UNIVERSITI MALAYSIA PERLIS

DESIGN AND FABRICATION OF AUTOMATICA TAMARIND DESEEDING MACHINE MAJI ENTERPRISE

Automatic Tamarind Deseeding Machine

Nor Zaiazmin Yahya
Mohamad Shaiful Ashrul Ishak
Mohd Nazri Omar
Kartini Alir

Technical Report

TECHNICAL REPORT

DESIGN AND FABRICATION OF AUTOMATICA TAMARIND DESEEDING MACHINE MAJI ENTERPRISE

Automatic Tamarind Deseeding Machine

Nor Zaiazmin Yahaya
Mohamad Shaiful Ashrul Ishak
Mohd Nazri Omar
Kartini Alir

Penerbit Universiti Malaysia Perlis
Kangar ○ 2021

Published by:

Penerbit UniMAP, Universiti Malaysia Perlis
Tingkat 10, Bangunan KWSP
Jalan Bukit Lagi,
01000 Kangar, Perlis. MALAYSIA.

Tel: (04) 977 5159, Fax: (04) 977 5135
Website: http://penerbit.unimap.edu.my
E-mail: penerbitan@unimap.edu.my

TABLE OF CONTENTS

LIST OF FIGURES

ACKNOWLEDGEMENT

The authors would like to thank the Faculty of Mechanical Engineering Technology (FTKM) at Universiti Malaysia Perlis for allowing us to complete the work described above using the Ansys software. The authors would also like to thank the Malaysian Ministry of Education (MOE) for providing the PPRN grant under KPM.600-2/1/12 Jld.2(23) and Puan Kamariah Binti Md. Yusoff, director of Maji Enterprise, for putting her trust in us and giving us the opportunity to design and deliver the automatic tamarind deseeding machine so that the company's output productivity can be increased.

PREFACE

The company is producing sambal kicap sauce. The ingredients for the product are cili padi, onions, tamarind and soy sauce. The company is currently using manual method using strainer to separate the tamarind flesh from its seeds. The manual process is time-consuming and only 10% of the seeds can be separated. Company needs a technology that can separate tamarind flesh from its seeds without/minimal use of water with the capacity of 100kg/batch.

CONTENT

Problem Statement

MAJI ENTERPRISE requires an automatic machine capable of separating tamarind from its seeds. The machine should use as little water as possible (5-10%) and have a capacity of 100 kg per load when processing the tamarind. The machine must meet the Malaysian government's hygiene standards for the food industry. Employee comfort should be considered when designing the machine (ergonomics).

Objectives

We will develop: -

1. A machine for automatically separating tamarind from its seeds, which includes the installation of several sensors, motors, mixers, filters, and control panels.
2. The system to be developed will make use of electrical and electronic components readily available in the Malaysian market.
3. The machine to be developed is powered by a 240V power supply and draws no more than 13A.
4. All tamarind-contact components are stainless steel (SS304/SS316) and simple to maintain.

Project Scope

The scope of this product's development will be as follows: -

1. Capacity does not exceed 100 kg per load.
2. Water and Tamarind are manually introduced into the machine.

Process Flow

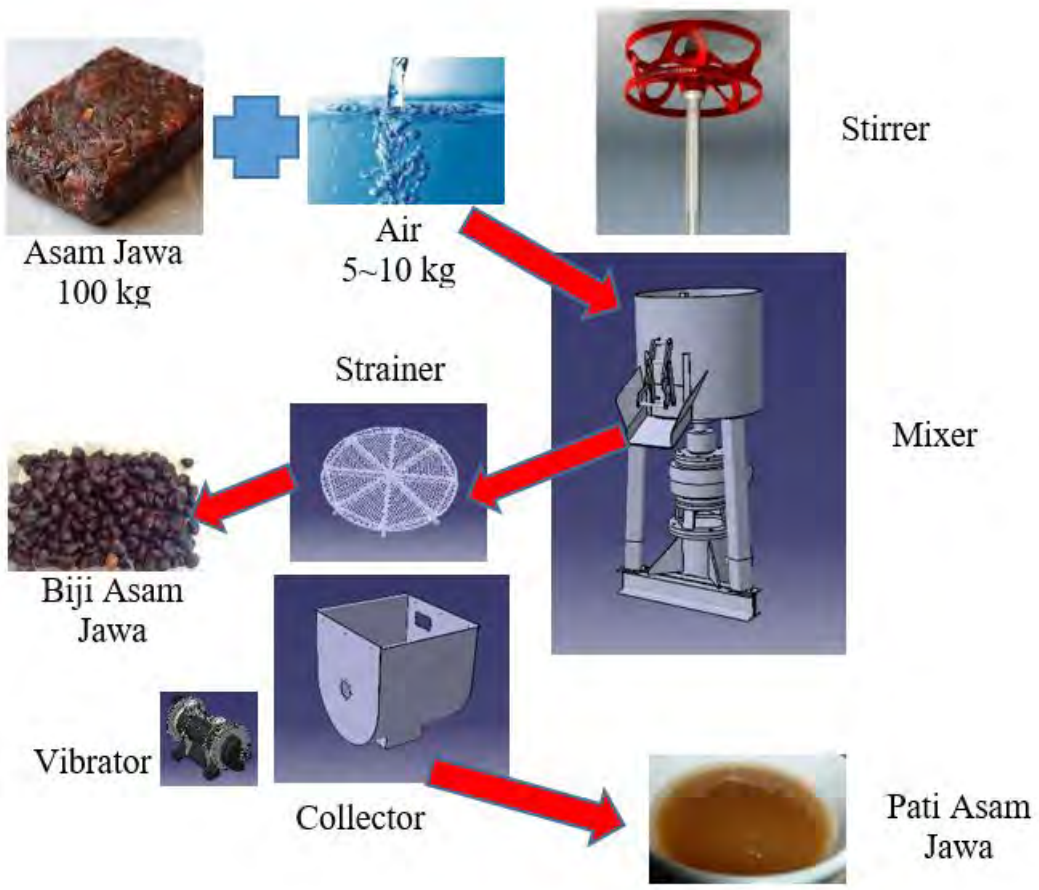

Figure 1: Automatic Tamarind Seed Separation Machine Concept

Design Process

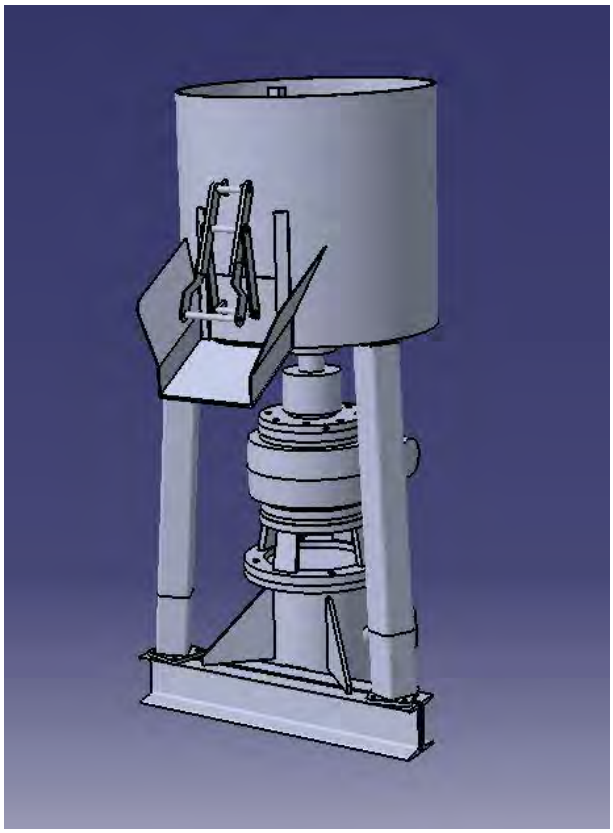

Figure 2: Mixer machine

Figure 2 shows a tamarind-contact part of a mixing machine with a capacity of 150 kg made of stainless steel 316. To prevent oil and grease from entering the tamarind solution, the motor will be placed at the bottom of the mixer as of a GMP (Good Manufacturing Practice) certificate is required.

Figure 3: Tamarind

To dilute the tamarind, 100 kg of tamarind (Figure 3) and 5 to 10 kg of water will be placed in the mixer.

Figure 4: Stirrer blade

Figure 4 shows the blades of a tamarind stirrer rotating at different speeds. At the start of the mixture, it will rotate slowly at a speed of (30 to 60 RPM). This allows the Tamarind to slowly melt without destroying the tamarind seeds. The stirrer blade will rotate at a medium speed as the tamarind melts (100 to 200 RPM). The tamarind seeds are not broken or crushed at this speed; rather, it is intended to soften / dissolve the fibers attached to the tamarind seeds.

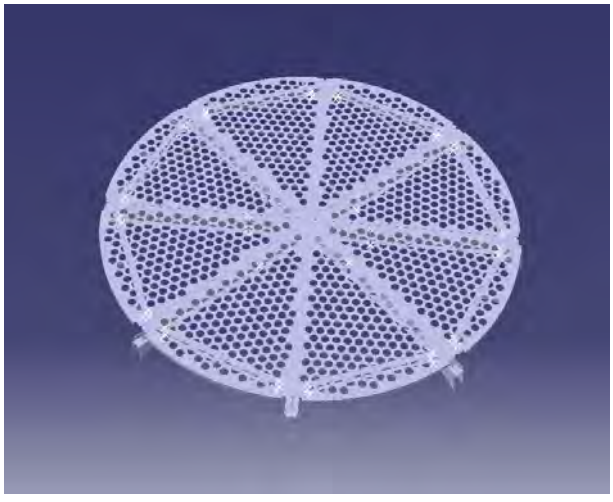

Figure 5: Filter / Strainer

Figure 5 shows the filter / strainer that will be used to separate the tamarind essence and seeds. The diameter of this filter hole ranges from 4 to 8 mm. This size is appropriate because tamarind seeds range in size from 10 to 15 mm on average. To further improve the quality of tamarind

essence, 2 or 3 more filters / strainers will be designed in tiers with smaller hole sizes based on the company's tamarind essence quality requirements.

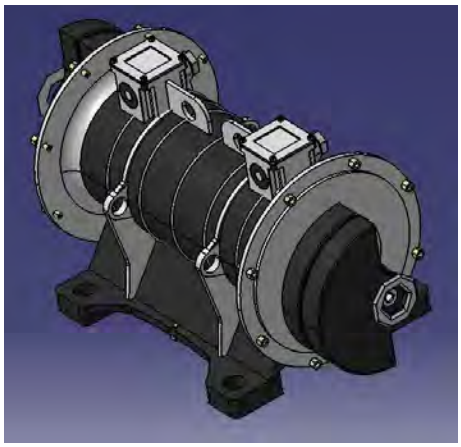

Figure 6: Vibrator Motor / Vibrator

Figure 6 shows the vibrator motor / vibrator that will be connected to the filter / strainer to allow it to vibrate. This vibration speeds up the process of separating the tamarind seeds and keeps the filter from clogging. Depending on the viscosity of the tamarind essence, the vibration rate can be adjusted. To separate the viscous tamarind starch from the tamarind seeds, a strong vibration is required.

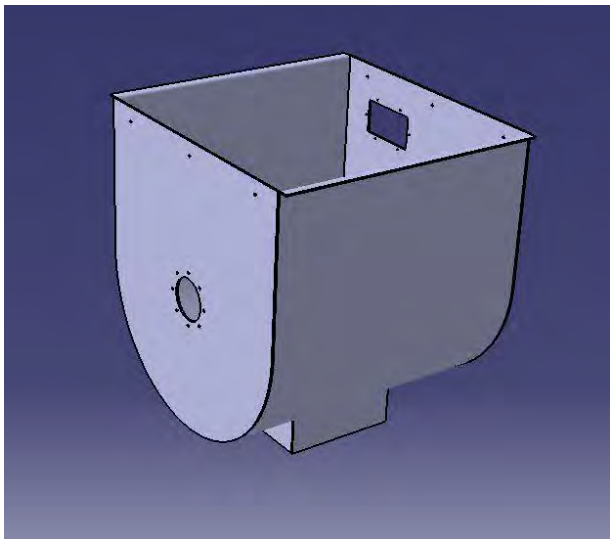

Figure 7: Catchment Container / Collector

Figure 7 shows a container for catching / collecting filtered Javanese acid essence. This container is made of stainless steel and has a capacity of 80 to 100 kg (SS316). There is a valve

under this catchment container that can be opened to allow the tamarind essence to be transferred for the next process.

Figure 8: Starch and seeds of tamarind

Figure 8 shows the separated essence and seeds of tamarind.

CONCLUSION

This project was successfully completed in one year. Several difficulties were encountered during the fabrication process, and several adjustments and modifications were made. Maji Enterprise was delighted to receive a fully functional automation tamarind deseeding machine that met the GMP standards. The machine's overall performance produces an average of 250 kg of tamarind paste per day.

-