

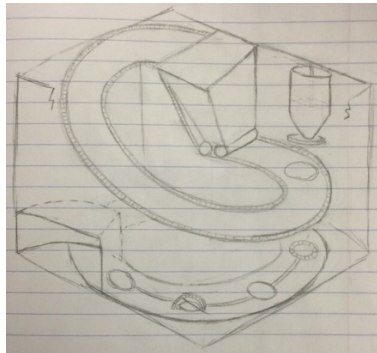
EDSGN 100 Introduction to Engineering Design  
Section 009 Team 8

# INFINITY DUMPLING MAKER



Submitted by: [Ruiye Yao](#), [Michael Truong](#) (chief editor), [Hank Haly](#), [Stephen Herrick](#)

Submitted to: [Xinli Wu](#)



Fall 2015

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# ABSTRACT

The purpose of this project is to design and construct a model of a dumpling maker. The dumpling maker must be automatic or semi-automatic, produce 10 or more dumplings per minute, easy to use, easy to clean, and the materials must cost no more than \$200. Several models were drafted and a round design was agreed upon.

# INTRODUCTION

Modern life is all about speed and efficiency. In the fast-paced world that humans live in today, nobody has the time anymore to stop and perform everyday tasks, simply because they take too long. The goal of this design project was to create a machine that makes dumplings more quickly and efficiently than hand-made dumplings. The machine is intended to meet the requirements of being creative, safe, simple, and cost efficient as much as it can. The design created by this group, “*Infinity Dumpling*”, not only fulfills the above, but goes above and beyond expectations. This report highlights the reasoning behind certain aspects of the design, the task presented in the project, and a description of the design prototype.

## PROBLEM STATEMENT

Dumplings have been a staple Chinese food for centuries. However, the process of hand-making dumplings is a long and labor intensive process that turns many away from making their own. There is currently no product on the market that is able to make dumplings automatically while also being affordable to the average family household.

# MISSION STATEMENT

The design of the Infinity Dumpling Maker will be appeal to both the commercial market as well as the non-commercial market. The design will have an affordable price for sale, no more than \$200, as well as an affordable material cost for production. All in all, the design will be all-around affordable and easy to use for all consumers while meeting all design specifications.

# DESIGN SPECIFICATIONS

The following specifications should be fulfilled:

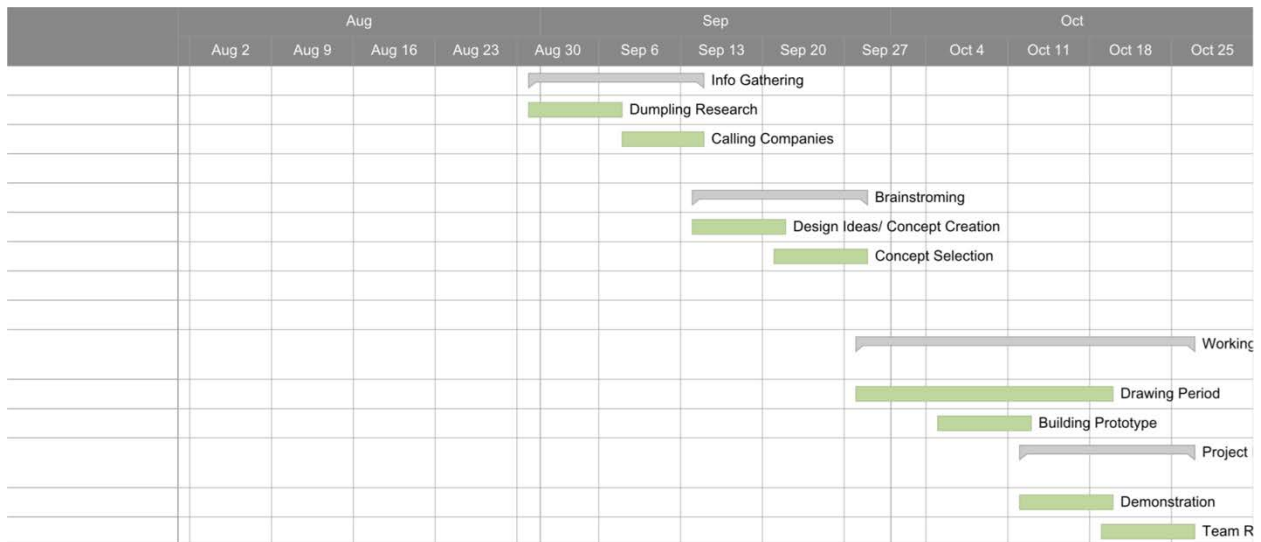
- The model should be should be automatic or semi-automatic
- The model should produce 10 or more dumplings per minute
- The model should have a material cost that is no more than \$200 to manufacture
- The model should be safe, easy to use, and easy to clean

# GANTT CHART

Figure 1.1

	Task Name	Start Date	End Date	Duration	Predecessors	% Complete	Assigned To	Comments
1	Info Gathering	08/31/15	09/14/15	11d				
2	Dumpling Research	08/31/15	09/07/15	6d				
3	Calling Companies	09/08/15	09/14/15	5d				
4								
5	Brainstroming	09/14/15	09/28/15	11d				
6	Design Ideas/ Concept Creation	09/14/15	09/21/15	6d				
7	Concept Selection	09/21/15	09/28/15	6d				
8								
9								
10	Working Drawings/ Building Prototype	09/28/15	10/26/15	21d				
11	Drawing Period	09/28/15	10/19/15	16d				
12	Building Prototype	10/05/15	10/12/15	6d				
13	Project Demonstration/ Team Report	10/12/15	10/26/15	11d				
14	Demonstration	10/12/15	10/19/15	6d				
15	Team Report	10/19/15	10/26/15	6d				

Figure 1.2



## CUSTOMER NEEDS ASSESSMENT

Each group member was asked to contact two restaurants that are known to make dumplings and ask them about the process of making dumplings and some input on the ideas of the design

being made. Each member got some feedback to the ideas of the design.

Figure 2.1

Discussion Topics	Tops' Buffet	China Gourmet	China Place	Madam Lu Chinese Restaurant	Best China Wok	Golden Work Chinese Restaurant	Shanghai Chinese Restaurant	Happy Family
Production Per Minute (dumplings)	20+	10	20+	8	10+	15+	10+	6
Recycle Idea Rating (out of 10)	7	8	9	8	7	6	5	7
"Would You Buy It?" (\$200)	Most Likely	It's Probable	Yes	No	No	It's Probable	Not Likely	Most Likely

## CONCEPT GENERATION

The main idea for the *Infinity Dumpling* design was the ability to recycle unused dough and ready it to be used again, a process that is rarely seen in dumpling makers and that is very beneficial in the long run. It was also decided that the process would be semi-automatic, so that the only work

a consumer would need to do is work a crank. The final big decision that shaped the design was the idea of the dumpling filling being simultaneous with the cutting of the dough. With all of these ideas in mind, the final shape of the design began to form. This resulted in the two-layer conveyor belt system, which not only made the insertion of the crank relatively easy, but the circular shape also allowed for the recycling of the dough to become a very simple yet important aspect in the design. The decision for the filling helped to shape the remainder of the design. It provided the perfect and most efficient way for the filling to be distributed and allowed for the rest of the prototype to be built around it. Though the filling and crank were both excellent ideas in the design, the main concept that was built upon the the dough recycling, even inspiring the name *Infinity Dumpling*. The upper conveyor belt constantly rotates and reuses the dough over and over, showing the design as innovative, useful, and efficient. This was the best concept for a dumpling maker design, which is why the concepts presented were the ones chosen.

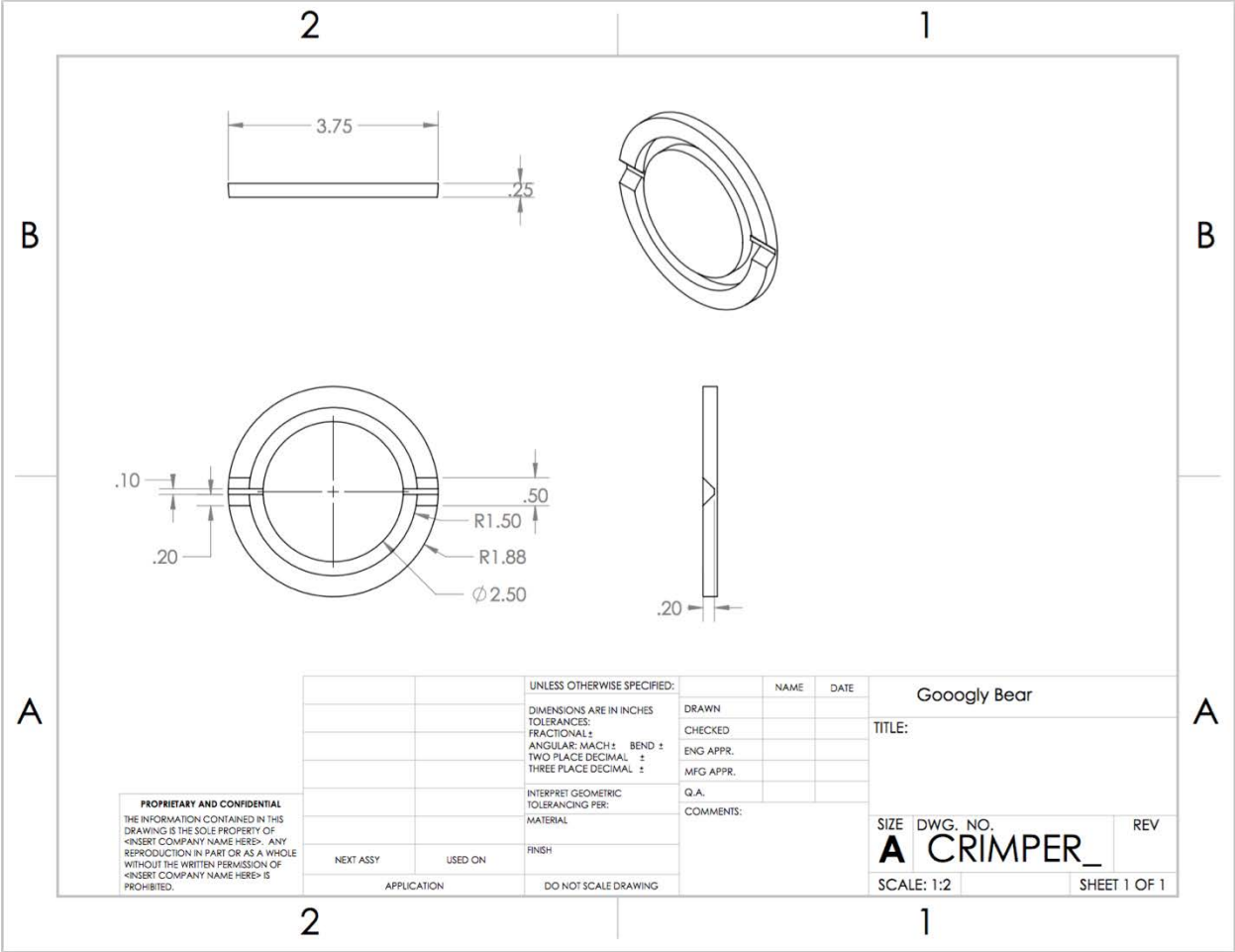
## DESIGN SELECTION MATRIX

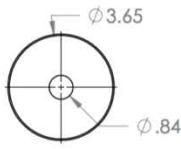
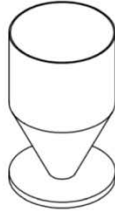
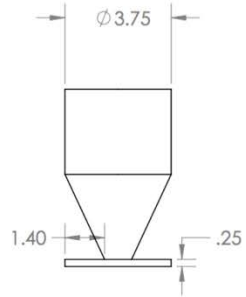
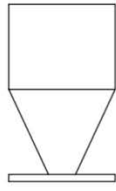
	A	B	C	D	E
size	+	0	+	-	0
speed	0	+	0	++	+
waste	-	+	+	-	+
shape of dumplings	0	-	0	0	+
material cost	-	-	+	-	0
ease of manufacture	0	-	-	-	0

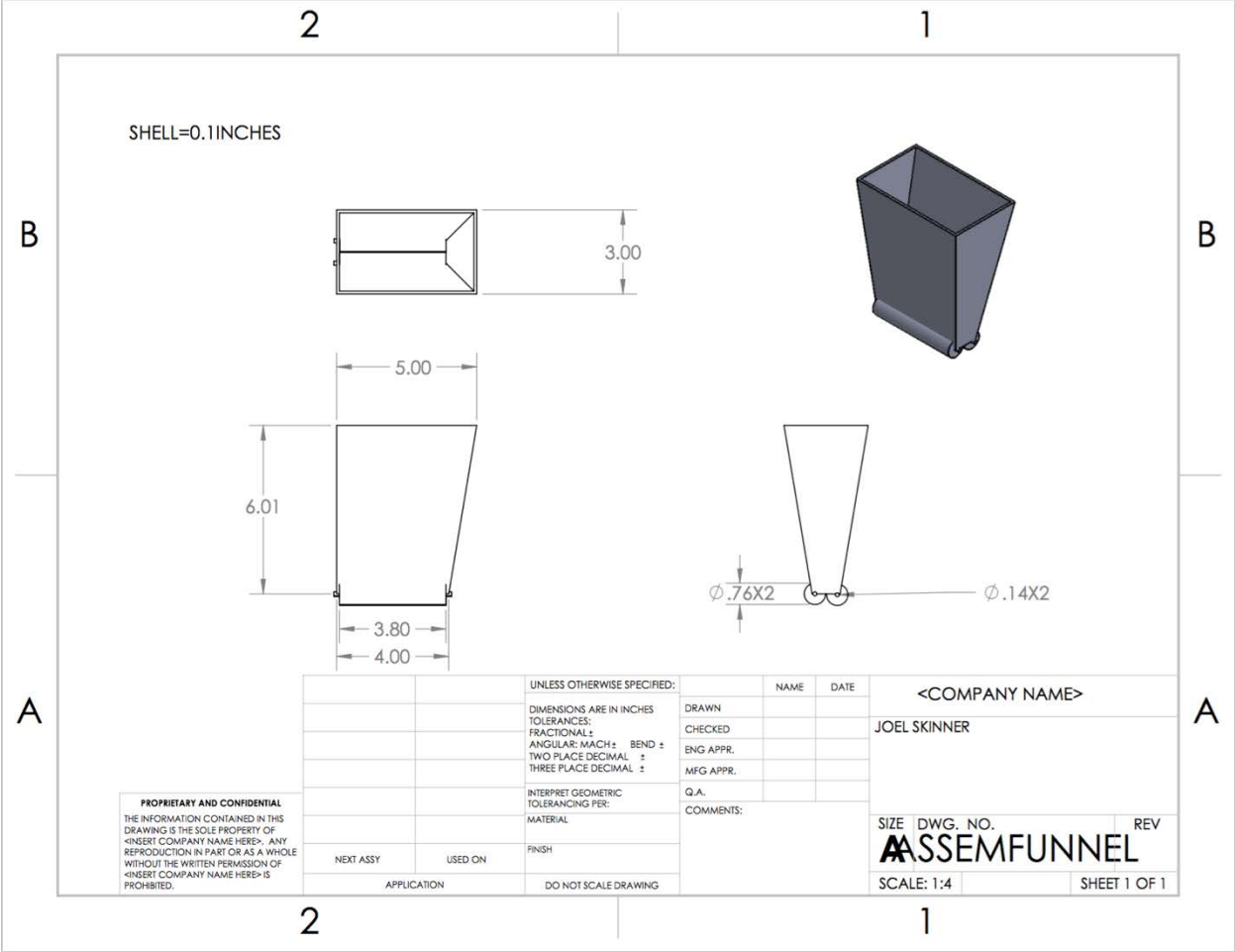


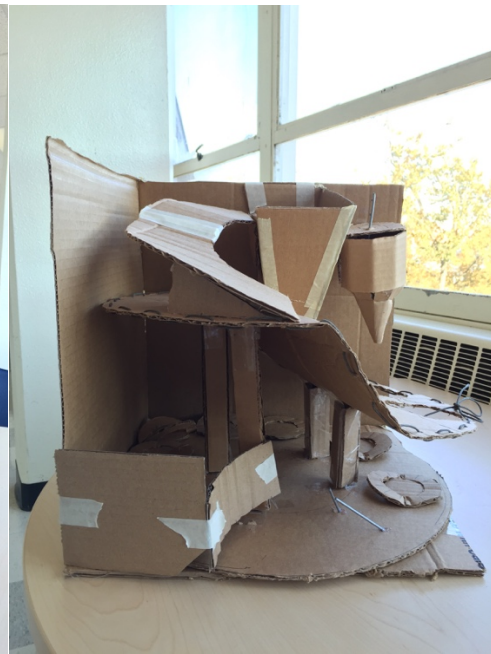
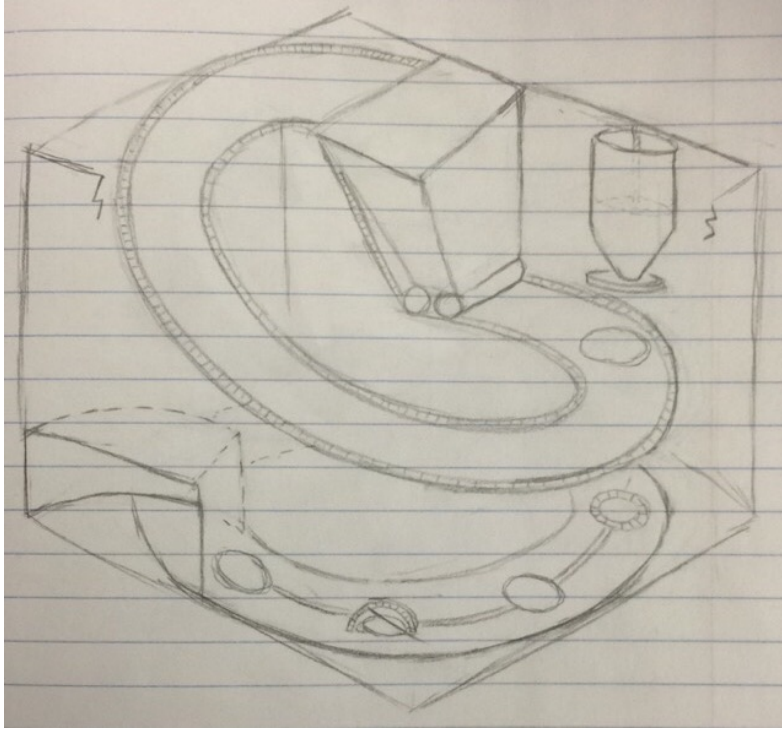
extra function	0	+	0	0	0
ease to wash	-	0	0	0	-
Sum +'s	1	3	1	2	3
Sum -'s	3	3	3	4	1
Sum 0's	4	2	4	3	4
Net Score	-2	0	-2	-2	2
Rank	3	2	3	3	1

## WORKING DRAWINGS



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# DESIGN FEATURES

The Infinity Dumpling Maker offers a multitude of design features that set it apart from the crowd. The first of which is an enclosed box shape which keeps hands and fingers out of harm's way. This also makes the dumpling maker child friendly. The second feature is the removable faces. With the top and frontal face off, it makes it very easy to remove dirty components and clean the inner walls. The fact that the Infinity Dumpling maker takes the dough that is not used and recycles it back into the dough basin is one which we are very proud of. This will lower production costs for restaurants who are making dozens to even hundreds of dumplings today. Lastly, the Infinity Dumpling Maker is compact, portable, and takes up little counter space making it great for both restaurants and homes.

# OPERATION INSTRUCTIONS

The design created is very simpler and easy to use. Below are a list of steps and directions to follow for the correct use of *Infinity Dumpling*.

1. Before use, make sure *Infinity Dumpling* machine is clean and in working condition  
(Remove the top and right side portions of the box to have access to inside for cleaning).
2. After the machine is clean, place a device to catch the dumplings out of the front of the box (plate, bowl, etc.).
3. Open top hatch and insert up to one pound of pre-made dumpling dough so that it may drop for use into the funnel.
4. Close top hatch and ensure that cranking side of *Infinity Dumpling* box is free from obstacles and obstructions.
5. Begin cranking counterclockwise. Each full rotation will give the inside belt a  $\frac{1}{4}$  rotation, but dumplings will be ready and made after a  $\frac{1}{2}$  conveyor belt rotation (2 cranks).
6. After 2 cranks dumplings are made. Stop after any full crank rotation to end dumpling making cycle.
7. Dumplings are filled and folded. Cook dumplings and enjoy a delicious meal!

## WORKING MECHANISM

The entire mechanism is driven by a detachable hand crank. As the crank spins, it spins the

gears located inside the box. These gears, which are all connected, work to move both conveyor belts, the dough rollers, and the dough cutter/filling press. The dough is first put into the basin at the top of the Infinity Dumpling Maker. It is then fed through the rolling pins and laid onto the cutting station as a flat sheet. There, the dough cutter/filling press will drop down and push a perfect three and three quarter inch dough circle through the hole in the conveyor and onto the lower level conveyor after being loaded with the perfect amount of filling from the press. On the lower level there will be a dumpling crimper that is attached directly to the lower conveyor. These will be spring loaded so that they are able to close to fold the dumpling but will open right back up afterward for the next dumpling that comes through. In order for the crimper to close, it will be fed through two small rods sticking upward at just the right angle so that the edges of the crimper will be forced upward and fully closed. Then, once through the rods the crimper will open and go under a ledge which the dumpling cannot fit under. This will push the dumpling off of the crimper and into a bowl or basket which the operator had previously placed.

## COST ANALYSIS

Table 3.1

Cost Analysis			
Item	Cost	Quantity	Total



Funnels	\$9.99	2	\$19.98
Rollers	\$4.20	2	\$8.40
Conveyor Belts	\$8.96/ft	6ft	\$53.76
Gears	\$4.09	4	\$16.36
Crimpers	\$5.30	10	\$53.00
Aluminum Shell	\$0.023/in <sup>2</sup>	980in <sup>2</sup>	\$22.54
Miscellaneous Aluminum	\$0.023/in <sup>2</sup>	200in <sup>2</sup>	\$4.60

Total Cost per Unit: \$178.64

This is the final cost of the first dumpling maker. However, the more components purchased at once, the lower the total price. The total price of \$178.64 will drop significantly the more dumpling makers are produced. When our product hits mass production, the profits will go through the roof.

## SUMMARY AND CONCLUSION

The name of the dumpling maker is the Infinity Dumpling Maker. Infinity Dumpling Maker can recycle the dough that it doesn't use back into the original dough basin to minimize extra costs. It also contains two separate levels which saves surface area for the table or counter top which the product is placed on. This design greatly differs from the current designs on the

market. Infinity Dumpling Maker is semiautomatic, driven by a removable hand crank. If the costumers wish to purchase a motor, it can be made automatic and make dumplings at an even higher speed. Each of the conveyer belts rotations are designed to make two dumplings which makes it easy to achieve ten to twenty dumplings per minute. The machine is inside of a box to keep finger and hands safe. The box has two walls that can open so that it can be taken apart and put into dishwasher. Since it is a sealed box and works manually, it is really safe for both home use and restaurant use. It costs around \$180 to make but it is expected that this will fall greatly once the product hits mass production. The planned starting price is about \$200 which is an average price in the market. Therefore, Infinity Dumpling Maker meets all the criteria and stands out from the other dumpling makers.