

Final Report

Double Wishbone Suspension System

Group 5

Motivation

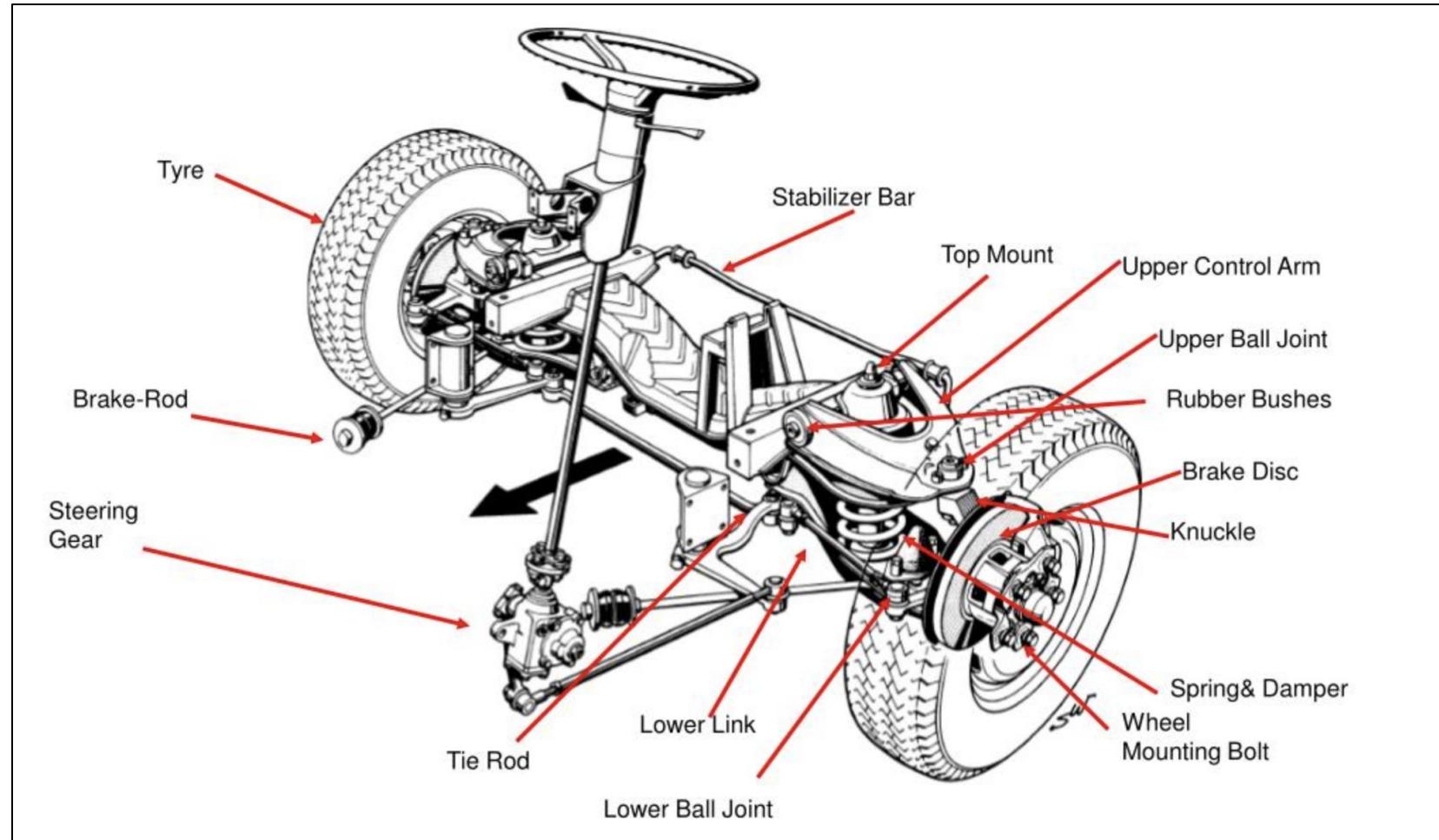


Double Wishbone Suspension System

Help understand the complexity in the design and working of the suspension system.

Enhance our modelling skills in Autodesk Inventor through practice of various modelling techniques and functionality and assembly constraints.

Process Research



Breakdown into subparts

We analyzed the structure of the whole suspension system to break it down to individual components.

Process

Structural analysis and preliminary sketches

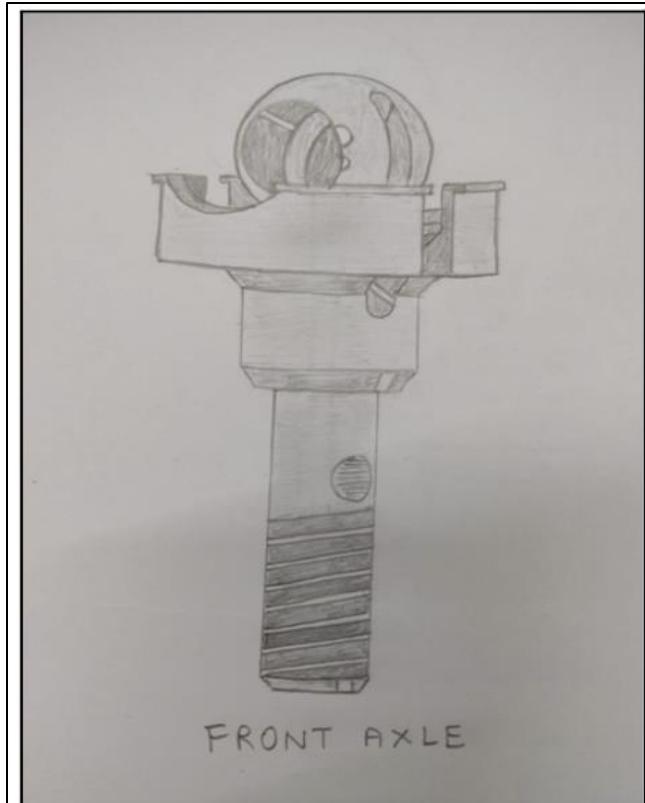


Fig 2(a): Front Axle



Fig 6(a): Shock Absorber

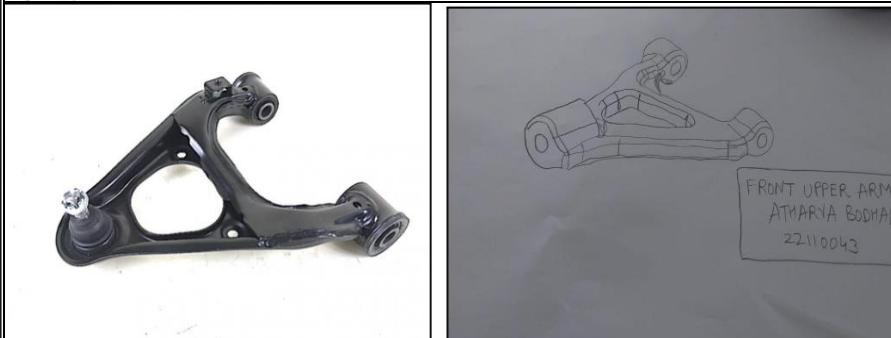


Fig 4(a): The Front Upper Arm

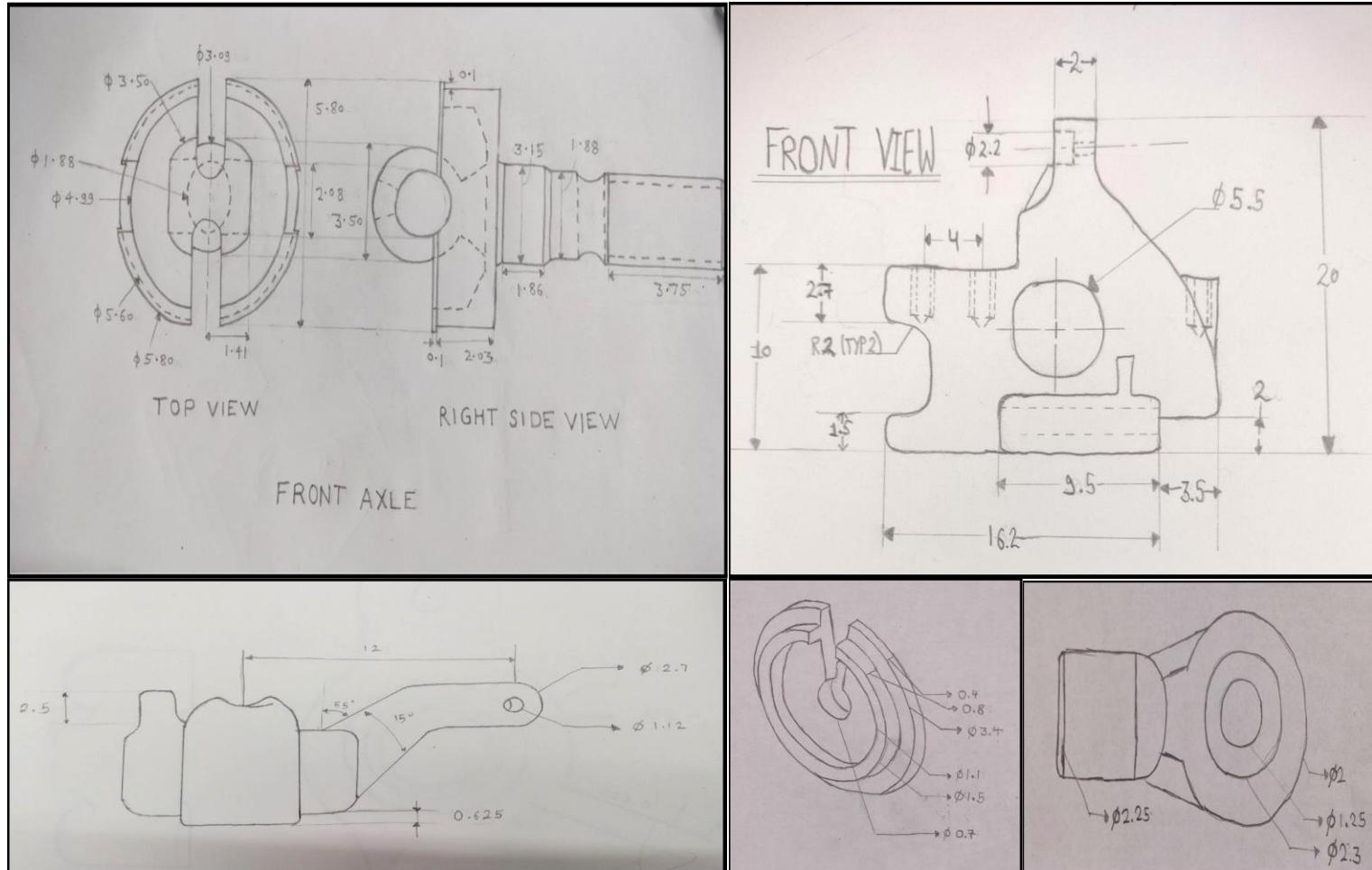


Fig 4(b): The Front Upper Arm Sketch

Parts were divided between members to analyze structure of each part and its interaction with other parts.

Corresponding images show some of the sketches and components.

Process Dimensioning

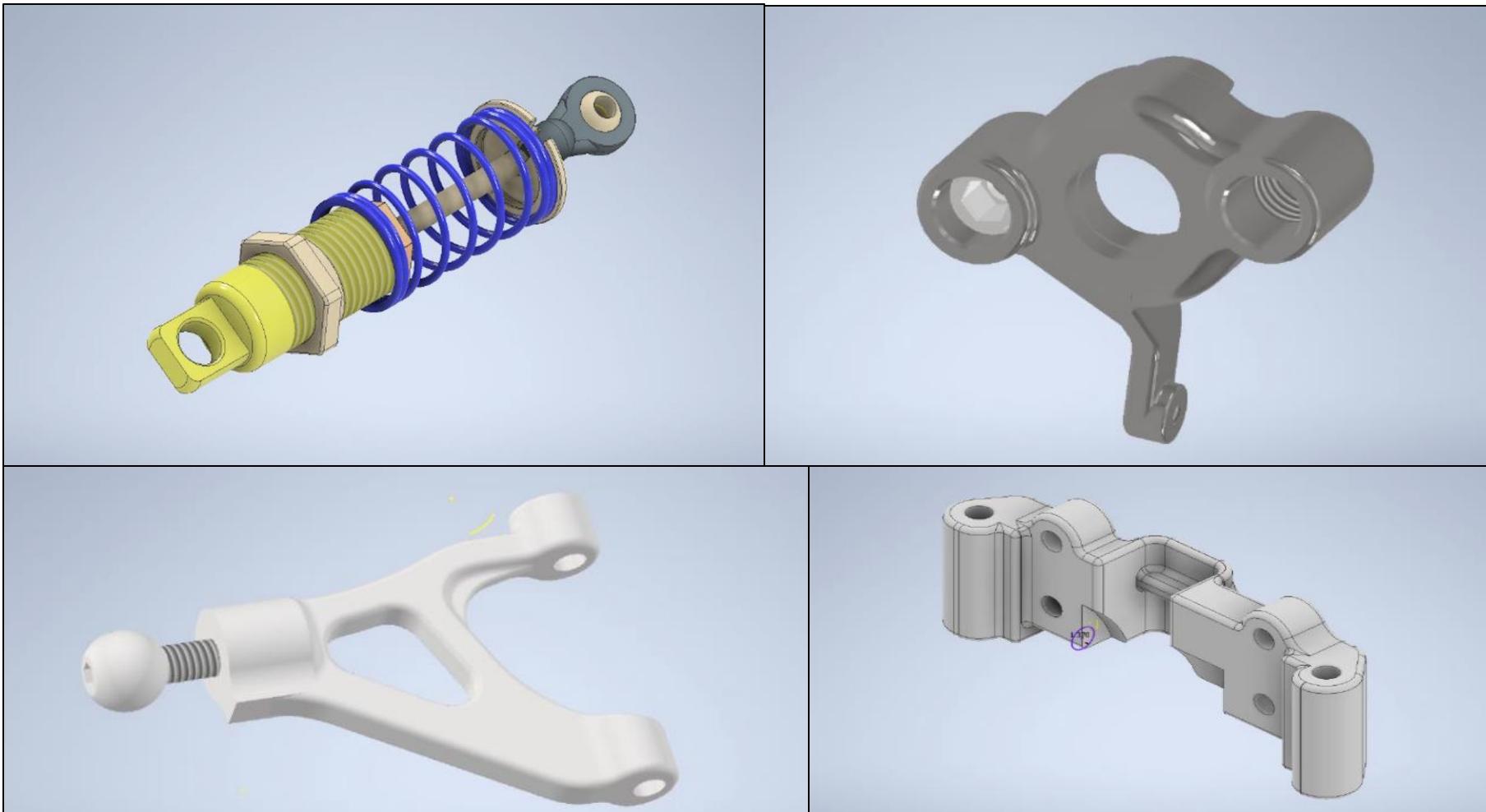


Each part was dimensioned in order to ensure proper assembly.

Corresponding figure contains some of the dimensioned components.

Process

Modelling And Assembly

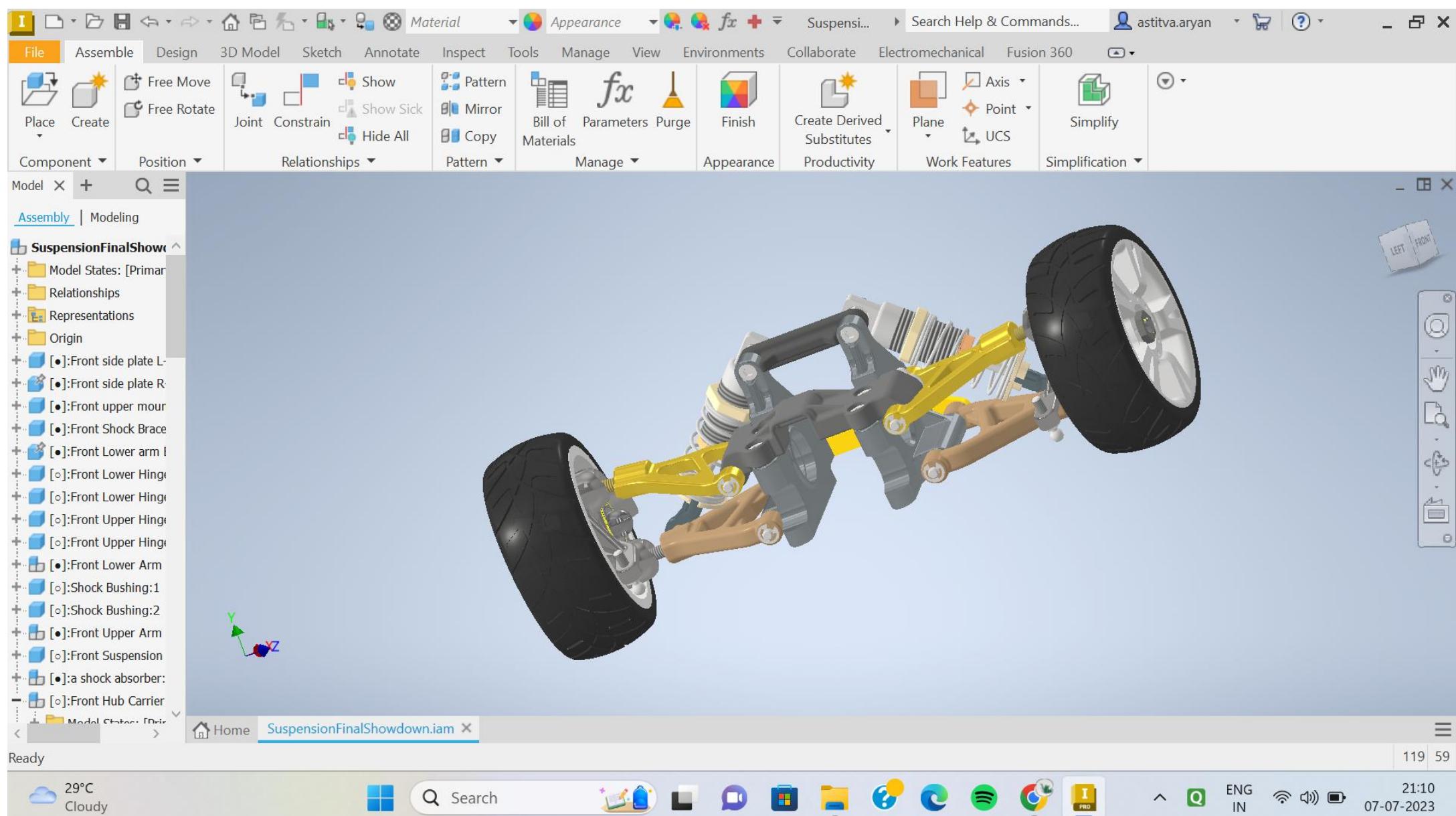


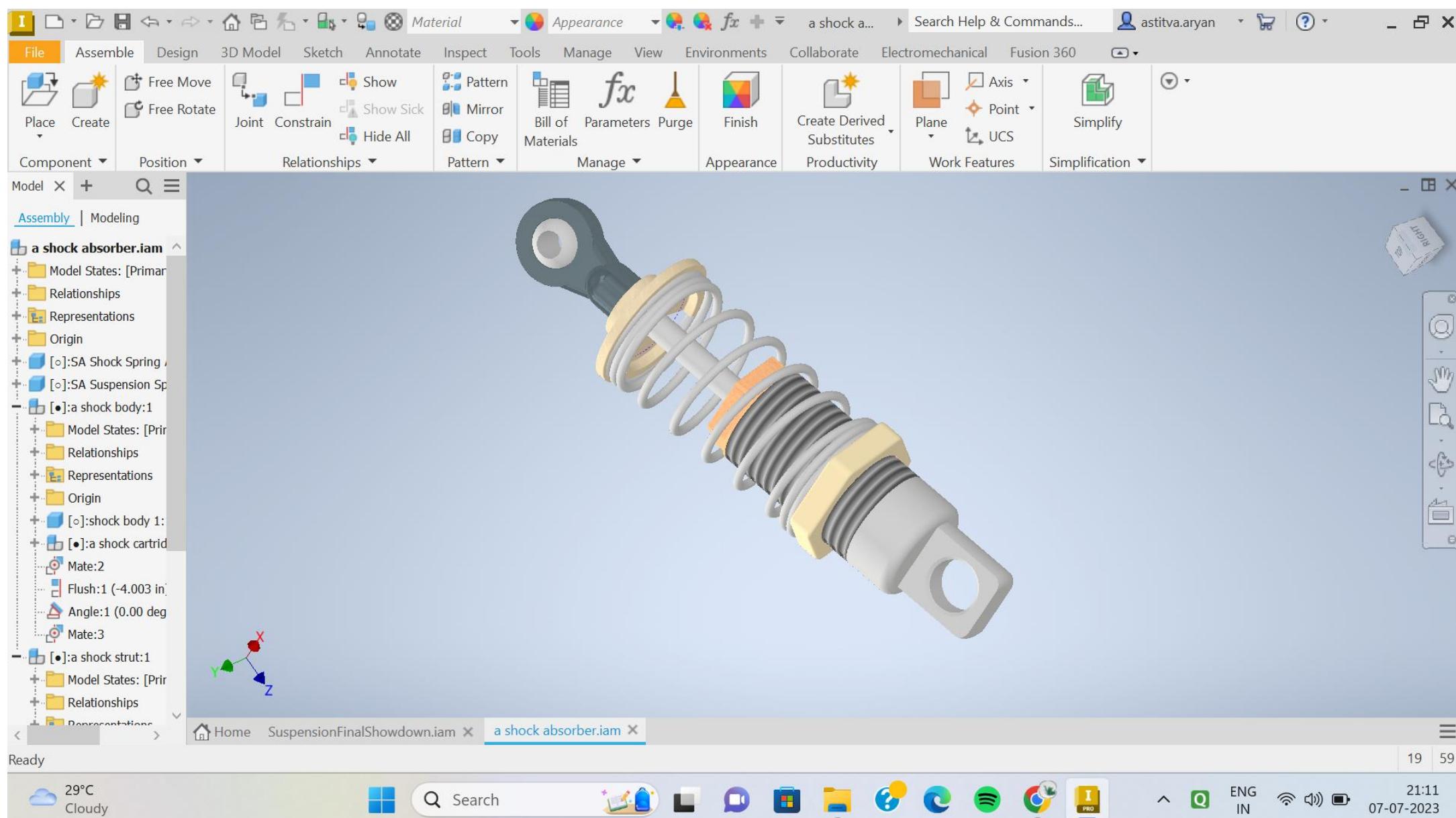
Corresponding image contains some of the 3D CAD models.

Challenges

- Breaking down the whole system into smaller parts.
- Dimensioning to ensure perfect assembly.
- Exploration of new function to achieve desired features.
- Redesign of components in case of mistake.







Screenshot of the Fusion 360 interface showing a mechanical assembly named "a shock body.iam".

The assembly consists of two main parts:

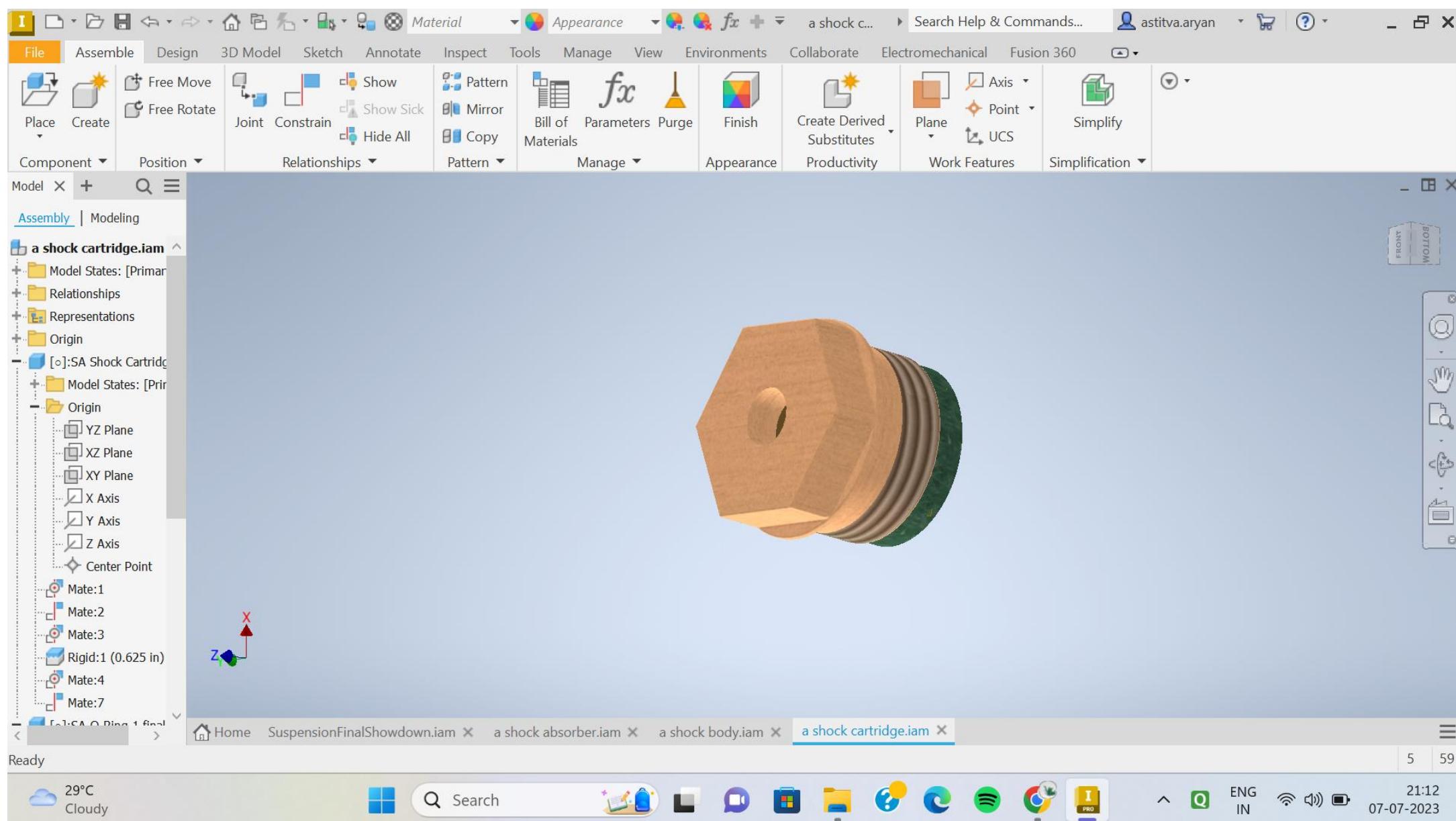
- A cylindrical component with a ribbed surface, colored grey.
- A hexagonal base part, colored orange.

The assembly tree on the left shows the following components:

- a shock body.iam (selected)
- + Model States: [Primary]
- + Relationships
- + Representations
- + Origin
- + [o]:shock body 1:1
- + [●]:a shock cartridge:1

The status bar at the bottom shows:

- Ready
- 29°C Cloudy
- Search bar
- Icons for Microsoft Edge, File Explorer, Task View, File Explorer, Spotify, Google Chrome, and a PRO icon
- System tray icons for battery, signal, volume, and date/time (07-07-2023, 21:11)



Screenshot of the Fusion 360 interface showing a 3D model of a ball end component.

The top menu bar includes: File, Assemble, Design, 3D Model, Sketch, Annotate, Inspect, Tools, Manage, View, Environments, Collaborate, Electromechanical, Fusion 360, and a search bar for Help & Commands.

The toolbar below the menu bar contains icons for Place, Create, Free Move, Free Rotate, Joint, Constrain, Show, Show Sick, Hide All, Pattern, Mirror, Copy, Pattern, Bill of Materials, Parameters, Purge, Finish, Create Derived Substitutes, Productivity, Plane, Axis, Point, UCS, Simplify, and Simplification.

The left sidebar displays the assembly tree for "a ball end.iam", listing components like Model States, Relationships, Representations, Origin, and specific parts like SA Ball End, ball, and Mate features.

The main workspace shows a 3D view of a dark grey ball end component with a central threaded hole. A local coordinate system (X, Y, Z) is shown at the bottom left. A callout bubble labeled "RIGHT" points to the right side of the model.

The bottom taskbar shows other open files: Home, SuspensionFinalShowdown.iam, a shock absorber.iam, a shock body.iam, a shock cartridge.iam, a shock strut.iam, and a ball end.iam (which is the active file).

The status bar at the bottom right shows weather (29°C, Cloudy), system icons (Search, File Explorer, Task View, File, Spotify, Google Chrome, Microsoft Store, Microsoft Edge), language (ENG IN), battery level (21:13), and date (07-07-2023).

Screenshot of the Fusion 360 interface showing a mechanical assembly named "a shock strut.iam".

The interface includes:

- Top Bar:** File, Assemble, Design, 3D Model, Sketch, Annotate, Inspect, Tools, Manage, View, Environments, Collaborate, Electromechanical, Fusion 360.
- Toolbars:** Place, Create, Free Move, Free Rotate, Joint, Constrain, Show, Show Sick, Hide All, Pattern, Mirror, Copy, Bill of Materials, Parameters, Purge, Finish, Create Derived Substitutes, Productivity, Plane, Axis, Point, UCS, Simplify, Work Features, Simplification.
- Left Panel:** Model tree showing components: a shock strut.iam, Model States: [Primary], Relationships, Representations, Origin, [o]:Piston-1:1, [o]:shock shaft-1:1, [o]:SA E-Clip:1, [o]:SA E-Clip:2, [o]:a ball end:1, [o]:SA Spring Cup:1.
- Center View:** 3D model of a shock strut assembly, featuring a black piston at the top, a yellow spring cup, a grey shock shaft, and a yellow E-clip. A coordinate system (X, Y, Z) is shown at the base.
- Right Panel:** Assembly toolbars and a preview area.
- Bottom Bar:** Home, SuspensionFinalShowdown.iam, a shock absorber.iam, a shock body.iam, a shock cartridge.iam, a shock strut.iam (selected), Ready, Weather icon (29°C, Cloudy), Search, Taskbar icons (OneDrive, Microsoft Edge, File Explorer, Task View, Spotify, Google Chrome, Autodesk Fusion 360 PRO), System tray (Battery, ENG IN, WiFi, Volume, Date/Time: 07-07-2023, Time: 21:12).

SolidWorks interface showing a 3D model of a suspension spring.

Top Bar:

- File
- 3D Model
- Sketch
- Annotate
- Inspect
- Tools
- Manage
- View
- Environments
- Collaborate
- Fusion 360

Toolbar (Create tab):

- Start
- Extrude
- Revolve
- Loft
- Derive
- Import
- Hole
- Chamfer
- Thread
- Decal
- Fillet
- Shell
- Combine
- Draft
- Shape Generator
- Plane
- Pattern
- Box
- Surface
- Stress Analysis Simulation
- Convert to Sheet Metal
- Convert

Model View:

- SA Suspension Spring
- Model States: [Primary]
- Solid Bodies(1)
- View: [Primary]
- Origin
- Sketch1
- Coil1
- Coil2
- Extrusion1
- Coil3
- Extrusion2
- Extrusion3
- Direct Edit1
- Sketch6
- End of Part

Bottom Bar:

- Home
- SuspensionFinalShowdown.iam
- a shock absorber.iam
- a shock body.iam
- a shock cartridge.iam
- a shock strut.iam
- a ball end.iam
- P20.ipt
- P20-nut.ipt

For Help, press F1

Cloudy 27°C

Search

21:19 07-07-2023

ENG IN

Screenshot of Fusion 360 interface showing a 3D model of a shock absorber component.

Top Bar:

- File
- 3D Model
- Sketch
- Annotate
- Inspect
- Tools
- Manage
- View
- Environments
- Collaborate
- Fusion 360

Toolbar (Create tab):

- Start
- Extrude
- Revolve
- Sweep
- Emboss
- Decal
- Hole
- Chamfer
- Thread
- Shell
- Fillet
- Draft
- Import
- Combine
- Unwrap
- Shape Generator
- Plane
- Work Features
- Pattern
- Create Freeform
- Box
- Surface
- Stress Analysis
- Simulation
- Convert to Sheet Metal
- Convert

Model Tree: P12 > Model States: [Primary] > Solid Bodies(1) > View: [Primary] > Origin > Sketch1 > Extrusion1 > Extrusion2 > Work Plane1 > Extrusion3 > Chamfer1 > Fillet1 > Thread1 > Direct Edit1 > End of Part

3D View: A cylindrical shock absorber model with a ribbed base and a flared top. A coordinate system (X, Y, Z) is shown at the bottom left. A callout indicates "FRONT RIGHT".

Bottom Bar:

- Home
- SuspensionFinalShowdown.iam
- a shock absorber.iam
- a shock body.iam
- a shock cartridge.iam
- a shock strut.iam
- a ball end.iam
- P20.ipt
- P20-nut.ipt

Ready

27°C Cloudy

Search

System icons: File Explorer, Control Panel, Mail, Photos, Task View, File Explorer, Spotify, Google Chrome, Microsoft Store, Microsoft Edge, and others.

System status: ENG IN, 21:25, 07-07-2023

Fusion 360 interface showing a 3D model of a shock absorber body.

Top Bar:

- File
- 3D Model
- Sketch
- Annotate
- Inspect
- Tools
- Manage
- View
- Environments
- Collaborate
- Fusion 360
- Search Help & Commands...
- User Profile: astitva.aryan
- Cart icon
- Help icon
- Exit icon

Toolbar (Create tab):

- Start
- Extrude
- Revolve
- Sweep
- Emboss
- Decal
- Hole
- Chamfer
- Thread
- Shell
- Combine
- Draft
- Shape Generator
- Plane
- Pattern
- Box
- Surface
- Stress Analysis
- Simulation
- Convert to Sheet Metal
- Convert

Model View:

- HexDrive
- Model States: [Primary]
- Solid Bodies(1)
- View: [Primary]
- Origin
- Extrusion1
- Sketch2
- Extrusion2
- Extrusion3
- Chamfer1
- Work Plane1
- Extrusion4
- Work Plane3
- Revolution1
- Direct Edit1
- End of Part

3D Model Preview: A blue-shaded 3D model of a shock absorber body with a central hole and a ribbed base. A coordinate system (X, Y, Z) is shown at the bottom left.

Right Panel:

- FRONT
- RIGHT

Bottom Taskbar:

- Home
- SuspensionFinalShowdown.iam
- a shock absorber.iam
- a shock body.iam
- a shock cartridge.iam
- a shock strut.iam
- a ball end.iam
- P20.ipt
- P20-nut.ipt

For Help, press F1

1 60

System Icons:

- Cloudy: 27°C
- Search
- File Explorer
- OneDrive
- PowerPoint
- Word
- Excel
- Teams
- PowerPoint
- Spotify
- Google Chrome
- Fusion 360 PRO
- Up arrow
- Search icon
- ENG IN
- Wi-Fi
- Battery
- 21:25
- 07-07-2023

Fusion 360 interface showing a 3D model of a hex retaining o-ring.

Top Bar:

- File
- 3D Model
- Sketch
- Annotate
- Inspect
- Tools
- Manage
- View
- Environments
- Collaborate
- Fusion 360

Toolbar (Create tab):

- Start 2D Sketch
- Extrude Revolve
- Sweep
- Emboss
- Decal
- Hole
- Chamfer
- Thread
- Shell
- Combine
- Draft
- Shape Generator
- Plane
- Pattern
- Box
- Surface
- Stress Analysis Simulation
- Convert to Sheet Metal
- Convert

Model View:

- hex retaining o-ring
- Model States: [Primary]
- Solid Bodies(1)
- View: [Primary]
- Origin
- Revolution1
- Direct Edit1
- End of Part

3D View: A 3D view of the hex retaining o-ring, colored orange-red, centered in the workspace.

Coordinate System: A 3D coordinate system with X (red), Y (green), and Z (blue) axes.

Right Panel: Includes a cube labeled "FRONT RIGHT" and various icons for selection, search, and orientation.

Bottom Taskbar:

- Home
- SuspensionFinalShowdown.iam
- a shock absorber.iam
- a shock body.iam
- a shock cartridge.iam
- a shock strut.iam
- a ball end.iam
- P20.ipt
- P20-nut.ipt

Ready

27°C Cloudy

Search

1 60

21:25

07-07-2023

Screenshot of Fusion 360 interface showing a 3D model of a hex axle pin.

Top Bar:

- File
- 3D Model
- Sketch
- Annotate
- Inspect
- Tools
- Manage
- View
- Environments
- Collaborate
- Fusion 360

Toolbar (Create tab):

- Start
- Extrude
- Revolve
- Sweep
- Emboss
- Decal
- Hole
- Chamfer
- Thread
- Shell
- Combine
- Draft
- Shape Generator
- Plane
- Pattern
- Box
- Surface
- Stress Analysis
- Simulation
- Convert to Sheet Metal
- Convert

Model Tree:

- hex axle pin
- + Model States: [Primary]
- + Solid Bodies(1)
- + View: [Primary]
- + Origin
- + Extrusion1
- Chamfer1
- Direct Edit1
- End of Part

3D View: A large orange cylinder representing the hex axle pin. A coordinate system (X, Y, Z) is shown at the bottom left. A callout indicates "FRONT RIGHT".

Bottom Bar:

- Home
- SuspensionFinalShowdown.iam
- a shock absorber.iam
- a shock body.iam
- a shock cartridge.iam
- a shock strut.iam
- a ball end.iam
- P20.ipt
- P20-nut.ipt

For Help, press F1 1 60

System Tray:

- Cloudy 27°C
- Search
- File Explorer
- OneDrive
- Microsoft Store
- Folder
- Task View
- Power User
- Spotify
- Google Chrome
- Fusion 360 PRO
- Up arrow
- Q ENG IN
- Wi-Fi
- Battery 21:23
- Date 07-07-2023

Screenshot of the Fusion 360 interface showing a 3D model of a cylindrical part with a ribbed end.

Top Bar:

- File
- 3D Model
- Sketch
- Annotate
- Inspect
- Tools
- Manage
- View
- Environments
- Collaborate
- Fusion 360

Toolbar (Create tab):

- Start
- Extrude
- Revolve
- Sweep
- Emboss
- Decal
- Loft
- Derive
- Import
- Hole
- Chamfer
- Thread
- Shell
- Combine
- Draft
- Fillet
- Shape Generator
- Explore
- Plane
- Work Features
- Pattern
- Create Freeform
- Box
- Surface
- Stress Analysis
- Simulation
- Convert to Sheet Metal
- Convert

Left Panel (Model Tree):

- Front Upper Hinge Pin
- + Model States: [Primary]
- + Solid Bodies(1)
- + View: [Primary]
- + Origin
- + Extrusion1
- + Extrusion2
- + Extrusion3
- Chamfer1
- Mirror1
- Direct Edit1
- End of Part

Right Panel (Views):

- FRONT
- RIGHT

Bottom Bar:

- Home
- SuspensionFinalShowdown.iam
- a shock absorber.iam
- a shock body.iam
- a shock cartridge.iam
- a shock strut.iam
- a ball end.iam
- P20.ipt
- P20-nut.ipt

For Help, press F1

1 60

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Search

21:23 07-07-2023

ENG IN

Screenshot of Fusion 360 interface showing a mechanical assembly and its feature tree.

Top Bar:

- File
- 3D Model
- Sketch
- Annotate
- Inspect
- Tools
- Manage
- View
- Environments
- Collaborate
- Fusion 360

Toolbar (Create tab):

- Start
- Extrude
- Revolve
- Sweep
- Emboss
- Decal
- Hole
- Chamfer
- Thread
- Shell
- Combine
- Draft
- Shape Generator
- Plane
- Pattern
- Box
- Surface
- Stress Analysis
- Create Freeform
- Convert to Sheet Metal
- Convert

Feature Tree:

- Front upper mount
- + Model States: [Primary]
- + Solid Bodies(1)
- + View: [Primary]
- + Origin
- + Extrusion1
- + Extrusion2
- Fillet1
- + Extrusion3
- + Extrusion4
- + Extrusion5
- Fillet2
- + Extrusion6
- + Extrusion7
- + Rectangular Pattern1
- + Extrusion8
- + Extrusion9
- Fillet3
- Fillet4
- Fillet5
- + Extrusion10
- Fillet6
- Fillet7

Model View:

- Front upper mount
- Model States: [Primary]
- Solid Bodies(1)
- View: [Primary]
- Origin
- Extrusion1
- Extrusion2
- Fillet1
- Extrusion3
- Extrusion4
- Extrusion5
- Fillet2
- Extrusion6
- Extrusion7
- Rectangular Pattern1
- Extrusion8
- Extrusion9
- Fillet3
- Fillet4
- Fillet5
- Extrusion10
- Fillet6
- Fillet7

Bottom Bar:

- Home
- SuspensionFinalShowdown.iam
- a shock absorber.iam
- a shock body.iam
- a shock cartridge.iam
- a shock strut.iam
- a ball end.iam
- P20.ipt
- P20-nut.ipt

For Help, press F1

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ENG IN

Screenshot of Fusion 360 interface showing a mechanical part model.

Top Bar:

- File
- 3D Model
- Sketch
- Annotate
- Inspect
- Tools
- Manage
- View
- Environments
- Collaborate
- Fusion 360

Toolbar (Create tab):

- Start
- Extrude
- Revolve
- Sweep
- Emboss
- Decal
- Hole
- Chamfer
- Thread
- Shell
- Combine
- Draft
- Shape Generator
- Plane
- Pattern
- Box
- Surface
- Stress Analysis
- Simulation
- Convert to Sheet Metal
- Convert

Model Tree:

- Front Upper ARM BP
- + Model States: [Primary]
- + Solid Bodies(1)
- + View: [Primary]
- + Origin
- + Extrusion1
- Work Plane1
- + Extrusion2
- + Extrusion3
- + Extrusion4
- Fillet1
- Fillet2
- + Extrusion5
- + Extrusion6
- Fillet3
- Fillet4
- Fillet5
- Fillet6
- Fillet7
- Fillet8
- Fillet9
- Fillet10
- Fillet11

Part Preview: A 3D view of a mechanical part, likely a suspension component, showing internal features like holes and slots.

Bottom Bar:

- Home
- SuspensionFinalShowdown.iam
- a shock absorber.iam
- a shock body.iam
- a shock cartridge.iam
- a shock strut.iam
- a ball end.iam
- P20.ipt
- P20-nut.ipt

For Help, press F1

27°C Cloudy

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21:23

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Screenshot of Fusion 360 interface showing a 3D model of a front suspension part.

Top Bar:

- File
- 3D Model
- Sketch
- Annotate
- Inspect
- Tools
- Manage
- View
- Environments
- Collaborate
- Fusion 360

Toolbar (Create tab):

- Start
- Extrude
- Revolve
- Sweep
- Emboss
- Decal
- Hole
- Chamfer
- Thread
- Shell
- Combine
- Draft
- Shape Generator
- Plane
- Pattern
- Box
- Surface
- Stress Analysis
- Simulation
- Convert to Sheet Metal
- Convert

Model View:

- Front Suspension Adjustment
- Model States: [Primary]
- Solid Bodies(1)
- View: [Primary]
- Origin
- Extrusion1
- Fillet1
- Direct Edit1
- End of Part

3D Model Preview:

Right Panel:

- FRONT RIGHT
- Search icon
- Hand icon
- Zoom icon
- Orientation icons
- Save icon

Bottom Taskbar:

- Home
- SuspensionFinalShowdown.iam
- a shock absorber.iam
- a shock body.iam
- a shock cartridge.iam
- a shock strut.iam
- a ball end.iam
- P20.ipt
- P20-nut.ipt

For Help, press F1

1 60

System Icons:

- Cloudy, 27°C
- Search
- File Explorer
- OneDrive
- Windows Store
- Folder
- Task View
- Power User
- Spotify
- Google Chrome
- Fusion 360 PRO
- Up arrow
- Search icon
- ENG IN
- Wi-Fi
- Battery
- 21:23
- 07-07-2023

Screenshot of the Fusion 360 interface showing a mechanical part model.

Top Bar:

- File
- 3D Model
- Sketch
- Annotate
- Inspect
- Tools
- Manage
- View
- Environments
- Collaborate
- Fusion 360

Toolbar (Create tab):

- Start
- Extrude
- Revolve
- Sweep
- Emboss
- Decal
- Hole
- Chamfer
- Thread
- Shell
- Combine
- Draft
- Shape Generator
- Plane
- Pattern
- Box
- Surface
- Stress Analysis
- Create Freeform
- Convert to Sheet Metal
- Convert

Model Tree:

- Front side plate R
- + Model States: [Primary]
- + Solid Bodies(1)
- + View: [Primary]
- + Origin
- + Extrusion1
- + Extrusion2
- Fillet1
- Extrusion3
- Extrusion4
- Extrusion5
- Extrusion6
- Extrusion7
- Fillet2
- Extrusion8
- Chamfer1
- Fillet3
- Fillet4
- Fillet5
- Fillet6
- Fillet7
- Fillet8
- Fillet9

Part Preview:

Right Panel:

- FRONT RIGHT
- Q
- Hand
- Search
- Zoom In
- Zoom Out
- Fit
- Orientation

Bottom Bar:

- Home
- SuspensionFinalShowdown.iam
- a shock absorber.iam
- a shock body.iam
- a shock cartridge.iam
- a shock strut.iam
- a ball end.iam
- P20.ipt
- P20-nut.ipt

For Help, press F1

27°C Cloudy

Search

Cloud

21:23

07-07-2023

ENG IN

Screenshot of the Fusion 360 interface showing a 3D model of a mechanical part.

Top Bar:

- File
- 3D Model
- Sketch
- Annotate
- Inspect
- Tools
- Manage
- View
- Environments
- Collaborate
- Fusion 360

Toolbar (Create tab):

- Start 2D Sketch
- Extrude Revolve
- Loft
- Coil
- Start Sketch
- End of Part
- Extrude
- Revolve
- Derive
- Rib
- Import
- Hole
- Chamfer
- Shell
- Draft
- Fillet
- Thread
- Combine
- Shape Generator
- Explore
- Plane
- Pattern
- Create Freeform
- Box
- Surface
- Stress Analysis Simulation
- Convert to Sheet Metal
- Convert

Model View:

- Front side plate L
- Model States: [Primary]
- Solid Bodies(1)
- View: [Primary]
- Origin
- Front side plate R.upt
- End of Part

3D Model Preview: A 3D wireframe view of a mechanical part, likely a suspension component, featuring a central circular opening and various mounting holes and arms.

Bottom Bar:

- Home
- SuspensionFinalShowdown.iam
- a shock absorber.iam
- a shock body.iam
- a shock cartridge.iam
- a shock strut.iam
- a ball end.iam
- P20.upt
- P20-nut.upt

For Help, press F1

1 60

Cloudy 27°C

Search

21:22 07-07-2023

ENG IN

Screenshot of Fusion 360 CAD software interface showing a 3D model of a shock absorber component.

Top Bar:

- File
- 3D Model
- Sketch
- Annotate
- Inspect
- Tools
- Manage
- View
- Environments
- Collaborate
- Fusion 360

Toolbar (Create tab):

- Start
- Extrude
- Revolve
- Sweep
- Emboss
- Decal
- Hole
- Chamfer
- Thread
- Shell
- Combine
- Draft
- Shape Generator
- Plane
- Pattern
- Box
- Surface
- Stress Analysis
- Simulation
- Convert to Sheet Metal
- Convert

Model View:

- Front Shock Brace
- Model States: [Primary]
- Solid Bodies(1)
- View: [Primary]
- Origin
- Extrusion1
- Extrusion2
- Hole1
- Work Plane1
- Extrusion3
- Fillet1
- Fillet2
- End of Part

3D Model Preview: A detailed 3D wireframe model of a shock absorber component, showing internal features like holes and slots. A coordinate system (X, Y, Z) is visible at the bottom left.

Right Panel: A cube icon labeled "FRONT RIGHT" and a vertical toolbar with icons for search, hand, magnifying glass, and other tools.

Bottom Taskbar:

- Home
- SuspensionFinalShowdown.iam
- a shock absorber.iam
- a shock body.iam
- a shock cartridge.iam
- a shock strut.iam
- a ball end.iam
- P20.ipt
- P20-nut.ipt

For Help, press F1 1 60

System Tray:

- Cloudy 27°C
- Search bar
- Icons for File Explorer, Microsoft Edge, File Explorer, Spotify, Google Chrome, and a PRO folder
- Network status: ENG IN
- Date and time: 07-07-2023 21:22

Screenshot of the Fusion 360 interface showing a 3D model of a mechanical part (Front Lower Arm) in the workspace.

The top menu bar includes:

- File
- 3D Model
- Sketch
- Annotate
- Inspect
- Tools
- Manage
- View
- Environments
- Collaborate
- Fusion 360

The toolbar below the menu bar contains icons for various tools:

- Start 2D Sketch
- Extrude Revolve
- Sweep
- Emboss
- Decal
- Hole
- Chamfer
- Thread
- Shell
- Combine
- Draft
- Shape Generator
- Plane
- Pattern
- Box
- Surface
- Stress Analysis Simulation
- Convert to Sheet Metal
- Convert

The left sidebar displays the model tree:

- Front Lower Arm
- + Model States: [Primary]
- + Solid Bodies(1)
- + View: [Primary]
- + Origin
- + Extrusion1
- + Sketch2
- Work Plane1
- + Extrusion2
- + Extrusion3
- Fillet1
- Fillet2
- Fillet3
- Fillet4
- Fillet5
- Fillet6
- Fillet7
- + Sketch5
- + Sketch6
- + Sketch7
- + Sketch8
- + Sketch9
- + Rib1

The main workspace shows the 3D model of the front lower arm, which is a complex mechanical part with multiple holes and a rib. A coordinate system (X, Y, Z) is visible at the bottom left. A callout box labeled "FRONT RIGHT" is located in the top right corner of the workspace.

The bottom taskbar shows open files:

- Home
- SuspensionFinalShowdown.iam
- a shock absorber.iam
- a shock body.iam
- a shock cartridge.iam
- a shock strut.iam
- a ball end.iam
- P20.ipt
- P20-nut.ipt

System status icons are shown at the bottom right, including weather (27°C Cloudy), search, file explorer, messaging, task manager, Spotify, Google Chrome, and battery level (1 60).

Fusion 360

File 3D Model Sketch Annotate Inspect Tools Manage View Environments Collaborate Fusion 360

Start Extrude Revolve Loft Derive Import Hole Chamfer Shell Draft Thread Combine Shape Generator Plane Pattern Box Surface Stress Analysis Simulation Convert

2D Sketch Sketch Create

Model Front Lower arm Brace Model States: [Primary] Solid Bodies(1) View: [Primary] Origin Extrusion1 Fillet1 Fillet2 Direct Edit1 End of Part

FRONT RIGHT

Home SuspensionFinalShowdown.iam a shock absorber.iam a shock body.iam a shock cartridge.iam a shock strut.iam a ball end.iam P20.ipt P20-nut.ipt

For Help, press F1 1 60

Cloudy 27°C Search ENG IN 21:22 07-07-2023

Fusion 360 interface showing a 3D model of a mechanical part.

Top Bar:

- File
- 3D Model
- Sketch
- Annotate
- Inspect
- Tools
- Manage
- View
- Environments
- Collaborate
- Fusion 360

Toolbar (Create tab):

- Start
- Extrude
- Revolve
- Sweep
- Emboss
- Decal
- Hole
- Chamfer
- Thread
- Shell
- Combine
- Draft
- Shape Generator
- Plane
- Pattern
- Box
- Surface
- Stress Analysis
- Simulation
- Convert to Sheet Metal
- Convert

Model View:

- Front hub carrier R
- Model States: [Primary]
- Solid Bodies(1)
- View: [Primary]
- Origin
- Front hub carrier L.ipt
- End of Part

3D Model Preview:

Right Panel:

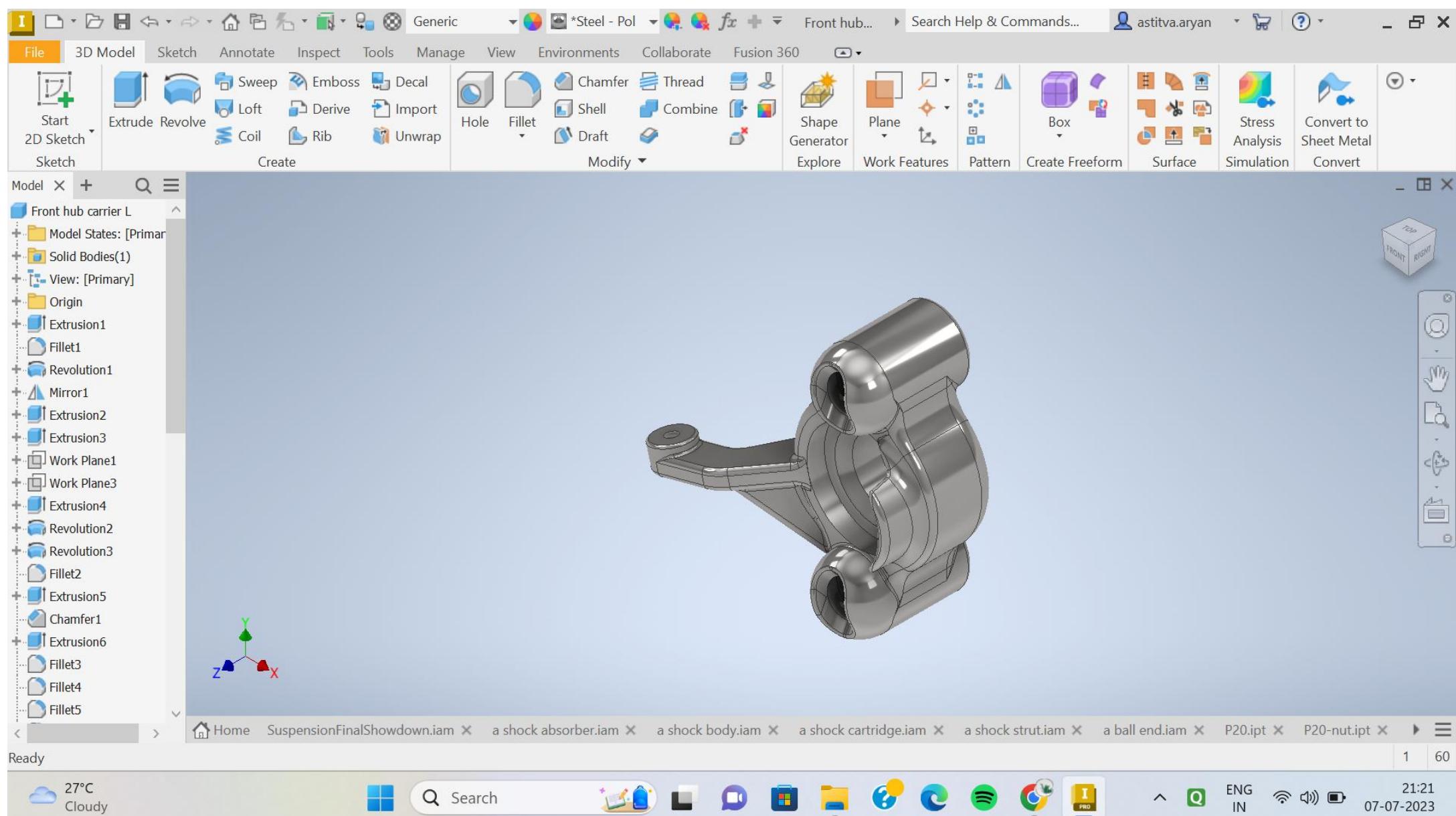
- FRONT RIGHT view icon
- Search icon
- Hand icon
- Zoom icon
- Orientation icons
- Save icon

Bottom Navigation:

- Home
- SuspensionFinalShowdown.iam
- a shock absorber.iam
- a shock body.iam
- a shock cartridge.iam
- a shock strut.iam
- a ball end.iam
- P20.ipt
- P20-nut.ipt

Status Bar:

- Ready
- 27°C Cloudy
- Search bar
- Icons for File Explorer, Task View, Chat, Microsoft Edge, Spotify, Google Chrome, and Microsoft Store
- Keyboard and Mouse icons
- ENG IN
- Wi-Fi, Battery, and Date/Time (07-07-2023, 21:22)



Screenshot of the Fusion 360 interface showing a 3D model of a front hub bearing.

Top Bar:

- File
- 3D Model
- Sketch
- Annotate
- Inspect
- Tools
- Manage
- View
- Environments
- Collaborate
- Fusion 360

Toolbar (Create tab):

- Start
- Extrude
- Revolve
- Loft
- Derive
- Import
- Hole
- Chamfer
- Thread
- Decal
- Fillet
- Shell
- Combine
- Draft
- Shape Generator
- Plane
- Pattern
- Box
- Surface
- Stress Analysis
- Create Freeform
- Convert to Sheet Metal
- Convert

Model Tree:

- front hub bearing
- + Model States: [Primary]
- + Solid Bodies(1)
- + View: [Primary]
- + Origin
- + Extrusion1
- Fillet1
- Chamfer1
- + Extrusion2
- + Direct Edit1
- End of Part

3D View: A yellow-colored 3D model of a front hub bearing, showing its internal structure and features like the outer ring, inner ring, and central bore.

Right Panel:

- FRONT RIGHT indicator
- Orientation icons (Top, Bottom, Left, Right, Front, Back)

Bottom Bar:

- Home
- SuspensionFinalShowdown.iam
- a shock absorber.iam
- a shock body.iam
- a shock cartridge.iam
- a shock strut.iam
- a ball end.iam
- P20.ipt
- P20-nut.ipt

For Help, press F1

1 60

Cloudy 27°C

Search

21:21 07-07-2023

ENG IN

Fusion 360 interface showing a 3D model of a front axle assembly.

Top Bar:

- File
- 3D Model
- Sketch
- Annotate
- Inspect
- Tools
- Manage
- View
- Environments
- Collaborate
- Fusion 360

Toolbar (Create tab):

- Start
- Extrude
- Revolve
- Sweep
- Emboss
- Decal
- Hole
- Chamfer
- Thread
- Shell
- Combine
- Draft
- Fillet
- Shape Generator
- Plane
- Pattern
- Box
- Surface
- Stress Analysis
- Create Freeform
- Convert to Sheet Metal
- Convert

Model Tree:

- front axle
 - Model States: [Primary]
 - Solid Bodies(1)
 - View: [Primary]
 - Origin
 - Extrusion1
 - Extrusion2
 - Chamfer1
 - Revolution1
 - Fillet1
 - Fillet2
 - Extrusion3
 - Chamfer2
 - Work Plane1
 - Revolution2
 - Mirror1
 - Extrusion4
 - Chamfer3
 - Extrusion5
 - Thread1
 - Direct Edit1
 - End of Part

3D View: A detailed 3D rendering of the front axle assembly, showing a cylindrical shaft with a flange and a housing. A coordinate system (X, Y, Z) is visible at the bottom left.

Right Panel: A vertical toolbar with icons for search, hand, magnifying glass, and other tools.

Bottom Bar:

- Home
- SuspensionFinalShowdown.iam
- a shock absorber.iam
- a shock body.iam
- a shock cartridge.iam
- a shock strut.iam
- a ball end.iam
- P20.ipt
- P20-nut.ipt

For Help, press F1 1 60

System Tray:

- Cloudy 27°C
- Search bar
- Icons for File Explorer, Microsoft Edge, File Explorer, Mail, Task View, File Explorer, File Explorer, Spotify, Google Chrome, and Fusion 360 PRO.
- Network status: ENG IN
- Date and time: 07-07-2023 21:21

Fusion 360 interface showing a 3D model of a Ball Stud.

Top Bar:

- File
- 3D Model
- Sketch
- Annotate
- Inspect
- Tools
- Manage
- View
- Environments
- Collaborate
- Fusion 360

Toolbar (Create tab):

- Start
- Extrude
- Revolve
- Sweep
- Emboss
- Decal
- Hole
- Chamfer
- Thread
- Shell
- Combine
- Draft
- Fillet
- Shape Generator
- Plane
- Pattern
- Box
- Surface
- Stress Analysis
- Simulation
- Convert to Sheet Metal
- Convert

Model View:

- Ball Stud
- Model States: [Primary]
- Solid Bodies(1)
- View: [Primary]
- Origin
- Extrusion1
- Extrusion2
- Revolution1
- Fillet1
- Work Plane1
- Split1
- Extrusion3
- Chamfer1
- Thread1
- Direct Edit1
- End of Part

3D Model Preview: A detailed 3D rendering of a ball stud, showing a threaded shaft with a hexagonal nut at the top and a spherical end at the bottom.

Bottom Bar:

- Home
- SuspensionFinalShowdown.iam
- a shock absorber.iam
- a shock body.iam
- a shock cartridge.iam
- a shock strut.iam
- a ball end.iam
- P20.ipt
- P20-nut.ipt

For Help, press F1

Cloudy 27°C

Search

21:21 07-07-2023

ENG IN

Screenshot of Fusion 360 interface showing a 3D model of a mechanical part.

The interface includes:

- Top Bar:** File, 3D Model, Sketch, Annotate, Inspect, Tools, Manage, View, Environments, Collaborate, Fusion 360, Search Help & Commands..., User Profile, and various icons.
- Toolbar:** 2D Sketch, Start, Extrude, Revolve, Loft, Sweep, Emboss, Decal, Hole, Chamfer, Thread, Shell, Fillet, Import, Derive, Unwrap, Draft, Combine, Shape Generator, Explore, Work Features, Pattern, Create Freeform, Box, Surface, Stress Analysis, Simulation, Convert to Sheet Metal, and Convert.
- Left Panel:** Model tree view under "ansi" category, listing Model States, Solid Bodies, Views, Origin, Revolution1, Work Plane1, Sketches, Extrusions, Chamfers, Threads, Direct Edit1, and End of Part.
- Center View:** 3D view of a mechanical part (nut) with a hole and a rib. A coordinate system (X, Y, Z) is shown at the bottom left.
- Right Panel:** View orientation buttons (FRONT, TOP, RIGHT) and a zoom/move tool.
- Bottom Bar:** Home, SuspensionFinalShowdown.iam, a shock absorber.iam, a shock body.iam, a shock cartridge.iam, a shock strut.iam, a ball end.iam, P20.ipt, P20-nut.ipt, and a search bar.
- Bottom Icons:** Weather (Cloudy, 27°C), Search, Microsoft Edge, File Explorer, Chat, Task View, File, Taskbar, Spotify, Google Chrome, and a yellow square icon.
- Bottom Status:** ENG IN, 21:21, 07-07-2023.

Screenshot of Fusion 360 interface showing a 3D model of a flange part.

Top Bar:

- File
- 3D Model
- Sketch
- Annotate
- Inspect
- Tools
- Manage
- View
- Environments
- Collaborate
- Fusion 360

Toolbar (Create tab):

- Start
- Extrude
- Revolve
- Loft
- Derive
- Import
- Hole
- Chamfer
- Thread
- Decal
- Fillet
- Shell
- Combine
- Draft
- Shape Generator
- Plane
- Pattern
- Box
- Surface
- Stress Analysis
- Create Freeform
- Convert to Sheet Metal
- Convert

Model Tree:

- ANSI B18.22.1 - No. 5
 - Model States: [Primary]
 - Solid Bodies(1)
 - View: [Primary]
 - Origin
 - Extrusion1
 - Direct Edit1
 - End of Part

3D View: A 3D view of a flange part with a central hole and a thick outer ring. A coordinate system (X, Y, Z) is shown at the bottom left. A callout indicates "FRONT RIGHT".

Bottom Bar:

- Home
- SuspensionFinalShowdown.iam
- a shock absorber.iam
- a shock body.iam
- a shock cartridge.iam
- a shock strut.iam
- a ball end.iam
- P20.ipt
- P20-nut.ipt

Ready

27°C Cloudy

Search

21:21

ENG IN

07-07-2023

Screenshot of Fusion 360 interface showing a wheel model.

Top Bar:

- File
- 3D Model
- Sketch
- Annotate
- Inspect
- Tools
- Manage
- View
- Environments
- Collaborate
- Fusion 360

Toolbar (Create tab):

- Start
- Extrude
- Revolve
- Loft
- Derive
- Import
- Hole
- Chamfer
- Thread
- Shell
- Combine
- Draft
- Shape Generator
- Explore
- Plane
- Pattern
- Box
- Surface
- Stress Analysis
- Create Freeform
- Convert to Sheet Metal
- Convert

Model Tree:

- Wheel
 - Model States: [Primary]
 - Solid Bodies(1)
 - View: [Primary]
 - Origin
 - Revolution1
 - Sketch2
 - Sketch3
 - Revolution2
 - Revolution3
 - Extrusion1
 - Extrusion2
 - Extrusion3
 - Fillet1
 - Fillet2
 - Circular Pattern1
 - Revolution4
 - Revolution5
 - Fillet3
 - Work Point1
 - Work Plane1
 - Revolution6

Bottom Bar:

- Home
- SuspensionFinalShowdown.iam
- a shock absorber.iam
- a shock body.iam
- a shock cartridge.iam
- a shock strut.iam
- a ball end.iam
- P20.ipt
- P20-nut.ipt

Status Bar:

- Ready
- 27°C Cloudy
- Search
- Cloud
- File Explorer
- Task View
- Power Shell
- Folder
- Taskbar
- Spotify
- Google Chrome
- Autodesk Fusion 360 PRO
- ENG IN
- Wi-Fi
- Battery
- 21:20
- 07-07-2023

Fusion 360 interface showing a 3D model of a tire.

Top Bar:

- File
- 3D Model
- Sketch
- Annotate
- Inspect
- Tools
- Manage
- View
- Environments
- Collaborate
- Fusion 360

Toolbar (Create tab):

- Start
- Extrude
- Revolve
- Sweep
- Emboss
- Decal
- Hole
- Chamfer
- Thread
- Import
- Fillet
- Shell
- Combine
- Draft
- Shape Generator
- Unwrap
- Plane
- Work Features
- Pattern
- Create Freeform
- Box
- Surface
- Stress Analysis
- Simulation
- Convert to Sheet Metal
- Convert

Model Tree:

- Tire_Jay
 - Model States: [Primary]
 - Solid Bodies(1)
 - Surface Bodies(1)
 - View: [Primary]
 - Origin
 - Revolution1
 - Fillet1
 - RevolutionSrf1
 - Work Plane1
 - Sketch3
 - Extrusion1
 - Circular Pattern1
 - Mirror1
 - Direct Edit1
 - End of Part

3D View: A 3D wireframe model of a tire tread pattern.

Bottom Bar:

- Home
- SuspensionFinalShowdown.iam
- a shock absorber.iam
- a shock body.iam
- a shock cartridge.iam
- a shock strut.iam
- a ball end.iam
- P20.ipt
- P20-nut.ipt

For Help, press F1

Cloudy 27°C

Search

21:20 07-07-2023

ENG IN

Screenshot of Fusion 360 interface showing a 3D model of a rear hub bearing.

Top Bar:

- File
- 3D Model
- Sketch
- Annotate
- Inspect
- Tools
- Manage
- View
- Environments
- Collaborate
- Fusion 360

Toolbar (Create tab):

- Start
- Extrude
- Revolve
- Sweep
- Emboss
- Decal
- Hole
- Chamfer
- Thread
- Shell
- Combine
- Draft
- Shape Generator
- Plane
- Pattern
- Box
- Surface
- Stress Analysis
- Simulation
- Convert to Sheet Metal
- Convert

Model Tree:

- rear hub bearing
- + Model States: [Primary]
- + Solid Bodies(1)
- + View: [Primary]
- + Origin
- + Extrusion1
- Fillet1
- Chamfer1
- Chamfer2
- Work Plane1
- + Extrusion2
- Direct Edit1
- End of Part

3D View:

Bottom Bar:

- Home
- SuspensionFinalShowdown.iam
- a shock absorber.iam
- a shock body.iam
- a shock cartridge.iam
- a shock strut.iam
- a ball end.iam
- P20.ipt
- P20-nut.ipt

For Help, press F1

1 60

Cloudy 27°C

Search

21:18 07-07-2023

ENG IN

Fusion 360 interface showing a 3D model of a piston.

Top Bar:

- File
- 3D Model
- Sketch
- Annotate
- Inspect
- Tools
- Manage
- View
- Environments
- Collaborate
- Fusion 360

Toolbar (Create tab):

- Start
- Extrude
- Revolve
- Sweep
- Emboss
- Decal
- Hole
- Chamfer
- Thread
- Shell
- Combine
- Draft
- Shape Generator
- Plane
- Pattern
- Box
- Surface
- Stress Analysis
- Simulation
- Convert to Sheet Metal
- Convert

Model Tree:

- Piston-1
 - Model States: [Primary]
 - Solid Bodies(1)
 - View: [Primary]
 - Origin
 - Extrusion1
 - Fillet1
 - Chamfer1
 - Work Plane1
 - Extrusion2
 - Circular Pattern1
 - Direct Edit1
 - End of Part

3D View: A 3D model of a piston with three holes. A coordinate system (X, Y, Z) is shown at the bottom left. A callout indicates "FRONT RIGHT".

Bottom Bar:

- Home
- SuspensionFinalShowdown.iam
- a shock absorber.iam
- a shock body.iam
- a shock cartridge.iam
- a shock strut.iam
- a ball end.iam
- P20.ipt
- P20-nut.ipt

For Help, press F1

Cloudy 27°C

Search

21:18 07-07-2023

ENG IN

Fusion 360 interface showing a 3D model of a bolt.

Top Bar:

- File
- 3D Model
- Sketch
- Annotate
- Inspect
- Tools
- Manage
- View
- Environments
- Collaborate
- Fusion 360

Toolbar (Create tab):

- Start
- Extrude
- Revolve
- Sweep
- Emboss
- Decal
- Hole
- Chamfer
- Thread
- Shell
- Combine
- Draft
- Shape Generator
- Plane
- Pattern
- Box
- Surface
- Stress Analysis
- Simulation
- Convert to Sheet Metal
- Convert

Model Tree:

- Pillow Ball
- + Model States: [Primary]
- + Solid Bodies(1)
- + View: [Primary]
- + Origin
- + Revolution1
- Fillet1
- Chamfer1
- + Sketch2
- + Work Plane1
- + Work Plane2
- Split1
- Fillet2
- + Extrusion1
- + Thread1
- + Direct Edit1
- End of Part

3D View: A 3D model of a bolt with a hexagonal head and a threaded shank. A coordinate system (X, Y, Z) is shown at the base. A callout indicates "FRONT RIGHT".

Bottom Bar:

- Home
- SuspensionFinalShowdown.iam
- a shock absorber.iam
- a shock body.iam
- a shock cartridge.iam
- a shock strut.iam
- a ball end.iam
- P20.ipt
- P20-nut.ipt

For Help, press F1

Cloudy 27°C

Search

21:18 07-07-2023

ENG IN

Fusion 360 interface showing a 3D model of a cylindrical part with a ribbed base and a central slot.

Top Bar:

- File
- 3D Model
- Sketch
- Annotate
- Inspect
- Tools
- Manage
- View
- Environments
- Collaborate
- Fusion 360

Toolbar (Create tab):

- Start 2D Sketch
- Extrude Revolve
- Sweep
- Emboss
- Decal
- Hole
- Chamfer
- Thread
- Shell
- Combine
- Draft
- Shape Generator
- Plane
- Pattern
- Box
- Surface
- Stress Analysis Simulation
- Convert to Sheet Metal
- Convert

Model View:

- pillow ball retainer final
- + Model States: [Primary]
- + Solid Bodies(2)
- + View: [Primary]
- + Origin
- Pillow Ball Retainer-1.upt
- End of Part

Right Panel:

- FRONT RIGHT view
- Orientation icons: Q, Hand, Magnifying Glass, Crosshair, Book

Bottom Bar:

- Home
- SuspensionFinalShowdown.iam
- a shock absorber.iam
- a shock body.iam
- a shock cartridge.iam
- a shock strut.iam
- a ball end.iam
- P20.upt
- P20-nut.upt

For Help, press F1

Cloudy 27°C 21:18 07-07-2023

Fusion 360 interface showing a 3D model of a pillow ball bushing.

Top Bar:

- File
- 3D Model
- Sketch
- Annotate
- Inspect
- Tools
- Manage
- View
- Environments
- Collaborate
- Fusion 360

Toolbar (Create tab):

- Start
- Extrude
- Revolve
- Sweep
- Emboss
- Decal
- Hole
- Chamfer
- Thread
- Shell
- Combine
- Draft
- Shape Generator
- Plane
- Pattern
- Box
- Surface
- Stress Analysis
- Simulation
- Convert to Sheet Metal
- Convert

Model Tree:

- Pillow Ball Bushing
- + Model States: [Primary]
- + Solid Bodies(1)
- + View: [Primary]
- + Origin
- + Revolution1
- Fillet1
- Extrusion1
- Direct Edit1
- End of Part

3D View: A 3D wireframe view of the pillow ball bushing, showing a thick cylindrical body with a central hole and a flared outer edge.

Orientation: A coordinate system with X, Y, and Z axes is visible at the bottom left.

Right Panel: Includes a "FRONT" and "RIGHT" view icon, a search icon, a hand icon, a magnifying glass icon, and a file icon.

Bottom Bar:

- Home
- SuspensionFinalShowdown.iam
- a shock absorber.iam
- a shock body.iam
- a shock cartridge.iam
- a shock strut.iam
- a ball end.iam
- P20.ipt
- P20-nut.ipt

For Help, press F1

Cloudy 27°C

Search

21:17 07-07-2023

ENG IN

Screenshot of Fusion 360 interface showing a 3D model of a hex nut.

The top menu bar includes: File, 3D Model, Sketch, Annotate, Inspect, Tools, Manage, View, Environments, Collaborate, Fusion 360, Generic, Default, P20-nut, Search Help & Commands..., astitva.aryan, and various icons for file operations.

The toolbar below the menu contains icons for: Start, Extrude, Revolve, Loft, Sweep, Emboss, Decal, Hole, Chamfer, Thread, Shell, Fillet, Import, Derive, Unwrap, Draft, Combine, Shape Generator, Explore, Plane, Work Features, Pattern, Create Freeform, Box, Surface, Stress Analysis, Simulation, Convert to Sheet Metal, and Convert.

The left sidebar displays the model tree for "P20-nut":

- + Model States: [Primary]
- + Solid Bodies(1)
- + View: [Primary]
- + Origin
- + Extrusion1
- + Thread1
- + Fillet1
- + Direct Edit1
- End of Part

The main workspace shows the 3D model of a hex nut with a central threaded hole. A coordinate system (X, Y, Z) is visible at the bottom left. A callout box labeled "FRONT RIGHT" is positioned in the top right corner.

The bottom navigation bar lists open files: Home, SuspensionFinalShowdown.iam, a shock absorber.iam, a shock body.iam, a shock cartridge.iam, a shock strut.iam, a ball end.iam, P20.ipt, P20-nut.ipt, and a file with index 1 and page 59.

The taskbar at the bottom includes: Cloudy (27°C), Search, Microsoft Edge, File Explorer, Task View, Spotify, Google Chrome, and a Fusion 360 icon. It also shows connectivity status (ENG IN), battery level, and the date/time (07-07-2023, 21:17).

Screenshot of Fusion 360 interface showing a 3D model of a threaded rod.

Top Bar:

- File
- 3D Model
- Sketch
- Annotate
- Inspect
- Tools
- Manage
- View
- Environments
- Collaborate
- Fusion 360

Toolbar (Create tab):

- Start
- Extrude
- Revolve
- Sweep
- Emboss
- Decal
- Hole
- Chamfer
- Thread
- Shell
- Combine
- Draft
- Fillet
- Shape Generator
- Plane
- Pattern
- Box
- Surface
- Stress Analysis
- Simulation
- Convert to Sheet Metal
- Convert

Model Tree: P20 > Model States: [Primary] > Solid Bodies(1) > View: [Primary] > Origin > Sketch1 > Extrusion1 > Extrusion2 > Work Plane1 > Extrusion3 > Chamfer1 > Thread1 > Fillet1 > Direct Edit1 > End of Part

3D View: A 3D model of a threaded rod with a flared end. The model is shown in a perspective view with a coordinate system (X, Y, Z) at the bottom left. A callout indicates "FRONT RIGHT".

Bottom Bar:

- Home
- SuspensionFinalShowdown.iam
- a shock absorber.iam
- a shock body.iam
- a shock cartridge.iam
- a shock strut.iam
- a ball end.iam
- P20.ipt

Ready

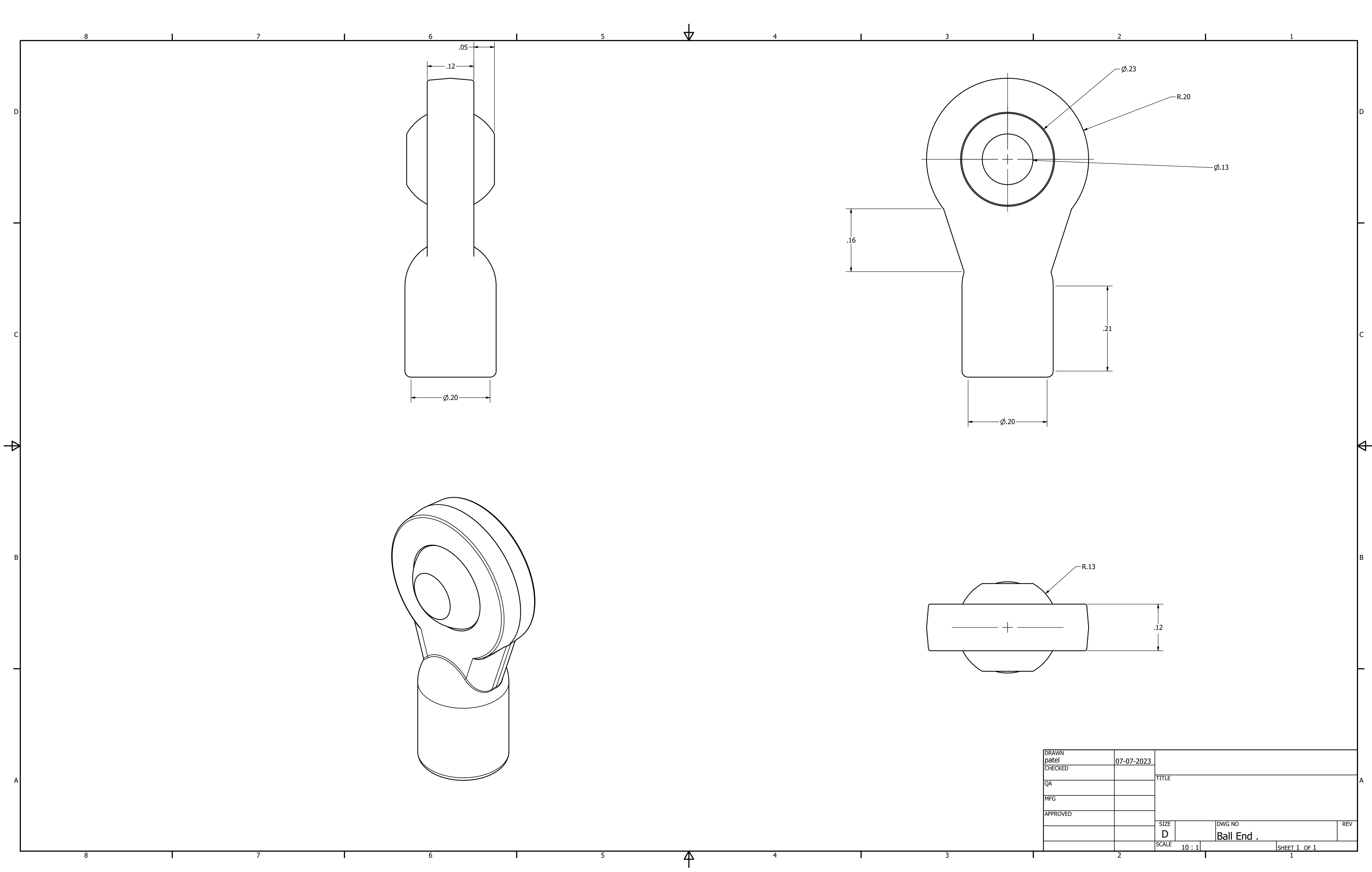
27°C Cloudy

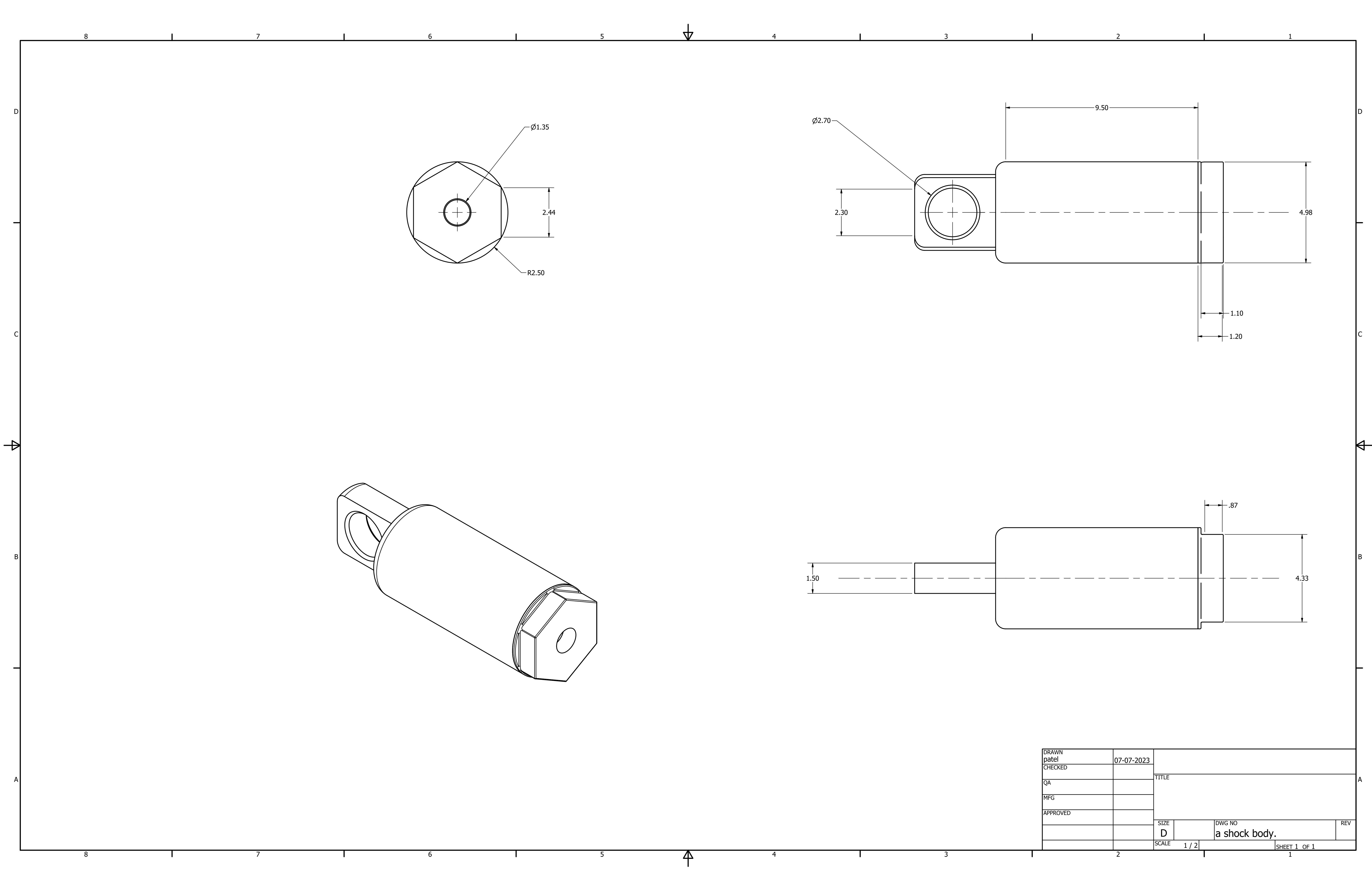
Search

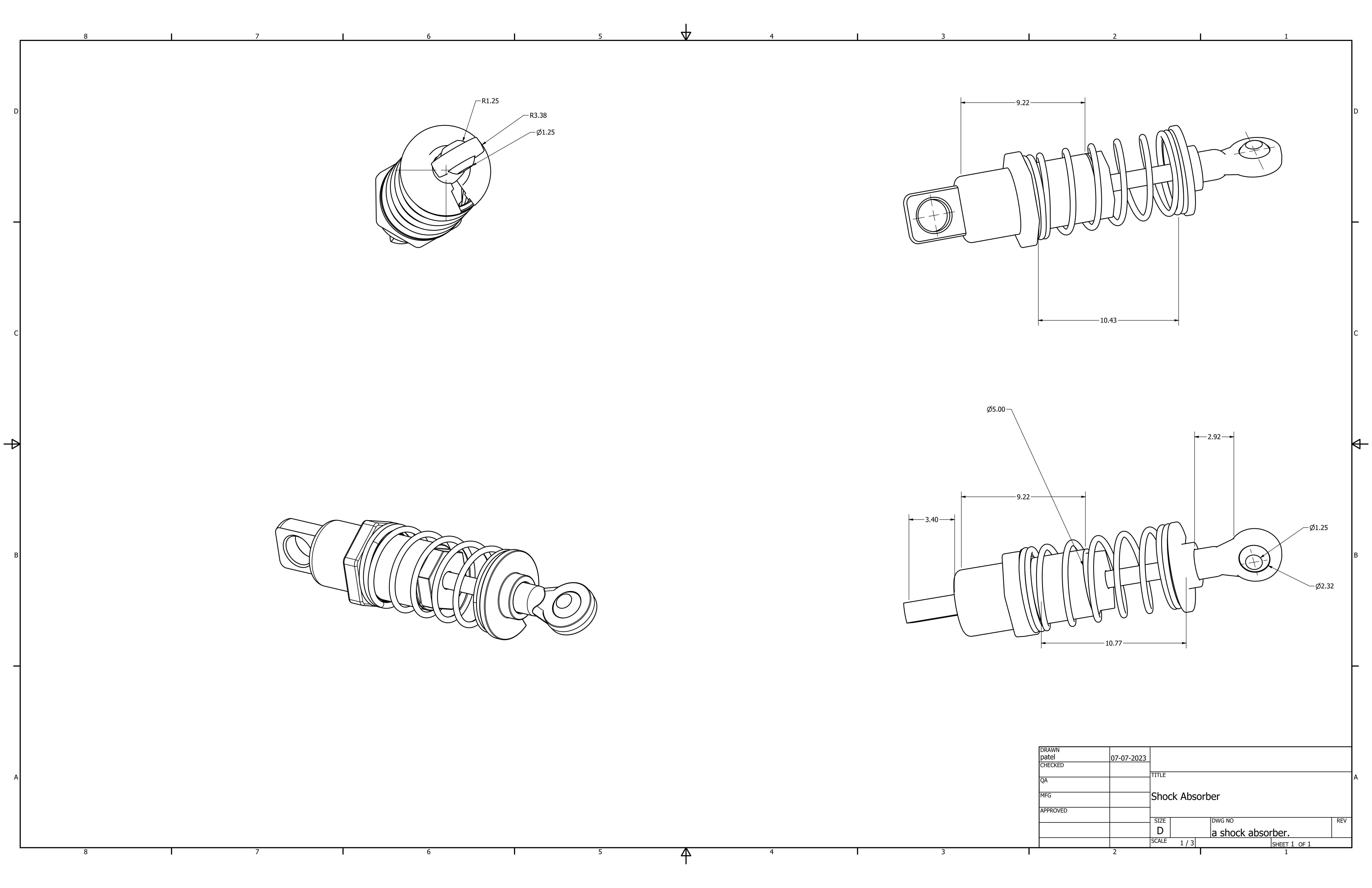
Icons for various applications (OneDrive, Mail, Photos, Microsoft Store, File Explorer, Task View, Spotify, Google Chrome, Autodesk Fusion 360)

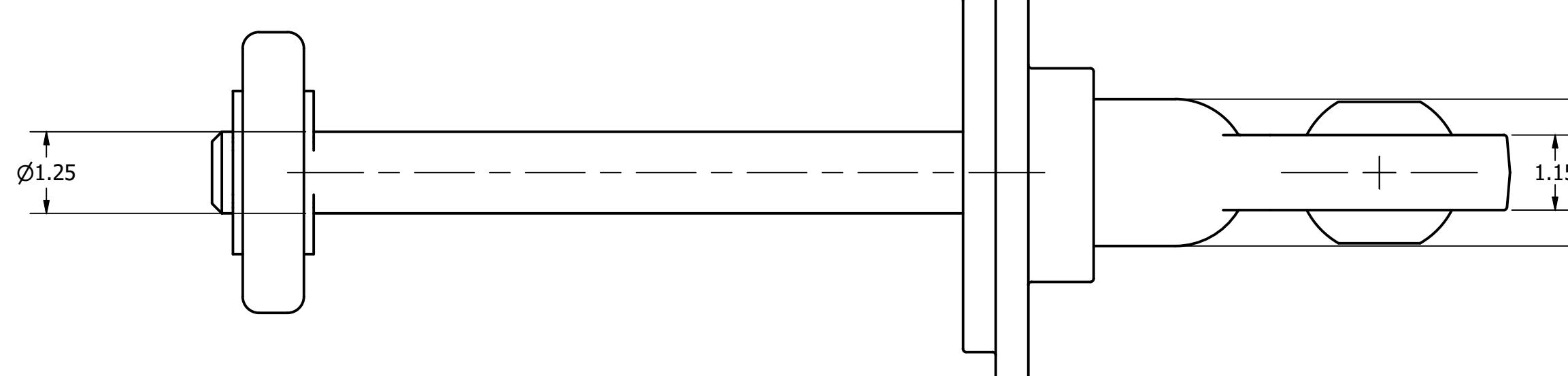
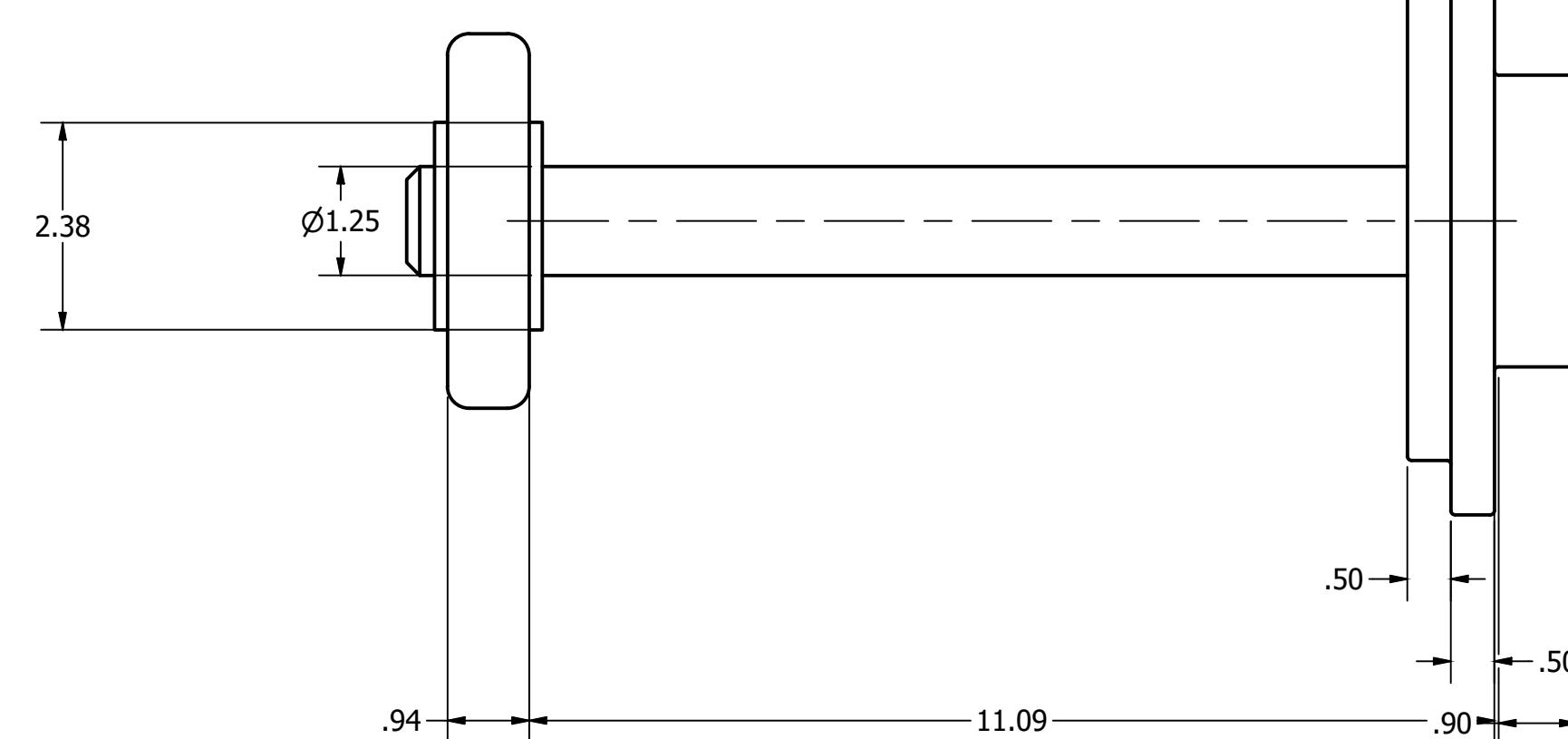
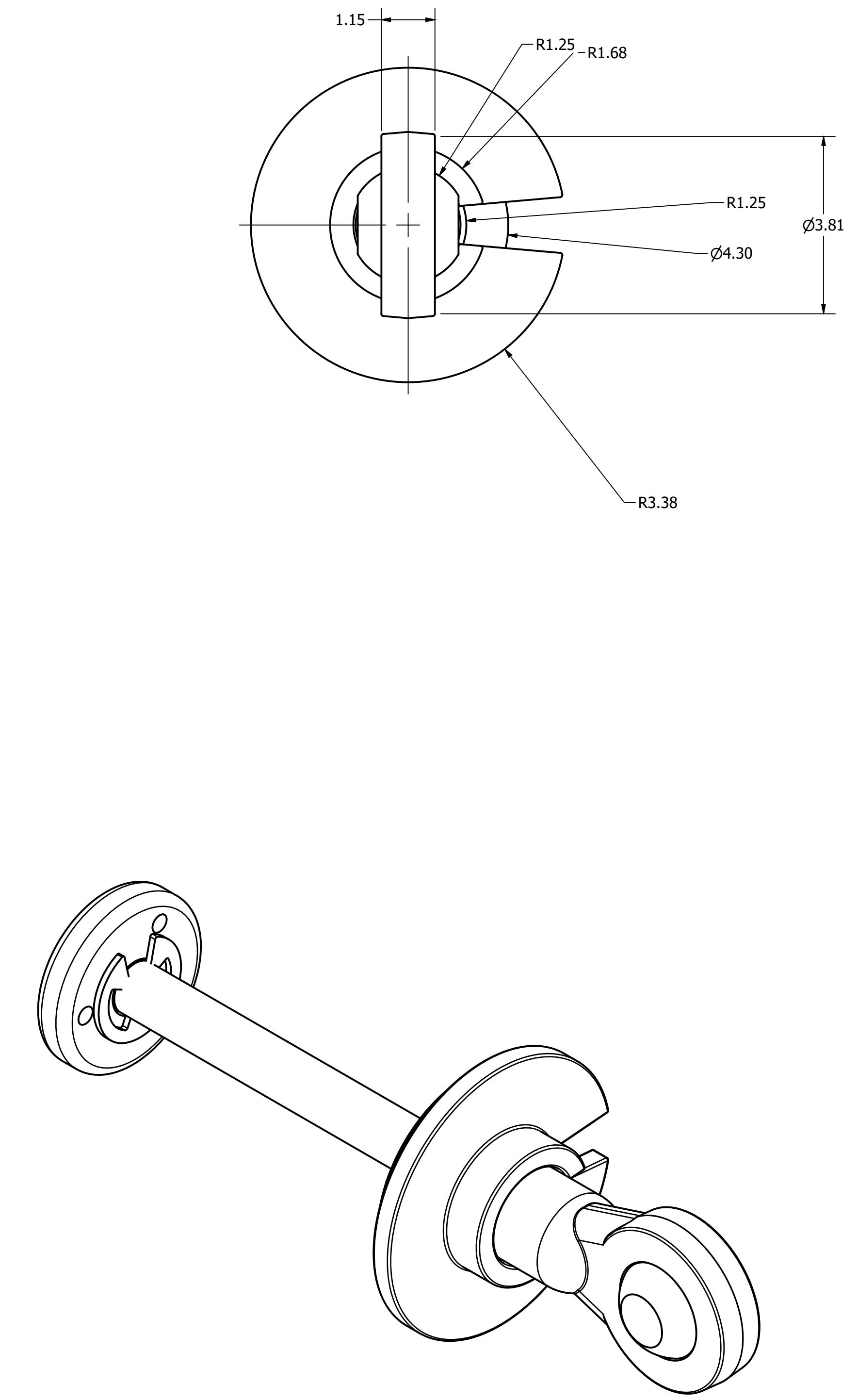
1 59

ENG IN 21:17 07-07-2023

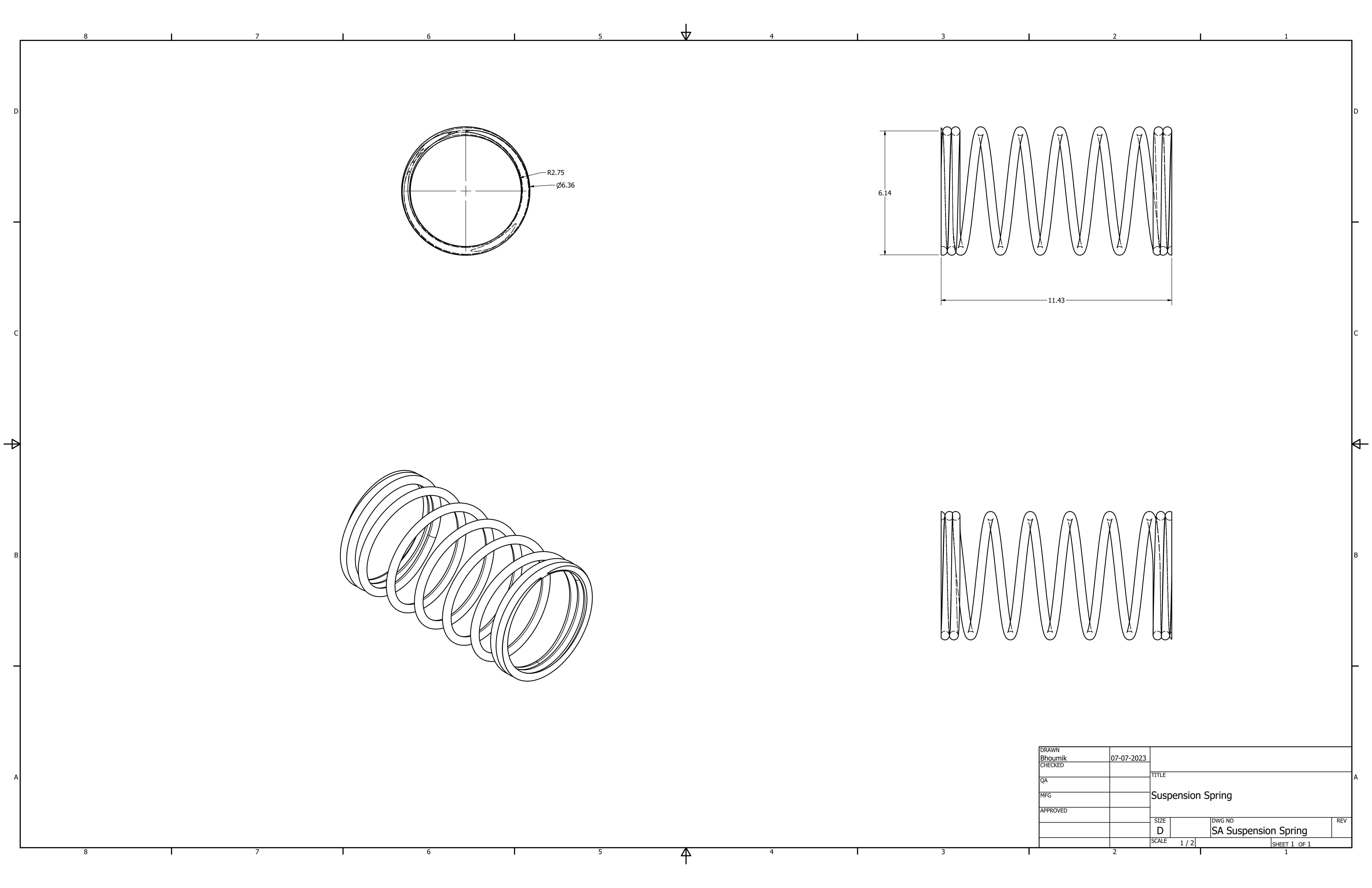


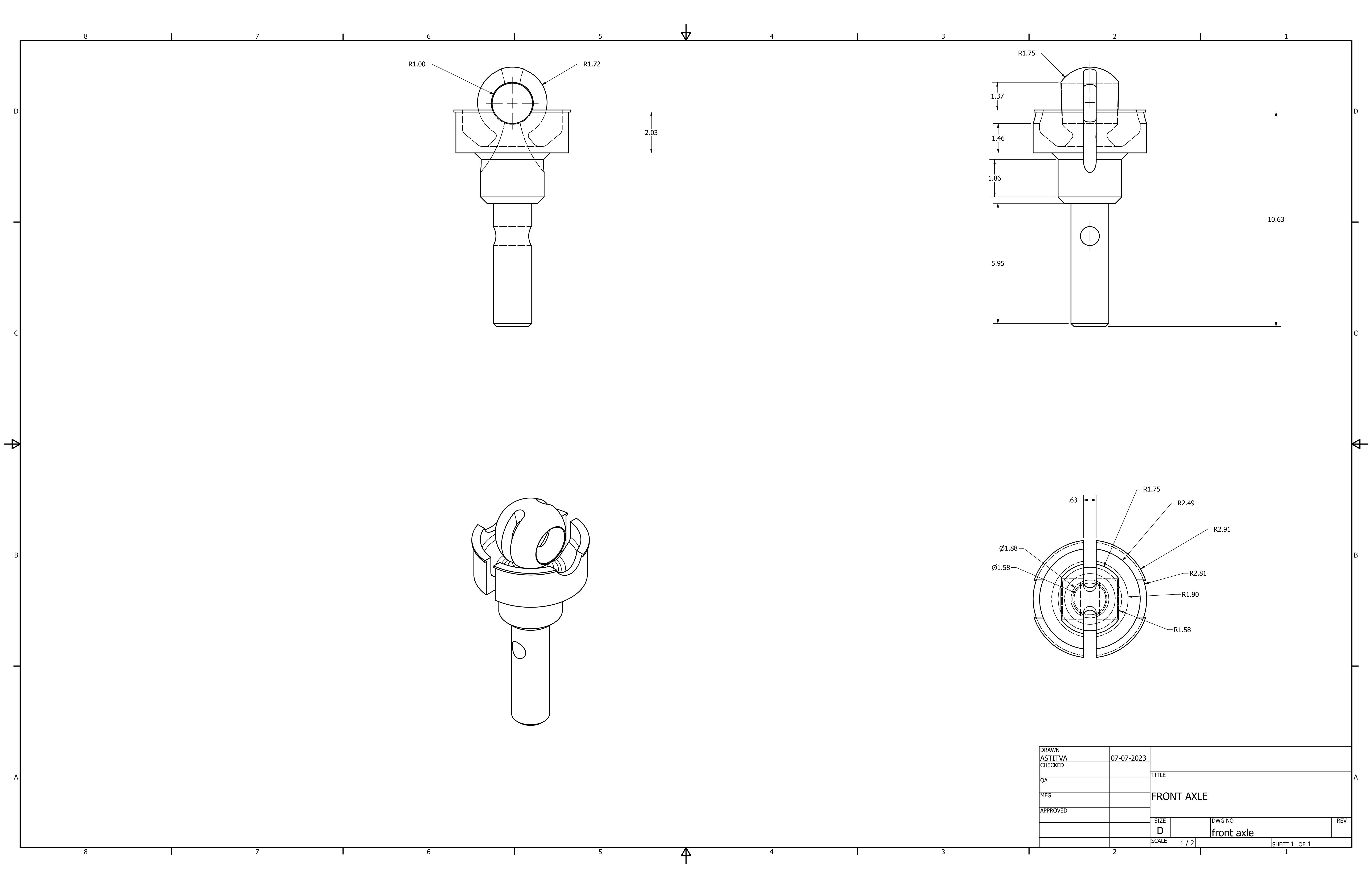


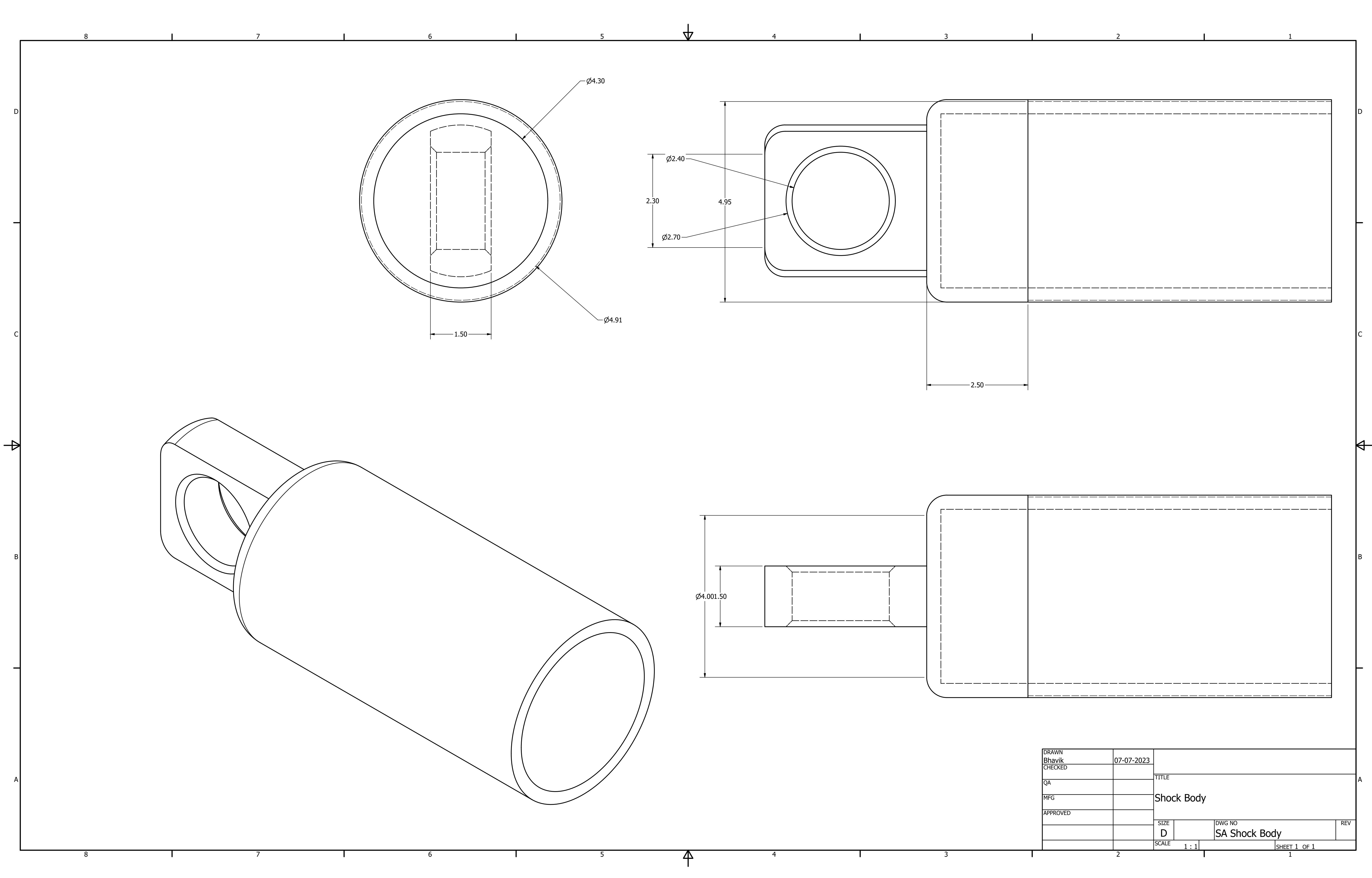


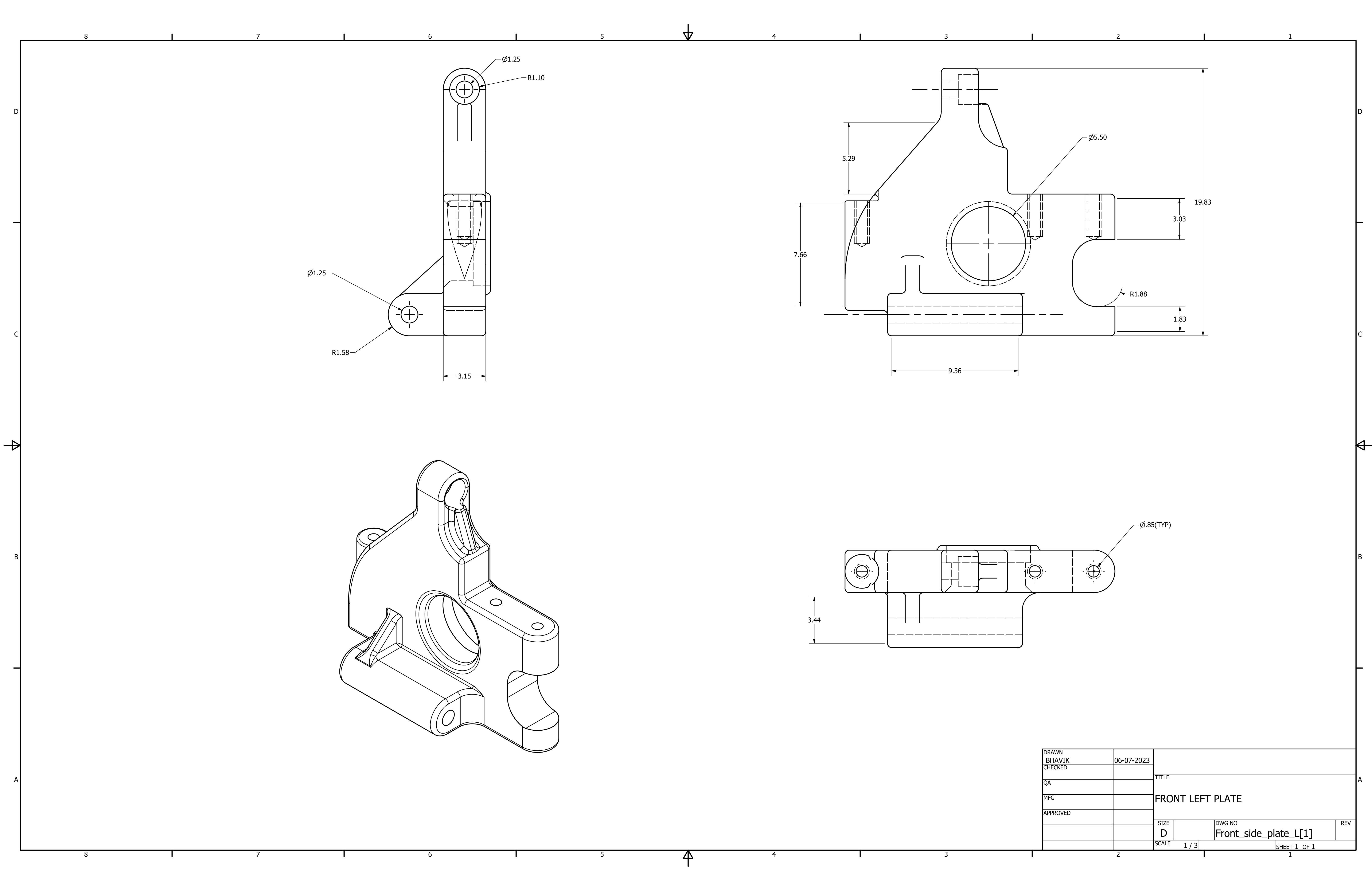


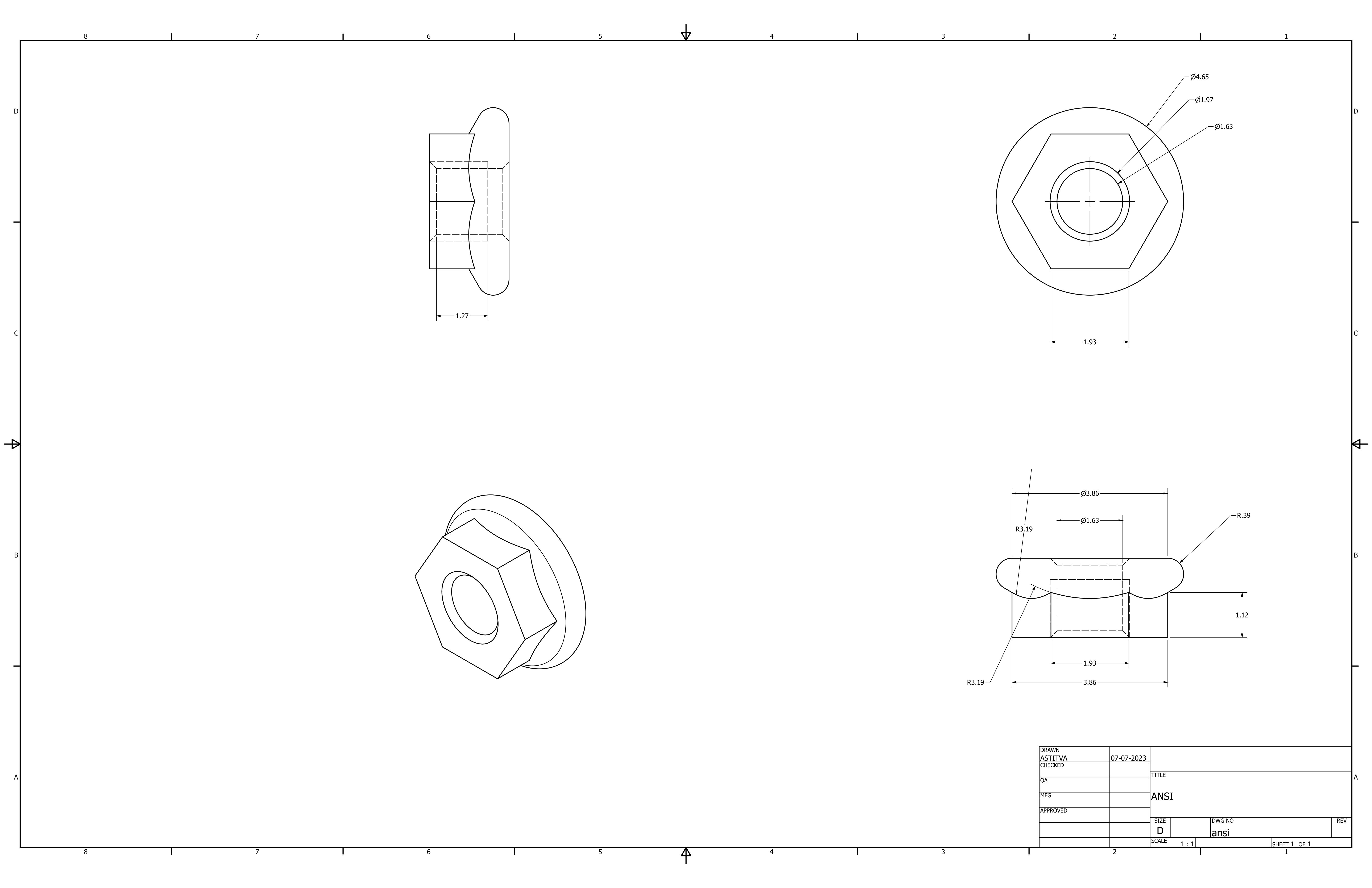
DRAWN patel	07-07-2023			
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MFG				
APPROVED		SIZE D	DWG NO a shock strut.	REV
	SCALE 1 / 2		SHEET 1 OF 1	

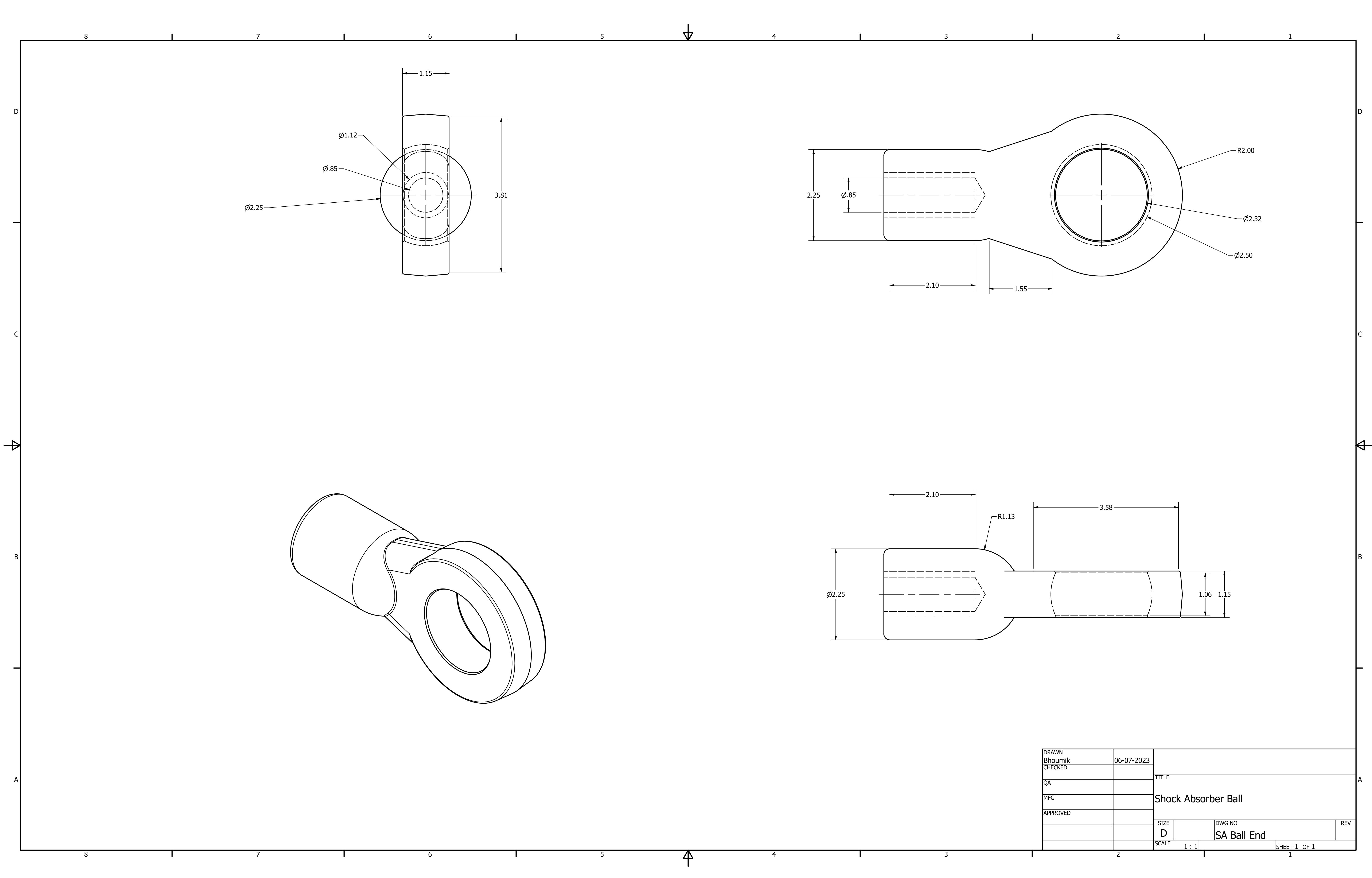


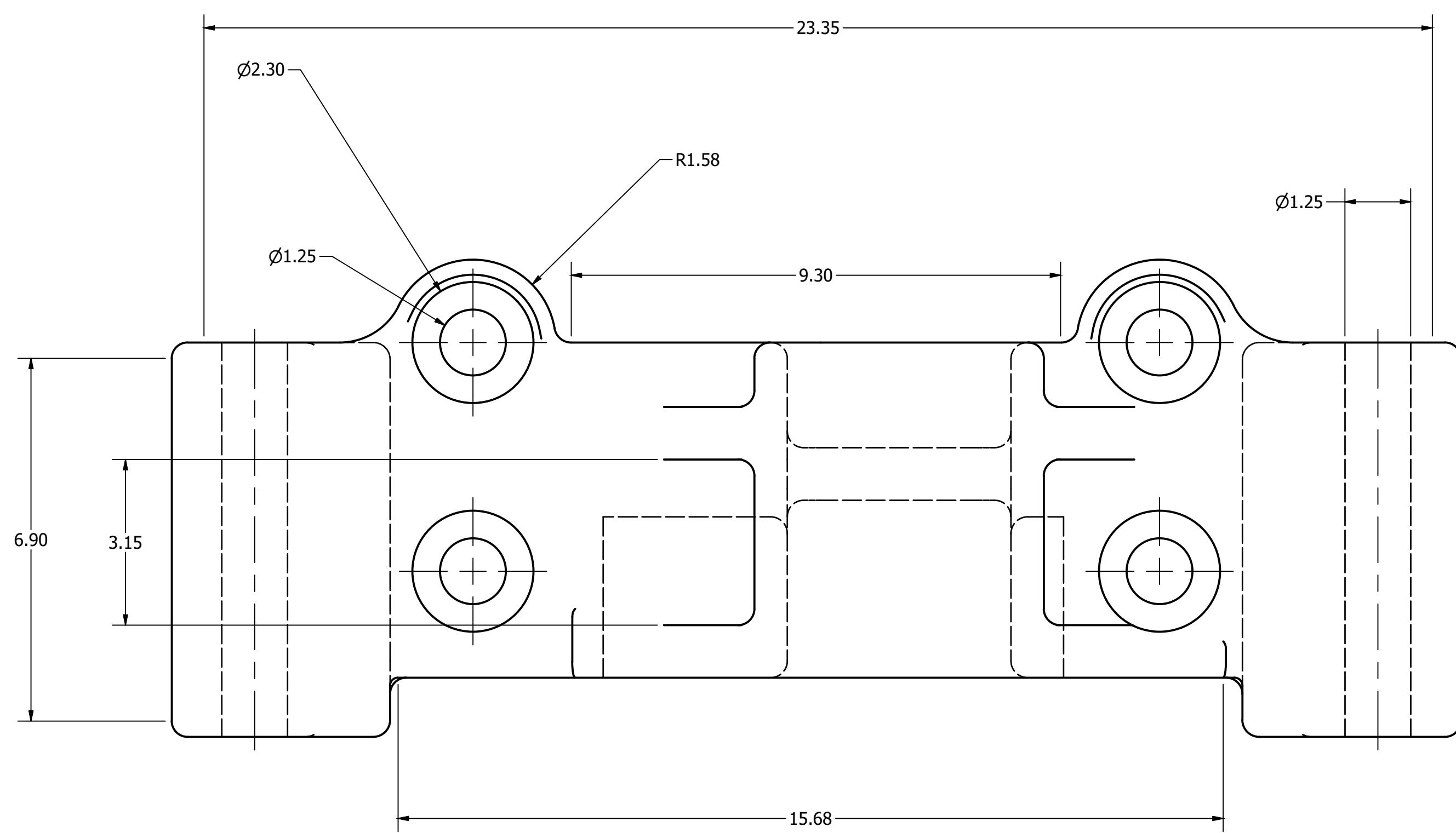
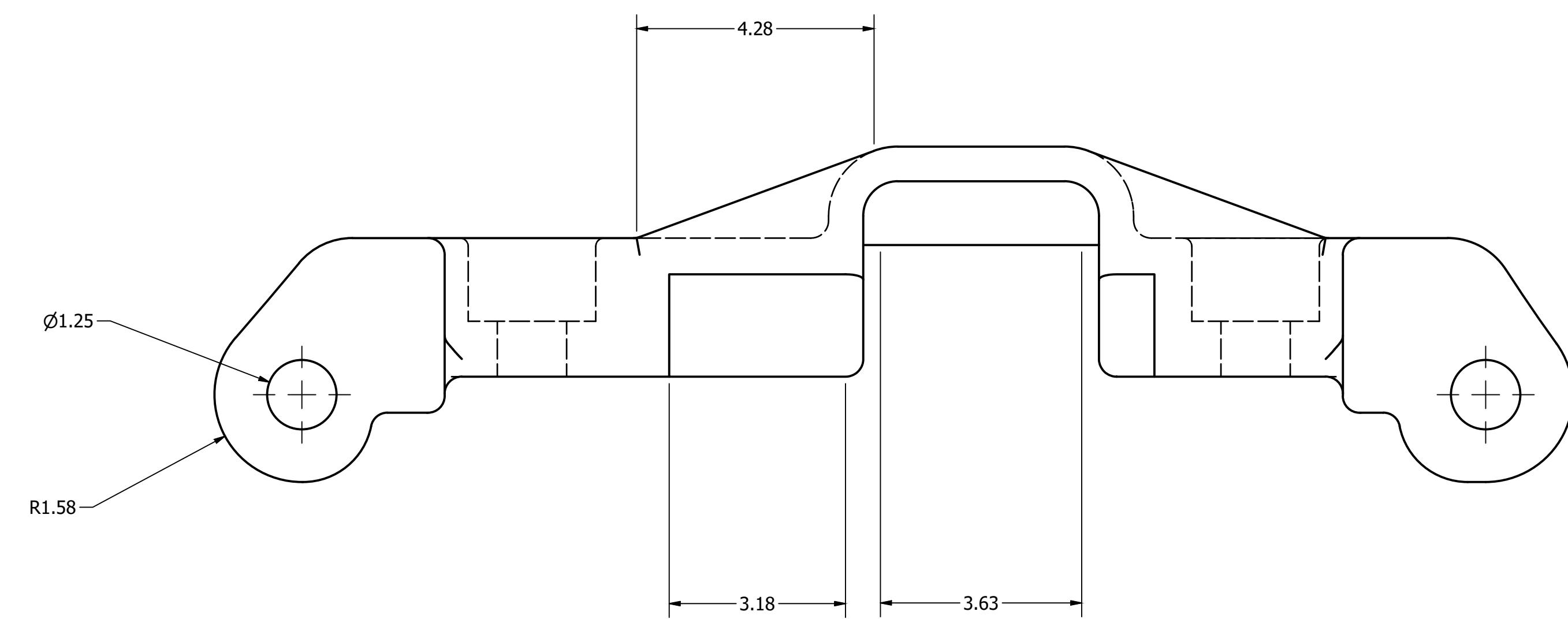
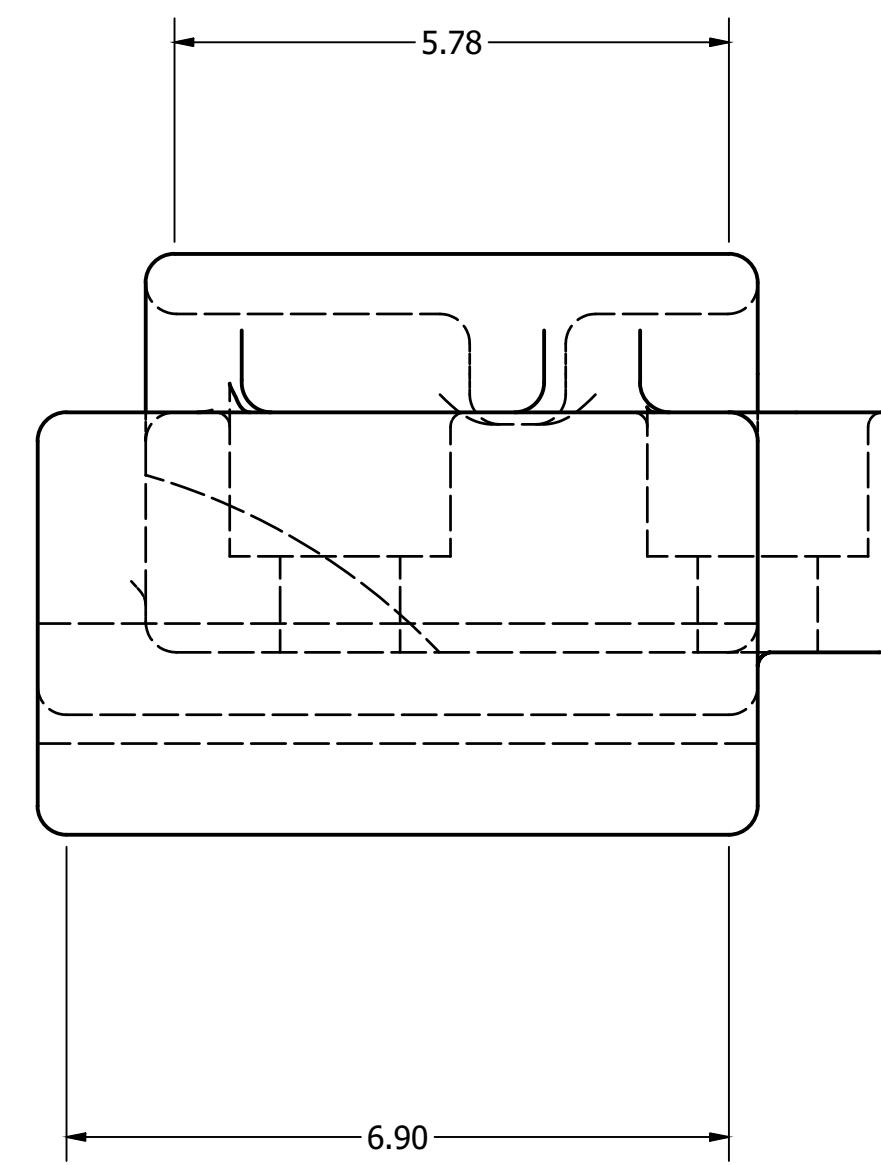
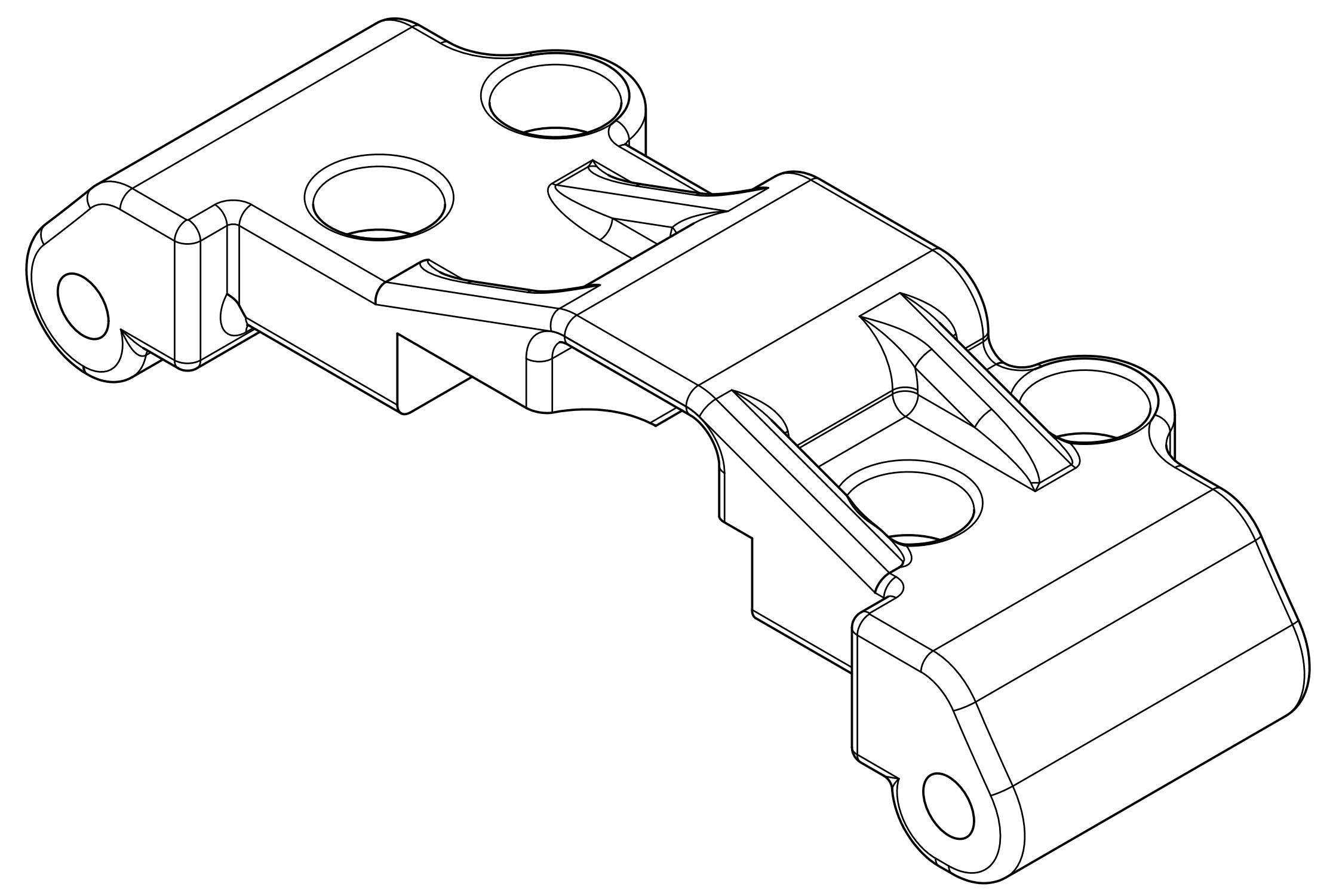












DRAWN Mamta	06-07-2023			
CHECKED				
QA				
MFG				
APPROVED				
SIZE D		DWG NO Front Upper Arm Mount Mamta	REV	
SCALE 1 / 2		SHEET 1 OF 1		1

