Our initial design consisted of adding springs and dampers to the hinge to close the cabinet door. After reviewing our benchmark we decided to retain its main features and supplement them with improved ones in our design. Different springs and dampers were considered to make the hinge close slowly. Through analysis of literature and survey results as well as a patent review, we decided on a combination of linear torsion springs and friction dampeners to close the hinge. A simple adjustment screw that can be adjusted with a flat head was added so that the closing time can be adjusted. After modeling our design in SolidWorks and generating dimensioned drawings, we machined a proof of concept model (pictured left, Figure 3).

Figure 3. Proof of concept model vs. regular cabinet hinge

**Design Evolution**

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Figure 3. Proof of concept model vs. regular cabinet hinge

**Engineering Challenges**

The engineering challenges identified for this design included:

- Provide smooth closure of cabinet doors
- Improve performance and remain cost-effective
- Fully close the cabinet from any open angle
- Install as would any standard hinge
- Full adjustability with only a standard screwdriver
- Durability to exceed the life of the cabinet

**Analysis and Results**

After building a prototype and obtaining our benchmark product, we tested the closing time and max weight held for each hinge, with results shown in Figure 2. These measurements are a good gauge on the improvement of the self closing cabinet hinge. Finite element testing was used to ensure robustness and safety of our design. As can be seen in Figure (5), it can be seen that there is very little displacement when an excessive weight of 30 N is applied and the maximum stress does not surpass the yield stress of the material.

Figure 5. Finite element analysis of right hinge plate with visually exaggerated stresses.

**Benchmark**

A benchmark of a standard non-closing cabinet hinge was selected to compare the self closing cabinet hinge to. This benchmark is the standard hinge used in most cabinets and is a good benchmark to test against.

![Performance comparison of the benchmark and the proof of concept models.](image1)

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**References**

ANSI/BHMA Standards
US Patents: 5144721, 4490884