

Fabrication of Portable Noodle Making Machine

Bharathraj M, Murali Kumar L

Abstract— Many of us enjoy eating noodles, considering it healthy and delicious fast food. This project aims to help people in making noodles easily, quickly and on a wider scale. The first stage of the project with brainstorming, visualizing the idea, forecasting all our needs in the project and deeper research was held between all competitive noodle machines in the market.

Proposed Noodle machine with compact Design, portable and operated by the single person. Extrusion of noodle at shaping die by a continuous feed of dough in the hopper which is pushed towards shaping die by thread conveyor to achieve the desired shape of noodle. Design and development of noodle machine by integrating all ideas together and testing of Automatic noodle machine which is operated by DC-power source.

Index Terms— Selection of Flour, Thread rod, Wiper Motor & 12V-Battery, Gear Ratio

I. INTRODUCTION

The popularity of noodle can be attributed to its sensory appeal, versatility, low cost, ease of preparation, nutritional content and excellent storage stability as well as increased consumer interest in ethnic foods in the western world. Noodles are a value-added item made from flour. As regular breakfast item. The raw material required for making noodles is available in the local market. It is widely used by school children for breakfast because it takes less time for preparation.

The demand for noodles would be mainly from urban areas and people are relatively hard pressed for time. Besides, after the launch of Maggi a popular product, a distinct market segment which has emerged is school children and college students.

Choosing a right machine is extremely important in any type of manufacturing business. A wrong selection of machine may damage the quality and profitability of the product. A product development process is the set of activities beginning with the perception of a market opportunity and ending in the production, sale and delivery of a product. Product development is an interdisciplinary activity requiring contributions from nearly all the functions of a firm however Marketing, Design and manufacturing are almost always central to a product development. Design & developed of Semi-automatic and fully-Automatic noodles making machines that is best suited for mass production.

II. TRADITIONAL WAY OF NOODLE MAKING MACHINE

- Noodles appear as hand-made noodles prevail, because they are thus easily prepared and can be cooked into various dishes.
- One can boil them and then add in different meat for noodles with minced meat, tomato and egg sauce for

tomato and egg noodles and one can also steam and then electrocute them with different veggies.

- Homemade noodles dough prepared using the just flour, eggs, salt, and olive oil.
- *Akki Shavige*(noodle) is a specialty of Karnataka and is also widely prepared in our family.
- Preparing noodle is quite laborious and needs at least two people to help.
- Noodle is quite versatile and we prepare sweet as well as spicy varieties with it.
- The picture below display's how the Noodle press looks which is employed to prepare noodle. This machine is quite lightweight with a handle to turn and a perforated cylindrical cup and stands on its legs.



Fig 1: Traditional way of noodle making at home

III. MARKET POTENTIAL OF NOODLE MACHINES

This type of ready-to-eat food items is very popular in the developed countries because of its versatility of form, composition, and ease of preparation, nutritional content and excellent storage stability as well as increased consumer interest in ethnic foods in the western world at consumer end, which has made these products so widely, accepted world over.

Due to improving the standard of living in the cities and the rapid urbanization taking place in the rural areas, consumption of these products is widely expected to go up steadily. At present, the market of noodles, especially in the urban areas, is dominated by brands like Maggi. Some medium & small companies are also engaged in its production. Besides the boom in the food service sector, including fast food chain, has widened the demand potential for Noodles.

Bharathraj M, M-Tech, PDM-Mechanical Engg. Department EPCET-Bangalore

Murali Kumar L, Assistant Prof. Mechanical Engg. Department EPCET-Bangalore

Fabrication of Portable Noodle Making Machine

IV. PROPOSED CAD MODEL OF NOODLE MACHINE

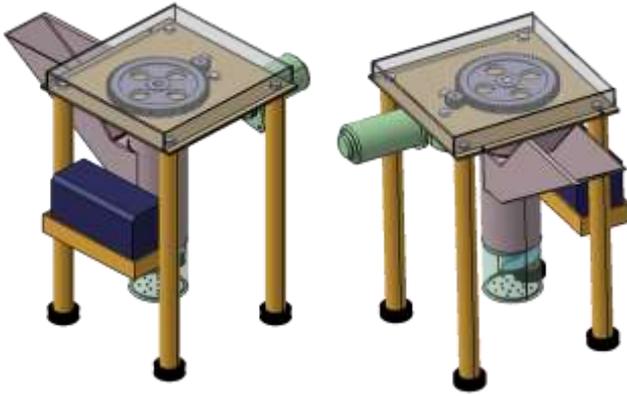


Fig 2: Basic noodle machine 3D-model

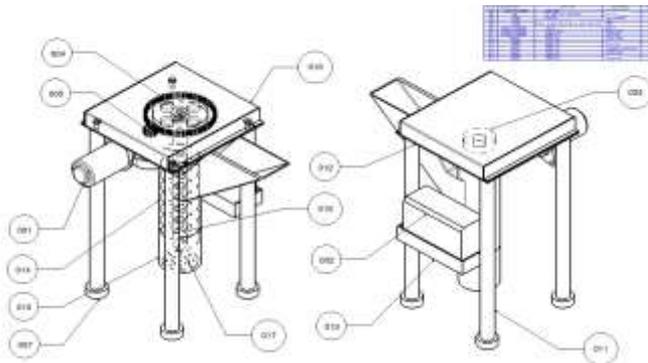


Fig 3: Assembly Drawing

Before starting with the proposed concept of noodle machine we tried with different models of concepts operating on hydraulic power, pneumatic power with rack and pinion arrangement which has its own pros and cons. Finally, we choose the machine operated by DC motor which is portable, lightweight, Durable and Cheap.

V. CALCULATIONS

Noodle machine which is operated by DC motor which has its own features. Motor Torque and Speed of the thread conveyor calculation as shown below.

TORQUE AND SPEED REQUIRED:

➤ TORQUE:

In the case of our Gear, the force exerted is due to the mass being accelerated by gravity:

$$T = (\text{Mass}[\text{kg}] \times g) \times \text{Radius}[\text{m}]$$

where $g = 9.81 \text{ ms}^2$

We want to lift a 0.63 kg mass using a 0.36 m diameter pulley. We can find the torque load created by the mass using equation

$$T [\text{Nm}] = \text{Mass} [\text{kg}] \times g \times \text{Radius}$$

$$= 0.63 \times 9.81 \times 0.18$$

$$T = 1.112 \text{ Nm}$$

➤ SPEED OF THE THREADED CONVEYOR:

No. of teeth on DRIVEN Gear (T_2) = 67

No. of teeth on DRIVER Gear (T_1) = 11

Smaller driver gear must turn six times to get the larger driven gear to make one complete turn

$$\text{Gear ratio} = T_2/T_1 = 67/11 = 6.09 \text{ or } 6:1$$

Motor Speed = 60RPM

Therefore,

$$\frac{\text{No. of teeth on Driven Gear}}{\text{No. of teeth on Driver Gear}} = \frac{\text{Speed of Motor}}{x}$$

$$67/11 = 60/X$$

$$X = 10 \text{ rpm}$$

Speed of thread Conveyor = 10 RPM

VI. MATERIAL DESCRIPTION

There are different parts used in the Noodles machine as shown below:

1. MOTOR AND BATTERY



Fig 4: Wiper motor and 12-V Battery

2SW60 wiper motor operating at the 3.5A current & 12V power which has output rotating speed of 60 rpm with rated Torque of 13Nm

$$P = V \times I = 12 \times 3.5 = 42W$$

Choice of Motor based on the requirement for the task, it has provided variable speed, low initial cost, high durability, simple control of motor Velocity. Simple mounting mechanism with 3 holes as shown [4]. But these motors with a high maintenance cost because of its internal gear mechanism.

HP12075, 12V.7.5 AH/20hr battery Specification used as an input power supply to motor.

2. THREAD ROD

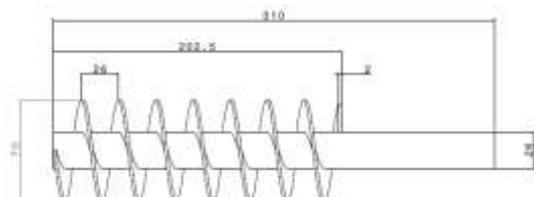


Fig 5: -Thread Rod

Thread rod plays a major character in the noodle making task which pushes the dough towards the shaping die, thread rod is made up of stainless steel with uniform pitch.

3. MIXING CONTAINER AND STAND



Fig 6: SS-Container and Stand

Thread rod, which is inside the container pushes the dough with tight tolerance towards shaping Die. Simple stand [6] which carrying complete setup with high vibration absorbs capacity.

4. GEAR SPROCKET



Fig 7: Gear sprocket

Driven (67-tooth) and driver (11-tooth) sprocket gear ratio 1:6 which controls the speed of the thread rod lead to uniform extrusion of noodle. Gears are made of hardened carbon steel to avoid greasing to ensure quality of the nutrients.

5. OTHER ACCESSORIES

Bearing at one end of the thread rod control the rotary motion and Container ends with tape to set die and bearing container. Fasteners of different specification are used to mount the motor to stand with a base PCD of 48mm. Also gear cover and stand pads are the extra parts used in the noodle machine.

VII. SEQUENCE OF OPERATION & TRYOUT

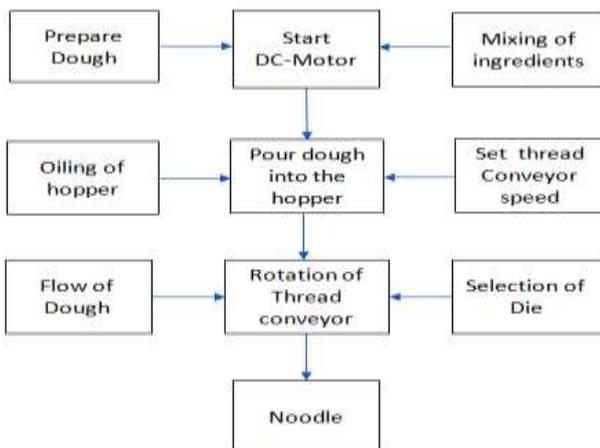


Fig 8: Schematic block diagram of noodle machine

Step-1: The proper flour-to-water ratio to get softer noodle or tougher noodles.

Step-2: Take the dough out of the basin and knead again thoroughly. To get chewy noodles, one should knead the dough for a comparatively longer time until its surface is very smooth and there are a few or no air bubbles inside. And let it rest for about 30 minutes.

Step-3: Switch on the motor for thread rod rotation and oil the chamber before placing dough into the hopper.

Step-4: Set the speed of the thread conveyor motor.

Step-5: By continuous supply of dough in the container pressure tend to push towards the shaping die.

Step-6: Collect extrusion on the tray and then boil.

Step-7: Clean after every use.



Fig 9: Noodle Machine

Above figure shown the basic semi-Automatic noodle machine operated by DC motor.

VIII. BILL OF MATERIAL & COST ESTIMATION

Noodle Machine BOM & Cost Estimation				
Component name	MATERIAL / PART No.	Quantity	Cost in Rupees	
1	TVS Wiper Motor	26071095A	1	1500
2	Battery	HP 12075,12V 7.5Ah/20hr	1	1000
3	Bearing	SAE4140/304 stainless steel	1	200
4	Driver sprocket-External 11 Tooth Spur Gear	High carbon steel	1	500
5	Driven sprocket-External 67 Tooth Spur Gear	High carbon steel	1	800
6	Switch	Spring push button	1	50
7	Rubber bush	Urethane	4	50
8	Stand ROD	MS-IS277	4	250
9	Stand plate	MS-IS277	1	100
10	Battery Box	MS-IS277	1	100
11	Mixing chamber/container	SAE4140/304 stainless steel	1	1500
12	Container Connection	SAE4140/304 stainless steel	1	300
13	Stand-Cover	SAE4140/304 stainless steel	1	100
14	Shaping Die	SAE4140/304 stainless steel	1	50
15	Thread ROD	SAE4140/304 stainless steel	1	5500
15	Fabrication Cost	-		3000
				₹ 15,000.00

Gross Weight 8 kg

Input Power supply HP12075,12V.7.5 AH/20hr

Cost of the machine will be comparatively more because of single piece fabrication when we ordered for mass production price of the machine will be lesser than current estimation.

IX. CONCLUSION & SCOPE FOR FUTURE WORK

There are different types of manual operated, semiautomatic, automatic noodle machine available in the market.

All the machines have its Advantages and disadvantages to each other. Manually operated machine

needs high pressure required operate and multiple people to handled machines.

In Automatic noodle machines, right proportion of flour and water ratio is predefined for the machine before feeding to the mixing container.

From a variety of noodle machine this project proposed to present a new semi-automatic noodle machine with real dimensional model. It is a simple switch control mechanism that operates complete design. This machine utilizes a simple mechanism compared to other machines, cheaper components, easily detachable and portable device.

FUTURE RECOMMENDATION

A Lot of future work can be done to increase the functionality of this machine. As researching decreasing serving time and decreasing the size/weight of the machine.

Adding new flavours to the dough is also a proposed addition, as well as introducing a more user-friendly interface between user and machine. A lot of research is to be done on ways of starting the machine. A proposed research is communication between machine and operator through modems and Internet connections.

REFERENCES

- [1] L. Piancastelli, L. Frizziero. 2014. How to adopt innovative design in a sport scar factory. Asian Research Publishing Network (ARPN). Journal of Engineering and Applied Sciences. ISSN 1819-6608, 9(6): 859-870, EBSCO Publishing, 10 Estes Street, P.O. Box 682, Ipswich, MA 01938, USA.
- [2] J. Barwick, Noodle making machine -Patents, Patent US4083668, (2004).
- [3] Noodle-makingmachines,Sunseni.en.made-in-China.www.google.com/patents/US4083668 Retrieved on 14/11/2015
- [4] N. Sharma, M.A. Hanna, and Y. R. Chen, Flow behavior of wheat flour-water dough using a capillary rheometer 1. Effect of capillary Geometry. Cereal chem. 70(1): 59