INTERNATIONAL JOURNAL OF ADVANCE RESEARCH, IDEAS AND INNOVATIONS IN TECHNOLOGY

ISSN: 2454-132X
Impact factor: 6.078
(Volume 6, Issue 4)
Available online at: https://www.ijariit.com

Design and analysis of cocoon extractor

Yeshwant J.
yeshujayaram20@gmail.com
SJB Institute of Technology, Bengaluru, Karnataka

Samarth B. Deshpande
samarthdeshpande98@gmail.com
SJB Institute of Technology, Bengaluru, Karnataka

Yashvanth Naik M. M.
yashvanthnaik5399@gmail.com
SJB Institute of Technology, Bengaluru, Karnataka

Sadan Gowda V.
sadangowda64@gmail.com
SJB Institute of Technology, Bengaluru, Karnataka

Manjunath Naik H. R.
naikmanju3@gmail.com
SJB Institute of Technology, Bengaluru, Karnataka

ABSTRACT

This paper tells us about Design and Analysis of Cocoon Extractor machine. One of the traditional methods for growing cocoon is by using chandrika. This method is widely used in SOUTH INDIA. The removal of cocoon from chandrika is art and it's a careful practice followed by farmers. During extraction process of cocoon farmers face many problems i.e., labour problem, wearing of bamboo strips due to continuous strips, pricking of bamboo strips into fingers, time management and many such problems. The major problem we are facing while building the machine is that the texture of cocoon is too delicate. To solve these problems, we decided to use air as medium to extract cocoon from chandrika. This can be achieved by vacuum pressure. The basic principle we are using in this machine is vacuum cleaner's principle. After survey we found that we need high suction pressure to suck the cocoon from the chandrika. We will be using centrifugal impeller to create high suction pressure which is driven by universal DC motor.

Keywords: *Chandrika, Universal Motor, Vacuum Cleaner, Sericulture*

1. INTRODUCTION

This project is based on sericulture which is a sub-branch agriculture. This project mainly gives importance to sericulture farmers. This project helps farmers to overcome the problems faced during extraction of cocoon from "CHANDRIKA".

Present scenario in sericulture field in India related to cocoon extraction from chandrika is that farmers are using contract labors and also it is only done by bare hands. The main intention of this project is to save labour cost, time also to provide safety along with increasing extraction rate ` chandrika which will decrease burden in large extraction process. So, by providing solution to this real-time problem. With combination of less investment for the machine and simple mechanism which easier to understand and operate.

2. LITERATURE SURVEY

Experiment on extraction of natural silk fibre from cocoon os Argcma mimosa Authors: Boniface Mutha Ngoka, Everlyn Kamene Nguku, Esther Ndaisi Kioko, Suresh Kumar Raina and Jones Mulwa Mucke**.** Boniface Mutha Ngoka, Everlyn Kamene Nguku, Esther Ndaisi Kioko, Suresh Kumar Raina and Jones Mulwa Mucke conducted an Experiment on extraction of Natural silk fibre from cocoon as Argcma mimosa. By the end of this test they conclude that physical properties of the silk obtained from the bombyx mori the boiling point for the cocoons to yield the silk from bombyx mori using sodium carbonate. By this we can conclude the optimum suction pressure required to suck the cocoon without any damage.

Design and application of dc vacuum cleaner using axial flow fan. Authors: Vijioth Gaajbhiyc, Naved Ahmed and MS Tutail designed and application of DC vacuum cleaner using Axial Flow fan. By studying this we come to know that where exactly axial flow fan must be placed. The volumetric flow rate, storage capacity of cylinder, total consumption and power required to drive the gear can be calculated. The various parameters like blade number, Inlet/Outlet Blade angle, blade thickness should vary for better results. By conduction these test we can increase the vacuum level. Design and development of universal motor control using MAT LAB and Arduino Authors: Kanoria Shubham, Anil Pandey and Jeet Madhusudan. Kanoria Shubham, Anil Pandey and Jeet Madhusudan designed and development of universal motor control using MATLAB and Arduino. They demonstrated controlling action of the motor using drivers through Arduino and also explained about hardware and software part of it. By this we can work on optimization of the motor using electrical devices.

Analysis on impeller blade by varying blade number Authors: Mr. C.V.S Rajesh, Mr. SK Hidiyath ulla Sharif conducted analysis on Impeller blade by varying blade number, they calculated critical parameters like impeller outlet diameter, blade angle and the blade number for different types of blades.

And also calculated specific speed and different head. By conducting this experiment, we concluded by increasing number of blades in backward flow is best design for high head & low stress.

An experiment on flow analysis through the centrifugal, impeller of a vacuum cleaner. Authors: Janez Rihtarsic, Matiaz Subelj, Marko Hocevor, Joze Duhavnik. Conducted an experiment on flow analysis through the centrifugal, impeller of a vacuum cleaner. They carried this experimental both practically and theoretically viz numerical simulation and flow visualized flow visualization was conducted with the use of theory dynamic similarity. By conducting this experiment, we come to know there is a positive incidence angle at reading edge than in trailing edge.

3. OBJECTIVE

- The main objective of this project is to assist farmer in extraction process of cocoon in minimal cost and time saving.
- To reduce tedious work done by farmers, accomplishing safety and rapidity in their work.
- This process more effective and user friendly.
- Increase extraction rate.
- To achieve professional design learning.
- To achieve advance CFD analysis using ANSYS CFD

4. METHODOLOGY

The prototype mainly works on the suction pressure for the sucking the cocoon from chandrika.

Step 1 A long hose pipe attached to the collecting bag suction through hand held pipe. The suction force sucks cocoon from the chandrika and is collected in the collecting bag.

Step 2 While travelling to the collecting chamber it may get ruptured due to the collision between the walls and also to resist the impact on cocoon the sponge is used.

Step 3 Cleaning the excreta and dust particles by vibrating the mesh made of sheet metal.

Step 4 Then it is collected in the collector for further processes.

5. WORKING DIAGRAM

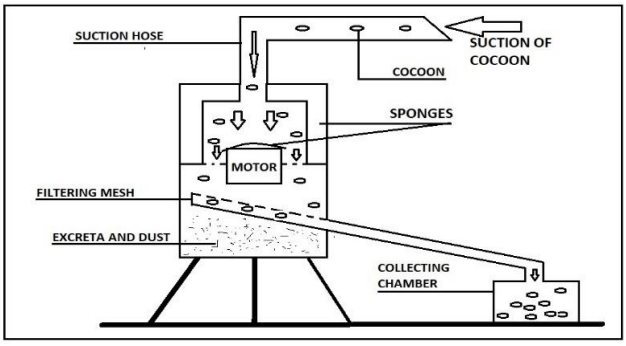

Fig. 1: Working diagram of cocoon extractor

6. HARDWARE COMPONENTS REQUIRED

120v 1100w dc motor
Hose pipe
Sheet metal mesh
Sponge
Container
Power supply circuit
Pressure gauge

7. FIELD SURVEY

We had been to Ramanagar to do some field test. This field test includes.

- Time taken to remove cocoon manually from CHANDRIKE.
- Force required to remove cocoon from CHANDRIKE.
- To calculate force required to remove cocoon from CHANDRIKE we took more than 10 iterations and concluded with maximum and minimum force.

Fig. 2: Photographs of field survey

8. CALCULATION

Average weight of cocoon is **1.7 – 2.3 grams**, as the cocoon is attached to the Chandrika, we are taking additional **100 grams** of weight so the total weight is taken as **302 grams.**

The amount of force required to remove the cocoon is calculated as shown below

Force=mass∗acceleration

Force=0.302∗9.81. Amount of negative pressure created inside the container is **1 KPa**

Pressure=force/area

Force=pressure∗area

$$\text{Force}=1000*\frac{\pi d^2}{4}$$

Suction Force generated = **2.3758N**

9. ANALYSIS

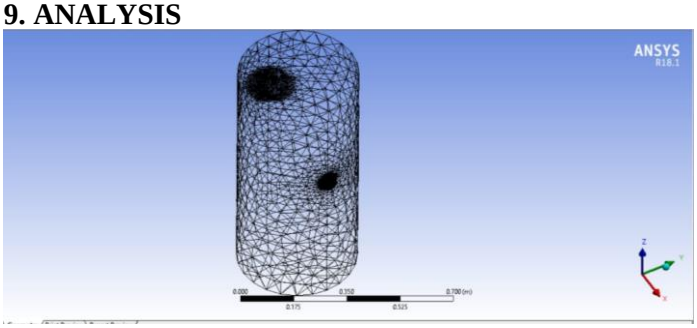

Fig. 3: Tetrahedron meshing

The graph below shows the results of velocity components in XY and Z direction v/s the iteration. As the graph shows velocity will be minimum at inlet and reaches maximum value as the air enters the inlet and the velocity value decreases at the outlet, no of iterations entered was 200.

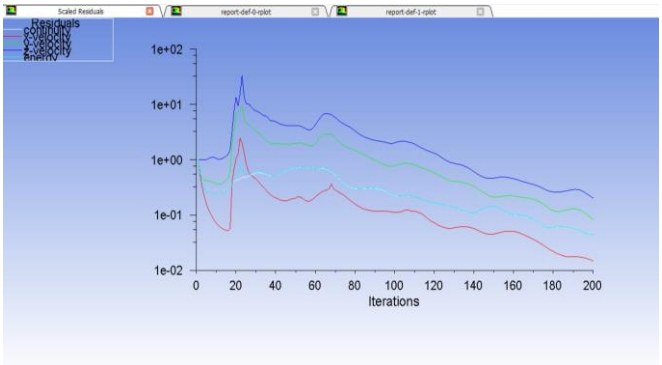

Fig. 4: Velocity vs iterations

10. OUTCOMES

- Cocoon handled in a safe manner by using sponges and impact absorbing materials
- It will be very efficient
- With the help this machine we can easily extract and clean cocoon
- The traditional method used by the farmer for the removal of matured worm i.e. cocoon is done by bare hands. The project mainly reduces the working time for this process due ne by farmers thus reducing working time.
- The involvement if hands during the removal causes injuries to the hands. By the usage of this model, eliminates the involvement of hands.

11. CONCLUSION

This project is designed in CATIA V5 software, the design calculations are done theoretically after doing several experiments. Other parameters are calculated using MATLAB software. The Parameters are then verified using ANSYS software. The table below will give the information about theoretical and analytic values.

Table 1: Results

Parameters	Theoretical	Analytical
Inlet Pressure (Pa)	2163.85	2198
Outlet Pressure (Pa)	3310	3346
Inlet Velocity (m/sec)	45.91	45.93
Outlet Velocity (m/sec)	8.83	9.31
Pressure Difference (Pa)	1244.699	1240

By this above table it is seen that the theoretical values and analytical values are approximately correct and the design calculations done are correct.

12. REFERENCES

[1] Boniface Mutua Ngoka1, Suresh Kumar Raina1 and Jones Mulwa Mueke. Experiment on extraction of natural silk fibre from cocoon os Argcma mimosa (Article in Journal of Agricultural Science and Technology - January 2016)

[2] Mr. C.V.S Rajesh, Mr. SK Hidiyath ulla Sharif. Analysis on impeller blade by varying blade number (Article in No-rdic Pulp and Paper Research Journal · December 2015)

[3] Hyuk San, Yoojeong Noh, Eun-Ho Choi, Young Jin Ji, Kyungae Lim. Optimization of the flow path efficiency in a vacuum cleaner fan (IJSRD National Conference on Emerging Trends)

[4] Boniface Mutha Ngoka, Everlyn Kamene Nguku, Esther Ndaisi Kioko, Suresh Kumar Raina and Jones Mulwa Mucke. Experiment on extraction of natural silk fibre from cocoon os Argcma mimosa (Conference Paper in Con-ference Proceedings of the EUROMICR-O. February 2001)

[5] Vijit Gajbhiye, Naved Ahmad, M. S. Tufail. CFD analysis on the performance of centrifugal pump impellor by changing the number of blades at different rpm (International Journal of Engineering and Techniques - Volume 4 Issue 1, Jan Feb 2001)

[6] Sheela Patel, Singh R. K. and Shweta Sao. CFD simulation on centrifugal pump impellor using ANSYS-CFX (Department of Life Sciences, Dr. C.V. Raman University, Bilaspur, Chhattisgah495113, India)

[7] Rajesh M Patel & Keyur K Pate. Analysis and optimization of centrifugal fan (International Journal of Emerging Trends in Engineering and Development)

