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Study of Manufacturing Processes for Onion Stem Cutting and Sorting Mechanism

N.T. Manjare[1], Deepak Khune[2], Ajinkya Pawar[3], Prashant Kudande[4] and Akshay Kapase[5]

[1]Asst. Prof., DYPCOE-Talegaon, Pune, India

[2]Student, DYPCOE-Talegaon, Pune, India

[3]Student, DYPCOE-Talegaon, Pune, India

[4]Student, DYPCOE-Talegaon, Pune, India

[5]Student, DYPCOE-Talegaon, Pune, India

ABSTRACT:

This project is intended to discuss different manufacturing processes which are used for onion stem cutting machine. The various processes involved are selection of raw material, fabrication process, grinding process, cutting process, finishing process. The processes should be carried in such a way that it will be economically efficient for the project. The need of this project is to increase productivity, quality and quantity of onions. This mechanism can also used for other vegetables and fruits. So, the main aim of this project is to overcome from demerits which arises from traditional process.

Keywords:Onion stem cutting, Onion sorting, Mechanized method, Grading of onion, Raw materials

I. INTRODUCTION

Onion is mostly producing crop in India. Apart from internal consumption, it is also highest foreign exchange earner among the other crops. India's major onion producing states are Maharashtra, Karnataka, Madhya Pradesh, Andhra Pradesh, Bihar, Gujarat, Rajasthan and Haryana. After harvesting, various processes are carried out on onion such as its stem cutting, sorting based on their size to import them in market with required quality and quantity. Today in many regions, onion stem cutting process is done manually like in village areas. But due to this, the productivity not increase to that much extent which we require. The main reasons behind this are human interface, his fatigueness towards his work, labour unavailability, less or no automation in mechanism, etc. So, there is need to develop a machine which overcomes these all factors with increased automation and less human interface.

II. LITERATURE REVIEW

1) Hunter and Meyer (1958) studied apple sorting methods and equipment i.e. sorting tables include one with a flat belt, one with longitudinal spiral rolls and one with reverse rotating rubber rollers moving over a plywood frame. Modification as the test proceeded included addition of sorting lanes, variables forward speed of rolls and ultimately a new design called the flat roll table. The surface of this table consists of small rubber covered rolls extending across the table. The forward motion is controlled by varying the speed at which the rolls move down the table and the rotating speed of the fruit is controlled by varying the rate at which the rolls rotate. The cost of labor for sorting a given amount of fruit was lowest for the float roll table and highest for the belt table. When sorting of fruits of good quality, the relative efficiency of various types of equipment was apparent.

2) Burt and Pachen (1966) developed and tested a unitized machine for sorting, brushing and sizing apples, which used rotating forward moving brushes instead of rollers as in the conventional roller conveyor. The unit includes a conveyor for lifting fruit from the float tank to brush conveyor. The conveyor includes lane formers, which position the apples for placement on the synchronized brush rollers. Apples remained between the same pair of brushes and in the same lane as they moved through the complete unit for sorting, brushing and sizing. Advantages claimed by the developers include minimum transfer of fruit from one section to another which reduces fruit damage, control of rate and direction of fruit location and less floor-space requirement than for conventional grading and sizing lines.

3) McClure and Holmes (1979) investigated an inclined vibrating plate as tomato sorter. Separation into red and green fractions was successful for an angle of tilt of 40^0 at a frequency of 72 Hz and amplitude of 0.18 cm, because the green tomatoes bounced down while the red tomatoes slided up the incline.

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III.MANUFACTURING PROCESSES

A. Selection of raw material

Figure1. Raw Material

MS angle solutions offered find main application in fabrication jobs, structure buildings transmission lines towers as well as in marking frames among other end usages. Being durable and of high strength, these MS angles can be made available in desired specifications as well as at competitive market prices to our clients. The MS angle options include equal angles from 20 x 20 x 3 mm to 200 x 200 x 24 mm, unequal angles from 40 x 25 x 4 mm to 200 x 150 x 18 mm as well as in different lengths specified by the customers. These can also be cut to size and delivered as specified by the customers. Further, for delivering superior end performance, these also come tested for mechanical properties that include Tensile strength, Elongation at gauge length, Yield stress, Bend test and others.

B. Fabrication Process

Figure 2.Welding Operation

Metal fabrication is building of metal structures by cutting, bending, and assembling processes. It is a value added process that involves the construction of machines and structures from various raw materials. A fabrication shop will bid on a job, usually based on the engineering drawings and if awarded the contract will build the product.

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Fabrication is the process used to manufacture steelwork components that will when assembled and joined form a complete frame. The frame generally use readily available standard sections that are purchased from the steelmaker or steel stockholder, together with such items as protective coatings and bolts from other specialist suppliers.

Most modern steelwork fabrication factories have computer aided design and detailing (CAD) which is linked directly to factory floor computer numerically controlled (CNC) machinery creating a genuine CAD/CAM environment. The accuracy of the computer generated details being transmitted directly to the computer aided manufacturing (CAM) machinery increases the quality standards of production.

C. Grinding Process

Figure3. Grinding Process

Grinding is used to finish work pieces that must show high surface quality and high accuracy of shape and dimension as the accuracy in dimensions in grinding is in the order of 0.000025 mm. In most of applications, it tends to be a finishing operation and removes comparatively little metal about 0.25 to 0.50 mm depth. However, there are some roughing applications in which grinding removes high volumes of metal quite rapidly.

D. Cutting Process

Figure 4 Cutting Operation

The rotary cutting process rotates a tube or pipe and cuts it with a rotating blade. Because it is a chip less cutting method, it does not waste any material and reduces or eliminates subsequent deburring and cleaning operations. Although it can be used on any metal, it is not suitable for every application. The cutting action produces a slight chamfer on the end of work piece, so it is not useful for applications that require square end. Machine types include manual and pneumatic. Accessories include cutter block assemblies that support the workpiece during the cut; length gauges for repeatable cut lengths and feed systems that store and feed the material into the cutting machine.

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IV. CONCLUSIONS

Here, we studied the different processes that are carried out during the manufacturing of machine for onion stem cutter and sorter. The processes are carried in such a way that they produces minimum waste and better utilization of raw material. Dimensions while working are kept within acceptable limits to increase accuracy.

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