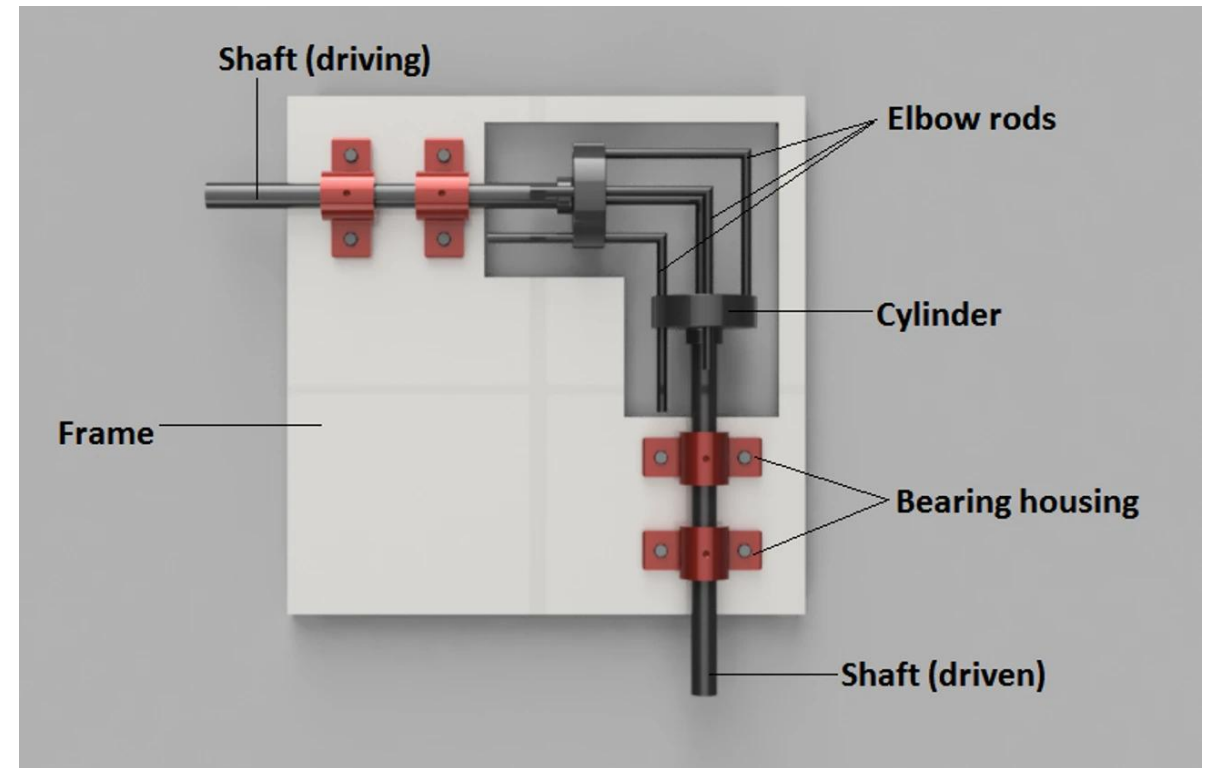


# ME3425: Mini Project Group 1

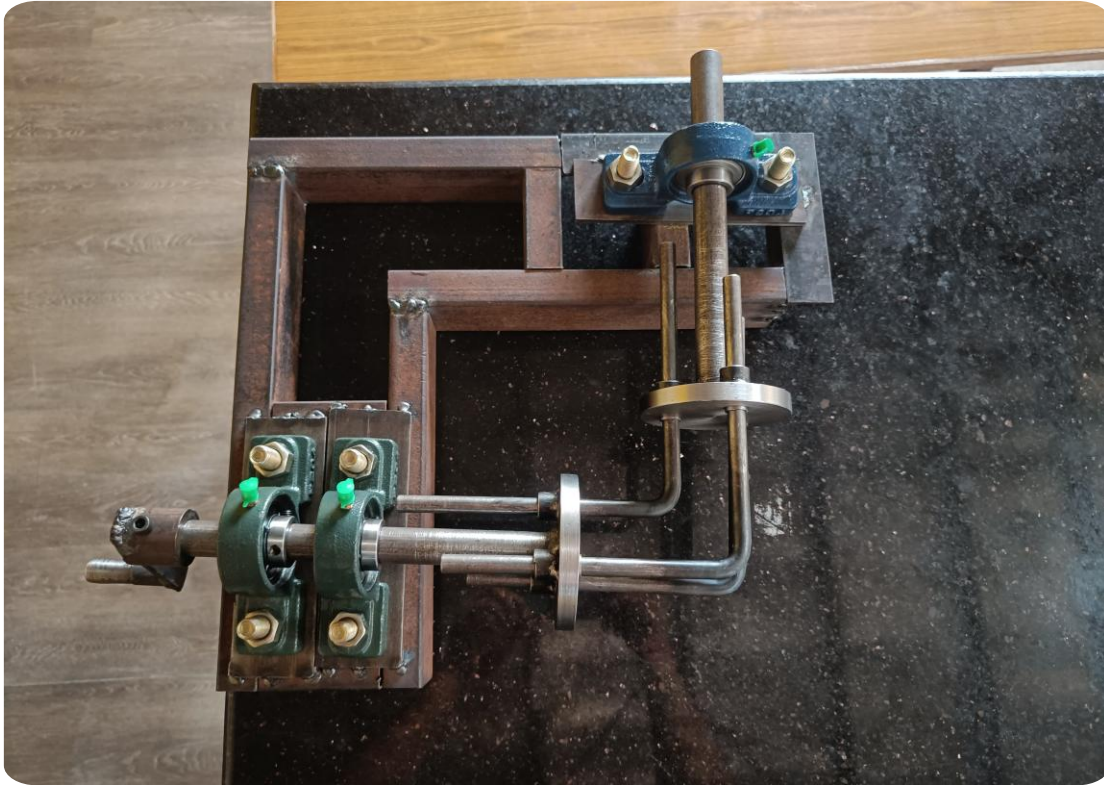
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## Gearless Power Transmission using Elbow Rod Mechanism



Top View



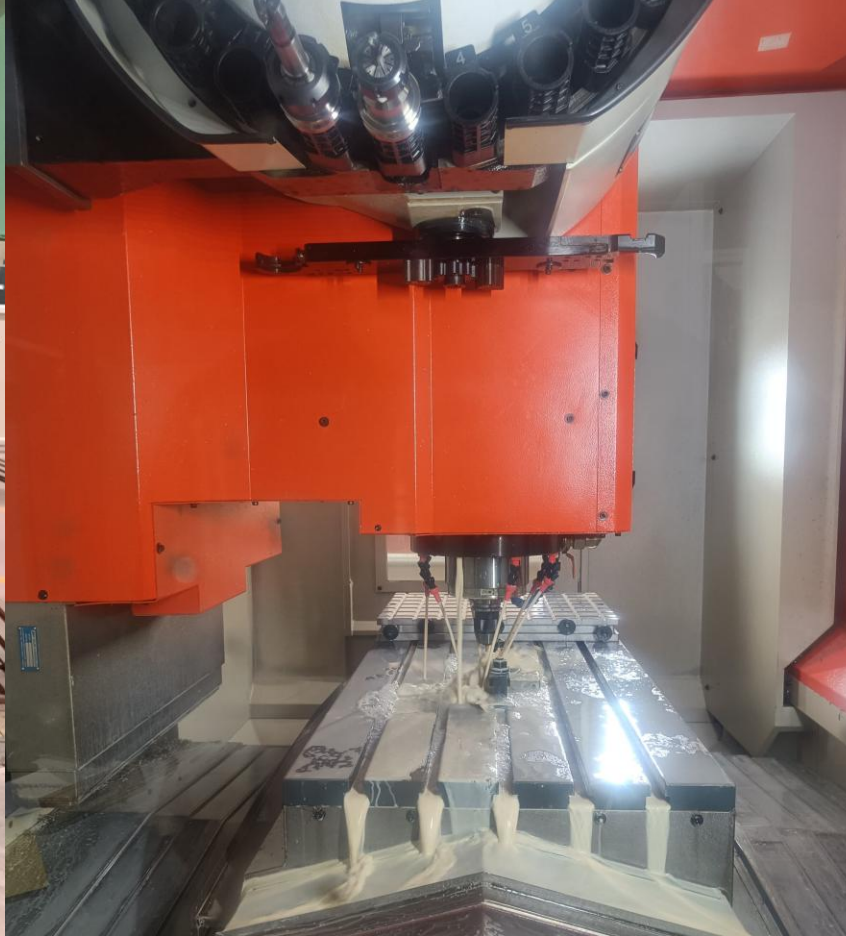
# Introduction

- **Gearless transmission systems provide an efficient alternative to traditional gear-based mechanisms for power transfer between rotating shafts.**  
By eliminating meshing gears, these systems aim to reduce mechanical losses, simplify design, and lower maintenance requirements.
- The **elbow rod mechanism** enables gearless power transmission by using a set of bent connecting rods to transfer motion smoothly between shafts, maintaining a consistent rotational relationship without engaging gears.
- This approach enhances mechanical reliability in compact systems and is particularly useful in low-torque applications like hand tools, steering mechanisms, and lightweight automation systems.
- The **problem statement** focuses on developing a functional model that demonstrates efficient rotary motion transfer using an elbow rod mechanism, offering a low-cost, low-maintenance alternative to conventional gear trains.

# Component Dimensions

Part	Dimension
Cylindrical Hub	D=85mm, t=10mm, three holes radially at 25 mm distance of d=10 mm, center 20mm hole
Elbow link	D = 10mm, l = 150mm on each side
Shaft	D=20mm, l=200mm
Plummer Block (UCP 204)	D = 20mm inner, outer 30mm, t = 30mm
Base rectangular section	L = 350mm, b=350mm





Work in Progress



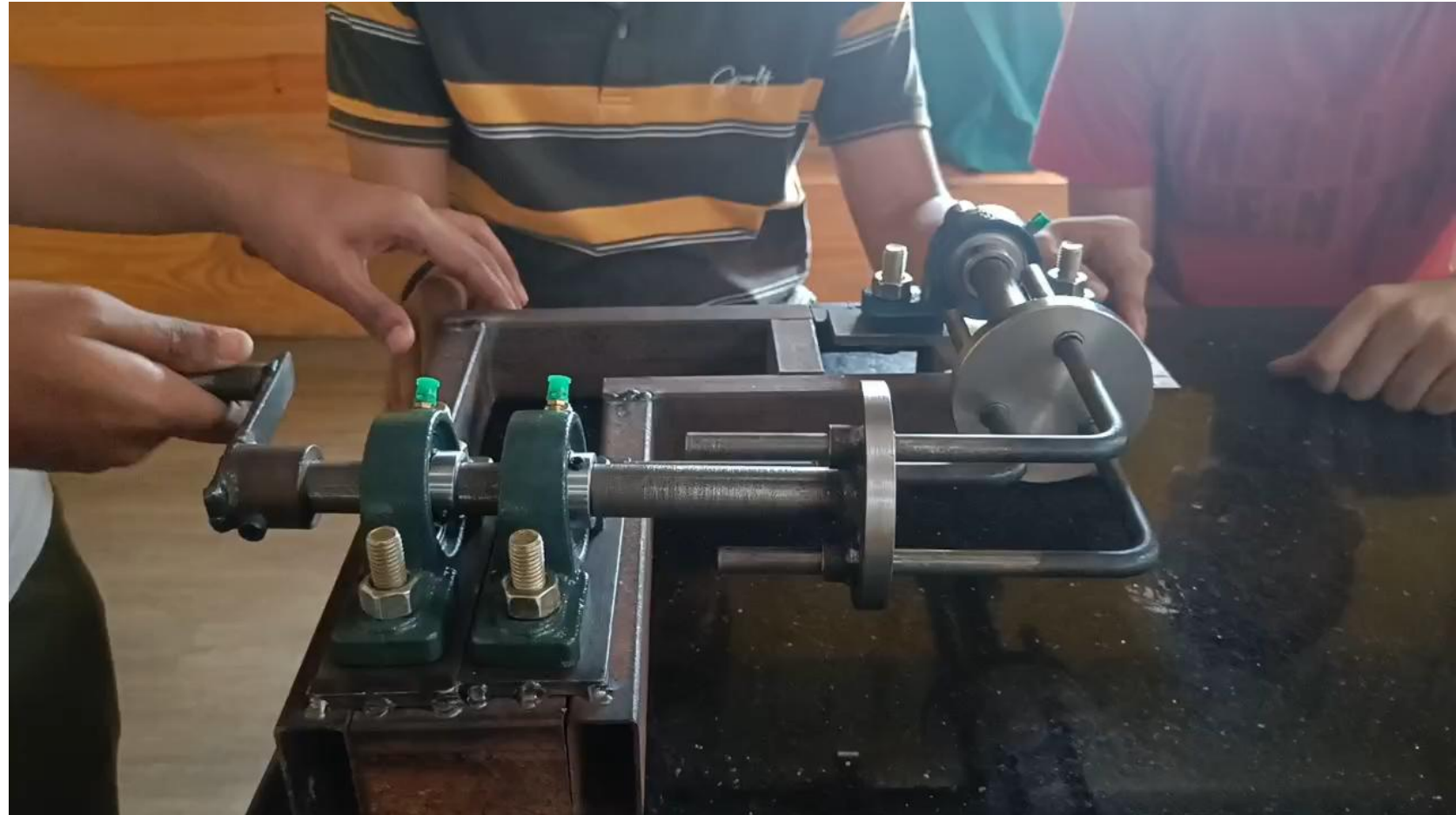
# Video Demonstration

You have a central rotating shaft applying torque to a hub.

This hub transmits power to three elbow rods inserted in slotted paths, which slide in and out as the shaft rotates.

The elbow rods themselves do not rotate — instead, the hub rotates and imposes a sliding action on the elbow rods.

The elbow rods change the rotary motion into a controlled back-and-forth (reciprocating) motion in a plane, which can be used to drive other parts or keep the speed consistent.



# Manufacturing Steps

Step No.	Fabrication Step	Process Description	Tools / Machines Used
1	Elbow Rod Bending	Heated and bent the rod to desired shape	Gas Welding Torch, Bench Vice
2	Hub Manufacturing	Precision machining of the hub	CNC Machine
3	Shaft and Hub Welding	Fixed the shaft to hub at 90° angle	Arc Welding Machine, Try-square
4	Base Plate Design	Marked and prepared base to fix Plummer Block	Surface Plate, Marking Tools, Vernier Caliper, Drilling Machine
5	Plummer Block Plate Welding	Welded mounting plates to the main frame	Arc Welding Machine, Clamps, Vertical Gauge
6	Bush Fabrication & Mounting	Turned a bush and welded it to the hub to allow sliding motion	Lathe Machine, Arc Welding Machine, Hacksaw, Drilling Machine
7	Output Plummer Block Calibration	Adjusted position for smooth sliding and proper alignment	Try-square, Spanner Set
8	Detachable Handle Fabrication	Designed and fabricated handle for manual transmission operation	Drilling Machine, Hacksaw, Grinding Machine

# Challenges

Challenge	Solution
<b>Bending of Elbow Rod:</b> To align the rods at 90 degrees	Used fixture pins and base plate to align rods in the same plane, ensuring precise 90° bends.
<b>Shaft and Hub Welding at 90 Degrees:</b> Shaft axis was misaligned with the hub axis.	Adjusted shaft position before welding and used alignment tools for final alignment.
<b>Hub Manufacturing and Sliding Motion:</b> Due to insufficient contact area, the rods were not in one plane.	Fabricated a sleeve to allow smooth sliding motion (increase contact area) and reduce friction.
<b>Bush Fabrication for Sliding Motion:</b> Thin sleeve melted during welding.	Redesigned as a stepped bush with two different outer diameters, ensuring proper welding and alignment.
<b>Base Plate and Plummer Block Alignment:</b> Difficulty in aligning blocks and maintaining height.	Used measuring instruments to fix plumber blocks at correct positions.



# Thank You

(Special Thanks to Central  
Workshop)

