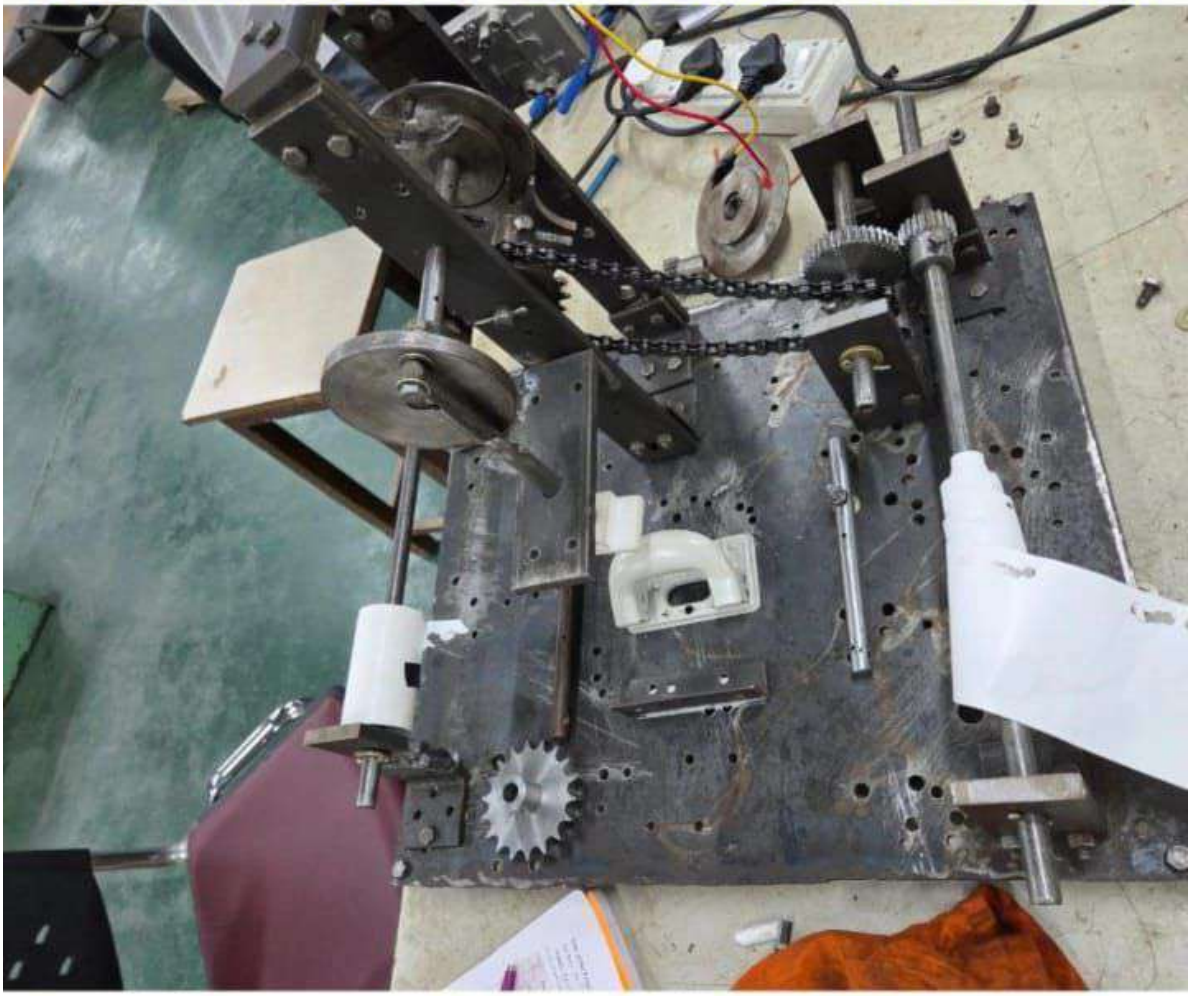
TA212 – Manufacturing Processes-II

2nd Sem 2024–25

Group No. 34

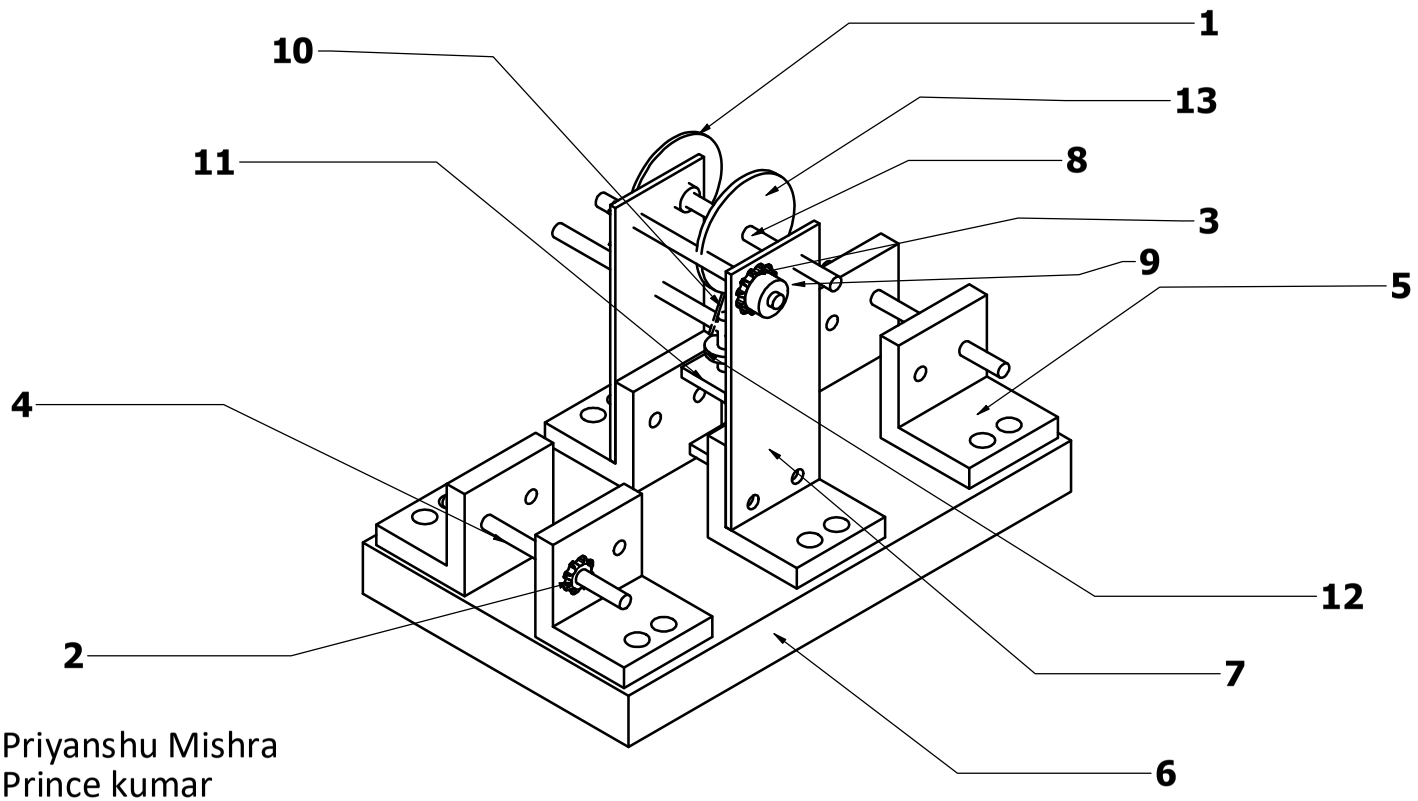
AUTOMATIC PUNCHING MACHINE



Tutor – Mr. Kishan B Prajapati

Course Instructor – Dr. Arvind Kumar

Paper Stamping Machine



230806 Priyanshu Mishra
230791 Prince kumar
230764 Pradeep Kumar Meena
230824 Raghvendra Singh
230964 Shenkesi Neha Pate
230978 Shivesh Shukla

GROUP 34 (FRIDAY)
Guide- Mr. KISHAN B.PRAJAPATI

ACKNOWLEDGEMENT

We would like to express our heartfelt gratitude to our project guide, Mr. Kishan Prajapati, for his consistent support, technical expertise, and valuable guidance throughout the development of our project, *Automatic Punching Machine*. His mentorship played a crucial role in shaping our understanding of mechanical design, fabrication processes, and system integration. His encouragement and constructive feedback motivated us to approach each challenge with confidence and clarity.

We are especially thankful to Dr. Arvind Kumar for providing us with access to the laboratory facilities, tools, and other essential resources that were fundamental to the successful execution of our project.

We also sincerely acknowledge the cooperation and assistance provided by the faculty and staff of IIT Kanpur, whose contributions during the fabrication, machining, and testing phases were invaluable. Their technical support and timely interventions greatly enhanced the overall quality and functionality of our machine. This project has been an enriching experience for us, allowing the practical application of our theoretical knowledge and giving us a hands-on understanding of real-world engineering challenges. The skills and insights gained through this endeavor will undoubtedly benefit us in our future academic and professional pursuit

ABSTRACT

The **Automatic Punching Machine** is designed to automate the process of punching holes in materials such as sheet metal, plastic, and paper. This project aims to reduce human effort, enhance productivity, and ensure precision in repetitive punching operations. The machine operates on the utilizing various mechanical components to perform the punching operation with accuracy and

The primary advantages of this system include time-saving, increased accuracy, reduced manual labor, and a reduction in human errors, making it ideal for mass production and continuous operations. The machine is particularly useful in industries such as sheet metal fabrication, leather processing, and packaging, where high-volume punching is required.

This project demonstrates how mechanical automation can enhance productivity in manufacturing processes. The use of simple yet effective components like Geneva gears, sprockets, spur gears, and electric motors allows for an efficient, low-cost solution that can be further improved with sensors and advanced control systems

The system is powered by an **electric motor** that drives the entire operation. A **Geneva gear** is incorporated into the design to convert continuous rotational motion into intermittent motion, allowing the punching mechanism to operate at specific intervals. The use of a **spur gear** helps in transferring rotational motion and adjusting the torque and speed, while a **sprocket and chain system** ensures the efficient movement of material under the punch head.

The punching action is initiated after the material is placed under the punch die, and the machine activates through a control system. The punch mechanism then presses down onto the material, creating a hole, before returning to its starting position to prepare for the next cycle. This cycle repeats until all required holes are punched in the material.

INDEX

Cost Analysis

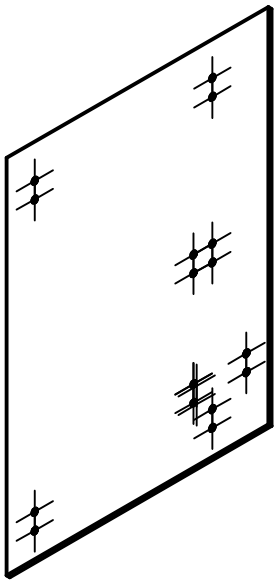
S.No.	Part name	Quantity	Approximate Cost
1	Base Plate	1	₹850 – ₹1,150
2	Short Support	9	9*(₹90 – ₹140)
3	Large Support	2	2*(₹200 – ₹305)
4	Bracket	13	13*(₹95 – ₹150)
5	Rods	1	₹110 – ₹160
6	Geneva Driven	1	₹120 – ₹160
7	Geneva Driver	1	₹140 – ₹200
8	Connecting Disc	1	₹120 – ₹180
9	Pushing Part	1	₹15 – ₹25
10	Spur Gears	1	₹550 – ₹700
12	Sprockets	1	₹550 – ₹700
Final Estimate-			₹4,900 – ₹7,095

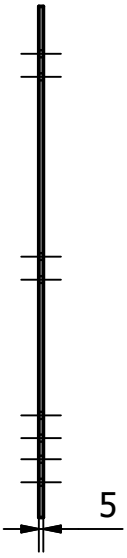
MOTIVATION

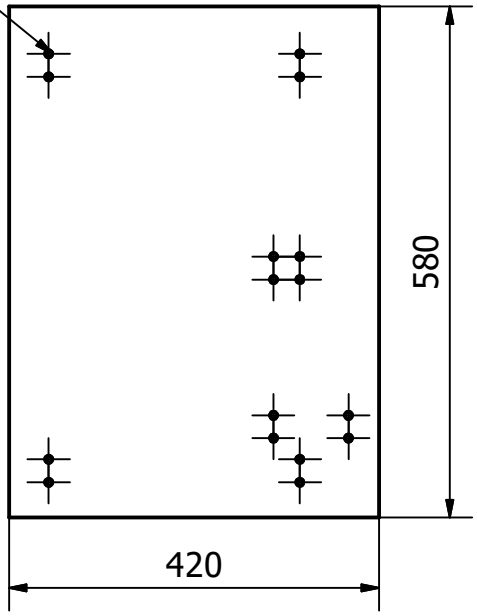
The motivation behind this project is to develop an automated system that minimizes human effort , increases productivity, and ensures precision and uniformity in punching operations. In many industries and workshops, punching machines are still performed manually, leading to increased labor, fatigue, time consumption, and inconsistency in results. Manual methods also pose safety risks and are inefficient for mass production

In offices, schools, and printing environments, punching holes in paper is a common but repetitive and time-consuming task. Manual punching not only slows down productivity but also causes physical strain, especially when processing large volumes of paper. Additionally, manual errors in alignment or inconsistent punching can lead to wastage of materials and unprofessional output. It also reflects the growing need to automate basic office processes in order to save time and improve overall workflow.

This project highlights the importance of innovation in everyday tasks and encourages the use of automation to solve real-world problems in a cost-effective and user-friendly manner.



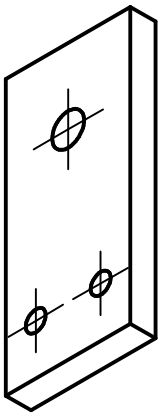


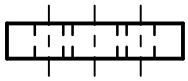


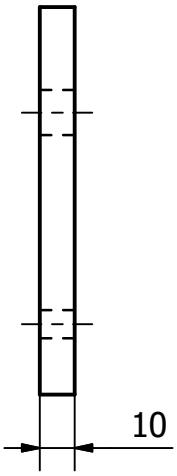
Material Used- Mild Steel
Process- Drilling

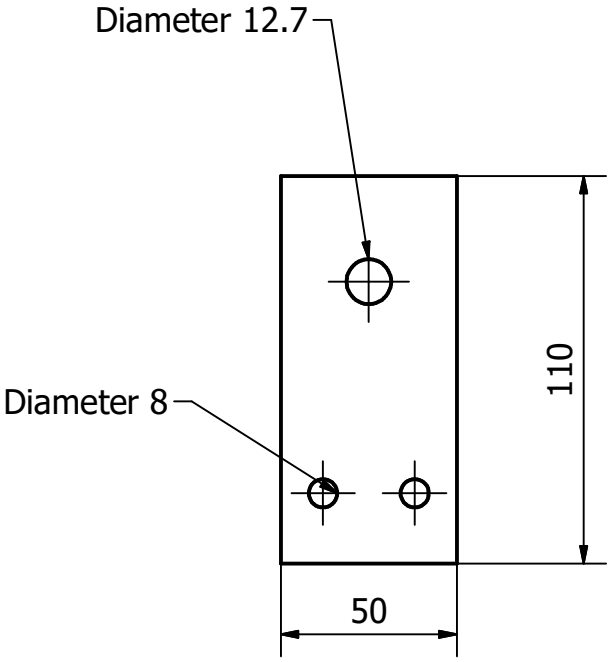
Designed by	Checked by	Approved by	Date		Date	
HP					19-04-2025	

Base Plate	Scale 1:8		
		Edition	Sheet 1 / 15





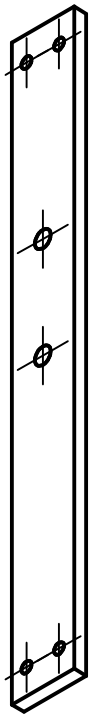


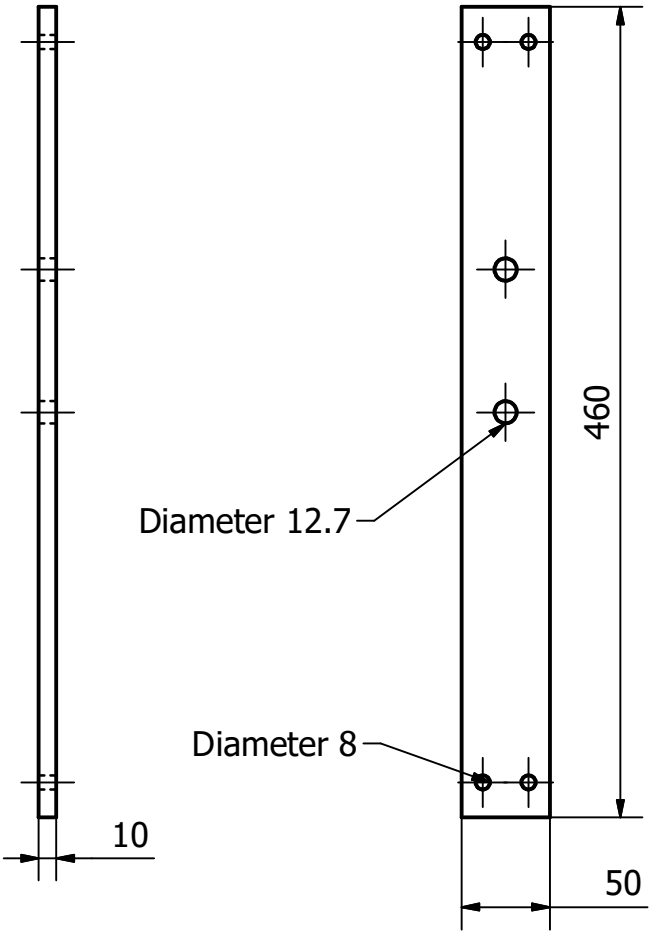


Material Used- Mild Steel
Process- Drilling , Cutting

Designed by	Checked by	Approved by	Date		Date	
HP					19-04-2025	

Short Support	Scale 1:2		
		Edition	Sheet 2 / 15

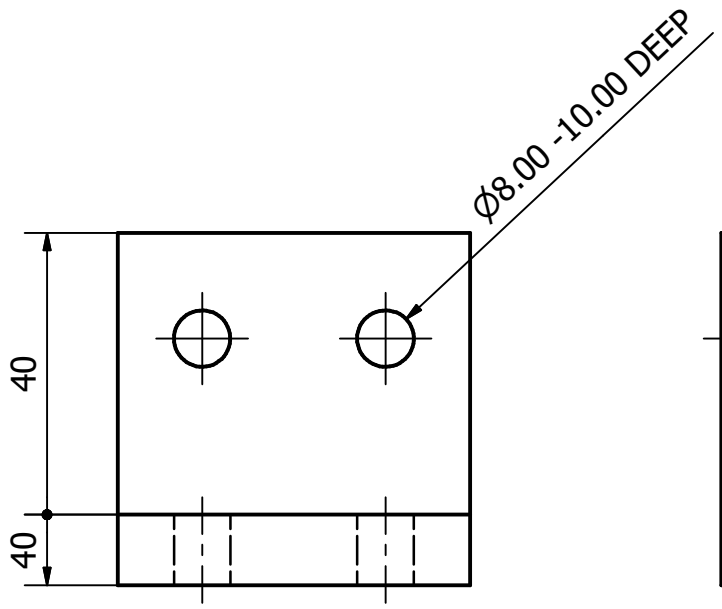


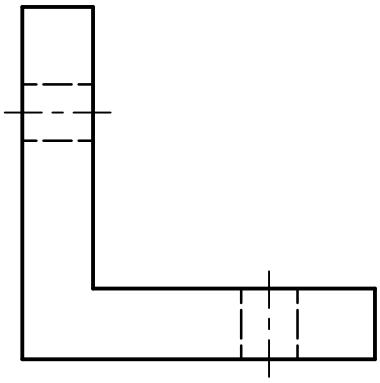


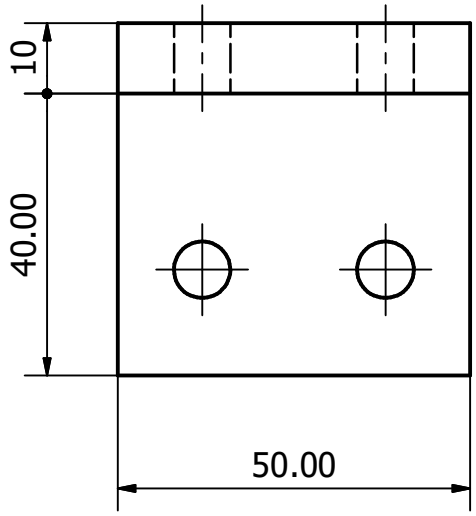
Material Used- Mild Steel
Process- Drilling , Cutting

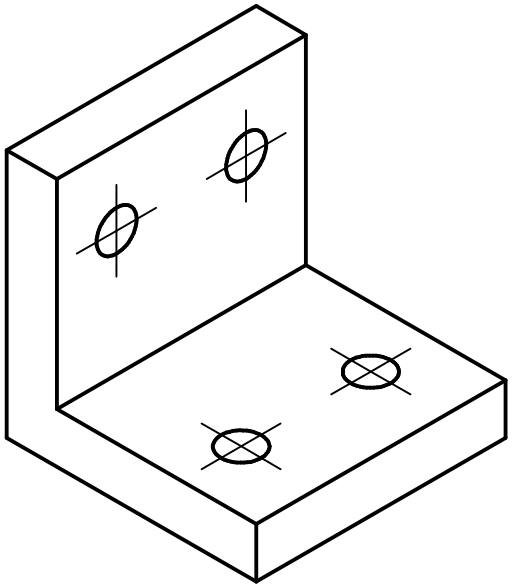
Designed by	Checked by	Approved by	Date		Date	
HP					19-04-2025	

Large Support	Scale 1:4		
		Edition	Sheet 3 / 15





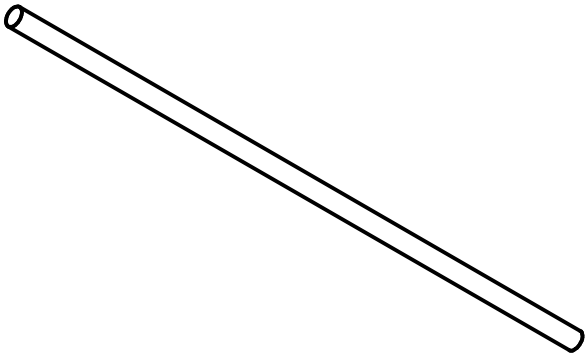




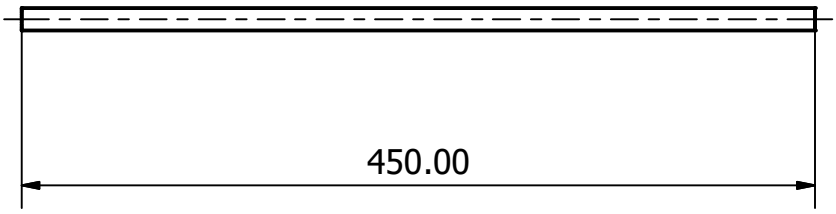
Material Used- Mild Steel
Process- Drilling

Designed by	Checked by	Approved by	Date		Date	
HP					19-04-2025	

Bracket	Scale 1:1		
		Edition	Sheet 4 / 15

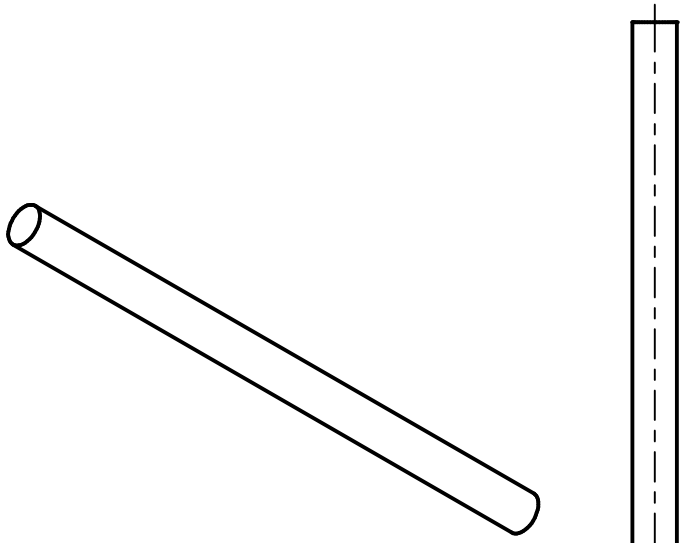


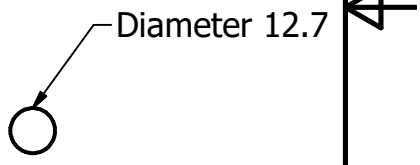
Diameter 12.7

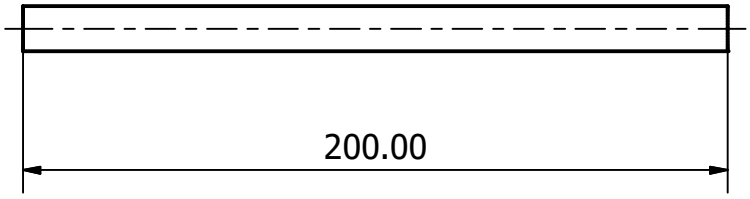


Material Used- Mild Steel

Designed by	Checked by	Approved by	Date		Date	
HP					19-04-2025	
Rod(450 mm)		Scale 1:4				
					Edition	Sheet 5 / 15



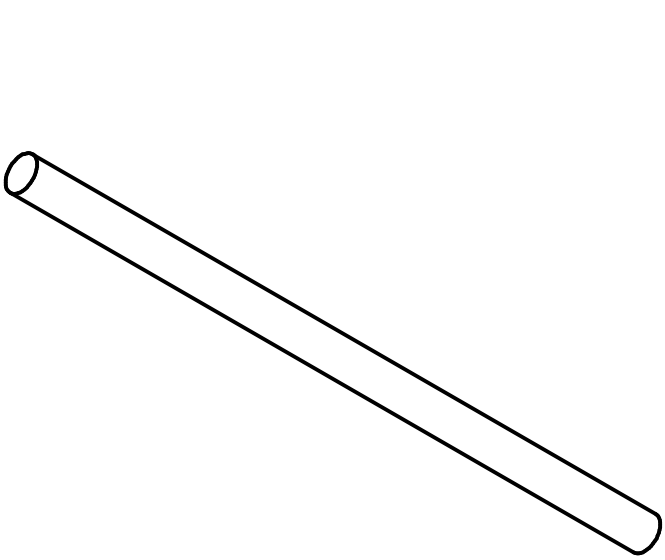


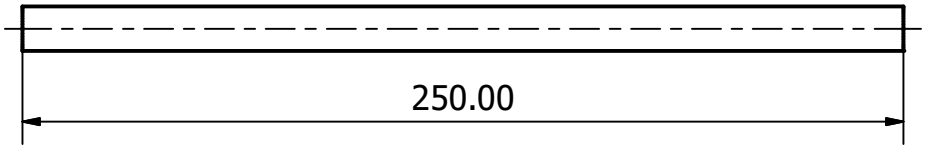


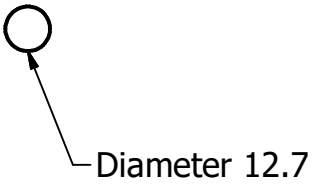
Material Used- Mild Steel

Designed by	Checked by	Approved by	Date		Date	
HP					19-04-2025	

Rod (200 mm)	Scale 1:2		
		Edition	Sheet 6 / 15



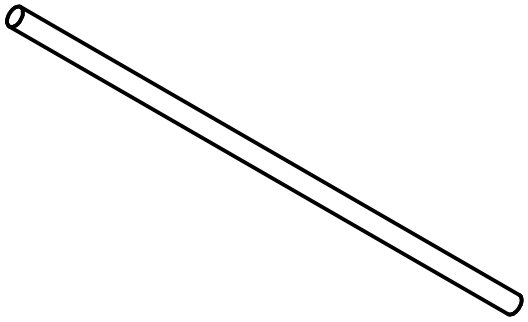


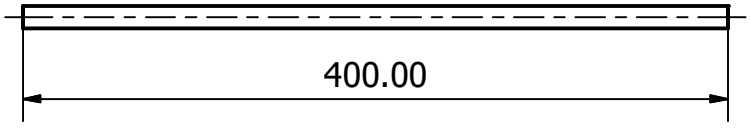


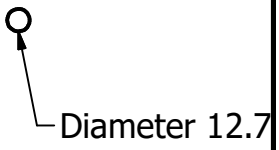
Material Used- Mild Steel

Designed by	Checked by	Approved by	Date		Date	
HP					19-04-2025	

Rod(250 mm)	Scale 1:2	Edition	Sheet 7 / 15



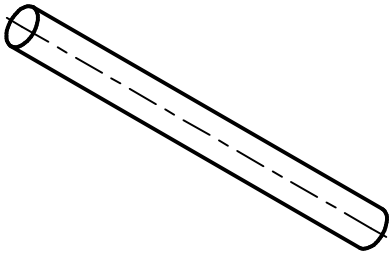


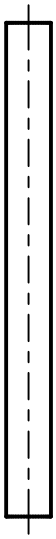


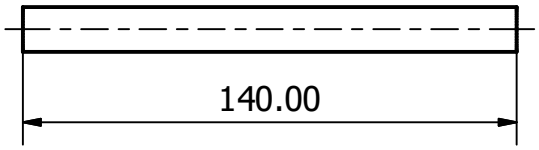
Material Used- Mild Steel

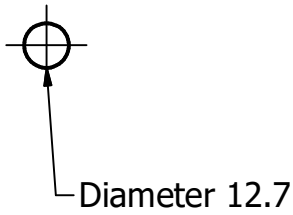
Designed by	Checked by	Approved by	Date		Date	
HP					19-04-2025	

Rod(400 mm)	Scale 1:4	Edition	Sheet 8 / 15





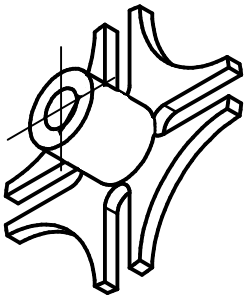


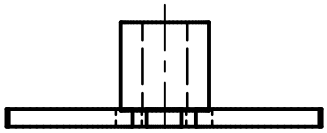


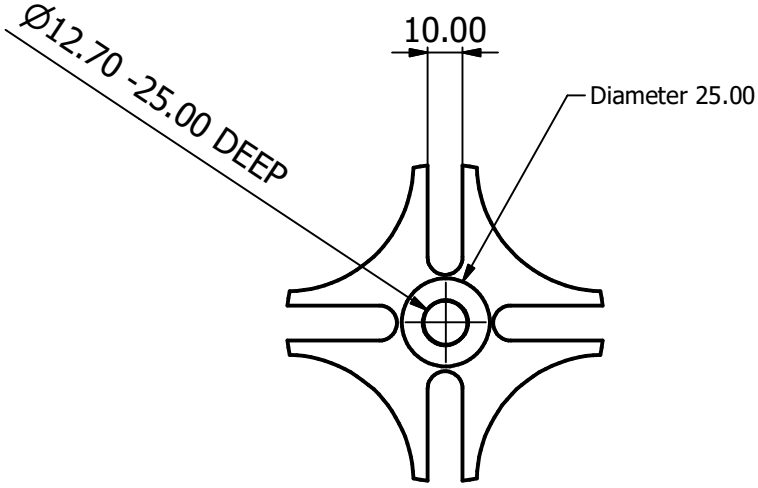
Material Used- Mild Steel

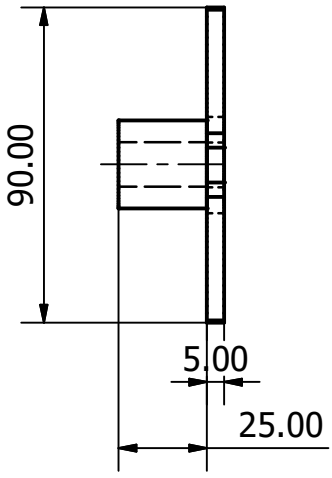
Designed by	Checked by	Approved by	Date		Date	
HP					19-04-2025	

Rod(140 mm)	Scale 1:2		
		Edition	Sheet 9 / 15





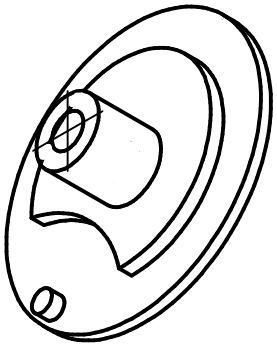


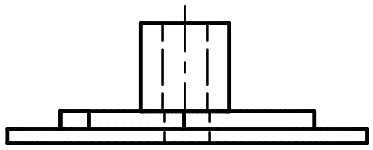


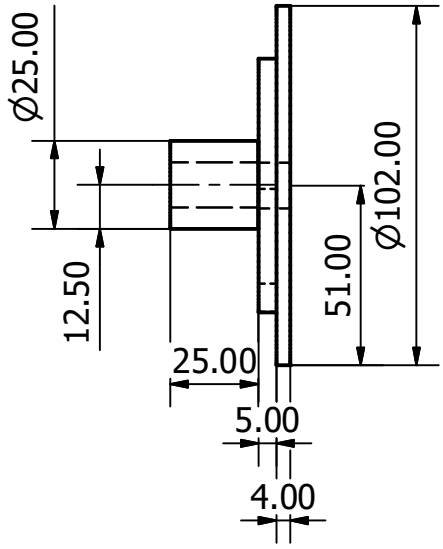
Material Used- Mild Steel
Process- Lathing, Drilling, Cutting

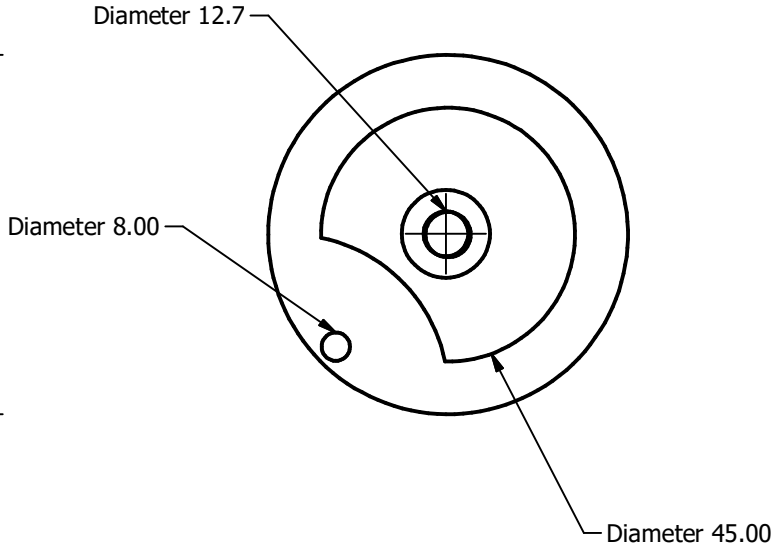
Designed by	Checked by	Approved by	Date		Date	
HP					19-04-2025	

Geneva Driven	Scale 1:2		
		Edition	Sheet 10 / 15





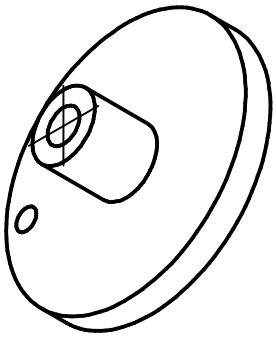


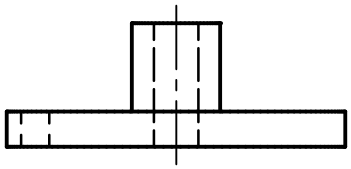


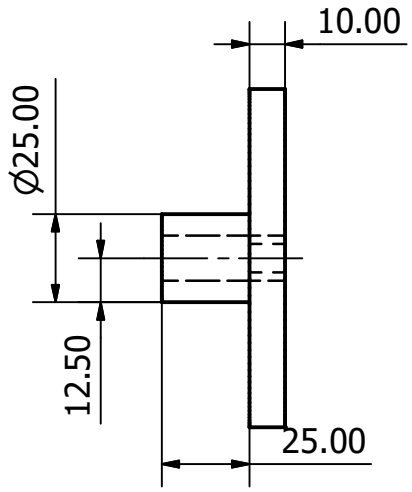
Material Used- Mild Steel
Process- Cutting, Lathing, Drilling

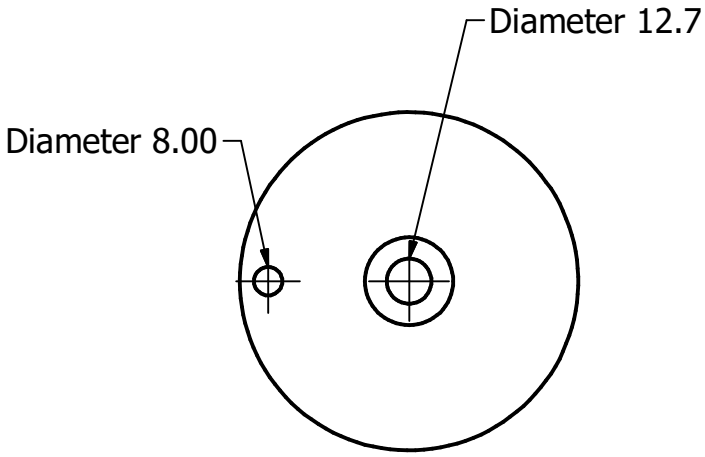
Designed by	Checked by	Approved by	Date		Date	
HP					19-04-2025	

Geneva Driver	Scale 1:2		
		Edition	Sheet 11 / 15





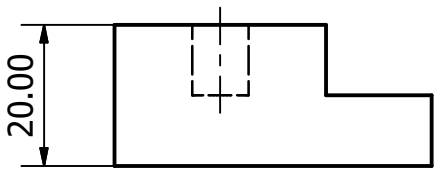


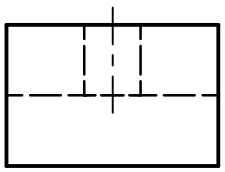


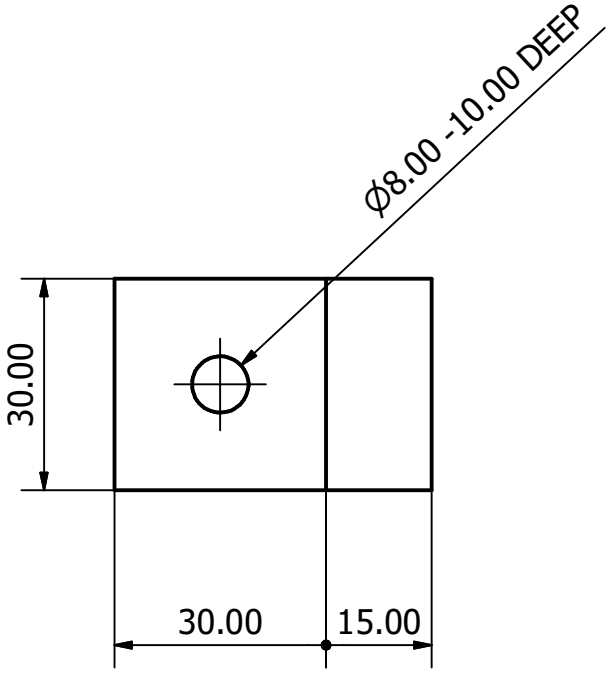
Material Used- Mild Steel
Process- Lathing , Cutting, Drilling

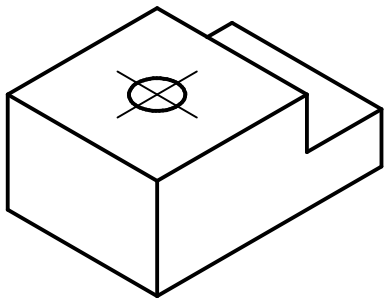
Designed by	Checked by	Approved by	Date		Date	
HP					19-04-2025	

Connecting Disc	Scale 1:2		
		Edition	Sheet 12 / 15





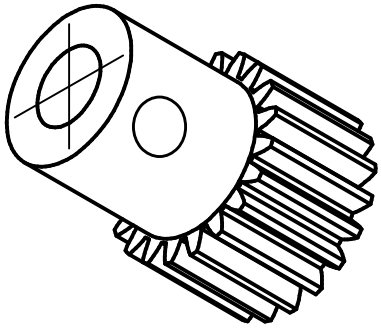


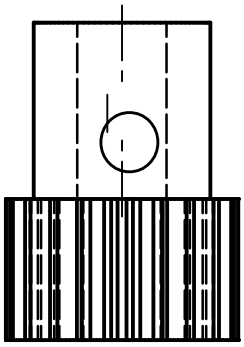


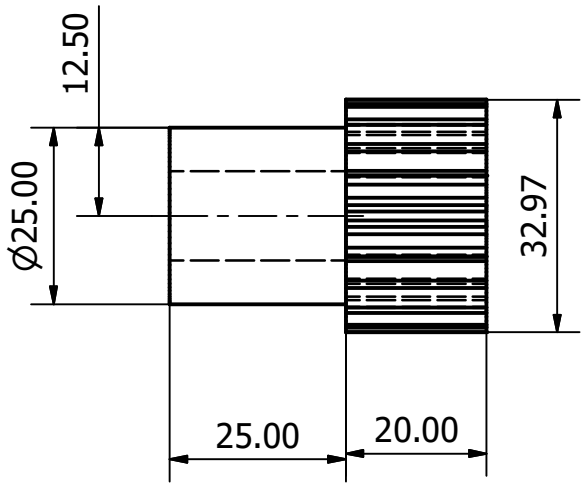
Material Used- PLA
Process - Cutting

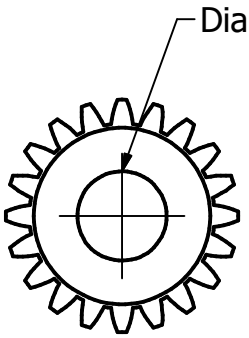
Designed by	Checked by	Approved by	Date		Date	
HP					19-04-2025	

Pushing Part	Scale 1:2		
		Edition	Sheet 13 / 15





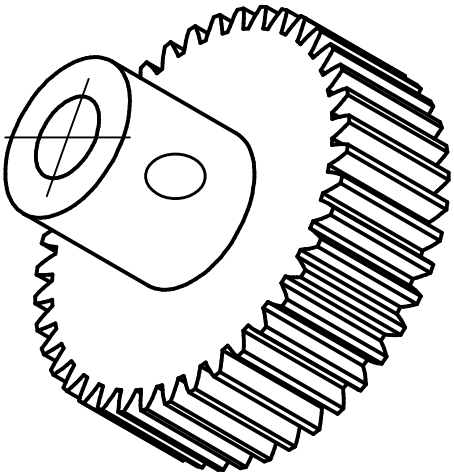


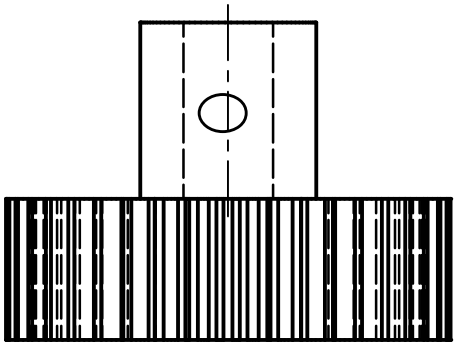


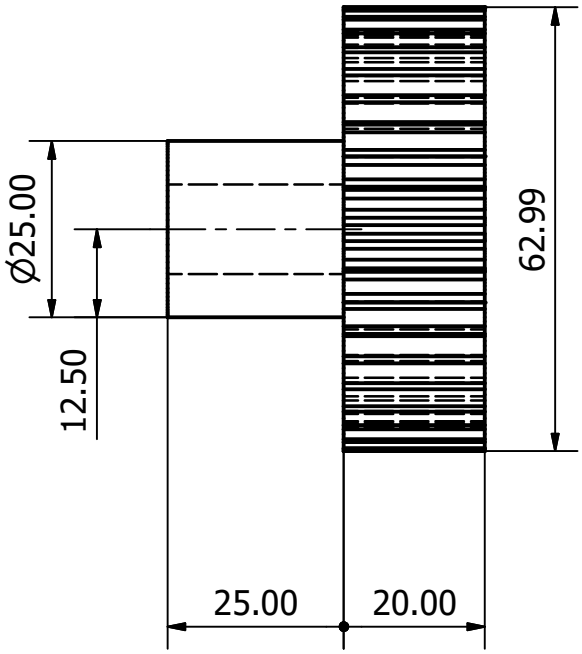
Material Used- Mild Steel
Process- Drilling, Lathing, Milling,Cutting

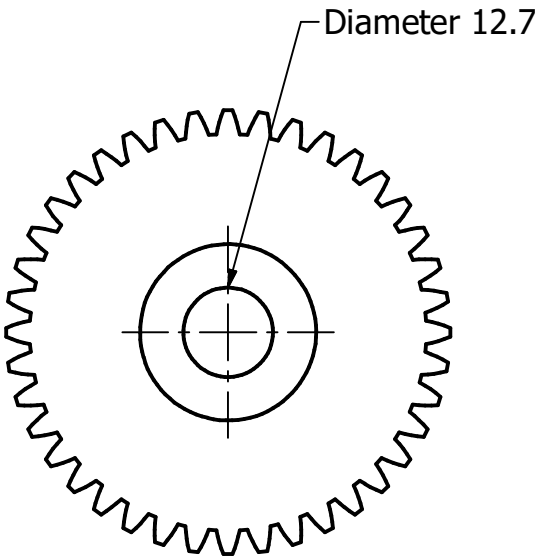
Designed by	Checked by	Approved by	Date		Date	
HP					19-04-2025	

Spur Gear (20 Teeths)	Scale 1:1	Edition	Sheet 14 / 15









Material Used- Mild Steel
Process- Drilling, Lathing, Milling,Cutting

Designed by	Checked by	Approved by	Date		Date	
HP					19-04-2025	

Spur Gear(40 teeths)	Scale 1:1	Edition	Sheet 15 / 15

Gear Calculation

For Bigger Gear:

No. of teeths= 40

Module= 1.5

Outer Diameter = 64 mm

Indexing Hole Diameter= 12.70 mm

Thickness= 12.5 mm

For Smaller Gear:

No. of teeths= 20

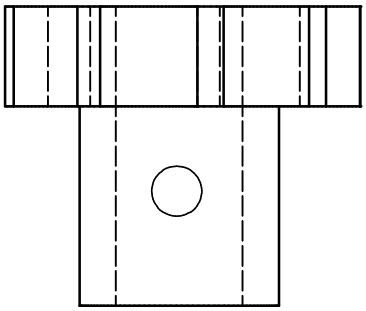
Module= 1.5

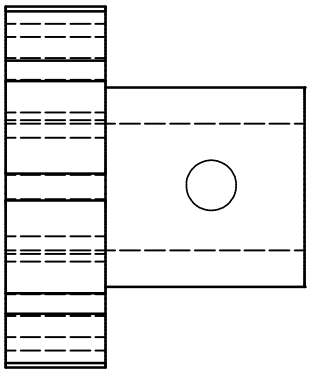
Outer Diameter = 32 mm

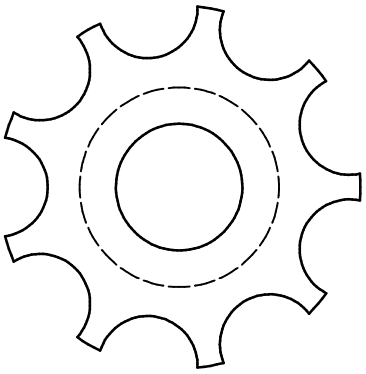
Indexing Hole Diameter= 12.70 mm

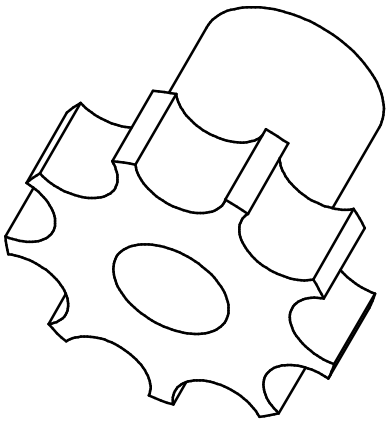
Thickness= 12.5 mm

here we use R50x30 cylindrical block of mild steel
make this using process of lathing,Millling,Driling, cutting



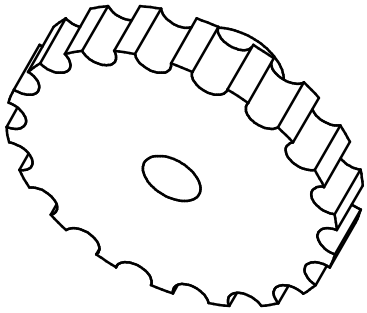


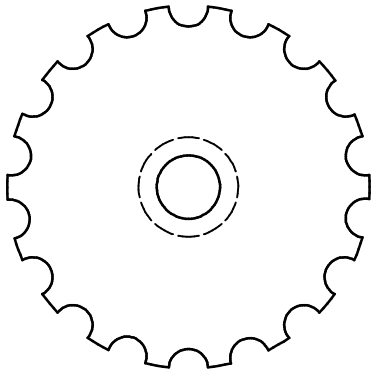


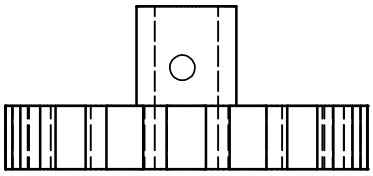


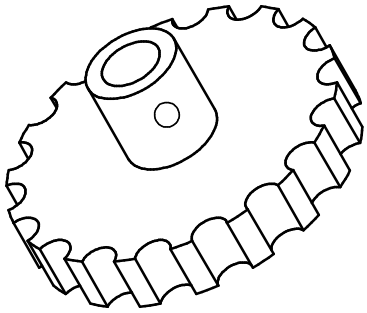
Edition	Date	Date	Approved by	Checked by	Designed by

here we use R80x30 cylindrical block of mild steel
make this using process of lathing,Millling,Driling,
cutting









Designed by	Checked by	Approved by	Date		Date	Edition

Sprocket Calculations:

A. Sprocket(18):

1.Pitch Diameter(PD) = Pitch/(Sin(180/No. of teeths))

= 12.7/(Sin(180/18))= 73.13

2.Outside Diameter(OD) = (Pitch)(0.6 + Cot(180/No. of teeths))

= (12.7)(0.6 + Cot(180/18))= 79.64

B. Sprocket(9):

1.Pitch Diameter(PD) = Pitch/(Sin(180/No. of teeths))

= 12.7/(Sin(180/9))= 37.13

2.Outside Diameter(OD) = (Pitch)(0.6 + Cot(180/No. of teeths))

= (12.7)(0.6 + Cot(180/9))= 42.51