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# Design and Fabrication of Automatic Corn Separator Machine

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**ABSTRACT:** Corn has very old history scientist believe corn is developed by people from Mexico 7000 years ago it was started from wild grass. Now a day's corn is very important crop in india as well as other countries it is very affordable crop, it can grow in any un favoured climate hence we have manufactures Corn separator machine which run by Handle i.e manual and by a machine automatic, which is portable and affordable to Indian Farmers. The existing methods of corn de-husking in agriculture industry consist of breaking the gains by hand or by using large machinery for deseeding, both of which are not effective for a developing economy like India where farmers have little money for investment. Hence there is a need for an innovative idea or product that is feasible, safe, cost effect and productive for the Indian farmer. In era of automation everyone wants continuous, effort free production, to improve productivity. Men is running behind automation and developing new ideas, artificial intelligence is one of the example of it, In which Robot can do his work i.e., it can take own decision according to situation. Agriculture is one of the field where automation can help to enhance production rate and to remove animal efforts of plowingbu an animal. Corn separator machine is one of the example of automation to separate corn from maze it is quite difficult job for human but by using this machine corn seeding is very simple. De-seeding of corn is the process of removal of its inner layers, leaving only the cob or seed rack of the corn.

**KEYWORDS:** Agriculture, farming, de-husking , deseeding , automatic machine , Robot

## I.N.T.R.O.D.U.C.T.I.O.N

Corn is the most important cereal grain in the world, after wheat and rice, providing nutrients for humans and animals and serving as a basic raw material for the production of starch, oil and protein, alcoholic beverages, food sweeteners and, more recently, fuel. It is because of the important place of maize that it's handling, processing and preservation within the optimum conditions must be analyzed. The problem of poverty, hunger and malnutrition would be alleviated if there is adequate production of corn, Corn also called maize plays an important dietary role in most parts of Africa, It is grown virtually everywhere, in tropical, subtropical and temperate regions where rain and irrigation is adequate (Messiaen, 1992), Tindall, 1983). The major steps involved in the processing of corn are harvesting, drying, de-husking, shelling, storing, and milling. All these processes are costly and for the rural farmers to maximize profits on their produce, appropriate technology that suites their needs must be used. Corn processing not only prolongs its useful life but also increases the net profit farmers (users) make from mechanization technologies. It is in this line that one of the most important processing operations done to bring out the quality of corn is shelling. It is basically the removal of the corn kernels from the cob. This separation, done by hand or machine, is obtained by shelling through friction or by shaking the products; the difficulty of the process depends on the varieties grown, and on the moisture content as well as the degree of maturity of grain.

## O.B.J.E.C.T.I.V.E.S

- The main aim of this project is to overcome the tradition method. To increase the efficiency. To reduce the hard work.
- To reduced time to shell the CORN.
- To develop a low cost machine which can be used by farmer to convert their semi- finished (CORN) into finished.
- Product (CORN) it satisfies the need of village people to corn more money.



### II. LITERATURE REVIEW

*Desai Shridhar R Et Al.*, “DESIGN AND DEVELOPMENT OF CORN CHAFF PEELING” (2017). It has concluded that the peeling machine has been designed, developed and fabricated for reduce the efforts of Indian farmers. The peeling machine was tested in the fabrication shop and later taken to the field. It worked smoothly in the field conditions and gives an output of 60kg/hour. The leaf discharging mechanism is effective and the corn leaf is discharged very easily.

#### Relevance to current Research

*Abhijeet Y. Kedge, Et All.* “PRESENTED THE REVIEW ON DESIGN OF PEELING –SHELLING COMPACT COMBO MACHINE” (2016). It has concluded that many authors have reported the corn sheller and peeling design and also analyzed it for different loading conditions. Now the corn peeling and Sheller machines are separately available, but there is no single unit exists consisting of both the mechanisms.

#### Relevance to current Research

*Onkar kale et all.*, “DESIGN AND FABRICATION OF AUTOMATIC CORN SEPARATOR MACHINE” (2017) they have concluded that: 1) The Automatic corn separator machine is portable as well as low cost Indian farmer can purchase it easily 2) Performance of Sheller machine is depend upon mechanical properties of Corn 3) Automatic corn separator machine can be run by manually by handle as well as automatically by motor.

#### Relevance to current Research

*Praveen Kiran Mali, Dr. C. N. Sakhale, S. D. Shelare*, “A LITERATURE REVIEW ON DEVELOPMENT OF MAIZE THRESHER” (2015) A threshing machine is used to separate the grain from the straw and other light materials. It is, essentially, a three-stage process. In the first stage, bundles of grain and straw were pitched into the feeder (or hopper). The feeder controlled the rate of feed passing into the machine to prevent overloading. In reality, the rate at which the bundles were pitched into the hopper probably had more effect on the rate than the hopper itself.

#### Relevance to current Research

*Oriaku E.C, Et All.*, “DESIGN AND PERFORMANCE EVALUATION OF A CORN DE-COBING AND SEPARATING MACHINE” (2014). The following are conclusion drawn from this project, the average feed rate of the designed machine was found to be 2.06 kg/min. This implies a value of 123.6 kg/hr while average threshing efficiency was obtained as 1.65 kg/min (99 kg/hr). The average threshing efficiency was found to be 78.93 % while the average separation efficiency was 56.06 %.

#### Relevance to current Research

*J.N. Nwakairea Et Al.*, “DESIGNED, CONSTRUCTED AND PERFORMANCE ANALYSIS OF A MAIZE THRESHER FOR RURAL DWELLER” (2011). It has concluded from this project, it is clear that the machine was designed successfully. The actual throughput capacity of 109.99kg/hr was far better than the human actual throughput capacity which was determined to be 21.1kg/hr.

### III. METHODOLOGY OF PROPOSED SURVEY

The electric motor provides the primary motion required to run the machine. The motion and torque are transmitted to the main shaft via pulleys, v-belt and bearing; a rod of 4mm diameter has been welded along its circumference from one end to other end. The main shaft with welded rod on its surface is rotated in a clockwise direction with the help of the motor

The maize collected in the hopper are introduced into the machine through the inlet. The maize comes in contact with the rotating main shaft inside the corn guider barrel. The Maize is subjected to the continuous impact force and rotatory motion due to the welded helical rod on the surface of the rotating shaft, the Kernels gets separated or deseeded from the cob. A straight rod is welded near the front end of the corn guider which helps in the de-seeding as well as guiding the cob towards



the cob outlet. Since the Corn guider or barrel is designed as a tapered section, the maize moves along the length of the barrel in the forward direction until it reaches the cob outlet spout. The cob comes out of the outlet provided for it near the front end of the machine whereas the kernels will come out through the outlet provided for it at the bottom of the machine.

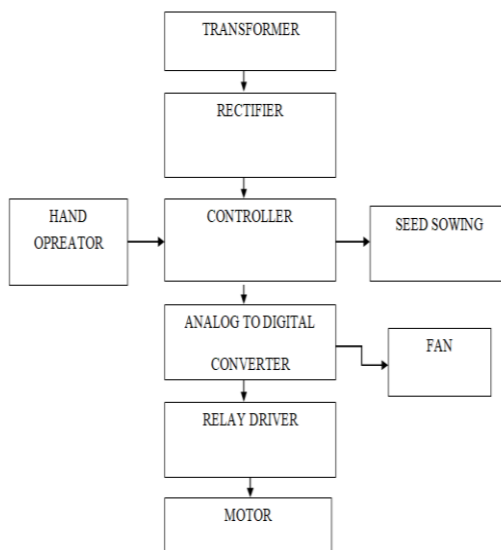


Figure.1 Methodology Flowchart

### VOLTAGE REGULATOR

A voltage regulator generates a fixed output voltage of a preset magnitude that remains constant regardless of changes to its input voltage or load conditions. A switching regulator converts the DC input voltage to a switched voltage applied to a power MOSFET or BJT switch.

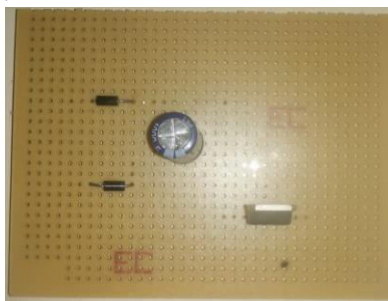


Figure.2 Voltage Regulator

### RELAY 12V

It works on the principle of an electromagnetic attraction. When the circuit of the relay senses the fault current, it energizes the electromagnetic field which produces the temporary magnetic field. The magnetic field moves the relay armature for opening or closing the connections.



Figure.3 Relay 12v

### 12-0-12 STEP DOWN TRANSFORMER

Step down transformer is made up of two or more coil wound on the iron core of the transformer. It works on the principle of magnetic induction between the coils. The voltage applied to the primary of the coil magnetize the iron core which induces the secondary windings of the transformer.



Figure.4 12-0-12 Step Down Transformer

### 40 PIN MICROCONTROLLER

Microcontrollers can take inputs from the device they controlling and retain control by sending the device signals to different parts of the device. A good example is a TV's microcontroller. It takes input from a remote control and delivers its output on the TV screen.



Figure.5 40 Pin Microcontroller

#### IV. RESULT AND DISCUSSION

The results obtained from the experiment was recorded and. The feed rate and threshing rate were obtained as a function of time while the separation efficiency was found by subtracting the weight of cobs collected at the exit spout from total sample collected and multiplying by 100 %. Threshing efficiency was obtained using the equation. All the results obtained were analyzed to obtain their best fit. The test result was found to be efficient. To deseed one piece of corn the time taken by the machine was found to be 2.5sec. Later the test was conducted by taking 10 pieces of corn and the time taken to deseed 10 pieces was found to be 25sec. The weight of corn of 10 pieces of corn was later measured and it was found to be 1.8kg. Therefore the time taken to deseed 1.8 kg of corn is 25sec without any damages. Going by the test results we can say that about 1440 pieces that is 260 kg of corn per hour can be deseeded effectively and completely without any damages. Therefore the efficiency of the model was found to be 100%. The only drawback of the model is that some amounts of kernels were discharging out of the machine through the outlet provided for discharge of empty cob (waste). From the test conducted the amount of deseeded corn (kernels) coming out through the actual outlet provided for that is found to be 1.271 kg from 1.8kg of the total weight. The amount of corn (kernels) coming out from the outlet provided for the empty cob is found to be 0.259kg which is almost negligible.



Figure.6 Automatic Corn Separate Machine

#### V. CONCLUSION AND FUTURE WORK

The corn de-seeding machine has been designed, developed and fabricated for reduce the efforts of Indian farmers during de-seeding. The cost of the machine is around Rupees 13000/-. This machine was tested in the work shop and the de-seeding capacity of the machine per hour is found to be 260Kg. The kernels were separated from the cob completely without any damages and the efficiency of de-seeding was found to be 100%. Discharging mechanism is effective and the corn seed is discharged very easily. For commercial purposes one can improve the efficiency of the machine by increasing the size of the machine, by using high speed motor and by providing multiple heads. The de-seeding machine has been established to reduce the efforts of the farmer and grains are separated with minimum cost. The de-seeding machine was tested in the machine shop and later taken to the field. It worked in the tested conditions and gives an output of 332 Kg/hour. It also performs additional operations which makes it multipurpose very effectively. Additionally, the de-seeder is a multi-functional machine that can de-seed various types of food items such as rice, chilly powdering, potato past, corn de-husking etc. This can be done by changing the drum and teeth.

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