

FABRICATION OF TEA LEAF GRINNING MACHINE

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Abstract: In this developing technological world, modern techniques and automation should be implemented in every aspects of the industrial field. The existing tea plants are very large in size and only large businessmen can install it. It will cost more than a core for setting up a new tea factory. So it is not possible for small tea growers to set up a tea plant and they must depend on the existing plant. The aim of our project is to fabricate a TEA LEAF GRAINING MACHINE which will largely aid the small tea growers. Data regarding the problem faced by the small tea growers are collected from field study and newspapers. Based on the collected study the price woes are the major problems of tea small tea growers. The pilot tea factory is to set up a factory for the small tea growers which can help them to overcome the difficulties of price woes. Our project consists of the belt conveyor, hopper, orthodox roller and rotating drum with heating coil. In this method the tea leafs are loaded in the Hooper and the required amount is delivered to the smart roller setup using stepper motor arrangement. Then the leaf's are feed into the orthodox roller. Then the leafs are fried with the help of electrical heating coil and rotating mechanism. Then the tea dust are separated different category.

black tea. Oxidization, which happens as soon as the cells have been broken at the rolling/CTC stage, is the interaction of the cell contents with oxygen. A series of complex chemical reactions take place creating the Flavin's and thearubigins. The Flavin's develop the 'brightness' and 'briskness' of tea and thearubigins are the 'strength' and 'color'. The best results are when a balance between these two has been reached. Over-fermented leaf makes the tea dull and 'redder' in appearance with a soft and 'stew' taste. Under-fermentation makes the tea brighter, but will taste thin and 'green'.



Fig.1 Existing System

I. INTRODUCTION

The objective of the project is to design and fabricate a semi-automatic system which reduces the cost of the existing system and also provides better and pilot tea dust making operation. This project work titled "Tea leaf graining machine" has been conceived having studied the difficulty of making of tea dust. The idea of the project is to develop a pilot tea factory which is very much helpful for the small tea growers. As per ITB estimation, STGs contribute 35% to the total national green leaf production. With holding of maximum 10 ha of land, a STG can produces 1 lakh kg green leaf per annum. This translates to near 22,000kg of made tea per annum. But, this volume cannot justify a usual factory of 2.5 lakh kg annual made tea capacity with a need of minimum Rs 5 crore of investment. Naturally, the STG's remain dependent on other's fact.

II. LITERATURE REVIEW

The existing system is studied by visiting the Sirikundra tea factory located at Valparai. The existing system is shown is the Fig.1 CTC (cut, tear & curl) passes the leaf through rollers that look like mangles with teeth rotating in different directions. The leaf is cut into smaller pieces by up to 4 sets of rollers in a row. The next stage is known as oxidization or fermentation and is the most simple, yet absolutely critical stage for the development of great tasting

III. PROBLEM IDENTIFICATION

Our project is done to the benefit of Small Tea Growers (STG). India's the second largest producer of tea in the world and has about 4.5 lakh small tea growers with less than 0.5 to 5 acres of land. The major problem faced by the small tea growers are price woes. These tea growers grow tea on small patches of land, but are dependent on the bought leaf factories (BLF) as they have no processing facilities. The BLF in turn buy the green leaf and sell it to the big companies in the organized industry after processing the teas. The present cost of production is about Rs.11 per kg, according to sources in the STG segment. Most of these growers have no access to institutional finance. Small tea growers in the state are facing distress due to pricing woes with the growers maintaining that the prices that they were getting from the BLF were below their costs of production. There is considerable agitation among the thousands of small tea growers in the state, who together with the STG segment in Assam, the southern region and other smaller tea growing areas, account for about 35 per cent of India's annual tea output which averages at 1,100 million kg. Growers experience great fluctuations in the price that they receive from the Bought Leaf Factories (BLF), for per kg of green leaf, ranging from Rs 22 to Rs 4 in West Bengal and Tamil Nadu; and Rs 22 to Rs 7 in Assam (2015 season).

IV. METHODOLOGY

In this project, the hopper is located at the top of our setup. The capacity of the hopper is 2kg. The opening and closing of the hopper is controlled by using manually operated valve. The pipe leads the nuts into the smart conveyor setup. The power supply is used to drive the A.C motor. The A.C motor shaft is connected to the conveyor arrangement. If the power is given to the A.C motor, it will run so that the conveyor arrangement also runs to the slower speed of the A.C motor. This will run the smart conveyor setup in clockwise direction. While rotating the conveyor setup in clockwise direction, there is a contact between conveyor and orthodox setup then the tea leaves are feed into the setup. After, orthodox process tea dusts are feed into the rotating heater roller. This leads to the uniform distribution of heat. Hence it eliminates the formation of black or brown color of tea dust.

The orthodox setup is used to option crushing, tearing, and curling those operations in same setup. It's consists of profiled blades in top of the fixed plate of this setup and other upper plate is moving using ac motor. The A.C motor drives the connecting rod setup. While rotating in clockwise direction, the upper plate rotates. Hence the tea leaves are crushed, tore and curled the end process. Now the tea dust are manually feed into the heater setup and after few minutes tea dust becomes black with brownish color. So the fried tea dust collected in the collector which is located at the bottom of the machine. Most of the small scale industries and farmers follow the other method for tea making; in order to reduce the time and to increase the production the tea dust making method will be useful. The working process of the project is shown in Fig.2

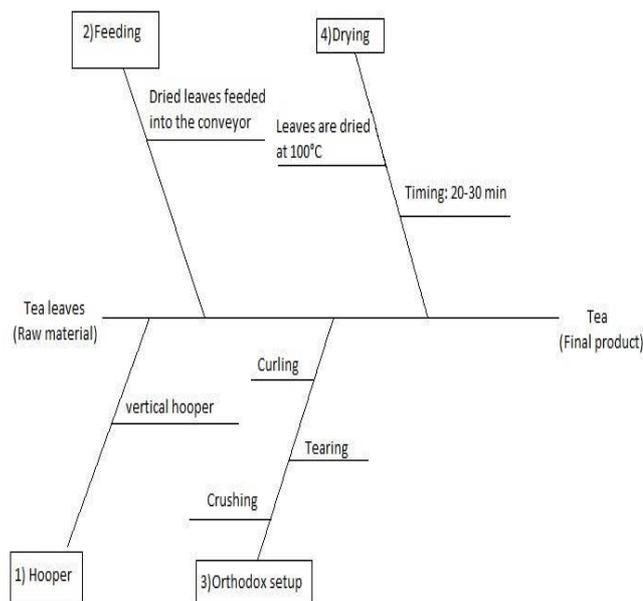


Fig.2 Methodology

V. OPERATIONAL FEASIBILITY

In many industries rubber conveyor used to transmit the material one place to another place. The A.C motor is used to drive the conveyor setup. The orthodox setup bottom plate is fixed and top plate is welded with connecting rod and bearing setup it's connect to the motor. By the manual calculations of belt conveyor setup fixed before the orthodox setup and in order to heating roller is located. The torque required to the load and torque required to rotate the roller are calculated. So it is feasible by introducing A.C drives for transporting and rotating operation.

VI. TECHNICAL FEASIBILITY

In this project, for rotating the smart roller setup A.C motor of 1440 rpm is used. But a rpm of 200-300 is enough to rotate the roller setup. Basically 1H.P Motor lifts 3300 pound. Similarly 1H.P=746 watts. So by using the formula,

$$H.P = \frac{Rpm * T}{5250}$$

$$1Kg = 2.2pounds.$$

By calculation 0.2H.P Motor lifts 660 pound, by Weight lift by 1 H.P Motor/H.P of the 60 watts Motor. So 660 pound =298.688 kg. Therefore a 0.2 H.P, 60 w A.C Motor can lift 298.688 kg.

VII. NEED FOR AUTOMATION

Automation can be achieved through computers, hydraulics, pneumatics, robotics, etc. of these sources, pneumatics forms an attractive medium for low cost automation. The main advantages of pneumatic system are economy and simplicity. Automation plays an important role in mass production.

For mass production of the product, the machining operations decide the sequence of machining. The machines designed for producing a particular product are called transfer machines. The components must be moved automatically from the bins to various machines sequentially and the final component can be placed separately for packaging. Materials can also be repeatedly transferred from the moving conveyors to the work place and vice versa. Nowadays almost all the manufacturing process is being automatized in order to deliver the products at a faster rate. The manufacturing operation is being automatized for the following reasons.

- To achieve mass production
- To reduce man power
- To increase the efficiency of the plant
- To reduce the work load
- To reduce the production cost

- To reduce the production time
- To reduce the material handling
- To reduce the fatigue of workers
- To achieve good product quality
- Less maintenance

VIII. MODELLING OF THE DESIGN

The cad model of the Tea leaf graining machine is shown in the Fig.3

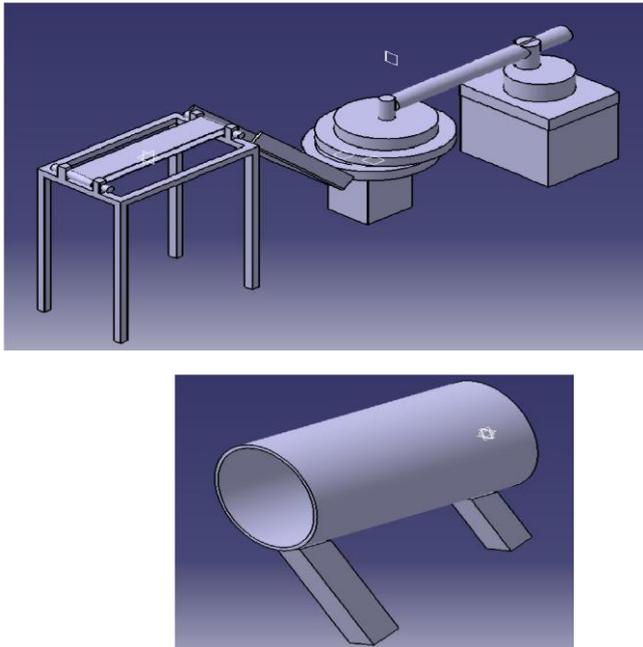


Fig.3 CAD Modeling of the Project

The line diagram and sectional view of the orthodox setup is shown in Fig.4 and Fig.5 respectively.

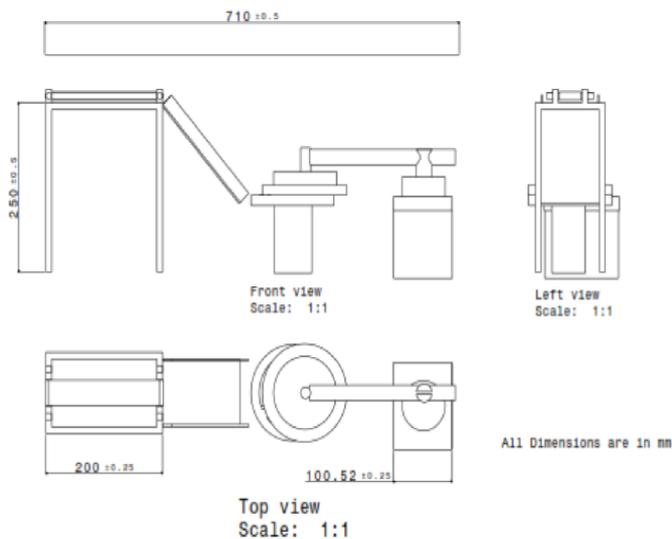


Fig.4 Line Diagram of the Project

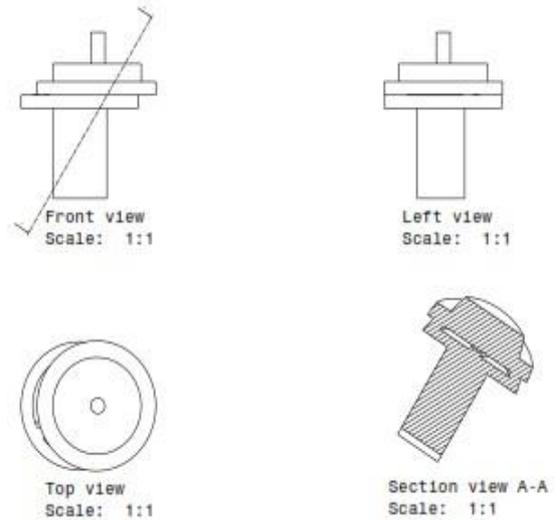


Fig.5 Sectional view of the Orthodox setup

IX. ADVANTAGES

1. Easy to repair.
2. Replacement of parts is easy.
3. Useful for small scale farmer.
4. Reduced manual power.
5. Low cost system.
6. Small space.

X. DISADVANTAGE

1. Care must be taken for handling the equipment

XI. APPLICATION

1. Production of tea dust at low cost

XII. CONCLUSION

This project has provides an excellent opportunity and experience, to use and expose the knowledge. A lot of practical knowledge regarding planning, purchasing, machining and assembling is gained while doing the project work. The project work is a good solution to bridge the gates between institutions and industries. "Tea Leaf Graining Machine" satisfactorily meets all the requirements. It is able to understand the difficulties in maintaining the tolerance and also quality.

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