

Developing Cost Effective Automation In Soap Manufacturing

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ABSTRACT

A low cost automation system for soap manufacturing is to be designed and developed. The setup consists of mixer in which the raw material is mixed for the process of soap making. The mixture is then carried into a tray to a stamping machine. The plunger embosses on raw material of soap to give desired shape and size to the soap in a low cost manner.

Keywords - Soap mixture, low cost automation, stamping machine, cottage industry

I. INTRODUCTION

Soap is used as cleansing agent. Chemically soap is mixture of sodium salts of various naturally occurring fatty acids, for softer lather of soap the fatty acids salt is to be mixed with potassium rather than sodium. A low cost automation is need of time for purpose of development of cottage level industrial sector. A low cost soap manufacturing machine is designed to contribute automation to the manually operated cottage level industry at an affordable cost. As manually processed soap making does not have attractive shape and size affecting the sale of soap. Customer gets attracted by the appearance of soap ,thus in order to enhance the appearance of soap at an affordable price a “low cost automation soap making machine” is to be developed The idea is to make low cost automated machine that can be used to manufacture soap. Automation cuts down employment rate and also, the initial capital investment required are high, so in order to make it possible for villagers, we have LOW COST ideology. The idea of punching machine to be used in the soap manufacturing machine is taken from brick industry, as the extrusion is not in the favor of low cost. Earlier soap was made by cutting into pieces from whole soap block with the help of Knife. That gave soap an irregular shape and size. As evolution started various machines were developed which could be used to cut every piece of soap in proper shape and size, but cost of such machines are very high and is not affordable for a common man. Considering this factor LOW COST AUTOMATED SOAP MANUFACTURING MACHINE is needed. The concept of socio-economic welfare is used here as the fabricated final product is socially upgrading and economically cheap.

II. AUTOMATION PRINCIPLES

The preceding discussion leads us to conclude that automation is not always the right

answer for a given production situation. A certain caution and respect must be observed in applying automation technologies. In this section, we offer three approaches for dealing with automation projects: The USA Principle

USA Principle

The USA Principle is a common sense approach to automation projects. Similar procedures have been suggested in the manufacturing and automation trade literature, but none has a more captivating title than this one. USA stands for:

1. *Understand* the existing process
2. *Simplify* the process
3. *Automate* the process.

1) *Understand the Existing Process.* The obvious purpose of the first step in the USA approach is to comprehend the current process in all of its details. What are the inputs? What are the outputs? What exactly happens to the work unit between input and output? What is the function of the process? How does it add value to the product? What are the upstream and downstream operations in the production sequence, and can they be combined with the process under consideration?

2) *Simplify the Process.* Once the existing process is understood, then the search can begin for ways to simplify. This often involves a checklist of questions about the existing process. What is the purpose of this step or this transport? Is this step necessary? Can this step be eliminated? Is the most appropriate technology being used in this step? How can this step be simplified? Are there unnecessary steps in the process that might be eliminated without detracting from function?

3) Automate the Process. Once the process has been reduced to its simplest form, then automation can be considered.

a. Process parameter

Under this parameter a single process which is DIRTY, DANGEROUS , TOXIC , TIDIOUS is automated so as to avoid human work in this environment, by doing this cost of automation is reduced when compared to cost required for automating whole of machine

b. Product parameter

Under this parameter all factors affecting APPEARANCE , QUALITY of soap are automated so as to attract the customer. Thus increasing sale and automating the process at lower cost

III. STAMPING MACHINE

The look of soap depends on the stamping and punching operation as it give shape and proper look to the soap. So we have selected this operation of stamping and punching to be automated as it maintains consistency and gloss look to the soap. Soap mixer mainly consists of hopper, cylinder, and exit pipe. In this machine, the mixture of various proportionate contents is to be mixed in order to get fine mixture. In this case, the mixture is poured into the cylinder by hopper where number of blades fixed on the shaft. The shaft is rotated with the help of motor. After proper mixing of

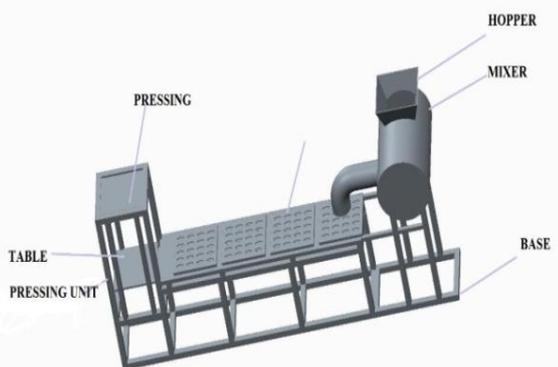


Fig 1 :- 1st Generation Machine

the ingredients the mixture is then transferred to tray through exit pipe fixed to the cylinder. After that the mixture is allowed to soak.

Stamping machine is very important in order to increase the market value of the soap. Since today's customer mainly attracted towards good look and their different attractive shapes. Stamping machine is

one of the effective equipment to fulfill these customers requirement.

Stamping machine consist of plunger, table and die in which plunger having vertical movement. The die is fixed on the plunger which is supported by plate. This plunger strikes on the tray which cuts the soap in proper shape and performs the stamping operation with the same. The die can be changed as per the requirement of size and shape of soap.

The average power produced by the man is approximately 75W if he works continuously, therefore human power may be used for a process if the power requirement is a maximum of 75W. If process power requirement is more than 75W and if the process can be of an intermittent nature without affecting the end product, a human-powered machine system can be employed.

IV. MANUFACTURING SEQUENCE (Input and Output)

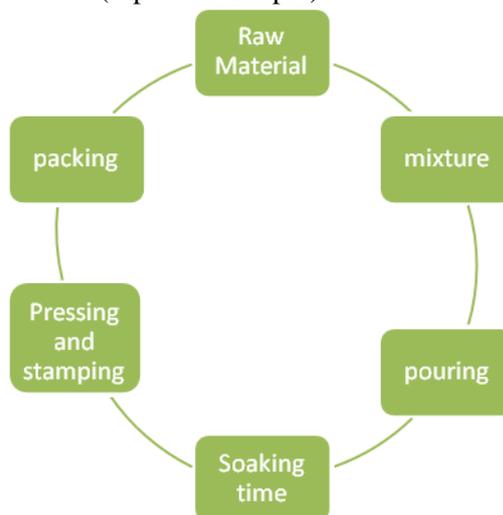


Fig 2 :- Manufacturing Sequence

a) Raw Material:

In soap manufacturing, the required raw material with proportionate content is mixed in soap mixer in order to gain fine powder. The raw materials may be different as the soap having various properties like soap having the high market value for their fragrance. Raw material should be cheap and good material strength.

b) Mixture:

The proportionate content of raw materials are mixed in soap mixer. The raw materials are introduced into the mixer through hopper. For exiting the mixture there is opening called as slurry. The mixer machine is driven by electric motor externally in which blades are fixed on the shaft. As the shaft rotate, blades revolves.

c) Pouring And Soaking:

Then after proper mixing of raw material, this mixture is poured into the tray and allowed to soak for required soaking time. Soaking is important for the removal of moisture. As the moisture content removes, there is negligible possibility of breakage of soap during the time of pressing and stamping. The dies already provided on the tray at the bottom that helps to emboss on the soap.

d) Pressing And Stamping:

After soaking, these trays are allowed to treat with stamping machine. For pressing and stamping process plunger is used. In which, plunger strikes the soap on the upper side of soap to emboss. The plunger provided with the dies supported by plate which is having vertical movement. The dies can be changed as per the requirement of the soap size and shape or as per the customer’s specifications.

e) Packing:

Packing is one of the most important process in soap manufacturing as the high percentage of people are attracted towards attractive look of soap. Many of the customers go through the external appearance Therefore soap manufacturing industries mainly focused on the packing of soap

- In soap manufacturing process the raw material required is caustic soda, fatty acid, vegetable oil, fats coconut oil or glycerin. Caustic soda and fats are main constituents moreover oils and glycerin are use for moisture purpose.
- All these constituents are taken in reactor where mixing, drying and freezing is carried out.
- In mixing process all the contains are taken in a definite proportion and mixed upto required phase. After mixing the mixture is kept for drying purposes.
- The dried material is crushed for removing the noodles to get smoother raw material to manufacture soap the raw material is crushed with the help of planner to increase viscosity of material. These materials are poured intodies and allow soaking.
- After soaking stamping process is carried out with the help of plunger where the plunger is provided with the dies of required shape of soap.

Now the last stage is packing in which the finish soap is wrapped.

VI. CONCLUSION

In the designing of the stamping and punching machine, we have focused on the economically cheap, readily available and having good strength of materials in fabricating of machine in order to make available in low cost for set up of cottage industry in rural areas.

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V. INPUT AND OUTPUT

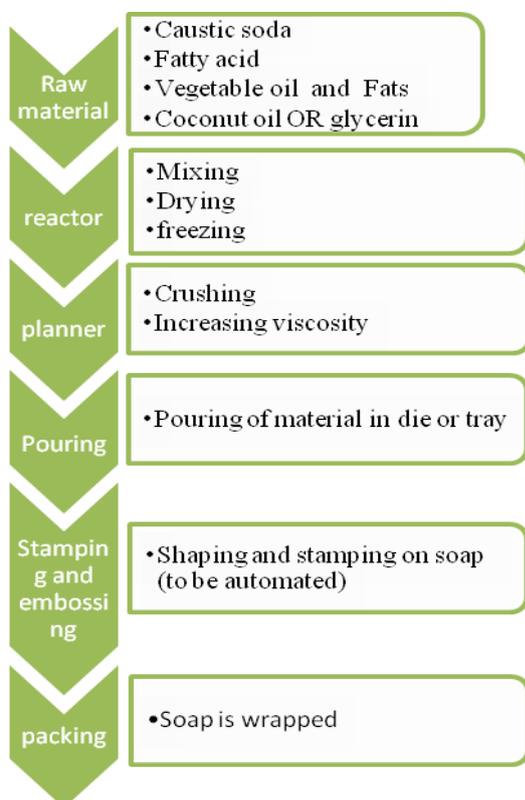


Fig 3 : - Input and Output