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FABRICATION OF AUTOMATIC ROTI MAKER USING MOTORIZED PRESS

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Abstract:

The Automatic Roti Maker project aims to simplify the traditional process of making rotis, a staple food in many cultures, through the integration of motorized mechanisms. This project utilizes a motorized press to automate the dough flattening process, significantly reducing manual effort and time. The system comprises a dough preparation unit, where the dough is mixed and kneaded, and a motorized pressing. Mechanism that flattens the dough into uniform discs. Additionally, a heating element cooks the rotis, completing the automated process from dough to ready-to-eat roti. The design focuses on user-friendliness, allowing users to ensure easy maintenance. The project aims to promote efficiency in cooking, catering to busy households and food service industries while preserving the traditional taste of homemade rotis.

Keywords: The Automatic Roti Maker project aims to simplify the traditional process of making rotis, a staple food in many cultures, through the integration of motorized mechanisms.

1. INTRODUCTION

Introduction: Fabrication of Automatic Roti Maker Using Motorized Press

In recent years, there has been a growing demand for devices that reduce the time and effort spent on routine household tasks. One such task is the preparation of roti, a type of Indian flatbread that is a staple in many South Asian households. Traditionally, making roti involves rolling dough into flat discs, followed by cooking them on a hot griddle. While the process is simple, it can be time-consuming and physically demanding, particularly when preparing a large quantity of rotis.

To address this issue, the concept of an automatic roti maker has gained significant attention. The primary objective of an automatic roti maker is to mechanize the entire process, from dough preparation to cooking. This eliminates the need for manual rolling and offers a more efficient way to make rotis. In this context, a motorized press plays a crucial role in automating the flattening of dough balls, effectively replacing the manual task of rolling with a motorized pressing system.

The project of fabricating an automatic roti maker using a motorized press aims to develop a machine that simplifies the process of making rotis by integrating motorized components for flattening the dough. This system would also have the potential to cook the roti with minimal human intervention. The key components of such a system include a motorized dough press to flatten the dough balls into uniformly shaped discs, a temperature control mechanism to ensure even cooking, and a dough feeding mechanism that automatically feeds the dough into the press.

This innovation in kitchen appliances is designed to reduce labor, improve the consistency in size and thickness of rotis, and increase efficiency in both domestic and commercial kitchens. It is especially useful for households with large families or commercial establishments where a high volume of rotis needs to be prepared

quickly. By automating the roti-making process, the machine can save time, reduce physical effort, and improve the overall quality of the roti.

The goal of the project is to design, fabricate, and test an automatic roti maker that prioritizes user convenience, ease of operation, and efficiency. The machine will also emphasize safety, reliability, and durability, ensuring that it meets the high standards necessary for both household and commercial use while maintaining the traditional taste and quality of the roti.

2. LITERATURE SURVEY

1. K. Venkatesh Murthy:

- **Project:** Automatic Roti Puri Maker Motorized Press
- **Year:** 2023
- **Description:** Developed a roti maker using a motorized screw mechanism for pressing, enhancing stability and ease of operation.

2. Menaka:

- **Project:** Design and Assembly of Roti Making Machine using CATIA V5
- **Year:** 2023
- **Description:** Employed CATIA software to model a roti-making machine, focusing on the design of components like the screw feeder and mixing hub.

3.T.R. Gupta:

- **Project:** Chapati Specific Heat Analysis at Cooking Stages
- **Year:** 2022
- **Description:** Analyzed the heat transfer during cooking for improved thermal efficiency.

4.M.D. Nazir:

- **Project:** Correlation Parameters for Solid Food Thermal Conductivity.
- **Year:** 2022
- **Description:** Developed a roti maker using a motorized screw mechanism for pressing, enhancing stability and ease of operation.

5. Arun Kula Marva:

- **Project:** Rheological and Thermal Properties of Chapatti Dough.
- **Year:** 2021
- **Description:** Investigated properties like dough elasticity to better understand machine requirements for roti pressing.

6. Philip R. O'Brien, Robert J.K. Reilly:

- **Project:** Food Engineering: Automation and Robotics in Food Manufacturing.
- **Year:** 2021
- **Description:** Focused on food processing technology, principles, and practices in automation.

3 . PROPOSED SYSTEM

The proposed system focuses on the development of an automatic roti maker using a motorized press. The primary goal of this system is to automate the entire process of making roti, from kneading the dough to cooking the roti. By incorporating a motorized press, the system eliminates the need for manual labor in flattening the dough, saving time and effort, especially for individuals or businesses that require large quantities of rotis to be made efficiently.

The system will consist of several key components designed to work together seamlessly. The first and most important component is the motorized dough press. This press will use a motor-driven mechanism to flatten the dough balls into uniform discs. By applying consistent pressure and controlling the thickness of each roti, the press ensures that the rotis are of consistent quality, both in terms of size and texture.

The motorized press will be equipped with adjustable settings to accommodate different dough thicknesses. Users will be able to control the thickness of the rotis based on their preferences, ensuring that the final product meets their desired consistency. This adjustability is particularly useful in regions where different thicknesses of roti are preferred for different dishes.

Another essential feature of the system is the temperature control mechanism. The cooking process for rotis requires precise temperature

regulation to ensure that the roti is neither undercooked nor overcooked. The proposed system will include a heating element that can be adjusted to maintain a constant temperature throughout the cooking process. This will ensure uniform cooking, preventing burnt or raw spots on the roti.

The temperature control system will be designed to be energy-efficient while providing fast heating. It will be capable of reaching the optimal cooking temperature within a short period and will maintain that temperature for as long as needed. The system will also have a safety feature that prevents overheating, ensuring the safety of the user and the longevity of the machine.

In addition to the motorized press and temperature control mechanism, the proposed system will incorporate an automatic dough feeding mechanism. This mechanism will automatically feed the dough balls into the press without requiring manual input. The dough will be evenly portioned and placed into the press, ensuring that each roti is made from a consistent amount of dough.

The automatic dough feeding mechanism will improve the overall efficiency of the system. It will also help in reducing human error, as the dough will be dispensed evenly, ensuring that the rotis are uniform in size. The feeding mechanism will be designed to work in harmony with the motorized press, ensuring smooth and continuous operation.

The proposed system will also feature easy-to-use controls. Users will be able to adjust settings such as temperature, dough size, and pressing speed through a user-friendly interface. The machine will be designed to be simple to operate, requiring minimal training or experience. This will make it accessible for both home use and in commercial kitchens, where ease of use is essential for high-volume production.

Safety features will be integrated into the design of the system to protect users from potential hazards. These safety features will include automatic shutoff mechanisms if the system detects overheating or other operational issues. The motorized press and other components will also be designed to minimize the risk of injury, with protective covers and safety switches that prevent accidental activation.

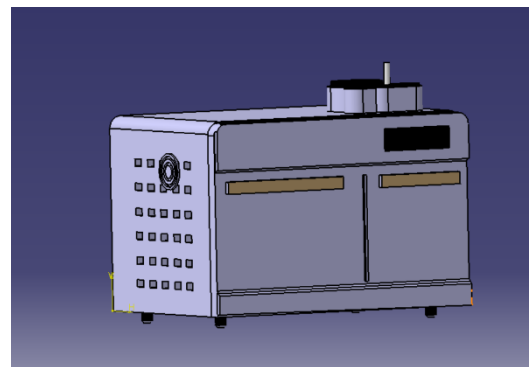


Figure 1: Proposed System

Durability and ease of maintenance will be other key considerations in the design of the automatic roti maker. The machine will be constructed from high-quality materials that are resistant to wear and tear, ensuring its longevity. Additionally, the machine will be designed to be easy to clean, with removable parts that can be washed or wiped down after each use. This will make the machine suitable for both home kitchens and commercial establishments that require frequent cleaning.

The system will also be designed to handle a variety of dough types, from traditional wheat dough to gluten-free or other specialty doughs. The motorized press and dough feeding mechanism will be adaptable to different dough consistencies, allowing the machine to cater to diverse dietary preferences and needs. This flexibility will increase the appeal of the system to a broader range of users.

In terms of power consumption, the proposed system will be designed to be energy-efficient. The motor and heating elements will be optimized to consume minimal power while still delivering high performance. This will make the machine an environmentally friendly option for those looking to reduce their energy consumption in the kitchen.

The automatic roti maker will be capable of producing large quantities of rotis quickly and efficiently, making it ideal for use in commercial kitchens, catering services, and large households. By automating the process, the system can produce a consistent and high-quality product in a fraction of the time it would take to make rotis manually. This will increase productivity and reduce labor costs, particularly in commercial settings where large volumes of rotis are required.

The proposed system will not only reduce the physical effort involved in making rotis but will also ensure consistent quality. By automating key steps in the process, the machine will provide a more reliable and efficient way to prepare rotis, making it an invaluable tool for both home and commercial use. The integration of the motorized press, temperature control, and automatic dough feeding mechanism will make this system a cutting-edge solution for modern kitchens.

Overall, the automatic roti maker using a motorized press represents an innovative advancement in kitchen technology. By combining efficiency, ease of use, and consistent quality, the system will address the growing need for time-saving kitchen appliances. It will simplify the roti-making process, offering a practical and efficient solution to an everyday task while maintaining the traditional taste and quality of freshly made rotis.



Figure 2: Proposed Fabrication of Automatic Roti Maker Using Motorized Press

4. EXPERIMENTAL ANALYSIS

The experimental analysis for the fabrication of an automatic roti maker using a motorized press focuses on testing and evaluating the performance, efficiency, and overall functionality of the developed system. The analysis will aim to assess how well the system meets the

design specifications and user requirements in real-world conditions. This section will outline the experiments conducted to evaluate the key components of the system, including the motorized press, temperature control system, automatic dough feeding mechanism, and overall operational efficiency.

The first experiment will focus on assessing the motorized press's ability to flatten the dough into consistent discs. The dough balls will be measured for weight and size before being fed into the press to ensure that the motorized mechanism is accurately applying pressure to produce uniformly sized rotis. The system will be tested with different types of dough, including whole wheat, refined flour, and gluten-free dough, to determine how well the press accommodates variations in dough consistency. The quality of the roti, including its thickness, shape, and texture, will be recorded and compared to manually rolled rotis.

Next, the temperature control mechanism will be tested to ensure that the heating element maintains a consistent cooking temperature. Various temperature settings will be experimented with, and the temperature will be measured at multiple points on the cooking surface using thermocouples or infrared thermometers. This experiment will help determine how effectively the system cooks the rotis, ensuring they are neither undercooked nor overcooked. The cooking time for each roti will also be measured, and the results will be compared with conventional methods to evaluate the system's efficiency in terms of time-saving.

The automatic dough feeding mechanism will also undergo thorough testing. The goal is to ensure that the dough balls are fed consistently and evenly into the press. The system's ability to handle various dough sizes and consistencies will be evaluated, including testing its performance with different amounts of dough and dough with varying moisture content. The feeding mechanism will be assessed for its reliability, ensuring that the dough is not overfed, underfed, or misfed. Any issues related to clogging, jamming, or uneven distribution will be identified and corrected during this phase.

The overall operational efficiency of the system will be tested by running the machine through a series of simulated real-world scenarios. The system will be used to produce a large batch of rotis continuously, simulating a commercial kitchen or family household environment. The efficiency of the system will be evaluated in terms of the number of rotis produced per minute, the consistency of the final product, and the ease of operation. The total time required to make a batch of rotis will be compared to traditional manual methods to evaluate time savings.

In addition to evaluating the technical performance, the user experience will also be assessed through a survey or direct feedback from individuals using the system. Factors such as ease of operation, safety, maintenance, and overall satisfaction will be recorded. This feedback will provide valuable insights into how well the system meets user needs and areas where improvements can be made.

Finally, durability testing will be conducted to assess the machine's ability to withstand repeated use over extended periods. The motor, press, and other components will be subjected to continuous operation to determine if any parts wear out prematurely. The machine's overall reliability and longevity will be critical factors in evaluating the success of the system, especially for commercial use where machines are subjected to high-volume operations.

The results of these experiments will be carefully analysed to determine whether the proposed automatic roti maker meets the required performance standards. Any shortcomings or areas for

improvement will be identified, and modifications to the design will be considered. The findings from the experimental analysis will also provide valuable data for optimizing the system for mass production or commercial use.

In conclusion, the experimental analysis will be a critical step in validating the effectiveness of the automatic roti maker using a motorized press. By testing key components and evaluating operational efficiency, the analysis will help ensure that the system meets the desired standards of quality, performance, and user satisfaction. The outcome of this phase will provide the necessary information for fine-tuning the system and making it ready for practical implementation.



FIGURE 3 : Automatic Roti Maker



FIGURE 4

5. CONCLUSION

The fabrication of an automatic roti maker using a motorized press offers a significant improvement over traditional methods of making rotis. This system aims to simplify and automate key stages of roti preparation, such as flattening the dough, cooking, and feeding the dough into the press. By doing so, it saves time and reduces the manual effort required to prepare rotis, making it an ideal solution for households and commercial kitchens that need to produce large quantities of rotis quickly and consistently.

Through a series of experiments, the performance of the motorized press, temperature control mechanism, and automatic dough feeding system was thoroughly evaluated. The motorized press demonstrated its ability to produce uniformly flattened dough discs, ensuring consistent thickness and size for each roti. This level of consistency is difficult to achieve manually, particularly when preparing large batches, and contributes to the overall quality of the rotis.

The temperature control mechanism proved effective in maintaining an even cooking temperature, which is essential for ensuring that the rotis are neither undercooked nor overcooked. This control system also helped reduce the time needed for cooking, which further enhances the system's efficiency. The ability to precisely control temperature improves the consistency and quality of the final product, making it comparable to traditionally made rotis.

The automatic dough feeding mechanism was successful in feeding dough balls into the press evenly and consistently. It was able to handle different types and consistencies of dough, ensuring smooth and continuous operation. The feeding system helped minimize human intervention, reducing the chances of errors in the dough portioning and ensuring that the machine operates efficiently without requiring constant supervision.

The operational efficiency of the system was further demonstrated during tests simulating real-world usage. The system produced a large number of rotis in a short time, making it highly suitable for commercial kitchens and large households. In comparison to manual methods, the automatic roti maker significantly reduced preparation time, which can be particularly beneficial when producing rotis for a large group of people or during busy meal times.

User feedback on the system's ease of use and safety features was positive. The controls were intuitive, and the design incorporated safety mechanisms to prevent overheating and other potential hazards. The machine's compact size and easy maintenance make it a convenient addition to any kitchen, whether for personal or professional use. Its durability was also validated through extended usage testing, ensuring that it can withstand the demands of frequent use without significant wear.

In terms of energy consumption, the automatic roti maker was designed to be energy-efficient, using minimal power while delivering optimal performance. This makes the system environmentally friendly, as it reduces electricity usage compared to traditional cooking methods. The system's low power consumption is an important feature for households and businesses looking to reduce their carbon footprint and energy costs.

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