MAJOR PROJECT REPORT

on

DESIGN, ANALYSIS AND FABRICATION OF BALL MILL FOR NANO COMPOST

An Major-project report submitted in partial fulfilment of the requirements for the award of the degree of

Bachelor of Technology in Mechanical Engineering

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(UGC AUTONOMOUS)

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CERTIFICATE

This is to certify that the thesis / dissertation entitled **DESIGN, ANALYSIS AND FABRICATION OF BALL MILL FOR NANO COMPOST** that is being submitted by **NAINI JAGADEESH (21675A03331), POTHU NAVEEN KUMAR(21675A0336), GUDIKANDULA RAMAKRISHNA (21675A03441), MUNAGAPATI THARUN (21675A0344) MADASI (21675A0347)** in partial fulfilment for the award of Bachelor of Technology in Mechanical Engineering to the J.B.INSTITUTE OF ENGINEERING & TECHNOLOGY(AUTONOMOUS) is a record of bonafide work carried out by him / her under our guidance and supervision. The results embodied in this thesis are original work and have not been submitted to any other University or Institute for the award of any degreeor diploma.

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EXTERNAL EXAMINER

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ABSTRACT

Most of people get some diseases like nervous system problem cancer at age of 40%of their life time. Due to take of food which are produced by chemicals . by using of chemicals, the soil polluted. It can be affect the delicate balance of the earth ecosystem. The chemicals like mercury, cadmium and lead can affect soil quality and reduce the number of micro-organisms.by using organic product. We can increase the soil fertility with organic compost. The organic compost increase nitrates, copper,zinc, and nitrogen to the soil.

The compost maker is designed and analized using ansys (work bench)

The input material such as cow dung, green leaves, kitchen waste are put in the compost maker the humidity and temperature are automatically controlled to designed temperature by the compost maker after 48 hours sample were taken out and then put in the ball mill.

The compost obtained from the ball mill is organic compost which is having nano particles. The nano compost is use full for efficient crop   fertilization and ecological solution it reals nutrients very slow for longer period that beneficial to crop

LIST OF FIGURES

LIST OF TABLES

TABLE OF CONTENTS

CHAPTER 1

1.1 INTRODUCTION

Most of people get some diseases like nervous system problem, cancer at age of 40% of their life time. Due to take of food which are produced by chemicals.by using of chemical, the soil polluted.it can be affect the delicate balance of the earth ecosystem. The chemicals like cadmium, mercury and lead can affect the soil quality and reduce the number of micro organisms. To avoid this, we use organic product to increase the soil fertility. The organic compost increases nitrates, copper, zinc and nitrogen to the soil.

Compost is a mixture of ingredients used as plant fertilizer and to improve soil's physical, chemical and biological properties. It is commonly prepared by decomposing plant, food waste, recycling organic materials. The resulting mixture is rich in plant nutrients and beneficial organisms, such as bacteria, protozoa, nematodes and fungi. Compost improves soil fertility in gardens, landscaping, horticulture, urban agriculture, and organic farming, reducing dependency on commercial chemical fertilizers. The benefits of compost include providing nutrients to crops as fertilizer, acting as a soil conditioner, increasing the humus or humic acid contents of the soil, and introducing beneficial microbes that help to suppress pathogens in the soil and reduce soil- borne diseases.

At the simplest level, composting requires gathering a mix of 'greens' (green waste) Greens are materials rich in nitrogen such as leaves, grass, and food scraps and other vegetable waste.The materials break down into humus in a process taking months Composting can be a multi-step, closely monitored process with measured inputs of water, air, and carbon- and nitrogen-rich materials. The decomposition process is aided by shredding the plant matter, adding water, and ensuring proper aeration by regularly turning the mixture in a process using open piles or "windrows."[1][3] Fungi, earthworms, and other detritivores further break up the organic material. Aerobic bacteria and fungi manage the chemical process by converting the inputs into heat, carbon dioxide, and ammonium.

There are so many compost makers are available in the market like in-vessel composting, aerated static pile compost maker, windrow composting, and other systems at household level

Hügelkultur (raised garden beds or mounds), composting toilets. These are the compost makers available in the market. But, they take too much time for making compost and some of the compost makers are too expensive that some people cannot afford.

To avoid this, we are going to make a compost maker, in which the compost can be made within 24 hours. The design and fabrication of this compost maker is very simple easy to understand the mechanism. The major difference between normal compost maker which takes months of time to convert into vermin compost and our compost is we are using bacteria to fasten up the process of getting composted within 24 hours.to mix all the ingredients in the compost maker, we use ball mill

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

This compost machine is fully automatic and highly compact where lot of processes such as grinding, mixing of bacteria etc. occur inside the machine and helps to prepare compost. In summer and winter seasons most of the trees loosing there leaves so it becoming waste product so by using this compost maker we are converting the waste into a useful product. Where we can add some value in our daily life and the compost machine is one of them. Green leaves waste compost machine is a waste composting machine which is easily break down green leaves waste by microorganism inside in machine. The main quality of machine is their reduction rate is very less, all kind leaves waste converted into compost within 48 hours with the reduction volume of 80 to 90 percent. No pollution occurs in the making of compost. Machine is fully automatic so anyone can operate this machine after taking some guidance. The main aim to build this product anyone can easily convert green leaves in compost. The machine of property is understandable for every person where anyone can operate according to his convince. Basically, the designed machine is system where user interaction is less during the whole process. Now days mostly people don't know about composting and its process mainly in rural are that's why the machine is allow to minimum interaction with user and operatable easily so the device is going to more famous and interesting around us. the designed product is based on lot of automatic inside the machine, where user only feed green leaves with right combination of material and just for 40 hours or 45 hours and then collect the proper composition of compost. Just we should fix the temperature and humidity and process is going further inside machine, the work of user is only to collect the compost after specific time. Machine is totally based on the convince of people, where the people is not stuck in between the process only simply feed the green leaves inside the chamber. obviously if people are enjoy the product with less effort our machine is going to more successful as well people aware about the green leaves. The compost is very naturally obtained product and we can use this compost to increase the soil fertility and to increase the crop yield compost increases the strength of the plants so we use this compost in gardens also its very cheap when it is come to cost its mainly converting waste product into best and useful product mostly it is more useful to the

2.1.2 NEED OF MACHINE

The basic problem in world is to wastage of green leaves. And still there is not taken any serious move towards it. every problem has a solution and compost machine is one of them. People can use his wastage green leaves for making in compost that is help to prevent pollution as well as diseases. Our main aim is to convert the waste into best product and also useful product. at the place of feed the wastage in earth or anywhere machine makes the work simple. We need to feed the wastage in machine and after specific time they convert into compost, so we can use in our soil and land. Another benefit of machine is to make compost and you can sell it in good prices either use it as a personal need .in rural area this machine is much needed, people is not aware about composting, once they are aware about composting. They are take initiative in making compost from composting machine. It is useful for farmers.

2.1.3 COMPONENT AND SPECIFICATIONS OF MATERIAL SELECTION

In any project the selection of material is important factor of our product is going to success either failure in market. in compost machine cat iron is main material is used for component inside or outside. because of his low cost and it is non corrosive material and it's light in weight when compare to other materials. inside the machine blades are important to divide or wastage in small part and the material of blade is also cast iron, in future there is no more problem of corrosion because steel has good corrosion resistance.

1 why composting?

1. Healthier plants 3.composting is practical and convenient 2.composting saves your money 4. composting is a good alternative to land filling

2. Compost application to agricultural soil

Composting helps to optimize nutrient management and the land application of compost may contribute to combat soil organic matter decline and soil erosion (Van Camp et al, 2004). Compost land application completes a circle whereby nutrients and organic matter which have been removed in the harvested produce are replaced (Diener et al ,1993). The recycling of compost to land is considered as a way of maintaining or restoring the quality of soils, mainly because of the fertilizing or improving properties of the organic matter contained in them. Furthermore, it may contribute to the carbon sequestration and may partially replace peatand fertilizers (Smith et al, 2001). Compost application to agricultural land needs to be carried out in a manner that ensures sustainable development. Management systems have to be developed to enable to maximize agronomics benefit, whilst ensuring the protection of environmental quality. The main determinant for efficient agronomics use is nitrogen availability, high nitrogen utilization in agriculture from mineral fertilizers is well established and understood, whereas increasing the nitrogen use efficiency of organic fertilizers requires further investigation (Amlinger et al, 2003).

2.1.4 THE COMPOSTING PROCESS

Composting of agricultural waste and municipal solid waste has a long history and is commonly employed to recycle organic matter back into the soil to maintain soil fertility. The recent increased interest in composting however has arisen because of the need for environmentally sound waste treatment technologies. Composting is seen as an environmentally acceptable method of waste treatment (Yvette B etal, 2000). It is an aerobic biological process which uses naturally occurring microorganisms to convert biodegradable organic matter into a humus like

2.1.5 AEROBIC

Composting is the decomposition of organic wastes in the presence of oxygen (air); products from this process include CO2, NH3, water and heat. This can be used to treat any type of organic waste but, effective composting requires the right blend of ingredients and conditions. These include moisture contents of around 60-70% and carbon to nitrogen ratios (C/N) of 30/1.Any significant variation inhibits the degradation process. Generally wood and paper provide a significant source of carbon while sewage sludge and food waste provide nitrogen. To ensure an adequate supply of oxygen throughout, ventilation of the waste, either forced or passive is essential. (Yvette B etal, 2000).

2.1.6 ANAEROBIC

Composting is the decomposition of organic wastes in the absence of O2, the products being methane (CH4), CO2, NH3 and trace amounts of other gases and organic acids. Anaerobic composting was traditionally used to compost animal manure and human sewage sludge, but recently is has become more common for some municipal solid waste (MSW) and green waste product.

The process destroys patho gens, converts N from un stable ammonia to stable organic forms, reduces the volume of waste and improves the nature of the waste. It also makes waste easier to handle and transport and often allows for higher application rates because of the more stable, slow release, nature of the N in compost (Fauziahetal, 2009). The effectiveness of the composting process is influenced by factors such as temperature, oxygen supply (i.e. aeration) and moisture content. There are two fundamental types of composting aerobic and anaerobic.

2.1.7 Phases of composting

1. Mesophilic phase (I). 3. Cooling phase (III).
2. Thermophilic phase (II). 4. Maturing phase (IV). (Yvette B.2000)

2.1.8 Important Parameters of composting process

1. Water content. 3. Nutrients. 5. PH.
2. Oxygen Demand. 4. Temperature. 6. Time. (RomeelaMohee, 2005).

2.1.9 Methods of Composting

1. Static pile. 3. In-vessel. 5. Bin Composter.
2. Windrow. 4. Vermicomposting. (Fauziah S.H, 2009) **2.1.10 Using of**

Compost Compost can be used for:

1. Soil Conditioning. 3. Lawn Dressing. 5. Vegetable Gardens.
2. Flower Gardens. 4. Trees and Shrubs. 6. House Plants. (Kashmanian, 1995).

2.1.12 Marketing

A key to the success of a composting operation is a marketing or distribution program for compost products. To develop long term markets, the products must be of consistently high quality. Other essential marketing factors include planning, knowledge about end users, following basic marketing principles and overcoming possible regulatory barriers and product stigma. Compost characteristics desired by end users vary with intended uses, but most compost users look for the following elements (in order of importance):

- Quality (moisture, odor, feel, particle size, stability, nutrient concentration, product consistency, and a lack of weed seeds, phototoxic compounds and other contaminants).
- Price (should be competitive with other composts, although high quality and performance can justify a higher price).
- Appearance (uniform texture, relatively dry, earthy colour).
- Information (product s benefits, nutrient and pH analysis, and application rates and procedures).
- Reliable Supply. (Romeela Mohee,2005).

Write a brief preamble to the chapter i.e., explaining the area of the problem about which the researchers have worked on it in three to four sentences.

The organic content of Municipal Solid Waste (MSW) tends to decompose leading to various smell and odors problems. It also leads to pollution of the environment. To ensure a safe disposal of the MSW it is desirable to reduce its pollution potential and several processing methods are proposed for this purpose. Composting process is quite commonly used and results in production of a stable product - compost which depending upon its quality can be used as a lowgrade manure and soil conditioner. The process results in conservation of natural resources and is an important processing method, especially in agricultural and horticultural areas. In the case of individual households, small establishments and colonies, vermi-composting which involves the stabilisation of organic solid waste through earthworm consumption for conversion of the organic material to worm casting is being increasingly preferred.

2.1.13 PRINCIPLES OF COMPOSTING – MANUAL AND MECHANISED METHODS

Decomposition and stabilisation of organic waste matter is a natural phenomenon. Composting is an organised method of producing compost manure by adopting this natural phenomenon. Compost is particularly useful as an organic manure which contains plant nutrients (Nitrogen, Phosphorous and Potassium) as well as micro nutrients which can be utilized for the growth of plants (Gotaas 1956). When used in conjunction with chemical fertilisers optimum results are obtained. Composting can be carried out in two ways i.e., aerobically and anaerobically. During aerobic composting aerobic micro-organisms oxidise organic compounds to Carbon di oxide, Nitrite and Nitrate. Carbon from organic compounds is used as a source of energy while nitrogen is recycled. Due to exothermic reaction, temperature of the mass rises. During anaerobic process, the 244 anaerobic microorganisms, while metabolising the nutrients, break down the organic compounds through a process of reduction. A very small amount of energy is released during the process and the temperature of composting mass does not rise much. The gases evolved are mainly Methane and Carbon di oxide. An anaerobic process is a reduction process and the final product is subjected to some minor oxidation when applied to land.

2.2.0 INDORE & BANGALORE METHODS OF COMPOSTING

Manual composting was systematised by Howard & his associates. It was further developed by Acharya & Subrahmanyam and the methods are conventionally referred as Indore and Bangalore methods of composting.

2.2.1 BANALORE METHOD

This is an anaerobic method conventionally carried out in pits. Formerly the waste was anaerobically stabilised in pits where alternate layers of MSW and night soil were laid. The pit is completely filled and a final soil layer is laid to prevent fly breeding, entry of rain water into the pit and for conservation of the released energy. The material is allowed to decompose for 4 to 6 months after which the stabilised material is taken out and used as compost.

2.2.2 INDORE METHOD

This method of composting in pits involves filling of alternate layers of similar thickness as in Bangalore method. However, to ensure aerobic condition the material is turned at specific intervals for which a 60 cm strip on the longitudinal side of the pit is kept vacant (Fig.14.1). For starting the turning operation, the first turn is manually given using long handled rakes 4 to 7 days after filling. The second turn is given after 5 to 10 more days. Further turning is normally not required and the compost is ready in 2 to 4 weeks. In the urban areas, due to extensive provision of water carriage system of sanitation, night soil is not available. Composting of MSW alone is hence often carried out. Aerobic composting of MSW is commonly carried out in windrows.

2.3 FACTORS AFFECTING THE COMPOSTING PROCESS

2.3.1 ORGANISMS

Aerobic composting is a dynamic system wherein bacteria, actinomycetes, fungi and other biological forms are actively involved. The relative preponderance of one species over another depends upon the constantly changing food supply, temperature and substrate conditions. Facultative and obligate forms of bacteria, actinomycetes and fungi are most active in this process. In the initial stages mesophilic forms predominate and thermophilic bacteria and fungi soon take over except in the final stage of composting. Except when the temperature drops, actinomycetes and fungi are confined to 5 to 15 cm outer surface layer. If the turning is not carried out frequently the actinomycetes and fungi in these layers register increased growth imparting it typical greyish white colour. Thermophilic actinomycetes and fungi are known to grow well in the range of 45 to 60o C. Different organisms are known to play predominant role in breaking down different constituents of municipal solid waste. Thermophilic bacteria are mainly responsible for the breakdown of proteins and other readily biodegradable organic matter. Fungi and actinomycetes play an important role in the decomposition of cellulose and lignin. The actinomycetes common in compost are Streptomyces sp. and Micromonospora sp. the latter being more prevalent. The common fungi in compost are Thermonomyces sp., Penicillium dupontii and Asperigallus fumigatus. Majority of these organisms responsible for composting are already present in municipal solid waste. Not much information is available regarding the organisms active in anaerobic composting, though many of the organisms responsible for anaerobic decomposition of sewage sludge will be active here also, and differences are expected due to the concentration of nutrients present and the temperature conditions.

2.3.2 USE OF CULTURES DURING

The development of composting process various innovators came forward with inoculum, enzymes etc., claimed to hasten the composting process. Investigations carried out by various workers have shown that they are not necessary. The required forms of bacteria, actinomycetes and fungi are indigenous to MSW. Under proper environmental conditions the indigenous bacteria adapted to MSW rapidly multiply, as compared to the added cultures which are more attuned to controlled laboratory conditions and carry out decomposition. The process is dynamic and as any specific organism can survive over a specific range of environmental conditions, as one group starts diminishing, another group of organisms starts flourishing. Thus, in such a mixed system appropriate life forms develop and multiply to keep pace with the available nutrients and environmental conditions.

2.3.3 MOISTURE

The moisture tends to occupy the free air space between the particles. Hence, when the moisture content is very high, anaerobic conditions set in. However, the composting mass should have a certain minimum moisture content in it for the organisms to survive. The optimum moisture content is known to be between 50 to 60 %. Higher moisture content may be required while composting straw and strong fibrous material which soften the fibre and fills the large pore spaces. Higher moisture content can also be used in mechanically aerated digesters. In anaerobic composting the moisture content used will depend upon the method of handling and whether it is carried out in the open or in closed container.

2.3.4 TEMPERATURE

The aerobic decomposition of a gram mole of glucose releases 484 to 674 kilo calories (kcal) energy under controlled conditions, while only 26 kcal are released when it is decomposed anaerobically. Municipal solid waste is known to have good insulation properties and hence the released heat results in increase in temperature of the decomposing mass. As some of the heat loss occurs from the exposed surface, the actual rise in temperature will be slightly less. When the decomposing mass is disturbed, as during turning of windrows, the resultant heat loss results in drop in temperatures. Under properly controlled conditions temperatures are known to rise beyond 70oC in aerobic composting. Under properly controlled conditions temperatures are known to rise beyond 70oC in 248 aerobic composting. During anaerobic composting as the released heat is quite small and as part of it is lost from the surface only a marginal rise in temperature occurs. This increased temperature results in increased rate of biological activity and hence results in faster stabilisation of the material. However, if the temperature rise is very high, due to inactivation of the organisms & enzymes the rate of activity may decrease. The studies carried out have shown that the activity of cellulose enzyme reduces above 70oC and the optimum temperature range for nitrification is 30o to 50oC beyond which nitrogen loss is known to occur. The temperature range of 50o to 60oC is thus optimum for nitrification and cellulose degradation. The high temperature also helps in destruction of some common pathogens and parasites (Table 14.1). According to Scott, during aerobic composting when the material is turned twice in 12 days Entamoeba histolytica is killed and the eggs of Ascaris lumbricoides are killed in 36 days when turned thrice. The studies carried out at NEERI have shown that the destruction of these organisms is not ensured under anaerobic conditions. Knoll has proved that the high temperature and long retention during aerobic composting along with the antibiotic effect results in destruction of parasites and pathogens. Thus, if the process is so controlled that the temperature is kept between 50o to 60 o C for 5 to 7 days, destruction of pathogens and parasites can be ensured.

2.3.5 CARBON/NITROGEN RATIO

The organisms involved in stabilisation of organic matter utilise about 30 parts of carbon for each part of nitrogen and hence an initial C/N ratio of 30 is most favourable for composting. Research workers have reported the optimum value to range between 26-31 depending upon other environmental conditions. The C/N ratio considers the available carbon as well as the available nitrogen while the available carbon and nitrogen in the MSW may vary from sample to sample. Whenever the C/N ratio is less than the optimum, carbon source such as straw, sawdust, paper are added while if the ratio is too high, the sewage sludge, slaughter house waste, blood etc. are added as a source of nitrogen.

2.3.6 AERATION

It is necessary to ensure that oxygen is supplied throughout the mass and aerobic activity is maintained. During the decomposition, the oxygen gets depleted and has to be continuously replenished. This can be achieved either by turning of windrows or by supplying compressed air. During the turning, it is necessary to bring inner mass to the outer surface and to transfer the outer waste to the inner portion. In case of artificial air supply the quantity of air supply is normally maintained at 1-2 cu.m./day/kg of volatile solids. Artificial air supply requires enclosing decomposing mass in containers which is quite costly. Hence in Indian conditions the decomposition is commonly carried out in open windrows. Studies at NEERI have shown that the optimum turning interval which will reduce the cost and simultaneously maintain aerobic conditions is 5 days.

2.3.7 ADDITION OF SEWAGE AND SEWAGE SLUDGE

The optimum C/N ratio for composting is 25-30. MSW in developed countries has a C/N ratio of nearly 80. To bring it down to the optimum value and to reduce the cost of sewage sludge treatment, it is mixed with sewage sludge (C/N = 5 to 8). MSW in India, on the other hand has an initial C/N ratio of around 30 which does not need blending. If such a mixing is done, C/N value may reduce below 20, when a loss of nitrogen in the form of ammonia occurs.

Addition of sewage sludge increases smell and odour problems. It will also increase handling and transportation cost. Even if sewage is used as a source of moisture, bulk of sewage will still have to be treated. The sewage often contains waste waters from industries which contain hazardous constituents which will pose problems in the composting process and compost quality. In view of the above, addition of sewage and sludge is not desirable in India.

2.4 CONTROL OF COMPOSTING PROCESS

The composting is normally taken to be complete when the active decomposition stage is over and the C/N ratio is around 20. If the C/N ratio of compost is more than 20, the excess carbon tends to utilise nitrogen in the soil to build cell protoplasm. This results in loss of nitrogen of the soil and is known as robbing of nitrogen in the soil. If on the other hand the C/N ratio is too low the resultant product does not help improve the structure of the soil. It is hence desirable to control the process so that the final C/N ratio is around 20. The composting process should also be so controlled that the temperature of the decomposing mass remains between 50o -60 oC for at least a week. This ensures the destruction of any parasites or pathogens present in the decomposing mass. During the operation of the process, aerobic conditions should be maintained by controlling the aeration so that smell & odour as well as fly problems do not arise. During turning, care should be taken to avoid dust problem. The windrows should be located over impervious surface so that the surface water from the windrows which may contain entrained particulates & pollutants is 252 properly collected and safely disposed of after processing. Such process leachate can also be reused in composting operation. The rejects from the process should be disposed off at properly designed and operated sanitary landfills. The MSW should be diverted to a properly operated sanitary landfill during annual maintenance period as well as during shutdown of the plant. When the composting is carried out by controlling the various factors within the optimum range, proper quality compost will be obtained.

2.4.1 PROPERTIES OF COMPOST

The compost prepared from MSW should be black brown or at least black in colour. It should be crumbly in nature with an earthy odour. The pH should be neutral though slightly acidic or alkaline pH within the range of 6.5 to 7.5 can be tolerated. The compost should neither be completely dry nor it be lumpy and water should not come out of the mass when squeezed. The Nitrogen, Phosphorous and Potassium (NPK) contents should be more than one percent each. The Nitrogen should be in the form of Nitrates for proper utilisation by the plants. The C/N ratio should be between 15 to 20. In order to ensure safe application of compost, the standards laid down in the

CHAPTER 3
Present work

3.1 PART DESIGN OF BALL MILL

Designing of Ball Mill consists of several steps these are explained in the following.

We have drawn a square pipe as shown in figure 3.1.

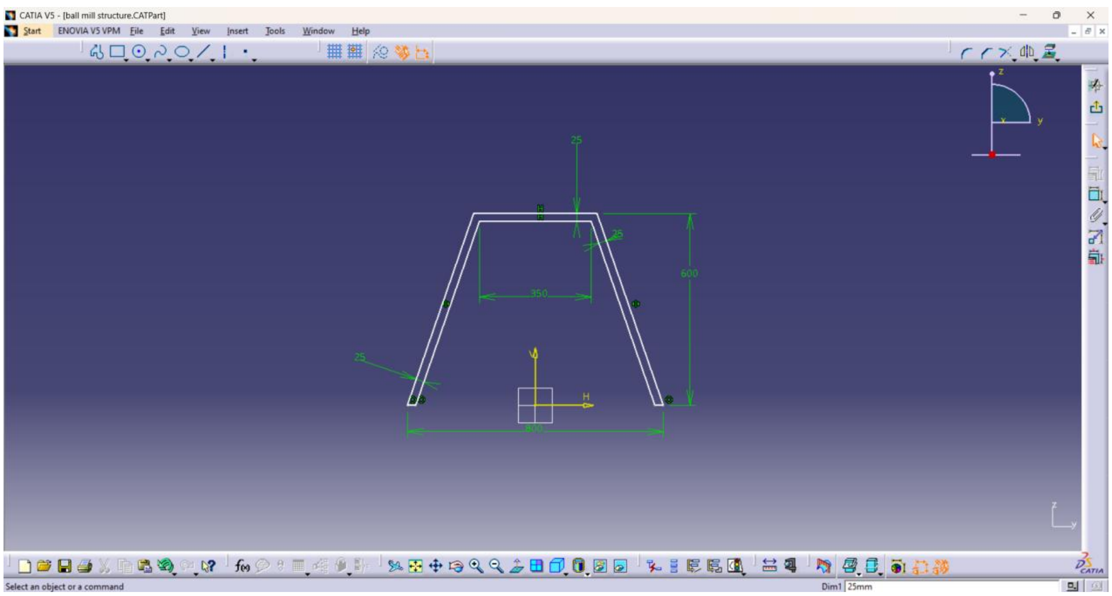


Fig 3.1 square pipe

We have used pad command in order to generate 3D of the sketch for length 25mm as shown in figure 3.2.

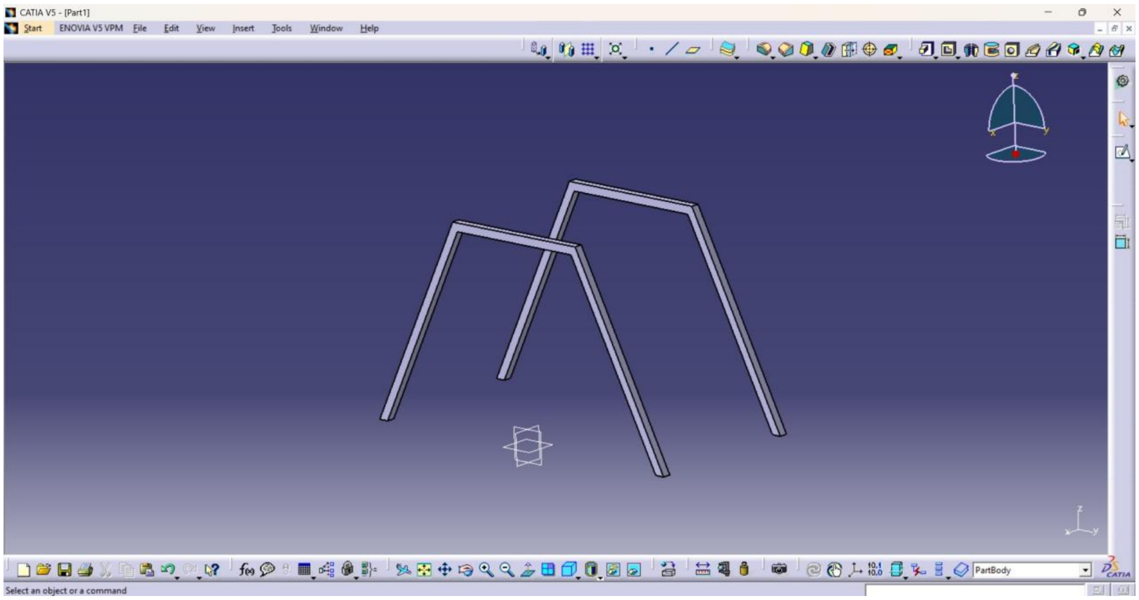


Fig 3.2 pad command

We have drawn a square pipe in lengths as shown in figure 3.3.

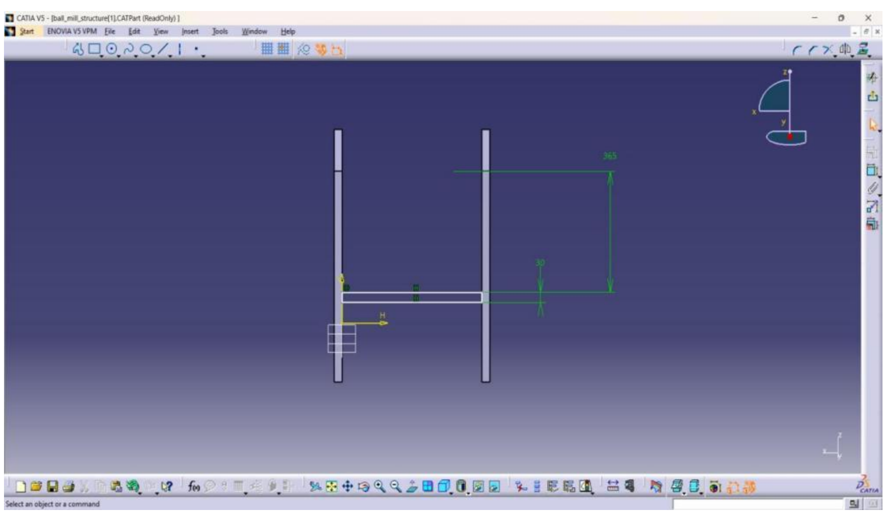


Fig 3.3 line command

We have used pad command in order to generate 3D of the sketch as shown in figure 3.4

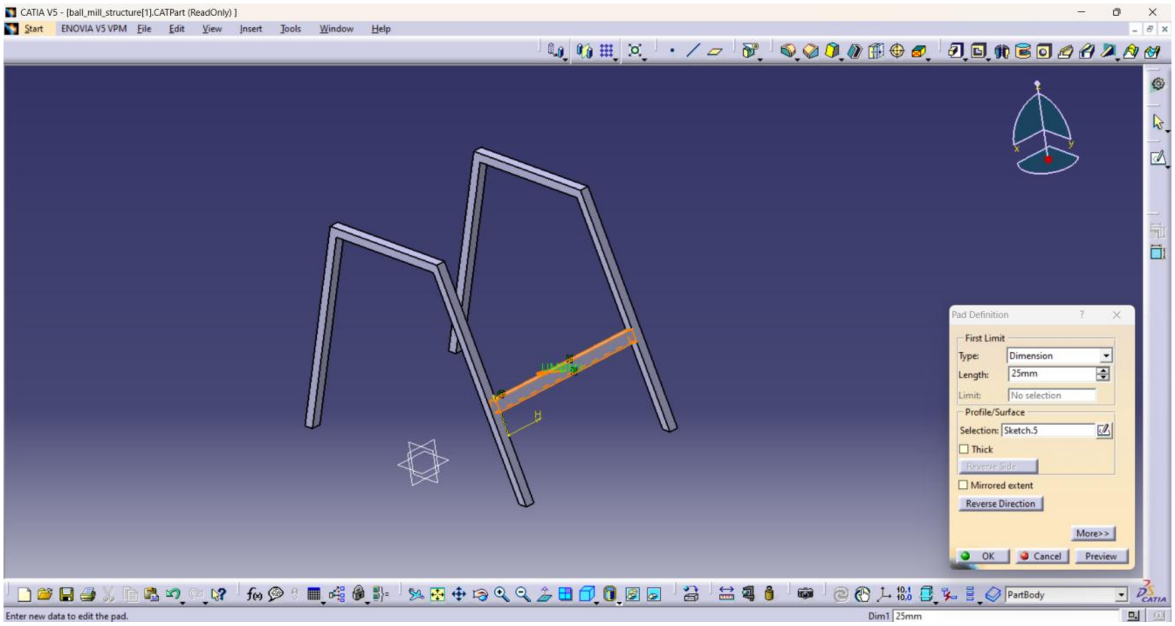


Fig 3.4 pad command

We have used pai command in order to same opposite direction of the square pipe generate 3D of the sketch as shown in figure 3.5

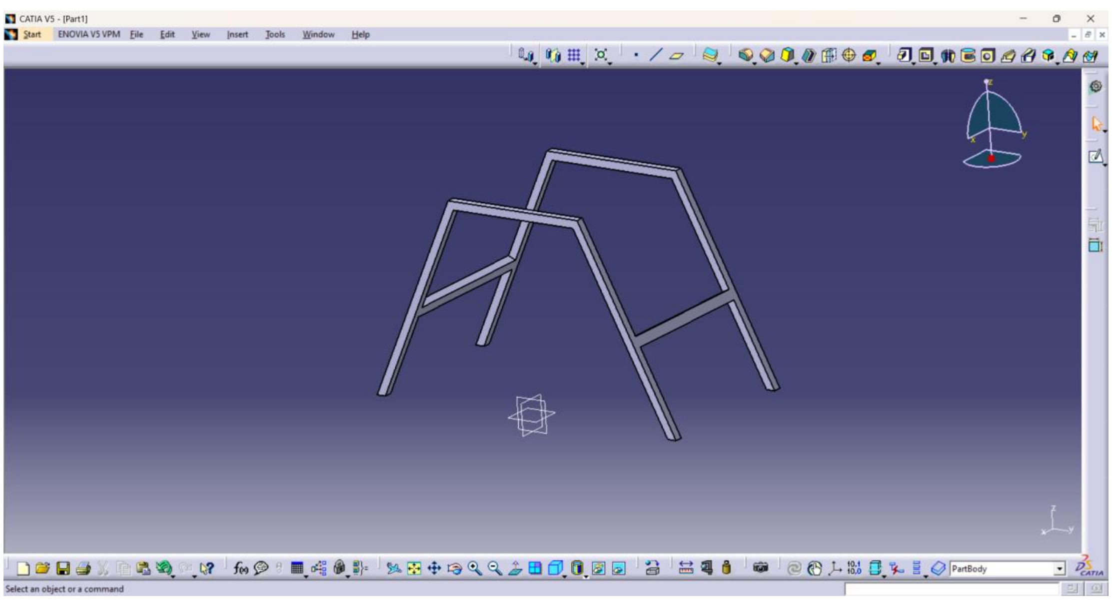


Fig 3.5 pad command

We have drawn two square pipes distance between them as shown in figure 3.6

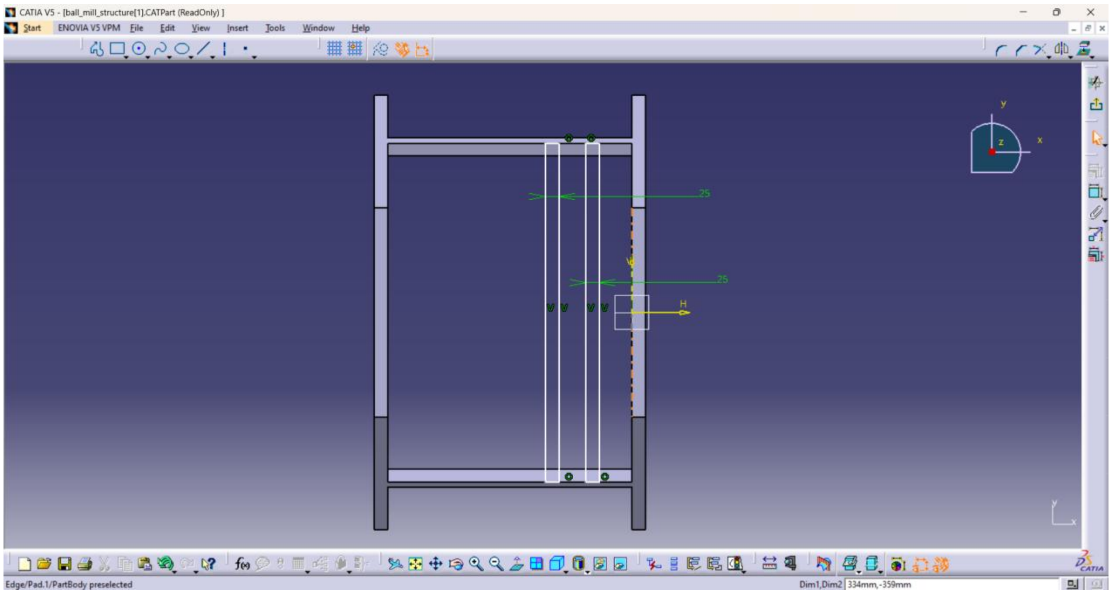


Fig 3.6 line command

We have used pai command in order to generate 3D of the sketch as shown in figure 3.7

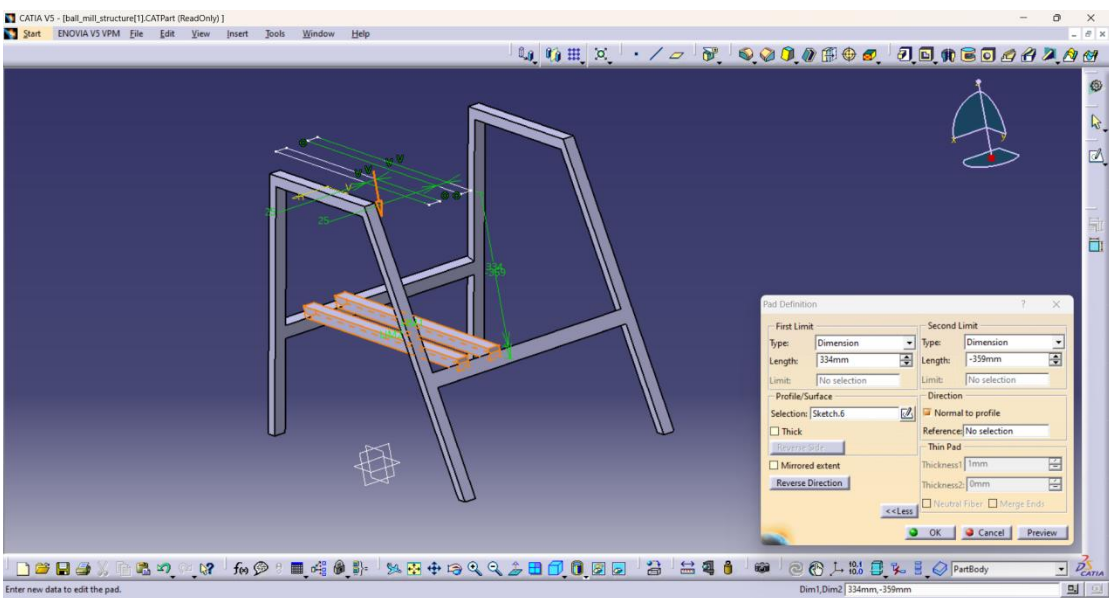


Fig 3.7 pad command

We have drawn Pillow Block Bearing by using line command and circle commend as shown in figure 3.8

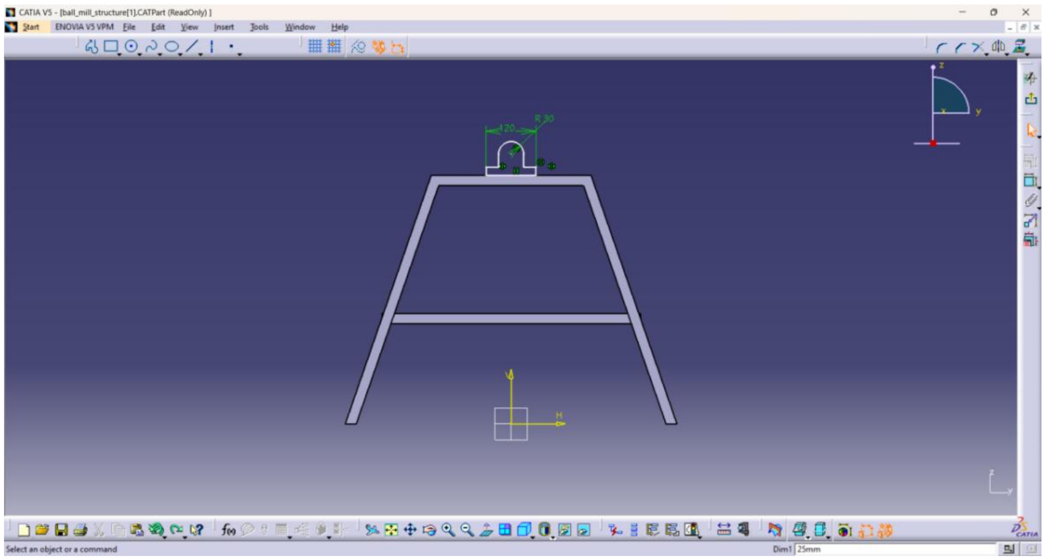


Fig 3.8 line command and circle command

We have used pai command in Pillow Block Bearing generate 3D of the sketch as shown in figure 3.9

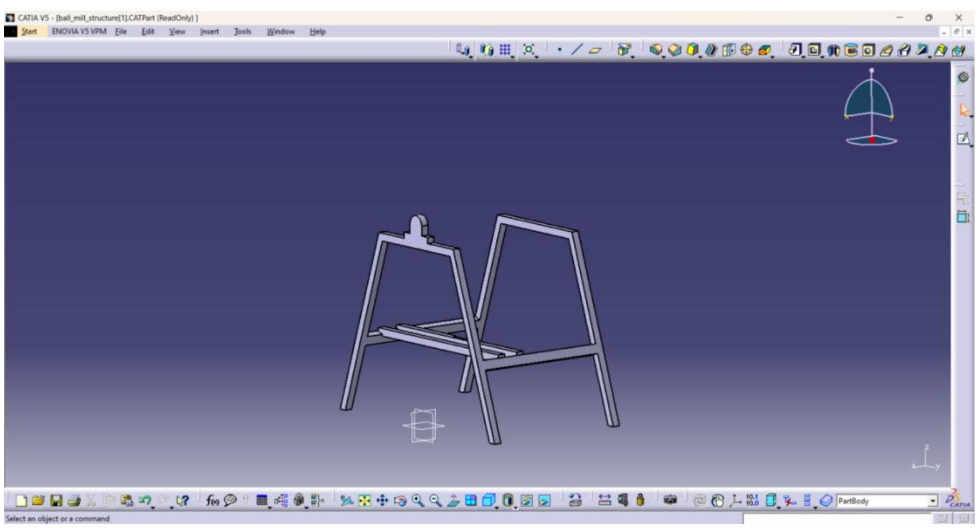


Fig 3.9 pad command

We have drawn a cicrle dia 30mm in Pillow Block Bearing sketch as shown in figure 3.10

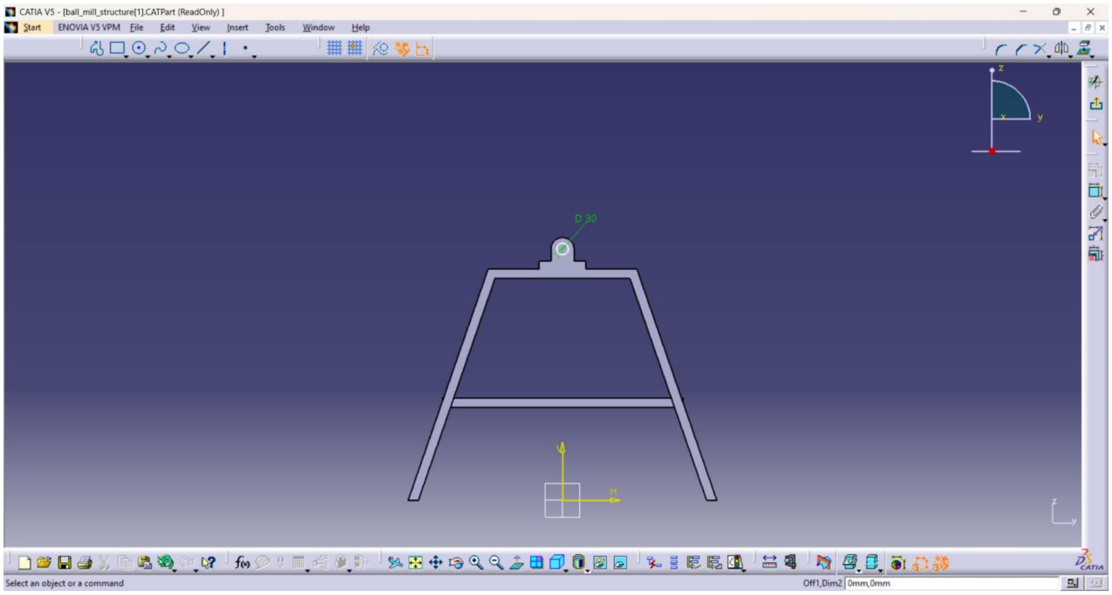


Fig 3.10 circle command

We have used pocket command by using making hole in Pillow Block Bearing generate 3D of the sketch as shown in figure 3.11

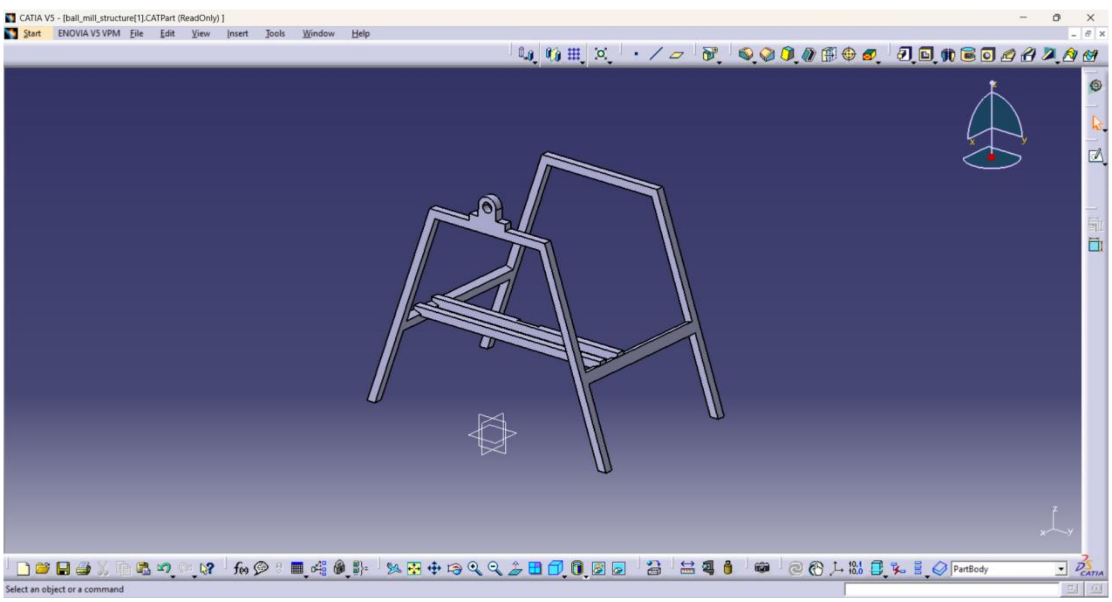


Fig 3.11 pocket command

We have used mirror command in order to same opposite direction of the Pillow Block Bearing generate 3D of the sketch as shown in figure 3.12

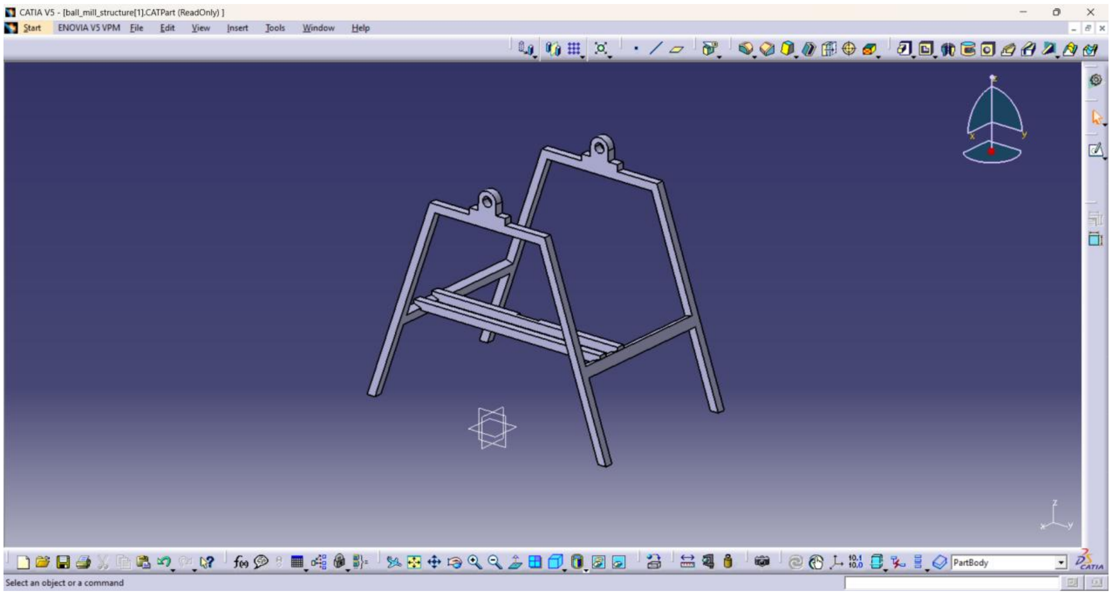


Fig 3.12 mirror command

We have drawn a cicrle dia 300mm in cylinder shell sketch as shown in figure 3.13

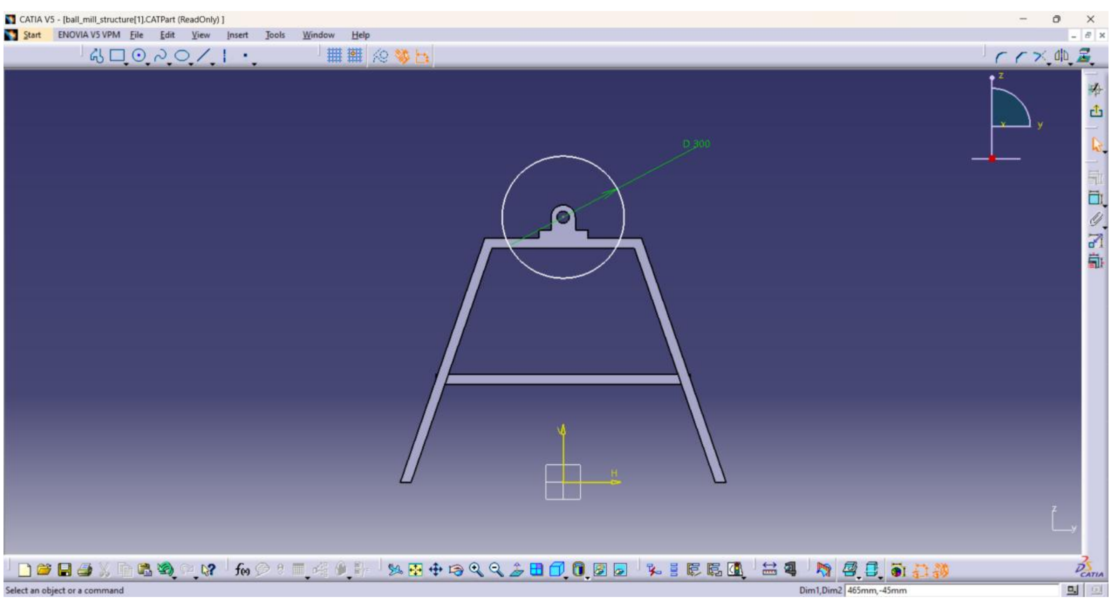


Fig 3.13 circle command

We have used pad command in order to make a cylindrical container length of 450mm generate 3D of the sketch as shown in figure 3.14

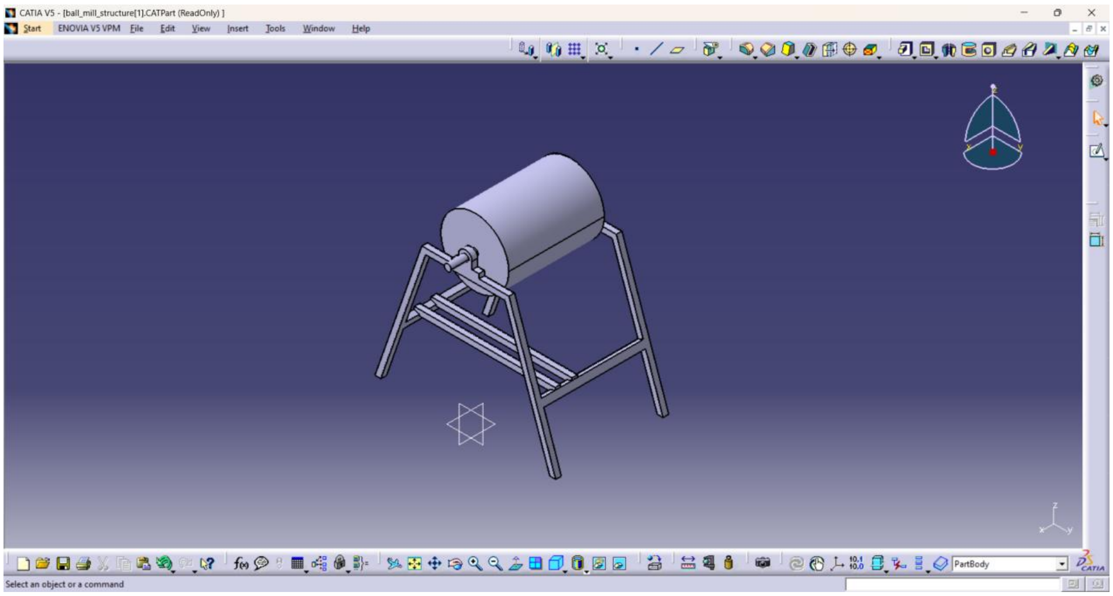


Fig 3.14 pad command

We have used shall command in order to make a cylindrical container to make a hole generate 3D of the sketch as shown in figure 3.15

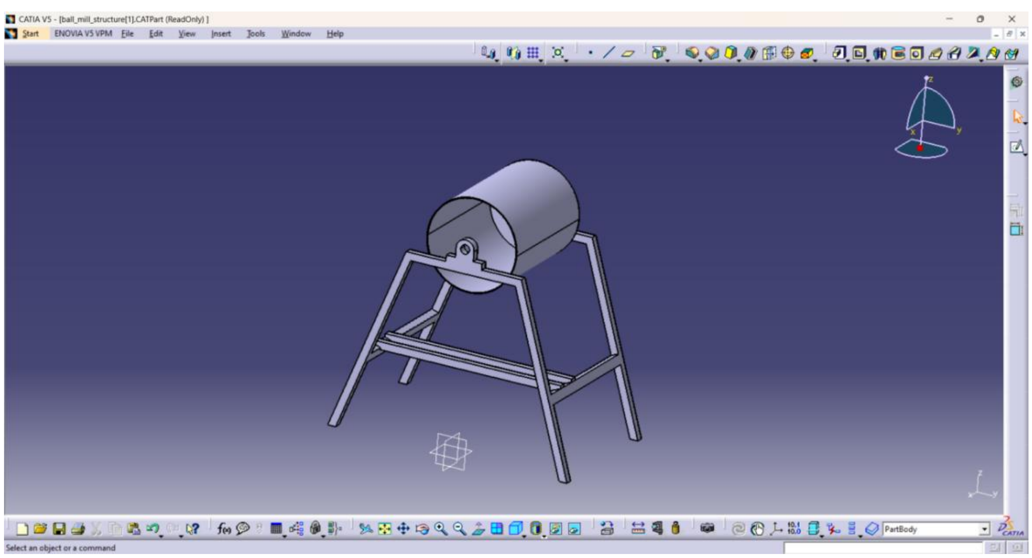


Fig 3.15 shall command

We have draw the rectangular block in order to make a pocket sketch as shown in figure 3.16

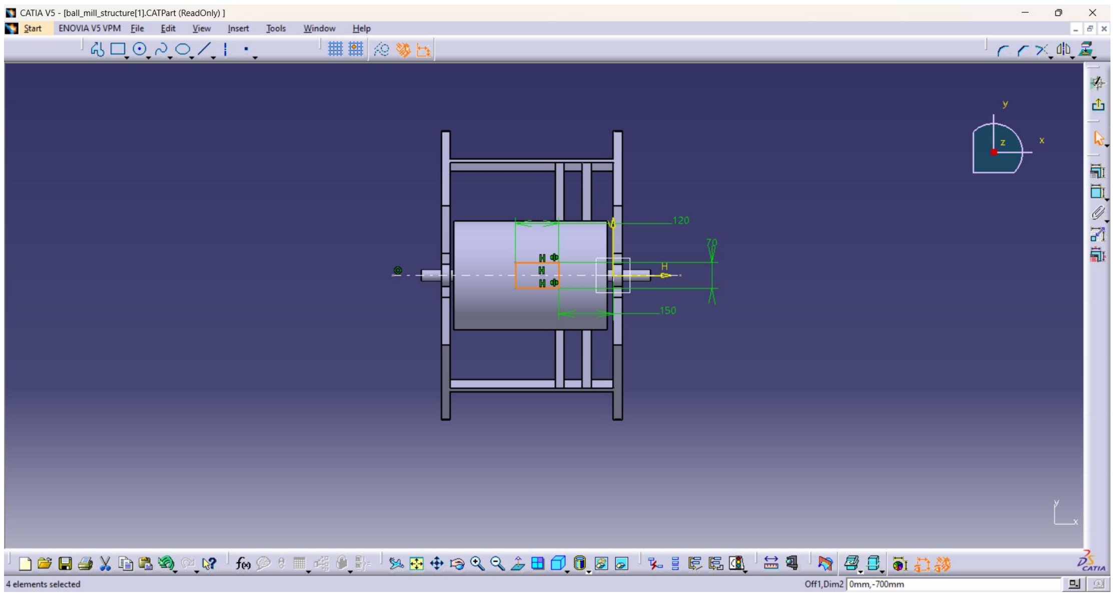


Fig 3.16 rectangular command

We have used pocket command in order to make a hole as shown in figure 3.17

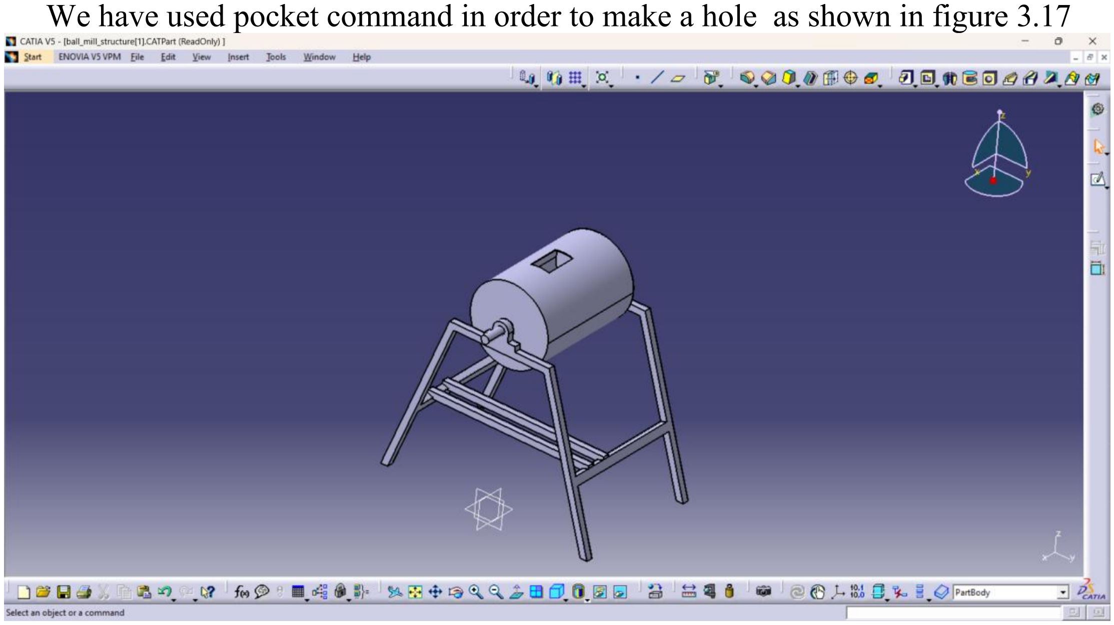


Fig 3.17 pocket command

We have draw the rectangular block sketch as shown in figure 3.17

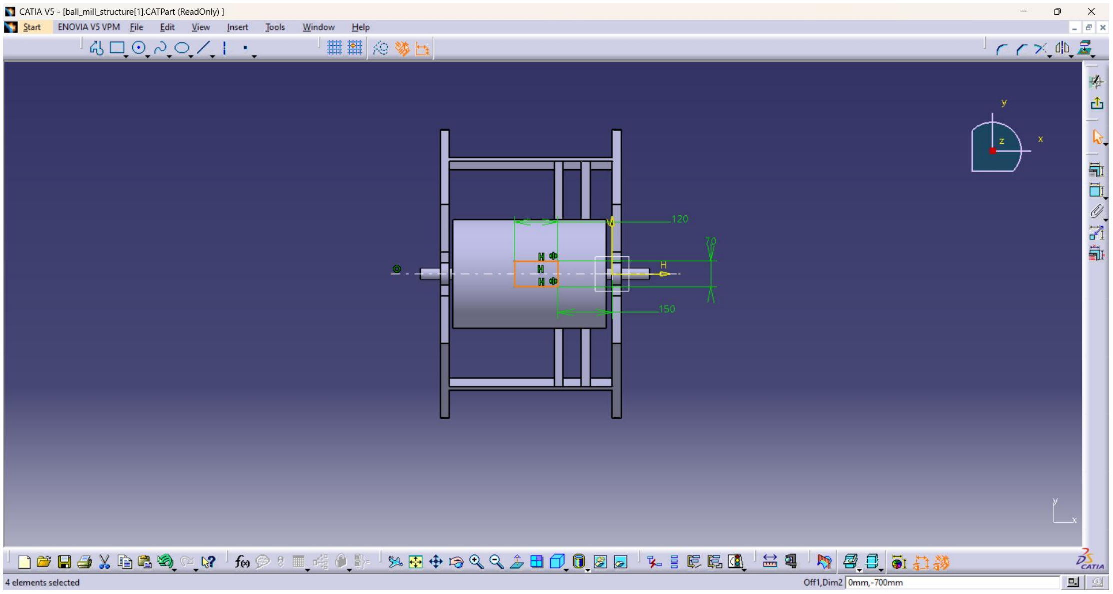


Fig 3.17 rectangular command

We have use pad command by making the pocket as shown in figure 3.18

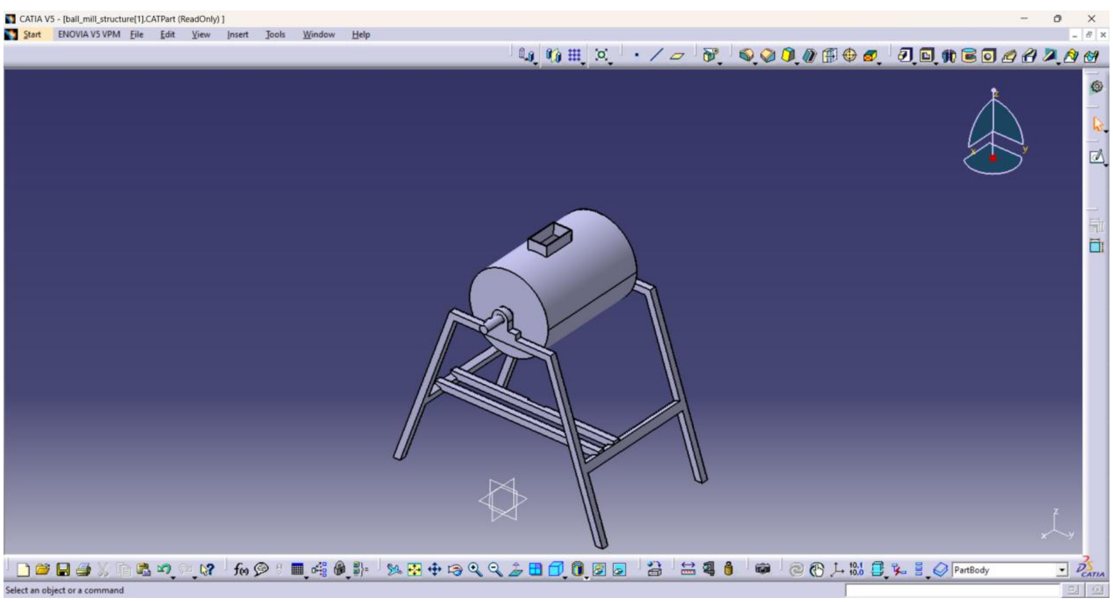


Fig 3.18 pocket command

We have use to make a closed place upper part of the fixed with blotes cylinder shell as shown in figure 3.19

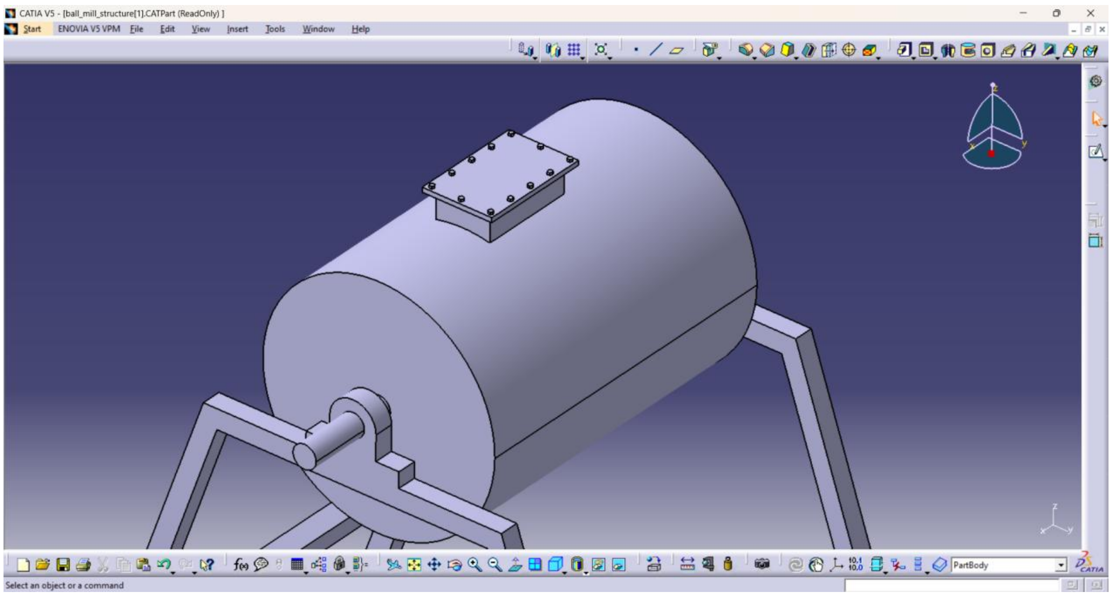


Fig 3.19 pad command and fix the blots

We have draw the blear drive wheel by using circle command as shown in figure 3.20

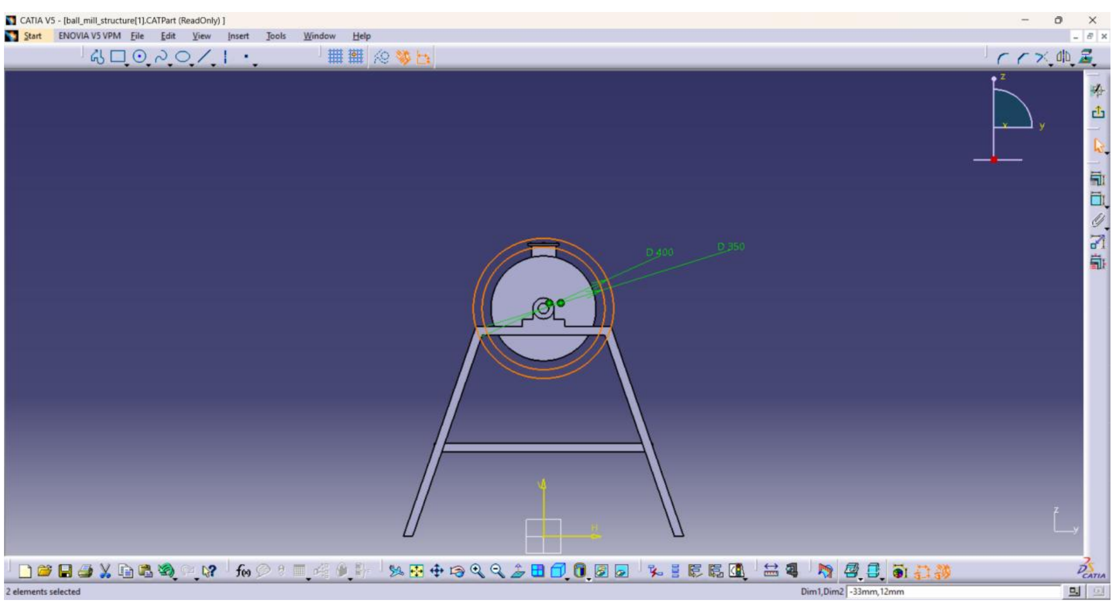


Fig 3.20 circle command

We have to used pad command the blear drive wheel as shown in figure 3.20

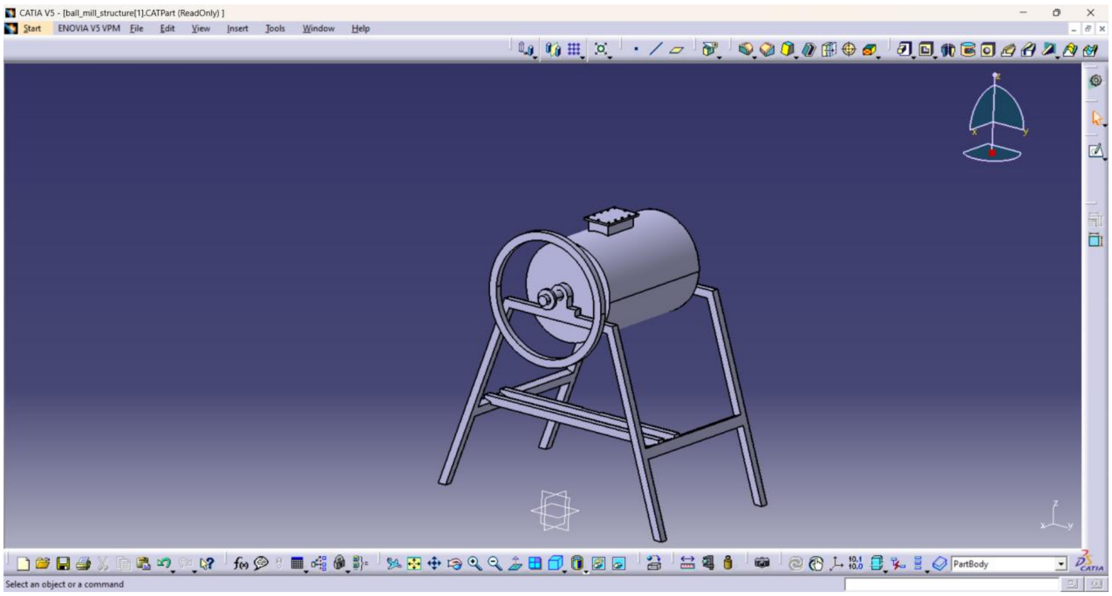


Fig 3.21 pad command

We have to use line command by using supporting belt drive wheel as shown in figure 3.21

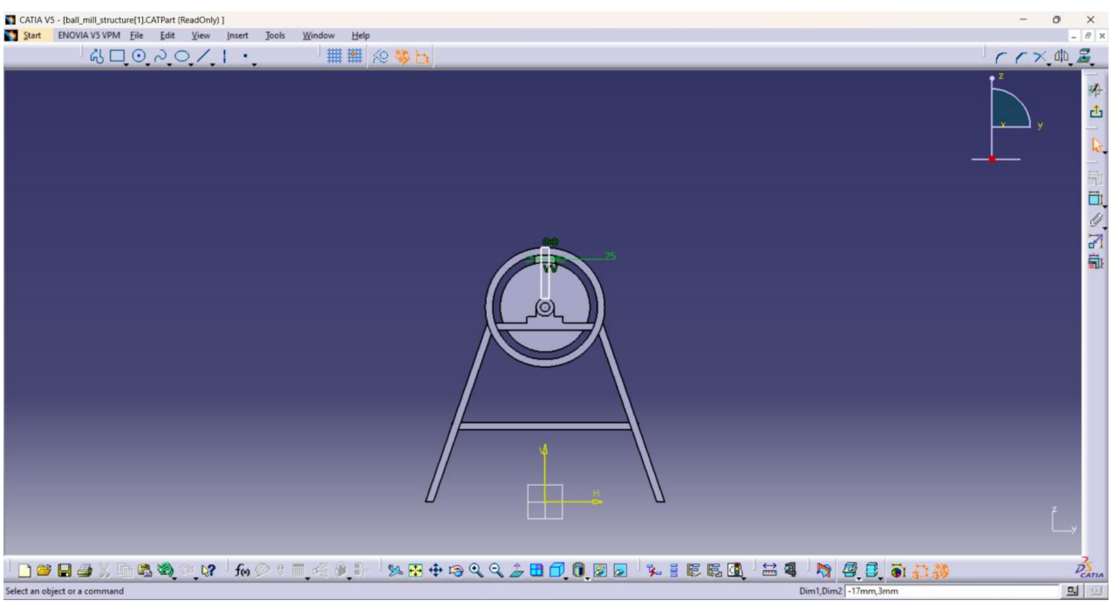


Fig 3.21 line command

We have to use pad commend by using to make a supporting belt drive wheel and also using circular pattern by using six parths around the wheel as shown in figure 3.22

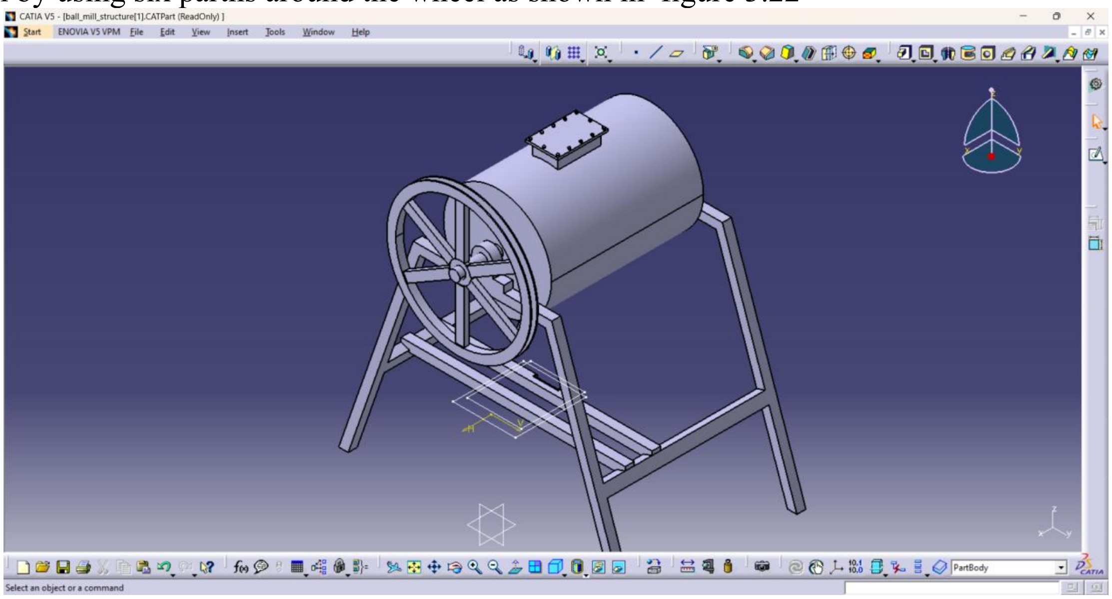


Fig 3.21 pad command and circular pattern

Finnaly we fix the motor to connect the belt drive wheel as shown in figure 3.22

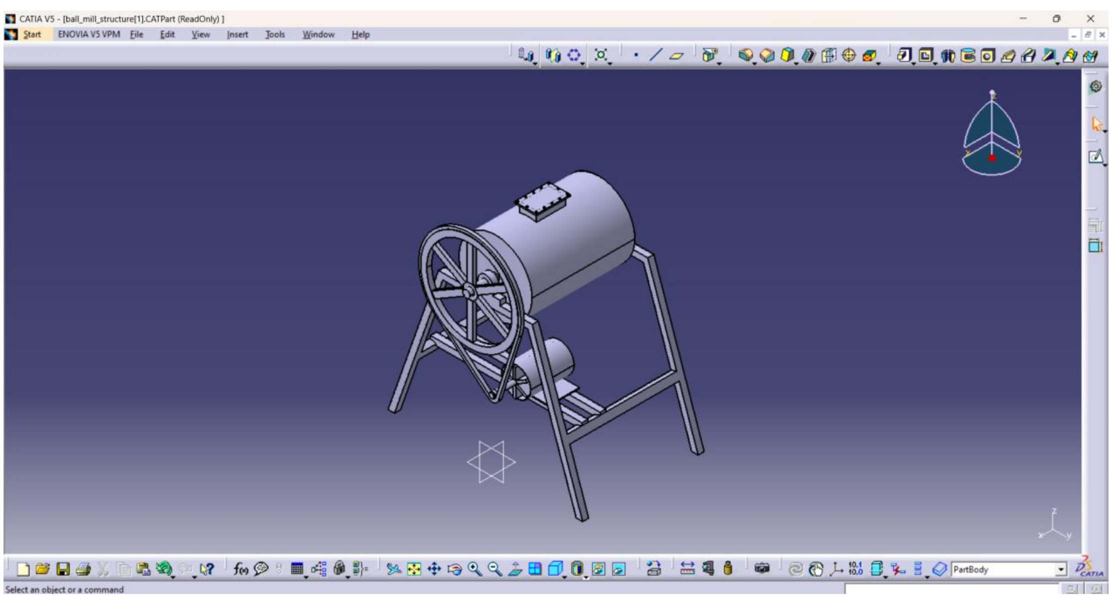


Fig 3.21 fixed the motor

3.2 ANALYSIS AND SPECIFICATIONS OF Ball Mill IN ANSYS SOFTWARE

We have generate a mesh with specifications as shown in figure 3.22

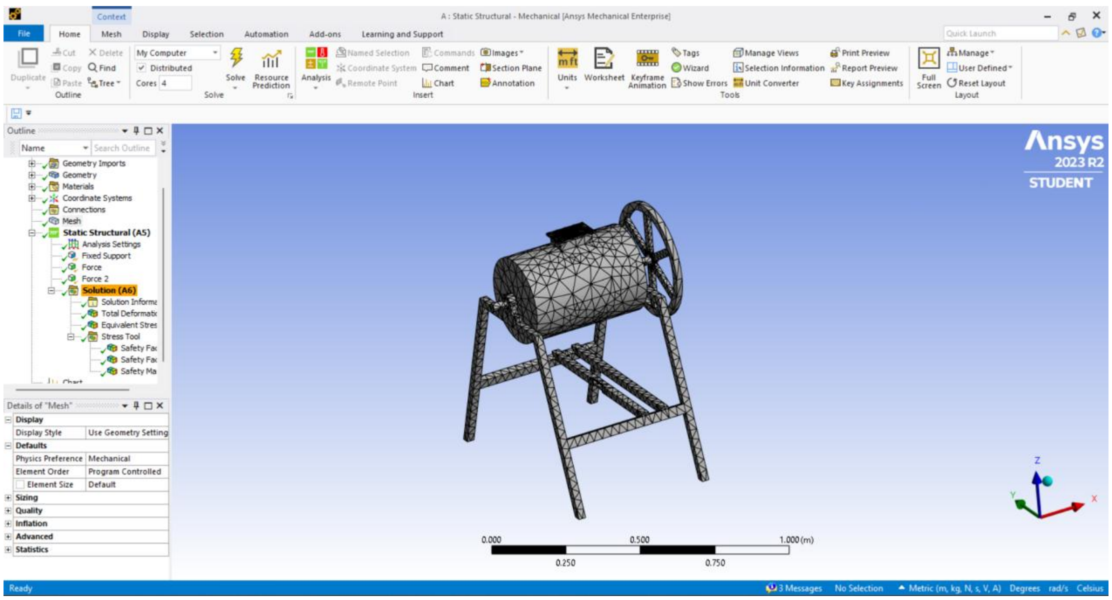


Fig 3.22 generate the mesh in ansys

Sizing of mesh :

Average Surface Area : 7.8876e-003 m²
Bounding Box Diagonal : 1.573 m
Minimum Edge Length : 3.9664e-004 m

Statistics of mesh :

Nodes : 23556
Elements : 11334

We have to develop the total deformation as shown in figure 3.23

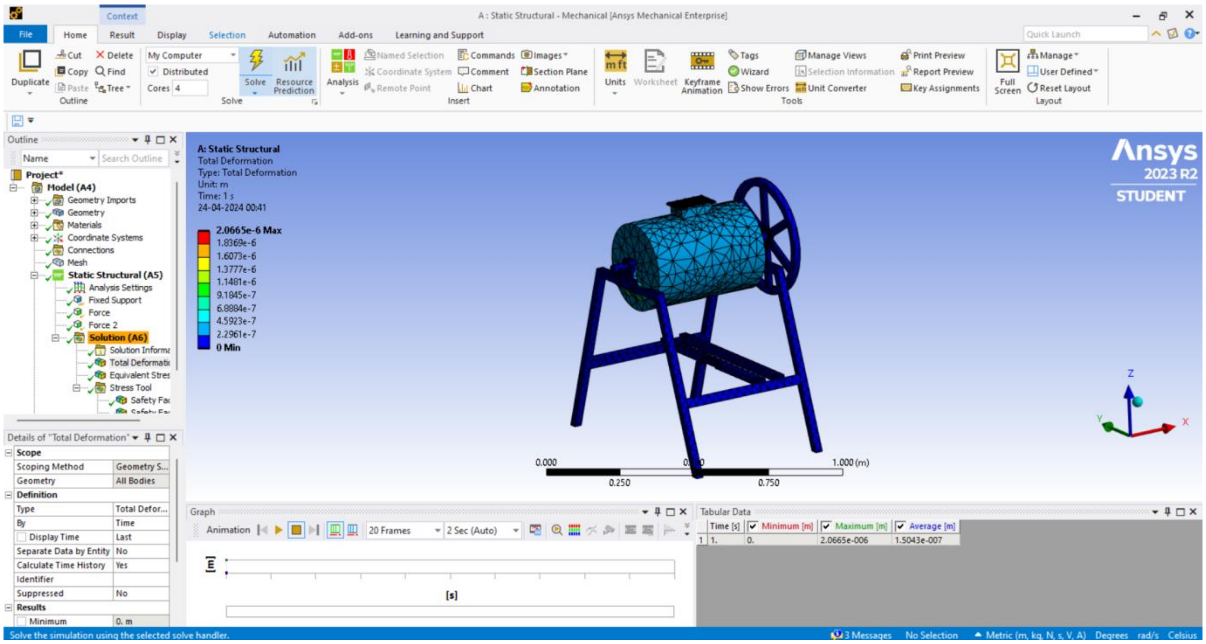


Fig 3.23 generate the total deformation by applying loads in ansys

Results :

Minimum	:	0. m
Maximum	:	2.0665e-006 m
Average	:	1.5043e-007 m

We have the develop Equivalent (von-Mises) Stress as shown in fig : 3.24

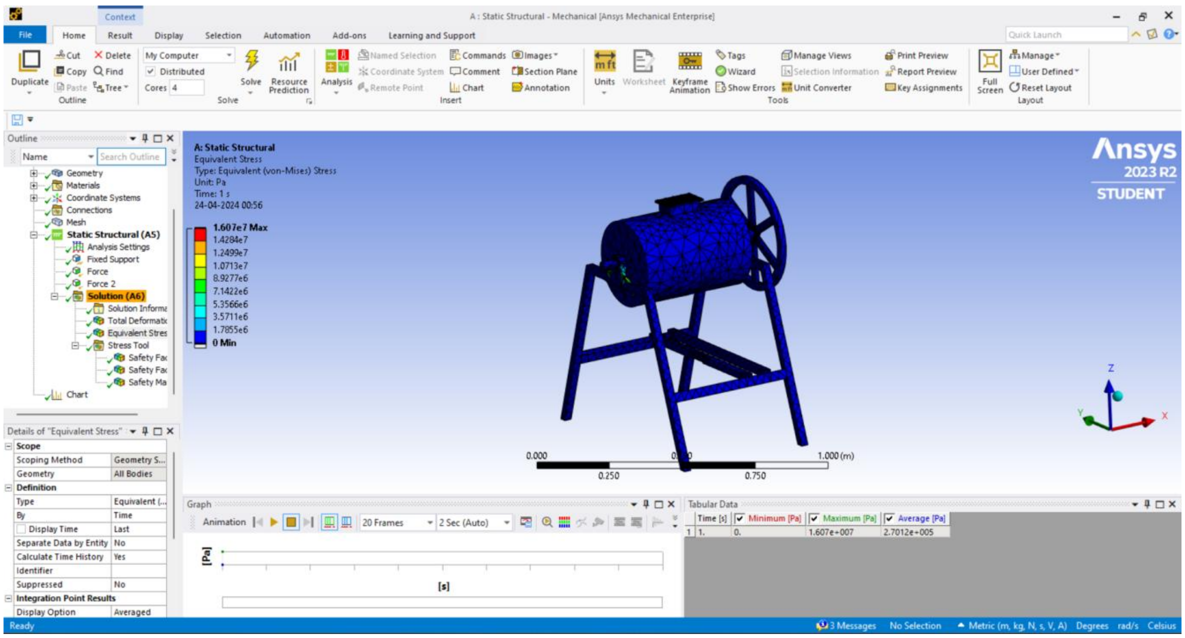


Fig 3.24 generate the Equivalent (von-Mises) Stress by applying loads in ansys

Result :

Minimum : 0. Pa
Maximum : 1.607e+007 Pa
Average : 2.7012e+005 Pa

FABRICATION

3.3 PARTS PREPARATION:

CHASSIS

We have taken a Mild Steel (MS) pipe of width 20mm and thickness 2mm as shown in figure (3.1).

Fig (3.1) Mild Steel Pipe

We have marked the pipe at distance 500mm from its edge using measuring and marking tools as shown in figure (3.2).

Fig (3.2) marking on pipe

We have performed cutting operation using angle grinder machine with respect to the markings as shown in figure (3.3).

Fig (3.3) cutting of square pipe

We have obtained 2 pipes of length 500mm, width 20mm and thickness 2mm by following above mentioned process.

We have taken a Mild Steel (MS) pipe of width 20mm and thickness 2mm as shown in figure (3.4).

Fig (3.4) Mild Steel Pipe

We have marked the pipe at distance 400mm from its edge using measuring and marking tools as shown in figure (3.5).

Fig (3.5) marking on pipe

We have performed cutting operation using angle grinder machine with respect to the markings as shown in figure (3.6).

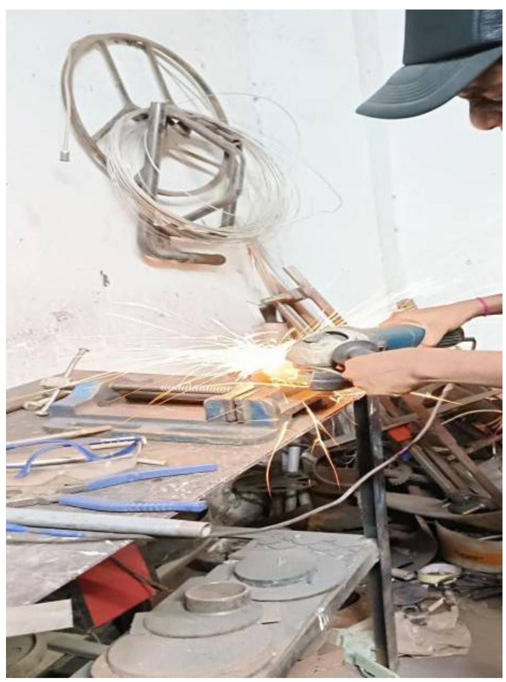


Fig (3.6) cutting of square pipe

We have obtained one piece of length 250mm, width 25mm, breadth 25mm and thickness 2mm by following above mentioned process.

We have taken a Mild Steel (MS) pipe of width 20mm and thickness 2mm as shown in figure (3.7).

Fig (3.7) Mild Steel Pipe

We have marked the pipe at distance 300mm from its edge using measuring and marking tools as shown in figure (3.8).

Fig (3.8) marking on pipe

We have performed cutting operation using angle grinder machine with respect to the markings as shown in figure (3.9).

Fig (3.9) cutting of square pipe

We have obtained 2 pipes of length 600mm, width 20mm and thickness 2mm by following above mentioned process.

We have taken a Mild Steel (MS) pipe of width 20mm and thickness 2mm as shown in figure (3.10).

Fig (3.10) Mild Steel Pipe

We have marked the pipe at distance 60mm from its edge using measuring and marking tools as shown in figure (3.11).

Fig (3.11) marking on pipe

We have performed cutting operation using angle grinder machine with respect to the markings as shown in figure (3.12).

Fig (3.12) cutting of square pipe

We have obtained 2 pipes of length 60mm, width 20mm and thickness 2mm by following above mentioned process.

We have taken a Mild Steel (MS) pipe of width 50mm, breadth 25mm and thickness 2mm as shown in figure (3.13).

Fig (3.13) Mild Steel Pipe

We have marked the pipe at distance 600mm from its edge using measuring and marking tools as shown in figure (3.14).

Fig (3.14) marking on pipe

We have performed cutting operation using angle grinder machine with respect to the markings as shown in figure (3.15).

Fig (3.15) cutting of square pipe

We have drilled pipes with the help of radial arm drilling machine at required location as shown in figure (3.16).

Fig (3.16) drilling of pipes

We have obtained all the structural pipes by following above mentioned process as shown in figure (3.17).

Fig (3.17) structural pipes

We have welded all the pipes together using arc welding machine as shown in figure (3.18).

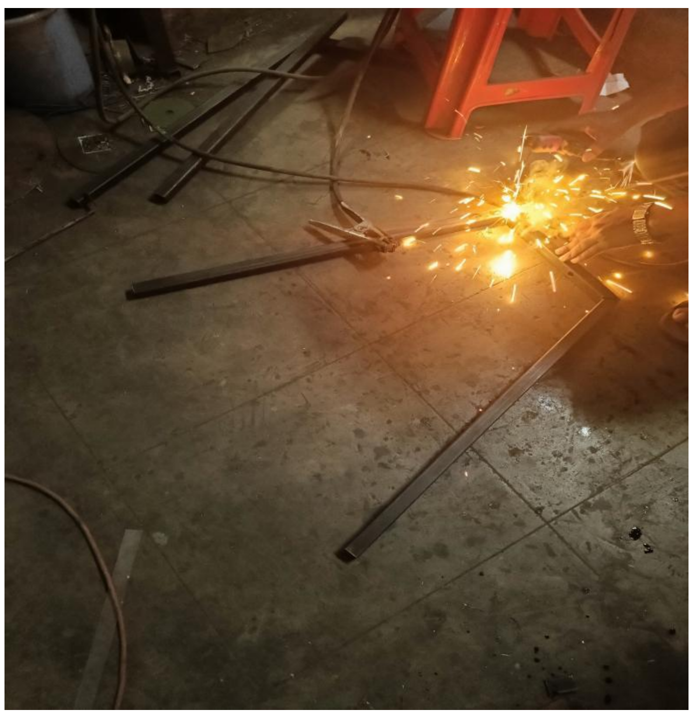


Fig (3.18) welding of chassis base

We have obtained the chassis base frame by following above mentioned process as shown in figure (3.19).

Fig (3.19) chassis base

We have welded the pipes together to form 600mm x 300mm frame as shown in figure (3.20).

Fig (3.20) welding frame

We have welded all the pipes with chassis base using arc welding machine as shown in figure (3.21).

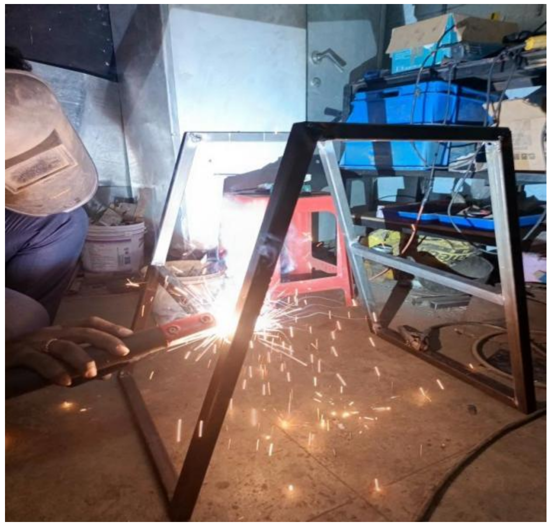


Fig (3.21) chassis

3.4 PARTS ASSEMBLY

We have assembled all the components together and final image of the project is as shown in figure (3.22).

Fig (3.22) project image after assembly

We have fix the motor by using 2 way switches as shown in Fig (3.23)

Fig (3.23)

After assembly all components are painted for 2 coats with oil paint image of the project after painting is as shown in figure (3.24).

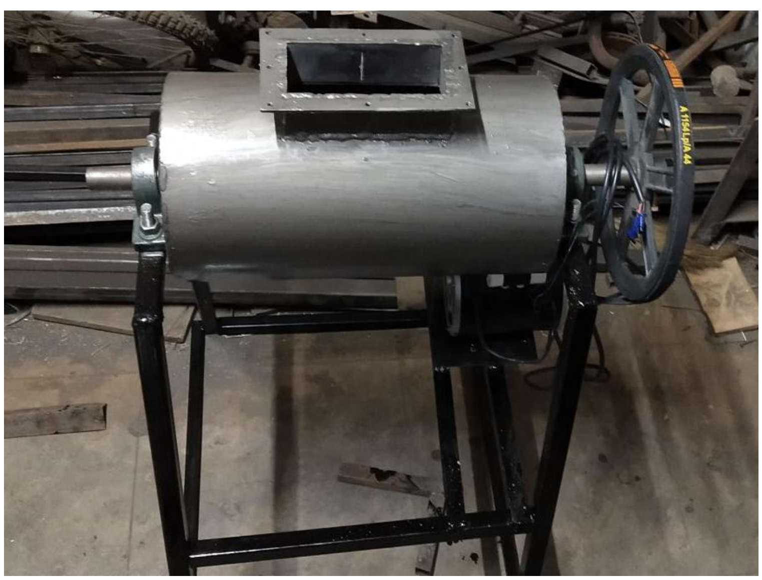


Fig (3.24) painted

3.5 Specification of container :

- The container material is plastic
- The length of the container is 0.75
- And the diameter of the container is 0.45
- And the thickness of the walls of c2ontainer is 0.05m
- The volume of container is 0.1477cubicmeter volume(v)=pi *r^2*h
- The Capacity of the container is 150 lit

Table :3.5 Specifications of compost maker

S.N0	COMPONENT	SPECIFICATIONS
1	DRUM	150 Lit
2	CUTTING MOTOR	650W,230V-AC 1000RPM
3	CUTTER BLADE	8 DIAMETER,5MM THICKNESS AND 20MM WIDE
4	HEATER	500W-HALOGEN BULB
5	HUMIDITY SENSOR	CONTROLLER 6A 12V
6	TEMPERATURE CONTROL SENSOR	3000W
7	PUMP	1 BAR PRESSURE,12V,20W,1LPM

CHAPTER 4

RESULT AND DISCUSSION

Executive Summary:

This report presents the design and analysis of a critical component of a ball mill using ANSYS software.

The ball mill component under consideration is a shell whose integrity is crucial for the efficient performance of the mill. The analysis includes stress and deformation calculations to ensure that the shell can withstand the operational loads without failure.

1. **Geometry and Material Properties:** The geometry of the ball mill shell is modeled using CAD software. Material properties such as density, Young's modulus, and Poisson's ratio are assigned to the model based on the material used for construction.

2. **Meshing:** The CAD model is meshed to discretize the geometry into finite elements. A finer mesh is employed in areas of high stress concentration to ensure accurate results.

3. **Boundary Conditions:** Boundary conditions are applied to simulate the operational loads experienced by the ball mill shell during grinding. These loads include the weight of the grinding media, material to be ground, and dynamic forces generated during rotation.

4. **Analysis:** The finite element analysis is performed using ANSYS software. The software calculates the stress distribution, deformation, and safety factors within the ball mill shell under the applied loads.

5. Evaluation: The results of the analysis are evaluated to determine whether the ball mill shell meets the required safety criteria. Any areas of concern, such as high stress concentrations or excessive deformation, are identified and addressed.

The analysis reveals that the ball mill shell experiences maximum stresses at the points of contact with the grinding media and material to be ground. However, the calculated stresses are well within the yield strength of the material, indicating that the shell is structurally sound.

Analysis of ball mill component details :

1 . Sizing of mesh :

Average Surface Area : 7.8876e-003 m^2
Bounding Box Diagonal : 1.573 m
Minimum Edge Length : 3.9664e-004 m

Statistics of mesh :

Nodes	:	23556
Elements	:	11334

2. generate the total deformation by applying loads in ansys

Results :

Minimum	:	0. m
Maximum	:	2.0665e-006 m
Average	:	1.5043e-007 m

3. generate the Equivalent (von-Mises) Stress by applying loads in ansys

Result :

Minimum	:	0. Pa
Maximum	:	1.607e+007 Pa
Average	:	2.7012e+005 Pa

CONCLUSION

The study on the ball mill design , modeling and analysis is carried out. The ansys analysis of the ball mill shows

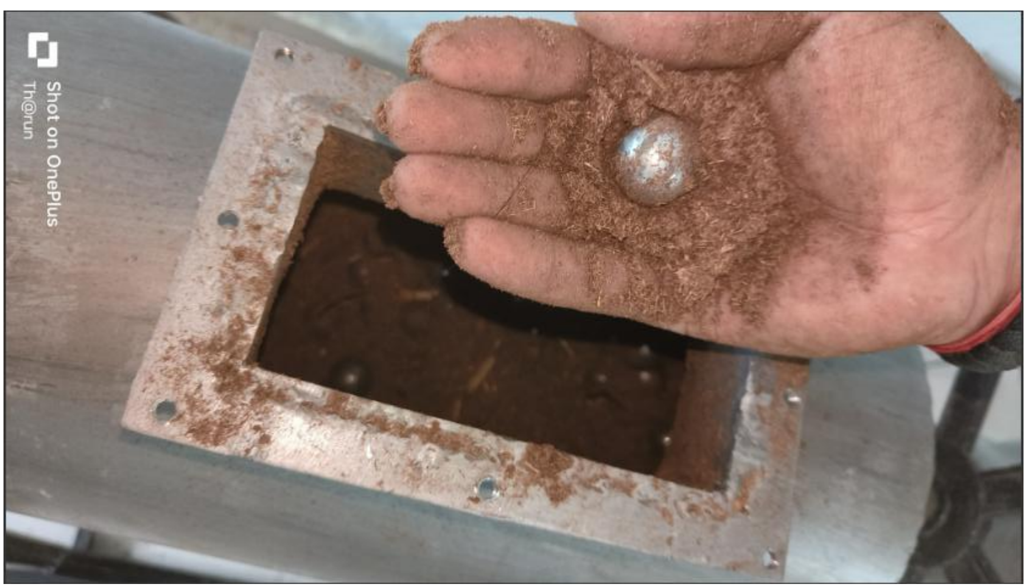
The analysis shows safe design factor of safety

The compost put into the ball mill and ball mill runs 6hours continuously the particles of the compost obtained or in nano and micro size

BEFORE WE PUTTING THE COW DUNG IN TO THE BALL MILL

AFTER THE FINAL RESULT OF WE MAKE IN TO NANO PARTICALS BY USING BALL MILL

The project "Design, Analysis, and Fabrication of Ball Mill for Nano Compost" represents a significant advancement in agricultural technology and waste management. Through careful design, rigorous analysis, and precise fabrication, we have developed a specialized ball mill capable of finely grinding compost materials into nano-scale particles.



Finally we don the nano size of the cow dung by using ball mill machine

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