Assesment of Maize Thresher For Rural Dwellers By Human Powered Flywheel Motor Concept.

Praveen Kiran Mali*[1], Dr. C. N. Sakhale[2], Devendra O. Rapelli[3]

1. *Assistant professor, Department of Mechanical engineering, G H Raisoni College of engineering, Pune University.*
2. *Associate professor, Department of Mechanical engineering, Priyadarshini College of engineering, Nagpur.*
3. *Assistant professor, Head of Department, Gurusai polytechnic Chandrapur.*

ABSTRACT
The development of any existing technology requires an exploration regarding its history. In different ages human always tried to develop new methods, new technology for the up gradation of living style. Through the exhaustive literature survey and study it is found that the maize was extensively used worldwide. In developing world, maize threshing is done by various PTO operated machines, but in rural areas the farmers who lack in financial condition cannot afford this machine .so they use various hectic process which leads to monotonous work. . The literature says that the maize was widely used since ancient times and spread all over the world. In modern historic period threshing was accomplished by wooden threshers. But now the era has changed process became automatic and the conventional process is carried out by the present maize threshers. On the other side of machines requires constant electricity as an energy source which is impossible because it is found that electricity in India is a major problem in rural areas keeping this as an epic center the present work is framed.

KEYWORDS: - Design, fabrication, Cost, maize threshing

INTRODUCTION
Maize is one of the most important staple crops in the world. In India, maize is inferior grain which is used both as food and fodder. Its grains provide food and are used for obtaining starch and glucose. Its stalk is fed to cattle. There have been large variations in the production of maize in India since independence. For threshing various types of threshers are available in market. This thresher uses the energy of electricity. But in rural and remote areas the scarcity of electricity generally found in day to day life. However on the other side the running cost and the initial cost of existing thresher are so high that poor person who has the less then the acreage farms cannot afford it. In this new concept electricity is not needed and instead of two people only one person can do the work and acquire good quantity of production without any difficulty .the production cost is also less for this machine. The new machine is based on human powered flywheel motor concept is used. To accomplish this new idea the present work is well carried out which is under.Effects have been made to overcome the limitation observed in the traditional method of threshing. The common feature of this method of threshing mentioned above is that the diameter between the threshing prongs is fixed which limit the size of the maize that the threshing can accommodate. This modification process of threshing which operate pedaled is developed so that it can

thresh different cobs of the maize at the same time. This is accomplished by producing a thresher with an adjustable threshing unit (Adams J.M. 1982).

MATERIAL AND METHODS:

The manufacturing process used in the fabrication of Human Powered Maize threshing machine is such that the total cost of fabrication is low and also one that can make use of the available materials. The manufacturing process involved in this work includes, joining of metal parts by welding, cutting using hacksaw and hand cutting machine. Each component of the machine is fabricated separately before they are joined or welded together as the case may be. The following are the procedure of fabrication of each component of the machine and the final assembly.

MOTHER BODY/ FRAME

Fig 2: frame of actual machine

Mother body and main drum frame is made from 15 m l shaped pipe of 5 cm x 5cm cut to the following dimensions

1. Four l shaped bars were cut to make the frame.
2. Two straight bars were cut to join the flywheel shaft.
3. 3 cover plates for prevention of accidents.
4. 4 bars for bottom support.
5. Manufacturing process
6.

Sr. No.	Operation	Machine
1	Cutting of angle according to size	Power hacksaw machine
2	Drilling on the angles	Power Drill Machine
3	Welding of angles	Welding machine

Table 5.1 Manufacturing Process for Frames

THRESHING UNIT

The threshing unit is made up casting procedure having 19cm diameter and with spiked disc connected to shaft of processing unit. It has adjustable screw for different types of shapes of maize cob. And an outlet for easily segregation of threshed cobs.

SHAFT

Sr. No.	Operation	Machine
	Cutting of circular rod according to size.	Power hacksaw machine
	Turning of shaft according to specified data	Lathe machine

Figure 5.7 Shaft **Table 5.2 Manufacturing Process for Shaft**

The shaft of machine carries the sprocket, gears that receive power from pedaling through chain drive, it supports threshing unit. Three shaft having same diameter and same length required where as one shaft having larger diameter required on which flywheel mounted, 25 and 30 mm circular rod cut to the following dimensions.
Three rods lengths of 43cm from 2.5cm diameter MS rod. One rod length of 43cm from 3cm diameter MS rod.36 cm long rod of from 2.5cm diameter MS rod

SPUR GEARS

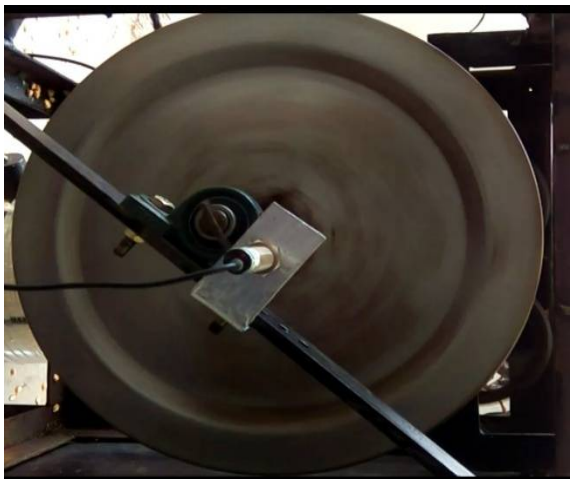
Sr. No.	Operation	Machine
	Facing turning, drilling of gear blank according to specification	Lathe machine
	Mounting gear blank on milling machine and indexing according to number of teeth required	Milling machine
	Teeth cutting	Milling machine

Fig : Spur Gear and Pinion **Table 5.3 Manufacturing Process for Gears and Pinion**

FLYWHEEL AND BEARING

The bearing and flywheel as a results of the fact that they are readings available in market and the relative high cost of fabricating a new are, they are purchased from the market.

- Flywheel with approximately 20kg
- Six bearing of 25mm diameter.



BICYCLE FRAME

Weld the bicycle frame in place, lining up the sprocket so the chain will run straight. Old bicycle frame can be used to fabricate machine.

FIG 5.9: FLYWHEEL

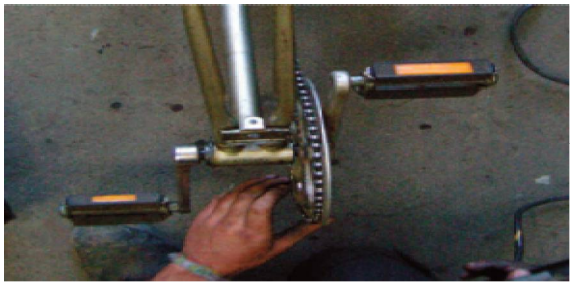


Figure 5: Bicycle Frame and sprocket

The fabricated model is developed after assembling all above components. It operates on the human power and bill of material used in machine include in table which include component used, its material and quantities used.

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.

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/-

Table 1: Bill of Engineering Measurement

Although the cost for fabrication of this proposed design (standing at15000 rs) is less than the cost of purchase of 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 Shellers. 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.

CALCULATIONS:
CHAIN DRIVE DESIGN:

1. Design Power, P_d

$P_d = P_R * K_L \ldots K_L =$ 1.4 (for heavy shock, 10 hrs day)[16]

$P_d =$ 0.5 *1.4 = 0.7 hp = 522.2 watts = 0.5222 KW

2. Find pitch circle diameter

PCD of bigger sprocket

Dg = $\frac{\text{pitch}}{\sin(\frac{180}{\text{Tg}})} = \frac{12.7}{\sin(\frac{180}{48})}$ =178.02 mm

$T_g = T_p * \frac{N_p}{N_g}$ = 16 *266.4/96.87 = 44

3. Roller chain dimension

Find dimension of both sprocket

1. Roller diameter = d_r = 5/8 * P = 7.93 mm
2. Chain width = W= 5/8 *P = 7.93mm
3. Pin diameter =d_p = 5/16 * P = 3.96mm
4. Thickness of link plate = 1/8 * P = 1.58mm
5. Maximum height of pin links plates,

.

= Hp = 0.82*P = 10.414mm

6. Maximum height of roller link plate,
   = Hp = 0.95* P =12.0665mm

4. Standard roller chain sprocket dimension

1. Width of sprocket = t_O ,For single strand chain
   t_O = 0.58p – 0.15 = 7.216 mm
2. Transverse pitch for multiple strands chain , A(mm)

= 1.1525 * p = 14.63mm

3. Corner relief= e = 0.125 * P =1.587mm
4. Chamfer radius = r=0.54 * P=6.85 mm
5. Bottom diameter
   i) $D_r = D_p - 0.625\,p$
   = 71.66mm

FLYWHEEL DESIGN:

Calculate the mass of flywheel:

7200*0.051*0.035*3.14*0.480 = 19.38 kg =Approx 20 kg

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.

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Praveen Kiran Mali: author, presently he is student of M.tech (M.E.D.) in mechanical engineering design in Priyadarshini College of engineering Nagpur. He has work experience in automobile industry and worked in PRICOL LTD PUNE in production department. He has designed fixtures for Mahindra & Mahindra cluster. He has published many papers in international journal and conferences. He is also member of bodies like ISTE.

Dr. Chandrashekhar N. Sakhale: Co-author, presently he is working as Associate professor and Co-ordinator of Ph.D and M.Tech. (MED) in Mechanical Engineering Department, Priyadarshini College of Engineering, and Nagpur. He has completed his Ph.D in Engg. & Tech. from Nagpur University. His specialization is in Mechanical Engg. Design. He has published 50 papers in International Journal and Conferences. He received young delegate award of $500 in 13th World Congress of IFToMM at Guanjuato, Mexico. He also received three Governments funding of Rs. 30 Lacs under RPS scheme from AICTE, New Delhi. He is a member of various bodies like AMM, ISTE, ISHRAE, ISB. He also published books on "Analysis of Automotive Driveline System using Finite Element Approach", LAP Lambert Academic Publishing, and Germany. He is a Member and working Chairmen of Board of Studies Aeronautical Engineering R.T.M. Nagpur University, Nagpur. He had also worked as Head of Aeronautical Engg. Department.