

Tool head of shaper assembly in CAD CAM CAE PLM and 3D with CATIA

A Project Report for Industrial Internship

Submitted by

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In the partial fulfillment for the award of the degree of

BACHELOR OF TECHNOLOGY

IN

MECHANICAL ENGINEERING

Dr. Sudhir Chandra Sur Degree Engineering College



at

Ardent Computech Pvt. Ltd.



CERTIFICATE FROM SUPERVISOR

This is to certify that “**Pallab Saha, 25500717032**” have successfully completed the project titled " **Tool head of shaper assembly in CAD CAM CAE PLM and 3D with CATIA**" under my supervision during the period from “2nd June 2020” to “7th July 2020” which is in partial fulfilment of requirements for the award of the **B. Tech** degree and submitted to the Department of “**MECHANICAL ENGINEERING**” of “**DR. SUDHIR CHANDRA SUR DEGREE ENGINEERING COLLEGE**”.



Signature of the Supervisor

Date:

Name of the Project Supervisor: **BIJOY NASKAR**



ACKNOWLEDGEMENT

The achievement that is associated with the successful completion of any task would be incomplete without mentioning the names of those people whose endless cooperation made it possible. Their constant guidance and encouragement made all our efforts successful.

We take this opportunity to express our deep gratitude towards our project mentor, *BIJOY NASKAR* for giving such valuable suggestions, guidance and encouragement during the development of this project work.

Last but not the least we are grateful to all the faculty members of Ardent Computech Pvt. Ltd. for their support.

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Objective

The objective of this project is to get familiar with handling the software Catia and make various objects in lesser time and expertise in making designs with the required dimensions. This is to practice the ways of handling and possible variety of ways the program can be used and generate ideas of using this in a simpler way.

Here a tool head of shaper is designed to know its components in a better way by designing all the component available in the body. It will give a better view for observing and understanding the arrangement of the components. The designing is an example to show possible things that can be created.

Introduction

A shaper is a type of machine tool that uses linear relative motion between the work piece and a single-point cutting tool to machine a linear toolpath. Its cut is analogous to that of a lathe, except that it is (archetypally) linear instead of helical. (Adding axes of motion can yield helical toolpaths, has also done in helical planning.) A shaper is analogous to a planner, but smaller, and with the cutter riding a ram that moves above a stationary work piece, rather than the entire work piece moving beneath the cutter. The ram is moved back and forth typically by a crank inside the column; hydraulically actuated shapers also exist.

The toolhead of a shaper holds the cutting tool rigidly. It is fitted on the face of the ram. The vertical slide of the toolhead can be moved vertically or at a particular angle to provide vertical and angular feed movement to the tool. It allows the tool to have an automatic relief during the return stroke of the ram.

The toolhead has a swivel base attached to the circular seat on the ram. The swivel base has angular graduations marked on it. As the vertical slide is mounted on the swivel base of the toolhead, it may be set and moved at any desired angle to machine angular surfaces like 'V' grooves and dove tail grooves.

The down feed screw handle is rotated to move the vertical slide up and down. A graduated dial is placed on the top of down feed screw to control the amount of depth of cut or feed accurately.

The work is held firmly on the table and the ram is allowed to reciprocate over it. A single point cutting tool is attached to the ram. When the ram moves horizontally in the forward direction, the tool removes metal from the work. On the return stroke, metal is not removed. The ram moves at a slow speed during forward stroke. But during return stroke, the ram moves at a faster speed. Though the distances of ram movement during the forward and return stroke remain the same, the time taken by the return stroke is less as it is faster. It is possible by 'Quick return mechanism'.

In a shaping machine, a flat horizontal surface is machined by moving the work mounted on the table in a cross direction to the tool movement. When vertical surfaces are machined, the feed is given to the tool.

Types

The SHAPING MACHINES are classified as follows depending on the mechanisms:

- **According to the type of driving mechanism**

1. Crank type
2. Hydraulic type
3. Geared type

- **According to the design of the table**

1. Plain shaper
2. Heavy duty shaper
3. Standard shaper
4. Universal shaper

- **According to the position and travel of ram**

1. Horizontal shaper
2. Vertical shaper

- **According to the type of cutting stroke**

1. Push cut shaper
2. Draw cut shaper

Mechanism

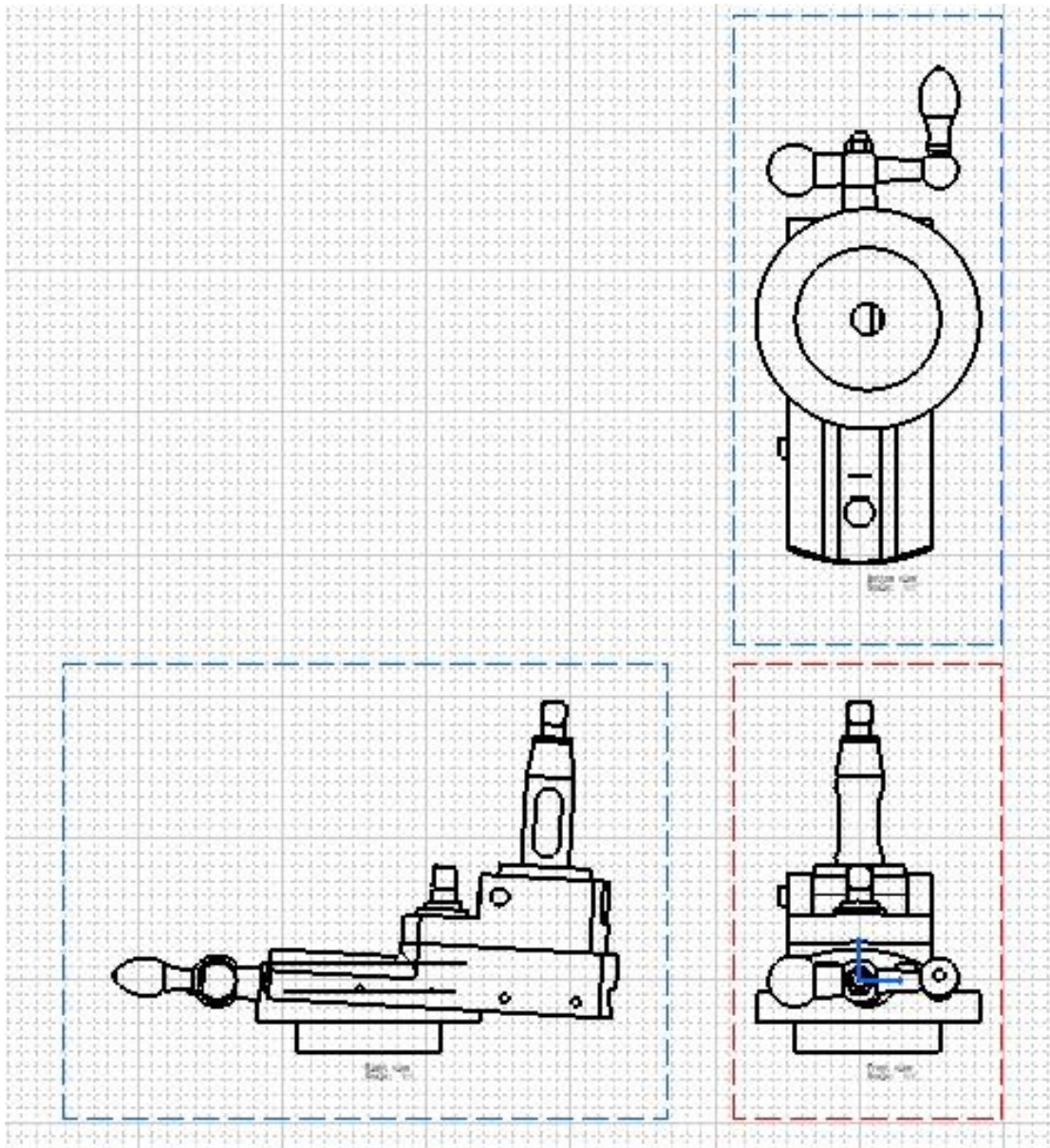
A shaper machine is working on the following principle:

- A shaper machine holds the Single point cutting tool in ram and work piece is fixed over the table.
- The ram holding the tool reciprocates over the work piece and metal is cut during the forward stroke called a cutting stroke and
- No metal is cut during its return stroke is called an Idle stroke.
- The feed is given at the end of the cutting stroke.
- Generally, the cutting stroke is carried out at slow speed and the idle stroke is carried at high speed with the help of quick return mechanism.

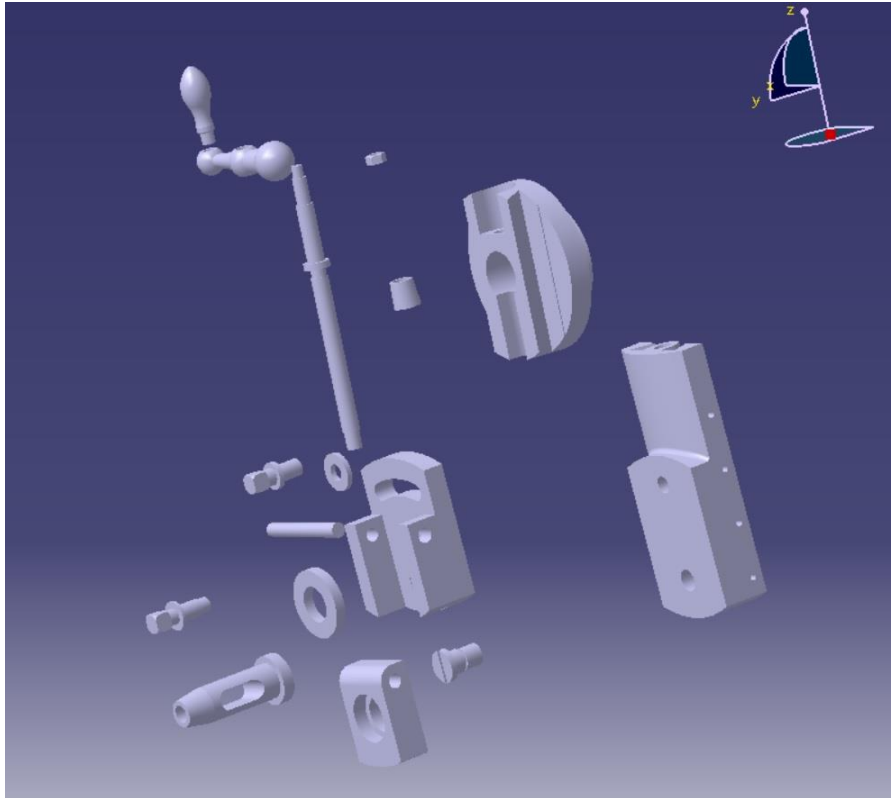
In the shaper machine, there is another mechanism called Quick Return Motion Mechanism.

Project design

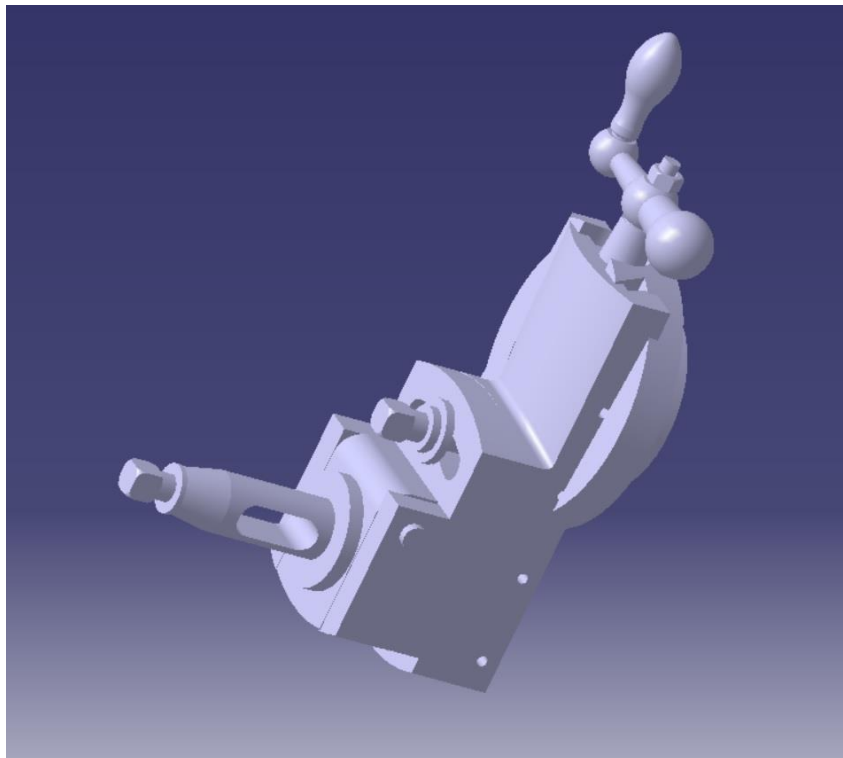
The tool head of shaper is made as follows. Various views of this model is provided for different views.



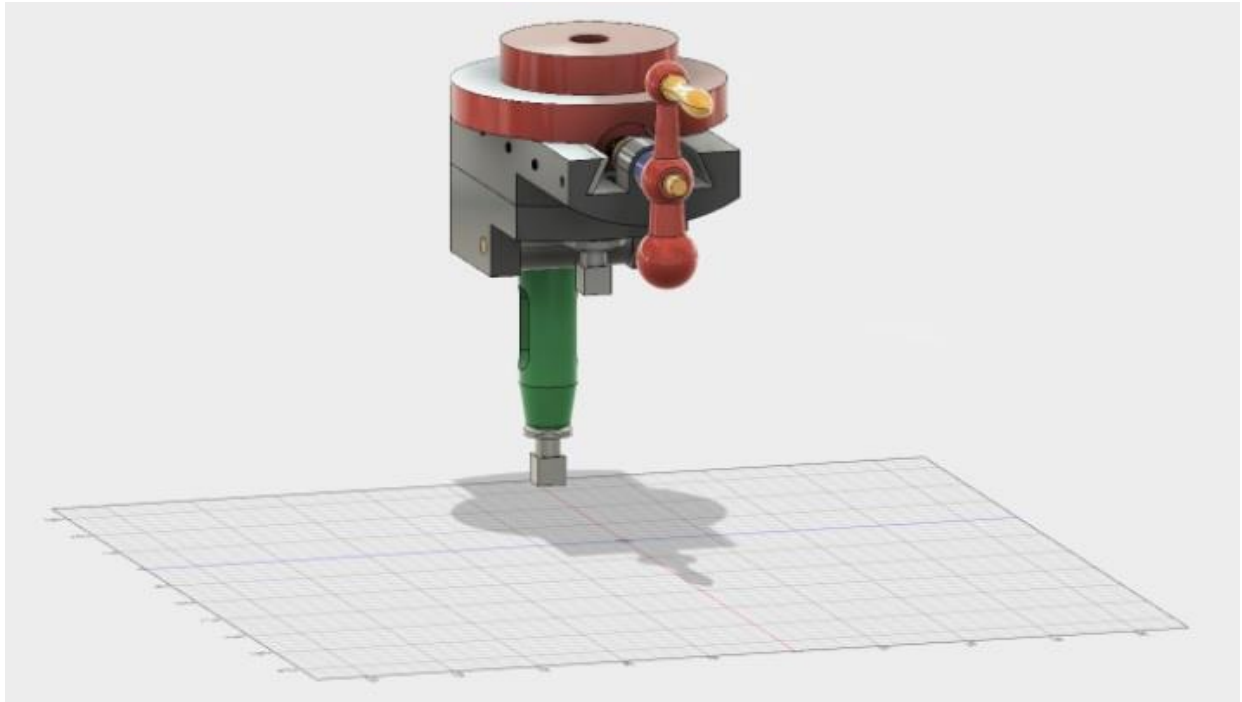
Drafting of the model



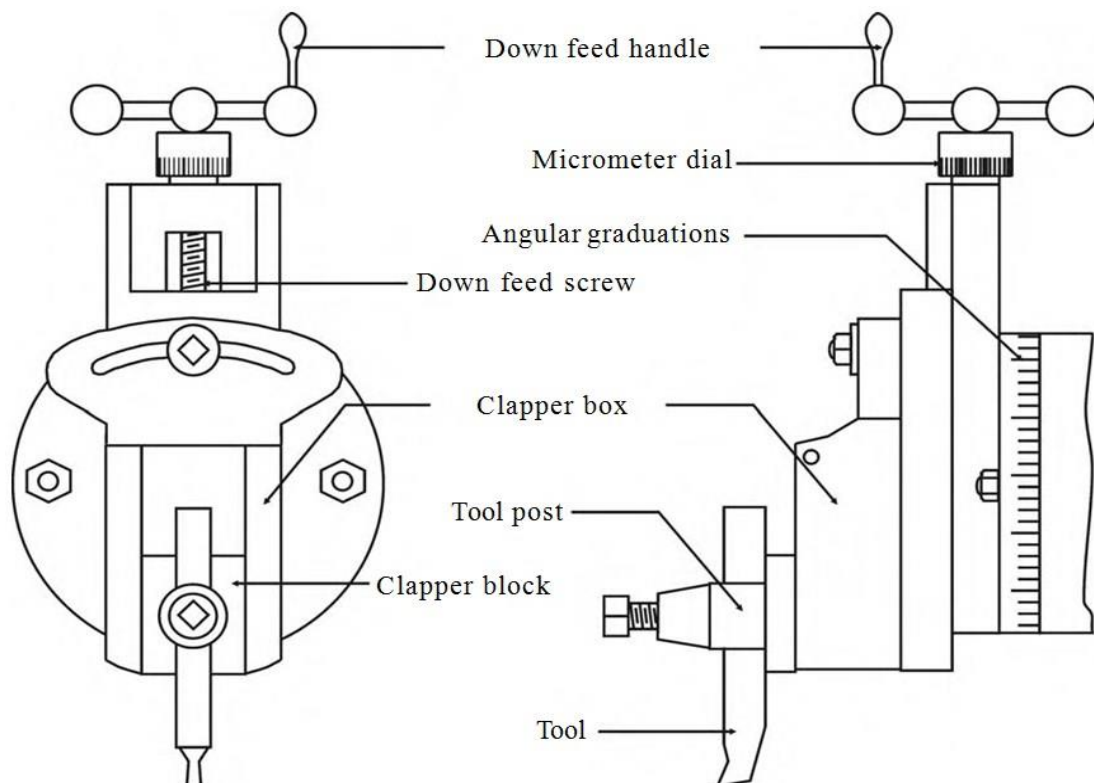
Showing all the parts scattered



Showing all the parts arranged as a single model



Possible view of the model



Swivel Toolhead

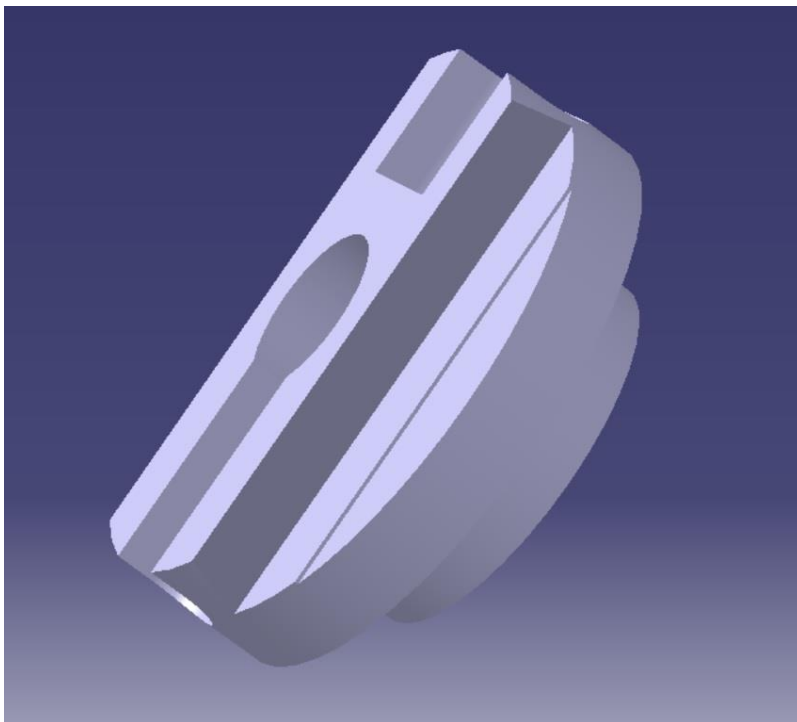
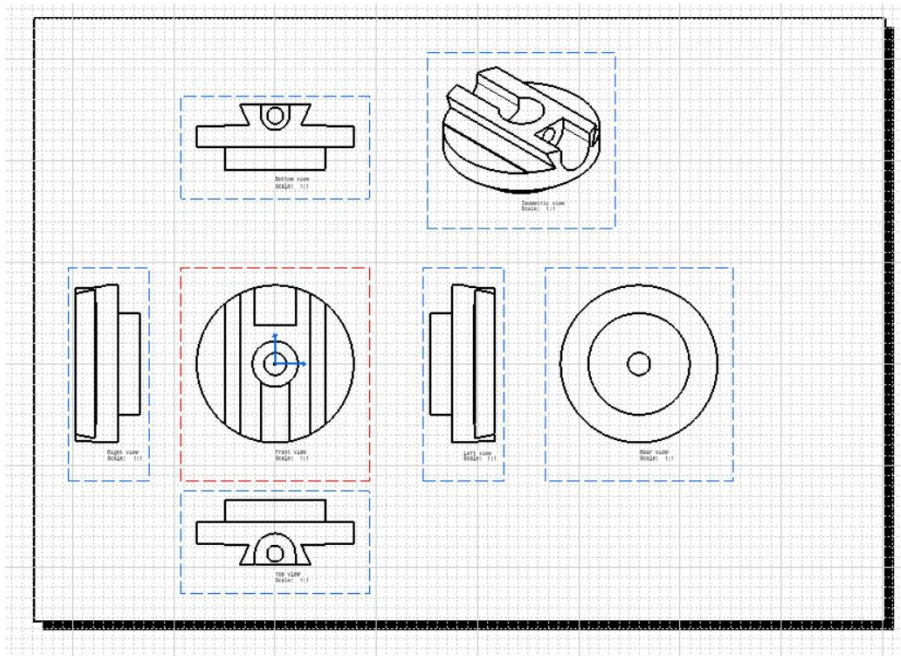
Named diagram of the parts in the model

Components

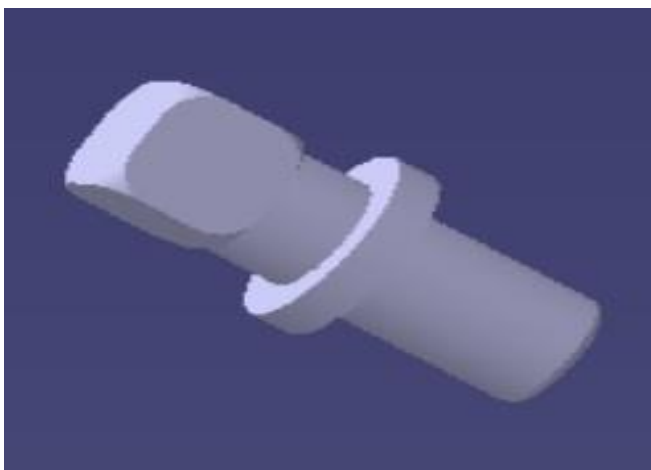
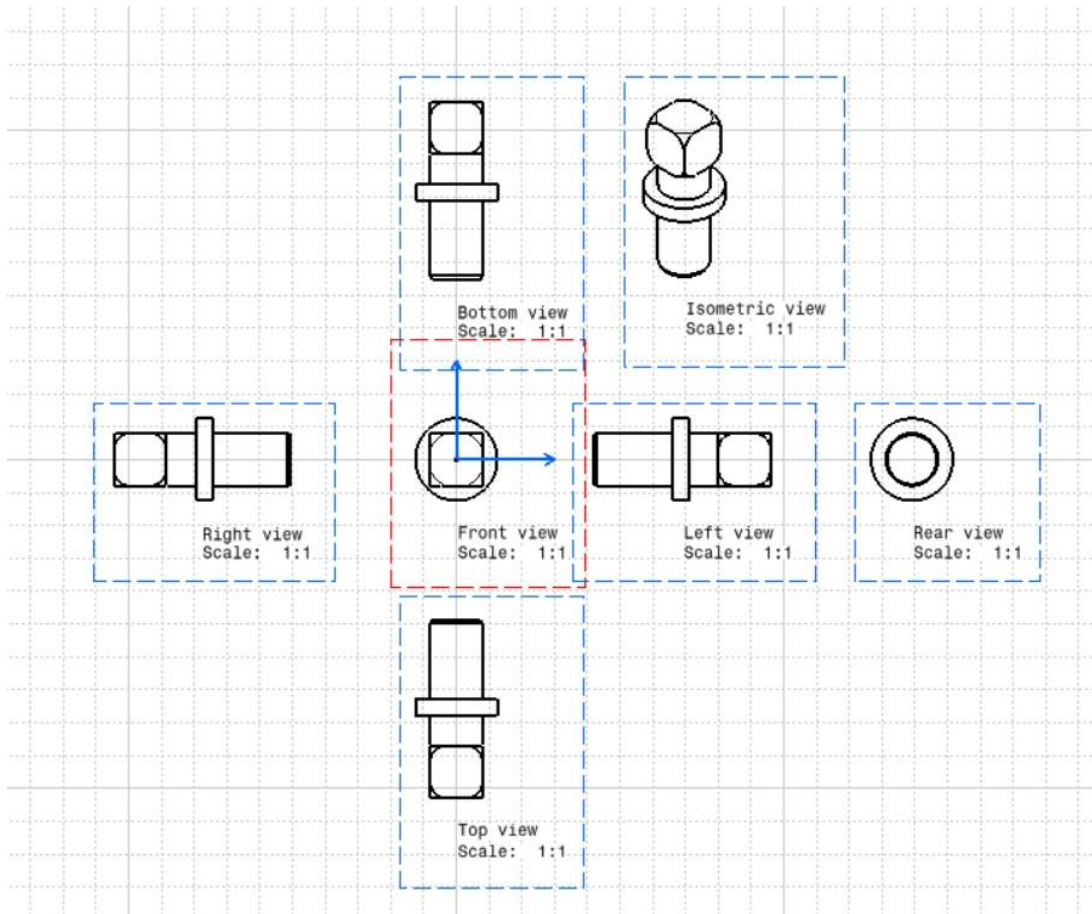
- Back plate
- Clamping screw
- Drag plate
- Handle bar
- Handle
- Nut
- Pivot pin
- Screw bar
- Small washer
- Spacer bush
- Swivel plate
- Swivel screw pin
- Tool fixing screw
- Tool holder vertical slide
- Washer

Description of components

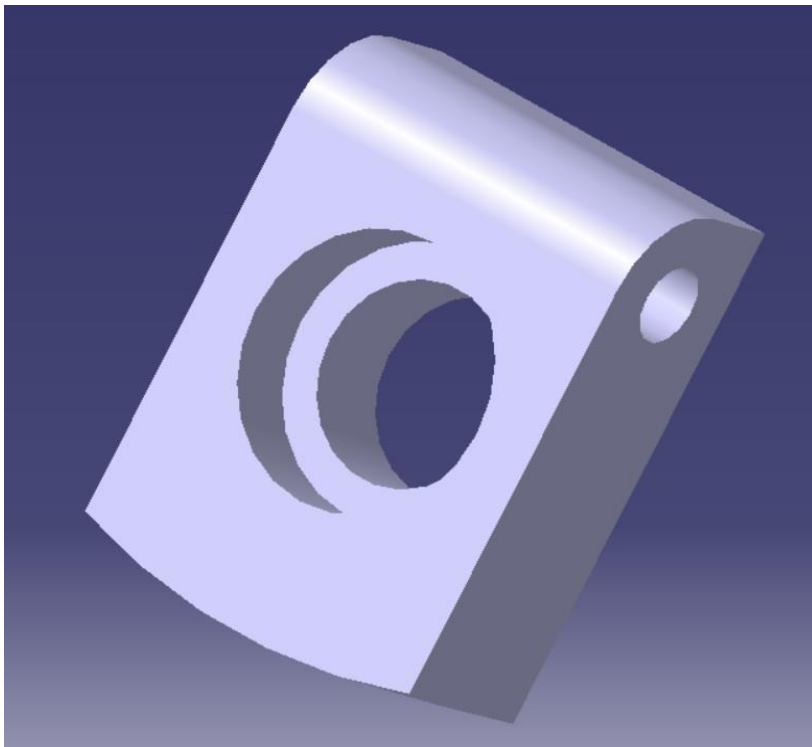
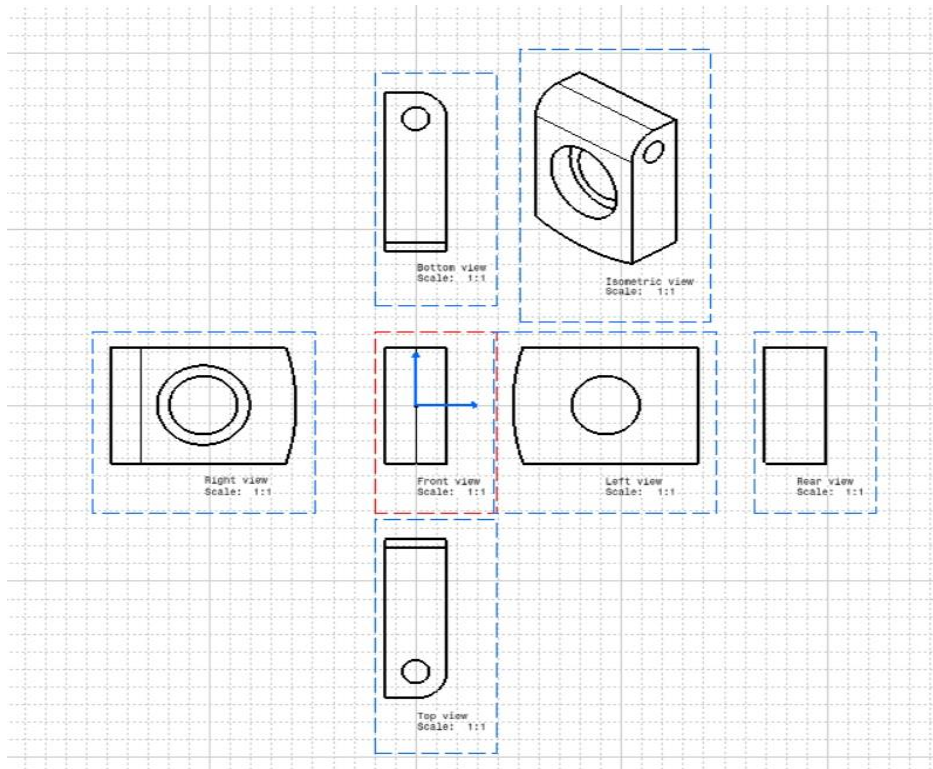
- Back plate



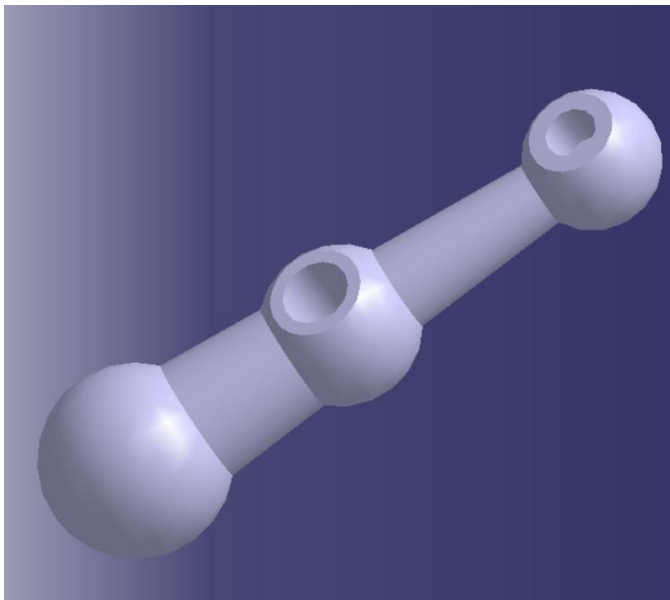
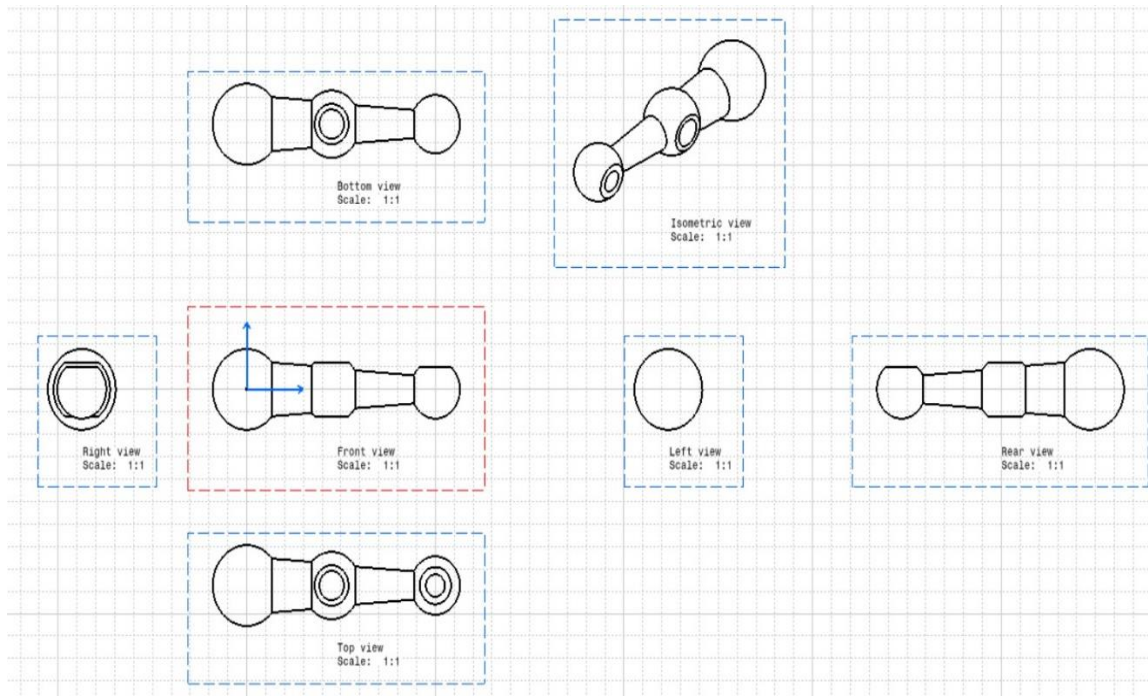
- Clamping screw



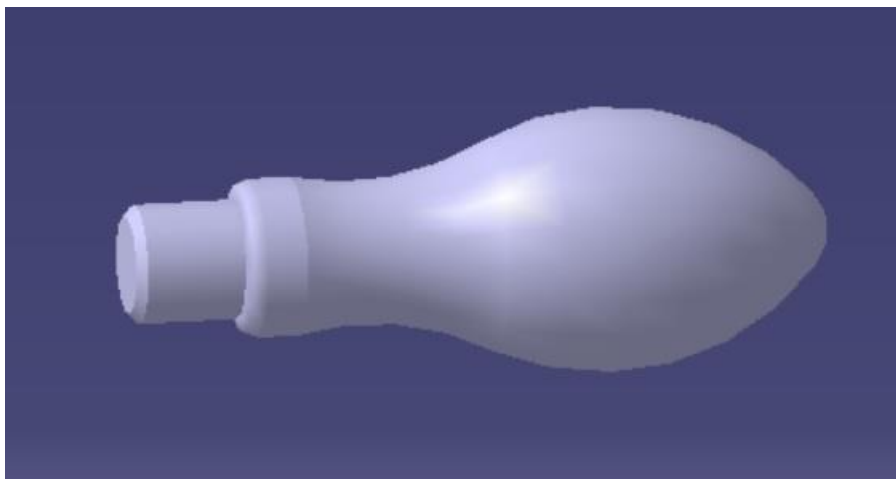
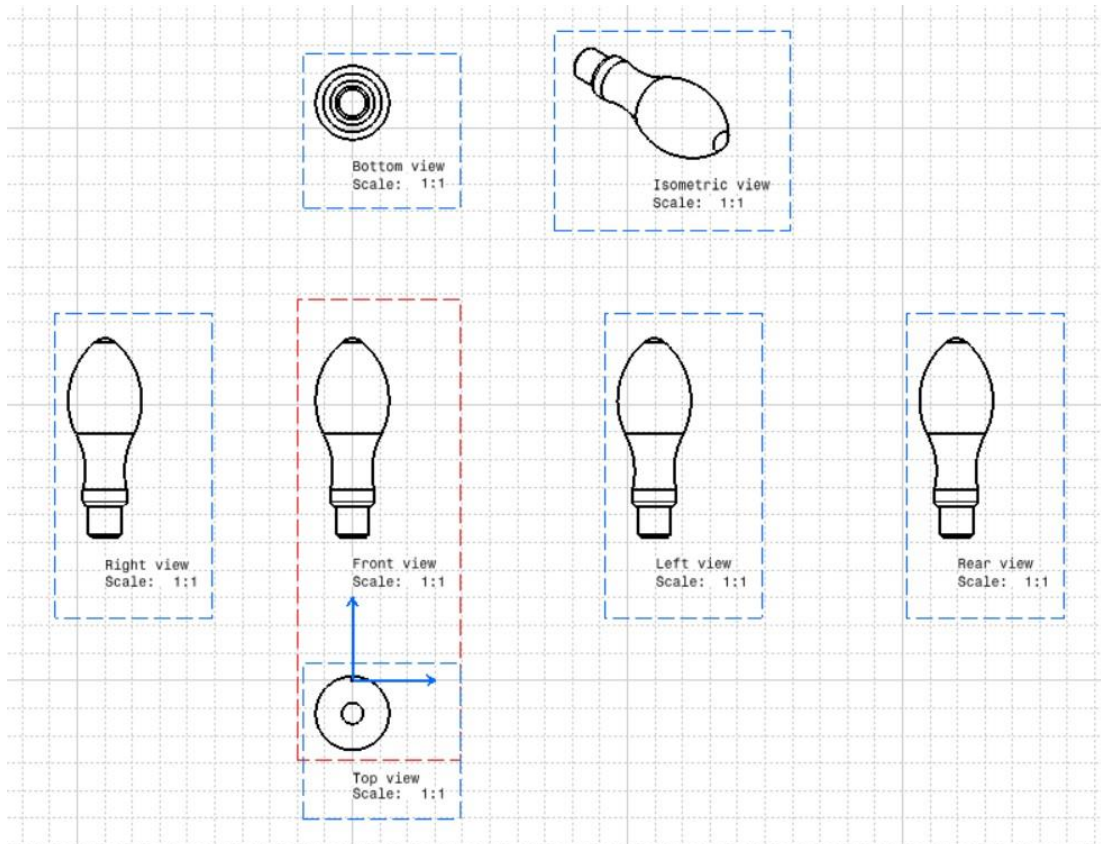
- Drag plate



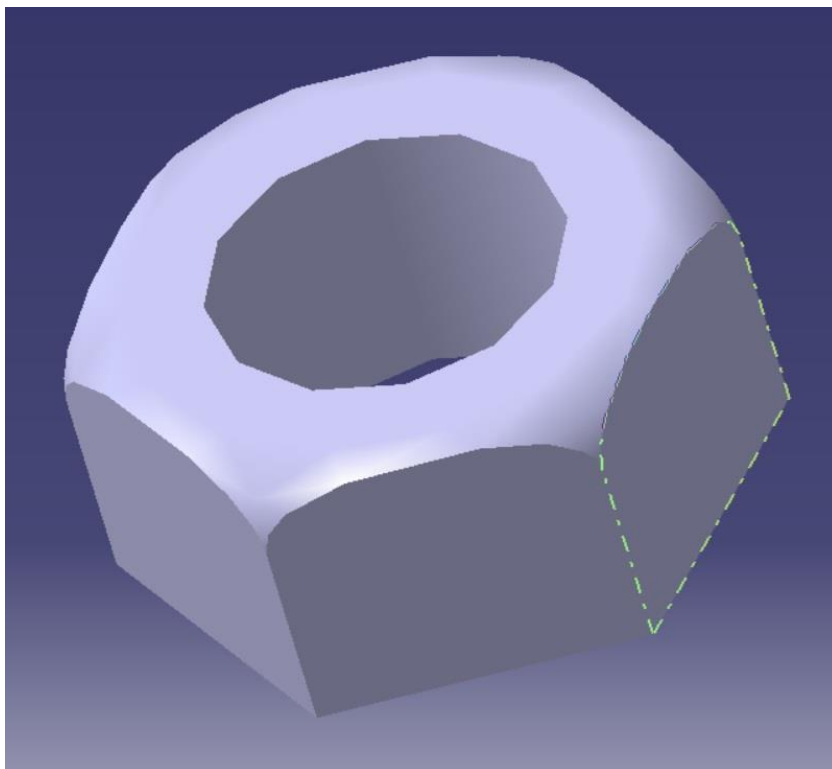
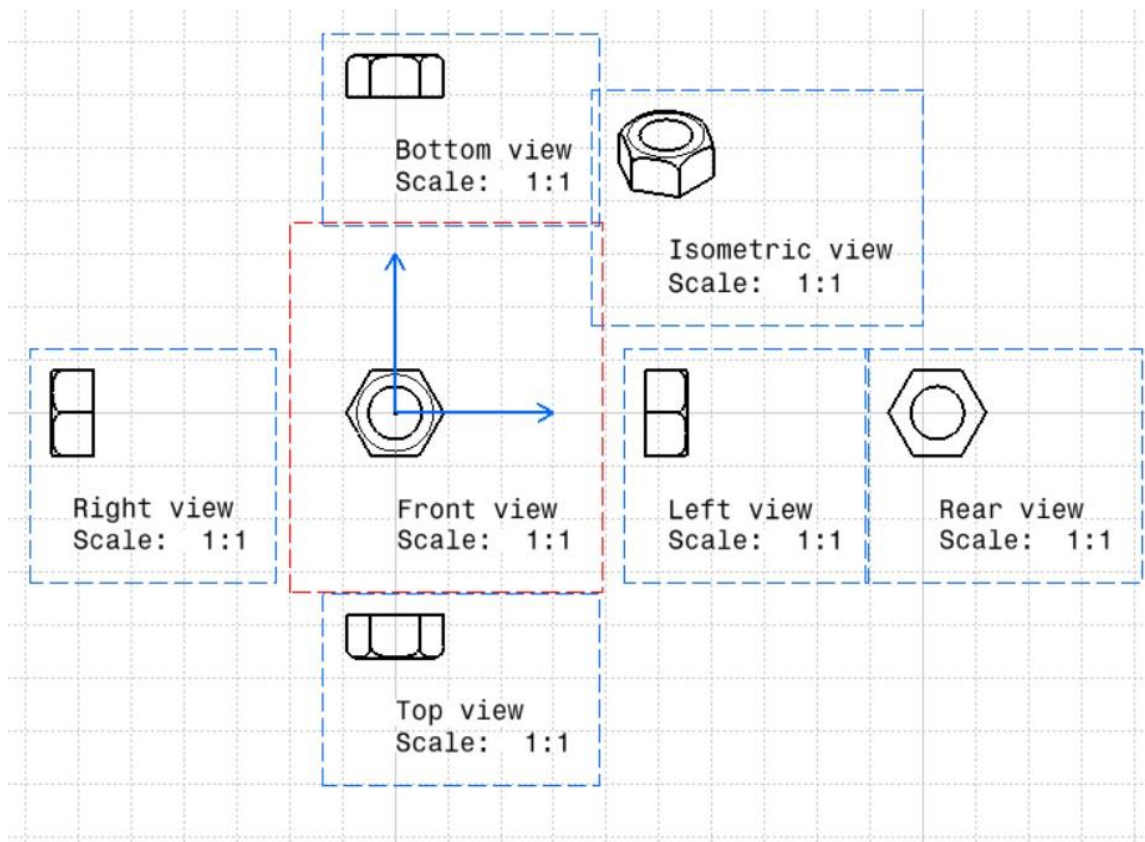
- Handle bar



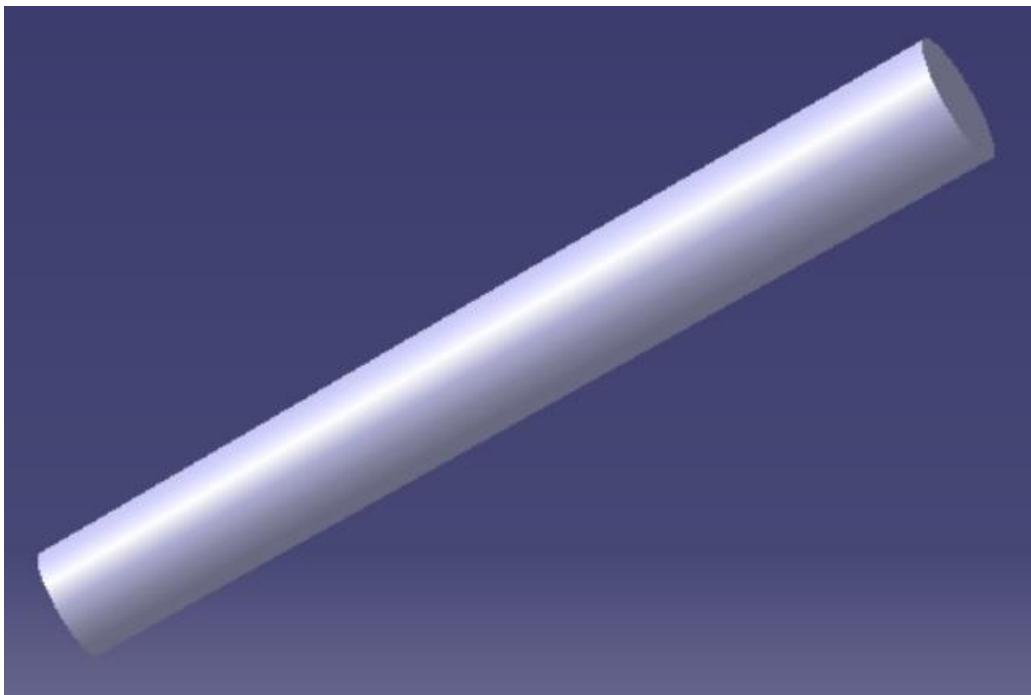
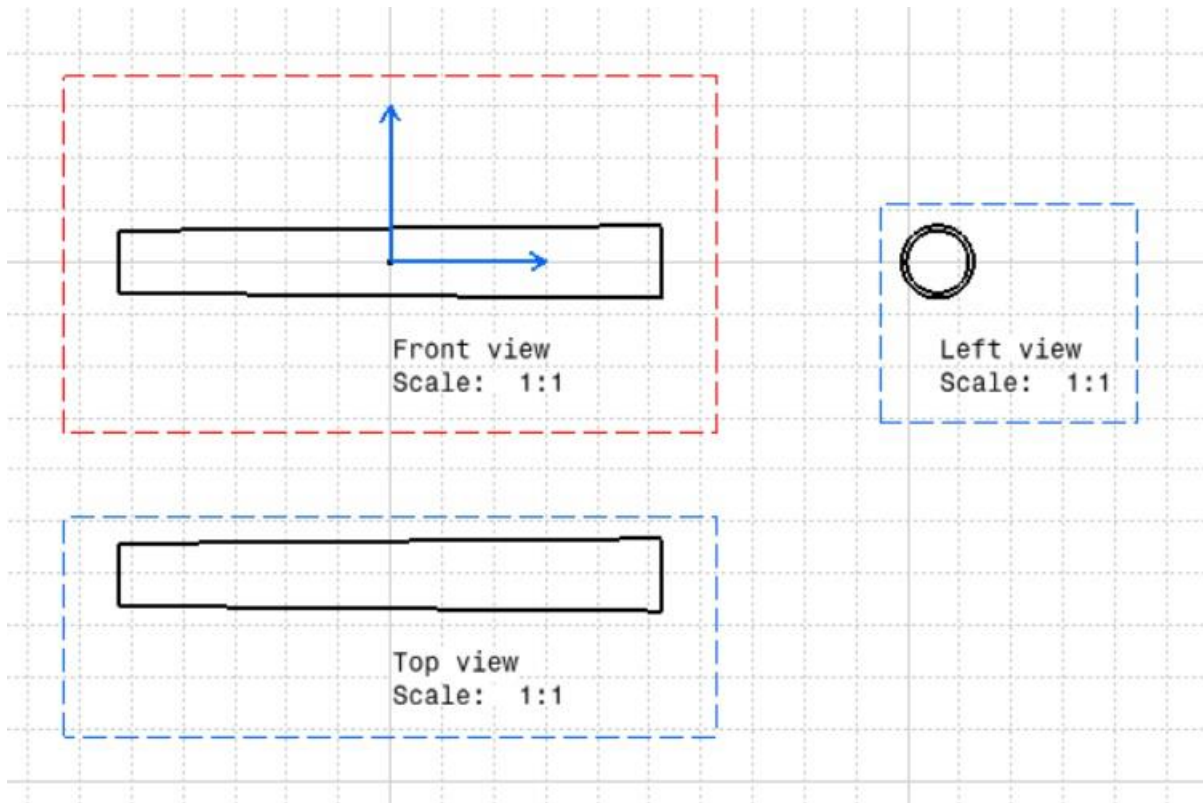
- Handle



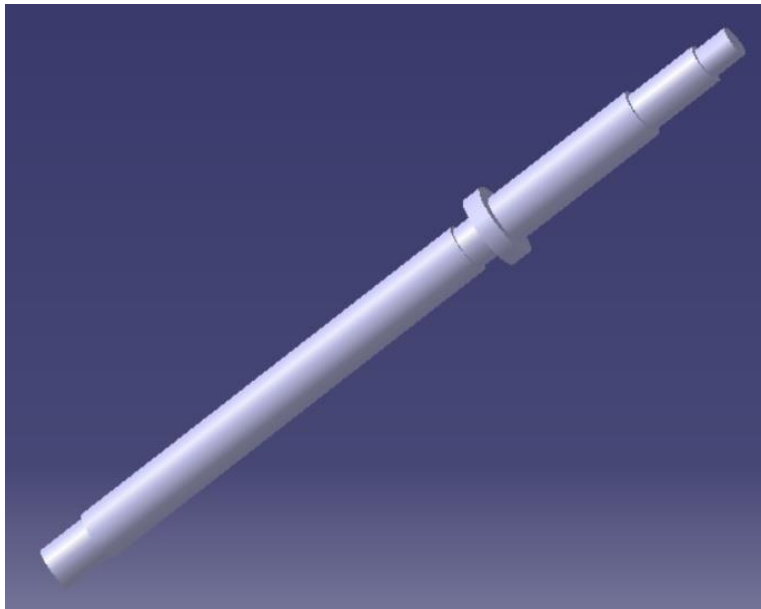
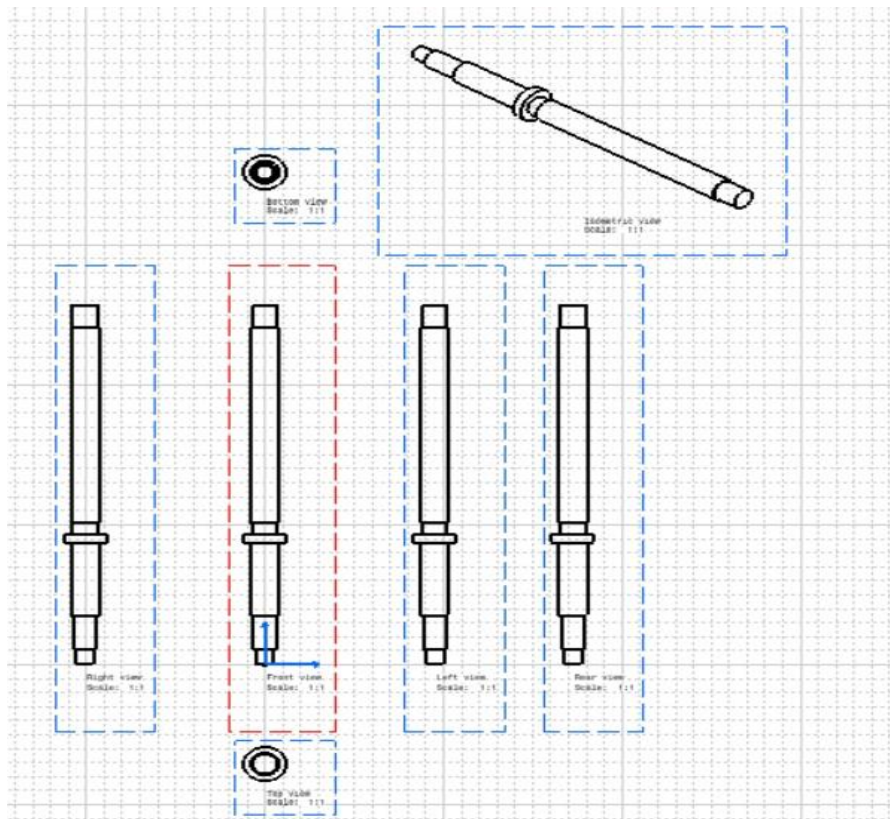
- Nut



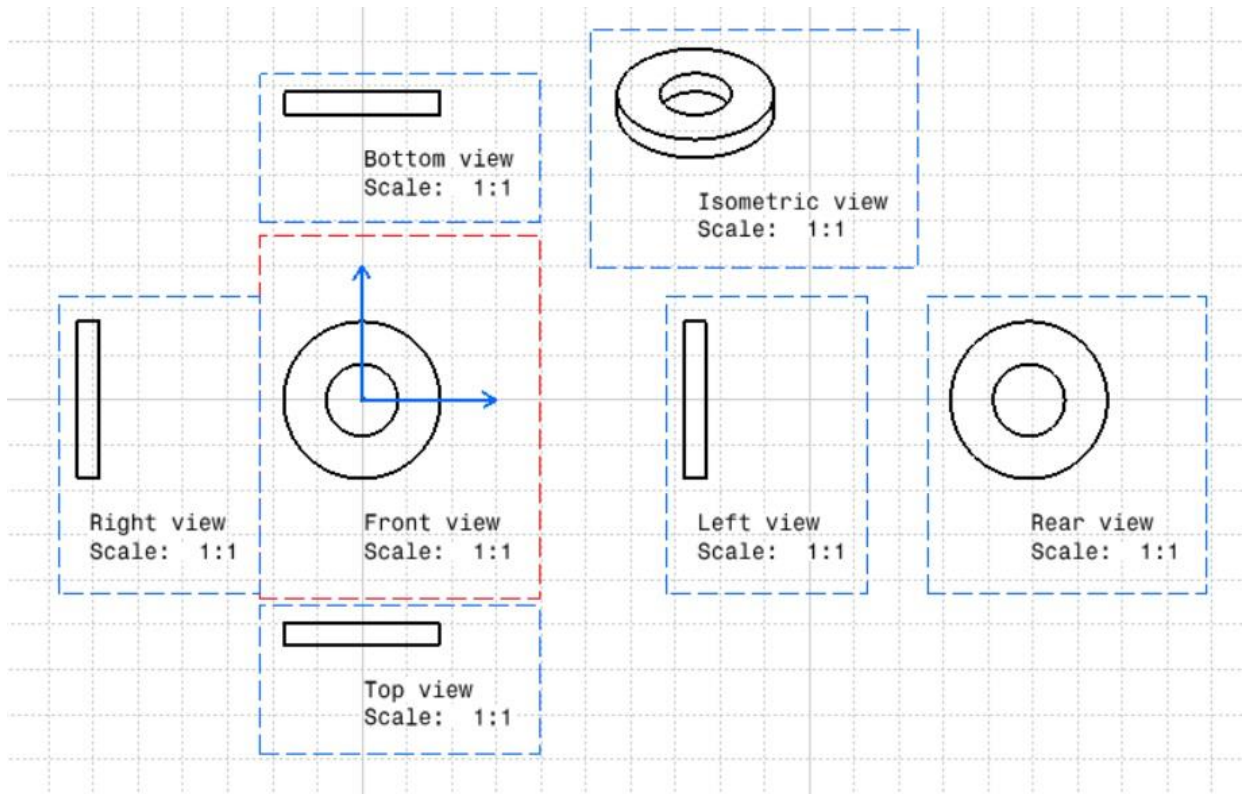
- Pivot pin



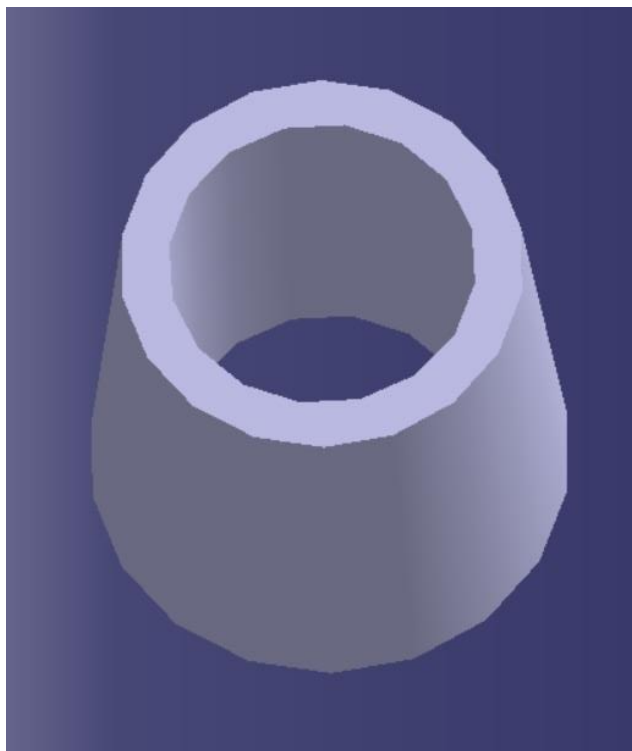
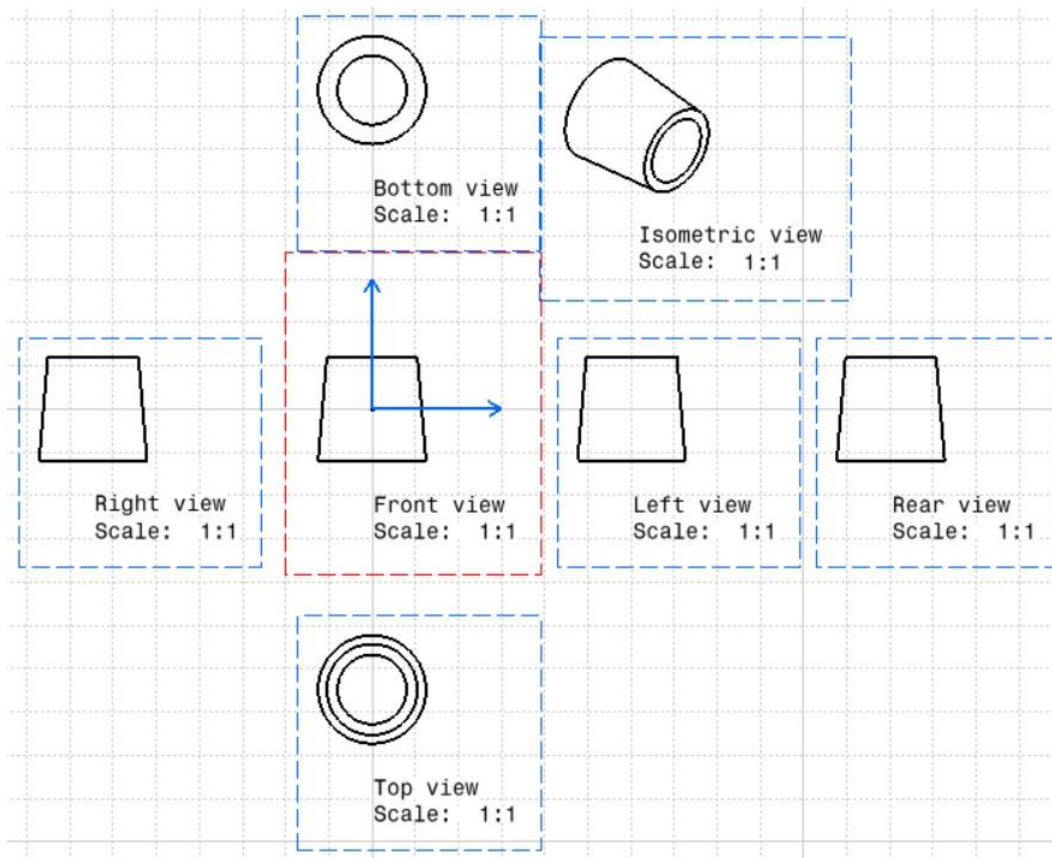
- Screw bar



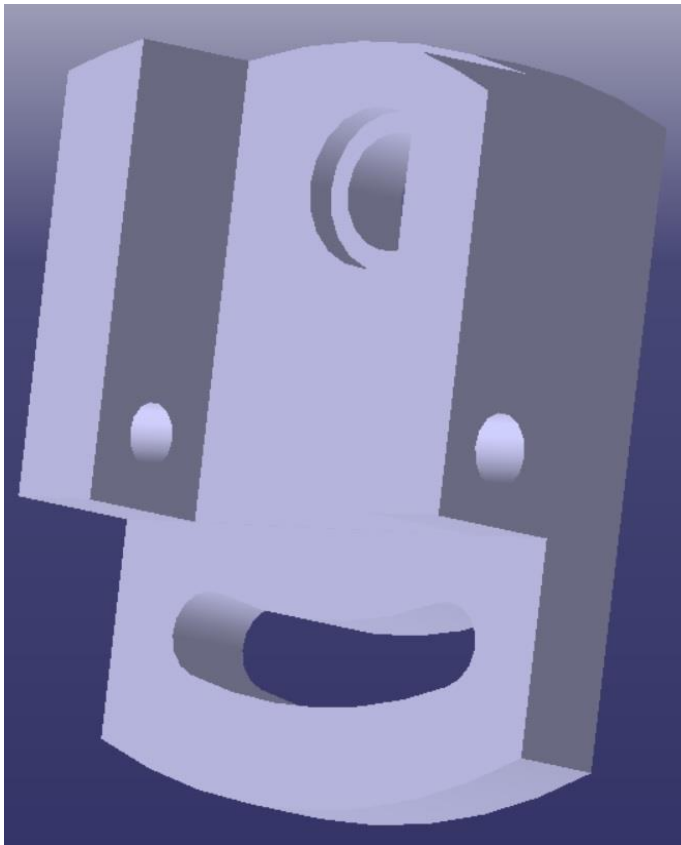
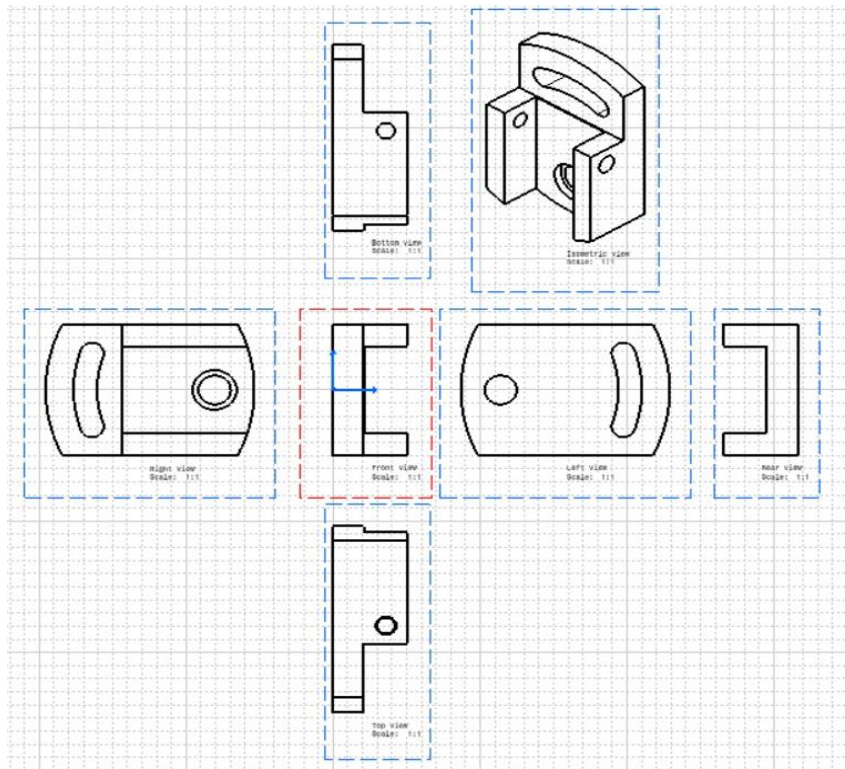
- Small washer



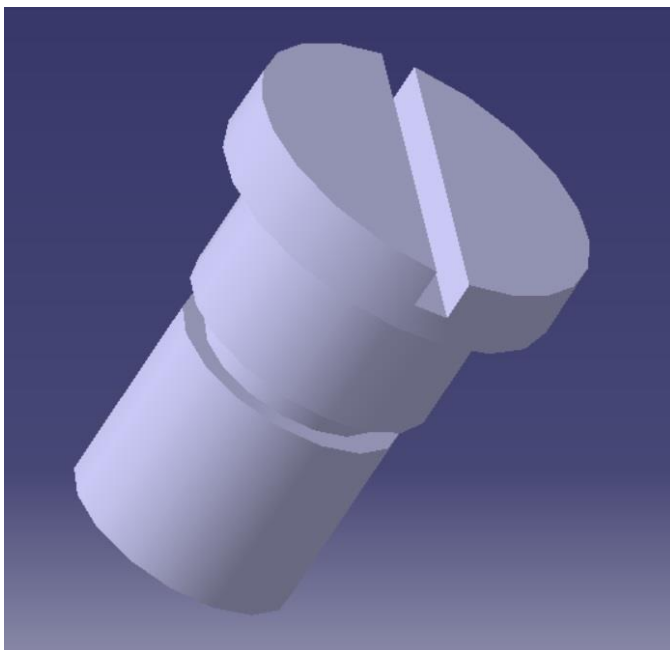
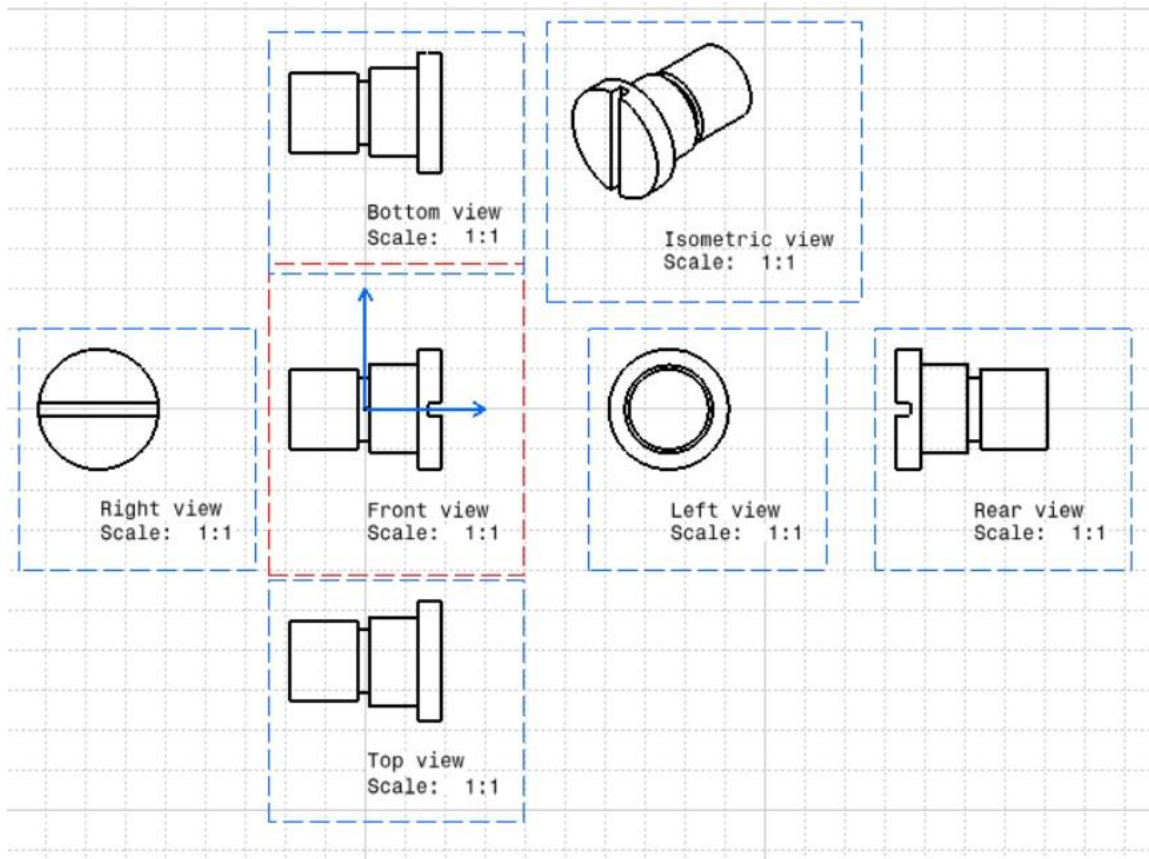
- Spacer bush



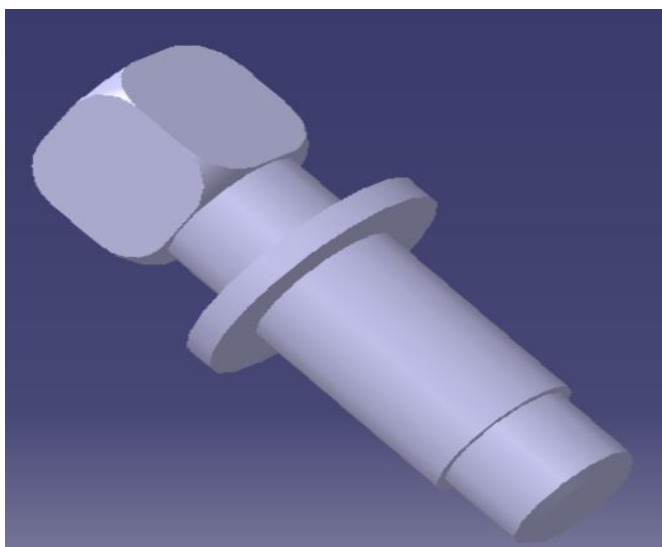
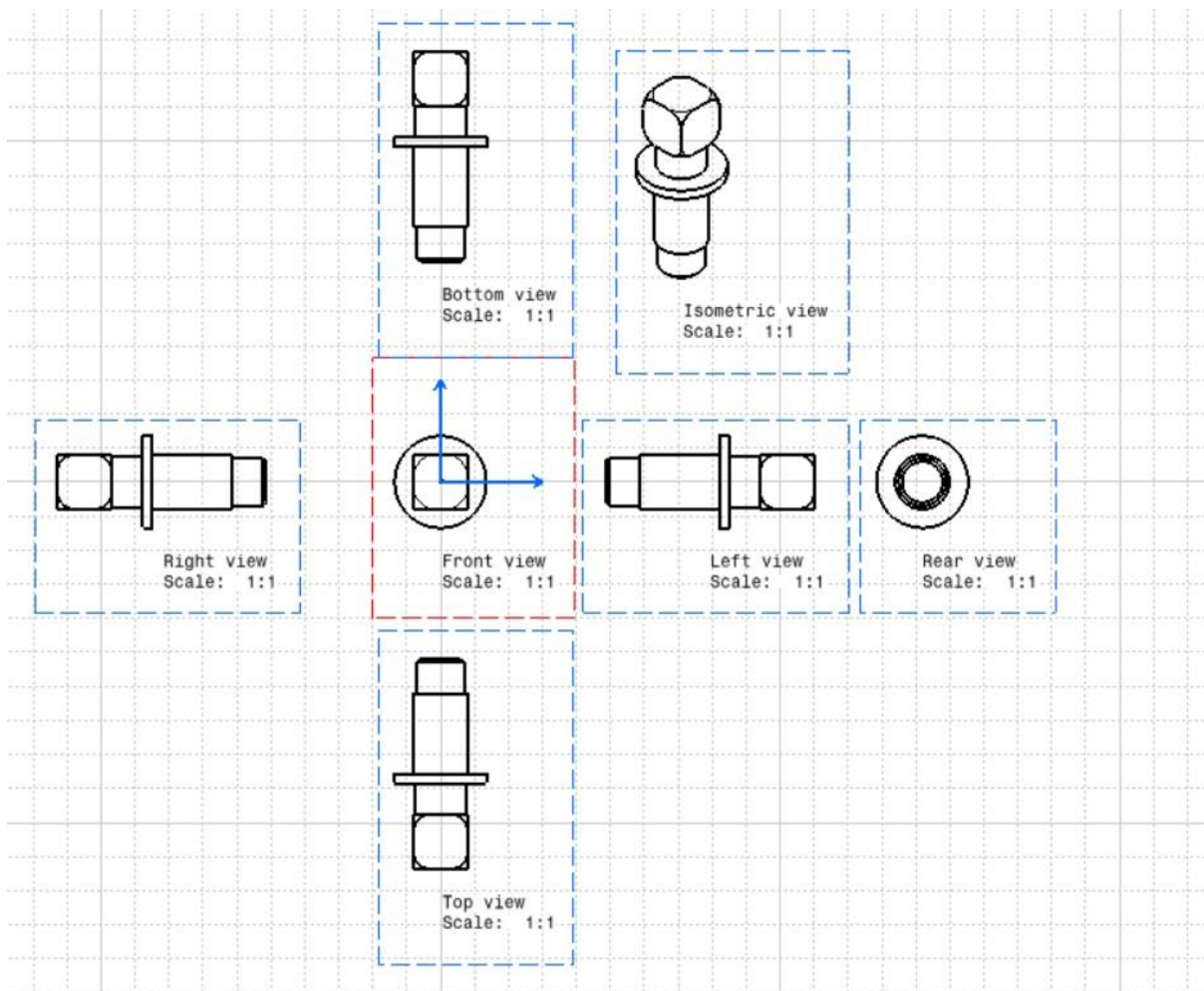
- Swivel plate



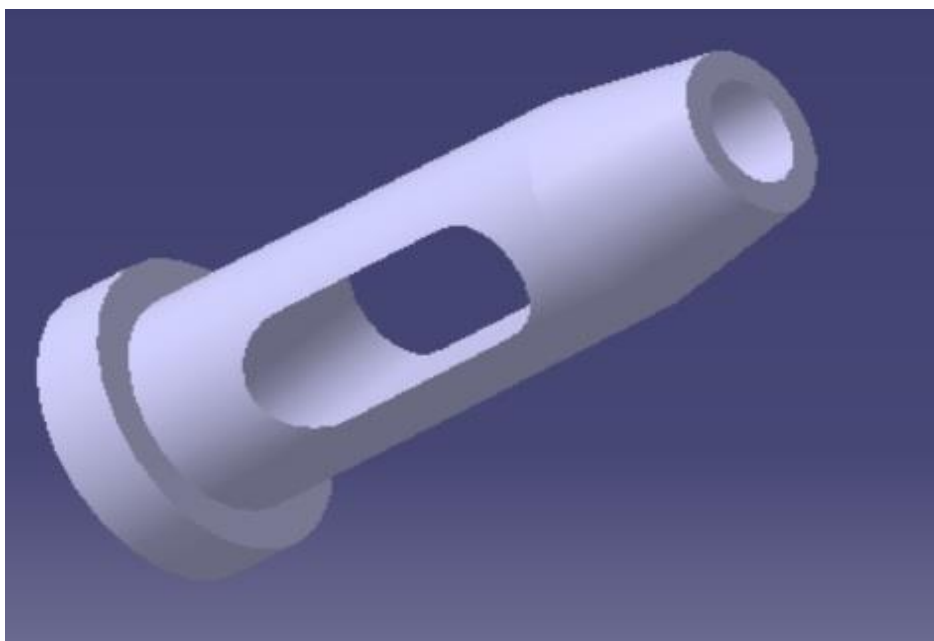
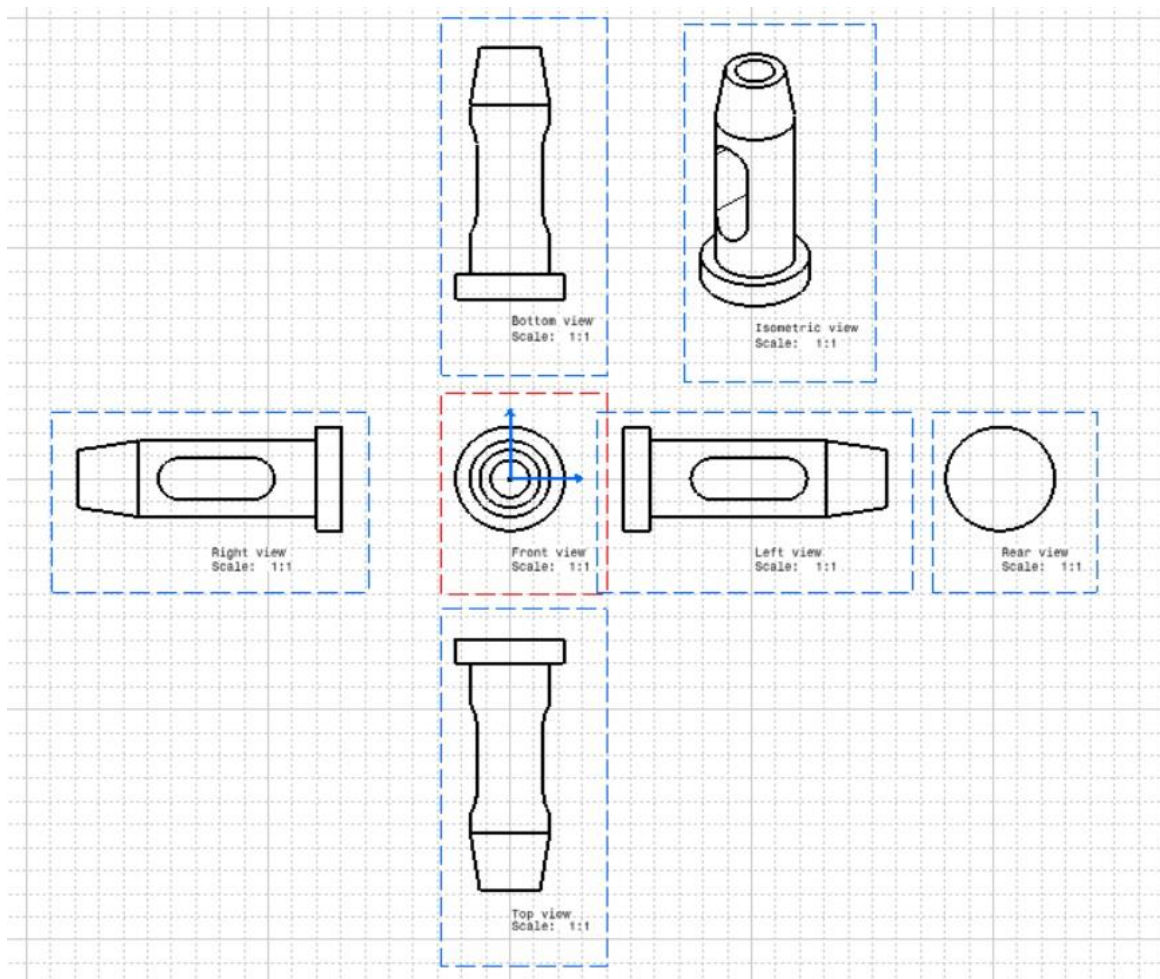
- Swivel screw pin



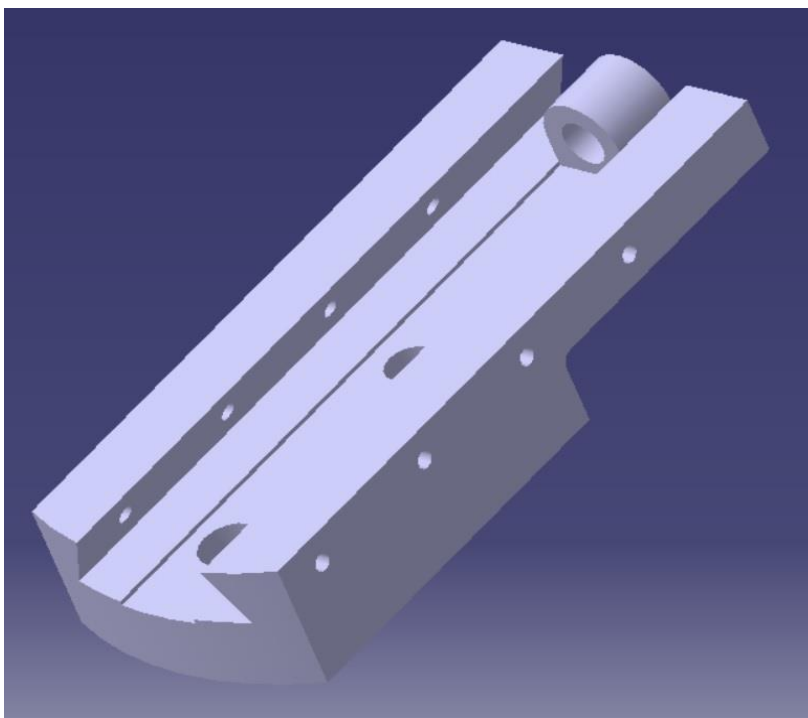
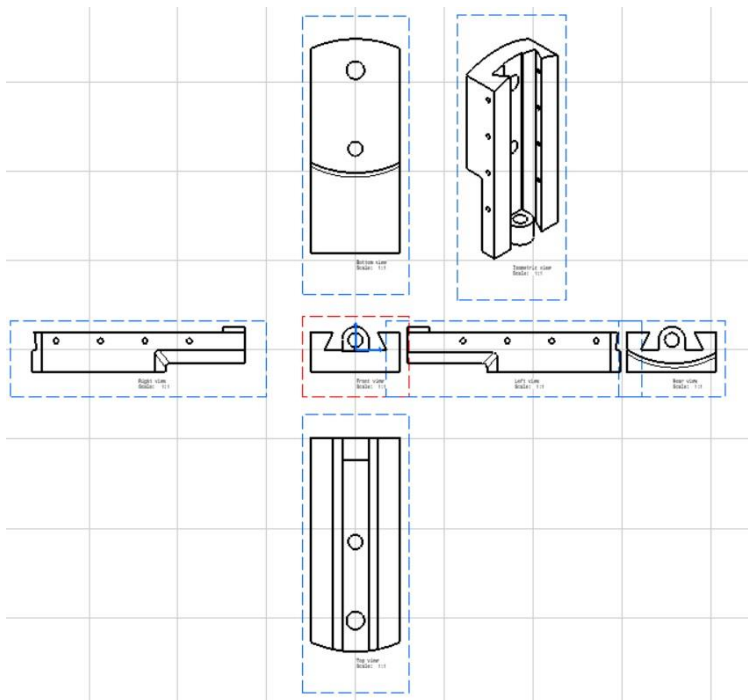
- Tool fixing screw



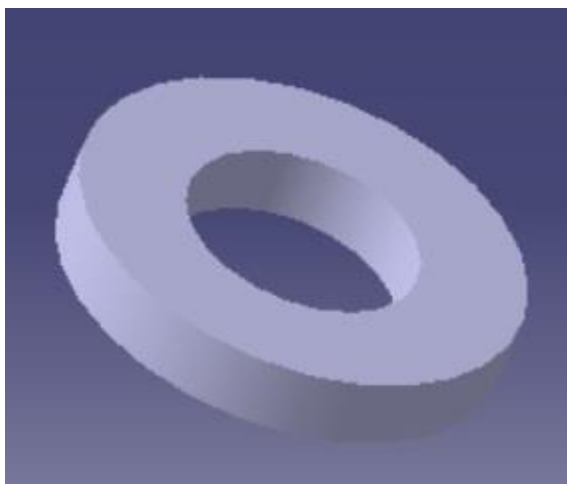
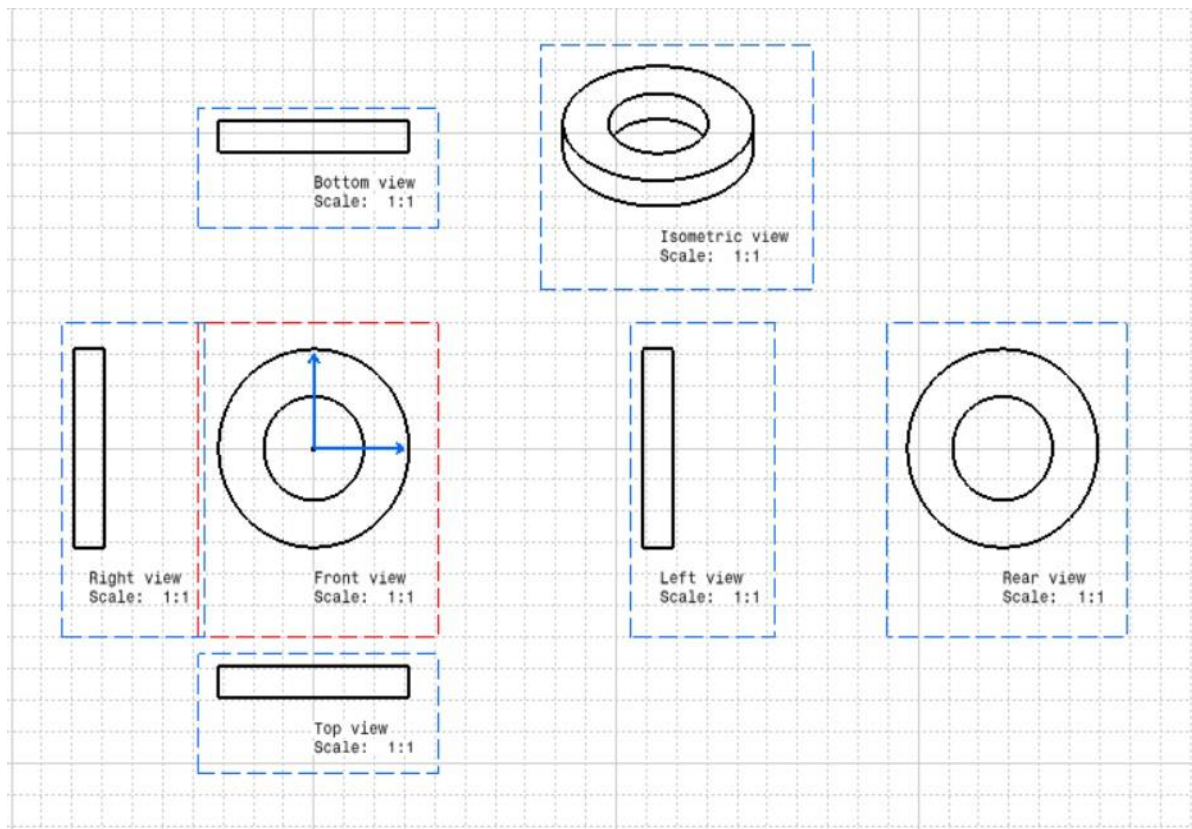
- Tool holder



- Vertical slide



- Washer



Uses

Achieve any desired angle to machine angular surfaces like

- 'V' grooves
- Dove tail grooves
- Keyways in the gear can be machined without resorting to a dedicated broaching setup.
- Dovetail slides
- Internal splines and gear teeth.
- Keyway, spline, and gear tooth cutting in blind holes
- Smoothing of a rough surface

Conclusion

We can conclude that we came to know more about designing and assembling which will help us to be efficient in designing works for our future. This has also helped us improving the speed of our work by the practice and managing time for the production of the end den design. This has helped us, know the names of the parts of the assembled object. The object designed had various processes that helped learn various commands. So, we came to learn and expertise ourselves to a better level with this project.