



Electrical Cashew Nut Roasting Machine

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Abstract

The electrical cashew nut roasting machine is an advanced solution designed to enhance the efficiency, quality, and sustainability of cashew nut processing. Traditional roasting methods using firewood, charcoal, or gas are labor-intensive, inconsistent, and environmentally harmful. This machine operates on electricity, providing uniform heat distribution and automated roasting, ensuring optimal quality and flavor of the nuts. Constructed with a stainless steel roasting vessel, an electric heating element, a rotating vessel, the machine ensures even roasting while minimizing energy consumption. The automated process reduces labor requirements and eliminates the need for constant monitoring. The electrical cashew nut roasting machine is energy-efficient, cost-effective, and environmentally friendly, reducing carbon emissions and deforestation associated with traditional roasting. Its durable, easy-to-maintain design enhances longevity, making it a valuable investment for small and large-scale producers. Moreover, its energy-efficient design helps reduce production costs, making it a viable investment for small-scale and large-scale producers. This machine significantly improves the productivity, profitability, and market value of cashew nuts, revolutionizing the industry with its precision, convenience, and sustainability.

Keywords: roasting, electricity, nuts, charcoal, steel.

DOI: <https://doi.org/10.5281/zenodo.15193874>

1. Introduction

The electrical cashew nut roasting machine is an innovative solution designed to improve the efficiency, quality, and sustainability of cashew nut processing. Roasting is a crucial step in cashew production, as it enhances the flavour, texture, and shelf life of the nuts, making them more desirable for consumers. Traditional roasting methods, such as firewood, charcoal, and gas, are often inefficient, labour-intensive, and environmentally damaging. These methods result in inconsistent roasting, increased operational costs, and higher carbon emissions. The introduction of an electrical roasting machine addresses these challenges by providing a controlled, automated, and energy-efficient solution. This machine operates using an electric heating system that ensures uniform heat distribution, preventing under-roasting or scorching of the nuts. The rotating vessel ensures even exposure of all nuts to heat, improving the overall consistency of the process. The adoption of electrical cashew nut roasting machines benefits both small and large-scale producers by lowering production costs, reducing environmental impact, and ensuring hygienic processing. Since electricity is a cleaner energy source compared to firewood or charcoal, this machine contributes to sustainability and environmental conservation. Its durable stainless steel vessel ensures hygiene

and longevity, making it a cost-effective investment. Overall, the electrical cashew nut roasting machine revolutionizes the cashew industry by offering an efficient, eco-friendly, and high-quality roasting solution.

2. Objective

The primary objective of the electrical semi-automatic cashew nut roasting machine is to improve the efficiency, consistency, and cost-effectiveness of the cashew nut roasting process while maintaining a balance between semi-automation and manual control. Traditional roasting methods using firewood, charcoal, or gas are often labour-intensive, inconsistent, and environmentally harmful. This semi-automatic machine offers a modern alternative that enhances roasting precision while still allowing some manual intervention for flexibility in operations. By integrating an electric heating system with a partially automated roasting mechanism, the machine ensures uniform roasting, reduces operational costs, and enhances overall productivity.

Thus the Gas-powered machines often experience uneven heat distribution, leading to variations in roasting levels. But in the case of semi-automated electrical roasting machine, it uses induction heater to heat the vessel with the help of electricity. Another important goal of the electrical semi-automatic machine is to reduce operational costs and dependency on non-renewable resources. Gas-powered machines require continuous refuel, making them vulnerable to fluctuating fuel prices and supply chain issues. Additionally, gas leakage risks increase maintenance costs and safety concerns. The electrical machine, on the other hand, eliminates the need for gas refuel, reducing both fuel expenses and operational uncertainties. By operating on electricity, which can be sourced from renewable energy such as solar or wind, businesses can lower their energy costs in the long run while reducing their carbon footprint.

Another important objective is to reduce labour intensity while maintaining flexibility in production. Unlike fully automatic machines that require minimal human intervention, the semi-automatic model allows operators to monitor and control certain aspects of the roasting process. This ensures that the machine can cater to varying production scales, from small-scale businesses to medium-sized enterprises. The reduction in manual labour compared to traditional methods helps improve efficiency, reduce worker fatigue, and lower operational costs without eliminating human oversight.

The electrical semi-automatic cashew nut roasting machine is designed to improve efficiency, reduce labour dependency while maintaining flexibility, promote sustainability, enhance food safety, and ensure safe operation. Its adoption in the cashew processing industry can lead to higher productivity, lower operational costs, and better-quality roasted cashew nuts, making it a valuable investment for businesses seeking modernized yet adaptable roasting solutions.

3. Methodology

System Design and Layout:

A cylindrical vessel is placed as a crucial role in mechanism which is used for roasting Cashew nut with the help of electricity. And a vessel motor and platform motor are used to control the movement of vessel and platform. An induction heater is provided under the cylindrical vessel for roasting.

Shaft and vessel motor Mechanism:

The cashew nuts are put inside the cylindrical vessel and closed the vessel door tightly, by the help of electrical



energy the vessel motor rotates the shaft and vessel.

Platform control Mechanism:

The platform motor is placed on frame it used for control the movements of platform, the vessel attached to the platform by the help of bearing seat. And the platform motor rotates the shaft, it will helps the platform to move up and downward direction and it helps for putting the cashew nut and taking the roasted cashew nut which in less effort.

Heat Energy emission:

When the vessel starts to rotate at the time the induction heater will starts to emit the heat towards the cylindrical vessel.

Control Mechanism:

1. The control of the platform motor and vessel motor done by the help of a switches.
2. The motor is used to make the rotation motion and is used to rotate the vessel and the platform by the help of gears.
3. The bearing seat that supports the shaft and the cylindrical vessel to stand without any other movements.

Collection of roasted cashew nuts:

When the roasting process finished by the help of switch we can rotate the platform motor and moves the platform downwards and collect the roasted cashew nuts by less effort.

4.Formulae

Power consumption

Power consumption, $E = P * t$

Where;

E = Energy consumed in watts- hour or joules

P = Power of induction heater (W)

t = time (h)

Heat energy required

Heat energy required, $Q = mc * \Delta T$

Q = Heat energy required

m = Mass of cashew

c = Specific heat capacity of cashew

ΔT = Temperature

Specification of DC motor

The torque of the dc motor is calculated by using volts, speed and the power of the tor.

Power $P = 2\pi NT/60$

Torque $T = P*60/2\pi N$

The gear ratio is calculated by number of teeth of gears.

Gear ratio, $i = Z2/Z1$

The torque of the cylindrical vessel is:

$$I = T_2/T_1$$

$$T_2 = i \cdot T_1$$

5. Figures

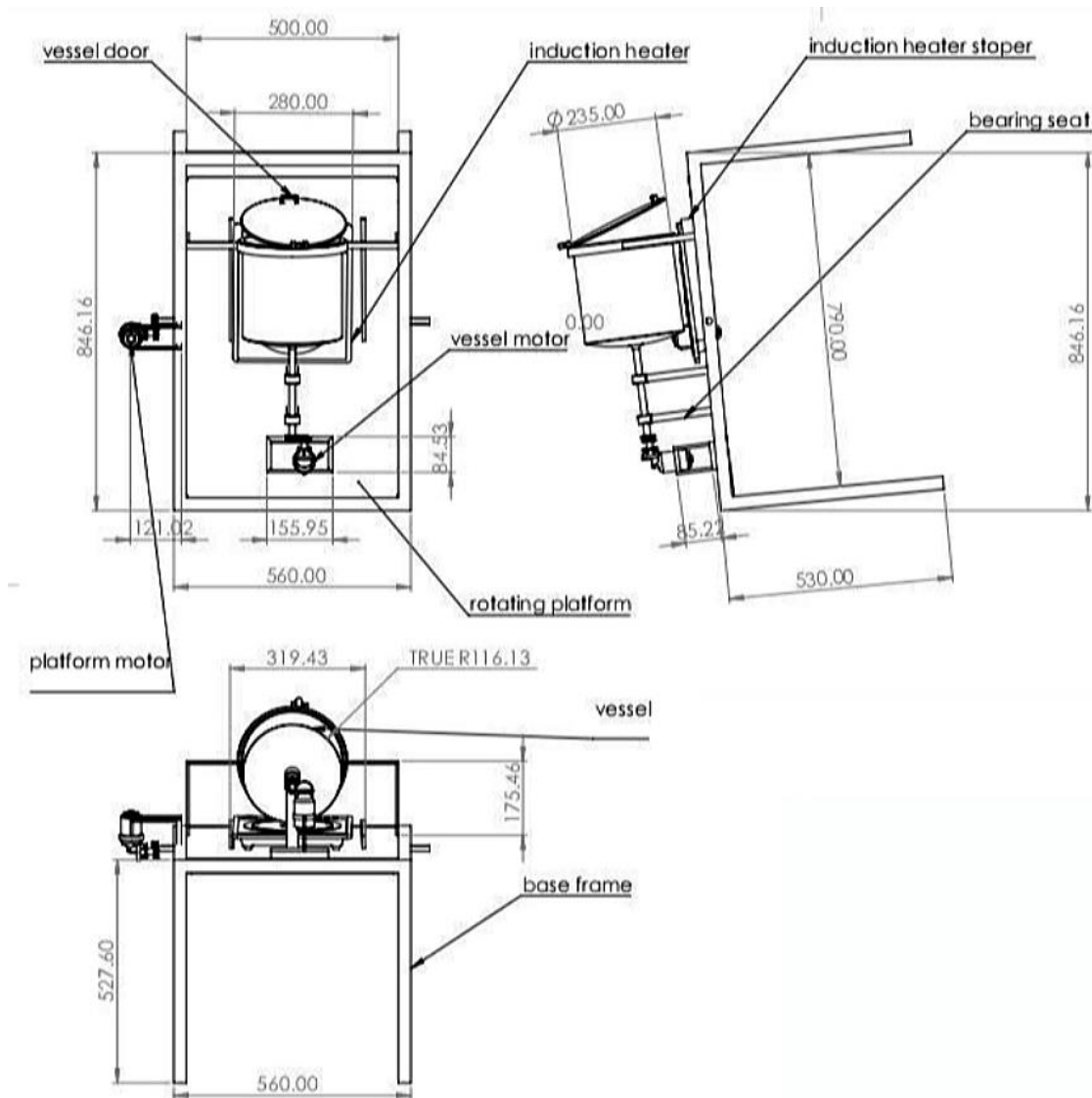


Figure 1 : Cad Drawing of Electrical Cashew Nut Rosting Machine

6. Conclusions

The semi-automatic electric cashew nut roasting machine is an innovative and efficient solution that enhances the quality and productivity of cashew processing. Unlike traditional roasting methods that rely on firewood, charcoal, or gas, this machine uses an electric heating system to ensure uniform roasting while reducing energy consumption and environmental impact. The semi-automatic functionality minimizes manual labour while allowing operators to control temperature and roasting time, ensuring optimal results for different production needs.

A key advantage of this machine is its automated rotating drum, which ensures even heat distribution, preventing over-roasting or under-roasting. Made from high-quality stainless steel, it ensures durability, hygiene, and easy maintenance, making it ideal for both small-scale and large-scale cashew processing businesses. Additionally, its energy-efficient design reduces operational costs, making it a cost-effective investment.

Beyond economic benefits, the electric roasting machine promotes environmental sustainability by eliminating the need for fossil fuels and reducing carbon emissions. Overall, it enhances productivity, improves product quality, and aligns with modern, eco-friendly industrial practices. The semi-automatic electric cashew nut roasting machine is a game-changer in the industry, offering an effective, sustainable, and high-quality roasting solution for cashew producers worldwide.

7. References

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