DESIGN AND DEVELOPMENT OF GINGER PEELER

Adhityan Ravi [1], Sanjai R [1], Suriya L R[1], Subhiksha R[1], Dr Sridhar N[2]
Department of food technology
Sri Shakthi Institute Of Engineering and Technology

Abstract:- *A combination of its culinary and medicinal qualities, ginger is widely used in many different traditional medicine systems and cuisines across the world. Processing ginger efficiently is essential for preserving product quality and cutting manufacturing costs, especially during the peeling stage. The purpose is to enhance the quality and efficiency of ginger processing through the design, development, and testing of a novel ginger peeler. To solve the issues with conventional peeling techniques, the suggested ginger peeler integrates the latest technological concepts. By utilizing a blend of rotating blades and modifiable peeling parameters, the apparatus seeks to reduce waste, optimize output, and augment the general efficiency of ginger processing facilities. Ginger rhizomes are handled gently thanks to the mechanical design, which guards against damaging the delicate skin and preserves the natural flavour.*

Key words: *Ginger, Quality, Peeling technique, Optimize output*

INTRODUCTION: In our nation, ginger is a frequent element. The local cultivars Ernad, Nadia, Wayanad, and Maran are well known. Rio-de-Janeiro, an exotic cultivar, has also become incredibly popular. The major ways that the root or subterranean stem of the ginger plant is eaten are as juice, oil, dried spice, powdered root, and fresh ginger. It is possible to treat colic, swellings, coughs, asthma, and appetite loss with fresh ginger. Lack of acceptable value addition at the basic processing steps is one of the main reasons ginger is rejected in the global market. Soaking, cleaning, peeling, drying, and packing are the main processing steps for gingers. The goal of the perfect peeling technique is to remove the peel as efficiently and with as little loss as possible. There are four methods for conducting the peeling process: mechanical, chemical, thermal, and enzymatic. The benefits of using a mechanical approach include keeping the produce's edible components fresh and undamaged. Conversely, chemical peeling involves immersing the product in a heated caustic soda solution for a predetermined amount of time. Because of its high automation and accurate control devices, steam peeling has become one of the most widely used techniques. Fruits may benefit from enzymatic peeling, which is based on treating them with the appropriate glycohydrolase enzymes. Peeling pretreatment and machine operating settings have a significant impact on peeling efficiency. When it comes to peeling ginger, most enterprises use barrel drums or specialized knives to remove the outer peel before drying or processing the ginger further. However, because of the uneven shape of ginger, the process is tedious, demanding of time, and tedious. Therefore, the goal of this study was to create and improve an abrasive belt peeling machine for optimum efficiency and minimal meat loss.

MATERIALS AND METHODOLOGY:

MATERIALS:

Known for its durability and resistance to corrosion, stainless steel is an essential component utilized in the making of the ginger peeler blades with capacity of 5-7kg.The lifespan and sharpness of these blades are crucial for effectively slicing off the ginger skin without damaging the rhizome. Stainless steel is also preferred because it is simple to clean, which helps keep food processing settings adhering to stringent hygiene regulations. Ginger peelers typically have sharp blades made of stainless steel or other durable metals. The sharpness of the blades is crucial for effectively peeling the ginger without wasting too much of the flesh.

The handle of a ginger peeler is commonly made of plastic, rubber, or a combination of materials. It needs to provide a comfortable grip and be resistant to moisture since peeling ginger often involves wet conditions.

The framework and the frame of the ginger peeler are frequently made of sturdy materials like food-grade. These materials assist the machine with stability and ease of handling and ability by providing a balance between strength and weight. The ginger peeler's overall lifetime and durability depend heavily on the choice of materials.

To facilitate easy cleaning, ginger peelers may have removable parts or a design that allows for quick rinsing. Materials like dishwasher-safe plastics are common for this purpose.

METHODS:

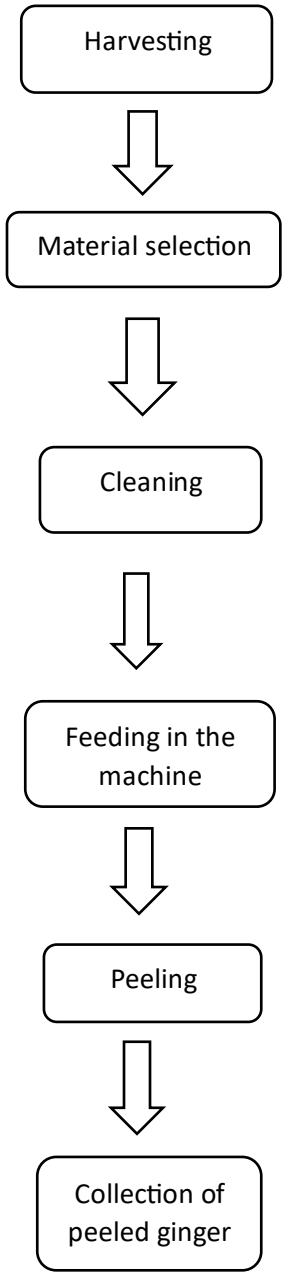

Figure 1: Flowchart for peeled Ginger

MATERIAL SELECTION:

India's national economy benefits from the yearly spice crop known as ginger. Ginger yields 20–40 t/ha, depending on several parameters such as usage, biotic and abiotic stress levels, and geographic location. Due to the dormant period, conventional rhizome propagation methods are slow. This makes a rapid multiplication approach essential, especially when dealing with

recently produced, exceptionally profitable cultivars that are only available in a limited quantity.

A ginger crop usually lasts six to eight months. Eight months for dry ginger and six months for vegetables. The variety decided on will also determine the exact date and time frame. Ginger leaves that turn yellow and grows into dry suggest that the plant is ready to be harvested. Gather the leaves by hand, selecting the clusters that remain. Clear away the dirt and other debris.

CLEANING:

To obtain freshly harvested vegetable ginger, wash the harvested rhizomes in water and let them sit for a day.

Dry Ginger:

1. Soak rhizomes for about eight hours in water.

2. Apply pressure to the rhizomes and remove any surplus from the surfaces.

3. Repeatedly wash in water

4. Carefully and very lightly scrape off the ginger's skin.

5. Take a week to clean and organize

6. Press the desiccated rhizomes together. This will get rid of any dirt and loose skin particles.

PEELING:

Once the ginger is washed it is kept into the machine to peel the skin by using rotating mechanism. Then it is again washed by water to get the clear ginger and the peeled skins are removed from the drain. Then it is ready to use for the culinary and kitchen purposes.

DESIGN OF THE EQUIPMENT:

FABRICATION:

The materials that are being used to fabricate the equipment:

 Pulley

A wheel with a sheave, or groove, running down its edge to hold onto a rope or cable, is called a pulley. Pulleys are commonly used in systems designed to reduce the force needed to raise a load. It takes the same amount of work to raise the load to the same height as it would have without the pulleys. The approximate amount of effort needed to pull the load up is equal to the weight of the load divided by the number of wheels. In 2010 Adnan and Ambrose the pulleys and lines are weightless, and there is no loss of frictional energy.

Furthermore, the assumption is that the lines are rigid. This assumption requires that there be zero amount of force performing on the pulley in equilibrium.

 Belt

Belts can be used to mechanically connect two or more rotating objects.

They have the ability to transfer electricity between two sites with up to 98% efficiency, track relative movement, and function as a motion source. A conveyor belt can be used as a source of motion if it is meant for moving anything between two locations continuously. Reversing the direction of rotation at the other point is another approach of looping back a belt between two locations. Certain designs of pulleys and belts are used to transfer power. (Hegazy & Associates, 2020; Ravichandran & Associates, 2019)

the specifications needed for a belt-drive transmission system.

Belts usually transfer power only on the tension side of the loop. Certain continuously variable transmission designs use belts-a chain-like structure composed of multiple solid metal blocks-to transfer power on the compression side of the loop.

AC Motor

The rotor of an AC synchronous motor spins and coil consumes magnets at the same velocity as the current flowing through it and the resulting magnetic field that powers it. When enough field current is applied, speed is not impacted by the load that is applied. precise control over speed. By employing an appropriate field current in relation to the load, this motor power factor can be brought to unity. In its rotor, a motor alters electrical power into mechanical power. (Ravichandran et al., 2019; Hegazy et al., 2020). There are multiple methods for supplying the rotor with power. The rotating device induces this ac motor power. A synchronous AC motor is one in which the rotor receives a current supply. The rotor then rotates as a result of the magnetic field that is created and that, via magnetic connection, links to the stator's rotating magnetic field. Because the rotor's speed and the rotating magnetic field inside the stator's pipe are equal at steady state, this system is known as synchronous.

Motor specification
Rpm =1440
Volt= 230

Pump

A pump is a tool for transferring liquids, gases, or slurries. By supplying energy to the system, like a water system, a pump compensates for the pressure variations that occurs when moving liquids or gases from lower to higher pressure. With the exception of very low pressure-rise applications like heating, ventilation, and air conditioning, where the working machines involves fans or blowers, a gas pump is typically referred to as a compressor.

Pumps operate by applying compression or lifting force or other mechanical forces to push the material. Positive displacement, reciprocating, hand-operated water pump. By trapping a predetermined volume of fluid or gas and then forcing that trapped volume into the discharge pipe, a positive displacement pump moves a liquid or gas.(Joslin et al., 2020; Ravichandran et al., 2019; Gupta & Mahajan, 2018).

Relay

An electrically controlled switch is called a relay. A magnetic field produced by current passing through the relay's coil draws a lever, changing the switch contacts. One can turn the coil current on or off. Relays are double organize (changeover) switches that have two switch positions. Relays enable the switching of two circuits, one of which may be totally independent of the other. The connection is both mechanical and magnetic.(Ravichandran et al., 2020; Hegazy et al.,2019).

Relays that are intended to run at lower voltages can have coil currents as high as 100mA, but for a 12V relay, the typical coil current is 30mA. Since most

integrated circuits (ICs) are unable to supply this current, a transistor is typically needed to increase the tiny IC current to the higher value needed for the relay coil. Due to the well-known 555 timer IC's 200mA maximum output current, relay coils can be supplied directly from these devices without the need for amplification.

WORKING PRINCIPLE:

An ginger peeler that runs on water operates on a basis that combines mechanical and moisture- based operations. After being put into the machine, whole ginger are sliced through a mechanism that has abrasive surfaces. Meanwhile, a carefully measured amount of water is added to wet the ginger's outer layer. The water is added through a nozzle which can be set to a time that cut-off automatically. The softened peel is effectively and delicately removed from the gingers as they pass through the cutting mechanism, preserving the edible part. A lever is present which is agitated to collect the peeled ginger. Peeled gingers that are tear-free and prepared for cooking are obtained by collecting the extra moisture and the skin separately.

Figure 2:Model of ginger peeler

APPLICATION:

- ***Commercial Kitchens:*** When a lot of gingers need to be peeled fast and effectively, commercial kitchens such as restaurants and catering services frequently employ water- based ginger peelers. This guarantees a constant and spotless peeling procedure in addition to saving time.

- ***Food Processing Facilities:*** Water-based ginger peelers are advantageous for food processing facilities that process ginger as part of their product line. These devices contribute to maintaining high standards of food safety and hygiene while streamlining the peeling process.

- ***This equipment can Catering Services:*** Water-based ginger peelers are an efficient option for catering businesses, catering both small and large events. Caterers can quickly cook big amounts of food while keeping uniformity and quality thanks to these devices. extrude any type of millet.

RESULT AND DISCUSSION:

The use of water in the ginger extraction produces promising results and provides an interesting setting for discussion. By bringing water into the equation, provides the outside of the ginger the skin is soft, making it easier to remove. This method not only increases user comfort, but also contributes to overall kitchen hygiene by trapping and neutralizing ginger. The discussion therefore explores the potential of this technology to revolutionize the kitchen industry, as it greatly simplifies the production of ginger, making them more efficient and user friendly, and improving working

conditions in retail settings. In addition, reduced waste due to less damage to the edible ginger component is an environmental and economic benefit that should be investigated.

CONCLUSION

The ginger peeling and cutting machine prototype is made with a lower labor and operating time in mind. For peeling and chopping ginger, a 5 Nm torque capacity motor is sufficient to power the round disc and cutter, respectively. The machine that was built will peel a 2 kg ginger in 3 minutes, and it will take 8 minutes to finish the process of chopping and peeling. This model peeled the ginger successfully and sliced with 75% efficiency; however, this may be fixed by switching the cutter blade to achieve the desired result. The skin that has been peeled is kept apart and used as fertilizer in farming. This method of chopping and peeling ginger will significantly lower.(Bahnasawy, 2011a)

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