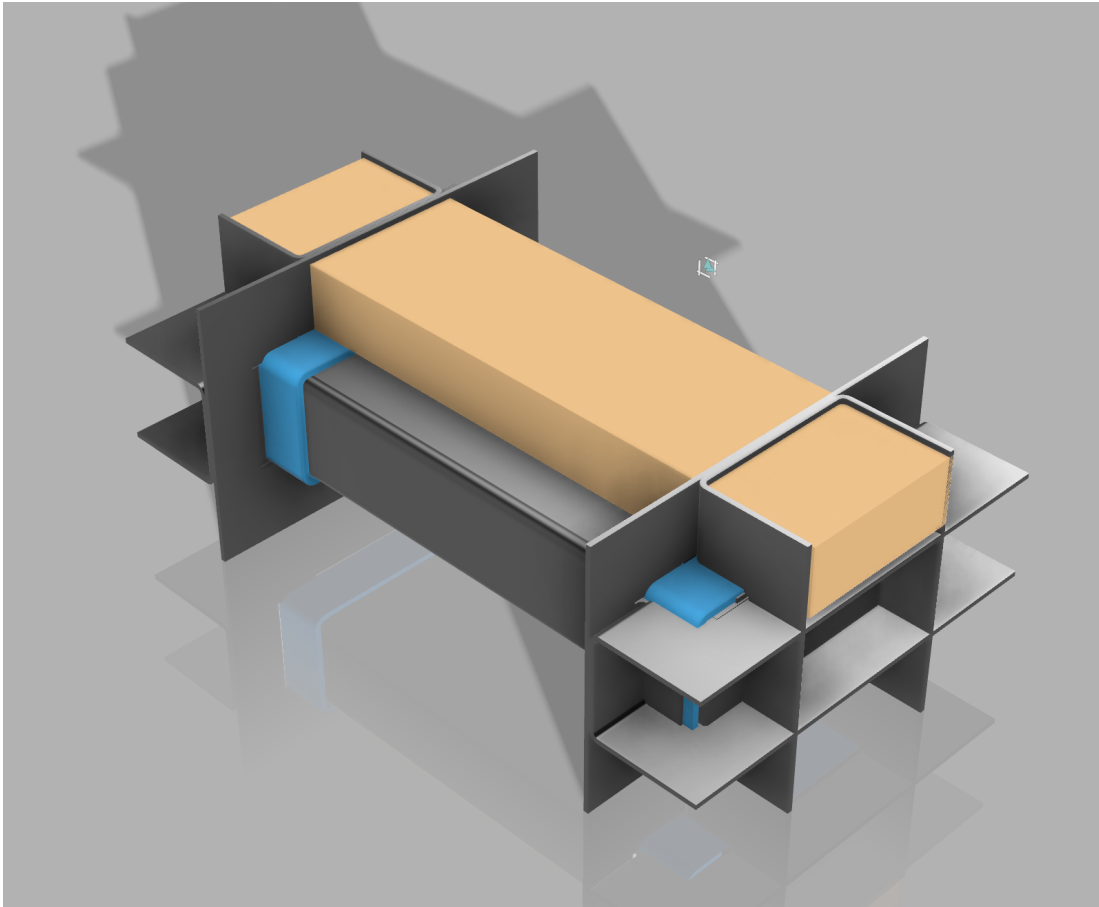


## Case Study II - Corrugated Packing Insert - Sheet Metal CAD Project - Fusion 360



We ship our Shadow airline travel cases all over the world and had initially invested heavily in custom foam inserts to keep them 3" from the outside of our shipping box and solidly in place. However, after investing several hundred dollars in tooling for the die cutting forms, the vendor increased the price and ceased deliveries without a standard loading dock.

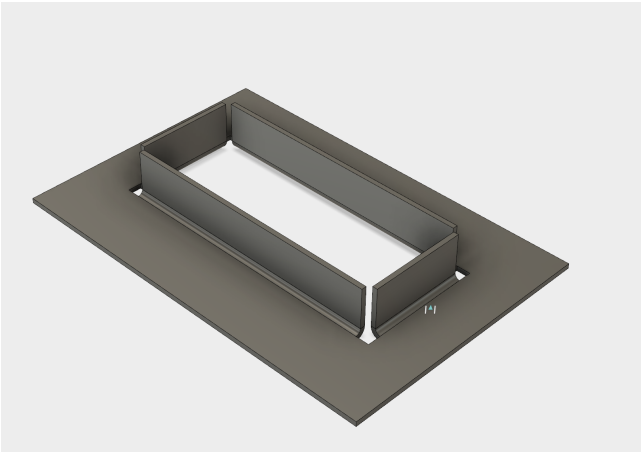
Like many small cottage businesses, we were in a residential neighborhood but never had a problem unloading as the containers that the inserts were shipped in were large but very light, being polypropylene foam. Under the new vendor restrictions the inserts, which were costing us \$16 a set, were going to be double the price and now would have to be shipped by a different trucking line at a whopping \$395 increase.

As that was totally unacceptable, I leveled once again, as I have in the past, the Mega Laser power of Industrial Design at the problem and came up with an alternative that:

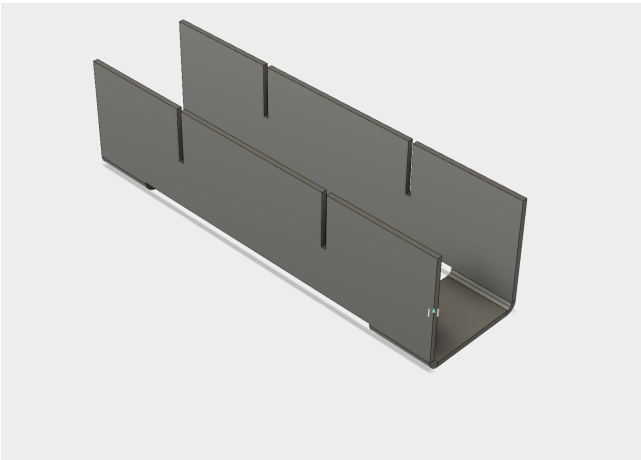
1. Reduced the cost from over \$16 to \$2.65 per set.
2. Reduced the storage volume of over 5 cubic yards, to 6 cubic feet.
3. Eliminated the necessity, therefore, of renting a storage facility to house them in, representing another \$1200 per year of rental fees.

Here then, are the details of that packaging strategy for international shipping:

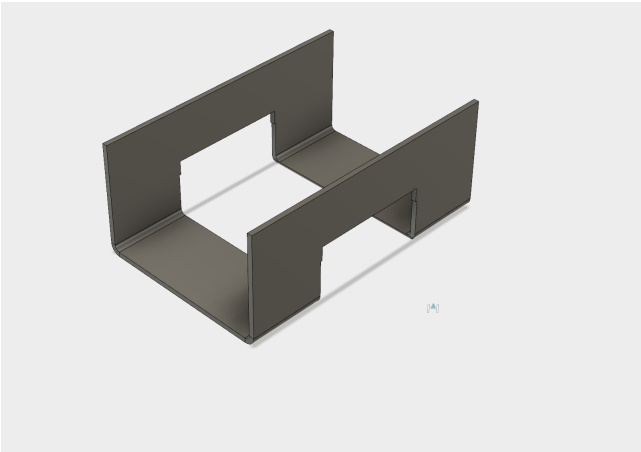
Component 1 - Base Flange - Frame



Component 2 - Strut 1 - Horizontal Support Member

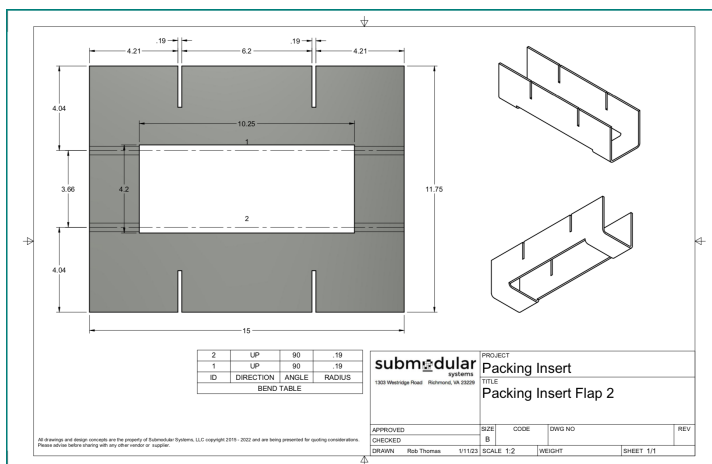
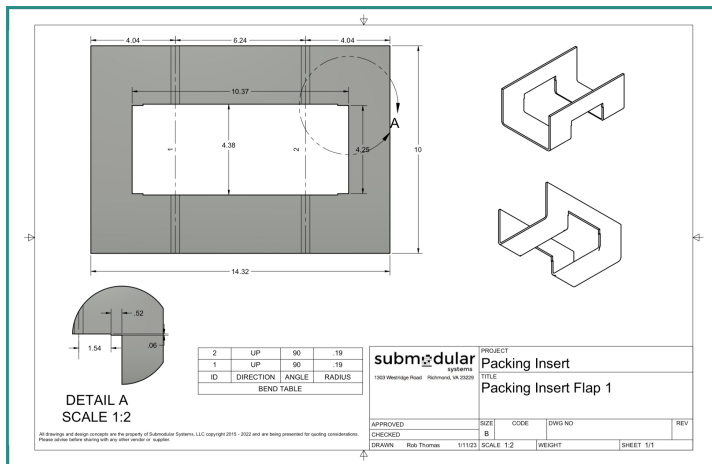
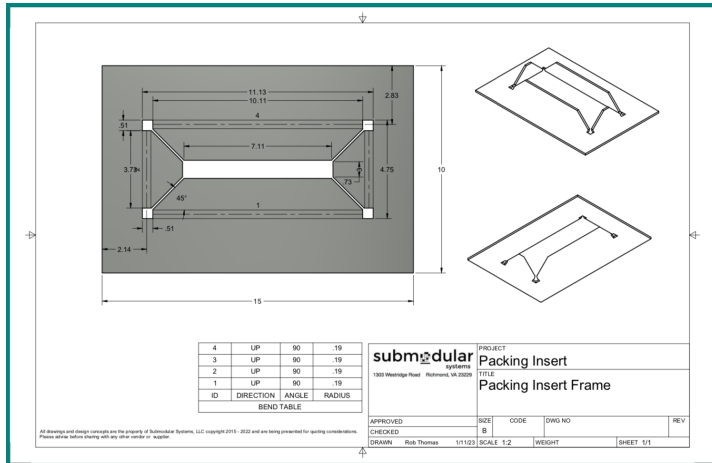


Component 3 - Strut 2 - Vertical Support Member



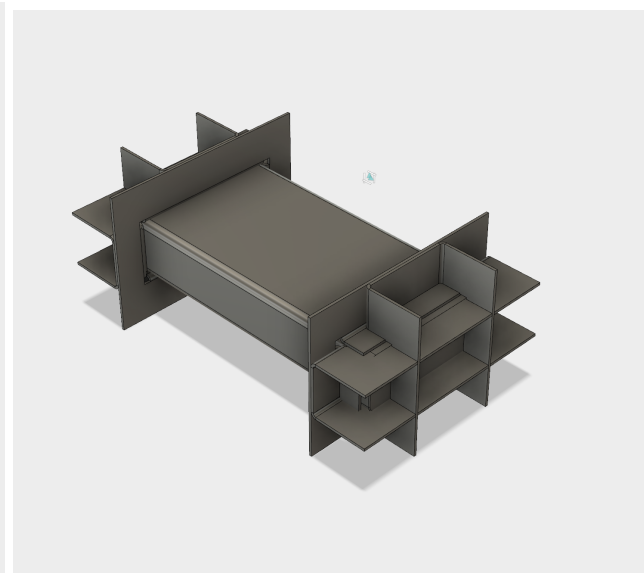
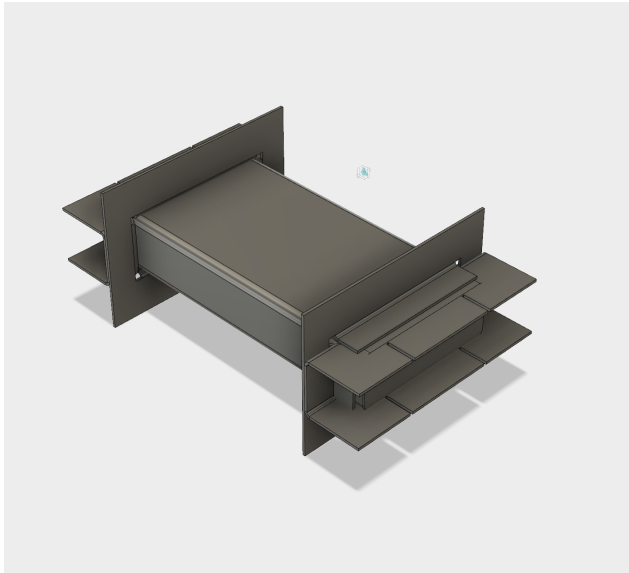
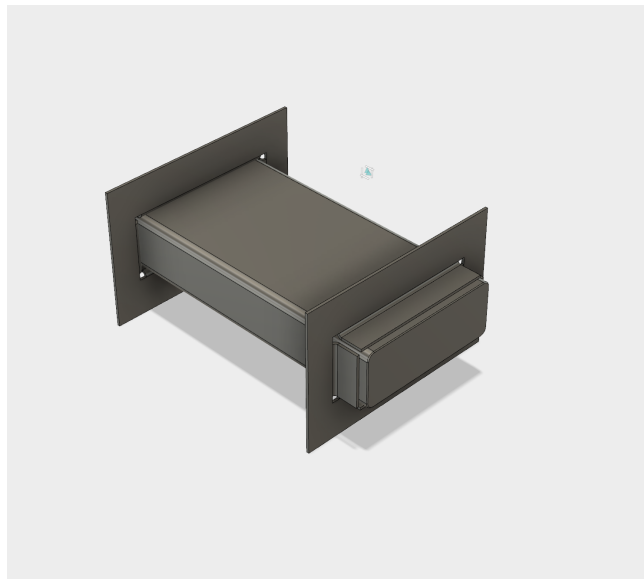
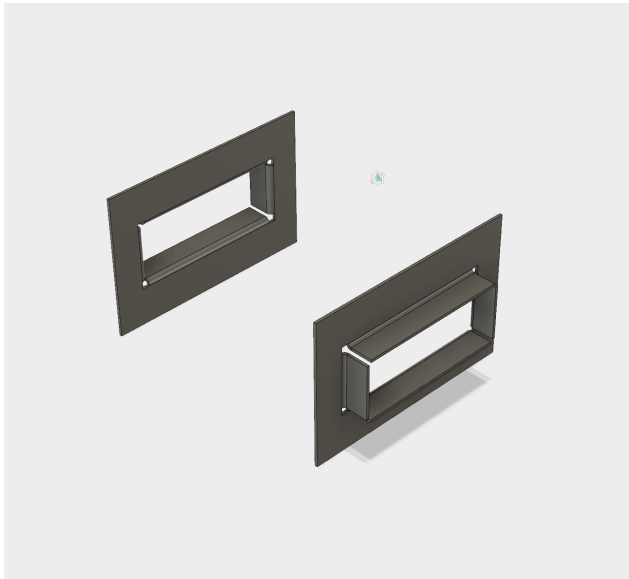
## CAD Drawings

I used Fusion 360's Sheet Metal features, creating a new material "corrugated .1875" to represent the heavy 3/16" board recommended by our box vendor Atlantic Corrugated Box for this application. Here are the drawings created for the manufacturing and communications with vendors as well as shipping personnel for assembly. The resulting STEP and DXF files were used to create the dies for production.



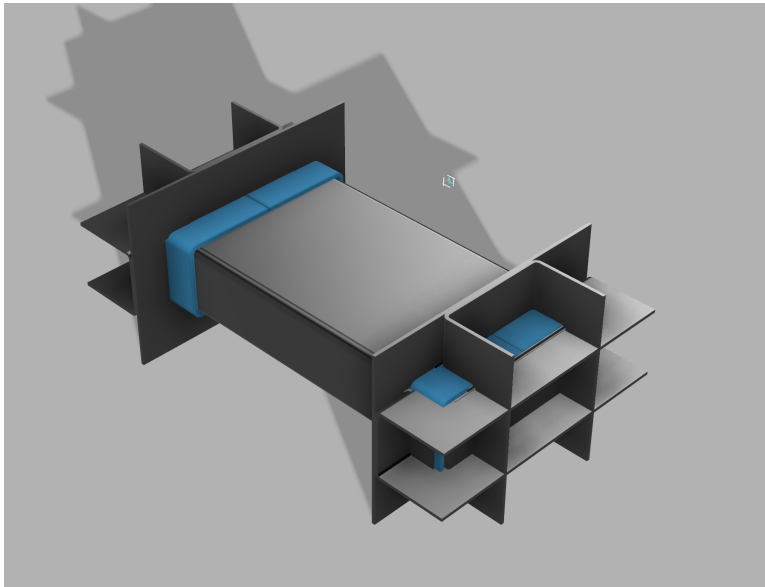
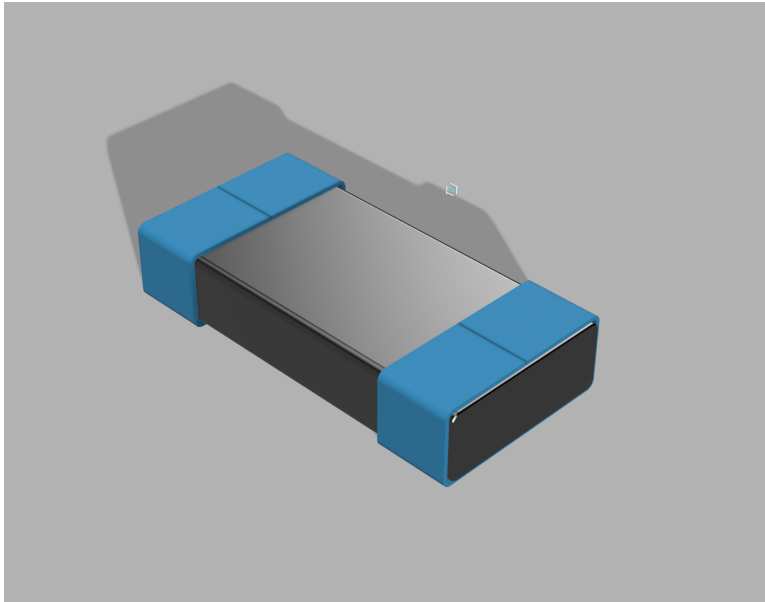
## Assembly

The component parts slot together and are tacked in place with hot glue so they can be prepped and put aside prior to packing the product allowing for a fluid assembly line to be established to that end. If needed, however, they can also be assembled quickly on a one off basis for last minute shipments if necessary and take up no shop space at all. Enough inserts for 15 - 20 cases can be stored under a table in one of our standard shipping boxes.



## Blue Foam Packing

Since corrugated is very abrasive material and even though our case is packed in a poly sleeve for surface protection, a ¼" foam barrier sourced from Uline was factored into the design to minimize any wearing of surfaces in transit and allowances made in the corresponding parts to accommodate that.



In addition to the increased protection, the design of the corrugated solution also provided convenient pockets for the placement of other components in every shipment namely the proper power cable (US,UK or EU), the screws, washers and hex wrench and the power adapter brick. This eliminated having to tape them down to minimize movement during transit. We were also able to integrate the Manifold product shipping container in its entirety into the configuration by making a minor adjustment to the flanges during the insert assembly process, shown as the brown box in the first illustration. To date, we have never had a failure of this system.