Experimental and Analysis of Fabrication of Motorized Oil Extraction

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ABSTRACT: Present methods of oil extraction are inefficient, time consuming and costly due to the refining process involved. There are many issues where it is not possible to know adulteration which causes health related problems. Also, it requires external temperature above $100 \circ C$ to extract oil. This high temperature reduces the quality of oil which is not suitable for human health. The aim of this project primarily focuses on maintaining/ improving the quality of oil which is extracted from groundnuts. To achieve this purpose, it will be necessary that compact, portable, easily operated, less time consuming and low-cost machines should be developed. At the same time the machine should maintain below specified temperature to avoid nutritional losses. Hence it is today's need to have an oil extracting machine which can be used at home by maintaining oil quality efficiently in a cost effective and adult – free way for a healthy life. Considering the above problems for this project it was decided to develop an oil extracting machine which will maintain the nutritional value and will be small in size & economical. The main aim focuses on maintaining the temperature below $70 \circ C$. based on this a machine will be developed and the output (oil temperature) will be checked to find the quality of oil

KEY WORDS: Motorized oil extraction, Fabrication process, Experimental analysis, Oil extraction efficiency, Performance evaluation, Prototype development, Motorized screw press, Oil yield analysis, Energy consumption analysis, -Design optimization

I. INTRODUCTION

The conventional traditional method of extracting oil from raw materials is stressful, in efficient and takes longer time which effect on the cost of purely refined oil in market. Indian agricultural resources are vast and progressive harnessing of there- source will result in substantial improvement in output. Groundnuts are generally economic crop. Gujarat tops with27.87% of total production followed by Andhra Pradesh 24.19%, TamilNadu14.84% and Karnataka 10.95%. Though other states like Maharashtra, Rajasthan, Orissa, Madhya Pradesh, Uttar Pradesh and West Bengal are the important groundnut producing states. This project is set out to establish possible extraction of oil from groundnuts and to improve processing procedure, market value and quality of the derived products from the groundnuts. The overall objective of the work Is to design, construct and evaluate the performance of simple and compact equipment for oil extracting machine from groundnuts. Initially we are using metal rollers for crushing and extraction. If the metal rollers fail to maintain required temperature, we are going to replace metal rollers with wooden rollers. Oil extracting machine is a mechanical assembly for extracting oil from raw materials which are squeezed under high pressure and proper working temperature. The typical raw materials are groundnuts, seeds like soybeans and soon which are easily available in market and supplied to press in continues feed. However, despite the increase in production, it is only the ground nut that is mostly utilized in the processing industry. It is necessary to provide external temperature near about 353K for harder raw materials to extract oil from the made this effects on the nutrients, vitamins and other important gradient An Introduction about ground nut Peanut oil, also known as groundnut oil.

II. CONCEPT

Objective Definition: Clearly define the objectives of the experiment, such as assessing the efficiency of the motorized oil extraction process, evaluating the quality of the extracted oil, or comparing different fabrication techniques.

Experimental Design: Design the experiment, including selecting the materials and equipment needed for fabrication, determining the variables to be measured, and planning the experimental procedure.

Material Selection: Choose the materials for the motorized oil extraction machine based on factors like durability, cost-

effectiveness, and suitability for the extraction process.

Fabrication Process: Fabricate the motorized oil extraction machine according to the designed specifications, ensuring that all components are assembled correctly and that the machine operates smoothly.

Measurement and Data Collection: Measure the relevant parameters during the fabrication process, such as the temperature, pressure, and speed of the extraction process, and collect data for analysis.

Data Analysis: Analyze the collected data using statistical methods to draw conclusions about the efficiency and effectiveness of the fabrication process.

Performance Evaluation: Evaluate the performance of the motorized oil extraction machine based on the experimental results, comparing it to the objectives set at the beginning of the experiment.

Optimization: If necessary, optimize the fabrication process based on the experimental findings to improve the efficiency, quality, or cost-effectiveness of the motorized oil extraction machine.

Documentation: Document the experimental process, including the design, fabrication, data collection, analysis, and conclusions, for future reference and publication

III. STEPS INVOLVEIN ANALYSIS

Project Planning and Research:
Define the objectives of the project.
Conduct literature review to understand existing methods and technologies.
Identify the requirements and constraints of the project.

Design and Fabrication:
Design the motorized oil extraction machine based on the research and requirements.
Select appropriate materials and components for the machine.
Fabricate the machine according to the design specifications.

Assembly and Testing:
Assemble the fabricated parts into the motorized oil extraction machine.
Conduct initial tests to ensure the machine functions correctly.
Make any necessary adjustments or modifications.

Experimental Setup:
Prepare the groundnut or other raw materials for extraction.
Set up the experimental apparatus, including the motorized extraction machine and any associated equipment.

Extraction Process:
Start the motorized extraction machine according to the designed parameters.
Monitor the extraction process, including temperature, pressure, and extraction rate.

Data Collection and Analysis:
Collect data on extraction efficiency, oil quality, and machine performance.
Analyze the data to evaluate the effectiveness of the motorized oil extraction machine.
Optimization and Refinement:

Identify areas for improvement based on the experimental results.
Make adjustments to the machine design or operation to optimize performance.
Repeat the extraction process and data collection as needed to refine the machine design.

Documentation and Reporting:
Document the experimental setup, process, and results.

Prepare a report summarizing the findings of the experimental analysis.
Present the report to stakeholders or publish it in relevant journals or conferences.

IV. MOTIVATION

Efficiency Improvement: Experimentation allows for the optimization of the motorized oil extraction process, leading to increased efficiency in oil extraction from groundnuts.

Cost Reduction: By analyzing the fabrication process, it may be possible to identify areas where costs can be reduced, making the extraction process more affordable and sustainable.

Quality Assurance: Experimental analysis helps ensure that the motorized oil extraction process meets quality standards, resulting in higher quality oil.

Innovation and Development: Through experimentation, new technologies and methods can be developed to improve motorized oil extraction, driving innovation in the field.

Environmental Impact: Analysis can help in developing methods that are environmentally friendly, reducing waste and energy consumption.

V. PROPOSED THEME

Groundnut Oil Extracting is operated on the shearing action blowering action and separating action. Firstly the inputs i.e. the groundnut are fed to the machine through the hopper. Then groundnuts come in contact with the two members, one is semi-circular net and another is roll shaft. Semi-circular net is a stationary member while the roll shaft is rotating member. When the groundnut comes in contact with these two members then the shearing action takes place here. Due to shearing action (crushing) the groundnuts gets shelled and divided into two parts. i.e. in the peanut and outer shell of the groundnuts. There clearance is provided between the net and roll shaft. The clearance provided is depends upon the size of the groundnuts which is to be decocted. After shelling the groundnut the peanut and shells of the groundnut gets dropped from the semi-circular net, in downward direction then a centrifugal force is applied by a fan on the peanut and shell of the groundnut. Due to more weight, the peanuts gets moved downward and collected in the separator. But due to lighter weight the shell of the groundnuts are thrown outside the machine and which are collected from the backside of the machine. From the shelling chamber the unshelled groundnuts also gets dropped in the tray (7% to 10%). This groundnut gets dropped from the clearance made among the grill. The three kinds of the nets can be used with different size of capsule slots, size vise small, medium and large for various size of groundnuts. In this way the "GROUNDNUT OIL EXTRACTING MACHINE" works. Fig. Modeling of Oil Extracting Machine 2.1 The Screw Press Operation Continuous pressing by means of expellers (also known as screw press) is a widely applied process for the extraction of oil from oil seeds and nuts. It replaces the historical method for the batch wise extraction of oil by mechanical or hydraulic pressing. The expeller consists of a screw (or worm), rotating inside a cylindrical cage (barrel).

VI.METHODOLOGY

To create a methodology for experimental analysis of the fabrication of a motorized oil extraction setup, you can follow these general steps:

1. **Define Objectives**: Clearly state the goals of the experiment, such as evaluating the efficiency of the motorized oil extraction process or comparing it with traditional methods.

2. **Design of the Motorized Oil Extraction Setup**: Describe the components and specifications of the motorized oil extraction setup, including the motor, extruder, heating elements (if any), and safety features.

3. **Materials and Tools**: List all the materials and tools required for the fabrication, including raw materials for the extruder, machining tools, and safety equipment.

4. **Fabrication Process**: Provide a detailed step-by-step procedure for fabricating the motorized oil extraction setup, including assembling the components, machining parts, and ensuring proper alignment.

5. **Testing Plan**: Outline the tests to be conducted to evaluate the performance of the motorized oil extraction setup, such as oil extraction efficiency, motor power consumption, and safety features.

6. **Data Collection**: Describe how data will be collected during the experiment, including measurements of extracted oil quantity, motor power consumption, and any observations related to the operation of the setup.

7. **Analysis**: Specify the methods for analyzing the data collected, such as calculating extraction efficiency, comparing results with traditional methods, and identifying any issues or improvements needed.

8. **Safety Measures**: Highlight the safety precautions to be followed during the fabrication and operation of the motorized oil extraction setup to prevent accidents or injuries.

9. **Conclusion**: Summarize the key findings of the experiment, including the performance of the motorized oil extraction setup, any limitations encountered, and recommendations for future improvements.

10. **References**: Include any references or sources used to design the motorized oil extraction setup and develop the methodology.

It's important to tailor the methodology to your specific project requirements and objectives.

VII. CONCLUSION

The various required components for the development to ground nut oil extraction machine are designed. The purpose is to have the small size oil extracting machine and the reduction of the temperature with rollers having combination of wood metal. It is found that oil extraction efficiency from dry groundnuts is more than the efficiency from wet groundnuts. But it is also observed that performance characteristics like temperature also varies in dry and wet groundnuts. Maximum number of vitamins, fats, proteins other nutrients can be achieved by maintaining the temperature below 70o− 80oC. It helps to maintain low cholesterol and maximum quality of oil can be achieved within minimum temperature for better health. The machine is fabricated from locally available materials successfully which is applicable for local production, operation, repair and maintenance. Fabricated machine extract average 62% of oil from nuts when operated manually and electrically. The operation is quite simple, time saving as well as energy saving which can be used in rural areas also where electricity problem is major

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