# Pedal Operator Sugarcane Juice Extractor Machine

Dr. Neerajkumar Wayzode, Atharva Dubey, Sanket Ramteke, Deepak Lilhare, Rohit Dhone, Aishwarya Sahare

**Abstract**

The milling of sugarcane into sugarcane juice is a critical first step in the process. Currently available sugarcane juice extractors need the use of high-energy, complex mills that are powered manually. Small-scale and rural farmers in Nigeria who turn sugarcane juice into ethanol, brown sugar, and other goods cannot afford them. Small and micro scale farmers, as well as juice processors, are the intended beneficiaries of this study's efforts to develop, fabricate, and evaluate the performance of a sugarcane juice extraction equipment on a smaller size. The extraction unit, pulley, gearbox belts, bearings and frame were all built using locally sourced, cost-effective components, and the machine was driven by a 5 hp single-phase electric motor. The machine was tested with two types of sugarcane, and the findings showed that on average, the machine extracted 64.97 and 56.90% of sugar from the cane. The equipment is useful for extracting sugarcane juice on a modest scale in both rural and urban areas. This work entails developing a device for extracting sugarcane juice. The operator of a sugarcane juice machine of the past had to rely solely on his hands, leaving his legs dormant while he stood to do his work. Therefore, we update the sugarcane mill with some modern features. Machine parts include a pulley, a v-belt, a flywheel, a rotor made of cast iron, bearings, a pedal, and a body frame. The sugarcane machine has been modified so that the operator can use their legs to pedal instead of their hands. By using a flywheel to ensure continuous rotation, we are able to solve the problem of vibration and shocks. Sugarcane milling is an essential and required unit process for producing high-quality sugarcane juice. The present sugarcane juice extractor available on the market is energy intensive and makes use of a complex mechanically powered extraction process. To make matters worse, some of the juice extractors on the market are too expensive for the small-scale, rural entrepreneurs who wish to open a sugarcane juice business. Miniature machines powered by a flywheel or pedals are used to crush sugarcane for sugarcane juice. This device has to be portable enough to be transported with little effort. There is no requirement for electricity to power this device. Crushing sugarcane using this equipment requires just a single worker. This equipment is less expensive to purchase in rural areas. The pedal makes it simple to provide additional loads to crush the sugarcane, thus a sugarcane juice machine that is powered by a flywheel and human effort may reduce the amount of time spent cutting cane.

This machine can be used by anybody without the requirement for special training or a substantial quantity of power. Small farm sizes and farm dispersion due to load ownership via inheritance are issues in sugarcane processing. Inadequate methods and spaces for preserving harvested canes and extracted juice before processing them into sugar

**Keywords: Pulley, V-Belt, Flywheel, Cast Iron Rotor, Bearings And Pedal With Body Frame**

## CHAPTER - I
## INTRODUCTION
### 1.1 INTRODUCTION

As we know now a days sugar cane juice is most important feeding of human body. Human also like this juice as food supplement. You can see the road side stall of sugarcane juice machine that mix with their hands. which machine having roller and gear mechanism and it is operated by hand and sometime having motor for the extraction of juice purpose. The milling of sugarcane is a unit operation that is crucial and necessary for making sugarcane juice available for various application. The currently available sugarcane juice extractor require high energy and application of more sophisticated driven mechanically. Some of the available juice extractors are very costly and requires more effort for extraction of juice so these are out of reach of small scale and rural area people which want to start up their own sugarcane juice shop.

Flywheel and pedal operated sugarcane juice machine is compact devices to crush sugarcane. This machine has to be easily moved from one place to another place. For this machine no need of any electrical power to drive the machine. On this machine one person can easily crush sugarcane. The cost of this machine is more affordable in rural area. A flywheel and pedal operated sugarcane juice machine has to take less time to cut the sugarcane because of the pedal it easy to give more loads to crush the sugarcane. For this machine no need of skilled person to operate the machine and no need to require large amount of electricity to run machine. The problem associated with processing of sugarcane include small size of farms and farm fragmentation as a result of load ownership by inheritance. Poor storage facilities and practice to preserve harvested canes or extracted juice from being refined to sugar (Mello and Harries, 2000, Wegener, 1996). In addition to the above problems using the same carriage capacity medium it will further reduce production cost to transport extracted sugarcane juice from the farm to the factory for refining into sugar than transporting harvested sugarcane to the factory for processing. The major cane processing stages in converting sugarcane to its economic derivatives. It was clearly indicated that processing of sugarcane start with the extraction of juice from sugarcane stalk. several methods of juice extraction were in used. These methods include boiling the cane to extract juice, use of wooden process and application of more sophisticated means driven mechanical or by bullocks. The high power requirements during processing of sugarcane constitutes the major constraint in the development of small scale sugar processing plants. This also explain why natural sugar juice is not generally available. The average power distribution for a medium sized sugar factory powered by electricity or steam turbine at crushing rate of 170 tons per hour. The development of small scale sugarcane juice extractor was there for to meet the needs of small scale farmers who cannot avoid high capacity and complex cane crushers. The main objective of the study work to design and construct a simple mechanical device for extraction of sugarcane juice. the functional performance and economics of operation of the machine were evaluated.

## CHAPTER II

## LITERATURE REVIEW

### 2.1 LITERATURE SURVEY

**1. Name of Title: Modelling & simulation of human powered flywheel Motor for field data in the course of artificial neural Network – a step forward in the**
**Development of Artificial intelligence**
**Name of Author: Lende A, J. P. Modak**
**Name of Journal: International Journal of Research in Engineering and Technology**
**Year of Publication: 2013**

As per geographical survey of India about 65% of human population is living in rural areas where urban resources like electricity, employment accessibility, etc are very deprived. The country is still combating with fundamental needs of every individual. The country with immense population living in villages ought to have research in the areas which focuses and utilizes the available human power. Some Authors of this paper had already developed a pedal operated human powered flywheel motor (HPFM) as an energy source for process units. The various process units tried so far are mostly rural based such as brick making machine (both rectangular and keyed cross sectioned), Low head water lifting, Wood turning, Wood strips cutting, electricity generation etc. This machine system comprises three sub systems namely (i) HPFM (ii) Torsionally Flexible Clutch (TFC) (iii) A Process Unit. Because of utilization of human power as a source of energy, the process units have to face energy fluctuation during its supply. To evaporate this rise and fall effect of the energy, the concept of use of HPFM was introduced. During its operation it had been observed that the productivity has great affection toward the rider and producing enormous effect on quality and quantity of the product. This document takes a step ahead towards the development of a controller which will reduce system differences in the productivity. This paper contributes in development of optimal model through artificial neural network which enables to predict experimental results accurately for seen and unseen data. The paper evaluates ANN modeling technique on HPFM by alteration of various training parameters and selection of most excellent value of that parameter. The mathematical model of which then could be utilized in design of a physical controller

**2. Name of Title: Experimental Data Based Model For Time To Exhaust Flywheel Energy In A Human Powered Flywheel Motor Driven System**
**Having A Novel GearboX**
**Name of Author: V. D. Ghuge , J. P. Modak**
**Name of Journal: IJREAT International Journal of Research in Engineering & Advanced Technology,**
**Year of Publication: 2014**
Use of fossil fuel has increased environmental pollution, which is posing a threat to the environment. So research is going on for harnessing human power because it is one of the resource of renewable energy. This research paper present mathematical modeling of a novel gearbox for the human powered flywheel motor for total time required to exhaust energy stored in a spinning flywheel.

**3. Name of Title: A literature Review On Design and Development of Maize Threasher**
**Name of Author: Prof. Mali P. K, Dr. Sakhale C. N**
**Name of Journal: International Journal of Pure and Applied Research In Engineering and Technology**
**Year of Publication:2015**
Since there are many maize threshing techniques in India which are used in life.rea The problem with these machines are that they are not affordable to farmer who are having acreage farms and which they do not require these big threshing machine. Many farmers in India are not affordable to use this machine because of their cost. So these farmer resort hand operated tools which give low output, more damage of kernel threshold form cob, which is monotonous work. Since inventions of maize threshing by machine reduced the hectic work for farmers but these machines never provided the cost , saving, accident precaution. So as man machine system can be established these machine provide simple mechanical design. This literature report is review on human powered machine, the survey proved to system which shows cost effective and functional viable.

**4. Name of Title: Human Powered Sugarcane Bud Chipping Machine**
**Name of AuthorA.S.Puttewar , Ketan Banayat,Vaibhav Bamnote**
**Name of Journal: International Journal of Advance Research and Innovative Ideas in Education**
**Year of Publication:2016**
Sugarcane is a major crop in the field of agriculture in India. As per survey, sugar output dropped to about 2.2 million tons in fiscal year 2016. As per the ministry of agriculture the production rate from 2014-2015 to fiscal year 2016 has decreased tremendously. Percentage wise it varies 10-15% of overall production in India. India produces 11 to 12 % of sugarcane in the world. Sugar, jiggery etc. are the by products made from sugarcane. A part of sugarcane production is used for the plantation of sugarcane and rest of sugarcane is used for the various purposes. The part of sugarcane used for plantation of sugarcane is known as ‘bud’ or ‘eye of sugarcane’. Sometime it becomes difficult for the people in rural areas to cater to the need of buds for plantation of sugarcane because the bud removal from sugarcane involves difficulties like, more no. of cuts to remove the bud, time required is more, productivity is less, effort required is more as most of the machines available are hand operated and poses various muscular problems in human beings. With a view to overcome all this problems this research aims at developing Human Powered Sugarcane Bud Chipping Machine which will not only improve the productivity but also saves time and effort required for bud removal.

**5. Name of Title: Human Powered Machine**
**Name of Author: Mr. Moghe S.**
**Name of Journal: Global Research and Development Journal for Engineering**
**Year of Publication: 2016**
In the present investigation the operator uses the pedal power to operate the machine and transmit power through crank chain to free wheel to the working unit. This human powers flywheel motor concept provide new era in the human powered agriculture processing, harvesting post harvested operation equipments. considering social. Culture and environmental factor as well as in many rural operations utilizing unskilled worker and in vidharbha region there is more problem of electricity so this kind of HPEM concept is helpful in driving various rural machine. The machine is

economically viable, can be adopted for human powered process unit which could have intermitted operation without effective the end product.

**6. Name of Title: Design And Development Of Sugar Cane Sprout Cutter Machine By Human Powered Flywheel Motor Concept**
**Name of Author: Rahul A. Sonawane , Jagdish R. Waybhase**
**Name of Journal: International Research Journal of Engineering and Technology (IRJET)**
**Year of Publication: 2017**

Sugarcane is a vegetative propagated Crop. In India, for conventional system of sugarcane cultivation, about 6 – 8 tones seed cane is used as planting material. This large mass of planting material poses a great problem in transport, handling and storage of seed cane and undergoes rapid deterioration .One alternative to reduce the mass and improve the quality of seed cane would be to plant excised auxiliary buds of cane stalk, popularly known as bud chips. These bud chips are less bulky, easily transportable and more economical seed material. The bud chip technology holds great promise in rapid multiplication of new cane varieties. The left-over cane can be well utilized for preparing juice or sugar or jiggery. The existing (traditional) tools used for bud chipping of sugar cane are unsafe, messy and need skill and training. But our research in this direction, literature survey, patent search, market survey and concept generation was carried out. Among the different concepts developed, we are using to the best concept was selected based on concept selection strategy. The punch torque tube was swaged to reduce the cross section of the tube. The punch tool was machined using lathe. The prototype was tested and the initial results indicated that equipment is complicated, as required for generating the sugarcane buds as compared traditional tools. In this arrangement we are using crank rocker mechanism and cam follower.

The cutter works in reciprocating motion. The whole equipment is very compact and simple with additional safety measures. Since there are many cutting 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 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 sugar cane, which is monotonous work. Since inventions of sprout cutting by machines reduced the hectic work for farmers but these machines never provided the cost saving, accident precautions. These machines are semi-automatic 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.

**7. Name of Title: Automatic Sugarcane Bud Detection and Cutting Mechanism**
**Name of Author: Pragati V. Jadhav, Sonali S. Surwase**
**Name of Journal: International Research Journal of Engineering and Technology**
**Year of Publication: 2020**

In today's world, the entire requirements are being fulfilled through automatic system. The demand for reducing the wastage of sugarcane. So the search of automatic system is completed by this project. One alternative to reduce the mass and improve the quality of seed for sugarcane would be to plant excised axillaries buds of cane stalk, popularly known as bud detector. This bud detector we can fit in bud chip to detect the bud. These bud detector are less bulky, easily portable and more economical material. The bud detector technology holds great promise in rapid multiplication of new sugarcane varieties. The problem of establishment and initial growth could be addressed by application of appropriate plant growth regulators and essential nutrients

**8. Name of Title: Review On Design And Fabrication Of Sugarcane Bud Chipper**
**Name of Author: Santosh. S. Dabhole, Manoj Pawar**
**Name of Journal: International Research Journal of Modernization in Engineering Technology and Science**
**Year of Publication: 2021**

This necessitates the development of a bud chip machine for sugarcane. Among the various ideas developed, the most effective conception was designed based on idea choice strategy. This new idea involves the use of a hand press cutter machine for the sugarcane that may be used to cut a sugarcane bud. As you utilize the machine, a press manually the handle, when the handle is pressed then with the help of the shaft and spring the cutter is going a downward slide and

cut the sugarcane bud. These buds are less bulky, simple movable and additional economical seed material. The bud chip technology holds great promise in speedy multiplication of recent cane varieties. The left over cane may be well used for making ready for juice or sugar or jaggery.

### 2.2 LITERATURE SUMMARY

1. Traditional sugarcane juice extraction methods are slow and inefficient.
2. Modern machines are efficient but costly and power-dependent.
3. High energy requirements make them unsuitable for rural or small-scale use.
4. Manual machines need more effort and give low juice output.
5. Studies highlight the need for **low-cost, portable, and energy-efficient extractors**.
6. **Pedal and flywheel-operated machines** offer a practical alternative for rural applications.

### 2.3 RESEARCH GAP

1. Existing sugarcane juice extractors are expensive and require electrical or mechanical power.
2. Traditional manual extraction methods are inefficient and physically demanding.
3. Limited research focuses on **low-cost, manually operated machines** suitable for rural users.
4. Current small-scale machines often lack **portability, efficiency, and ease of operation**.
5. There is a need to develop a **flywheel and pedal-operated sugarcane juice extractor** that is affordable, energy-efficient, and simple to use.

## CHAPTER - III
## AIM AND OBJECTIVE

### 3.1 AIM

The basic aim of this project is to reduce the human effort with the help of flywheel and increase the rotation of pulley with the help of pedal stand.

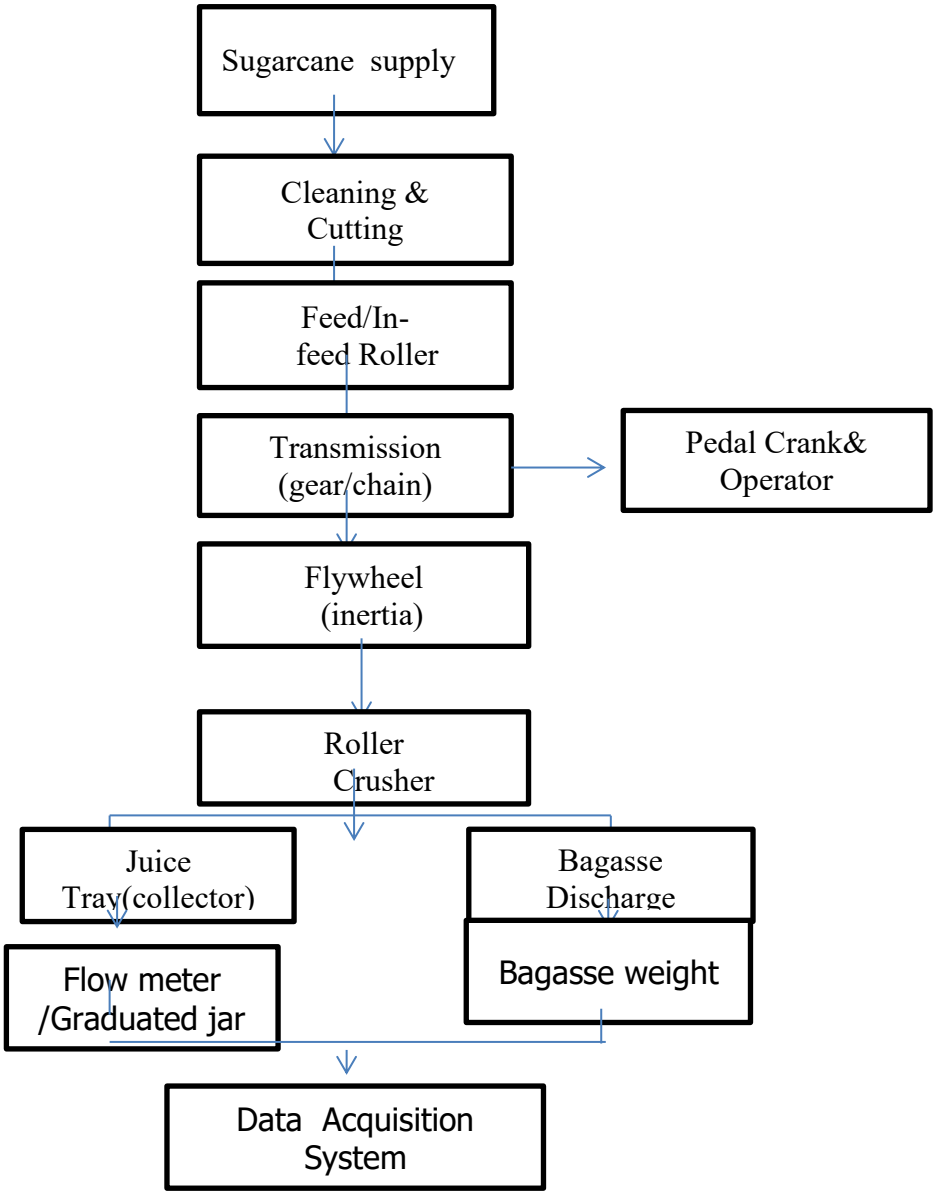
### 3.2 OBJECTIVES

1. To reduce human effort for extraction of juice.
2. To reduce fatigue.
3. To reduce shock and vibrations of machine.
4. To improve the efficiency of machine
5. Reduction of machine use hazards.
6. To improve the aesthetic of the constructed machine

## CHAPTER – IV
## RESEARCH METHODOLOGY

### 4.1 Experimental Block Diagram

The experimental setup consists of a **pedal and flywheel-operated sugarcane juice extractor**, where the operator pedals to drive rollers via a transmission system. Juice is collected in a tray, bagasse is discharged separately, and sensors record data for **yield, efficiency, and energy analysis**.




**4.2 WORKING PRINCIPAL**

The pedal operated sugarcane juice machine works on the principle of reciprocating motion of pedal is converted into rotating motion of Roller to crush The sugarcane for the purpose of extraction of juice.

**Figure.7.1.2: Sugarcane Machine**

A flywheel is mechanical device specially designed to efficiently store rotational energy. Flywheel resist change is rotational speed by the moment of inertia. The amount of energy stored in a flywheel is directly proportional to square of its rotational speed. The way to change the flywheel speed energy by increasing or decreasing the speed of pedal. When we drive the pedal the whole mechanism gets working. When we drive pedal the power of pedal is transmitted to the shaft through sprocket and chain mechanism. At the flywheel its also gets and pulleys is mounted on the same shaft so its also gets rotated and the power is transmitted from one to the other pulley through v-belt and then the threading roller rotates the fresh sugarcane is then passes through the rotating roller and juice gets extracted in one pass.

## CHAPTER – V
## DESIGN CALUCATION AND ITS PARTS

### 5.1 PARTS OR COMPONENTS REQUIRED

1. Threading Roller
2. Roller Bearing
3. Pedestal Bearing
4. Shaft
5. Pulley
6. V-Belt
7. Flywheel
8. Gear

### 5.2 DESIGN CALUCATION

We have ,

1) Mass of the flywheel(m) = 36 kg
2) Diameter of the flywheel(d) = 166 mm
3) Radius of gyration = 66.5mm
4) Speed of flywheel = 60mm

We known that,

i) Force = mass x acceleration due to gravity
= m x g
= 36 x 9.81
F = 353.16N

ii) Torque = force x radius of flywheel
= 353.16 x 133
T = 46970.29N-mm

iii) Power = $\frac{2\pi NT}{60}$
= $\frac{2x\pi\times60\times46.97}{60}$
P = 295.12 watt

iv) Angular speed of flywheel
W = $\frac{2\pi N}{60}$
= $\frac{2\pi N}{60}$
W=6.283rad/sec

v) Moment of inertia of flywheel

$I = mxk^2$

$= 36 \times 67$ N.m

$I = 161.604 \times 10^3 kg.mm^2$

vi) The energy stored in flywheel

We known that the K.E of flywheel

$E = \frac{1}{2} x I x W^2$

$= \frac{1}{2} x 161.604 \times 10^3 \times 6.283^2$

$E = 507.67 \times 10^3$ N-m

Therefore the total energy of flywheel

$E = 507.67 \times 10^3$ N-m

## CHAPTER – VI
## CONSTRUCTION AND FABRICATION

### 6.1 CONSTRUCTION

**1. Threading Roller :**

Threading roller is used to extracting of juice from sugarcane. The sharpening teeth of thread roller indicates the quantity of juice extraction form sugarcane .

The fresh sugarcane is passing through the two threading roller for the juice extraction process .

**Figure 6.1.1. Threading Roller**

Rolling Inc. produces rolled threads on a wide variety of parts. Often, rolled threads are required by design because of their superior tensile, share, and fatigue strength. Other processes remove material to produce third form, but thread rolling display the material with hardened steel dies. These dice typically have a hardness between a range of Rc58-Rc63 and there is a specific set of dies for each thread size and each thread form.

**2. Roller Bearing :**

Roller bearing is also known as roller element bearing are similar to ball bearing in that they are design to carry a load while minimizing the friction. However, roller bearing transit loads using cylinder rolling element, rather than balls, to maintain the separation between the moving parts of bearing.

**Figure 6.1.2 Roller Bearing**

These versatile bearing can contain single or multiple rows of rolling element; multiple rows can significantly improve radial load capacity. Also, the use of different roller shapes can further reduce friction and support both radial and axial loads. While roller bearing can handle higher loads than conventional ball bearings, their application are generally limited to low–speed operation. Many type of roller bearings are self- aligning, and are easily to enable to overcame misalignment and mounting issues- cutting down on maintenance, repair, and labor needs. Roller bearing come in a wide range of shapes and size, and can be customized for specializing situation. Also, the use of flange, cages, and multiple bearing rows and allow for higher performance to meet specific application needs.

**3. Pedestal Bearing :**


**Figure 6.1.3. Pedestal Bearing**

Pedestal bearing are widely used for providing support for a rotating shaft with the help of compatible bearing and various accessories. It is also known as pillow block or Plummer block. It is used for long shafts requiring intermediate support. It facilitates easy assembly and periodically statements of the worm parts. It protects the bearing from the heat contamination. It consists of unique design so that the pedestal provides complete rigidity. All components of the pedestal bearing assemble to single unit and coupled to a rotating shaft for intermediate support. Finally the component has fabricated by using CNC milling.
Pedestal bearing describe a form of housing for bearing unit which belonging to the roller bearing group. Roller bearing are bearings, which due to their rolling housing reduce the frictional resistance and are mostly used for fixing axles and shaft. They consist of following components: inner ring, outer ring and the rolling element. Bearing units are simple way of mounting shaft and are offer used in special machines and in agricultural machines.

**4. Shaft :**

**Figure 6.1.4. Shaft**

Shaft is the common and important machine element. It is rotating member, in general has, has a circular cross section and is used transmit power. The shaft may be hollow and solid. The shaft is support on bearings and it rotates asset of gears and pulleys for the purpose of power transmission. The shaft is generally acted upon by bending movement, torsion and axial force. Design of shaft of primarily involves in determining stresses at critical point in the shaft that is arising due to loading. Other two similar forms form of a shaft are axle and spindle. Axle is a non-rotating member used for supporting rotating wheels etc. and do not transmit ant torque. Spindle is simply defined as a short shaft.

**5. Pulley :**

**Figure.6.1.5. Pulley**

A pulley is a wheel on an axle or shaft that is design to support movement and change of direction of a taut cable or belt, or transfer of power between the shaft and cable or belt. In the case of a pulley support by a flame or shell that does not transfer power to a shaft, but I used to guide the cable or a exert a force, the supporting shell is called a block, and the pulley may be called as sleeve. A pulley may have a groove or grooves between a flanges around its circumference to locate the cable or belt. The drive element of pulley system can be rope , cable, belt, or a chain.

**6. V-Belt :**

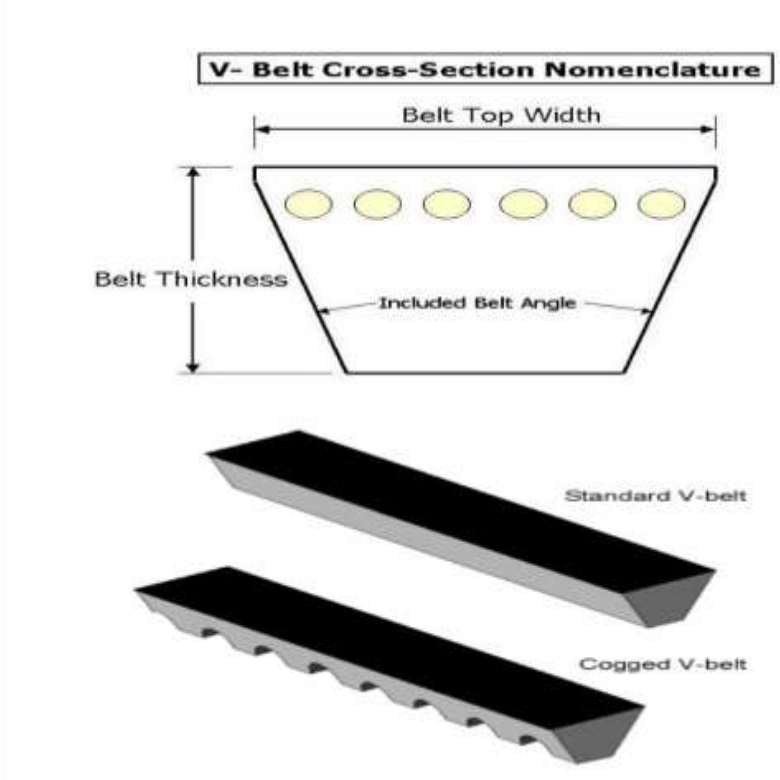



**Figure.6.1.6. V-Belt**

V-belt pulleys (also called v belt sheaves) are device which transmit power between axles by the use of a v-belt, a mechanical linkage with a trapezoidal cross-section. Together these device offer a high speed power transmission solution that is resistance to slipping and alignment.

V-belt pulleys are solely used for transmitting power between two parallel axles. The most notable difference between a v-belt pulley and other types of pulleys (round belt, flat etc) would be the geometry of the grooves or grooves located around the circumference of the pulley; these groove guide and grain the traction on v-belt. The accompanying video offers a comprehensive overview of some v-belt basics, as well as their advantages and variations.

**7. Flywheel :**

**Figure.6.1.7. Flywheel**

The main function of flywheel is to smoothen out variation in the speed of shaft caused by the torque fluctuation. If the source of driving torque of load torque is fluctuation in nature, then the flywheel is usually called for many machine have load patterns cause the torque time function to vary over the cycle. IC engine with one or two cylinder are typical example. Piston compressor, piston presses and rock crush etc. are the other system that have flywheel.

**8. Gear :**

**Figure 6.1.8. Gear**

A gear or cogwheel is a rotating machine part having cut teeth, or in the case of cogwheel, inserted teeth (called cogs), which mesh with another toothed part to transmit torque, geared devices can change the speed, torque, and direction of a power source. Gear almost always produce a change in torque, creating a mechanical advantages, through their gear ratio, and thus may be considered a simple machine. The teeth on the two meshing gear all have the same shape. Two or more meshing gear, working in sequence, are called a gear train or a transmission. A gear can mesh with a linear tooth part, called a rack, producing a translation instead of revolution.

The gear in a transmission are analogous to the wheels in a crossed, belt pulleys system. An advantages of gear is that teeth of gear prevent slippage. When two gear mesh, if one gear is gears is bigger than the other, a mechanical advantage is produced, with the rotational speeds, and the torque of the two gear differing in proportion to their diameter.

### 6.2 FABRICATION

In the fabrication process we have use the following types of machine for performing the various types of operation.

#### 6.2.1 CUTTING

Cutting process work by causing fracture of the material that is proceed usually, the portion that is fracture away is in small sized pieces, called chips. Common cutting processes include sawing, shaping, broaching, drilling, grinding, turning, and milling. Although the actual machine, tool and processes for cutting look very different from each other basic mechanism for causing the fracture can be understood by just a simple model called for orthogonal cutting.

**Figure.6.2.1: Cutting**

#### 6.2.2 WELDING

A welding is fabrication or sculptural process that joints materials, usually metals or thermoplastics by using high to melt the part together and allowing them to cool causing fusion. Welding is distinct from lower temperature metal joining techniques such as brazing and soldering, which do not melt the base metal.

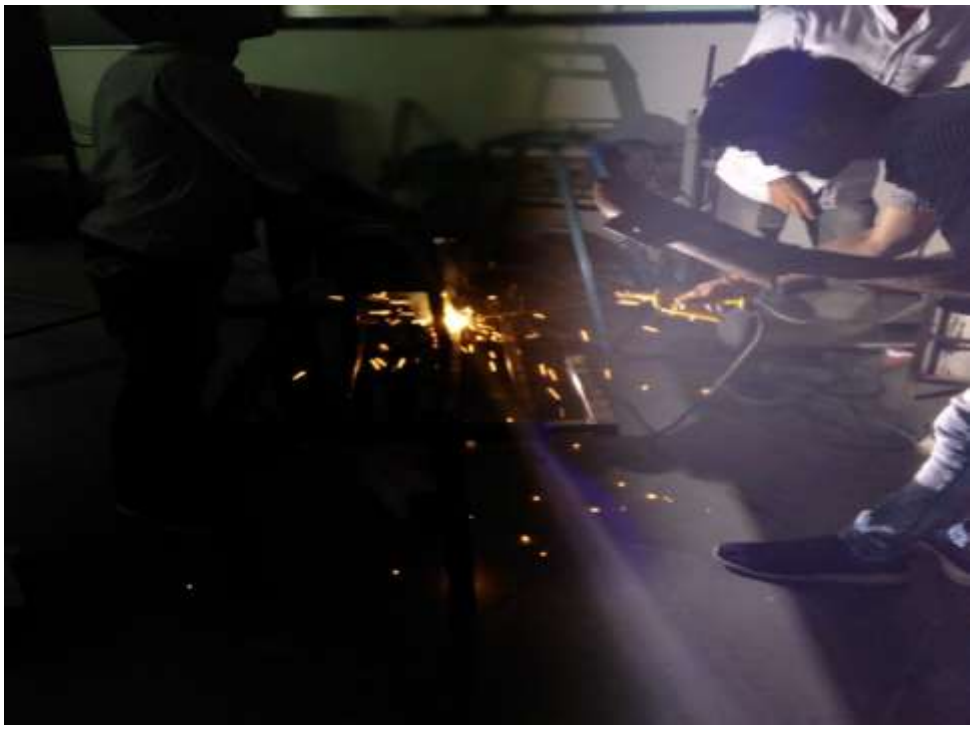


**Figure.6.2.2 Welding**

In addition to melting the base metal, a filler material is typically added the joint to form a pool of molten material that cools to form a joint that, the based on weld configuration (butt, full penetration, fillet, etc.), can be stronger than the base materials ( parent metal). Pressure may also be used in conjunction with heat, or by itself, to produce a weld, welding also require a form shielded to protect the filler metal or melted metal from being contaminated or oxidized.

Welding is hazardous under taking and percussion are require to avoid burns, electric shock, vision damage inhalation of poisonous gases and fumes, and exposure to intense ultraviolet radiations. Welding method, as well as semi automatic and automatic processes such as gas metal are welding , submerged pulse welding, flux cored are welding and electron leg welding.

### 6.2.3 DRILLING

Drilling is a cutting process that use a drill bit to cut a hole of circular cross-section in solid materials. The drill bit is usually a rotate cutting tool, often multipoint. The bit is pressed against the work piece and rotates at the rate from hundreds to thousand of revolution per minutes. Thus forces the cutting edge against work piece, cutting off chip from the hole as it is drill. In the bench drill machine, the hole is usually not made through a circular cutting motion.

**Figure. 6.2.3 Drilling**

Through the bit is usually rotated. Instead, firstly at the work piece where we want the hole so there hammered the punch and the hole is usually press the drill bit into the hole with slowly repeated movement. The drill bit can be performed downward direction till the drill bit outside the hole. This drill used for the work piece, it may be either horizontal or vertical is called as the bench drill machine.

## CHAPTER – VII

## TESTING OR DEMONSTRATION

| Sr. No. | Cane stalk size (inch) | Moisture content (%) | Extracted juice (ml) | Duration (min or sec) | Peripheral speed (m/s) |
|---|---|---|---|---|---|
| 1 | 25 | 78.8 | 550 | 41.47 (sec) | 0.25 |
| 2 | 3 | 80.4 | 910 | 1.30 (min) | 0.25 |
| 3 | 40 | 80.4 | 1500 | 2.39 (min) | 0.28 |
| 4 | 50 | 80.1 | 2500 | 2.41 (min) | 0.3 |
| 5 | 55 | 82.3 | 4000 | 2.58 (min) | 0.36 |

**Table 8.1 : Testing or Demonstration**

## CHAPTER – VIII

## ADVANTAGE AND LIMITATION

### 10.1 ADVANTAGE

1) Less amount of human effort.
2) It is easy to use.
3) It is simple in construction and less mechanical components.
4) Low in cost.
5) It is Eco-friendly and safe for user.
6) Less maintenance and labor cost.

### 10.2 LIMITATION

1. Suitable only for **small-scale or manual operation**.
2. Juice extraction depends on **operator strength and endurance**.
3. Limited **roller size and gap adjustment** may reduce efficiency for thick stalks.
4. Requires **regular maintenance** of gears, bearings, and pedals.
5. **Not fully automated**; manual feeding and pedaling are needed.

## CHAPTER – IX
## RESULT AND CONCLUSION

| Sr. No. | Cane Stalk Size (inch) | Moisture Content (%) | Extracted Juice (ml) | Duration | Peripheral Speed ( m/s) |
|---|---|---|---|---|---|
| 1 | 25 | 78.8 | 550 | 41.47 sec. | 0.25 |
| 2 | 30 | 80.4 | 910 | 1.30 min. | 0.25 |
| 3 | 40 | 80.4 | 1500 | 2.39 min. | 0.28 |

**Table 10.1 : Result and Conclusion**

It can observed that optimum performance cannot be sustained over a long processing period because of the observed bluntness of threading roller over a time of use and this reduce the extraction efficiency of the machine

## CHAPTER X
## FUTURE SCOPE

The further work of machine is to be carried out by arranging crushing chamber to enclose the crushing process of sugarcane. Arrangement of seat also improve the performance of machine and other required processing factors on extraction of juice from cane fiber in compression chamber.
The juice extraction efficiency is mainly depend upon the threading roller and clearance between them so it can be improve by the arrangement of good quality threading roller.

## CHAPTER - XI
## REFERENCE

1. Prof. Mali P. K, Dr. Sakhale C. N, " A literature Review On Design and Development of Maize Threasher" International Journal of Pure and Applied Research In Engineering and Technology (IJPRET) page no.9-14, Vol. 3.

2. Mr. A. Gopi Chand, Prof. A.V.N.L. Sharma, "Design Of Spur Gear and Its Tooth Profile" International Journal of Engineering Research and Applications (IJERA) page no. 820-827, Vol. 2.

3. De. J. P. Modak, Prof. A. K. Pitale, " Update In Concept of Flywheel Motor" International Journal of Engineering Science and Advanced Technology (IJESAT) page no.282-290, Vol. 3.

4. R. M. Nagaraj, "Suitability Of Composite Material For Flywheel Analysis" International Journal Of Modern Engineering Research (IJMER) Vol. 4.

5. Dr. J. P. Modak, Prof. H. S. Bhatkulkar,"Design and Development of Nursery Fertilizer Mixer Energised By Human wered Flywheel Motor" International Journal For Research In Engineering Science and Technology (IJREST) Vol. 1.

6. Mr. Nikhil S. Pisal, Prof. V. J. Khot, "Design and Development of Motorcycle Chain Links By Using C.A.E. Software" International Journal of Scientific Research and Management Studies (IJSRMS) page no. 175-183, Vol. 2.

7. Mr. Enrico Ciulli, Mr. Bruno Piccigallo, "Experimental Study of Engine, Cam Followers".

8. Prof. Ningappa H. Juri, Prof. Reddy Naik J, "Design and Development of Sugar Cane But Chipping Machine" International Journal of Research In Aeronautical and Mechanical Engineering (IJRAME) page no.97-110, Vol. 3.

9. Prof. Dipak U Adhapure, Kolekar, Navnath, Gadhave (2019), "Design Development & Fabrication of Sugarcane Bud Cutting Machine", IJSRD, Volume 6, Issue 12.

10. Prof. Mahesh Bhandare,ChavanAkshay, DhaigudeRajkumar, Gaikwad Ganesh, Jadhav Sunil (2017), "Sugarcane bud cutting machine", IERJ, Volume 2, Issue 8, pp2814−2816.

**APPENDIX "I"**

**PLAGARISM REPORT**

**APPENDIX "II"**

**COST OF PROJECT TABLE**

The costing is depend on the over all parameter of machine. Like the material cost (flywheel, gear, bearing etc.) other parts of machine (v- belt, frame).

| SR.NO. | ITEMS | QUANTITY | COST |
|---|---|---|---|
| 1 | Pulley | 2 | 650 |
| 2 | Flywheel | 1 | 1800 |
| 3 | Pedestal bearing | 4 | 2200 |
| 4 | Bearing | 4 | 2200 |
| 5 | Gear | 2 | 1160 |
| 6 | Roller | 2 | 2200 |
| 7 | Belt | 1 | 345 |
| 8 | Frame | ……. | 3500 |
| 9 | Shaft | 1 | 1300 |
| **TO** | **TAL** | **15255** | |

**Table : Cost Of Project**