3D DESIGN AND CAD USING AUTODESK FUSION FOR AMATEUR RADIO
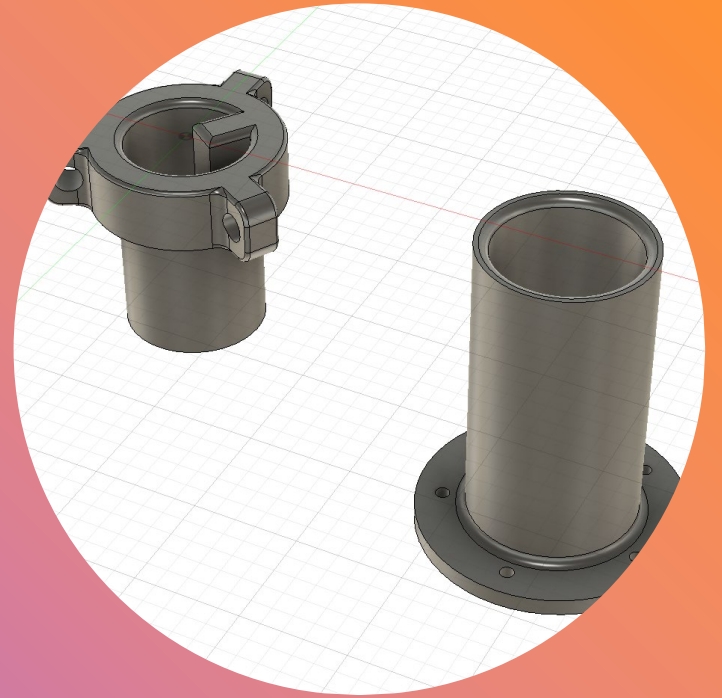
Presented by:

Jim Dixon – KA6ETE

WHY AUTODESK FUSION 360 ?

- **Fusion 360**: A powerful, cloud-based CAD/CAM tool by Autodesk.

- Combines **design**, **engineering**, and **manufacturing** workflows.

- Ideal for prototyping and custom designs.

- **Accessible to beginners** with intuitive tools and learning resources.
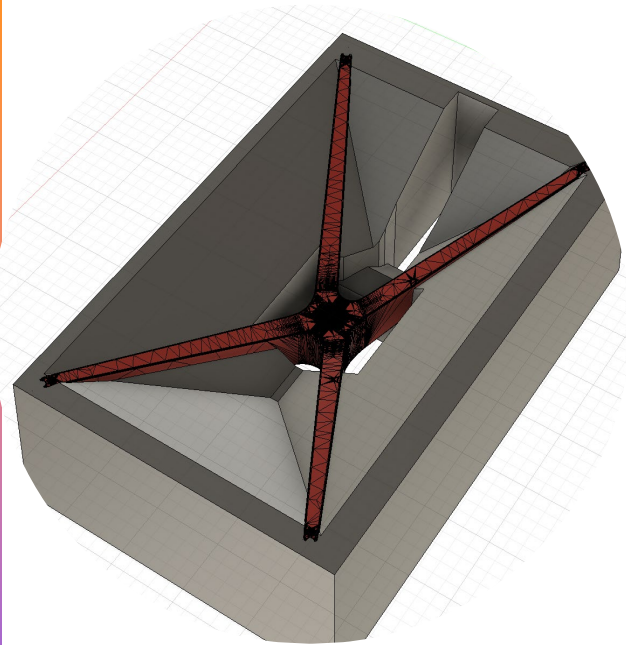
FEATURES OF AUTODESK FUSION 360

KEY FEATURES FOR BEGINNERS

•**3D Design Tools**: Easy-to-use interface for creating and editing models.

•**Parametric Modeling**: Make changes easily with history-based edits.

•**Simulation Tools**: Test designs virtually for strength and functionality.

•**Cloud Collaboration**: Work anywhere, share, and collaborate.

•**CAM Integration**: Export designs directly for manufacturing.

WHERE TO START

1.**Download & Install** Fusion 360 from the Autodesk website.

2.Create an **Autodesk Account**.

3.Familiarize yourself with the **user interface**:

    1. Toolbar, Browser, Canvas, Timeline, and Viewcube.

4.Start with **basic tutorials**:

    1. Navigate to the "Learn" tab for beginner-friendly guides.

GETTING STARTED WITH AUTODESK FUSION 360

Basic Terminology and Setup

1. User Interface Elements

- **Toolbar**: The main menu where tools for creating and editing designs are located.
- **Browser**: The panel that displays the components, bodies, and features of your design.
- **Canvas**: The main workspace where you create and edit your design.
- **ViewCube**: A navigational tool for rotating and orienting the view of your 3D model.
- **Timeline**: The area at the bottom that shows the history of your actions, allowing you to edit or reorder them.
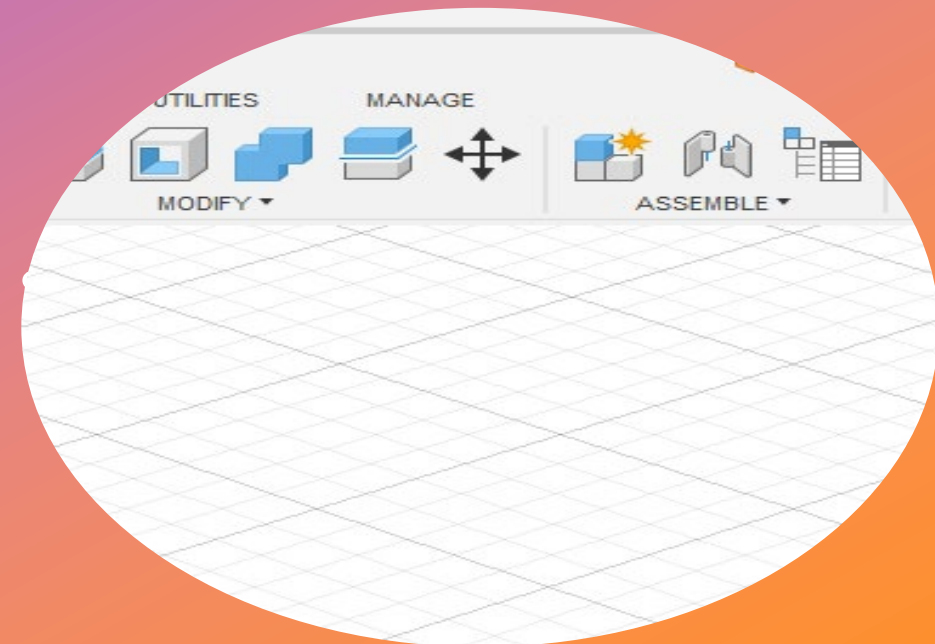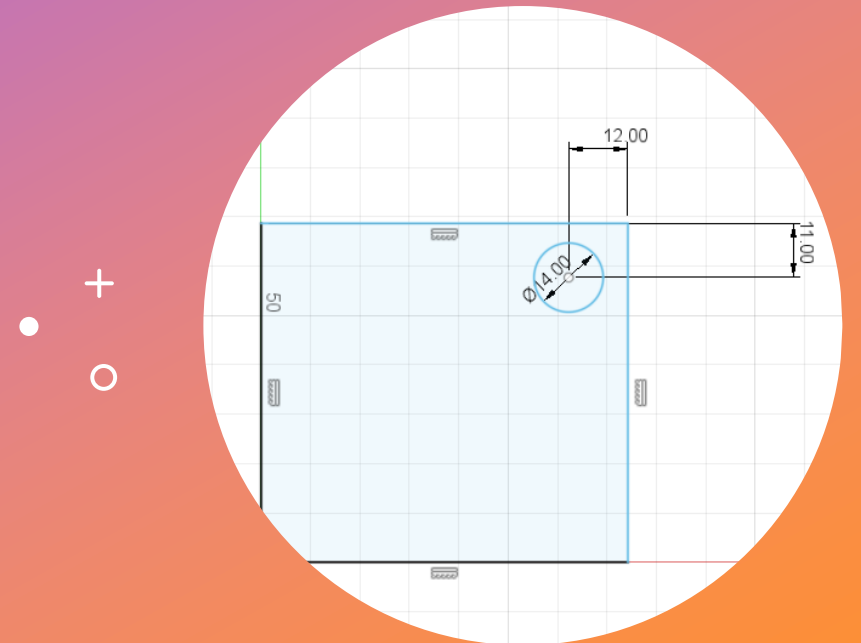
GETTING STARTED WITH AUTODESK FUSION 360

Basic Terminology and Setup

2. Sketching Terms

- **Sketch**: The 2D drawings that serve as the foundation for 3D features.
- **Constraints**: Rules that control the relationships between sketch entities (e.g., horizontal, vertical, tangent).
- **Dimensions**: Numeric values that define the size and position of sketch elements.
- **Profiles**: Closed 2D shapes in a sketch that can be extruded or revolved to create 3D objects.
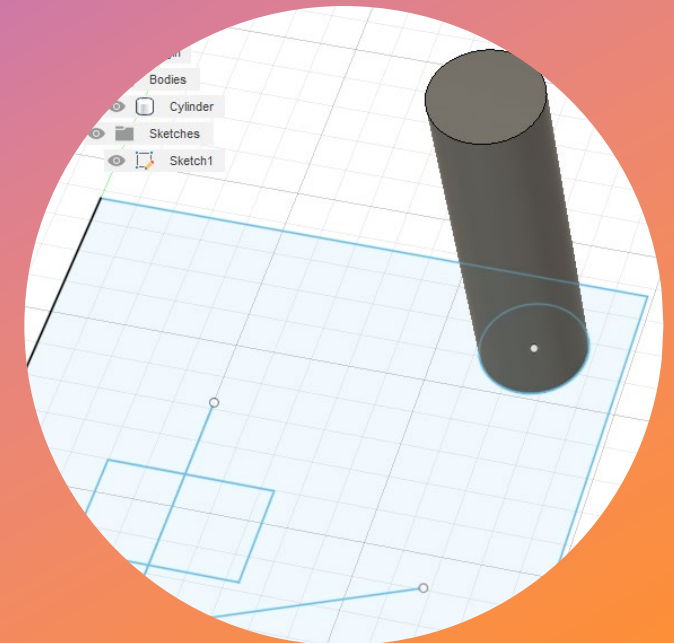
GETTING STARTED WITH AUTODESK FUSION 360

Basic Terminology and Setup

3. 3D Modeling Terms

• **Body**: A 3D object created from sketches and features. Can be solid or surface.

• **Component**: An individual part or assembly in your design. Useful for organizing complex models.

• **Feature**: A 3D operation applied to a sketch (e.g., extrude, revolve, loft).

• **Extrude**: Extends a sketch profile into 3D space to create a solid or cut.

• **Revolve**: Rotates a sketch profile around an axis to create a 3D object.

• **Loft**: Creates a smooth transition between two or more profiles.

• **Sweep**: Extends a profile along a selected path to create a 3D shape.

• **Fillet**: Rounds the edges or corners of a model.

• **Chamfer**: Creates a beveled edge at a corner or along an edge.

• **Shell**: Removes material from the inside of a body to create a hollow structure.
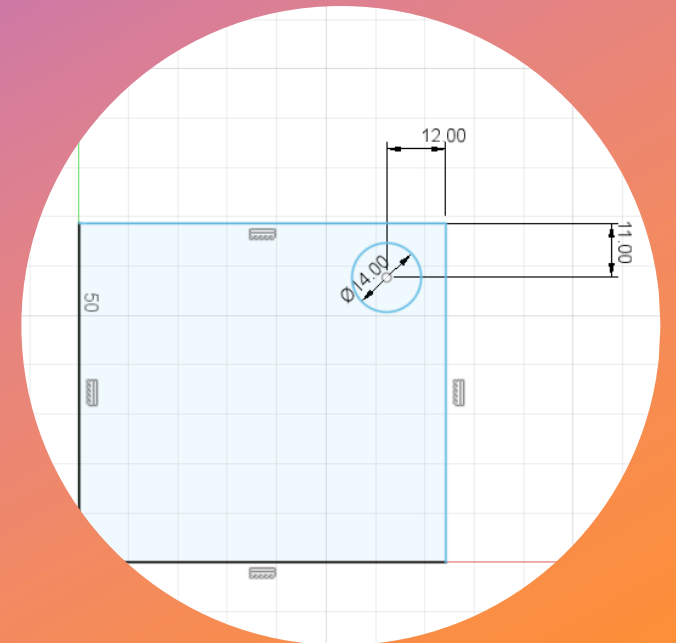
GETTING STARTED WITH AUTODESK FUSION 360

Basic Terminology and Setup

4. Parametric Modeling

- **Parameters**: Numerical values for dimensions that can be modified to adjust the design.
- **Parametric Modeling**: The process of defining dimensions and constraints to control a model.

5. Assembly Terms

- **Joint**: A connection between components that defines their relative motion.
- **As-Built Joint**: Defines the motion between components in their current position.
- **Rigid Group**: Fixes multiple components together so they act as a single unit.

GETTING STARTED WITH AUTODESK FUSION 360

Basic Terminology and Setup

6. Rendering and Simulation
- **Material**: Specifies the physical properties of the object (e.g., steel, plastic).
- **Appearance**: Defines how the model looks, such as color, texture, and finish.
- **Simulation**: Analyzes the design for stress, thermal, and other factors.

7. Collaboration and File Management
- **Fusion Team**: The cloud-based platform for sharing and collaborating on projects.
- **Version Control**: Fusion 360 automatically saves and tracks versions of your design.
- **Export**: Converts your design into formats like STL, STEP, or DXF for use outside Fusion.
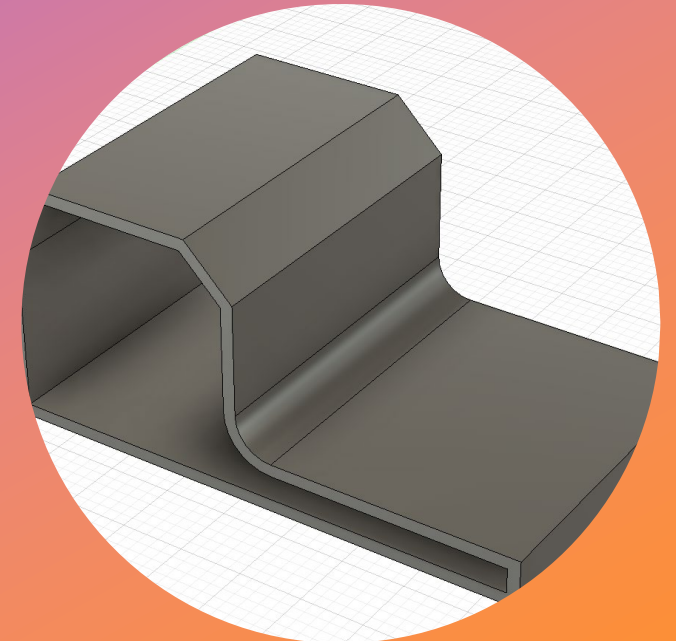
APPLICATIONS IN AMATEUR RADIO

FUSION 360 FOR AMATEUR RADIO PROJECTS

- **Custom Enclosures**: Design cases for radios, amplifiers, and power supplies.

- **Antenna Mounts**: Create lightweight and durable mounts for antennas.

- **PCB Holders**: Design holders and cases for circuit boards.

- **Custom Knobs & Dials**: Replace or design unique controls.

- **Cable Management**: Create clips, guides, and organizers for wiring.

- **Infinite Possibilities**……

CREATING A SIMPLE PART

Your First Design in Fusion

1. Open Fusion and select **Create Sketch**.

2. Choose a plane and use sketch tools (line, rectangle, circle) to draw.

3. Use the **Extrude Tool** to convert your sketch into a 3D model.

4. Save your design in the cloud or export it as an STL for 3D printing.
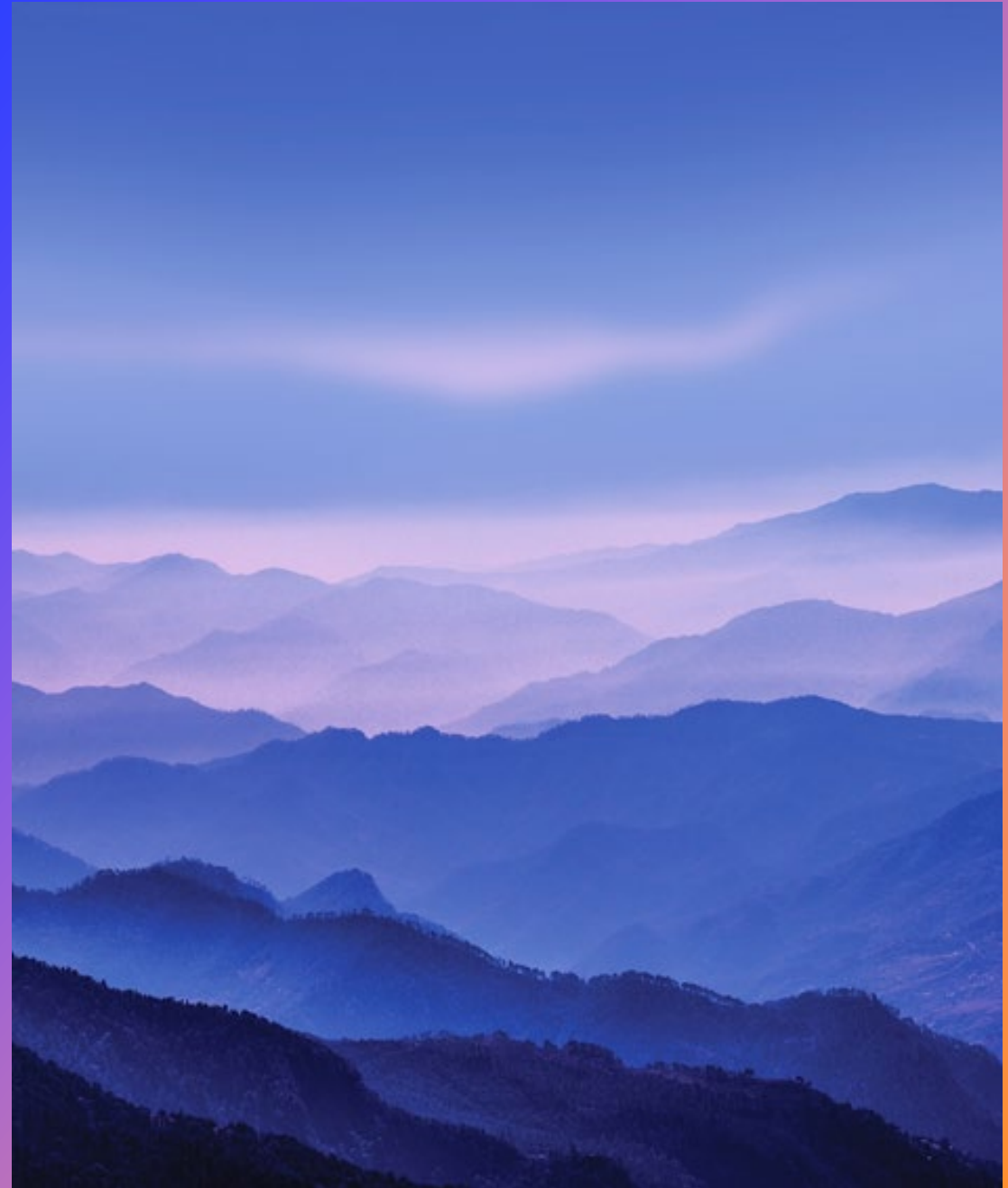
PRACTICAL TIPS FOR RADIO ENTHUSIASTS

- Use the **parametric modeling** feature for adjustable designs.

- Leverage the **materials library** to simulate radio enclosure performance.

- Export STL files for **3D printing** radio components.

- Test antenna mounts using Fusion's **simulation tools**.

Further Learning and Support

- **Autodesk Learn Platform**: Video tutorials and documentation.

- **YouTube Channels**: Tutorials by Fusion 360 experts.

- **Community Forums**: Share ideas and troubleshoot issues.

- **Amateur Radio Groups**: Collaborate with fellow enthusiasts on designs.

- https://www.youtube.com/@adskFusion/videos

- https://www.youtube.com/@TylerBeckofTECHESPRESSO

- https://www.youtube.com/@3DPrinterAcademyTutorials

RESOURCES FOR LEARNING

THANK YOU

Jim Dixon – KA6ETE

Rocky Mountain Ham Radio