MULTIPURPOSE CLEANING MACHINE

A PROJECT REPORT

Submitted By

BHOOPALAN	S	18ME007
BOOBASEKUMAR	P	18ME008
DHANUSHVEERA	C. S	18ME009
GOKUL KRISHNAN	S	18ME011
GOKUL	M	18ME012

Submitted for partial fulfillment of requirement for

the award of the Diploma in

MECHANICAL ENGINEERING

SRI RAMAKRISHNA MISSION

VIDYALAYA POLYTECHNIC COLLEGE

(AN AUTONOMOUS AND ISO 9001: 2015 CERTIFIED INSTITUTION)

Sri Ramakrishna Vidyalaya Post, Coimbatore - 641 020

☎0422-2692432♦E-mail: srkvtech56@gmail.com

Fax: (0422) 2692582♦Website: www.srkv.org, www.srkvtech.org

APRIL 2021

SRI RAMAKRISHNA MISSION VIDYALAYA
POLYTECHNIC COLLEGE
COIMBATORE – 641020

BONAFIDE CERTIFICATE

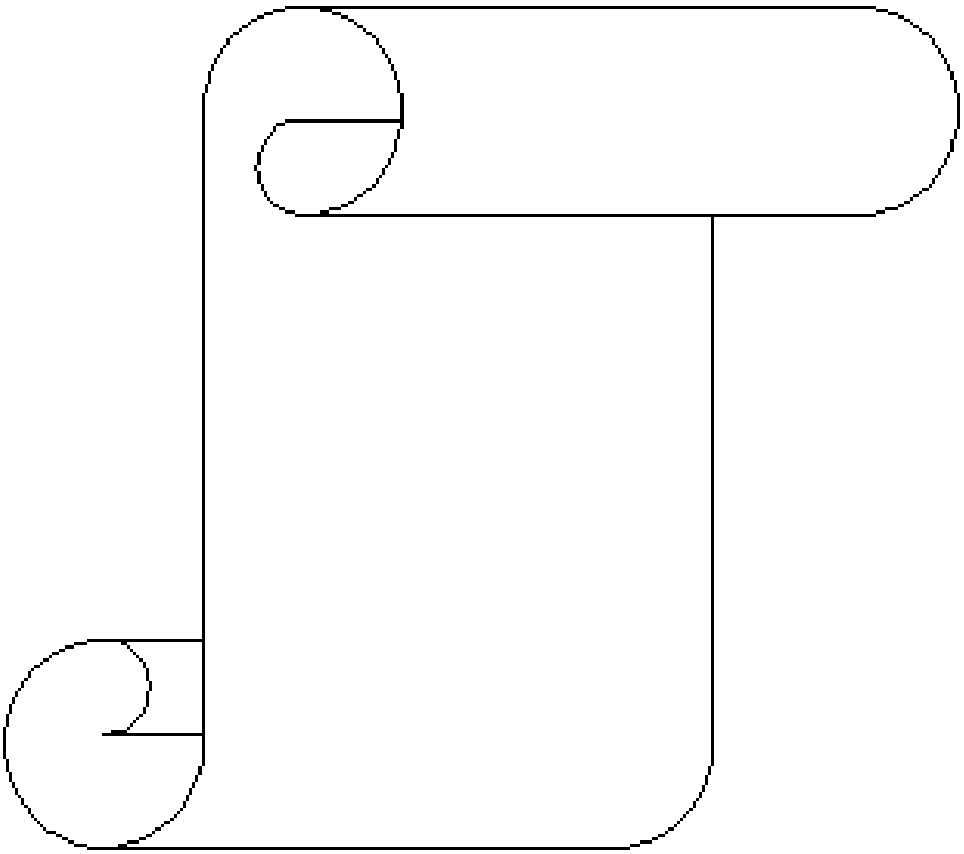
Certified that this project report entitled "**MULTIPURPOSE CLEANING MACHINE**" is a bonafide work done by "……..." with his batch mates, in partial fulfillment of the requirement for the award of Diploma in **MECHANICAL ENGINEERING** under my guidance.

SIGNATURE	**SIGNATURE**
Dr.S.CHANDRASEKARAN.M.E.,Ph.D.	**Sri.G.LAKSHMANAN.B.E.,**
HEAD OF THE DEPARTMENT	**GUIDE**
	Lecturer
Mechanical Engineering	Mechanical Engineering

Submitted for Autonomous Examination held on ……

INTERNAL EXAMINER EXTERNAL EXAMINER

" MULTIPURPOSE CLEANING MACHINE "



ACKNOWLEDGEMENT

ACKNOWLEDGEMENT

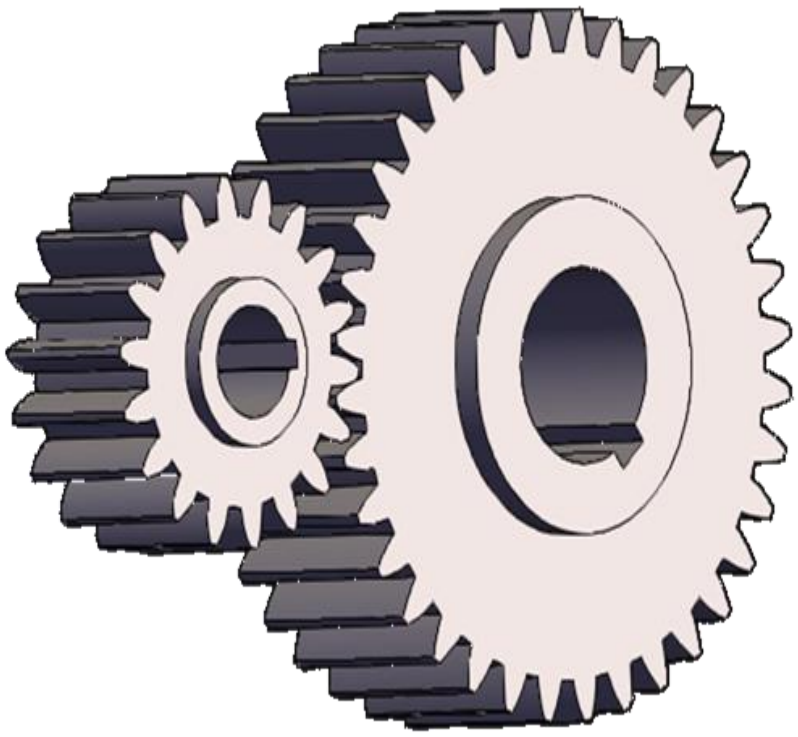
First, we wish to express our deep gratitude to our correspondent **SWAMI ANAPEKSHANANDA MAHARAJ** for providing us a glance for fulfilling of a long cherished dream of becoming Mechanical Engineers.

We take immense pleasure to express your heart full thanks to our principal **Dr.N.BALASUBRAMANI M.E., Ph.D.** for providing us the necessary facilities, which enable us to successfully complete our project.

We also express our sincere and hearty thanks to our Head of the Department **Dr.S.CHANDRASEKARAN ME., Ph.D.** of Mechanical engineering for providing necessary facilities and suggestion, which made us to successfully complete our project.

We take pleasure in expressing our sincere gratitude to our project guide Er.**G.LAKSHMANAN B.E.,** Lecturer of Mechanical Engineering department for his guidance and suggestions to complete our project.

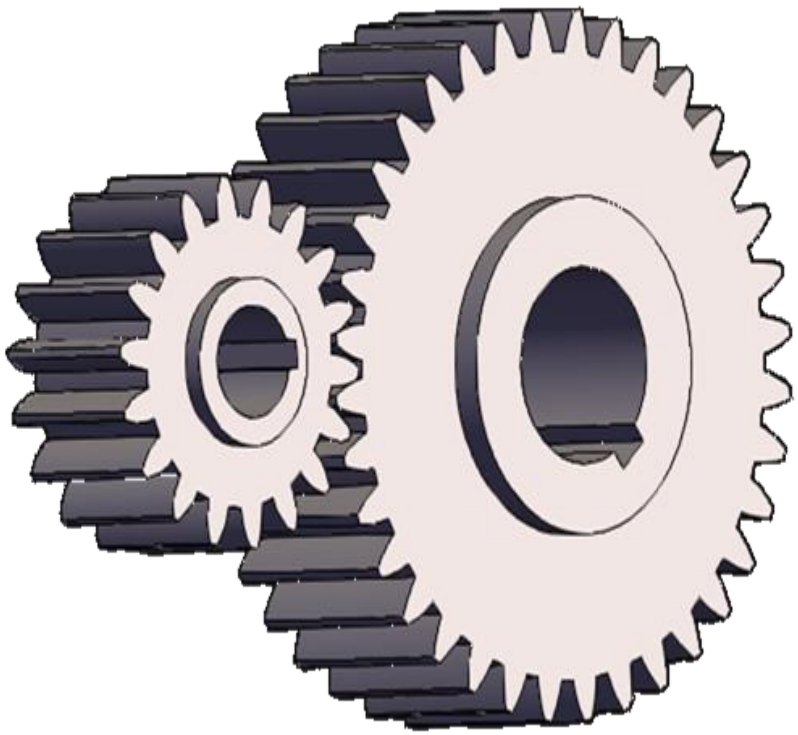
We also express our sincere thanks to teaching and non-teaching staff of our institution for their valuable help to complete our project.



ABSTRACT

ABSTRACT

- In this project, we are going to design and fabricate a multipurpose cleaning machine. Cleaning is the main basic need for all human beings and it is necessary for daily routine process.
- Our aim is to fabricate this machine with low cost and makes it easy to use for cleaning all places.
- The manually operated cleaning machine can work very efficiently with respect to covering area, time and cost of road cleaning process compared with the existing machinery.
- Our project consists of handle, wheels, vacuum pump, dust tray and cleaning brush, Vacuum pump is used as an alternative source while cleaning in non-flat surfaces.



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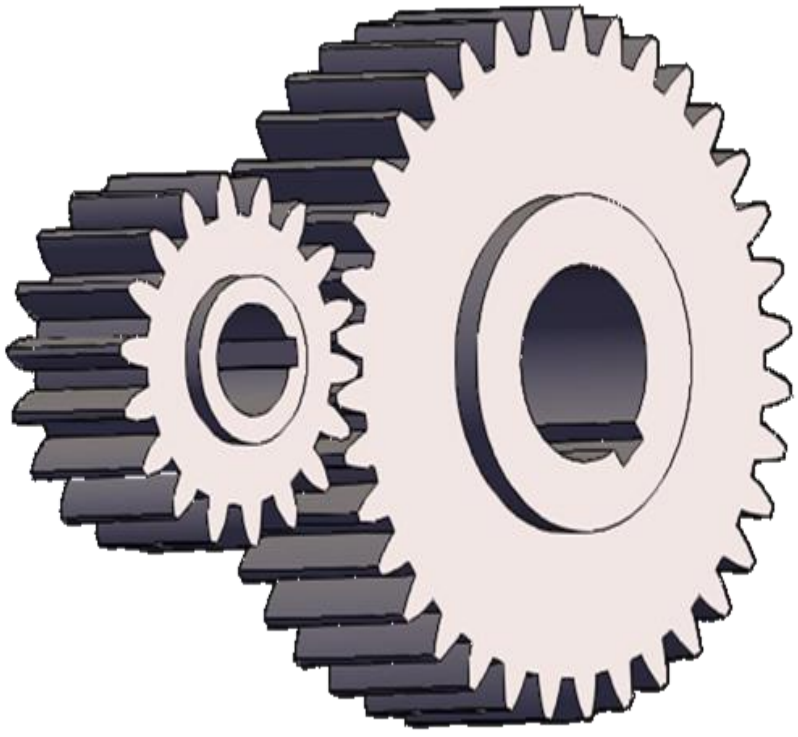

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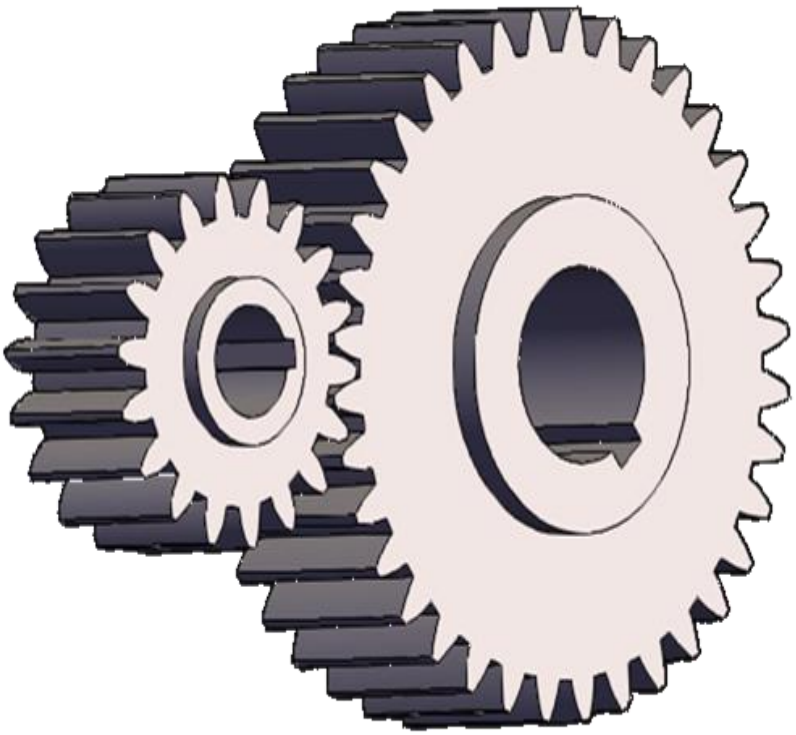

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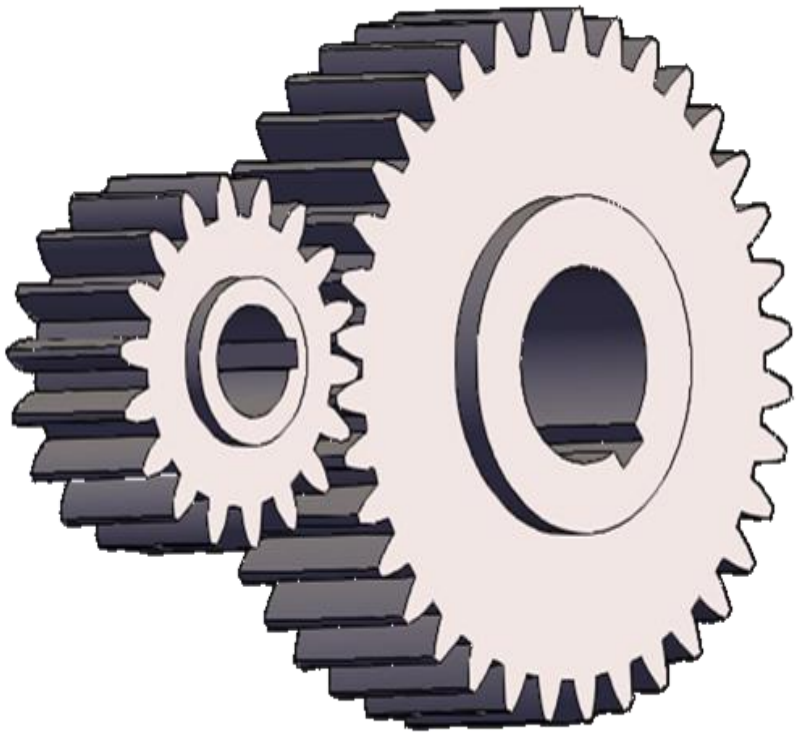
CHAPTER I

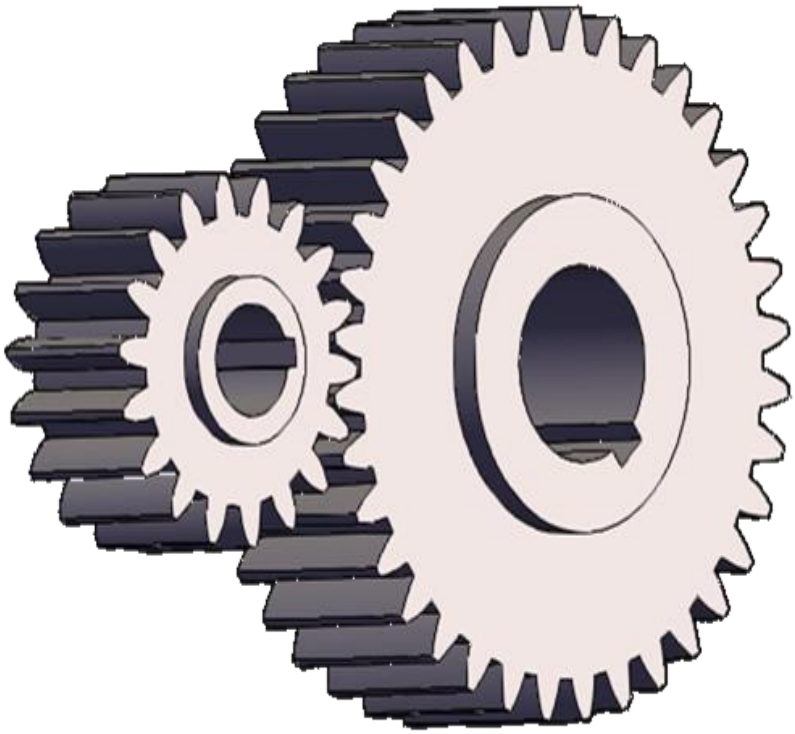


INTRODUCTION

I.INTRODUCTION

- A multipurpose cleaning machine is manually operated, so that it can be as an alternative for conventional electric cleaning machine.
- The dust cleaning machine system is fixed with a pair of wheels which are connected with the help of shaft.
- The shaft makes the wheels connected to one and other. The wheels are moved to the desired position with the help of manual force, which can handle is provided to move.
- The handle can be adjusted for a required height and are provided three adjusting holes for it.
- A chain drive is connected to the wheels and gear at each side. The chain is moved according to the wheel and gear.
- The brush moving the alternative direction of the wheels move and the brush brooms the waste present on the road also it dumps the waste into the waste-collecting box.
- The waste collection box is removed to dump the waste into desired places.

CHAPTER II



LITERATURE SURVEY

II.LITERATURE SURVEY

M. Ranjith Kumar et al 2015- "Design and Analysis of Manually Operated Floor Cleaning Machine"- The authors have been designed and analyzed manually operated floor cleaning machine. From his research he concluded the stress level in the manually operated machine is within the safe limit.

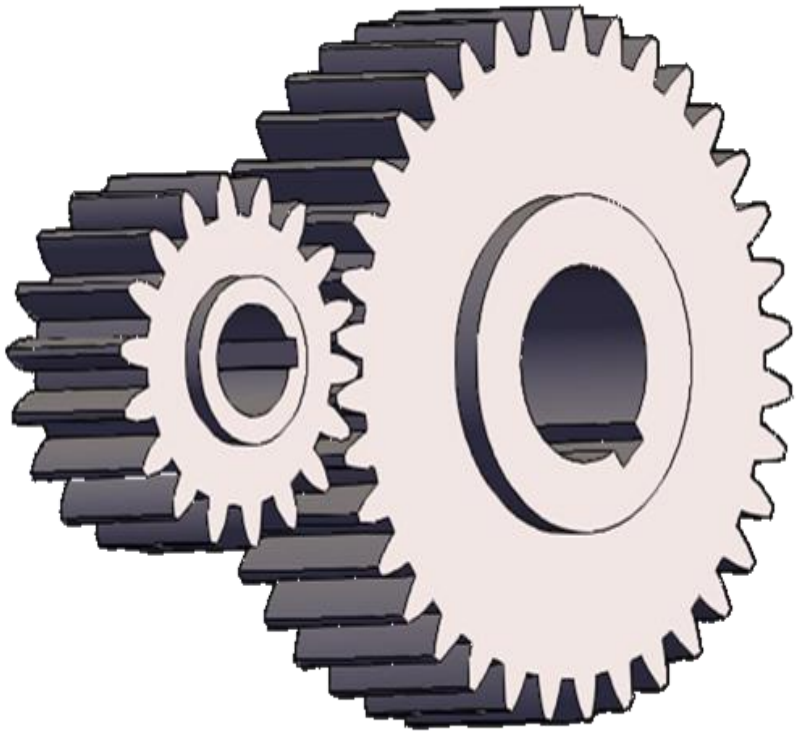
Sandeep. J. Meshram et al 2016- "Design and Development of Tricycle Operated Street Cleaning Machine" – He has developed the street cleaning machine by tricycle operated. In this research article he framed a model especially for rural area. He concluded that the cleaning is less effective where the street seems to be very rough and damaged.

Imaekhai Lawrence et al 2012– "Evaluating Single Disc Floor Cleaners" - The evaluation has shown how the use of multiple assessment techniques can provide a comprehensive appraisal of the design, usability and musculoskeletal loading upon the operator. They suggested that the trials with a larger number of subjects would certainly strengthen the conclusions.

Abhishek Chakra borty et al 2013 – "Design of Dust Collector for Rear Wheel" – They reported that the most significant cause of road dust to the total suspended particulate burden is vehicle traveling on paved and unpaved' surfaces. Consequently, data directly relating dust to road accidents are rare, but in a study if dust is the cause of 10% of these accidents casualties then the cost could amount to as much as 0.02% of GDP in some developing countries and total about $800 million annually.

Arjun V Murali et al. in their research, they work on floor cleaning machine. Their aim to develop and modernized process for cleaning the floor with wet and dry. At first dust is collected from vacuum cleaner.

CHAPTER III



III.DESCRIPTION OF EQUIPMENTS

III.DESCRIPTION OF EQUIPMENTS

The multipurpose cleaning machine consists of the following components to full fill the requirements of complete operations.

1. Wheels
2. Cleaning brush
3. Bearing
4. Tray
5. Bevel gearing
6. Vacuum cleaning
7. Chain

WHEELS

FIG 1.1

- In its primitive form, a wheel is a circular block of a hard and durable material at whose center has been bored a hole through which is placed about which the wheel rotates when torque is applied to the wheel about its axis.
- Wheels reduce friction. Instead of simply sliding over the ground, the wheels dig in and rotate, turning around sturdy rods called axis

BRUSH

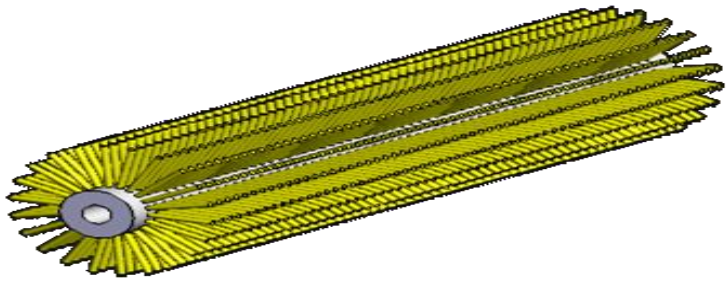


FIG 1.2

- A brush is a common tool with bristles, wire or other filaments. It generally consists of a handle or block to which filaments are affixed in either a parallel or perpendicular orientation, depending on the way the brush is to be gripped during the use.

BEARING

FIG 1.3

- A bearing is a machine element that constraint relative motion to only the desired motion, and reduces friction between moving parts. For example, it provides a free linear movement of the moving part or for free rotation around a fixed axis; or, it may prevent a motion by controlling the vectors of normal forces that bear on the moving parts.

TRAY

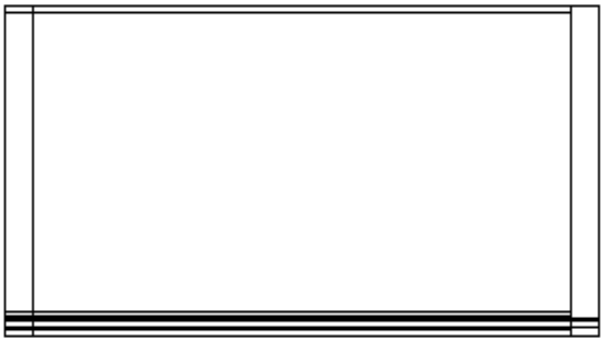


FIG 1.4

Tray is used to collect the dust from the brush. The brush pushes the dust into the tray. Thus, the dust is collected and stored into tray.

BEVEL GEAR

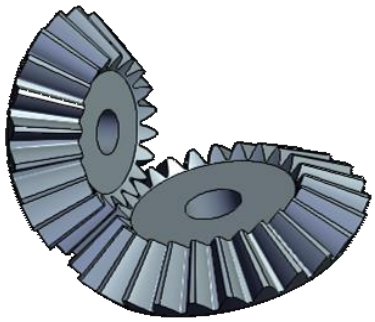


FIG 1.5

- Bevel gear are cone-shaped gear whose teeth mesh together to transmit power between two shaft that are at an angle to each other.
- The tooth-bearing surface of bevel gear have a conical shape. The shape of a bevel gear allows it to mesh with another gear whose axis is at an angle to it. Bevel gear are cone-shaped gear whose teeth mesh together to transmit power between two shaft that are at an angle to each other.

CHAIN

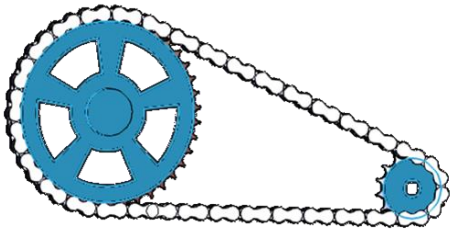


FIG 1.6

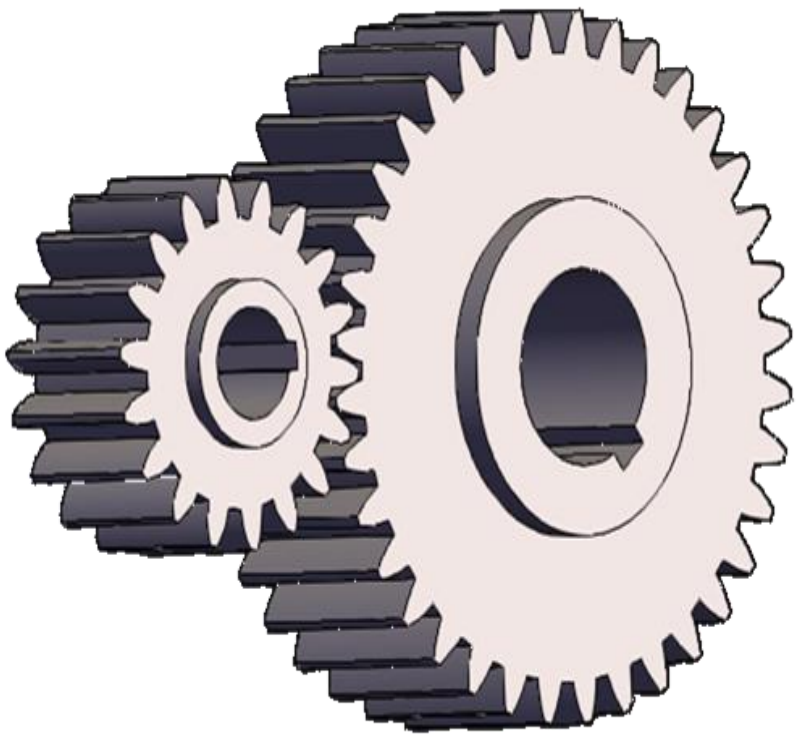
- Chain drive is a way of transmitting mechanical power from one place to another. It is often used to convey power to the wheels of a vehicle, particularly bicycles and motorcycles. It is also used in a wide variety of machines besides vehicles.

VACUUM CLEANER

FIG 1.7

- A vacuum cleaner, also known simply as a vacuum or a hoover, is a device that causes suction in order to remove debris from floors, upholstery, draperies and other surfaces. It is generally electrically driven.

CHAPTER IV

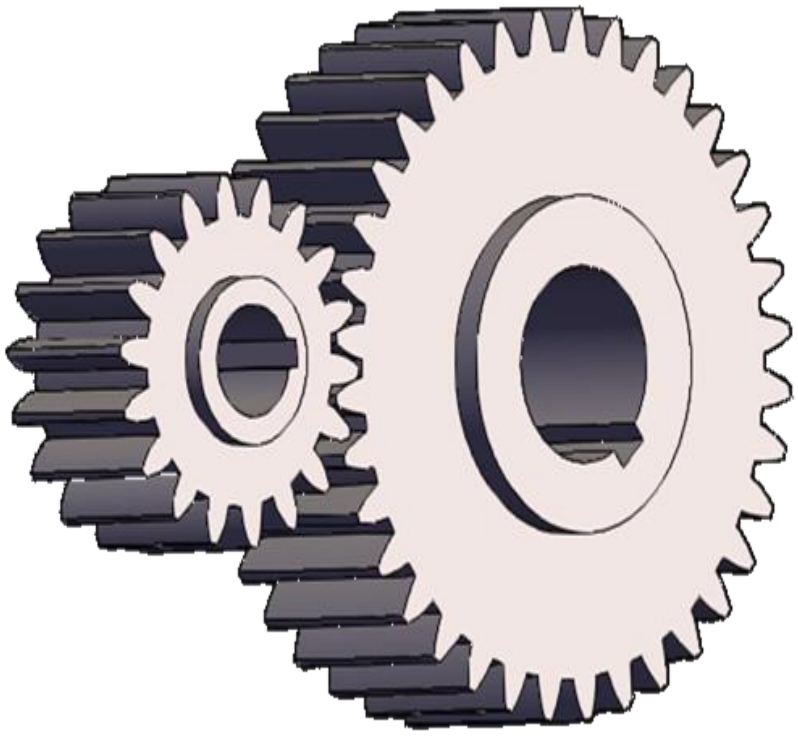


WORKING PRINCIPLE

IV.WORKING PRINCIPLE

- The device is fixed with pair of wheels which are connected to help an axle shaft. The handle frame is fastened with axle shaft.
- The chassis frame is welded with handle frame for carrying front wheel.
- The bearings are mounted on the chassis frame behind the front wheel and dust tray is welded and placed with brush assembly.
- The cleaning brush assembly is fixed inside the bearings and connected with axle shaft through chain sprocket.
- While the system moves manually in forward direction, the movement of rear wheel transmits the motion to cleaning brush assembly through chain.
- The rotations of the centre brush on the floor and sweep the trash. Dust tray collects the trash from the centre brush.
- Vacuum pump is operated while cleaning non-flat surfaces.
- Side brush is connected through the chain from the centre brush and the side brush is driven by using bevel gears.
- Bevel gears are used to convert horizontal rotation to vertical rotation.
- The dust swiped by the side brush is collected by the tray using centre brush.

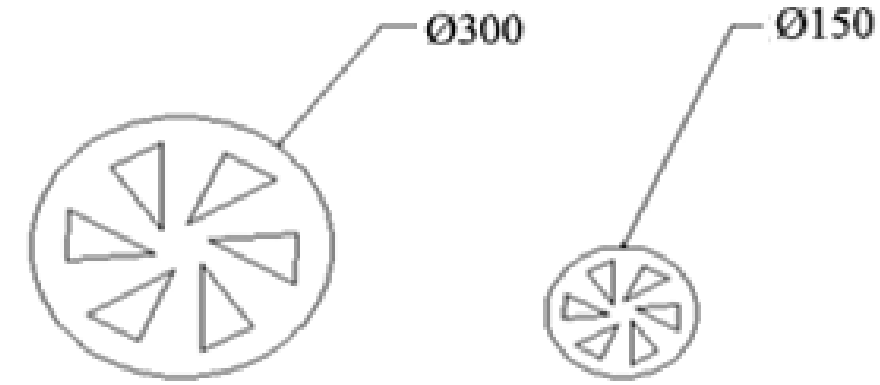
CHAPTER V



DESIGN & DRAWING

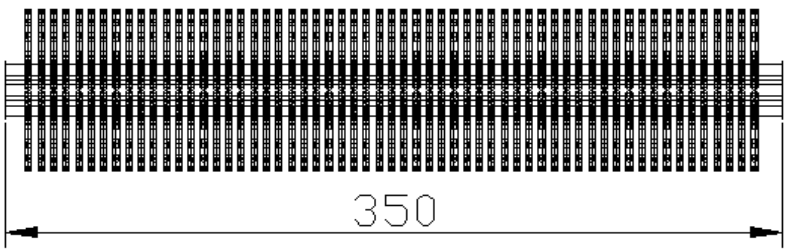
V.DESGIN & DRAWING

WHEELS



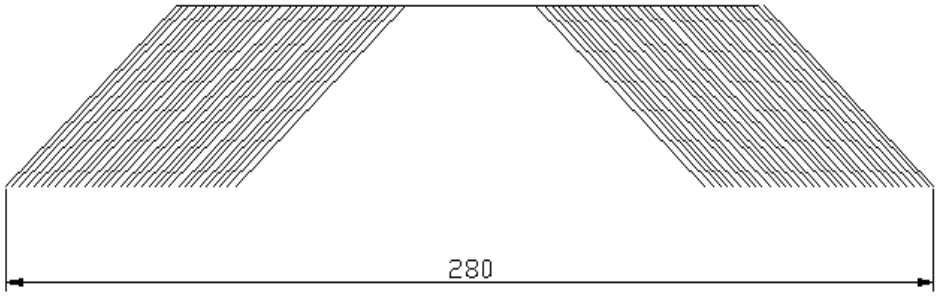
All dimensions are in mm

CENTRE BRUSH



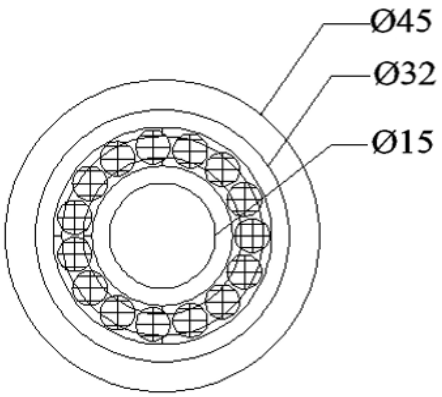
All dimensions are in mm

SIDE BRUSH



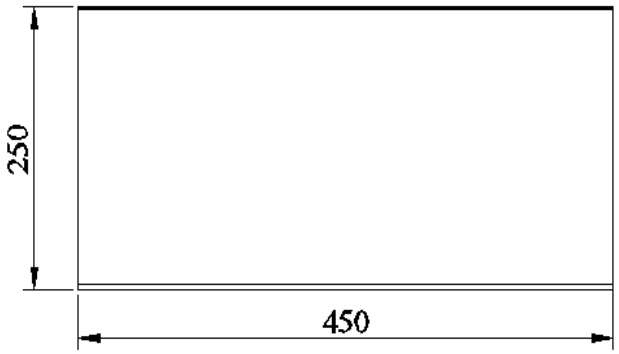
All dimensions are in mm

BEARING



All dimensions are in mm

TRAY



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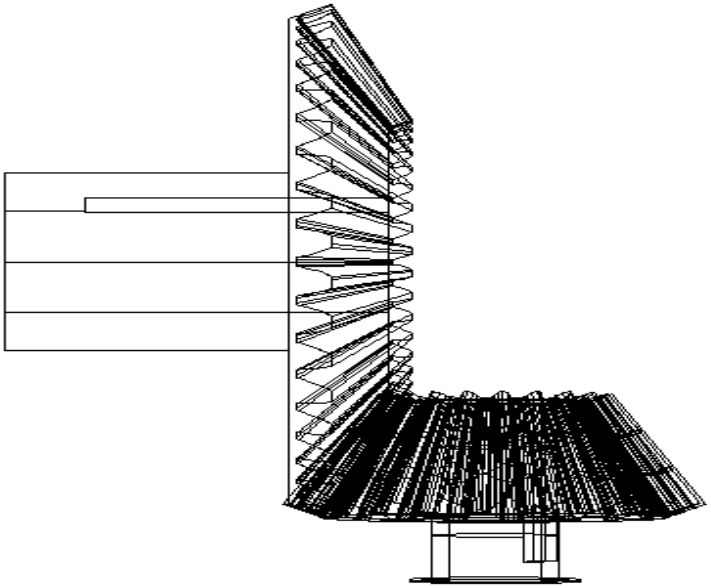
BEVEL GEAR



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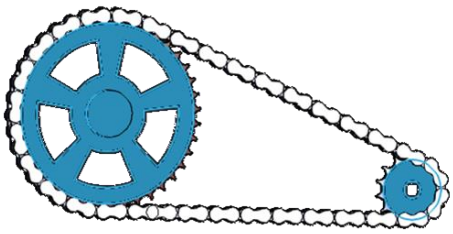
CHAIN



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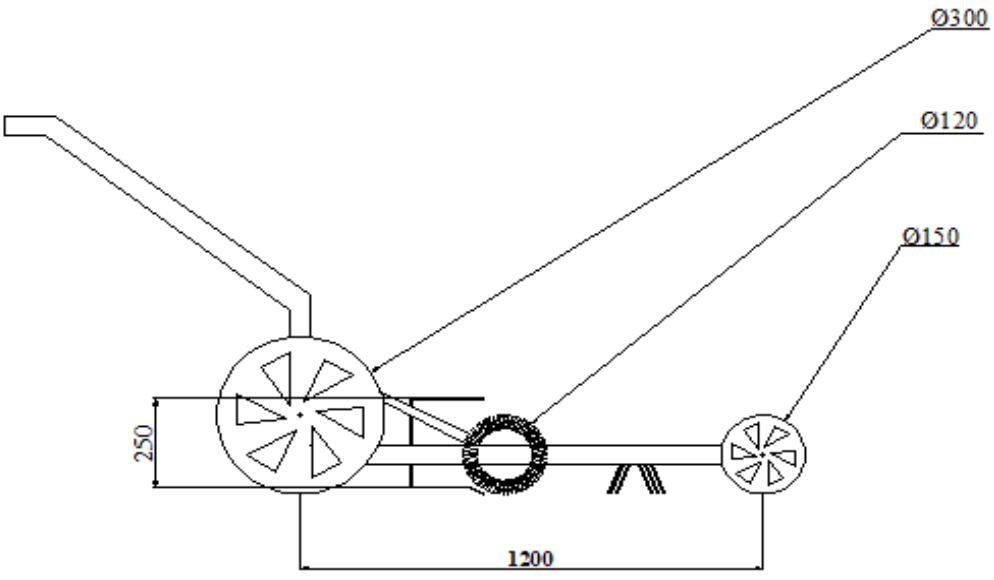
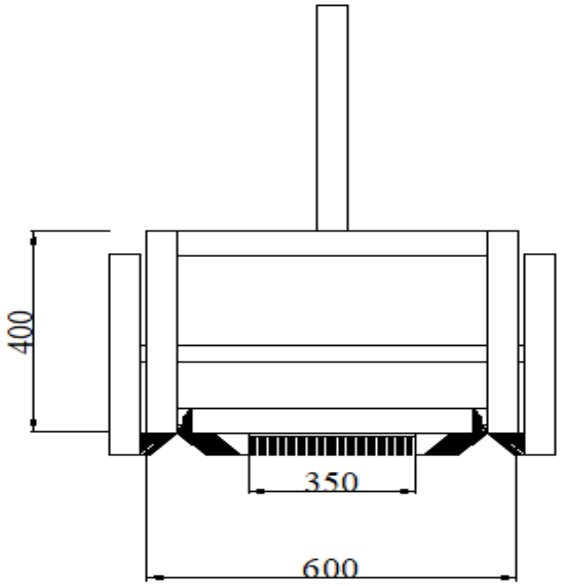
FRONT VIEW



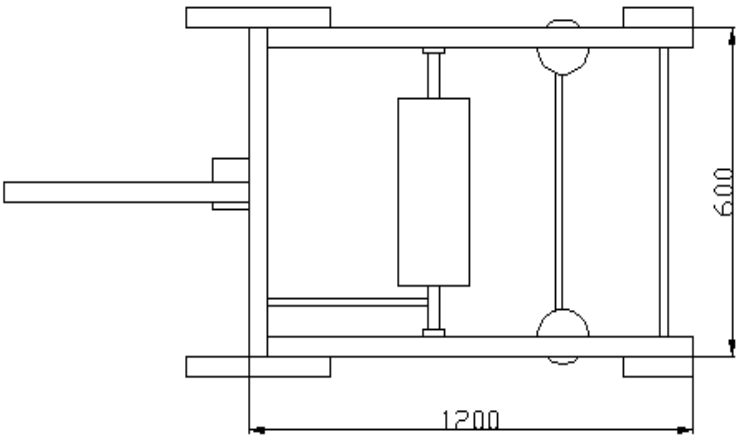
All dimensions are in mm

SIDE VIEW



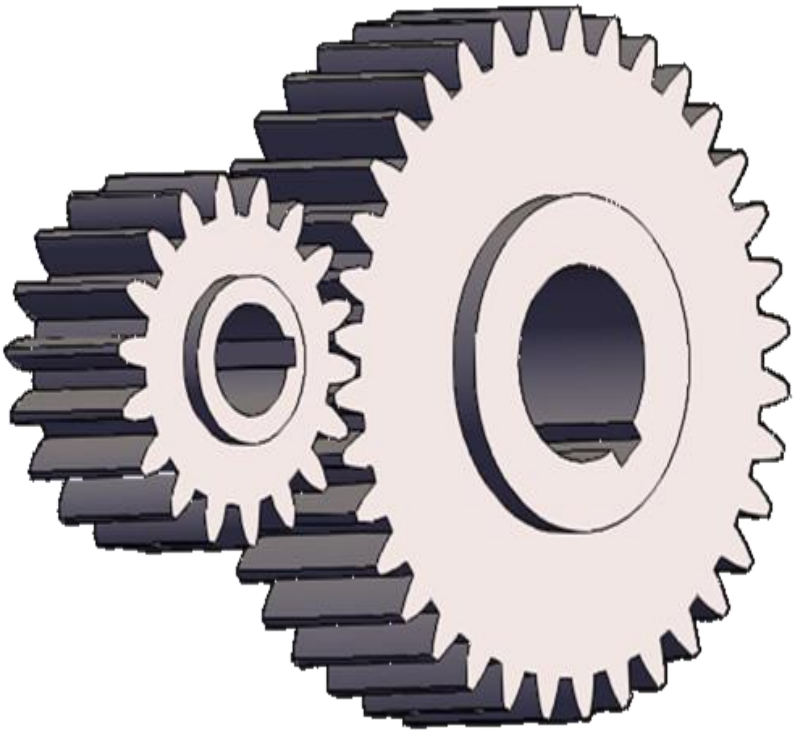
All dimensions are in mm

TOP VIEW



All dimensions are in mm

CHAPTER VI



MERITS & DEMERITS

VI. MERITS AND DEMERITS

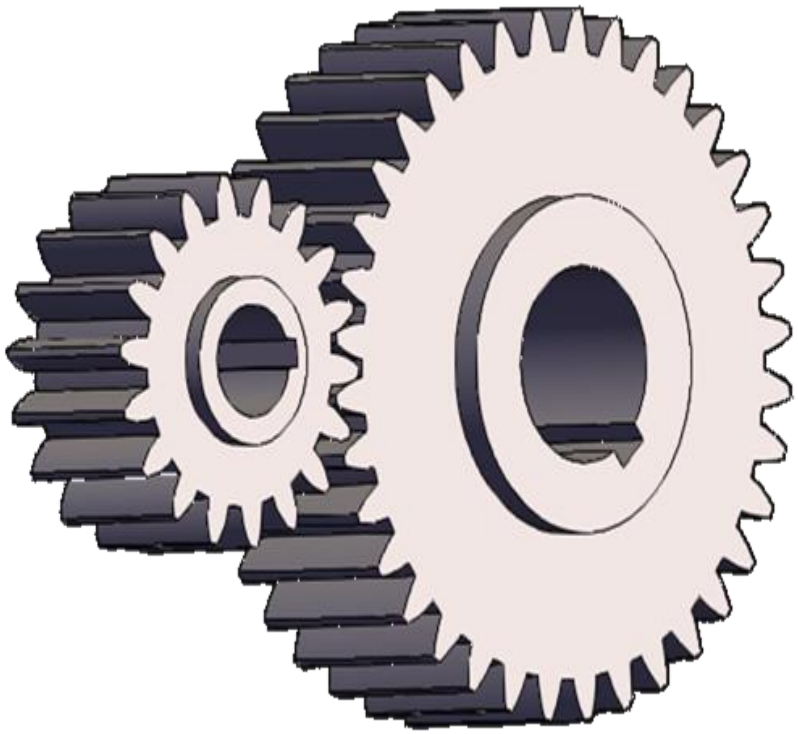
6.1 MERITS

- Equipment cost is low.
- Reduced Human Effort.
- Non flat surfaces can also be cleaned.

6.2 DEMERITS

- Constricted areas cannot be cleaned

CHAPTER VII

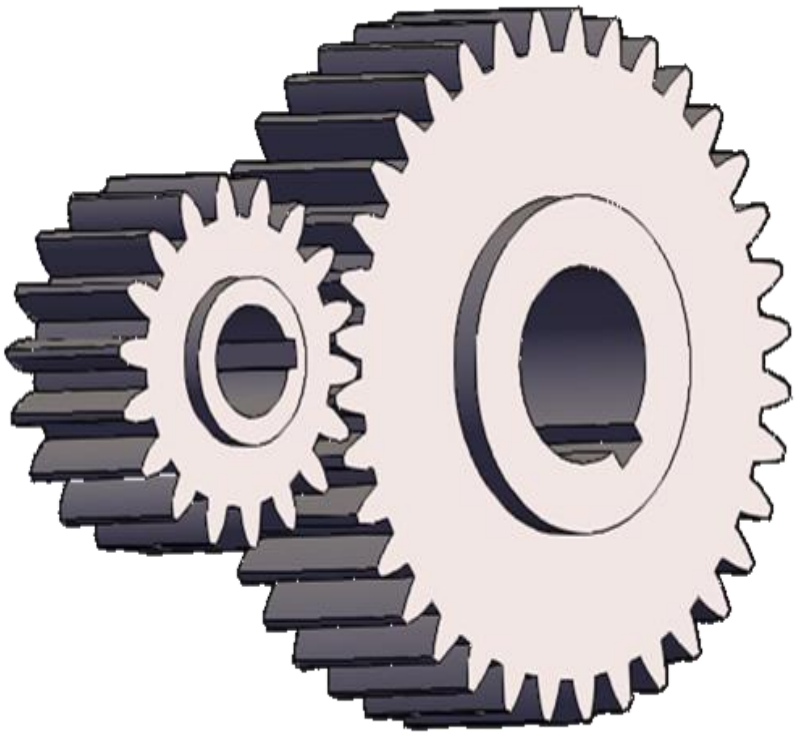


APPLICATIONS

VII.APPLICATIONS

- Multipurpose cleaning machine is used for cleaning areas such as roads, railway stations, airports, hospitals etc.
- Dust can be easily collected in tray.
- Thus, the time can be saved.

CHAPTER VIII

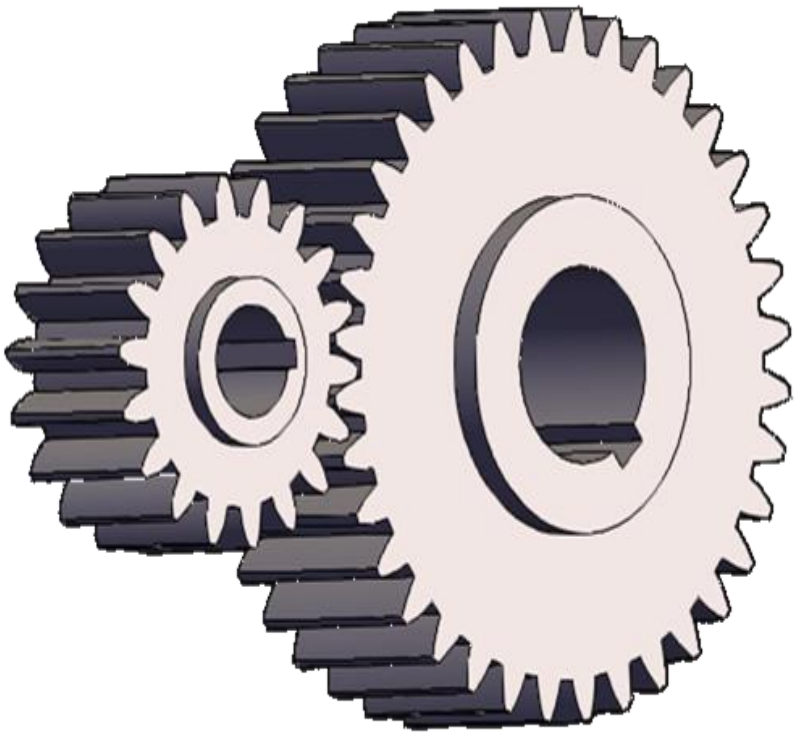


LIST OF MATERIALS

VIII.LIST OF MATERIALS

NAME OF COMPONENTS	NO OF COMPONENTS	MATERIAL USED
FRAME	4 LENGTH	M.S
WHEELS	2	RUBBER
BEVEL GEAR	1 PAIR	CAST STEEL
CENTRE BRUSH	1	NYLON
SIDE BRUSH	2	NYLON
BALL BEARING	4	CHROME STEEL
TRAY	1	SHEET METAL
CHAIN	1	STAINLESS STEEL
VACUUM CLEANER	1	STAINLESS STEEL AND PLASTIC

CHAPTER IX

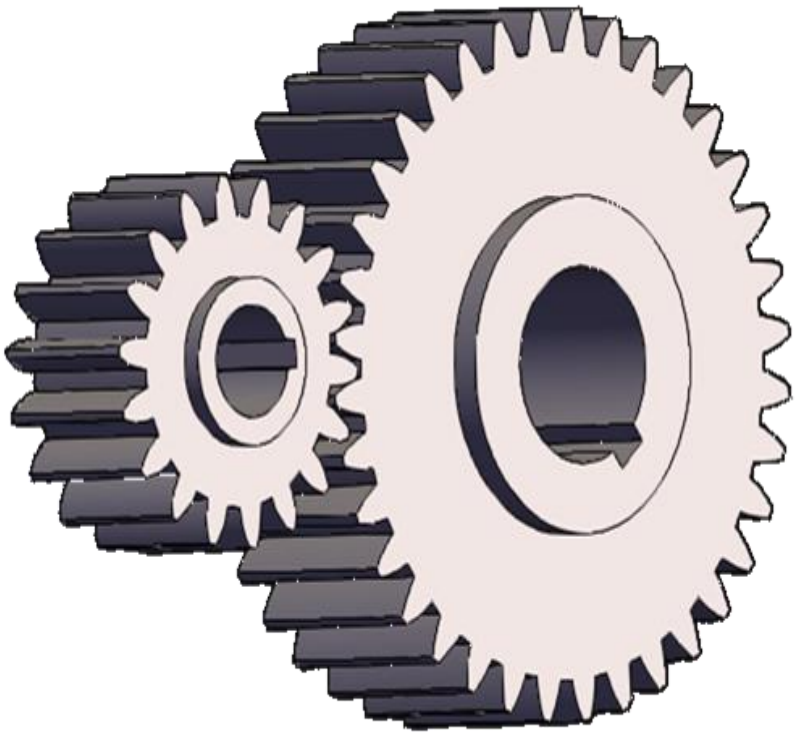


COST ESTIMATION

IX.COST ESTIMATION

SI.NO	DESCRIPTION	COST
1	FRAME	1200
2	WHEELS	600
3	BEVEL GEAR	600
4	BRUSH	3000
5	BALL BEARING	600
6	TRAY	500
7	VACUUM CLEANER	1000
8	CHAIN	500
	TOTAL	8000

CHAPTER X



LABOUR COST & TRANSPORT CHARGES

X.LABOUR COST & TRANSPORT CHARGES

LABOUR COST:

Lathe, welding, grinding, cutting: cost

=3000/-

OVERHEAD CHARGES:

The overhead charges are arrived by “Manufacturing cost”

Manufacturing cost = Material Cost + Overhead charge

= 8000+1000

= Rs.9000/-

TOTAL COST:

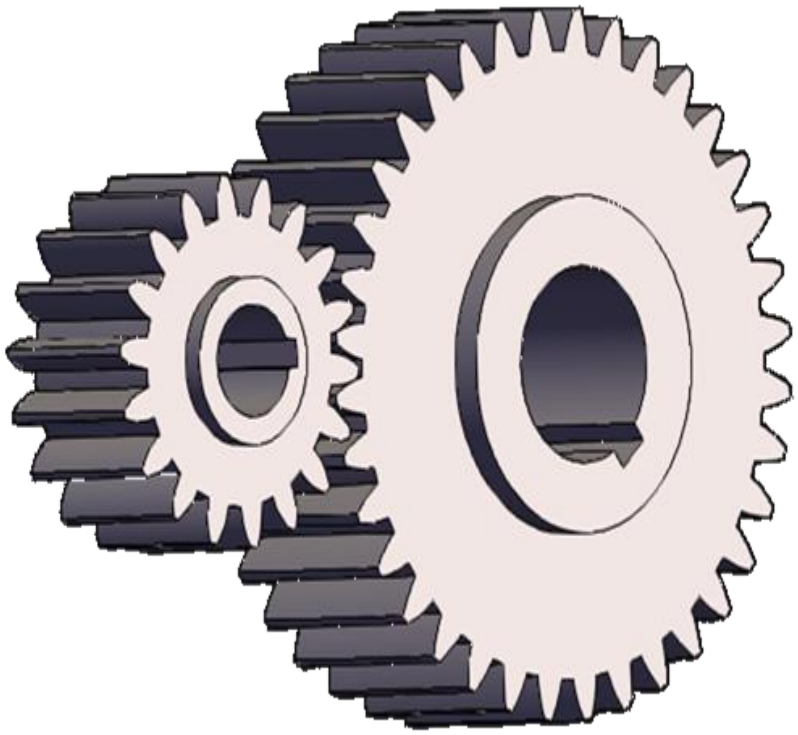
Total cost = Material Cost + Labor Cost+ Overhead charges

= 8000+3000+1000

= Rs. 12000/-

Total cost of this project is = Rs. 12000/-

CHAPTER XI

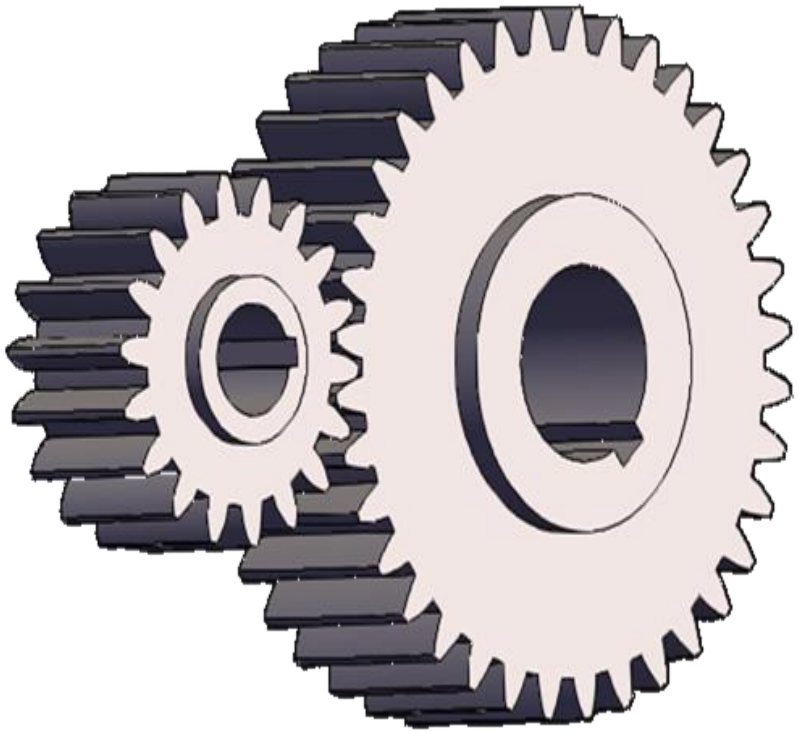


CONCLUSION

XI.CONCLUSION

The project carried out by us made made an impressing ask in colleges. This project has also reduced the cost involved in the concern. This project has been designed to perform the entire requirement task which has also been provided. This project carried to by us made an impressing task in the field of cost of production of is very less so the source of power is free and available in plenty and then is no power interruptions. This project has also reduced the cost involve in the concern. Project has been designed to perform the entire retirement task which has also been provided. This project helped us to know the periodic steps in completing a project work. Thus, we have completed the project successfully.

CHAPTER XII



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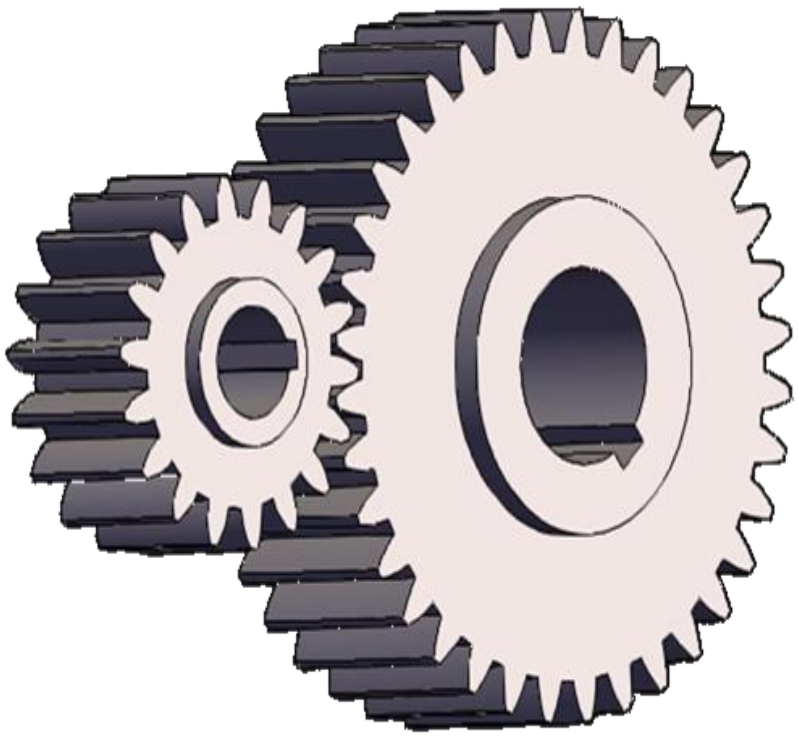
CHAPTER XIII



PHOTOGRAPHY

FRONT VIEW

SIDE VIEW

TOP VIEW