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DEVELOPMENT OF NEW SPECIAL PURPOSE SOAP STAMPING MACHINE FOR
SMALL SCALE SOAP MANUFACTURING

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ABSTRACT

This paper presents further development on a new special purpose soap stamping machine concept that was developed for effective stamping of logo on soap for small scale industrial application. The objective of this paper is to know the actual working of the special purpose Soap Stamping Machine. This machine works on the basis of three mechanisms used in this machine for stamping a logo on both sides of the soap. Like Geneva Mechanism, Single slider crank chain mechanism and cam and Follower. The Geneva Mechanism converts the rotary motion into intermittent rotary motion. Our main goal is to make a study model of special purpose soap stamping machine for studying purpose of students and for solving the industrial problem. The new designed fabricated model of special purpose soap stamping machine has solved several issues within industry. And also fulfills the requirement of small scale industry.

Keywords: *logo stamp, soap, Geneva Mechanism.*

I. INTRODUCTION

Now days, there is lot of competition in the market. So that is a need of developing a new technique or process for effective manufacturing. That process or methods should fulfill the requirement about accuracy, productivity etc[6].

It is necessary to reduce the manufacturing lead time. There are various ways by which the manufacturing lead time can be effectively minimized. There are various time consuming steps or sub process, which can be, minimize by various methods. In mass production the time criteria is very important. Within small time limit, a single unit job has to be completed. For minimizing the job time, the handling of the job should be minimum[3]. So that labor time considerably saved. Form minimizing the handling time; we introduce the attachment for loading and stamping as well as unloading machine for the operation. Suppose for one job B, there are number of sequential operation such as loading, sumping, unloading, oiling and cleaning that can be effectively perform by one after another with greater accuracy & at faster rate. For loading, stamping, unloading, oiling and cleaning on table head is using hand process, but by this attachment, there is only first initial making is required. Then automatically equipped loading, stamping, unloading, oiling and cleaning machine. This attachment is very useful for small-scale industry as well as work shop.

II. LITERATURE REVIEW

While studying on this project we came across various components of mechanically operated automation system [1] such as Main base/table, Geneva wheel, Geneva shaft, Crank shaft, crank, Bevel gear, Bearing etc. And also I have studied the actual implementation of these components. While designing the model we came across various difficulties such as Geneva mechanism fitting. Initially we had collected all the components required for MOA system. We arranged all the components of mechanically operated automation system according to their function [6]. There is a need of developing a new method or process for effective manufacturing. Automats are a device which can develop an effective manufacturing process [3].

The model of special purpose soap stamping machine is basically small version of stamping machine is used in industries [6]. Various Processes are performed on this machine. The processes like loading, stamping, unloading,

oiling and cleaning are performed in this machine. Like other soap stamping machine, this machine also undergoes or suffers from some issues, various mechanism like Geneva mechanism are used in our project [5].

III. PROBLEM AND SOLUTION

Problem

After carrying out the search for the problems in the industry we came across for the moisture content in the soap was very high, cutting of soap was not proper and stamping logo on the soap was also not proper [6]. Out of above three problems we thought on the problem of stamping of logo on the soap. In stamping machine there was a problem that worker were doing four operation after some interval because of that the more time required for the operation. Another problem was that this machine was manually hand lever operated and the Worker handle all the machine with their hand due to that worker not feel good. Hence the production rate of the soap stamping machine was very low and it required more man power for the stamping of soap.

Due to this production rate was low, the current setup is not convenient for the worker point of view and there is wastage of man power for loading, unloading of soap and oiling & cleaning of die cavity. So we have selected this problem taking consultation from M/S Aggrawal Soap Works [6].

Solution of problem

For carrying out the four operation (loading, stamping ,unloading, oiling cleaning) simultaneously, it required less effort and worker feel relaxed there is no any machine or any type of mechanism which carry above four operation simultaneously with less man power or mechanical energy, so we select this problem as a project [6]. For this purpose we make a device which carries the four operations simultaneously with less man power or mechanical energy and increased production rate.

IV. NEED OF PROJECT

1. To minimize the time required to perform various operations like are stamping, loading, unloading, oiling and cleaning.
2. To minimize the human effort.
3. To manufacture a job with high accuracy and precision.

Objectives

At the end of project student will be able to understand-

1. Design Procedure
2. Manufacturing Process.
3. Collection of Raw material.
4. Manufacturing of component.
5. Assembly of component.
6. Software Auto CAD/CATIA.
7. Identify the component.

V. CONSTRUCTION OF SPSS MACHINE

- These machine mainly consists of frame or table which support the two guide bar on which the single slider crank chain mechanism are mounted to provide the ups and down motion of the stamp holder plate.
- It gives three inputs at a time to the three mechanisms. Like Geneva mechanism, Single slider crank chain mechanism and cam and follower.
- Single slider crank chain mechanism which is used for converting rotary motion of crank shaft to the reciprocating motion of stamp holder.

- Geneva mechanism which is used for intermittent rotation of the rotary indexing mechanism. And Cam and follower also used for stamping logo lower side of the soap.

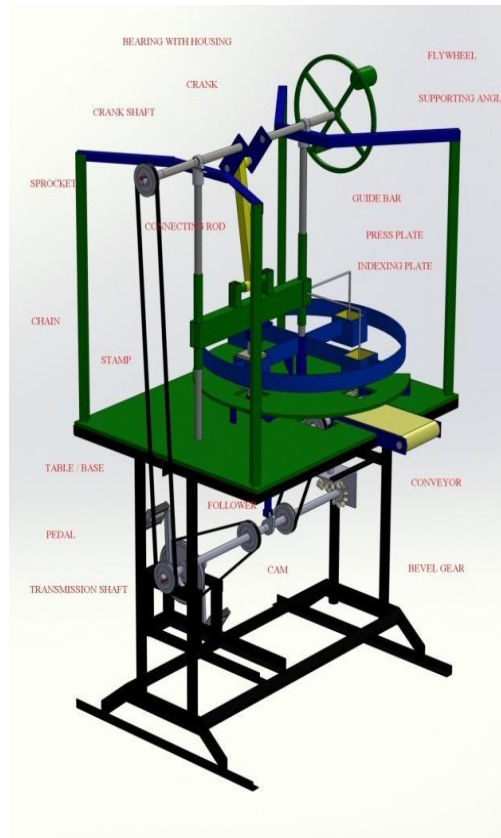


Figure 1: Construction of Special Purpose Soap Stamping Machine

Table no. 1 main parts of machine

Sr. No.	Main parts
1	Table/Base
2	Shafts
3	Press Plate
4	Guide bars
5	Connecting rod
6	Supporting square hollow bars
7	Top supporting holder angles
8	Fly wheel with dead weight
9	Indexing Plate with cavity
10	Geneva plates (4 slot 1 pin)
11	Small bush
12	Cam and Follower
13	Stamp and Stamp holder

Table no. 2 spare parts of machine

Sr. No.	Spare Part
1	Bevel Gears
2	Leg lever with pedal
3	Chains
4	Nuts and bolts with washers
5	Plywood
6	Sprockets
7	Bearing housing and small bearing with cover

VI. WORKING PRINCIPLE

When the pedal operates it transmits power to the Transmission shaft. The transmission shaft transmits to three mechanisms [6].

- 1) The gear is mounted on same shaft. This gear is engaged with another gear having same number of teeth having same number teeth. As a result the Geneva wheel moves with the same speed of transmission shaft. As the Indexing mechanism and the Geneva wheel are mounted on the same shaft, the indexing mechanism also rotates with the same speed of Geneva shaft.
- 2) The rear wheel sprockets mounted on the same shaft which transmits power to the crank shaft of single slider crank chain mechanism. The single slider crank chain mechanism converts rotary motion of crank shaft into reciprocating motion. The Press plate reciprocates along the guide bars. This is also called as stamp holder plate. The stamp is attaché at the bottom of the plate which is used for embossing the logo on upper side of the soap. Pressure required to stamp the logo on soap is 70 N.
- 3) The cam is mounted on the transmission shaft. The follower reciprocates with the help of cam which is use for embossing the logo on lower side of the soap.

The indexing mechanism (plate) mounted on the guide bar which is rotate with the help of Geneva mechanism at an angle of every 90 degree.

Each 90 degree rotation performs one operation. So there are four operation carried out in complete one rotation of indexing plate. These four operations are loading, stamping, unloading, oiling and cleaning [6].

Design consideration

In Design section, we have first design the component by calculating the stresses and forces acting on that particular component[6]. What should be the size of those components? All this found in Design. Those entire components listed below:-

- 1) Design of Shaft.
- 2) Design of Geneva Mechanism.
- 3) Design of Sprocket and chain.
- 4) Design of Table and Main Body of machine.
- 5) Design of Indexing plate.
- 6) Design of Cam and follower.

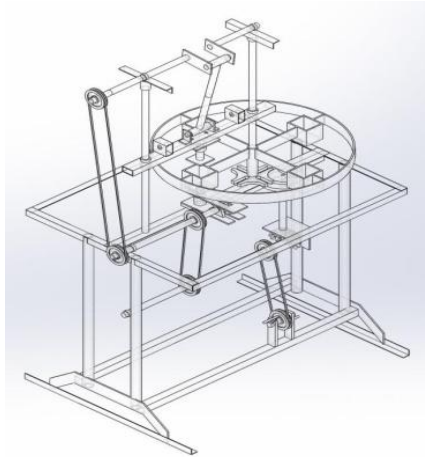


Figure 2: 3D Model of Machine



Figure 3: Actual Fabricated Model of special purpose soap stamping machine.

VII. ADVANTAGES AND APPLICATIONS

Advantages :

- This machine should be able to stamp a logo on both side of soap.
- It can give the proper shape
- Reduce lead time and Increase production rate.
- Quality soap is manufactured.
- Less effort required during its operation.
- Unskilled worker can operate.
- Working of this machine is very simple anyone can operate easily.

[NC-Rase 18]

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Limitation:

It is limited to small scale manufacturing only.

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Applications:

- This machine can manufacture soap in various shapes such as square, rectangular and elliptical.
- It is used in Small scale industries.
- It is used in where there is no electricity.
- It is used to stamp the variety of soap such as Bath soap, Detergent soap etc.

VIII. RESULT AND DISCUSSION

We have decided the some objectives of the new machine which is fulfilled after completing the project[6]. These objectives are enlisted are as follows:

Table 3: Objectives Identified the Production rate of the new machine:

S.N.	Objectives	Identified	Status
0 1	Stamping on both side of soap		Fulfilled
0 2	Proper Shape of soap (physical dimension)		Fulfilled
0 3	Reduce manufacturing lead time		Fulfilled
0 4	No electrical power use for operation		Fulfilled
0 5	Prevention of Accident (Safety to Worker)		Fulfilled
0 6	Loading, Stamping , Unloading, Cleaning & Oiling		Fulfilled
0 7	Easy to Operate and Comfortable		Fulfilled
0 8	Skilled worker not required		Fulfilled
0 9	Increased Production rate, Cheaper and Reliable		Fulfilled

The Production rate of the new machine is also increased as compared to previous machine is as follow:

- **Required Production Rate** = 10,000 soap/shift. Table 2: Production rate
- Considering all fatigue and allowances, Production Rate of New Design of M/C = **15,000** soap /shift

Table 4:

Old Design Machine	New Design Machine
15 Soap/ Min	30 Soap / Min
900 Soap/ hr.	1800 Soap/ hr.
7200 Soap/ Shift	14400 Soap/ Shift

IX. FUTURE SCOPE

Future scope for this special purpose soap stamping machine is to use electric motor instead of bicycle pedal. For low RPM and high torque the stepper motor is used. As per the shape of the soap (i.e. square, Rectangular and Elliptical) the Die and cavity is easily replaceable. For further advancement in machine the pneumatic press is also used for stamping the soap.

X. CONCLUSION

As a conclusion, a new special purpose soap stamping has solved several issues within industry. and also fulfills the requirement of small scale industry. The machine gives high production rate. The machine for stamping of NIROL soap is successfully designed and fabricated. To reduce human efforts, manufacturing lead time and increased the productivity special purpose soap stamping machine is required.

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REFERENCES

1. Mr. Shinde Tushar B. Mr.Bhalrao Ganesh N., Ms. Anita V. Hase, "Mechanically Operated Automation System" *International Journal of Science, Engineering and Technology Research (IJSETR)*, Volume 4, Issue 5, May2015
2. Engr, Issa A. K, M. H Idris, and U. J Ibrahim "Design and Construction of Manually Operated Soap Cutting and Scraping Machine for Small Scale Industries" *International Journal of Engineering Research & Technology (IJERT)*ISSN: 2278-0181 Vol. 4 Issue 06,June-2015
3. *Developing Cost Effective Automation In Soap Manufacturing* Rajesh B. Salwe et al *Int. Journal of Engineering Research and Applications* www.ijera.comISSN: 2248-9622, Vol. 4, Issue 1(Version 3), January 2014
4. B.N. Nwankwojike "Design and Development of A Soap Stamping and Tableting Machine for Small Scale Soap Manufacturing" *Nigerian Journal of Technology (NIJOTECH)* Vol. 31, No. 2, pp. 199 205. Copyright c 2012 Faculty of Engineering, University of Nigeria. ISSN 1115-8443 , July, 2012
5. R.S Khurmi and J. K. Gupta (2005).*Machine Design*.3rd Edition, S. CHAND & COMPANY LTD, NewDelhi
6. Ankit Padmne, Ajay Solanke, Ganesh Bawaskar, "Design and Fabrication of Special purpose Soap stamping machine." *Project of Final year students SSGMCE SGBAU, Amravati 2017*
7. *Theory of Machines* Book by J.K. Gupta and R.S. Khurmi Published: March1995
8. *A Textbook of Strength of Materials* Book by R.K.Bansal
9. Eze C. S. *Design and Development of a manual soap Tableting and stamping machine*, B. engg. Project Department of mechanical engg. Michael okpara university of Agricultural Technology 7(3), 2011, pp567-574
10. Cornish, E. H. *materials and the Designer*. Cam bridge University Press, Cambridge, 1991. pp. 509-556
A Text Book of Production Technology: By P.C.Sharma.