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A LITERATURE REVIEW ON DESIGN AND DEVELOPMENT OF MAIZE THRESHER

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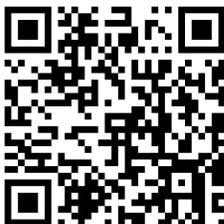
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Abstract: Since there are many maize threshing techniques in India which are used in our life. The main problems with these machines are that they are not affordable to farmers who are having acreage farms and which they do not require these big threshing machines. Many farmers in India are not affordable to use these machines because of their cost. So these farmers resort hand operated tools which gives low output, more damages of kernel threshed from cob, which is monotonous work. Since inventions of maize threshing by machines reduced the hectic work for farmers but these machines never provided the cost saving, accident precautions. These machines are automatic operated, fuel operated. So as man machine system can be established these machine provides simple mechanical design. This literature report is review on human powered machine, the survey proved to system which shows cost effective and functional viable.

Keywords: Design, Fabrication, Cost, Maize threshing

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INTRODUCTION

In today's developing world human being's innovative ideas had taken the world in all direction concerning about the production and safety in industrial establishments. Threshing/Shelling/Corn deseeding is the process of removing the kernels from the cob. It is the process of harvesting because the Maize kernels when harvested are attached to the cob which is hard. Most of the farmers who are having low acreage Maize production meet several difficulties because of high labour expenditure and cost of foreign Maize Threshers. Some machines are of good qualities but more costly where are other somewhat hazardous methods, but it is not, the amount of time and money spend in the invention of device or the sophistication of its operation is important, but its convenience, utility and operational efficiency that are important in considering the device.

Maize is another world's most Versatile seed crop .The techniques used previously were by using the process of rubbing the Maize cobs against one another by hand or by direct removal of kernels with low shelling rate. Another technique used is by hand stuffed with Maize are beaten with wooden fail. This method causes damage to the kernels. Thus, the quest for a satisfactory cheap effective means of detaching the kernels from the cob is important to the small and even medium size farmers in the country. Nowadays a few motorized, PTO operated machines have come into market but the prices of machines are not affordable to peasant farmers. Also some designs of hand operated Sheller's have been designed, which have been developed, which shelled many corn with the help of drum.



Fig 1: corn/maize

The main problem of these drums was wastage of kernels and detaching process was in less percentage and we have to remove the remained one with help of hand, which was more tedious work. Therefore, the aim of this investigation was to built and develops a maize Sheller using locally available material so that the machine will be operated continuously for a longer

period of time with high rate of shelling without causing damage to the kernels and evaluate the performance of developed machine for shelling rate, shelling efficiency, kernel damage and the rate of throughput.

MATERIAL AND METHODS

Amisy Machinery manufactures corn deseeding machine which is made of stainless steel. The machine has the wheels to move easily. The exit parts of the machine have the fan to get out of the waste. It comes with a 2 hp motor. The output of the machine is 600 kg/hr. The cost is approximately Rs 3, 00,000 [1].



Fig 2:- Amisy corn deseeder

Vidhata maize Sheller (as shown in fig) is used for shelling maize. The machine is quite simple in construction and provided with three point linkage and PTO arrangement. It is very easily transportable as it is a tractor operated machine with a 10 hp motor and drum size of 3ft.



Fig 3: Vidhata maize Sheller

The output of the machine is 5000 kg/hr. The maize cobs are put into hopper from where they go into drum in which shelling disk is mounted. Shelling is accomplished by the rotation of disc. Blower and double movable sieve separate the foreign matters from kernels. The cost is approximately Rs 1,20,000. Vidhata manufactures another lower capacity maize Sheller is used for shelling maize. The machine is quite simple in construction and made out of steel angles. It

is easily transportable with a 5 hp motor and drum size of 2.5ft. The output of the machine is 2000 kg/hr. It has a well balanced drum mounted on aligned roller bearing. Fan is provided to clean small dust & other foreign particles. The cost is approximately Rs 72,000 [2].

Working Principle of the of the hand operated maize Sheller

The uniqueness of this design is that it works on a different principle of threshing. As compared to other designs which work on the principle of impact force, this design works on the principle of abrasion; an application of force tangentially on a surface. The machine is to be operated by applying force to rotate the crank handle. Motion of the handle provides an angular velocity that is translated to the toothed gearing system. The driven gear is fixed on the primary shaft hence the resultant velocity of the driven gear generates power on this shaft. As the shaft rotates, the flywheel mounted on its far end provided an angular momentum which adds more power to that generated along the length of the shaft. This total power is transmitted to the secondary shaft via the chain drive hence providing rotary motion of the beater discs which pull and shell the maize cobs by friction and shearing action against the spiked cast iron projections on either side of the thresher bar. The empty cobs will pass out through the cobs outlet opening and are thrown out by the force of rotation of the Shelling discs, and then grain will spread through the grain outlet (collector and port)



Fig 6: Cob master maize shell

RESULT AND DISCUSSION

Proposed approach:

The Pedal Operated Energized Flywheel Motor has been adopted for many design of rural Applications in the last two decades In recent past a pedal powered process machines has been developed for wood turning (Modak and Bapat, 1993), washing (Dhakate,1995), brick making (Modak and Moghe, 1998). The main objective to design and develop a machine, which uses the Pedal, operated energized flywheel motor as an energy source, consisting of a bicycle mechanism, use of non-conventional energy as source Non availability of power in Interior areas and large scale unemployment of semi-skilled worker. In the context of the present

condition in India of Power shortage and exhaustion of coal reserves and unemployment, it is felt that “Pedal Operated Maize Thresher” for Maize Threshing is very necessary. This machine is environment friendly *i.e.* non-pollutant. It will bring innovation and mechanization in agricultural engineering. Unskilled women may also get employment. Development of such energy source which has tremendous utility in energizing many rural based process machines in places where reliability of availability of electric energy is much low .The average work rate of a Any manufacturing process requiring more than 75W and which can be operated intermittently without affecting end product can also be man powered. Such man powered manufacturing process can be based on the following concept. In this processes a flywheel is used as a source of power. Manpower is used to energize the flywheel at an energy input rate, which is convenient for a man. After maximum possible energy is stored in flywheel it is supplied through suitable drive (Gupta, 1997) and gearing system to a shaft, which operates the process unit. The flywheel will decelerate at a rate dependent on load torque. Larger the resisting torque larger will be the deceleration. Thus theoretical a load torque of even infinite magnitude could be overturn by this man-flywheel system. Pedal driven Maize Thresher operates on the basis of above principle. If such machine is developed it will be great help to farmers of rural area because it does not need conventional energy. It is environment friendly machine. [4][5][6].

Proposed Bill of Engineering Measurement and Evaluation

For cost evaluation purposes, the following table presents a BEME for the cost list of material of this project modification and possible construction or fabrication of this design’s Pedal Operated Maize Threshing Machine.

Table 1: Bill of Engineering Measurement

S/N Item	Description	Unit	Rupees/-
1	L-shape beams of iron	7	4000
2	Chain drives	1	1000
3	Big/small sprockets	2	1000
4	Bicycle gears	1	1500
5	Flywheel	1	1000
6	Threshing unit	1	3500
7	Seating chair	1	500
8	Handle	1	500
9	Other		2000
	Total		15000/-

Although the cost of fabrication of this proposed design (standing at 15000 Rs) is less than the cost of purchase of above maize shellers described earlier, the ease of operation of the machine at an average torque presents an added advantage in terms of the Cumbersomeness and fatigue that come along with the above named Sheller's. The force input Capacity to initiate the threshing process is also very low at an average speed such that both Male and female rural farmers can operate the machine.

CONCLUSION

The Threshing Machine has been proposed for designed, developed and fabricated keeping in mind the constraints and requirements of the Indian farmers. Self-reliance is the major drive of development and vibrant economy. This proposed machine has been designed to be fabricated with the use of locally available materials. The machine is simple, less bulky and the ergonomic considerations in the design would allow for its comfortable use in a sitting posture for it can easily be operated by either male or female. The development made in these machines provides safety from accidents and makes good use for its portability.

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