

DESIGN AND DEVELOPMENT OF A POTATO SLICER

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ABSTRACT: Potato chips and other snack foods. It accounts for Overall turnover: \$ 2.2 billion dollars from 70 manufacturing and technology research centers on the world. For the year 2010-2011. Problems with current Indian chip manufacturers are the wastage of vegetables and uneven thickness of the slices resulting in the low quality and there is a productivity loss in the manufacturing of chips in the Indian market due to non availability of the proper tools. The chips makers are at the risk of injuring their fingers and having difficulty in producing the type of slices they wanted. In hotels cucumber, onions and carrots all are sliced in a different thickness and also it requires a skilled worker to slice them evenly. The present work focuses on design and development of an improved version of a portable potato slicer that takes care of the problems mentioned above.

Keywords- functionality, portable, productivity, quality, safety.

I. INTRODUCTION

The chips and other snack foods in the world accounts for Overall turnover of \$ 2.2 billion dollars considering 70 manufacturing and technology research centers in the world.. Also the quality of chips plays a vital role in the hotel management. Due to uneven thickness of the slices arising from improper tools a lot of wastage of vegetables is happening leading to loss of productivity and other miscellaneous damages to vegetables. At present conventional chip manufacturing methods and the hotel management system is not efficient and safe; this was explained in literature survey with more details. During the course of literature survey and while interviewing the local chip manufacturers it was realized that there is a strong need for the design and development of an efficient, and safe multi functional vegetable slicer.

The main goal of the design is to create a quick, safe, and easy way to slice potato with increased productivity and cost effectiveness. It is also required to prepare slices that are aesthetically appealing. The present design also helps in reducing the rejection rate.

The Present design consists of three subsystems namely housing, blade, & storage device.

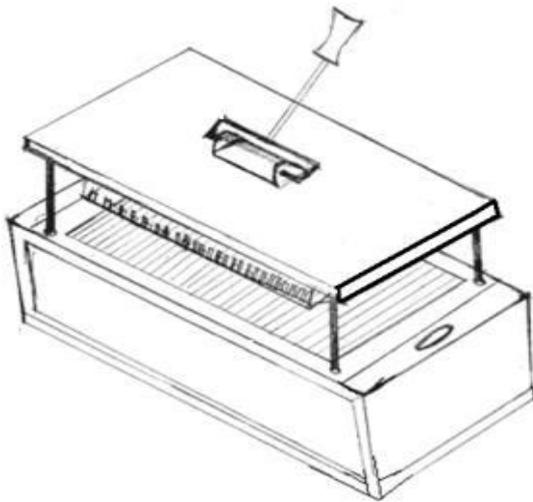
These subsystems will be discussed in more detail in the subsequent chapter. The concepts of design for manufacturing and assembly, ergonomics and design for maintainability are implemented during the current product design process. The following factors are considered while designing the potato slicer.

1. **Quality:** Due to unavailability of the proper tools the vegetables are not sliced uniformly leading to poor quality. The present design overcomes this design deficiency.
2. **Productivity:** This new multi functional vegetable slicer is capable of producing more number of slices in a single stroke. It has 200mm x 80mm cutting area. This cutting area can accommodate wide range of vegetables of different sizes.
3. **Cost Effectiveness:** Most of the vegetable slicer products available in the today's market are not suitable for Indian rural market due to their high cost and low productivity.
4. **Ergonomics:** Ergonomics was given due consideration while designing the product. The fatigue on the operator can be reduced by increasing the productivity.
5. **Safety:** The chance of injuring the figure is high in the conventional chip manufacturing methods. The fingers can get easily exposed to sharp edges in the conventional methods. In the present design the

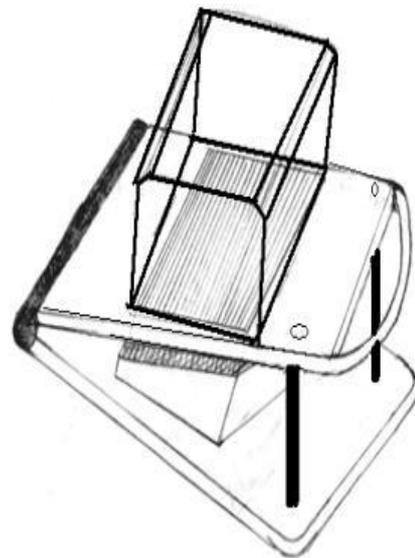
safety is built in by providing the vegetable holder which prevents the contact of fingers with sharp edges.

6. **Durability:** Due consideration was given to increase the product life. The sufficient design factor of safety was built in the structural design. Also the blades are made with high grade stainless steel and spring steel.
7. **Design Introduction:** The design has four basic subsystems: Housing, pusher element, blade, & storage device the housing contains the cutting device i.e., blades and the pusher element. The pusher element ensures the complete slicing of vegetables. The blades are mounted on a modular frame. There are different frames for slicing a wide range of vegetables. This frame and blade assembly can be replaced depending on the type of vegetables to be sliced. The storage subsystem holds the frame assembly while they are not in use.

II. CONCEPTUAL DESIGN



Concept 1



Concept

**Fig:1
Fig:2**

2



Fig:3
Concept 3

III. CONCEPTUAL SCREENING AND SCORING MATRIX

Table: 1 Pugh Concept Selection Matrix

Sl no	Selection criteria	1	2(ref)	3
1	Easy to Operate	0	0	+
2	Easy to carry	+	0	+
3	Easy to manufacture	0	0	+
4	Less Time consumption	0	0	+
5	Durability	0	0	+
6	Initial Cost	0	0	+
7	Portability	0	0	+
8	Safety	0	0	-
9	ergonomics	0	0	+
10	productivity	+	0	0
11	aesthetic	-	0	+
12	maintenance	-	0	+
	Sum of +'s	2	0	10
	Sum of 0's	8	12	2
	Sum of -'s	2	0	1
	Net score	-0	0	9
	Rank	2	3	5
	Continue?	No	Yes	Yes

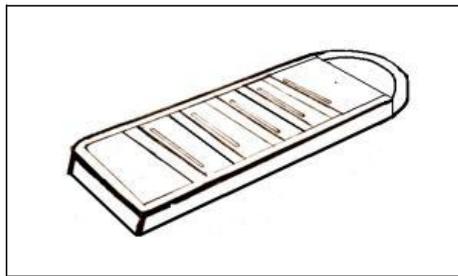
Table 2 Relative Performance And Rating

RELATVE PERFORMANCE	RATING
Much worse than reference	1
Worse than reference	2
Same as reference	3
Better than reference	4
Much better then reference	5

Based on the above ratings, it was decided that to manufacture the prototype of concept 3

Table 3 Concept Selected

Concept 3



IV. DETAIL DESIGN

1 CONCEPT

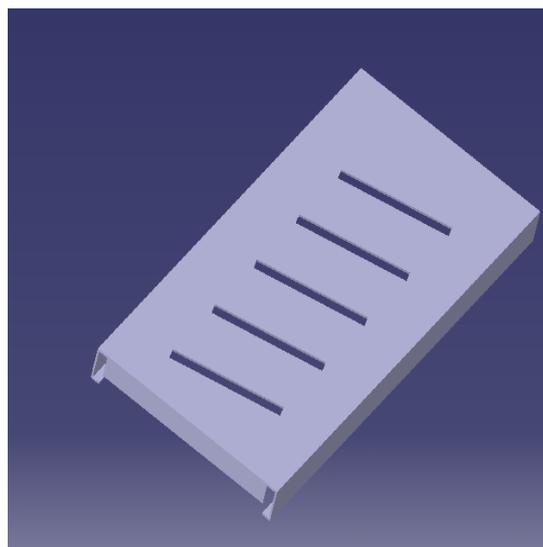


Fig: 14 Housing

The housing is made up of mild steel with 1mm thickness and 250mm long sheet .And with an angled cut of 15° with the width 60mm and 6mm wide each is slot is 30mm distance from each other.

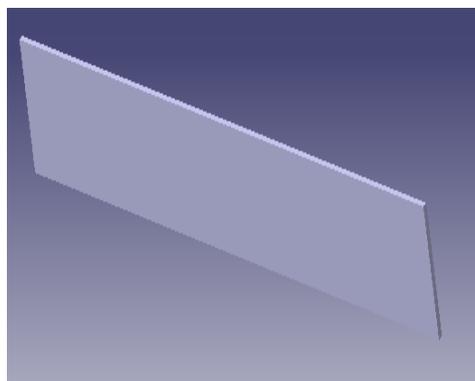


Fig: 15 Blade

It is made up of stainless steel with the width of 95mm and 15mm depth and a thickness of 0.8 mm

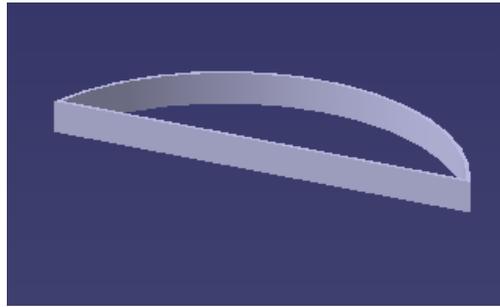


Fig: 16 Handle

It is made up of the cast iron and it is bent in a circular shape for handle it safely.

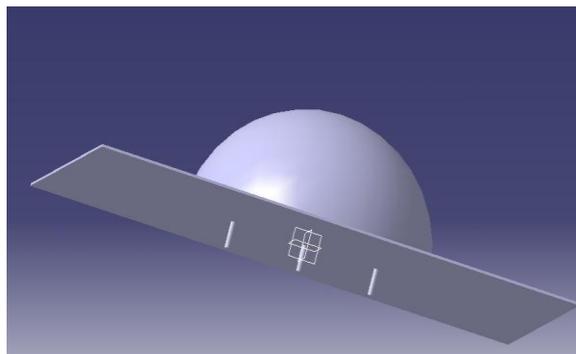


Fig: 17 Potato Holder

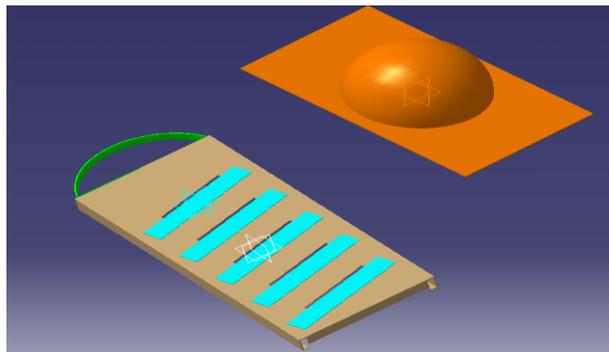


Fig: 18 Full Assemblies

V. OPERATION OF WORKING MODELS

The vegetable slicer for this type from the top we will slide the vegetable. Where blade is placed at distance of the 30mm from each other, Like that 5 blades are manufactured at a certain gap so that each slide five slices will come at a time.

VI. PROTOTYPE OF CONCEPT 3



Fig: 19 Photos of Prototype



Fig: 20 Photos of Prototype

VII. RESULTS AND DISCUSSIONS:

1. Design of a easy potato slicer capable of giving thin and uniform slices required for the chips manufacturers.
2. Increase in the productivity of the vegetable slicer in order to go for mass production.
3. Slices that are thin, which will give more taste.
4. Design also helps in reducing the rejection rate.

VIII. CONCLUSION:

Two varieties of prototypes were made in order to demonstrate the multifunctional vegetable slicer

1. The devices have a simple construction and can be used for slicing in the range of (1.2mm).
2. The slicer is safer, and productive.
3. These devices are simple as there is no need of power source and there is no complex mechanism.
4. The potato slicer can be used for slicing the vegetables like potato, carrot, onion, etc
5. This vegetable slicer is capable of giving five potato thin slices in a single sliding moment there by increasing the productivity.

IX. REFERENCES:

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