UNIVERSITI TEKNOLOGI MARA

JOHOR INTERNATIONAL INNOVATION, INVENTION COMPETITION AND SYMPOSIUM 2024

PROCEEDINGS OF JOHOR INTERNATIONAL INNOVATION INVENTION COMPETITION AND SYMPOSIUM 2024 (JIIICaS 2024)

"Flourish and Nurturing Sustainable Innovation for a Prosperous Nation"

JOHOR INTERNATIONAL INNOVATION, INVENTION COMPETITION AND SYMPOSIUM

Editorial Board

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Preface

In the name of Allah, the Almighty who gives us the enlightenment, the truth, the knowledge and with regards to Prophet Muhammad (peace be upon him) for guiding us to the straight path. We thank to Allah for giving us guidance and strength to write this e-book.

This e-book compiles the extended abstracts that submitted to Johor International Innovation Invention Competition and Symposium 2024 (JIIICaS2024), where JIIICaS2024 is a virtual platform for all creative minds to share and present their invention and innovation. Each abstract gives a brief background on the innovation or project.

We hope that this e-book will help the readers to get to know the innovation done by the students and get some ideas to develop future innovation products.

Foreword Rector

Assalamualaikum warahmatullahi Wabarakatuh, Salam Sejahtera, Salam Malaysia MADANI and Salam UiTM Dihatiku.

In the name of Allah, the Most Gracious, the Most Merciful.

It is a great honor to welcome you to the Johor International Innovation, Invention, Competition, and Symposium 2024 (JIIICaS 2024). This event connects various disciplines, focusing on education and engaging educators, students, researchers, and innovators from all walks of life.

Innovation is not just about ideas; it demands perseverance, creativity, and determination to turn those ideas into reality. The remarkable projects showcased today highlight the dedication and spirit of all participants. Initiatives like this not only explore new technologies but also cultivate skills and leadership among our youth. At Universiti Teknologi MARA (UiTM) Johor Branch, we are fully committed to fostering a dynamic culture of innovation, promoting the commercialization of new products, and encouraging meaningful collaborations with industry and society.

As we celebrate this event, I would like to extend my heartfelt gratitude to all sponsors, judges, the College of Computing, Informatics and Mathematics, UiTM Pasir Gudang Campus as the event organizer, as well as to the researchers and participants for their hard work in making this event a success. Let us continue striving for innovation and excellence. May the ideas presented today inspire us and lay the groundwork for future achievements.

Thank you.

Associate Professor Dr. Saunah Zainon
Rector
Universiti Teknologi MARA (UiTM)
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(A-ST153) DEVELOPMENT OF CHAFF COLLECTOR FOR DRUM COFFEE ROASTER MACHINE FOR HOME APPLICATION

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ABSTRACT

This project aims to enhance the efficiency of home coffee roasting, a growing trend among coffee enthusiasts seeking to achieve high-quality results in their own kitchens. Traditional drum coffee roasters often face significant challenges that can affect the quality of the final product, such as excessive chaff buildup leading to uneven roasting and burnt coffee beans. The objective of this project is to design a unique chaff collector that effectively removes excess chaff during the roasting process, utilizing the mechanical engineering design process to create a fan-like device that can be easily integrated into existing drum coffee roasters. The novelty of this project lies in its inventive approach to solving the chaff problem, which has the potential to revolutionize the home coffee roasting experience by providing a simple yet effective solution that not only enhances roasting quality but also reduces health hazards associated with chaff buildup and supports sustainable practices by allowing for the potential reuse of chaff. The market potential for this invention is promising, as it caters to the increasing demand for high-quality home coffee roasting equipment, offering a cost-effective and efficient solution that aims to significantly improve the home coffee roasting experience for enthusiasts and professionals alike.

Keywords: chaff collector, drum coffee roaster machine, mechanical engineering design process

1.0 INTRODUCTION

Coffee roasting is an essential step that transforms green coffee beans into aromatic roasted coffee. This process enhances flavour and releases the pleasant aromas associated with fresh coffee. However, traditional roasting methods produce a byproduct called chaff, which is the thin skin that separates from the beans during roasting. The disposal of coffee chaff creates several problems. It can be challenging to dispose of properly, leading to waste management issues, and it contributes to a messy roasting area.

2.0 OBJECTIVE

The objective of this innovation is to develop a chaff collector that helps with the removal of excess chaff during coffee roasting, thereby improving the overall roasting experience and efficiency.

The objective of this project is:

1. To design a unique chaff collector for drum coffee roasters that effectively integrates with existing roasting equipment.
2. To effectively remove excess chaff during the roasting process, minimizing mess and improving operational efficiency.
3. To enhance the efficiency and quality of home coffee roasting, enabling users to achieve superior flavour profiles and aromas in their coffee.

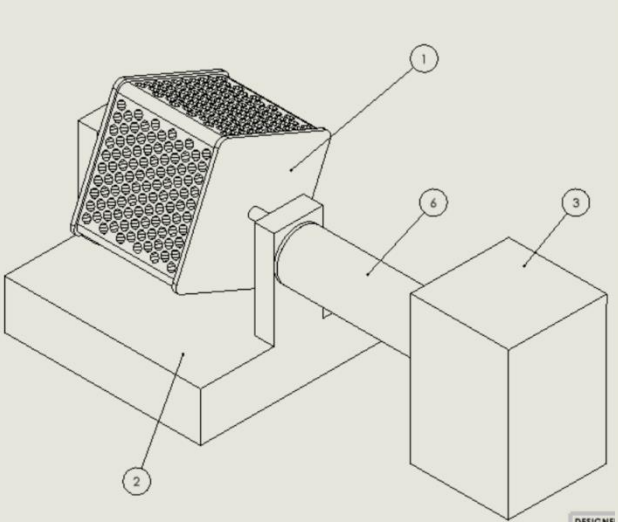
3.0 METHODOLOGY

The chaff collector, designed for easy assembly onto existing drum coffee roasters, is a key component of this innovation. It improves the functionality of the roasting process by effectively gathering chaff, the byproduct produced during roasting. This collection prevents chaff from interfering with the roasting process and reduces fire hazards associated with chaff buildup.

Table 1 outlines the features, functionality, usefulness, and practicality of the chaff collector. Figure 1 presents a 3D model of the chaff collector machine assembled with the drum coffee roaster, demonstrating its compatibility and design. This innovation streamlines the roasting process and contributes to a cleaner and safer environment for coffee roasting.

Table 1: Description the features, functionality, usefulness and practicality of the chaft collector.

No	Category	Feature	Description
1	Features	Durability	Constructed using durable materials, ensuring long-lasting performance and minimal maintenance requirements.
2		Compatibility	Designed to be compatible with various drum coffee roasters, offering flexibility and versatility for users.
4	Functionality	Seamless Integration	Integrates seamlessly with the drum coffee roaster, providing a streamlined and efficient roasting experience.
5		Noise Reduction	Engineered to operate quietly, minimizing distractions and providing a pleasant roasting experience.
6	Usefulness	Effective Chaff Removal	Ensures a clean working environment and minimizes mess, enhancing the overall roasting process.
7	Practicality	Compact Design	Space-efficient design that complements the overall size and weight of the drum coffee roaster, making it convenient for home use.



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	Drum Coffee Roaster		1
2	Frame		1
3	Chaff Storage Box		1
4	Fan		1
5	Fan Holder		1
6	Pipe		1

Figure 1: 3D model of the chaft collector machine assemble with the drum coffee roaster machine

4.0 RESULTS

The chaff collector for coffee bean roaster machines delivers key results that enhance the coffee roasting process. It improves roasting quality and reduces health hazards associated with chaff buildup. By addressing the chaff problem, this equipment ensures a cleaner roasting process, benefiting both the flavor of the coffee and the environment.

The design supports sustainable practices by allowing for the potential reuse of chaff, promoting environmentally responsible behavior among coffee enthusiasts and aligning with consumer preferences for sustainable products.

These features enhance the user experience, making home coffee roasting equipment a valuable option in the specialty coffee market. As demand for high-quality, fresh coffee increases, this equipment meets those needs while promoting health and sustainability.

The prototype of the chaff collector machine, shown in Figure 2, has been successfully produced and tested. It can be easily assembled onto existing drum coffee roasters through straightforward steps. Figure 3 illustrates the internal configuration of the chaff collector machine, displaying the collected chaff and confirming its effectiveness in gathering chaff during the roasting process.

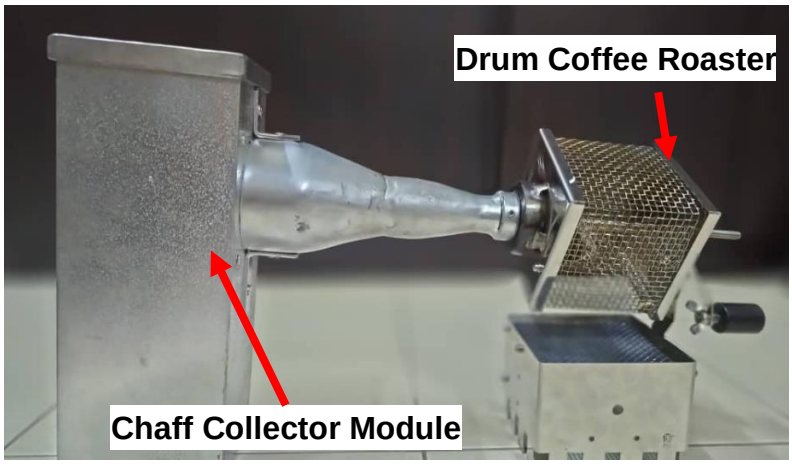


Figure 2: The Chaff Collector Prototype Machine with Drum Coffee Roaster Machine

Figure 3: The Internal Layout of Chaft Collector Machine with Chaff Collected

5.0 CONCLUSION

In conclusion, the development of the chaff collector for drum coffee roaster machines marks a significant improvement in home coffee roasting. This innovative device provides a practical solution to the common issue of chaff buildup, enhancing the overall roasting process. By efficiently collecting chaff, the chaff collector not only improves the quality of the roasted coffee but also promotes a cleaner and safer roasting environment. Its ease of assembly and compatibility with existing roasters make it a cost-effective option for both coffee enthusiasts and professionals. Overall, the chaff collector represents a valuable addition to the market, addressing the needs of a growing community of coffee lovers seeking to elevate their roasting experience.