

# Manufacturing Specifications

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## Overview

Our fabrication service provides the custom foam insert you have designed using CaseCAD. Your case insert will be fabricated according to the following specifications.

## Foam Properties

We fabricate the main sections of our inserts out of polyethylene foam, which is much more resilient than the polyurethane foams typically found in hard-sided cases. The foam we employ has a density of 1.9 pounds per cubic foot and is charcoal gray in color. It is of closed-cell construction, so it does not absorb moisture when exposed to rain or spills, and it degasses very little. Unlike other commonly used polyethylene foams, the one we use has a soft feel.

Note that when the case lid is more than 1" deep, as is typical, we construct foam for the lid using convolute ("egg crate") open-cell urethane foam (similar to the foam that comes in most stock cases) in combination with firmer polyethylene foam behind it. This provides a good combination of flexibility and protection. The convolute foam used for this has an average thickness of 1" (it varies between ½" and 1-½", from thinnest to thickest points).

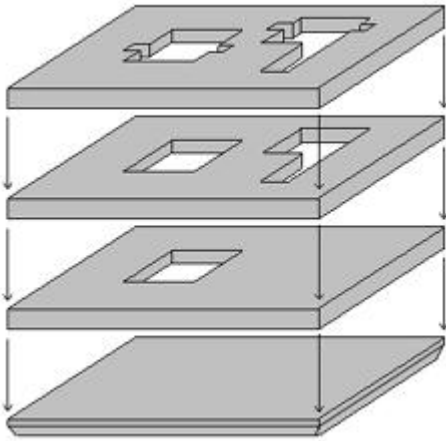
For more information about the foam we use, direct your browser to: <http://www.casecad.com/cms/casefoam.htm>

## Construction

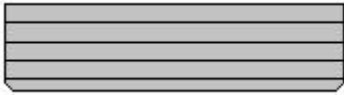
All inserts are constructed of multiple layers, which are laminated together. The layers used to construct the pocketed section of the insert are typically 1" thick, so as to allow the depth of pockets to be varied in 1" increments. If the design of the project allows it, the insert may be constructed using a combination of 1" and 2"-thick layers. The thickness of the base is variable (in quarter-inch increments), with a minimum thickness of one-quarter inch. (For base thicknesses greater than 1 inch, the base may be made up of two or more layers of foam laminated together.)

Thus if you desire an insert that is, for example, 3.750" deep, you would probably want to specify that the main section of the insert be 3" thick and that the base be three-quarters of an inch thick. Pockets can then be 1", 2" or 3" deep.

Finger holes straddling the pockets will be 1" deep.



Note that CaseCAD inserts have a 1/2"-tall bevel at the base so as to accommodate any curvature where the sides of your case meet the bottom.



If you are configuring the interior of a *PELICAN*<sup>™</sup> case, CaseCAD will size the foam for you automatically. The side walls of your foam insert will be made progressively smaller with depth so as to match the angled walls of your *PELICAN*<sup>™</sup> case.



Other types of cases with canted walls can be fit as well, but you must specify the wall angle. Clicking on the Help button when prompted for this angle will allow you to print a paper template, which you can cut out and use to measure how far the side walls depart from vertical.

## Tolerances

The thickness of each the various foam layers used to construct an insert has a manufacturing tolerance of 0.063" (plus or minus). **To allow for the possibility that some of the foam used for the insert is slightly thicker than its nominal value, specify that the insert be at least 1/4 inch less than the depth of your case.** (If you are selecting one of the popular *PELICAN*<sup>™</sup> cases from the list presented by the start-up wizard, CaseCAD will automatically adjust the depth appropriately.)

Building in 1/4-inch clearance in this way ensures that you will not have difficulty closing your case. It does, however, mean that there may be a small gap between the main section and the lid foam when the case is closed. Such a gap can, of course, be eliminated by using a shim (one made of corrugated cardboard for example) underneath your insert to raise its level slightly.

Although we use a computer numerically controlled router that is capable of very high repeatability (a few thousandths of an inch), the pockets machined in foam, by their very nature, have somewhat looser specs. This stems in part from the fact that the material is flexible and can deform as it is being

machined. The amount of deformation depends on the geometry of the pocket and the amount of foam separating it from adjacent pockets. If you respect our suggested minimum spacing between pockets (1”), deformation during cutting will be minimal and will not materially affect fit or appearance. **Note that the CaseCAD software does not impose a mandatory minimum spacing between pockets, so if you do not follow our guidelines and place pockets closer together than we suggest, you should be aware that these cuts may not be made accurately and that you must take responsibility for any unexpected results.** The same concern applies if you create a concave polygon that folds back on itself, leaving only a thin wall of foam standing. (Note that we reserve the right to decline orders for designs that in our view have pockets spaced too close together for good results.)

An additional consideration with flexible closed-cell foam, which is made mostly of air-filled voids, is that this material is subject to thermal expansion—more so than with typical solids. So when a foam insert is not installed in a case (and thus not constrained), you can expect that it will expand by a fraction of a percent in each dimension when modestly heated, say, by placing it in the sun. While this behavior does not interfere with the function of the foam to protect and cushion equipment in a case, be aware that the dimensional stability of the foam with changes in temperature is lower than for most solid materials.

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