

# TA 211 PROJECT 2024/ODD

## INDIAN INSTITUTE OF TECHNOLOGY, KANPUR



COURSE INSTRUCTOR – Prof. Kantesh Balani  
LAB IN-CHARGE - Mr. Anil Kumar Verma COURSE  
IN CHARGE – Mr I. P. Singh

### Fighter Plane (Grumman F-14 Tomcat)

Group M6 (Monday) :  
Harsh Gour (230444)  
Gaud Ayush Bharat (230410)  
Golden Kumar (230419)  
Hardik Tiwari (230437)  
Divyaman Pal (230379)  
Erpina Sri Keerthi (230398)  
Enakshi Jain (230397)



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# Plagiarism Declaration

## Certificate

This is to certify that the project report titled Fighter Plane (Grumman F-14 Tomcat) submitted by Group M6, students of TA211, is an original work carried out by the undersigned under the supervision.

We hereby declare that this project is free from any form of plagiarism and has not been copied or submitted elsewhere for any other group. The content in this report is based on my original research, analysis, and understanding. I understand that plagiarism is an academic offense and, if detected, could lead to disciplinary action.

# ACKNOWLEDGMENT

We are very grateful to Mr. Indra Pal Singh, Prof. Kantesh Balani and Laboratory in-charge, Mr. Anil K. Verma for their valuable and constructive suggestions during the planning and development of this project. Without their guidance and technical support, we would not have been able to complete this effortful task.

We would like to express our great appreciation towards all lab staffs, namely Mr. Anil Kumar Verma, Mr. I P Singh, Mr. Rakesh Kumar, Mr. Gaurav Mishra, Mr. Bharat Raj Singh, Mr. Gyanendra Singh, Mr. Surya P. Sonkar, Mr. Rajdipta Samadder, Mr. A. C. Saini and Mr. Pappu for their constant supervision and encouragement which helped us in the completion of the project.

We would also like to acknowledge the efforts of our TAs, Mr. Poresh Kumar and Mr. Santosh K. Singh for giving us their valuable time.

# Introduction

This project involves the creation of a detailed 3D model of a modern fighter jet, as illustrated in the provided image. The model is designed to capture the aerodynamic form and complex geometry of aircraft.

Begin by studying the specific design of the fighter jet, including its dimensions, shapes, and unique characteristics. This may involve reviewing technical diagrams and specifications.

Using CAD software, the model will be built step by step, starting with the basic fuselage, followed by the wings, engines, and other essential components. Attention will be given to accuracy and proportionality to ensure the model closely resembles the actual aircraft.

# Motivation

The creation of a metal model of a fighter jet presents a unique opportunity to combine engineering precision with artistic craftsmanship. This project is driven by a passion for aviation, a desire to understand the aircraft design, and the challenge of translating these elements.

Constructing a metal model involves a range of skills, from precise measurement and cutting to intricate assembly and finishing. This project provides an excellent opportunity to develop and hone these skills, offering practical experience in metalworking, design, and craftsmanship. It also fosters a deeper understanding of the structural aspects that govern aircraft design.

Through this metal model, we aim to bridge the gap between engineering and artistry, creating something that is as beautiful as it is engineered to perfection.

# Work Distribution

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
Divyaman Pal	Wheels	Wheels	Wheels	Wheels	Assembly	Assembly
Enakshi Jain	Vertical Stabilizers	Vertical Stabilizers	Vertical Stabilizers	Vertical Stabilizers	Assembly	Assembly
Erpina Sri Keerthi	Rear Wheels	Rear Wheels	Rear Wheels	Rear Wheels	Assembly	Assembly
Gaud Ayush Bharat	Wings	Wings	Wings	Wings	Assembly	Assembly
Golden Kumar	Cockpit	Cockpit	Cockpit	Cockpit	Assembly	Assembly
Hardik Tiwari	Body	Body	Body	Body	Assembly	Assembly
Harsh Gour	Thrust Generators	Thrust Generators	Thrust Generators	Thrust Generators	Assembly	Assembly

# Processes Involved :-

## 1) Sheet Metal Forming

Shearing, Bending, Spinning, Folding, Cutting

## 2) Welding

# Materials list

As per the list of materials provided, the materials required for our project are:-

Name of material	Cost of material
Mild Steel Sheets (0.5mm)*2	Rs 1745/sheet
Mild Steel Disk (20mm)*4	Avg ~ Rs 20-25/disc
Mild Steel Round Rod (4mm)*1	Rs.90/kg



# Cost Estimation :-

(1) 2 sheets ( $2*1745$ ) – For body,  
wings and other parts.

(2) 4 discs ( $25*4$ ) – For wheels.

(3) 1 steel rod ( $1*90$ ) – To  
connect

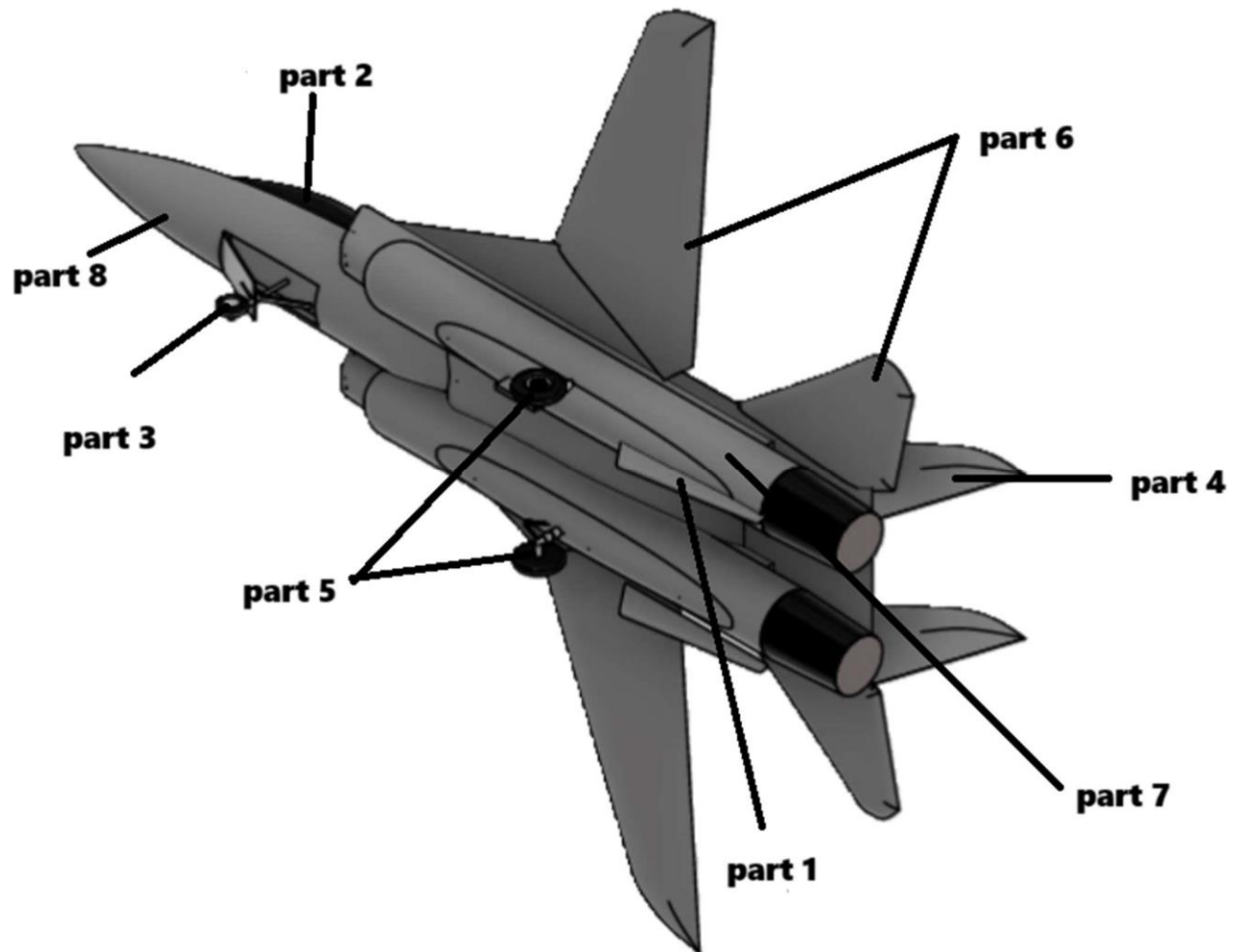
wheels and body.

$$\begin{aligned}\text{Total Cost} &= 2*1745 + 4*25 + \\ &1*90 = ₹3680\end{aligned}$$

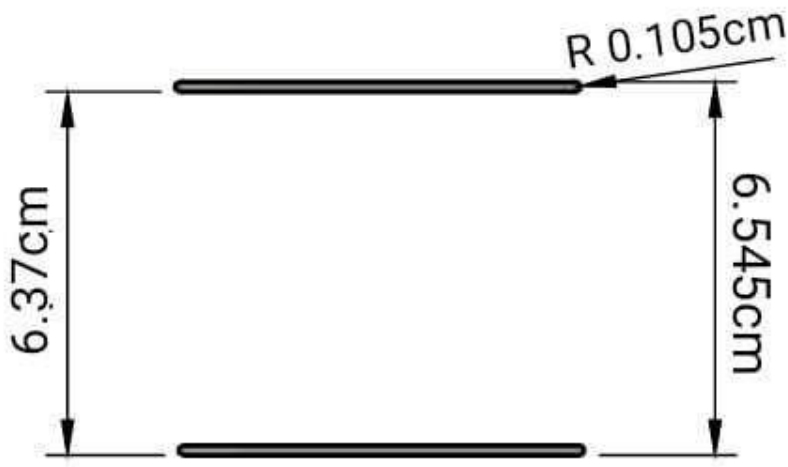
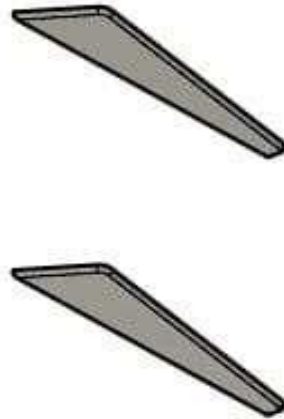
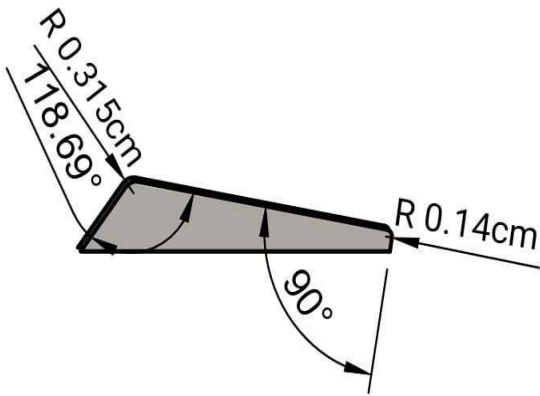
# Isometric view



# Parts Numbering

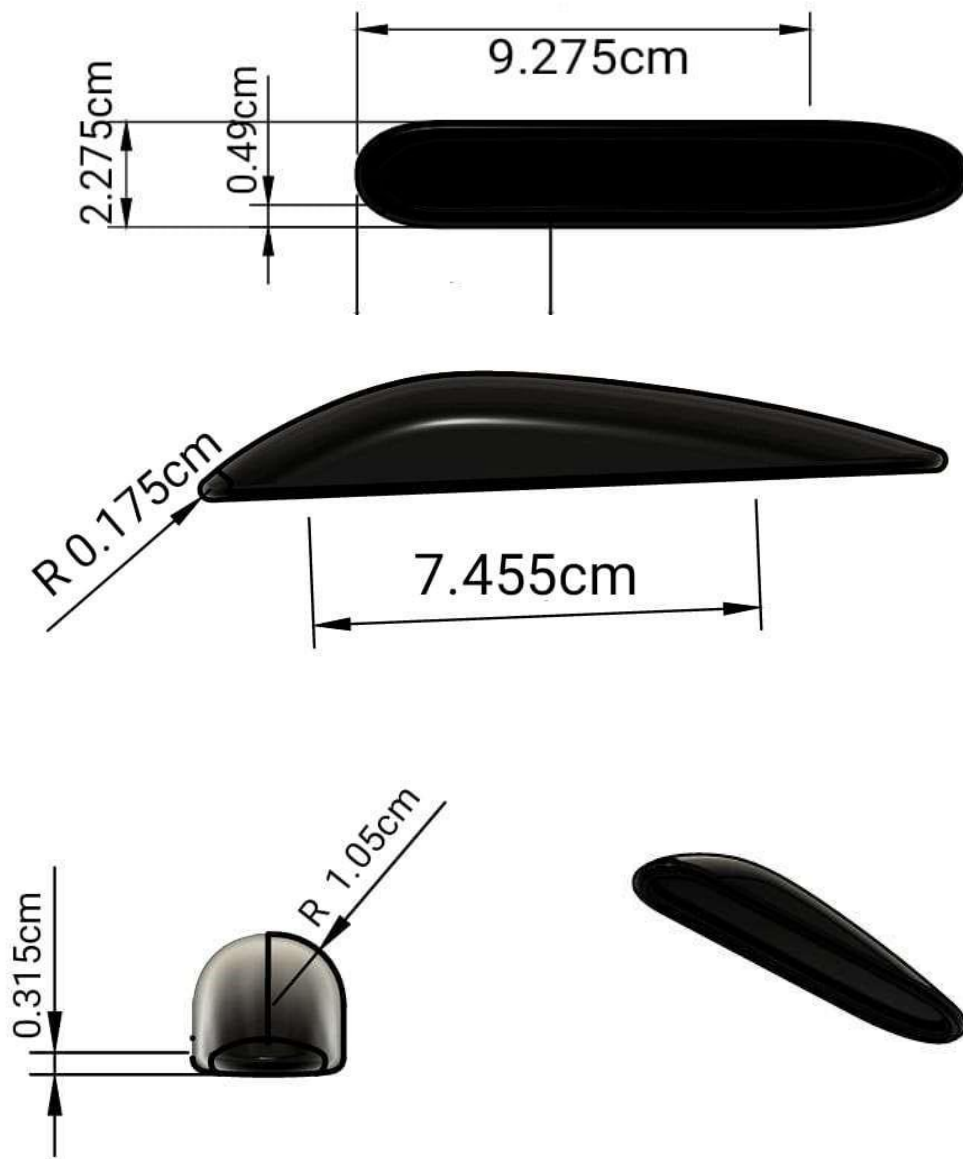


# (1) Vertical Fins



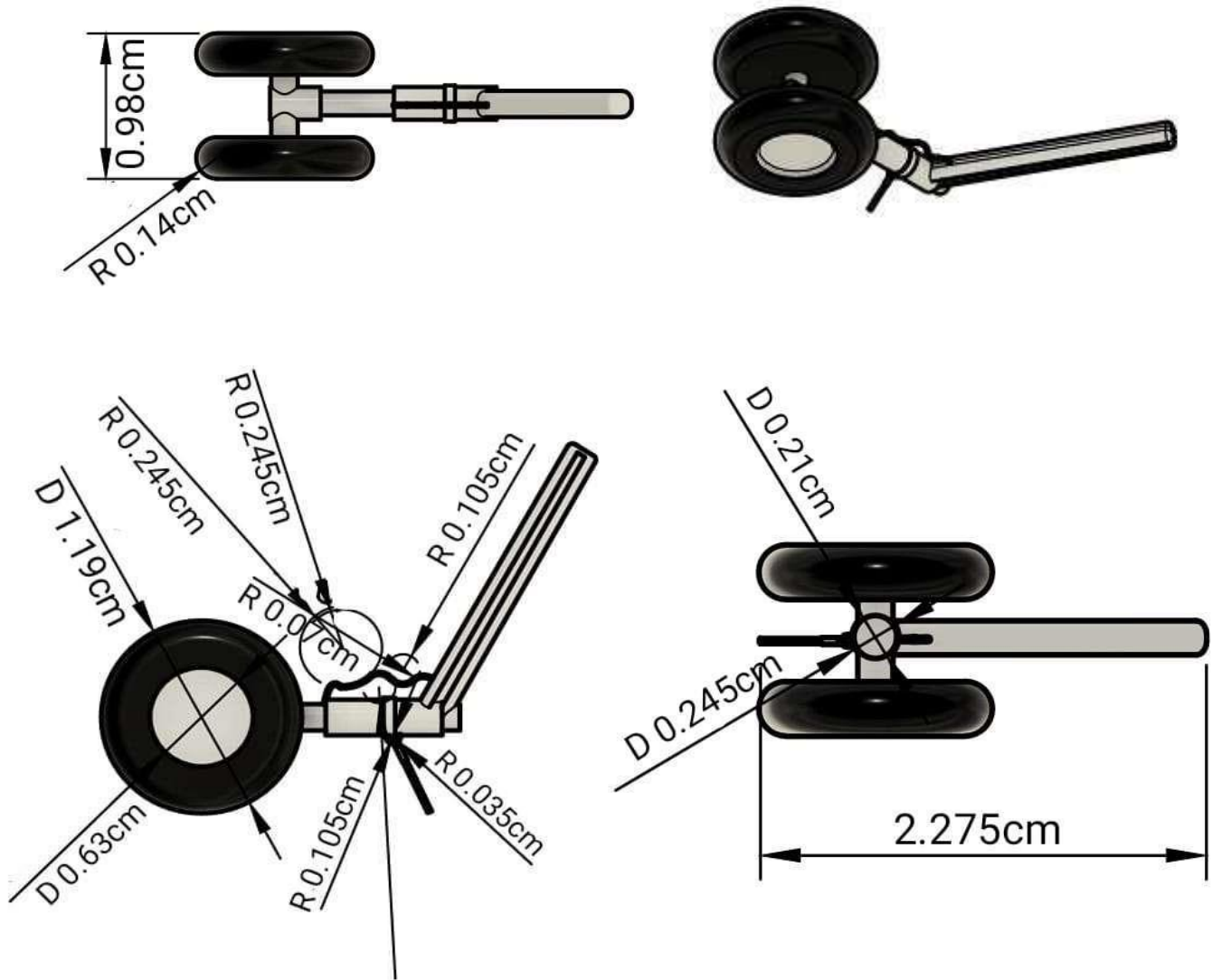
- Formed by metal sheet by the process of metal shearing.

## (2) Cockpit Window



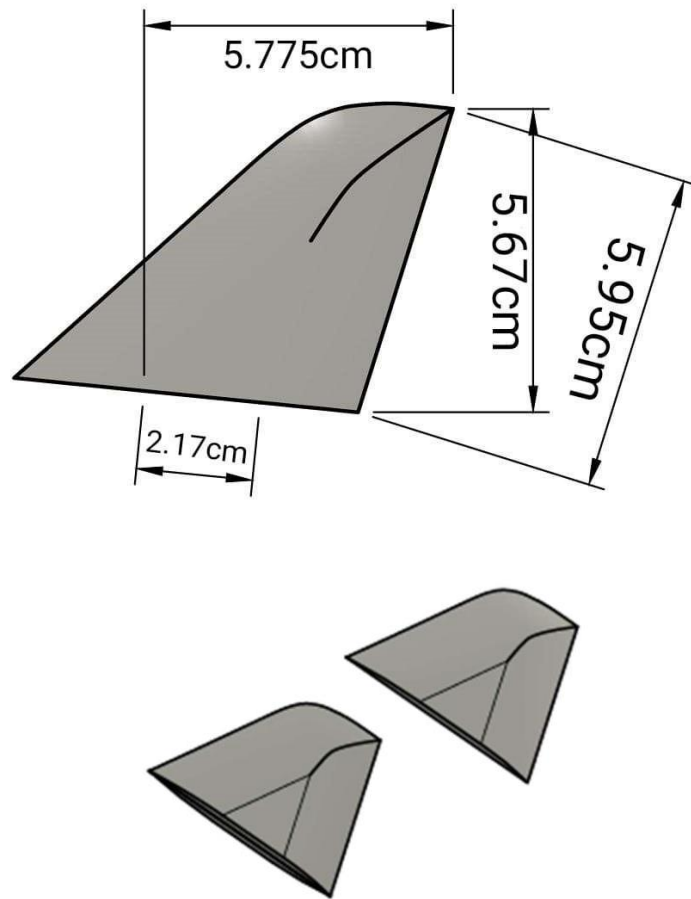
- Formed by metal sheet by the process of metal shearing and bending.

### (3) Front Wheels



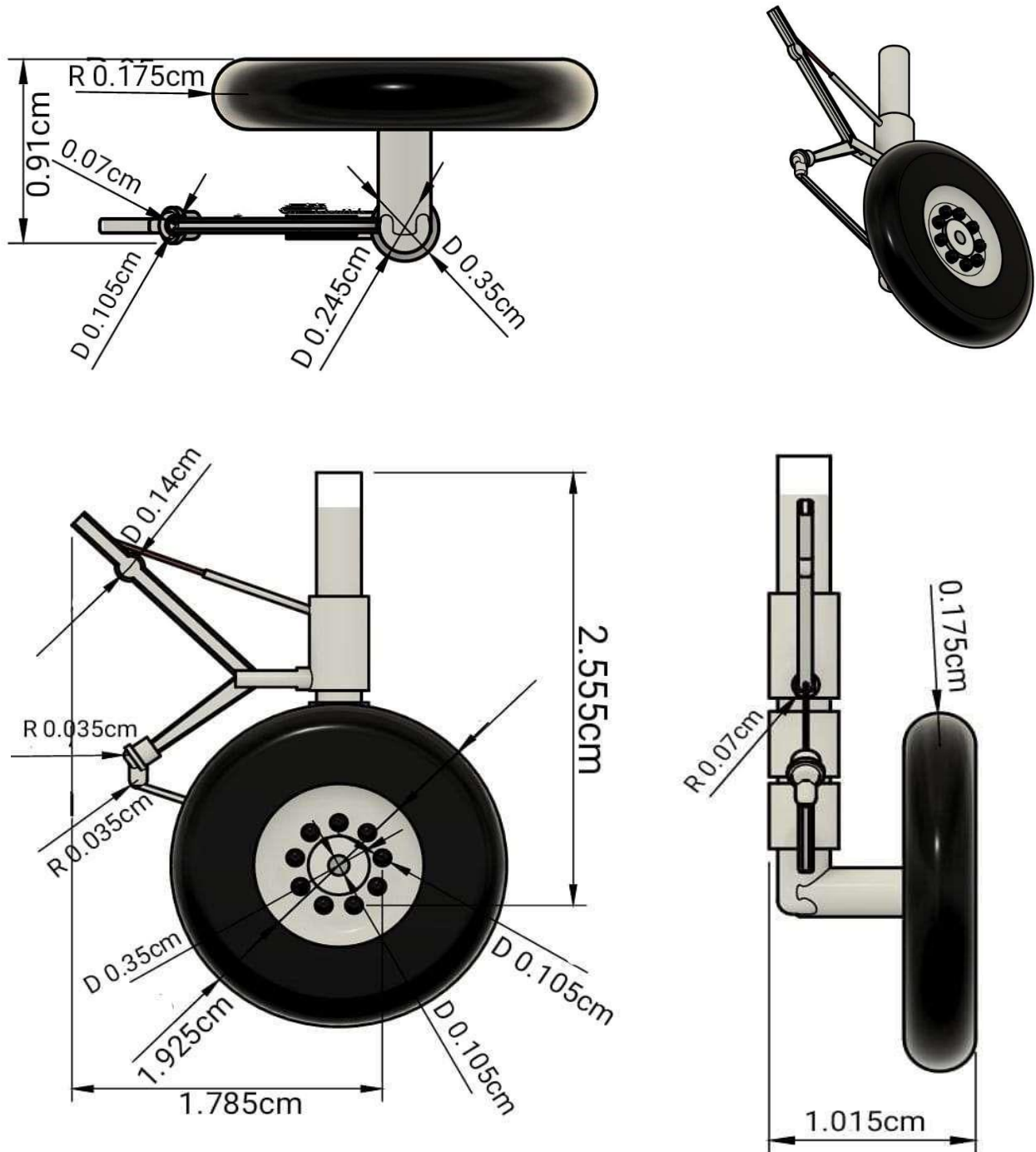
□ Made by metal disk by process of cutting.

## (4) Vertical stabilizers



- Made by metal sheet by the process of metal shearing.

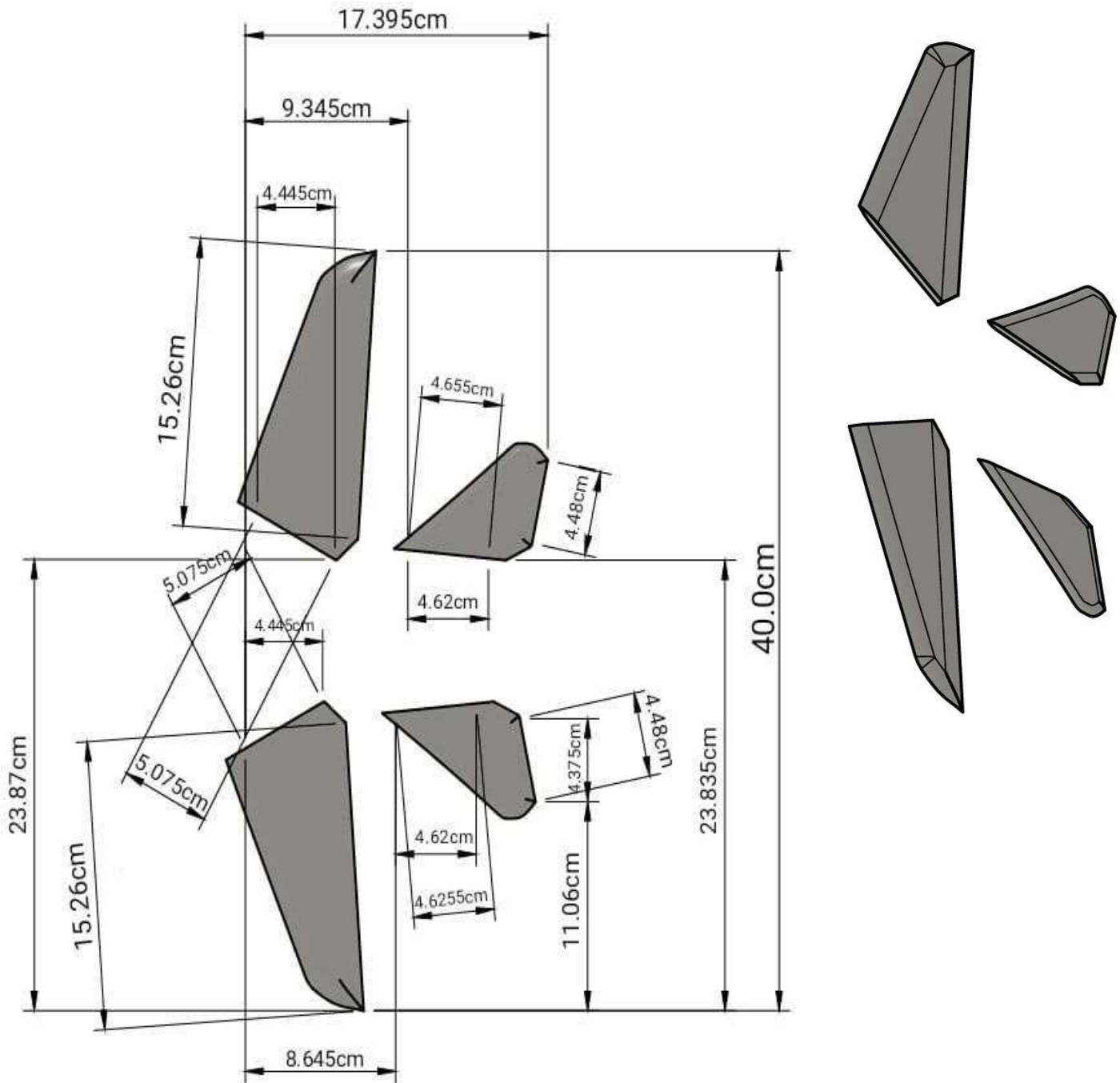
## (5) Rear Wheels



- Made by metal disk by process of cutting.

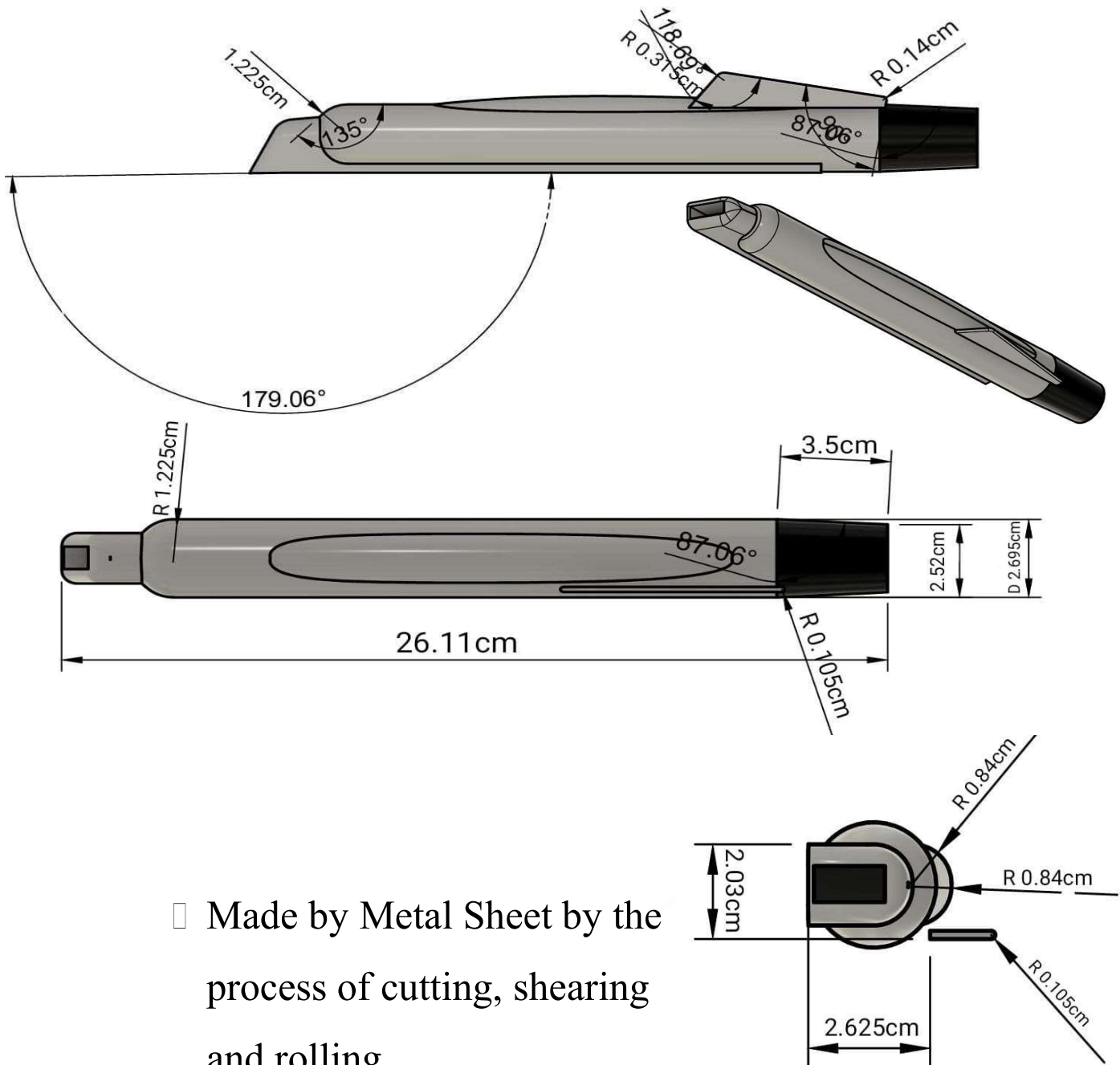


## (6) Wings



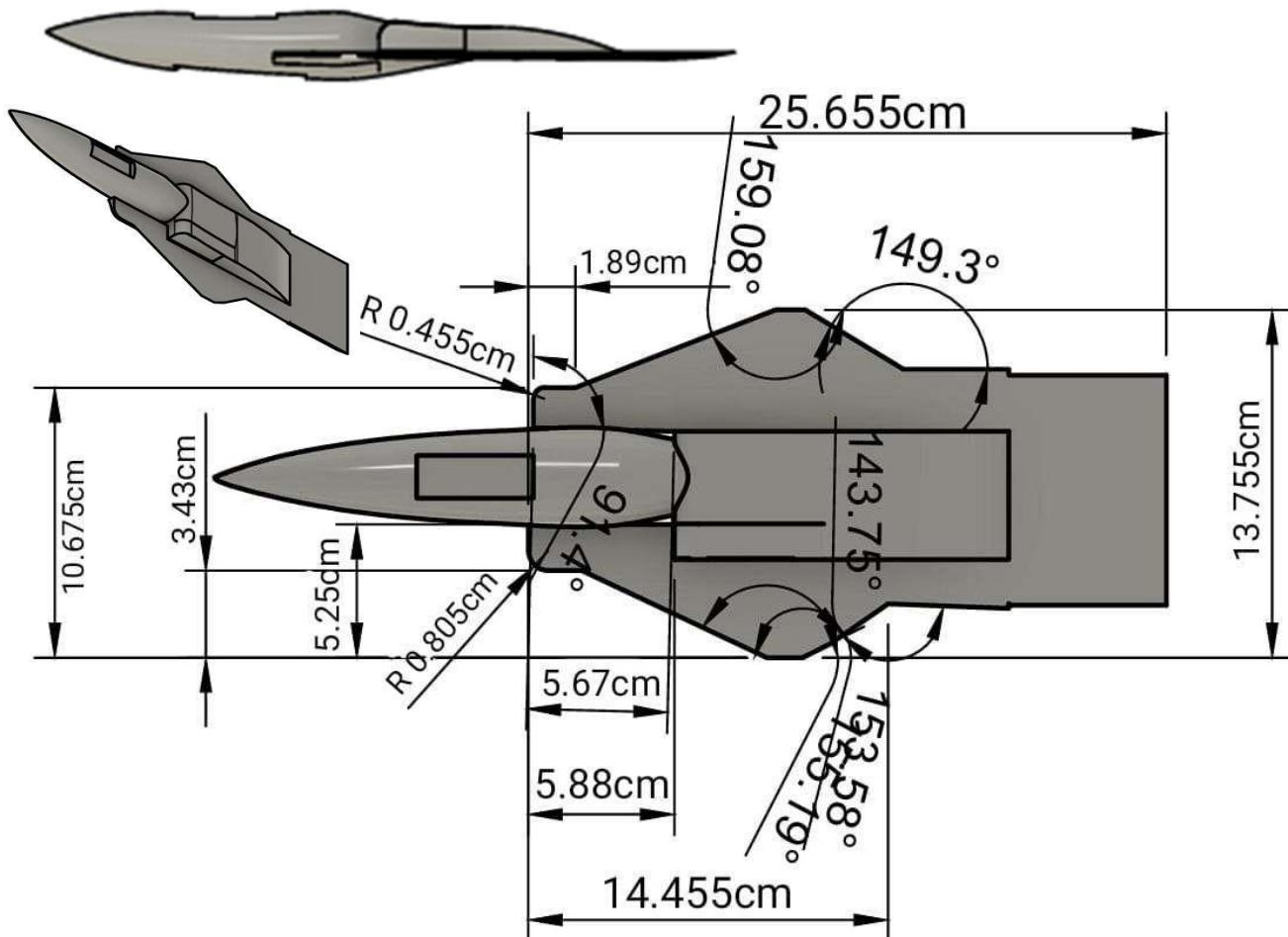
- Made by metal sheet by process of cutting and shearing.

# (7) Thrust generators of aircraft

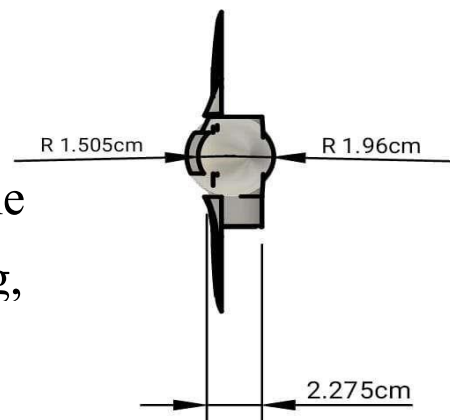


- Made by Metal Sheet by the process of cutting, shearing and rolling.

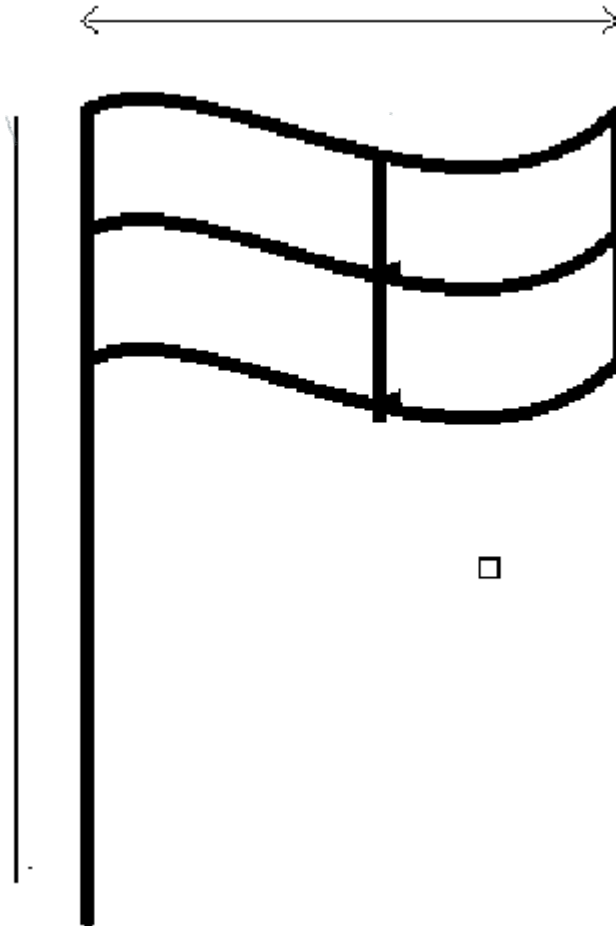
## (8) Body of aircraft



- Made by Metal Sheet by the process of cutting, shearing, rolling and riveting.

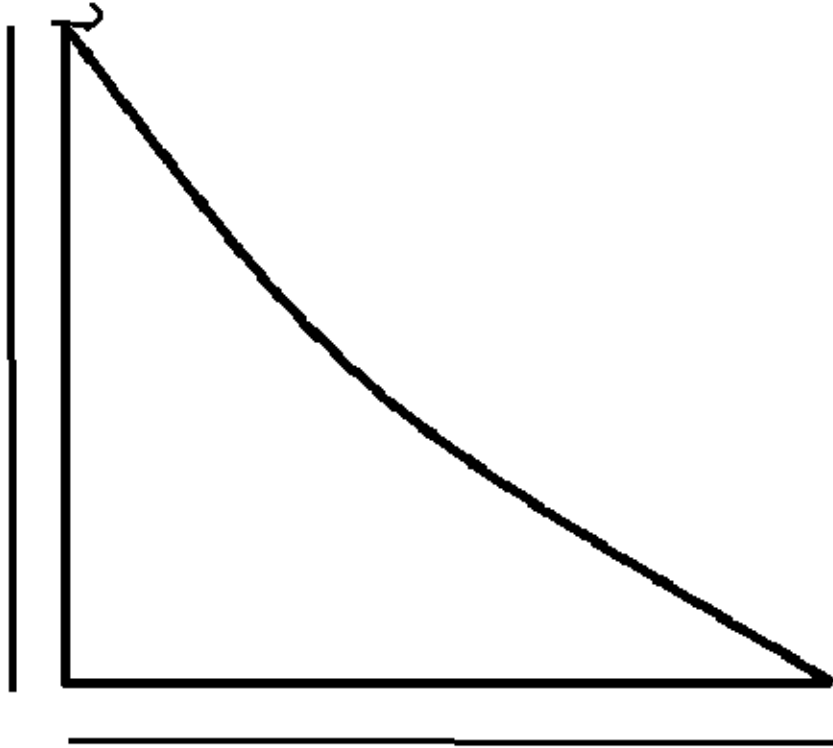


## (9)Flags



- Made by metal sheet and metal rod includes the process of cutting ,shearing,grinding.

## (10)Base



- Made by metal sheet by process of shearing and bending