}{\text{Volume/lb}} = \frac{12.25 \times 18.5 \times 24.25 \text{ in}^3}{194 \text{ in}^3/\text{lb}} = \frac{5496 \text{ in}^3 \text{ lb}}{194 \text{ in}^3} = \mathbf{28.3 \text{ lb}}$$

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There are some courier companies that round up measurements before they are used in calculations. This can have a significant cost impact, particularly on smaller packages. These courier companies would calculate the dimensional weight as follows:

The rounding up method to calculate dimensional weight of the same package
 13 (12¼) " x 19 (18½) " x 25 (24¼) " DIM Factor = 194:

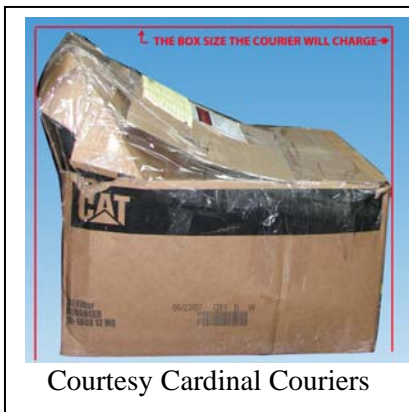
$\frac{\text{Volume}}{\text{DIM Factor}}$	$\frac{\text{Volume}}{\text{Volume / lb}}$	$\frac{13 \times 19 \times 25 \text{ in}^3}{194 \text{ in}^3/\text{lb}}$	$\frac{6175 \text{ in}^3 \text{ lb}}{194 \text{ in}^3}$	31.8 lb
---	--	--	---	----------------

In this example, subtle differences currently in use by two major couriers to calculate the dimensional weight of the same package would result in one charge based on 28.3 lb and another charge based on 31.8 lb.

Minimizing Package Size

Long gone are the days when a small item is thrown in an oversized carton and then surrounded in foam chips. It is possible to quickly surpass the value of the protected item with excessive shipping cost if a careful analysis is not used to determine the appropriate insulation required to protect an item.

While it is important to keep the size of the carton to a minimum, it is also important to find boxes that fit the item to be shipped properly. If an irregular item is presented to most courier companies, they will calculate the dimensional weight based on *'the minimum dimensions of a carton that would contain the irregular package'*. Loosely translated, the maximum measurements obtained by the automatic dimensioning systems will be used to determine the dimensional weight for invoicing.



These actual photos illustrate how sloppy packaging can incur extra shipping costs from dimensional weight. If the item pictured in the left photo was placed flat in a fitted box there could have been a 35% savings in shipping costs. Furthermore, irregular packaging is harder to handle and store making it much more vulnerable to damage.



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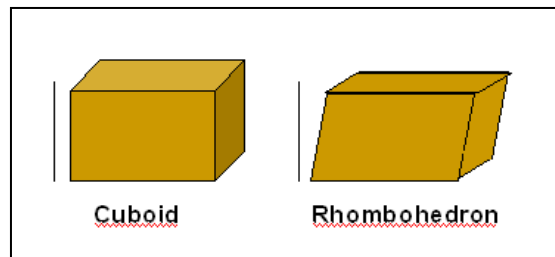
Remember that box manufacturers quote inside dimensions. The outside dimension used to calculate your dimensional weight will depend on the thickness of the cardboard, how it is folded and taped, the thickness of documentation, and, how a courier company treats fractional measurements in their calculations (as detailed above).

Measuring Packages on ExpressCube Dimensioning Systems

To acquire accurate measurements, the box should be placed such that the back surface of the box is in full contact with the rear height surface of the ExpressCube unit. The box must cover the three sensor arrays completely.

If the box is relatively light (e.g. pharmaceuticals, electronic components, etc), keep the top and bottom sealed flaps away from the ExpressCube surfaces (i.e. to the left and right sides of the operator). This procedure will negate any slight bulge on the openings that can cause the box to 'rock' on the surface due to the light weight of the box.

It is possible from box assembly or the contents that the box can become 'skewed' (some angles are not 90°) causing the box to change shape from a cuboid to a rhombohedron. Because two sides are 'skewed', there are two or more surfaces that will not rest flush against the ExpressCube height measuring array. To obtain an accurate measurement, rotate the box 90° to place a full contact surface against the height measuring array.



Note: The volume obtained by the ExpressCube for a rhombohedron for calculating dimensional weight will be accurate but as the box becomes more 'skewed', there will be a point that the courier company will treat the rhombohedron as an irregular shape and assess a volume based on the minimum size cuboidal box that could contain it. (If the edge of one side is 'skewed' 2" from the 90° axis, the courier company will calculate dimensional weight based on a box 2" larger in that dimension.)

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Measuring Irregular Cartons¹ With ExpressCube

ExpressCube systems are designed and rated for the measurement of cuboidal (square/rectangular) boxes. As illustrated above, understanding the method used by courier companies to determine the dimensional weight of an irregular shaped package allows an operator to obtain similar measurements on the ExpressCube by orienting the package on the platform to obtain the maximum dimensions.

¹The irregular carton measured on the ExpressCube must consist of flat surfaces of which at least two must be at 90° angles. Curved surfaces such as cylinders, liquid containers, bags, and pouches cannot be measured unless dimensional guides are used. (Described in the following section)

To obtain the dimensional weight of an irregular carton, rotate the object on the measurement platform such that the largest portions of the carton cover the sensor arrays. Remember that the length, width and height designations of the carton are arbitrary axis assignments to obtain a volume measurement – that is – freely rotate the carton on any axis to allow a measurement to be taken. Samples of measurement techniques are illustrated in the photos below.



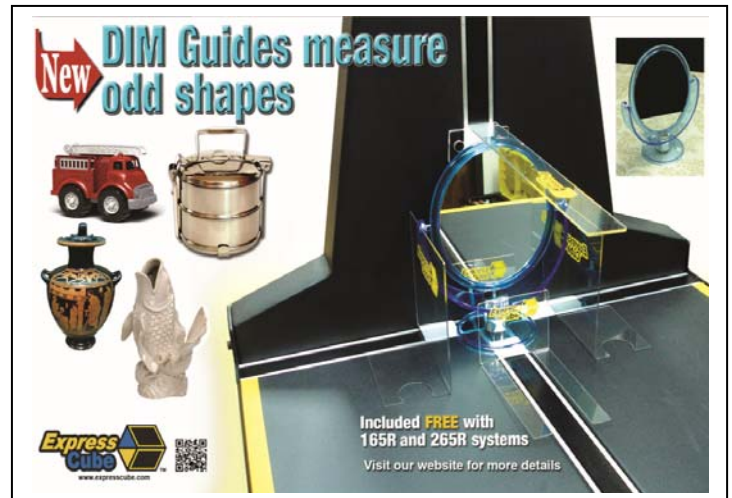
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Measuring Irregular Objects With ExpressCube Dimensional Guides

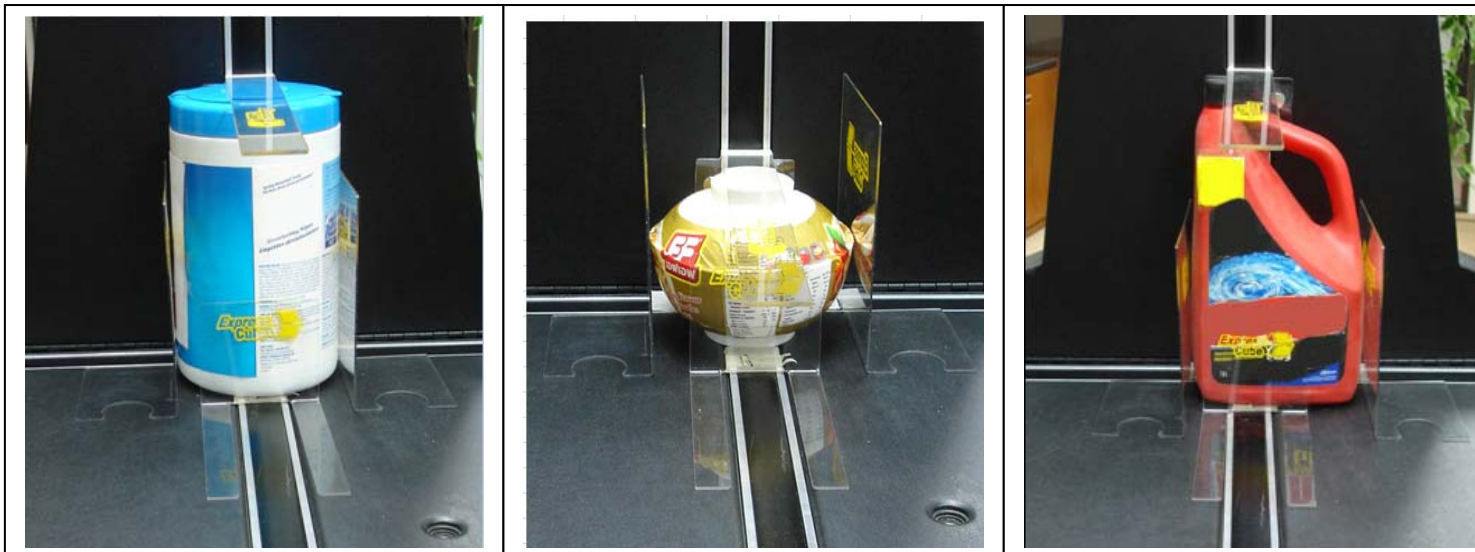
Dimensional guides are now provided with ExpressCube 165R & 265R systems and are provided as an aid to measure irregular shaped objects.

- Place the guides that you will use on the empty platform and zero the platform weight.
- Place the object to be measured on the platform.
- The guides are correctly placed when the yellow ExpressCube logo is facing out.
- Slide the guides to contact the object so that the white pads are covering the black dimensional array lens as shown. If required, use the length extensions.
- Remember to zero the empty platform when not using the dimensional guides.



Note: Use of the guides is intended for WMS, stocking & warehouse applications. It is not certified for legal trade.

Samples:



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Your cubing and reweighing solution.

Summary

- Use proper size cartons that will contain item(s) without bulges to minimize dimensional weight and avoid damage.
- Dimensional Weight calculations using identical cartons can vary with different carriers. Check with each carrier for the calculation method including when and how fractional numbers are treated.
- Carton dimensions quoted by carton manufacturers describe the inside dimensions. The dimensions used by carriers will depend on the outside package dimensions.
- Automatic (in-line) dimensioning systems generally measure the largest dimension in a direction including attached packaged invoices, tape bulges, skewed shapes, etc. Contents should be placed in sturdy packaging that will retain a rectangular shape when shipped.
- ExpressCube systems can be used to measure maximum dimensions on most irregular cartons by rotation and placement location on the measuring surface. (See previous description for more detail).

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