DESIGN AND FABRICATION OF PAPAD MAKING MACHINE FOR GRIHAUDYOG

Jyoti Bisane[1], Dr. A.V. Vanalkar[2], Er. P.M. Zode[3]

[1]M.Tech student, [2]Professor, [3]Assistant Professor
[1]Department of Mechanical Engineering,
[1]K.D.K. College of Engineering, Nagpur, India

---***---

Abstract: India has largest industries of Papad making machines which serves in every corner of country. Machines available in Indian market are costlier to afford for small scale industries like 'Grihaudyog' who are still making papad handmade. So to overcome this and looking on various parameter, it has decided to "Design and Fabricate papad making Machine" with advanced features available on affordable prices. The mechanism will use drives, pulley, belt, motor, roller mounted on spring, pedal operated vertical post. This machine would help to improve quality of product with the help of its less bulky and smaller size. It can use to make papad for multi grains.

I. INTRODUCTION

Papad is nothing but the thin Indian wafer, which can be refereed as a cracker or flat bread. Papad is generally made from dried pulses; it can be eaten fried or roasted. There are varieties of papad flavors available in the market that are made to suit the requirement of each and every individual. The dough prepared by kneading the grains/dal mixture is cut into balls and hand-rolled using roller and plate. The major drawback of this manual process is the rolling capacity which can produce only about 30-40 Papad/ hour. Papad is either leavened or unleavened flat bread consumed throughout the Indian subcontinent and other parts of Middle East. It is usually prepared from whole grains and sometimes yeast and fat is also included in the formulation to improve the dough handling, mixing and textural properties. The product is prepared by mixing the grains with water and other ingredients to develop the dough, sheeted and dried for short time. They have creamish brown colour generally prepared in households, forming a cheap source of protein and energy. The grains is mixed with water, shortening and salt, sour dough or yeast, and is creamish brown to brown in colour.

Market Prospect

Market Promotion plays a vital role for the generation of the potential customers therefore, application of marketing strategies are recommended. Marketing plan of the proposed project may include good quality maintenance, promotional campaign like offering special discounts, referrals, advertisement and tying up with buying houses.

II. CONSTRUCTION

Figure shows a schematic sketch of machine along with its components and various drives. It consists of a motor for its initial drive with specification 0.5HP, with shaft speed of 1440rpm, further fixed to frame of the machine. Shaft of the motor is mounted with pulley having a groove to mount on belt. Belt is further connected to a pulley that gives 1st speed reduction. Bigger pulley is mounted on a shaft which is further connected to rotating platform where material for making papad is kept in spherical form. All these assemblies including pulley, belt & motor are fixed to a frame having suitable dimensions. Machine is having two vertical post to mount the horizontal roller. Bottom ends of post are fixed to frame & top ends are provided with bearing to mount the shaft of roller. Roller itself is having bearing to have rotation within itself. Springs are mounted on vertical post which is fixed to post. Operator pedal is connected to top of the springs that exerts force applied by the worker. The machine further has a dryer located at the side of Papad platform that dries the Papad with the help of dry air.
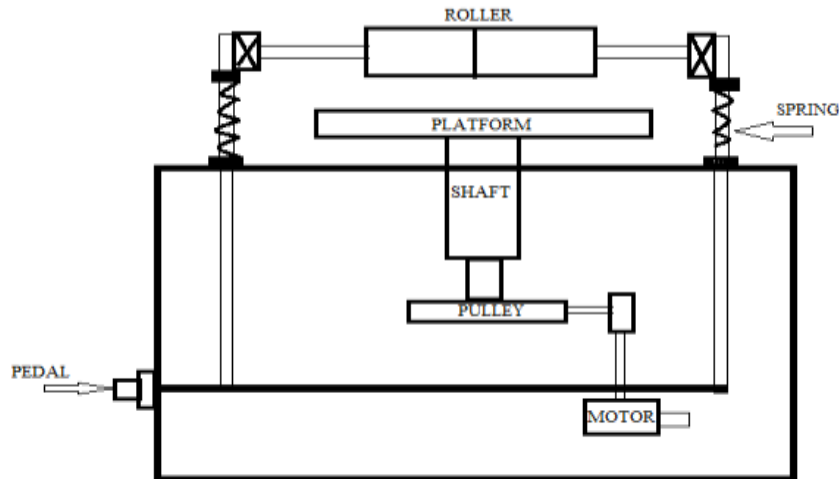
III. WORKING

Initially a piece of circular plastic is taken on which the Papad material would be pressed. Plastic is provided with oiling to avoid sticking of Papad at high pressures. Papad dough is prepared separately with mixture of refined grains & water along with additives and is placed on the lubricated plastic. Another same piece of plastic is kept above it & covered properly. A light pressure is applied on the plastic above it to press it a little that avoids slipping of material during rolling. Switch is made ON and motor is started.

Horizontal circular platform starts rotating with a designed velocity. Now this whole assembly of plastic & Papad dough is placed on the rotating platform & a slight pressure is applied on the pedal by the operator. The operator continues to apply force on the pedal, with the application horizontal roller moves downward pressing the material. With downward movement of horizontal roller, friction between roller & Papad exerts rotation in the roller & the roller starts rotating with some velocity. Roller forms a line contact with the Papad material exerting a force that flows along its circumference leading to flattening of Papad. Operator continues to apply force on the pedal until the required thickness of Papad is reached. Further operator removes force and plastic & flattened Papad is taken out, upper plastic is taken out & shifted to dryer compartment for drying. Here it is kept for about 1minute, until the making of next Papad, for drying of its moisture, this operation would reduce the drying time of Papad. First operation is completed & another material is performed with same procedural steps.

Cad Model of Papad Making Machine
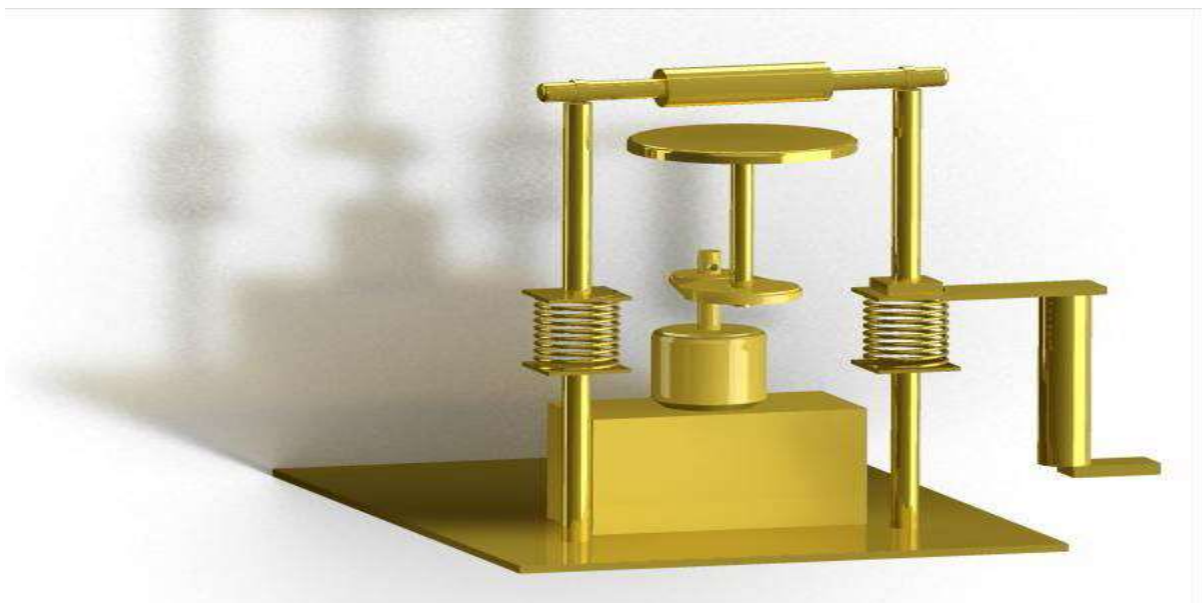
IV. CALCULATION

A. Design Of V-Belt

Rated Power, Pout=0.37kw, vbelt= 0.90, PR =Pout / vbelt =0.41 KW

1) Design power, Pd = PR x kl =0.451KW

2) D1=38.1mm Peripheral velocity (from D.T. N1=1440 rpm), Vp= (Π D1N1)/1000=2.87 m/sec

3) Assume negligible slip: Vdriven=Vdriver D1N1=D2N2, D2=203.2 m

4) Angle of Lap (θ) θ1= Π-(D2- D1)/C=2.45 rad ----------(C=D1+D2) θ2 =Π+(D2- D1)/C =3.82   rad, = = =0.3 --------->for C.I. & rubber belt

5) Belt tension ratio:- (/ =) =9.56 & (/) =33. Select lower value, (/) =9.5

6) Length of belt: L= (Π/2) × (D1+D2) + (2×C) + (D1-D2)^2/4C= 88.9m

B. Design Of Spring

Load of operator on pedal (As per ergonomic study), average human can exert 70N load comfortably.

Weight requirement of Papad rolling- 0.5-0.7kg

Papad size considered- 20cm dia. 1mm thickness, Pressure exerted= 222.92Pa Let C=5.5

Material- chromium vanadium steel SAE 6150

Sut = 1690 Mpa, Sys = 770 Mpa

max = Sys/Fos = 385 Mpa

1) Diameter:

τ = (8FC/πd2)*Kw

Kw= [(4c-1)/(4c-4)]+(0.615/ c) =1.27

d≈2mm

Checking Shear Stress,

τ = (8FC/πd2)*Kw

τ = 245.09Mpa max = 385 Mpa.

Shear stress value is under safe zone with this index value. Spring is under safe zone.

2) Coil Dimension

C = Dm/d= 11mm

Do = Dm+d=11+2=13mm

Di = Dm-d=11-2=9mm

3) No. of Coils

(Deflection of 40mm by equating volumes)

δ=[8FDm

3/Gd4]*n=9

Taking square and ground end n'=n+2=11

4) Free length= n'd+δ+0.15δ =68mm

IV. ADVANTAGES

A. Our design is having reduced size, weight & is convenient to keep in homes easily.

B. Machine has reduced cost that would be affordable to middle class families & home businesses.

C. Changing Papad dimensions in this machine is comparatively an easier task, just by application of pressure over a rotating material. It does not require any assembly changing and time consuming activities.

D. Only a single worker can work on this machine to carry out Papad rolling & handling activity

E. Energy consumption as compared to present machine is very low as it has 0.5HP motor as compared to 2HP motor.

VI. CONCLUSION

In this project we have concluded that as day by day there is more requirement of skilled labor because of faster rate of development in food processing area. Hence to reduce human effort and to reduce working time for Papad flattening operation we have developed simple Papad making machine for production of Papad which plays an important role in middle class people's business. Our machine makes Papad with the help of rolling & pressing mechanism and v-belt drive with pulley arrangement is used to transmit power.

Front View of Papad making machine

VII. REFERENCES

[1] Shurpalekar SR, Prabhavathi C (1976) Brabender faringograph, research extensometer and highlife chapatti press as tools for standardization and objective assessment of Chapatti dough. Cereal Chem 53(4):457–469

[2] Kumar S, Srivastava AK, Prasad Rao US, Haridas Rao P (2009) Studies on glute, Proteins and faringograph characteristics of wheat flour mill streams. J Food Sc-Technol 46(1):21–25 Sridhar BS (1991) An improved continuous chapatti making Machine. Indian patent No.177722.Advantages of Chain Drive Over

[3]Anonymous, 2014. Papad manufacturing at
http://www.nmfpchhattisgarh.in/pp/03%20Cereal%20&%20Pulse%20Based%20Products/09%20Papad%20Mfg.pdf

[4]Anonymous, 2013. Khadi & village industries commission project profile for gramodyog rojgar yojana, papad manufacturing at http://www.kvic.org.in/pmegpwebsite/pmegpwebsite/kvic-regppmegp.in/commonprojectprofile/PAPAD%20MANUFACTURING.pdf

[5]Borkar P. A., M. R. Rajput, R. P. Murumkar and M. M. Dange, 2014. Development of standardized and modified process technology for making sorgo papad (Sandoli and Bibadi), JInternational Journal for Research in Applied Science & Engineering Technology (IJRASET**)**

 [6]ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 6.887