The Dumpling Maker
EDSGN 100
Section 202
Team 3

http://personal.psu.edu/jnb5392/Homepage.htm

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14 August 2015
Abstract (Jerod Barone)

Our goal for this project was to design and build a prototype of an automatic dumpling maker for households that make dumplings often. Our goal is to make the process of dumpling making easier and faster. This report will show the processes of the research and development of our design for the automatic dumpling maker.
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Introduction (Alex Thomason):

This report documents the steps our group took to design a dumpling maker prototype in our Engineering Design 100 course. The dumpling is meant to be for households that make dumplings often and need a storable and easy to use dumpling maker. The machine will be automatic and be able to produce dumplings with the push of a button. However, premade dough and stuffing will be required to put into the dumpling maker. We started with a basic design task and specifications, and then proceeded to evaluate customer needs. We then generated design concepts and picked the best one based on specific needs. Our final product was a full scale prototype. The rest of this report goes more in depth of the process.

Problem Statement (Jeremy Deppen):

The problem is that there are many people who enjoy dumplings but find that they are tedious to make by hand, and industrial size makers can be very expensive and bulky. The market lacks an abundance of cheap, portable, easy to use dumpling makers.

Mission Statement (Jeremy Deppen):

The mission is to design and construct a workable, cost-efficient, and speedy dumpling maker that produces quality dumplings for either personal or restaurant use. It will be up to safety standards such as: dishwasher safe, safe to use, and safe to maintain. Our dumpling maker will also produce at least ten dumplings a minute and cost no more than two hundred dollars to produce.
Design Specifications (Alex Thomason):

There several specifications that we needed to include in the dumpling maker design. The dumpling maker should be automatic or semi-automatic and produce at least ten dumplings per minute on average. Unless justified, the machine should not exceed $200, and it should be as safe as a food processor, easy to maintain, safe to use, and dishwasher safe.

Gantt Chart (Jerod Barone)

Table No.1

Customer Analysis (Christian Sak)

Customer 1

1. Do you make dumplings? If so, how often?

Yes, I probably make dumplings a few times a month.

2. Do you prefer to make dumplings by hand or by machine?
I prefer to make dumplings using a machine because I cannot taste the difference between those made by hand and those made by machine.

3. **What problems do you experience the most with other dumpling makers?**

   Most other dumpling makers are very bulky and hard to store.

4. **What do you look for most in a dumpling maker?**

   I want it to be portable and easy to store.

5. **What is the reason you want to make dumplings and how many do you normally make?**

   I only make dumplings for friend and family gatherings but when I do, I normally make over one hundred dumplings.

6. **How much would you be willing to spend on a dumpling maker?**

   I would be willing to spend 200-300 dollars.

Customer 2

1. **Do you make dumplings?**

   Yes, I make dumplings at least once a week.

2. **Do you prefer to make dumplings by hand or by machine?**

   I usually make dumplings by hand but I would not be opposed to making them using a machine.

3. **What problems do you experience the most with other dumpling makers?**

   Most other dumpling makers are very unreliable. The dumplings do not come out very well made and I always end up having to remake a lot of them by hand.

4. **What do you look for most in a dumpling maker?**

   I want a dumpling maker that is easy to use and easy to clean.
5. **What is the reason you want to make dumplings and how many do you normally make?**

I make dumplings for my family very often, I usually make about 80-100.

6. **How much would you be willing to spend on a dumpling maker?**

I would be willing to spend up to 300 dollars.

**Concept Generation**

![Model A](Fig. No. 1: Model A (Alex Thomason))

![Model B]
Fig. No. 2: Model B (Jerod Barone)

Fig. No. 3: Model C (Christian Sak)

Fig. No. 4: Model D (Alex Thomason)
Fig. No. 5: Model E (Jeremy Deppen)

**Design Matrices** (Jerod Barone and Team)

<table>
<thead>
<tr>
<th>Selection Criteria</th>
<th>Model A</th>
<th>Model B</th>
<th>Model C</th>
<th>Model D</th>
<th>Model E</th>
<th>Reference</th>
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<tbody>
<tr>
<td>Easy to Use</td>
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<td>+</td>
<td>+</td>
<td>+</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Safe to Use</td>
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<td>0</td>
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<td>0</td>
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<td>Less than $200</td>
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<td>+</td>
<td>+</td>
<td>+</td>
<td>0</td>
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<tr>
<td>Speed (10 Dumplings/minute)</td>
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<td>+</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>0</td>
</tr>
<tr>
<td>Automatic/Semi-Automatic</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>0</td>
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<tr>
<td>Quality of Dumpling</td>
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<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Stability of Design</td>
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<td>0</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>0</td>
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<td>5</td>
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<tr>
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<td>1</td>
<td>3</td>
<td>2</td>
<td>5</td>
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<tr>
<td>Continue?</td>
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<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

Table 1. Design Matrix
Table 2. Design Matrix Weighted

Working Drawings (Jerod Barone)

Fig. No. 6
Fig. No. 7

Fig. No. 8
Design Features (Jeremy Deppen): 

The dumpling maker consists of multiple parts that are assembled together to make the complete product. One hopper holding the premade dough contains two rotating crosses that scoop out the perfect amount of dough. This ensures the same amount of dough is used per dumpling. Two rollers are placed at the bottom of the hopper that are 3.75in in width. This width of 3.75in is the diameter that is usually associated with typical dumplings. A slide connected to the bottom of the rollers effectively transports the flattened dough to the flat base at the bottom with a hole that is 3.5in in diameter. The design of a slide using gravity to transport the dough maximizes effectiveness, while reducing cost to build. Another hopper containing filling sits directly above the hole in the flat base and it dispenses filling directly in the middle of the dough. This hopper works like the dough hopper in the way that it uses two rotating crosses that break off the perfect amount of filling. When the filling hits the dough that is sitting on the flat base
with the hole in it, it adds weight in the center of the dough causing it to fall through the hole. Once again, gravity is used to reduce cost due to the lack of parts needed. Two larger rollers with indents in them rolls and folds the dough to become the perfect dumpling.

**Operation Instructions (Christian Sak):**

The dumpling maker is automatic, so it is very simple to operate. The dough hopper, filling hopper, and rollers are all removable and washable. Before starting, make sure to put these pieces in the correct places. The larger dough hopper gets put at the top of the mechanism. The filling hopper goes next on the bottom of the ramp, above the hole leading to the rollers. Then put the rollers on the underside of the machine, making sure that the indentations are aligned. This machine cannot mix dough or filling, so make sure to add premade ingredients to each container. After this prep work is done, simply turn on the machine and watch it create dumplings!

**Working Mechanism (Alex Thomason):**

This dumpling maker works in a very innovative and efficient way; it uses gravity to its advantage. First, premade dough is needed to place in the dough hopper. Rotating cutters in the hopper will break of the needed amount of dough for the dumpling while rollers in the funnel will flatten the dough to a circle with a 3.73 inch diameter. The dough circle will slide down to the hole where it will rest and wait for the filling to dispense onto it. The weight of the filling will make the circle of dough will fall through the hole above the rolling pinchers, where the dumpling will be folded in half and pressed. The dumpling will be finished and fall into a bowl of your choice.
Cost Analysis (Alex Thomason):

This Dumpling Maker is simple yet effective. This machine was built with minimal and inexpensive materials while maintaining its efficiency. This enables us to save money and make maximum profit. The material cost of the dumpling maker is $95.18, and we would sell a final product for $250.

Summary (Christian Sak):

Overall, the dumpling maker that was created is a great design. We tackled the task given to us and made a great final product. The compact machine makes it easy to store and the removable pieces make it easy to wash. These two qualities are what make this design perfect for at home use. Also, the speed of the machine makes the dumpling making process a lot quicker. The design follows all the design specifications and any buyer of this product will be happy with their decision.

Acknowledgements (Jeremy Deppen):

We would like to thank Xinli Wu for his guidance over the duration of the project as well as Nick Petrunyak for staying for evening hours and monitoring the workshop where we built our prototype.
References (Jerod Barone and Jeremy Deppen):


4 ft. of 35 ANSI Standard Chain


2 lights: 1 red, 1 green


12 rpm, 2.6 in*lbs of torque


1 sheet of .048" thick cold rolled steel: 2' x 4'


1 Open Channel for ANSI Chain No. 50/2050

6 ft. of red wire, 6 ft. of black wire

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