

# Food Sorting & Grading Machine

**Jaimeen Shah**

Parul Institute of Engineering & Technology  
Jaimeenshah3@gmail.com

**Abstract:** *“Best food is the necessity of every person. Hence the primary objective is to design and manufacture a machine to perform the task of grading a sorting the agro products specifically vegetable and fruits which are automatically graded and sorted according to their sizes without wastage of human efforts, time and cost. Hence it reduces the human effort and the cost of the production and labour. It will be also helpful for proper and efficient, segregation, grading of agro product which will eliminate the human mistake, negligence and inefficiency in the work. This will be helpful to handle the product hygienically with machines.*

**Keywords:** Food sorting, Grading, Sorting & Grading machine, Food Grading, Optical Sorting, Agriculture Mandlis

## I. Introduction:

- Sorting is carried out on the basis of individual physical properties. Details of principles and equipment are given in Saravacos and Kotsiopoulos, No sorting system is absolutely precise and a balance is often struck between precision and flow rate.
- Weight is usually the most precise method of sorting, as it is not dependent on the geometry of the products. A disadvantage of weight sorting is relatively long time required per unit
- Size sorting is less precise than weight sorting, but is considerably cheaper. The sizes and shapes of food units are difficult to define precisely. Size categories could include a number of physical parameters including diameter, length, or projected area. Diameter of spheroid units such as tomatoes or citrus fruits is conventionally considered to be orthogonal to the fruit stem, while length is coaxial. Therefore rotating the units on a conveyor can make size sorting more precise.
- Density can be a marker of suitability for certain processes. Sorting on the basis of density can be achieved using flotation in brine at different concentrations.
- Optical sorters are in widespread use in the food industry worldwide, with the highest adoption in processing harvested foods such as potatoes, fruits, vegetables and nuts where it achieves non-destructive, 100 percent inspection in-line at full production volumes.
- The technology is also used in pharmaceutical manufacturing, tobacco processing, waste recycling and other industries.
- Compared to manual sorting, which is subjective and inconsistent, optical sorting helps improve product quality,

maximize throughput and increase yields while reducing labor costs.

- In general, optical sorters feature four major components: the feed system, the optical system, image processing software and the separation system. The objective of the feed system is to spread product into a uniform monolayer so products are presented to the optical system evenly, without clumps, at a constant velocity.

- Grading is classification on the basis of quality (incorporating commercial value, end-use, and official standards) and hence requires that some judgment on the acceptability of the food is made, based on simultaneous assessment of several properties, followed by separation into quality categories. Appropriate inspection belts or conveyors designed to present the whole surface to the operator, are frequently used.

- Grading of foods is also the determination of the quality of a batch. This can be done by human graders who assess the quality of random samples of foods such as cheese or butter, or meat alternatively; batches of some foods may degrade on the basis of laboratory analysis.

- Food grading involves the inspection, assessment and sorting of various food regarding quality, freshness, legal conformity and market value.

- Food grading often occurs by hand, in which foods are assessed and sorted.

- Machinery is also used to grade foods, and may involve sorting products by size, shape and quality.

## II. Material and Methodology

### Material used:

➤ **Here Stainless Steel, Mild Steel, and PP materials are used.**

### Methodology:

- A structure of angles and channels is made on which the sprockets, whole drive and chain assembly is done directly or indirectly.

- Then on the one side of the structure there is a head end and opposite to it there is a tensioning unit.

- Then the chain is fitted on the sprockets. The sprockets are free and are not keyed on the shaft so that the chain can be adjusted.

- Then there are guides kept on which the rollers are moving and are adjustable, and there are different pipe rollers fitted in the pp sheet which are bolted on the chain.

- In the middle slot there are plates attached with the partition used for the grading, i.e. the sized particles can be collected differently at each part.
- Hence this is a complete description of the machine.

### Process of how a machine works:

- First of all the raw product i.e. the potatoes (for an example we can take any type of vegetables or fruits) of all the sizes are into machine and as machine starts, the potatoes or any vegetables or fruits which are needed to be sorted gets started to roll over the machine and according to their sizes the product will come out as the rollers allows them, in other words as according to the gap between the rollers are kept the potatoes will come out to the desired slots.
- Hence they are sorted & graded.

### III. Results and Tables

Practical result of machine for potatoes

1. potatoes						
Grade Trial	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Total
Trial 1	3.0	5.4	6.1	4.5	1.0	20
Trial 2	3.2	5.0	6.0	4.6	1.2	20
Trial 3	2.9	5.1	5.9	5.0	1.1	20
Trial 4	3.1	4.9	6.3	4.2	1.5	20

Practical result of machine for chickoo (sapotaes)

2. chickoo (sapotaes)						
Grade Trial	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Total
Trial 1	3.1	5.6	5.7	3.3	2.3	20
Trial 2	3.3	5.1	5.6	3.5	2.5	20
Trial 3	3.1	5.3	5.5	3.8	2.3	20
Trial 4	3.4	5.0	5.7	3.3	2.6	20

### IV. Conclusion

The machine will be fed with the required quantity of the vegetables and fruits. Then grading operation will be performed and segregated agro products will come out. It will be served to mandlis and the industries related to the sorting, grading and packaging of the vegetables and fruits according to their size, quantity and quality.

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### VI. References

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