International Journal of Latest Engineering and Management Research (IJLEMR)
ISSN: 2455-4847
www.ijlemr.com || Volume 04 - Issue 10 || October 2019 || PP. 80-85

Designing of Automated Indian Rice Compact Noodles Machine

Dinesh. E[1], Fathima. M[2], Rahini. B[3]
[1](Food Technology, K.S.Rangasamy college of Technology/ Anna University, India)
[2](Food Technology, K.S.Rangasamy college of Technology/ Anna University, India)
[3](Food Technology, K.S.Rangasamy college of Technology/ Anna University, India)

Abstract: The proposed model is to develop an Automatic compact Indian rice Noodles machine. This machine carries the basic model, which we use in cooking. By this automation technology, we can reduce the manpower with reducing the errors. In recent years, all food industry mainly focused on automated system. In addition, using this automatic system we achieve the reduction of huge wastage of manual handling and manpower. With the development of numerical control technology, it becomes more and more urgent to apply the related technology to the automated cooking field.

As per recent technological need in food industry, we are going to present the model for automated Indian rice compact noodles machine. This automated cooking machine comprises with motor. The speed of the motor will control by motor speed control. The flowing rate is calculated based on motor speed or RPM. Hence, this developed automated Indian rice compact machine makes the process easier, reduces risk and provide good quality product.

Keywords: Indian rice Noodles, mechanical and electrical design, process easier

I. INTRODUCTION

Automation is the use of management systems (such as numerical management, programmable logic management and different industrial management systems), mutually with different applications of knowledge technology (such as computer-aided technologies (CAD, CAM), to man- age industrial machinery and processes, reducing the requirement for human intervention. In the scope of industry, automation may be a step on the far side mechanization[1], [2,]. In general, mechanization provided human operators with machinery to help them with the physical needs of labor; automation greatly reduces the requirement for human physical and mental needs likewise. Processes and systems can also be automated. Many roles for humans in industrial processes presently lie on the scope of automation. Human-level pattern recognition, language recognition, and language production ability square measure well on the capabilities of contemporary mechanical and laptop systems. In several cases, the employment of humans is less expensive than mechanical approaches even wherever automation of business tasks is feasible.

This Automated Indian rice compact noodles machine gives improved quality product, reduced manpower and time which results in increased profit with reducing the food wastage. This kind of cooking system is one of the areas that have received the most attention in terms of automation. This machine will perform its functions with hygiene. The major reason for making this project is to introduce a new machine, which has a wide scope in our daily as well as in our professional life. This machine reduces the manpower's and time.

II. OBJECTIVES

The main scope of the machinery is:

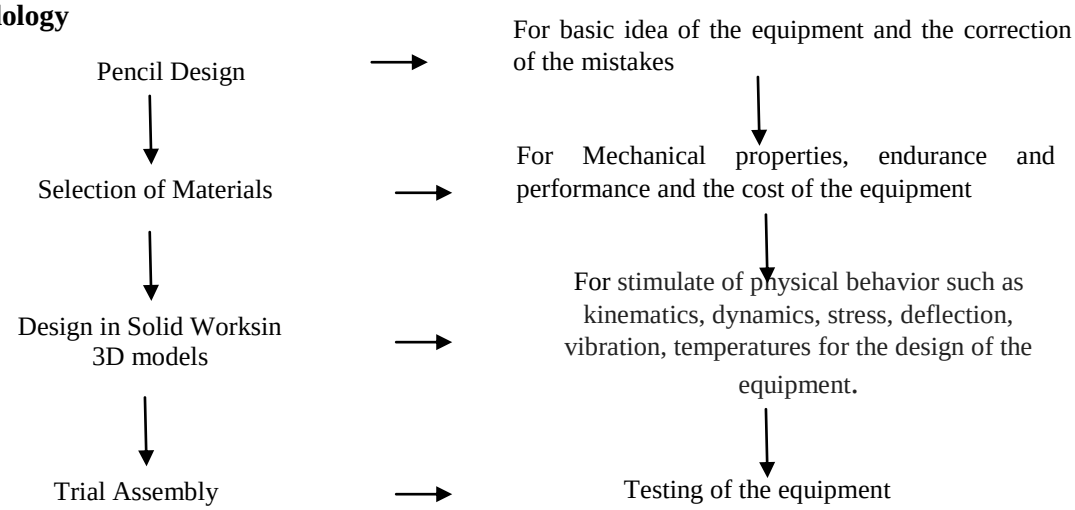
- To design automatic equipment using solid works.
- It will make different kinds of ready to cook foods like vermicelli.
- As per the quantity of people, we can reduce or increase the quantity.
- We are able to make the product in handy rather than retail one.

III. ANALYTICAL METHODS

Analytical methods can also be used to achieve precise results. Advanced analytical techniques often involve intense mathematical calculation. In addition, the significance of the calculations is often difficult to visualize. The analytical techniques incorporated in this text couple the theories of geometry, CAD Modeling and graphical mechanism analysis. This approach will achieve accurate solutions, yet the CAD modeling of Automatic Indian Rice Compact Noodles machine graphical theories allow the solutions to be visualized. A significant of Automatic Indian Rice Compact Noodles machine dedicated to these analytical techniques.

IV. MATERIALS AND METHODS

4.1 Methodology



4.2 Project Methods

This project has various different design paths to complete our products while matting the objectives. This means we will have to implement and compare our different designs to ensure the best product on our sat of objectives. These paths have changed as we progressed through our project and there were few fore seen methods that we expand upon in the design section.

The basic design for Automatic Indian Rice Compact Noodles machine is to have wood ward stepper motor fixed on stand. Disc is connected to the with the link rod when we supply the Dc current to the dc motor by using adopter then the motor shaft starts rotating further transmit the spinning motion to the disc by using shaft the first decision is to create an impact force for the respective operation this will help to determine product affordability.

A more efficient yet expensive design would be to have a battery instead of an adopter. There is bound to be various obstacles and design method to be implemented as projected progressives and will be observed and recorded as they occur.

4.3 Hardware

Material selection is a process of designing any physical object. In the context of product style, the main goal of material selection is to minimize cost while meeting product performance goals. Systematic choice of the simplest material for a given application begins with properties and prices of candidate materials.

The first step is to select all the requirements for the project. The basic equipment require is

- Woodward stepper motor
- Speed controller
- Power supplier
- Switch
- Limit switch

4.4 Woodward Stepper Motor

Woodward designs and manufactures a broad line of stepper motors for region and defense motion-control applications. Early stepper motor designs were primarily “large angle”, but we have expanded our portfolio with several sizes of fine-angle (1.8°) hybrid-type designs, which were first, popularized in industrial automation.

4.5 sSpeed Controller:

Stepper motor high force comes with a straightforward digital controller that permits you to manage the speed and direction of the motor.

Features: Speed controller for 12V up to 0.3A bipolar stepper motor. Speed control up to 200RPM.

4.6 Power Supply

A power provide is Associate in nursing device that provides electrical energy to Associate in nursing electrical load. The primary performs of an influence provide is to convert one variety of electricity to and as a result, power provides are typically noted as power converters. Some power provides are separate complete devices, where as others are engineered into larger devices at the side of their hundreds. Every power provide should acquire the energy it provides to its load, also as any energy it consumes whereas acting that task, from. Depending on its style, an influence provide could acquire energy from numerous varieties of energy sources, as well as electricity transmission systems, energy storage devices like batteries and fuel cells, mechanical device systems like generators and alternators, alternative energy converters, or another power provide.

4.7Power Switch

It may appear strange to hide the elementary topic of electrical switches at such a late stage during this book series, I do this as a result of the chapters that follow explore an older realm of digital technology supported mechanical switch contacts instead of solid-state gate circuits, and a radical understanding of switch sorts is critical for the endeavor. Learning the perform of switch-based circuits at an identical time that you simply study solid-state logic gates makes each topic easier to understand, Associate in Nursing sets the stage for an enhanced learning expertise in mathematical logic, the arithmetic behind digital logic circuits. A switch is any device accustomed interrupt the flow of electrons in an exceedingly circuit Switches square measure primarily binary devices:

They're either fully on ("closed") or fully off ("open").There are many different types of switches, in this type we are selected Proximity Switches

4.8 Proximity Switches

Proximity switches sense the approach of a silver machine half either by a magnetic or high frequency magnetic attraction field. Simple proximity switches use a permanent magnet to actuate a sealed switch mechanism whenever the machine part gets close (typically 1 inch or less).More complicated proximity switches work sort of a detector, energizing a coil of wire with a high-frequency current, and electronically observation the magnitude of that current. If a silver half (not essentially magnetic) gets shut enough to the coil, this can increase and trip the monitoring circuit. The image shown here for the proximity switch is of the electronic selection, as indicated by the diamond-shaped box surrounding the switch. A non-electronic proximity switch would use identical image because of the lever-actuated limit switch. Another style of proximity switch is that the optical switch comprised of a light source and photocell. Machine position is detected by either the interruption or reflection of a lightweight beam. Optical switches are helpful in safety applications, wherever beams of sunshine may be wont to find personnel entry into a dangerous space.

4.9 Limit switch

These limit switches closely fit rugged toggle or selector hand switches fitted with a lever pushed by the machine half. Often, the levers area unit tipped with a little bearing, preventing the lever from being worn off by recurrent contact with the machine half.

V. RESULT AND DISCUSSION

5.1 COMPUTER AIDEDMODELLING

Solid Works could be a solid modeler, and utilizes a constant quantity feature-based approach that was at first developed by PTC (Creo/Pro-Engineer) to form models and assemblies. The software is written on Para solid-kernel. Parameters visit constraints whose values confirm the form or pure mathematics of the model or assembly. Parameters are often either numeric parameters, such as line lengths or circle diameters, or geometric parameters, such as tangent, parallel, concentric, horizontal or vertical, etc. Numeric parameters are often related to one another through the employment of relations, which allows them to capture design intent.

Design intent is however, the creator of the half needs it to reply to changes and updates. For example, you would want the hole at the top of a beverage could to stay at the top surface, regardless of the height or size of the can. Solid Works permits the user to specify that the opening could be a feature on the highest surface, and will then honor their design intent no matter what height they later assign to the can. Features visit the building blocks of the half. They are the shapes and operations that construct the half. Shape based options generally begin with a 2D or 3D sketch of shapes like bosses, holes, slots, etc. This form is then extruded or move add or take away material from the half. Operation-based options

are not sketch-based, and embrace options like fillets, chamfers, shells, applying draft to the faces of a district, etc.

Building a model in Solid Works typically starts with a second sketch (although 3D sketches area unit out there for power users).The sketch consists of pure mathematics like points, lines, arcs, conics (except the hyperbola), and splines. Dimensions area unit supplementary to the sketch to outline the dimensions and site of the pure mathematics. Relations area unit accustomed outline attributes like tangency, similarity, perpendicularity, and disk shape. The constant quantity nature of Solid Works implies that the size and relations drive the pure mathematics, not the opposite approach around. The dimensions within the sketch are often controlled severally or by relationships to different parameters within or outside of the sketch.

In an assembly, the analog to sketch relations area unit mates. Just as sketch relations outline conditions like tangency, similarity and disk shape with regard to sketch pure mathematics, assembly mates outline equivalent relations with regard to the individual elements or components, allowing the easy construction of assemblies.SolidWorks additionally includes extra advanced coupling options like gear and cam follower mates, which permit shapely gear assemblies to accurately reproduce the motility movement of AN actual gear train.

Finally, drawings are often created from either elements or assemblies. Views area unit mechanically generated from the solid model, and notes, dimensions and tolerances will then be simply supplementary to the drawing as required. The drawing module includes most paper sizes and standards (ANSI, ISO, DIN, GOST, JIS, BSI and SAC).

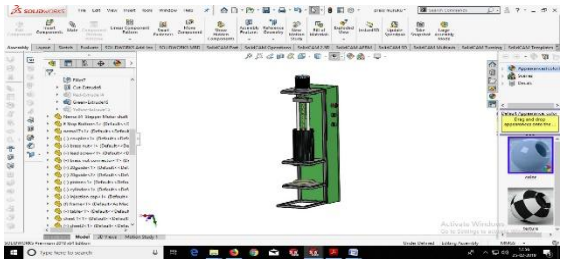


Fig 1: 3D view of Automatic Indian Rice Compact Noodles machine

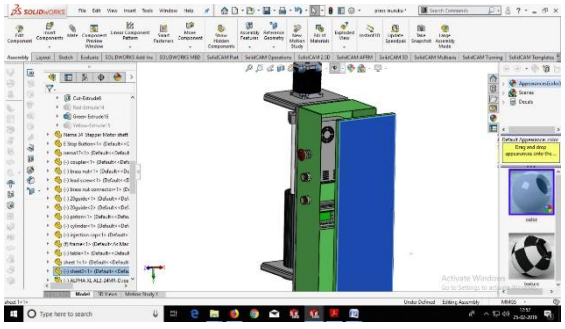


Fig 2: Side view of Automatic Indian Rice Compact Noodles machine

5.2 Analysis of Some Existing Design

The most reliable design Automated Indian rice compact noodles machine is described below along with their specification in order to show the different existing approaches to the small and portable automatic Indian rice compact noodles machine concept. These data could be useful when performing the initial sizing in the design stage of automatic hammering machine project.

- Machine weight = 6 kg.
- Machine length =300mm.
- Width = 355 mm.
- Height = 450 mm.
- Length = 580 mm.
- Disc thickness = 1 mm.
- Battery (supply voltage) =12v and 7 Ampere.

- Motor = DENSO INDIA LTD (SR05950-4772), 30 RPM, 12V. DC motor.
- Length of link rod = 200mm.
- Typical operation = Common Riveting for 2 mm rivet.

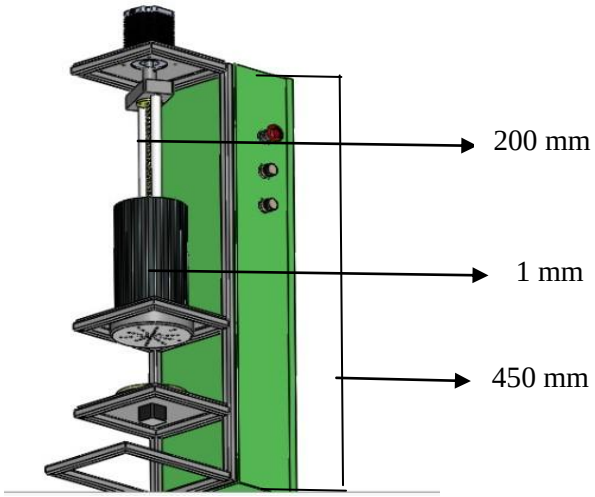


Fig 3: Diameter of the Automated Indian rice compact noodles machine

Calculations
A) To calculate maximum torque by motor
Motor rating,
Given Data: -
N = 30 RPM
I = 8 A
V = 12v
Power Transmitted by Motor,
P = V × I
= 12 × 8
P = 96 W
$P = 2\pi NT/60$

$$96 = 2\pi 30 \times T/60$$
$$T = 30.55N - M$$

4.2 To find torque force transmitted we have two cases
CASE 1: When Hammer Moves Downward.
Given:
(BC) = h = 153 mm = 0.153 mm
Maximum torque = 30.55 N-m
= 30.55 × 103 N-mm
Length of hammer rod = 420 mm
= 0.42 m

$$Tf = \frac{Tmax(length\ of\ the\ hammer)}{h} - length\ of\ the\ hammer$$
$$Tf = 30.55(0.42)/0.153 - 200$$
$$\boldsymbol{Tf = 83.86\ N - m}$$

CASE 2: WHEN HAMMER GOES UPWARD, TORQUE FORCE WILL BE DECREASED
$$Tf = \frac{Tmax(length\ of\ the\ hammer)}{h} - weight\ of\ the\ hammer$$

$$Tf = \frac{Tmax(0.42)}{0153} - 14.71$$

$$\boldsymbol{Tf = 69.15\ N - m}$$

4.3 TO FIND IMPACT VELOCITY OF HAMMER,

Given: -

H =153 mm = 0.153 m

T (time required for one re revolution of Disc) = 2 sec. So,

$$V = h \times T$$

$$V = 0.15 \times 2$$

$$\boldsymbol{V = 0.306 m/sec}$$

Therefore, the impact velocity of hammer is **0.306 m /sec.**

RESULT

Thus, for riveting of 2mm rivet calculated the impact velocity is **0.306 m/sec** with a torque force of **83.86 N-m** is sufficient and it is calculated successfully

VI. CONCLUSION

We have successfully calculated the torque force of the motor. For the design, the impact velocity and torque force is calculated accurately. The entire modelling of the project is done with the help of solid work software. In this addition to this. The project work has provided North American country a wonderful chance and knowledge, to use our limited knowledge. We gained a lot of practical knowledge regarding. Planning, Perching, assembling and machining while doing this feel that the project work is good solution to bridge the gates project work. We between institutions and industries. We area unit proud that we have completed the work with restricted time with success.

REFERENCES

[1] Tahir Nizamuddin, Bilal Iqbal. Design and Implementation of Locally Developed SCADA A Cost-Effective Solution, PCSIR, Institute of Industrial Electronics Engineering, (IIEE) Karachi (16), 2010.

[2] Tie-in Zhang, Yun Zhang, Xibornol Zhou. Development on Serial Communication between Panasonic Electrical PLC and Computer based on VB, Guangxi University, Nanning, China. Applied Mechanics and Materials, 2012, 170-173.

[3] S.S.Bidwai, V.B.Kumbhar, Real Time Automated Control using PLC-VB Communication, International Journal of Engineering Research and Applications (IJERA), 3(3),2013, 658-661.

[4] Naregalkar Akshay, Real Time Automated Control of Industrial Processes with PLC –LABVIEW Communication, Ibrahimpatnam, Hyderabad, India, 1(1), 2008, 035-038.

Books:

[1] "Modbus communication Manual" MTL 8000 process control for process I/O, The MTL Instruments Group PLC, England

[2] "DVP PLC communication Protocol," Delta Electronics Inc, www.delta.com.tw/industrialautomation (1998).

[3] "Using MODBUS for Process Control and Automation". The Interface Solution Experts, www.miinet.com

[4] www.plc-scada-dcs.blogspot.com

[5] http://www.edata.omron.com.au/eData/Servo_Controllers/U04P-E-01.pdf.