PROJECT REPORT

Project Title: LINEAR RAIL BLOCK ASSEMBLY

Submitted by: MAYANK

Software Used: AutoCAD (Educational Version)

Discipline: Mechanical Engineering

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INTRODUCTION

This project involves the mechanical design and modeling of a Precision Linear Rail Block Assembly, which is widely used in CNC machinery and automation systems to enable smooth and controlled linear motion.

The objective was to understand real-world machine part design, apply correct tolerances, and model components accurately in AutoCAD. The reference was taken from online sources and interpreted independently to create a fully custom, original model from scratch.

All drawings are made by the author, MAYANK, using educational AutoCAD. This process has deepened understanding of precision fits, manufacturing constraints, and 2D/3D modeling workflows.

ABOUT THE PROJECT

The Linear Rail Block Assembly consists of:

- Base Block (Aluminium 6061)
- Clamping Plate (Aluminium 6061)
- Guide Rollers (Tool Steel, precision-fit)
- M4 Standard Bolts (DIN 912, Alloy Steel)

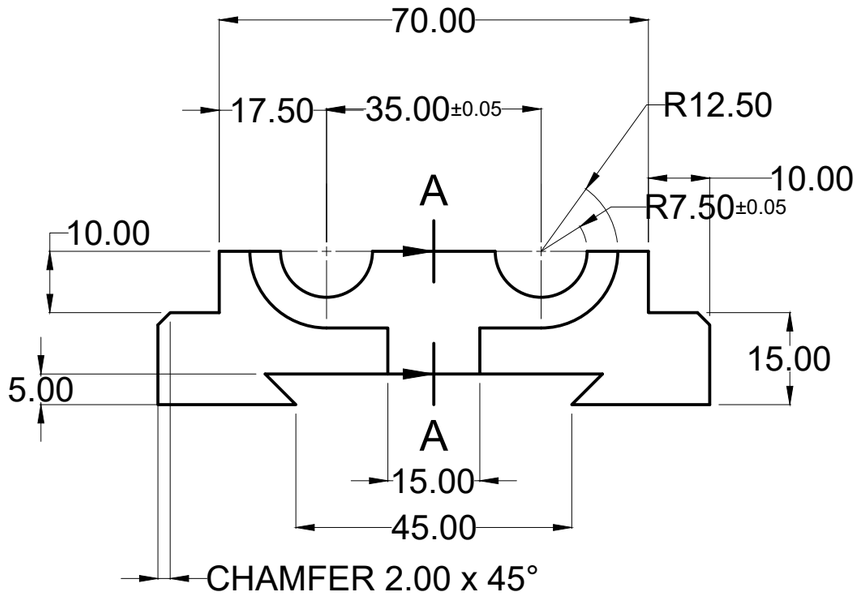
All 2D working drawings, section views, and exploded views were created from scratch by MAYANK in AutoCAD.

The problem was identified through independent research and interpreted for CAD practice. The modeling process included:

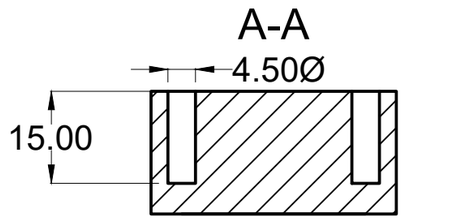
1. Reading and analyzing engineering sketches
2. Building 3D parts from 2D drawings
3. Applying tolerances and fits (e.g., Ø15 H7)
4. Generating detailed layout sheets and assembly views

Skills Gained:

- Confidence in AutoCAD 3D and 2D drafting
- Real-world application of tolerancing (H7, clearance fits)
- Improved understanding of mechanical assemblies
- Layout planning and sheet detailing
- BOM creation and documentation



FRONT VIEW



SECTIONAL SIDE VIEW

NOTES

All dimensions are in millimeters (mm).

Tolerances unless otherwise specified:
Linear ±0.1 mm, Hole Ø ±0.05 mm.

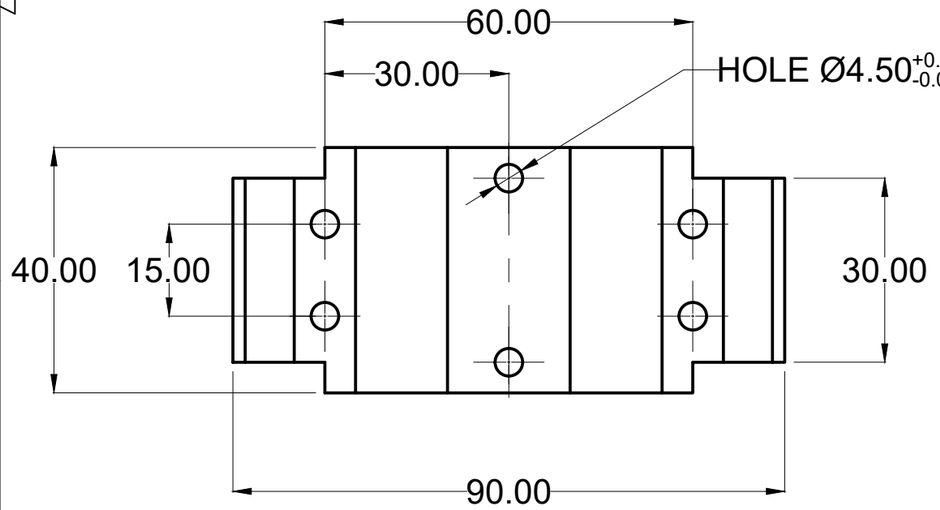
Material: Aluminum 6061 / Mild Steel (as per application).

Remove all sharp edges; deburr and break edges R0.2–0.5 mm.

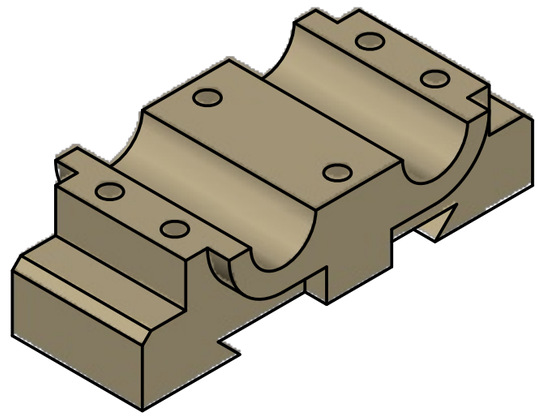
Surface finish: Ra ≤ 1.6 µm on sliding/guide faces.

Holes Ø15 mm to be machined to H7 fit.

Projection method: Third angle projection



TOP VIEW



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STUDENT WORK - MAYANK	MAIN BLOCK		
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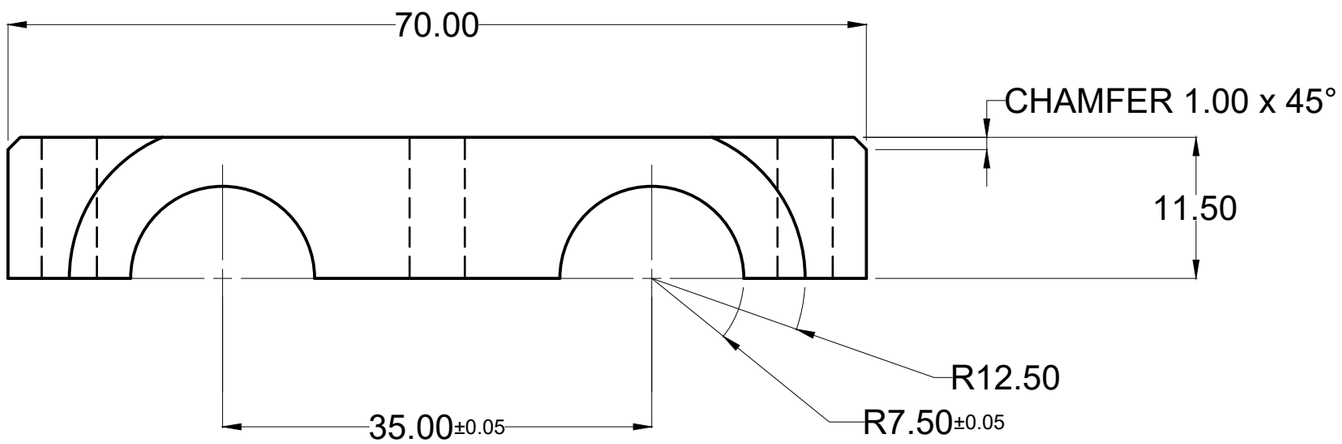
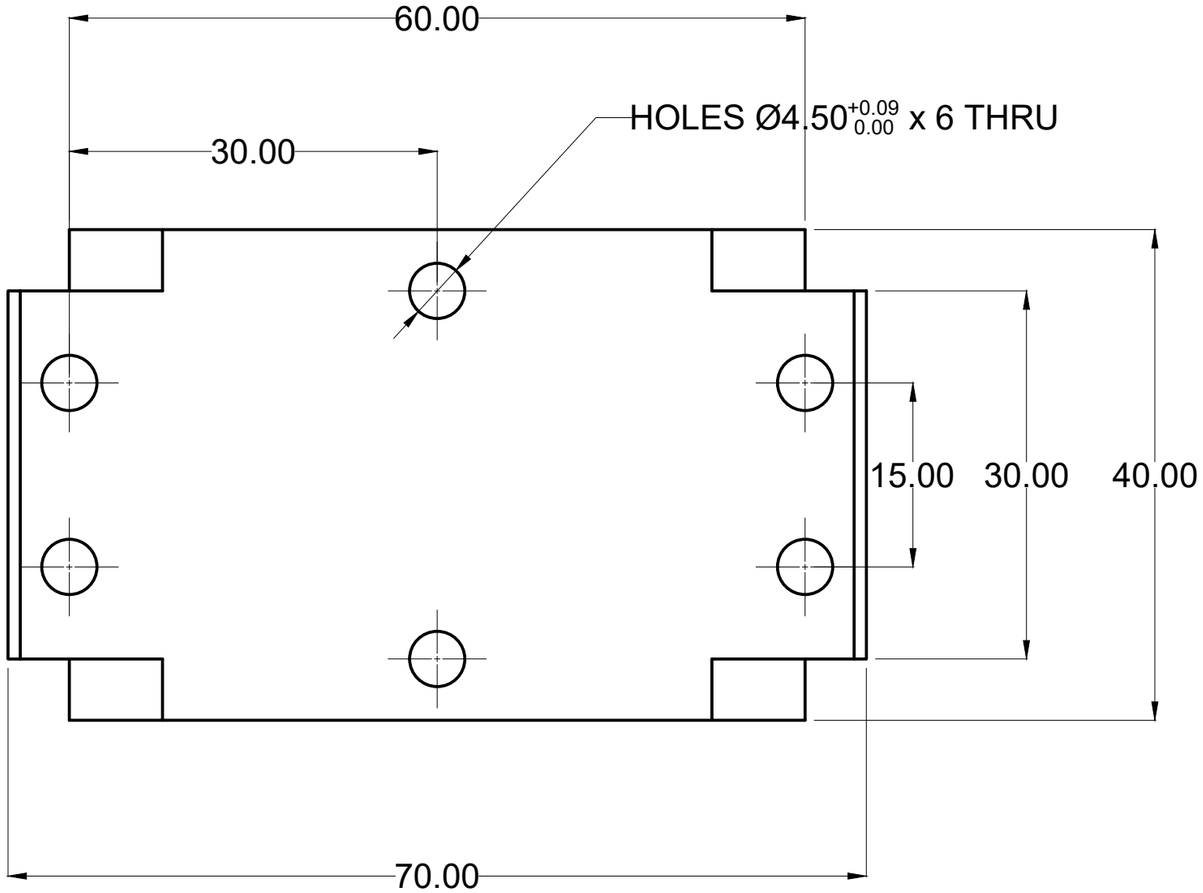
FRONT VIEW

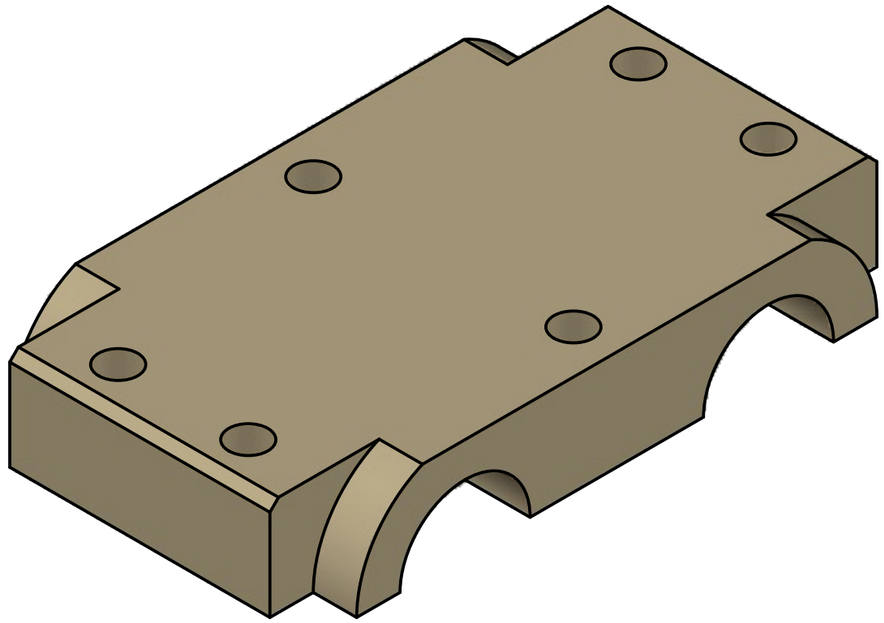




TOP VIEW

GENERAL NOTES:

1. ALL DIMENSIONS ARE IN MM.
2. UNLESS OTHERWISE SPECIFIED:
   a. LINEAR TOLERANCE: ±0.1 mm
   b. HOLE DIAMETERS: ±0.05 mm
   c. ANGULAR TOLERANCE: ±0.5°
3. MATERIAL: ALUMINUM 6061 (OR AS SPECIFIED)
4. REMOVE ALL BURRS AND SHARP EDGES.
5. SURFACE FINISH: Ra ≤ 1.6 µm ON MATING SURFACES.
6. USED FIRST ANGLE PROJECTION



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STUDENT WORK - MAYANK	CLAMPING PLATE		
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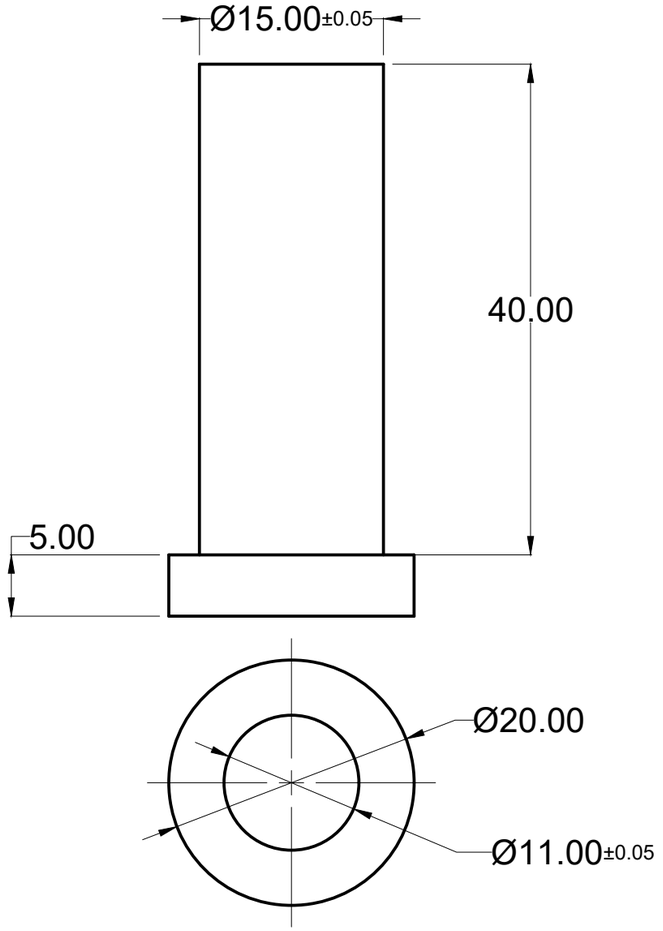

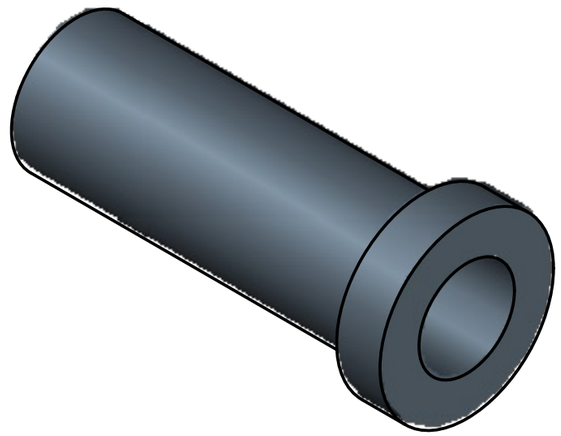

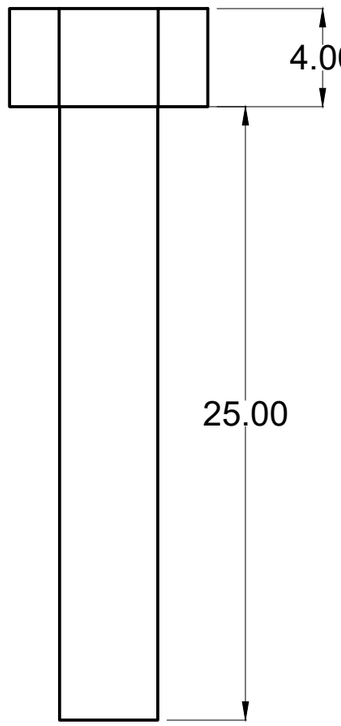

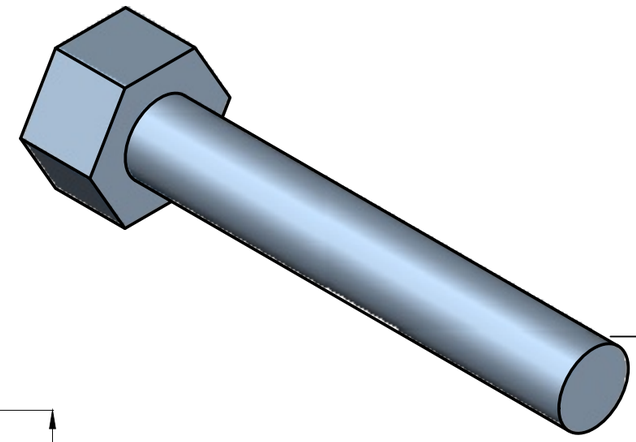

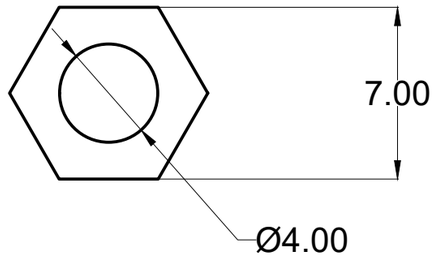

GENERAL NOTES:
1. ALL DIMENSIONS ARE IN MM.
2. UNLESS OTHERWISE SPECIFIED:
   a. LINEAR TOLERANCE: ±0.1 mm
   b. HOLE DIAMETER TOLERANCE: ±0.05 mm
   c. SHAFT Ø15.00: H7 FIT (±0.015 mm)
   d. ANGULAR TOLERANCE: ±0.5°
3. MATERIAL:
   - BOLT: ALLOY STEEL
   - GUIDE ROLLER: TOOL STEEL / EN8
4. REMOVE ALL BURRS AND SHARP EDGES (0.2–0.5 mm).
5. SURFACE FINISH: Ra ≤ 1.6 µm ON SLIDING OR MATING SURFACES.
6. THIRD ANGLE PROJECTION

**M4 BOLT SHOWN IS FOR REFERENCE ONLY —
USE STANDARD DIN 912 SOCKET HEAD CAP SCREW
(M4 × LENGTH AS REQUIRED).**

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STUDENT WORK - MAYANK	GUIDE ROLLER, M4 BOLT		
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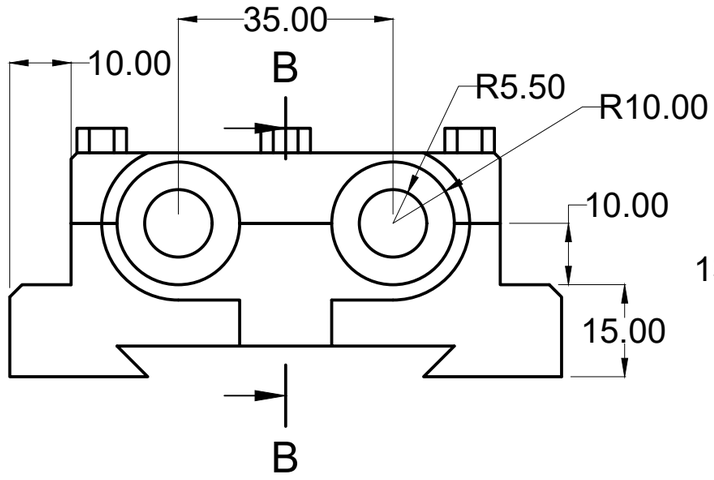
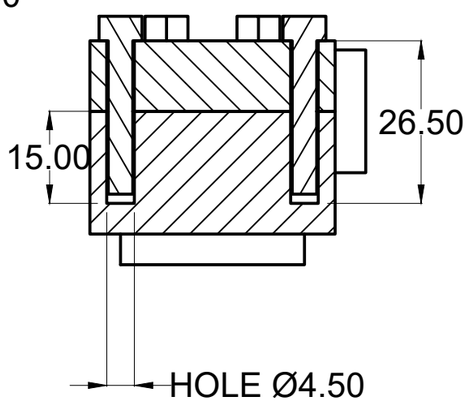
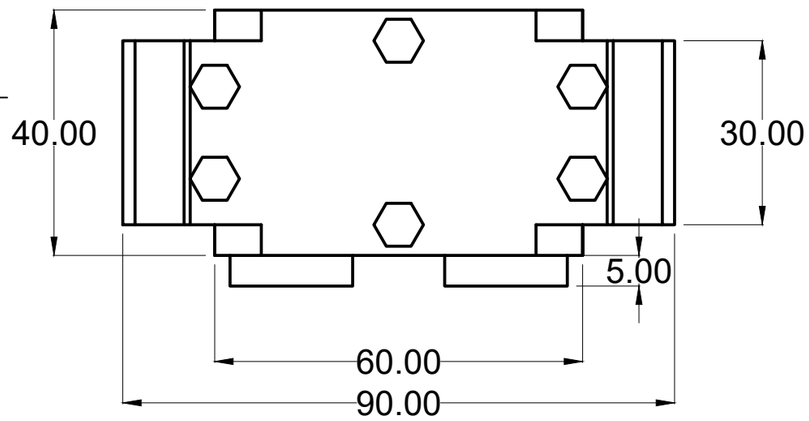
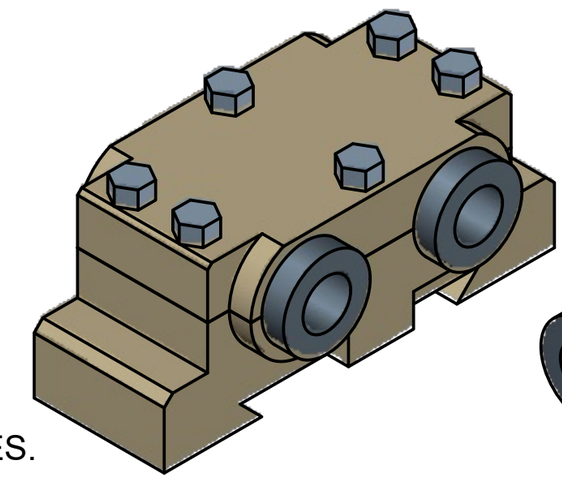
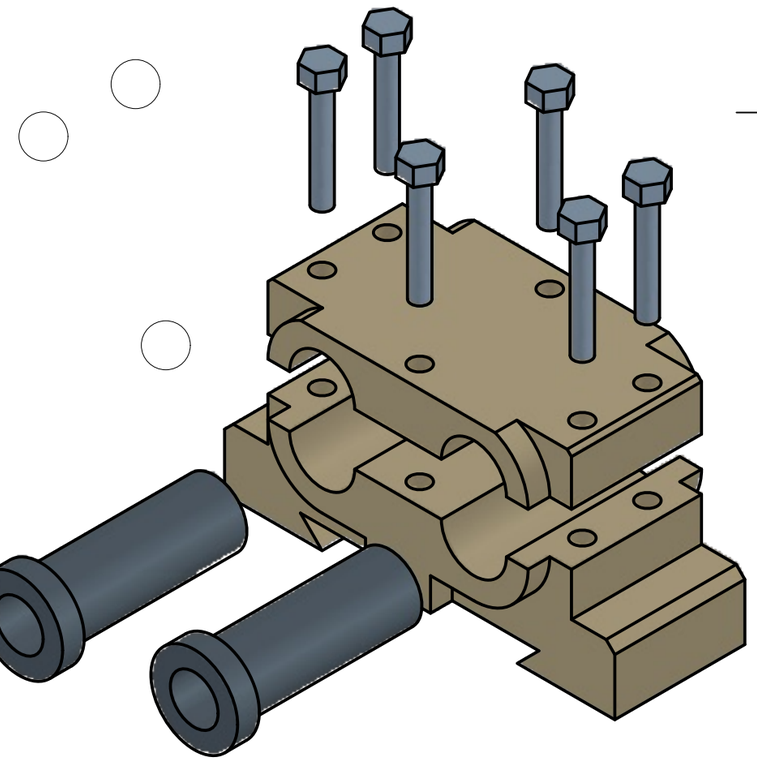




BILL OF MATERIALS			
PART NO.	PART NAME	MATERIAL	QUANTITY
1	BASE BLOCK	ALUMINIUM 6061	1
2	CLAMPING PLATE	AUMINIUM 6061	1
3	GUIDE ROLLER	TOOL STEEL	2
4	M4 BOLT	ALLOY STEEL	6







GENERAL NOTES:
1. ALL DIMENSIONS ARE IN MM.
2. UNLESS OTHERWISE SPECIFIED:
   a. GUIDE ROLLER Ø15.0: H7 FIT
3. REMOVE ALL BURRS AND SHARP EDGES (0.2 – 0.5 mm).
4. SURFACE FINISH: Ra ≤ 1.6 µm ON SLIDING/FITTING SURFACES.
5. USE THIRD ANGLE PROJECTION
6. M4 BOLTS SHOWN ARE FOR REFERENCE ONLY.
   USE STANDARD HARDWARE.

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