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Automatic Chakali Maker

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***Abstract*: Automation is the control of machines and processes by autonomous frameworks through the utilize of various technologies which are based on computer program or robotics. Automation is presently a need within the food industry to address the desired levels of quality control, production speed, labor deficiencies and in general benefit. The proposed machine is related to food industry. It makes a difference to diminish the work fetched as well as time. It diminishes the work stack as well. We are attempting to manufacture a machine which can donate high speed with more precise shape of chakali. This machine has high proficiency to the generation rate as compared to manual and conventional process.**

***Keywords*: chakali, automation, conveyor belt, motor transmission, serrated scale.**

1. Introduction

Chakali is a savory snack from India. It is a winding molded Pretzel like nibble with a spiked surface. Chakali is typically made from flours of rice, Bengal gram and dark gram. It is of a few varieties, depending on the type and extent of flours utilized in murukku, a comparative snack ordinarily made without the Bengal gram flour, is also sometimes called chakali. This machine is related to food industry. It makes a difference to decrease the work taken a toll as well as time. It moreover decreases the work stack. We are attempting to manufacture a machine which is able to donate high speed with more exact shape of chakali. The performance evaluation of the proposed system was experimented under different under different moisture content of the dough viz.24%,25%,26% and with the motor speed of 200rpm This machine has high productivity to the generation rate as compared to manual and conventional process. Our Proposed system could be utilized for making quality chakli in uniform shape and sizes and smooth functioning. Use of state of the craftsmanship innovation, popularizes these automatic chakli making machines amongst society.

2. Problem Statement

Customarily, Chakali is made by hand utilizing chakali mould. Small businesses to utilize this strategy since automated machines are exceptionally costly to purchase. Therefore, they ought to utilize more work control as well as its very slow in production. Issues with routine system are as follows,

- Time consuming
- Inaccuracy
- Work intensive
- Non-hygienic
- Expensive production

3. Literature Review

Design & development of automatic fast food machine Amit B Solanki et al give the proposed detail of design and development of automated fast-food machine for large food industry applications. Automated fast-food machine is a device that squeezing the duff mixture of fast food with following categorized efficiency such as time, human effort, safety, cleaning and quality during fast food making. In this design, it is mainly notified about cost of the machine as well as time efficiency. This designed machine can squeeze duff mixture using screw extruder with electric power, and extruded out using rotating conveyer from machine die to away as near to operator. Therefore, production rate of the fast-food making machine is high compared with other manual and commercially available machines machine learning: an artificial intelligence methodology Anish Talwar et al focus on the problem of learning and decision making is at the core level of argument in biological as well as artificial aspects. So, scientist introduced machine learning as widely used concept in artificial intelligence. It is the concept which teaches machines to detect different patterns and to adapt to new circumstances. Machine learning can be both experience and explanation-based learning. In the field of robotics machine learning plays a vital role, it helps in taking an optimized decision for the machine which eventually increases the efficiency of the machine and more organized way of pre forming a particular task. Now-a-days the concept of machine learning is used in many applications and is a core concept for intelligent systems which leads to the introduction innovative technology and more advance concepts of artificial thinking.

4. Methodology/Experimental

- We made a basic Structure to support our conveyor belt driving system. For this we used 3 Wooden planks and joined it in a "H" Shaped structure with proper tolerancing for the roller and plank.
- Next step was to calculate the length of belt. The formula we derived from VB Bhandari Sir's book and calculated the length of the required belt. We made and error of approximately 6% in this process and made the belt run. A

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12 Volt DC Stepper Motor (200 rpm) is attached to a Home-made coupling and the same is connected to a Step-Down Transformer.

- The output is 9 volts in the motor and that rotates the active pulley in our belt system. A serrated scale was made from Wood and attached with the help of superglue to the Tolerance limit space on the plank.
- The dough for Chakali is made and properly kneaded and put into a Mould of appropriate shape and size. Once the motor is turned on, the driver roller starts and pulls the belt system bringing the dough of Chakali in a straight line.
- The straight-line dough will then hit the serrated scale at an angle and turn in sideways to make itself a proper, delicious Chakali.

5. Calculations

Selection of Length of Belt:

$L = 2C+Pi(D+d)/2+ (D-d)^2/4C,$

Where C= Distance between 2 rollers.
D = Length ofRoller Pulley (Big Pulley)
d= Length of Roller 2 (Small Pulley)
L= Total length of Belt.

C= 60 cm
D = 2.2 cm
d = 2.2 c,m

For our application,

D=d
$L= 2C+Pi(D+d)/2+(D-d)^2/4C$
L = 2C+Pi(D+d)/2 + 0
L= 2x60 + 3.142 x (2.2+2.2)/2
L = 120 + 1.511 x (4.4)
L = 120 + 6.912
L = 126.912 cm.

Calculated Belt Length = 126.912 cm
Belt Length used in Model = 134 cm

Error due to Sewing Overlapping and Roller Adjustment:

Difference = 134 cm – 126.912 cm
= 7.1 cm.

% Error = 5.59 %.

Negligence:

- Inaccuracy of centre distance measurement.
- Tolerancing of contact between rollers and conveyor belt's rigid support.

We know

V∝n,

V	RPM(n)
12	200
9	x

x = 200*9/12
x=N=150

We also know that,

V = πDN/60*100
Where,
V= belt speed
D = roller Diameter
N = no. of revolution

Thus,
V=π*22*150/60*1000
V=17 cm/s

We know,
Power = volts * amps
= 9*2
Power = 18W

Torque (N.m) = 9.54*Power(HP)/RPM
= 9.54*0.02/150
= 0.1909/150
= 0.00127
= 12700 dyne cm

6. Working

When the Conveyer Belt Starts and the moisturized dough goes along with it then the dough makes a contact with Serrated Scale and configures it with a shape of chakli and furthers falls off the Conveyer belt. The Serrated scale was placed on a specific coordinate along conveyer axis where it perfectly shapes the dough.

A. Components

Fig. 1. 12V Stepper gear motor and nut and bolt

Fig. 2. PVC pipe used as roller

Fig. 3. Bearing

Fig. 4. Raw materials before assembling

B. Advantages

- Reduces the number of labors.
- As it reduces labor cost of labor also reduced.
- It reduces the production time as compare to traditional method.
- Its cost is less as compare to the other machines available in market.
- No human Intervention thus avoiding risk of contamination.

7. Results and Discussions

Problems Tackled by chakli maker:

- Time consuming has reduced due to automation of the manufacturing process.
- Labor reduced to almost zero. So, no labor cost.
- No human intervention and cross contamination. Hence, no hygiene issues with the process.

Irregularity in shape and size is eliminated by a constant process.

8. Future Scope

In Maharashtra the demand of chakali is more. There's mass generation of chakali. Automatic chakali machines are enormous and expensive. Small scale businesses cannot manage these large machines. We are attempting to make a programmed machine having low fetch and little estimate. The machine would turn out to be highly efficient for Mahila Bachat Gat.

9. Conclusion

After completing the work, it is concluded that work is simple in construction and compact in size for use manufacturing of machine is easy and cost of the machine is less. This machine can fabricate with less production time with ease by mass or batch production. This work can be implemented in small scale industries. Moreover, hygiene is also increased and less labor power is required which ultimately increase the profit. This work can be implemented in small scale industries.

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