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Cardamom Pod Separator Machine

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Introduction Black Cardamom (अर्द्धची), scientifically known as Amomum Subulatum, is a high-value, perennial crop cultivated in hilly and marshy regions. The cardamom pods grow in clusters as spikes, rooted at the base of the plant. The spikes are harvested from the plants, and then the pods are separated manually. The separated pods are then dried, roasted, and packed for delivery.

Problem Statement Each pod in the spikes requires a precise pull and pinch force for separation, which clearly consumes a large amount of time and a high amount of labor compared to other processes involved. The continuous and precise finger action during the separation process has caused several nail injuries, finger skin damage, and even musculoskeletal disorders like carpal tunnel syndrome (CTS).

Objectives

- ✓ To mechanize the pod separation method

Technical Requirement

Parameters	Requirement
Production Rate	$\geq 1,000 \text{ kg/day}$
Recovery	Seed recovery $\geq 95\%$
Cost	Rs.40000/-
Separation Quality	pods in seeds $\leq 50 \text{ pods/ton}$

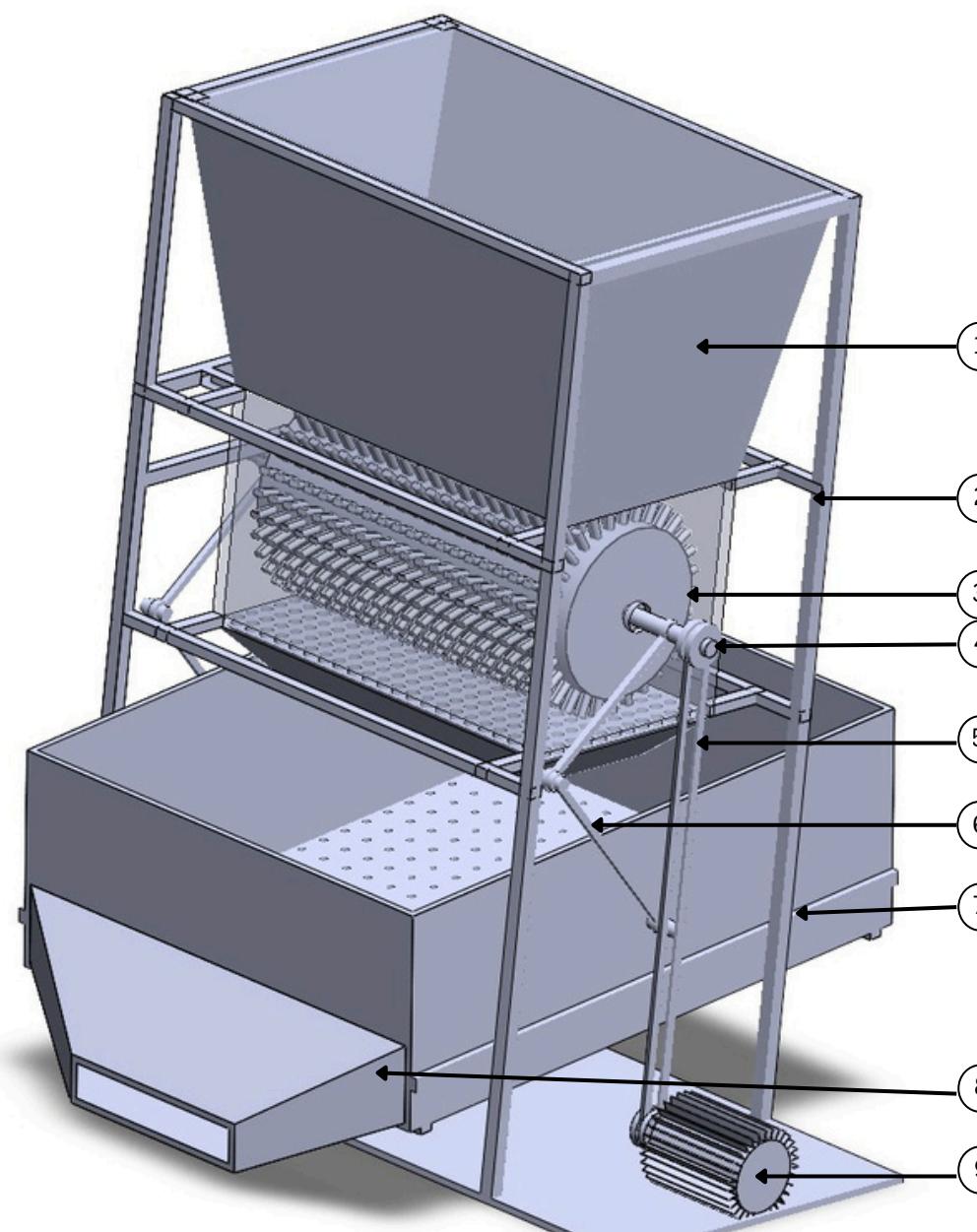
Technical Parameters

Machine output: 216.9 kg/hr
Machine Dimensions:
 $5 \times 4 \times 5.5 \text{ ft}$
Hopper Capacity: 30 kg
Motor Capacity: 1 HP

Vibration Unit Capacity: 30 kg
Motor speed: 60 rpm
Crank Displacement: 5 cm

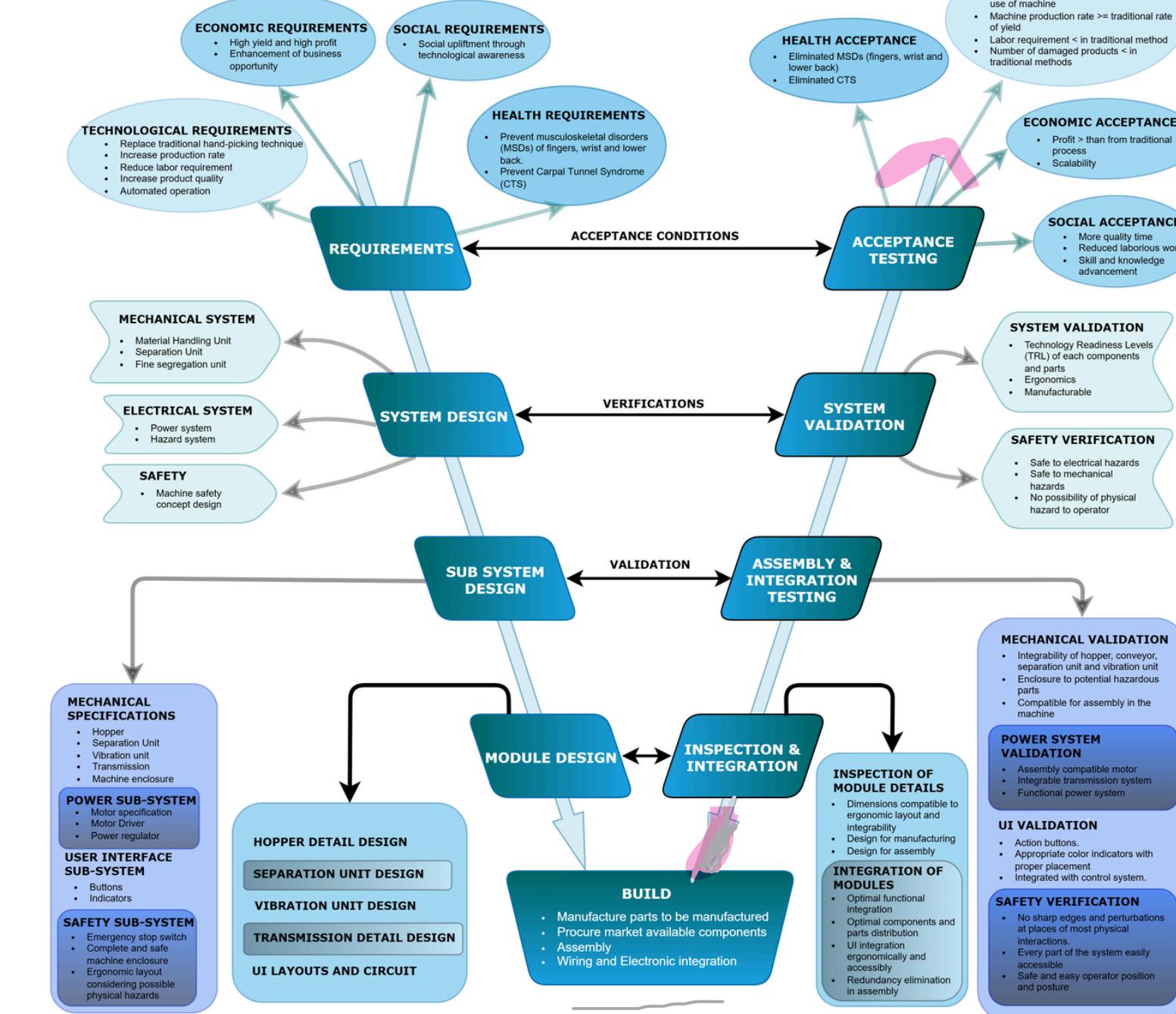
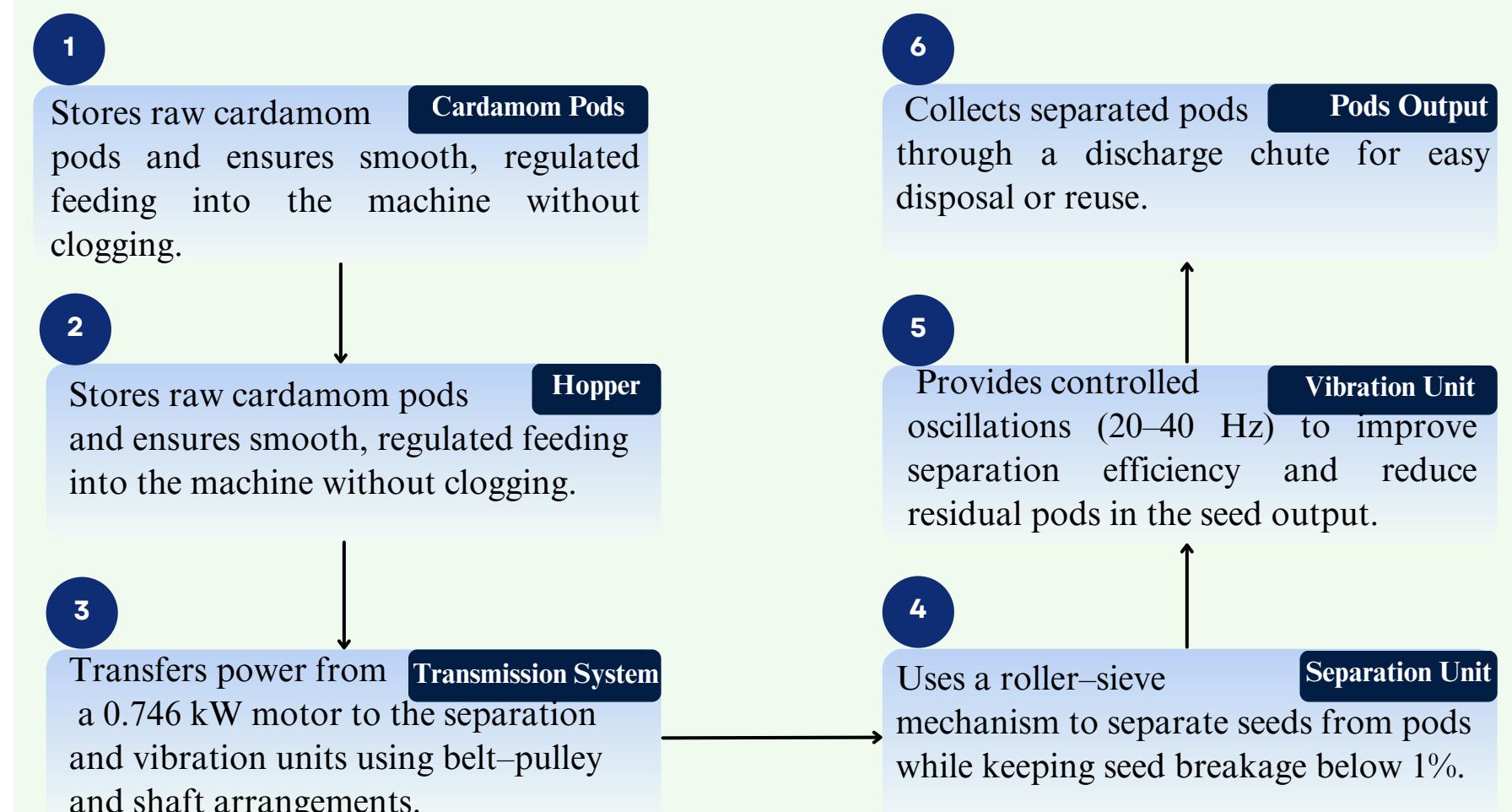
Testing and Verification

- ✓ To verify machine performance against targets: 1 ton/day capacity, ≤ 50 residual pods/ton, and $< 1\%$ seed damage.
- ✓ To analyze the role of design parameters such as hopper feed rate, vibration frequency, and separation gap on overall efficiency.
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BILL OF QUANTITY			
SN	DESCRIPTION	NOS.	COST IN G (NRS)
1	Hopper	1	1500
2	Frame	1	2500
3	Threshing Unit	1	4000
4	Pulley	2	800
5	V-belt	1	1000
6	Slider	1	1500
7	Cardamom Outlet	1	1000
8	Motor	1	15000
9	Fastener & Misc.	1	3000
Total Cost			30,300 /-

SYSTEM FLOWCHART



Conclusion

- ✓ The proposed machine will mechanize cardamom pod separation, reducing dependency on manual labor.
- ✓ It is designed to achieve a production rate of 1 ton/day with high separation quality (≤ 50 residual pods/ton).
- ✓ The estimated fabrication cost of Rs. 40,000 makes it affordable for small and medium-scale farmers.
- ✓ By providing a cost-effective and reliable solution, the project supports the commercialization and modernization of cardamom processing.