

Systems Design Feasibility Analysis
Prototype Cost

Question:

How much will one prototype unit cost?

The answer depends on the materials that we use, the cost of those materials, how thick and big of a prototype that we make, and the designs that we choose.

Assumptions:

- We use Ninja Flex 3D printing filament as a material (costs about 50 dollars per roll of 0.5kg)
- On average, the thickness of padding is around 2 inches
- Prototypes are about 3"x3" squares
- On average, the weight of materials is 0.009 lbs/ in³

Governing Equations:

Given each prototype is approximately 18 in³

Average weight of material is approximately 0.009 lbs/in³

Ninja Flex costs approximately \$50 for 0.5 kg per roll

$$(0.009\text{lbs/in}^3)(18\text{in}^3) = 0.162 \text{ lbs per prototype}$$

$$(0.5\text{kg})(2.2046/1\text{kg}) = 1.1023 \text{ lbs for } \$50$$

$$(\$50/1.1023 \text{ lbs})(0.162 \text{ lbs}) = \$7.35 \text{ dollars per prototype}$$

Solution:

It should cost approximately \$7.35 for each prototype

However, this is assuming that the prototypes will be as big as 18 in³ and also the density is 100% material (whereas realistically it will be much less than this).

This question can be estimated by analysis, but the estimation can become more accurate through prototype testing.