

Getting Started

Launching Ansoft HFSS

1. To access Ansoft HFSS, click the Microsoft **Start** button, select **Programs**, and select the **Ansoft, HFSS 10** program group. Click **HFSS 10**.

Setting Tool Options

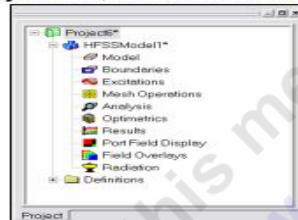
To set the tool options:

- ▲ **Note:** In order to follow the steps outlined in this example, verify that the following tool options are set :
 1. Select the menu item **Tools > Options > HFSS Options**
 2. HFSS Options Window:
 1. Click the **General** tab
 - ▲ Use Wizards for data entry when creating new boundaries: ☒ **Checked**
 - ▲ Duplicate boundaries with geometry: ☒ **Checked**
 2. Click the **OK** button
 3. Select the menu item **Tools > Options > 3D Modeler Options**.
 4. 3D Modeler Options Window:
 1. Click the **Operation** tab
 - ▲ Automatically cover closed polylines: ☒ **Checked**
 2. Click the **Drawing** tab
 - ▲ Edit property of new primitives: ☒ **Checked**
 3. Click the **OK** button

Opening a New Project

To open a new project:

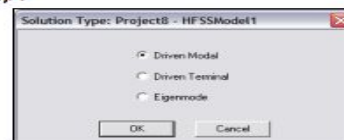
1. In an Ansoft HFSS window, click the On the Standard toolbar, or select the menu item **File > New**.
2. From the **Project** menu, select **Insert HFSS Design**.



Set Solution Type

To set the solution type:

1. Select the menu item **HFSS > Solution Type**
2. Solution Type Window:
 1. Choose **Driven Modal**
 2. Click the **OK** button

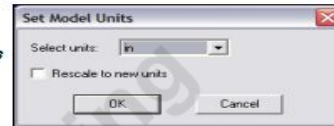


Creating the 3D Model

Set Model Units

To set the units:

1. Select the menu item **3D Modeler > Units**
2. Set Model Units:
 1. Select Units: **in**
 2. Click the **OK** button



Set Default Material

To set the default material:

1. Using the 3D Modeler Materials toolbar, choose **vacuum**



Create Circular Waveguide

Create waveguide

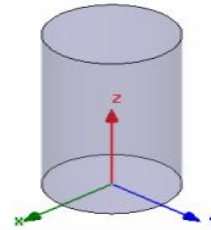
1. Select the menu item **Draw > Cylinder**
2. Using the coordinate entry fields, enter the cylinder position:
 - X: **0.0**, Y: **0.0**, Z: **0.0** Press the **Enter** key
3. Using the coordinate entry fields, enter the radius:
 - dX: **0.838**, dY: **0.0**, dZ: **0.0** Press the **Enter** key
4. Using the coordinate entry fields, enter the height:
 - dX: **0.0**, dY: **0.0**, dZ: **3.0** Press the **Enter** key

To set the name:

1. Select the **Attribute** tab from the **Properties** window.
2. For the **Value of Name** type: **Waveguide**
3. Click the **OK** button

To fit the view:

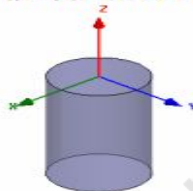
1. Select the menu item **View > Fit All > Active View**. Or press the **CTRL+D** key



Create Offset Coordinate System

Create CS

1. Select the menu item **3D Modeler > Coordinate System > Create > Relative CS > Offset**
2. Using the coordinate entry fields, enter the origin:
 - X: **0.0**, Y: **0.0**, Z: **3.0** Press the **Enter** key



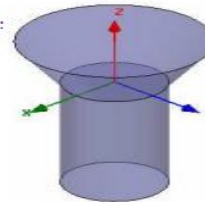
Create Transition Region

Create waveguide transition

1. Select the menu item **Draw > Cone**
2. Using the coordinate entry fields, enter the center position:
 - X: **0.0**, Y: **0.0**, Z: **0.0** Press the **Enter** key
3. Using the coordinate entry fields, enter the lower radius:
 - dX: **0.838**, dY: **0.0**, dZ: **0.0** Press the **Enter** key
4. Using the coordinate entry fields, enter the upper radius:
 - dX: **0.709**, dY: **0.0**, dZ: **0.0** Press the **Enter** key
5. Using the coordinate entry fields, enter the height:
 - dX: **0.0**, dY: **0.0**, dZ: **1.227** Press the **Enter** key

To set the name:

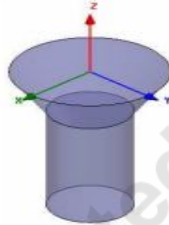
1. Select the **Attribute** tab from the **Properties** window.
2. For the **Value of Name** type: **Taper**
3. Click the **OK** button



▲ Create Offset Coordinate System

▲ Create CS

1. Select the menu item **3D Modeler > Coordinate System > Create > Relative CS > Offset**
2. Using the coordinate entry fields, enter the origin
 - ▲ X: 0.0, Y: 0.0, Z: 1.227 Press the **Enter** key



▲ Create the Throat

▲ Create Throat

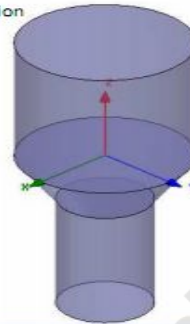
1. Select the menu item **Draw > Cylinder**
2. Using the coordinate entry fields, enter the cylinder position
 - ▲ X: 0.0, Y: 0.0, Z: 0.0 Press the **Enter** key
3. Using the coordinate entry fields, enter the radius:
 - ▲ dX: 1.547, dY: 0.0, dZ: 0.0 Press the **Enter** key
4. Using the coordinate entry fields, enter the height:
 - ▲ dX: 0.0, dY: 0.0, dZ: 3.236 Press the **Enter** key

▲ To set the name:

1. Select the **Attribute** tab from the **Properties** window.
2. For the **Value** of **Name** type: **Throat**
3. Click the **OK** button

▲ To fit the view:

1. Select the menu item **View > Fit All > Active View.**



▲ Group Object

▲ To group the objects:

1. Select the menu item **Edit > Select All Visible.** Or press the **CTRL+A** key
2. Select the menu item, **3D Modeler > Boolean > Unite**

▲ Rename group

▲ To rename the group of objects:

1. From the **Model** tree, select the only object shown
2. Click the **Properties** button
 1. For the **Value** of **Name** type: **Hom_Air**
 2. Click the **OK** button
3. Click the **Done** button

▲ Set Working Coordinate System

▲ To set the working coordinate system:

1. Select the menu item **3D Modeler > Coordinate System > Set Working CS**
2. Select Coordinate System Window,
 1. From the list, select the CS: **Global**
 2. Click the **Select** button

▲ Set Default Material

▲ To set the default material:

1. Using the 3D Modeler Materials toolbar, choose **Select**
2. Select Definition Window:
 1. Type **pec** in the **Search by Name** field
 2. Click the **OK** button



▲ Create the Horn Wall

▲ Create horn

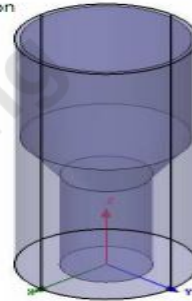
1. Select the menu item **Draw > Cylinder**
2. Using the coordinate entry fields, enter the cylinder position:
 - ▲ X: **0.0**, Y: **0.0**, Z: **0.0** Press the **Enter** key
3. Using the coordinate entry fields, enter the radius:
 - ▲ dX: **1.647**, dY: **0.0**, dZ: **0.0** Press the **Enter** key
4. Using the coordinate entry fields, enter the height:
 - ▲ dX: **0.0**, dY: **0.0**, dZ: **7.463** Press the **Enter** key

▲ To set the name:

1. Select the **Attribute** tab from the **Properties** window.
2. For the **Value of Name** type: **Horn**
3. Click the **OK** button

▲ To fit the view:

1. Select the menu item **View > Fit All > Active View**.



▲ Complete the Horn

▲ To select the object

- ▲ Select the menu item **Edit > Select All Visible**. Or press the **CTRL+A** key

▲ To complete the horn:

1. Select the menu item **3D Modeler > Boolean > Subtract**
2. Subtract Window
 - ▲ Blank Parts: **Horn**
 - ▲ Tool Parts: **Horn_Air**
 - ▲ Clone tool objects before subtract: ☐ **Unchecked**
 - ▲ Click the **OK** button

▲ Set Default Material

▲ To set the default material:

- ▲ Using the 3D Modeler Materials toolbar, choose **vacuum**



▲ Create Air

▲ Create Air

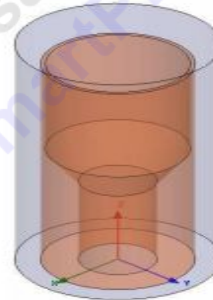
1. Select the menu item **Draw > Cylinder**
2. Using the coordinate entry fields, enter the cylinder position:
 - ▲ X: **0.0**, Y: **0.0**, Z: **0.0** Press the **Enter** key
3. Using the coordinate entry fields, enter the radius:
 - ▲ dX: **2.2**, dY: **0.0**, dZ: **0.0** Press the **Enter** key
4. Using the coordinate entry fields, enter the height:
 - ▲ dX: **0.0**, dY: **0.0**, dZ: **8.2** Press the **Enter** key

▲ To set the name:

1. Select the **Attribute** tab from the **Properties** window.
2. For the **Value of Name** type: **Air**
3. Click the **OK** button

▲ To fit the view:

1. Select the menu item **View > Fit All > Active View**.



▲ Create Radiation Boundary

▲ To create a radiation boundary

1. Select the menu item **Edit > Select > By Name**
2. Select Object Dialog,
 1. Select the objects named: **Air**
 2. Click the **OK** button
3. Select the menu item **HFSS > Boundaries > Assign > Radiation**
4. Radiation Boundary window
 1. Name: **Rad1**
 2. Click the **OK** button

▲ Create the Wave port

▲ To create a circle that represents the port:

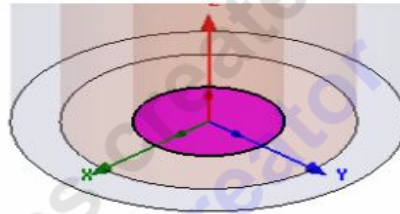
1. Select the menu item **Draw > Circle**
2. Using the coordinate entry fields, enter the center position
 - ▲ X: **0.0**, Y: **0.0**, Z: **0.0** Press the **Enter** key
3. Using the coordinate entry fields, enter the radius of the circle:
 - ▲ dX: **0.838**, dY: **0.0**, dZ: **0.0** Press the **Enter** key

▲ To set the name:

1. Select the **Attribute** tab from the **Properties** window.
2. For the **Value of Name** type: **p1**
3. Click the **OK** button

▲ To select the object p1:

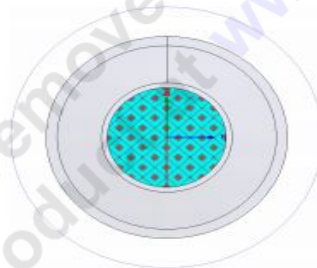
1. Select the menu item **Edit > Select > By Name**
2. Select Object Dialog,
 1. Select the objects named: **p1**
 2. Click the **OK** button



▲ Create Wave Port Excitation 1 (Continued)

▲ To assign wave port excitation

1. Select the menu item **HFSS > Excitations > Assign > Wave Port**
2. Wave Port : General
 1. Name: **p1**
 2. Click the **Next** button
3. Wave Port : Modes
 1. Number of Modes: **2**
 2. For **Mode 1**, click the **None** column and select **New Line**
 3. Using the coordinate entry fields, enter the vector position
 - ▲ X: **-0.838**, Y: **0.0**, Z: **0.0** Press the **Enter** key
 4. Using the coordinate entry fields, enter the vertex
 - ▲ dX: **1.676**, dY: **0.0**, dZ: **0.0** Press the **Enter** key
 5. Polarize E Field: ☒ **Checked**
 6. Click the **Next** button
4. Wave Port : Post Processing
5. Click the **Finish** button



▲ Create Offset Coordinate System

▲ Create CS

1. Select the menu item **3D Modeler > Coordinate System > Create > Relative CS > Offset**
2. Using the coordinate entry fields, enter the origin
 - ▲ X: 0.0, Y: 0.0, Z: 7.463 Press the **Enter** key

▲ Create a Radiation Setup

▲ To define the radiation setup

1. Select the menu item **HFSS > Radiation > Insert Far Field Setup > Infinite Sphere**
2. Far Field Radiation Sphere Setup dialog
 - ▲ **Infinite Sphere** Tab
 1. Name: **ff_2d**
 2. Phi: (Start: 0, Stop: 90, Step Size: 90)
 3. Theta: (Start: -180, Stop: 180, Step Size: 2)
 - 1. **Coordinate System** Tab
 1. Select **Use local coordinate system**
 2. Choose **RelativeCS3**
 - 2. Click the **OK** button

▲ Analysis Setup

▲ Creating an Analysis Setup

▲ To create an analysis setup:

1. Select the menu item **HFSS > Analysis Setup > Add Solution Setup**
2. Solution Setup Window:
 1. Click the **General** tab:
 - ▲ Solution Frequency: 5.0 GHz
 - ▲ Maximum Number of Passes: 10
 - ▲ Maximum Delta S per Pass: 0.02
 2. Click the **OK** button

▲ Save Project

▲ To save the project:

1. In an Ansoft HFSS window, select the menu item **File > Save As...**
2. From the **Save As** window, type the Filename: **hfss_chorn**
3. Click the **Save** button

▲ Analyze

▲ Model Validation

▲ To validate the model:

1. Select the menu item **HFSS > Validation Check**
2. Click the **Close** button
 - ▲ **Note:** To view any errors or warning messages, use the Message Manager.

▲ Analyze

▲ To start the solution process:

1. Select the menu item **HFSS > Analyze All**



▲ Solution Data

▲ To view the Solution Data:

1. Select the menu item **HFSS > Results > Solution Data**

▲ To view the Profile:

1. Click the **Profile** Tab.

▲ To view the Convergence:

1. Click the **Convergence** Tab

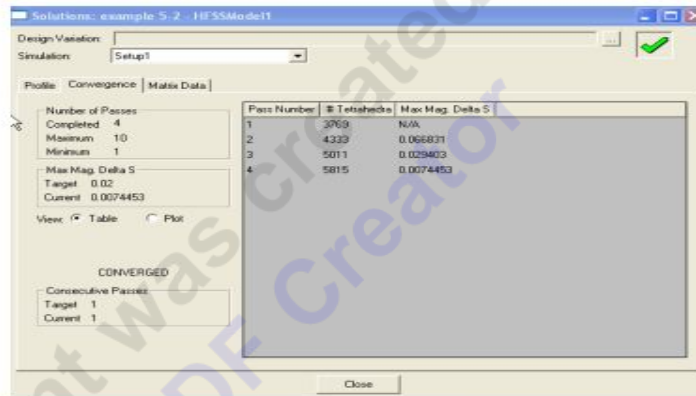
▲ **Note:** The default view is for convergence is **Table**. Select the **Plot** radio button to view a graphical representations of the convergence data.

▲ To view the Matrix Data:

1. Click the **Matrix Data** Tab

▲ **Note:** To view a real-time update of the Matrix Data, set the Simulation to **Setup1, Last Adaptive**

2. Click the **Close** button



▲ Far Field Overlays

▲ Edit Sources

▲ To Modify a Terminal excitation:

1. Select the menu item **HFSS > Fields > Edit Sources**
2. Edit Sources window
 1. Source: **p1:m1**
 1. Scaling Factor: **1**
 2. Offset: **0**
 2. Source: **p1:m2**
 1. Scaling Factor: **1**
 2. OffsetPhase: **90**
3. Click the **OK** button

▲ Create Far Field Overlay

▲ To create a 2D polar far field plot :

1. Select the menu item **HFSS > Results > Create Report**
2. Create Report Window:
 1. Report Type: **Far Fields**
 2. Display Type: **Radiation Pattern**
 3. Click the **OK** button
3. Traces Window:
 1. Solution: **Setup1: LastAdaptive**
 2. Geometry: **ff_2d**
 3. In the **Sweeps** tab
 1. Primary Sweep: Click on the Name **Phi** and toggle to **Theta**
 4. In the **Mag** tab
 1. Category: **Gain**
 2. Quantity: **GainLHCP, GainRHCP**
 3. Function: **dB**
 5. Click the **Done** button