

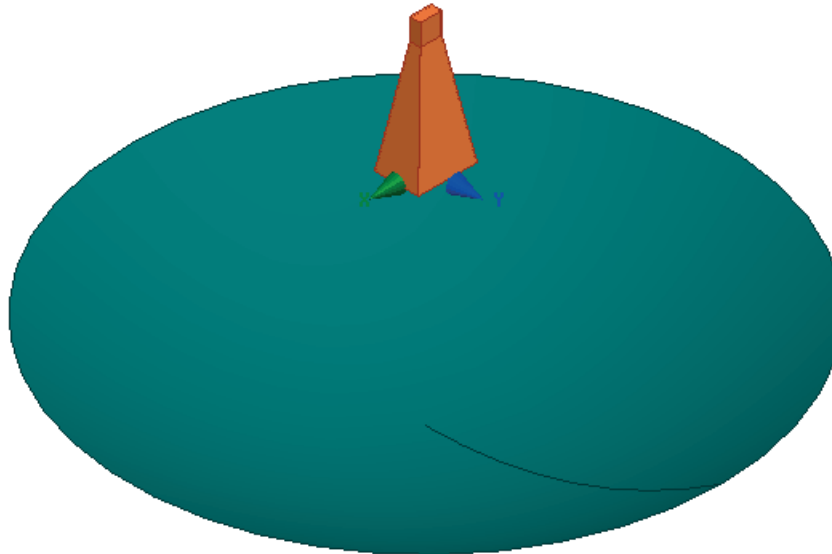
Example – Horn-Fed Reflector Antenna

- **Horn-Fed Reflector Antenna**

- This example is intended to show you how to create, simulate, and analyze horn-fed reflector antenna system efficiently, using the ANSYS Electronics Desktop; HFSS and HFSS-IE Design Environments.
 - Part 1: HFSS Design of horn antenna
 - Part 2: HFSS-IE design of reflector with excitation linking to HFSS design in part 1. Antenna solution using an Integral Equation and Physical Optics solution methods, both techniques are available within HFSS-IE.
 - Part 3: HFSS Hybrid design of a reflector + horn antenna
 - Part 4 – HFSS Hybrid Setup with Mesh Assembly
 - Part5: Placement study with Mesh Reuse


Input files:

Horn_10GHz.a3dcomp
horn_FEBl_boundary.a3dcomp
Reflector_IERegion_curvi.a3dcomp



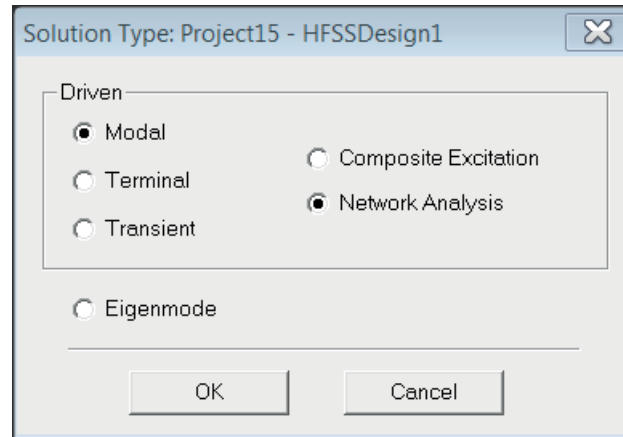
- **Launching *ANSYS Electronics Desktop 2015***
 - Select *Programs > ANSYS Electromagnetics > ANSYS Electromagnetics Suite 16.0*
 - Select *ANSYS Electronics Desktop 2015*.
- **Setting Tool Options**
 - **Note:** In order to follow the steps outlined in this example, verify that the following tool options are set :
 - Select the menu item *Tools > Options > HFSS Options...*
 - Click the **General** tab
 - Use Wizards for data input when creating new boundaries: **Checked**
 - Duplicate boundaries/mesh operations with geometry: **Checked**
 - Click the **OK** button
 - Select the menu item *Tools > Options > Modeler Options....*
 - Click the **Operation** tab
 - Automatically cover closed polylines: **Checked**
 - Select last command on object select: **Checked**
 - Click the **Drawing** tab
 - Edit properties of new primitives: **Checked**
 - Click the **OK** button

• Opening a New Project

- In HFSS Desktop, click the  On the Standard toolbar, or select the menu item **File > New**.
- From the Project menu, select **Insert HFSS Design**.

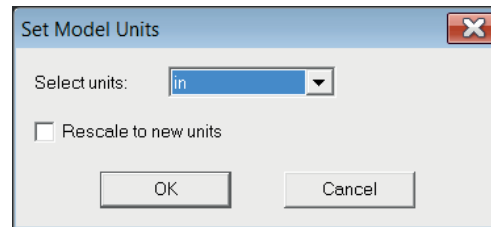
• Set Solution Type

- Select the menu item **HFSS > Solution Type**
 - Choose **Driven Modal**
 - Choose **Network Analysis**
 - Click the **OK** button

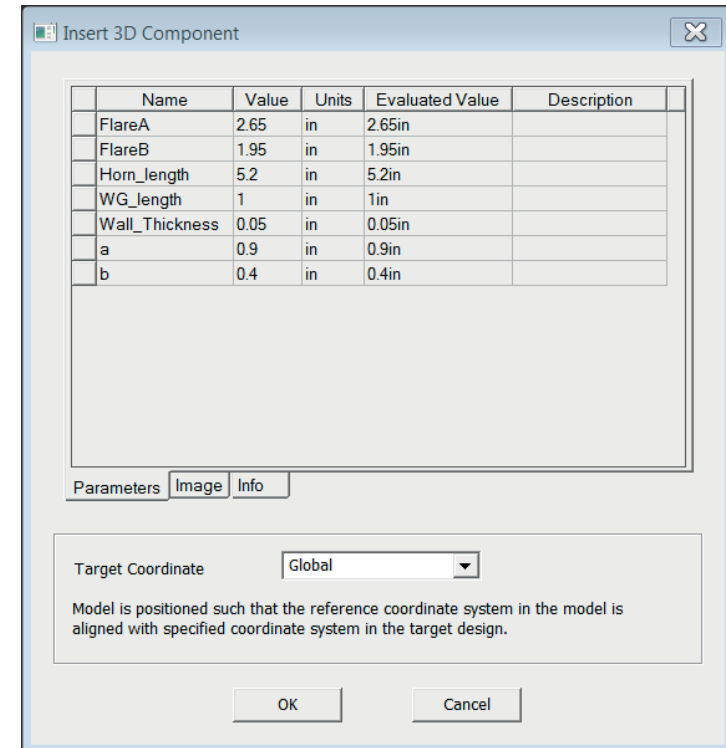
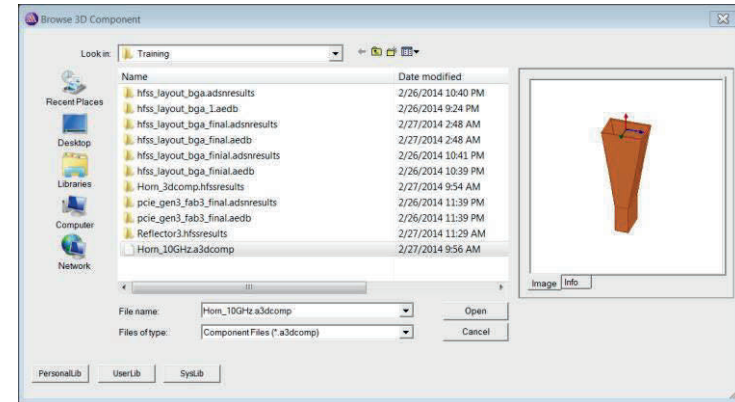
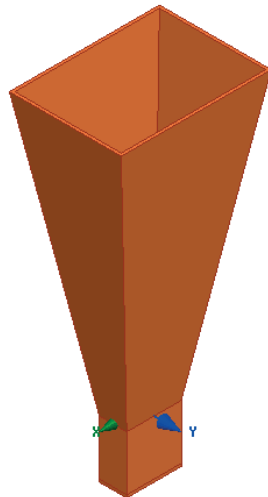


• Set Model Units

- Select the menu item **Modeler > Units**
 - Select Units: **in**
 - Click the **OK** button



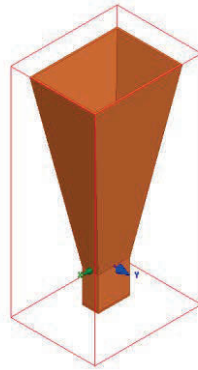
- **Creating the Horn Antenna**
 - Select the menu item **Draw > 3D Component Library > Browse**
 - Browse 3D Component Dialog
 - Filename: **Horn_10GHz.a3dcomp**
 - Click the **Open** button
 - Insert 3D Component Dialog
 - FlareA: **2.65in**
 - FlareB: **1.95in**
 - Horn_length: **5.2in**
 - Click the **OK** button
 - To fit the view:
 - Select the menu item **View > Fit All > Active View**. Or press the **CTRL+D** key



Example – Horn-Fed Reflector Antenna

• Creating the Airbox

- Select the menu item *Draw > Region*
 - Padding Data: **Pad all directions similarly**
 - Direction: **All**
 - Padding type: **Absolute Offset**
 - Value: **0.3in**
 - Click the **OK** button

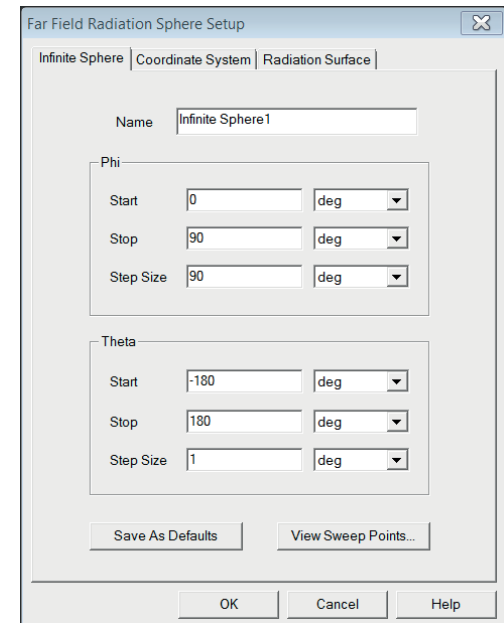
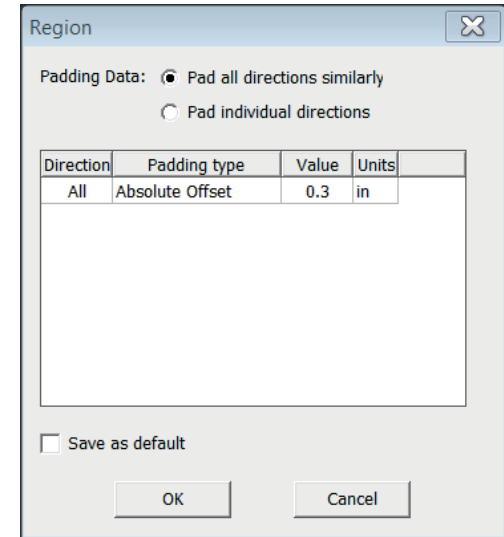


• Create Radiation Boundary

- Select the menu item *Edit > Select > By Name*
 - Object Name: **Region**
 - Click the **OK** button
- Select the menu item *HFSS > Boundaries > Assign > Radiation...*
 - Click the **OK** button

• Create a Radiation Setup

- Select the menu item *HFSS > Radiation > Insert Far Field Setup > Infinite Sphere*
 - Infinite Sphere Tab
 - Name: **2D**
 - Phi: (Start: **0**, Stop: **90**, Step Size: **90**)
 - Theta: (Start: **-180**, Stop: **180**, Step Size: **1**)
 - Click the **OK** button



• Creating an Analysis Setup

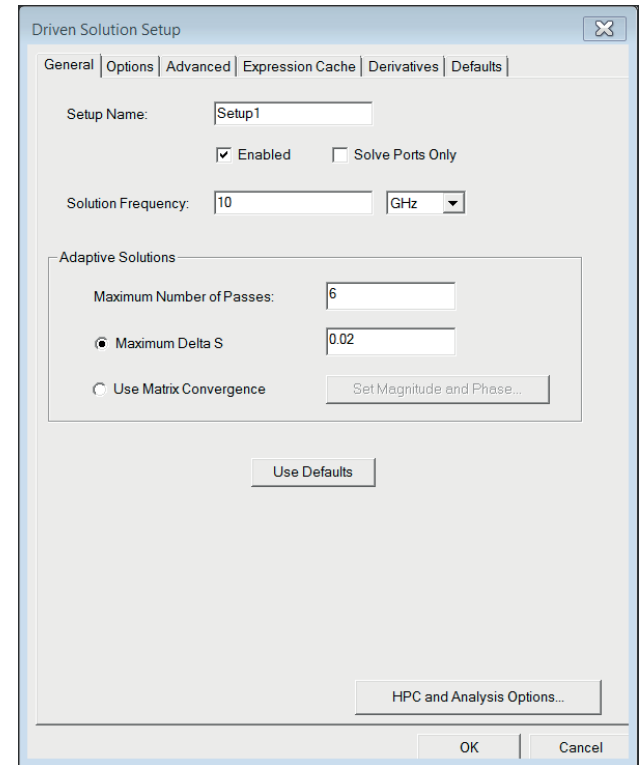
- Select the menu item **HFSS > Analysis Setup > Add Solution Setup**
 - Click the **General** tab:
 - Solution Frequency: **10 GHz**
 - Maximum Number of Passes: **6**
 - Maximum Delta S per Pass: **0.02**
 - Click the **OK** button

• Save Project

- Select the menu item **File > Save As**
 - Filename: **Reflector**
 - Click the **Save** button

• Source Design Analyze

- Select the menu item **HFSS > Analyze All**



Part 2 - HFSS-IE: Getting Started

• Setting Tool Options

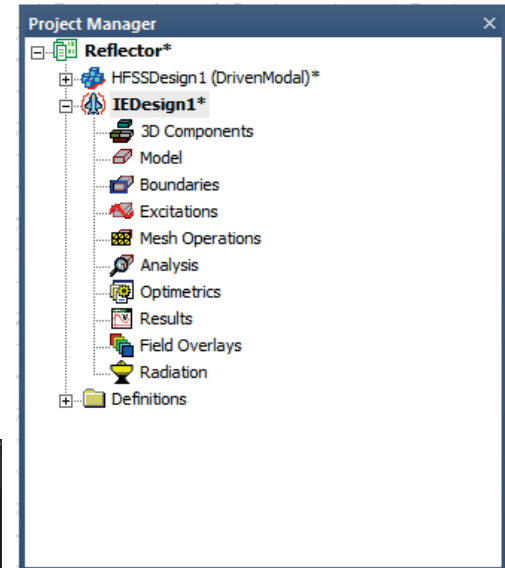
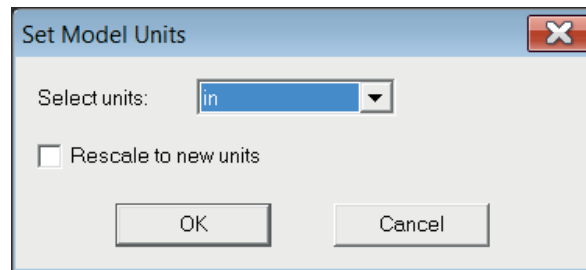
- **Note:** In order to follow the steps outlined in this example, verify that the following tool options are set :
 - Select the menu item **Tools > Options > HFSS-IE Options**
 - Click the **General** tab
 - Use Wizards for data input when creating new boundaries: **Checked**
 - Duplicate boundaries/mesh operations with geometry: **Checked**
 - Click the **OK** button

• Opening a New Project

- Select the menu item **Project > Insert HFSS-IE Design**

• Set Model Units

- Select the menu item **Modeler > Units**
 - Select Units: **in**
 - Click the **OK** button



HFSS-IE: Creating the 3D Model

• Create Reflector

- Select the menu item **Draw > Equation Based Curve**

- X(_t): **0**
- Y(_t): **(_t)*(1cm)**
- Z(_t): **(26.625-_t*_t/106.5)*(-1cm)**
- Start_t: **0**
- End_t: **32**
- Number of Points: **0**
- Click the **OK** button

- Select the menu item **Edit > Select All**

- Select the menu item **Draw > Sweep Around Axis**

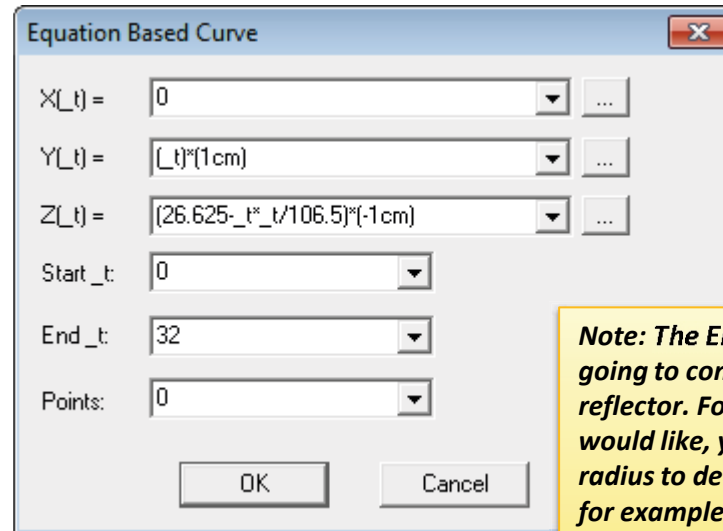
- Sweep axis: **Z**
- Angle of sweep: **360 deg**
- Draft angle: **0**
- Draft type: **Round**
- Number of segments: **0**
- Click the **OK** button

- To fit the view:

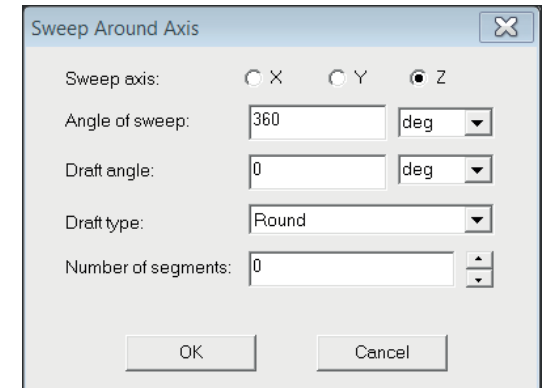
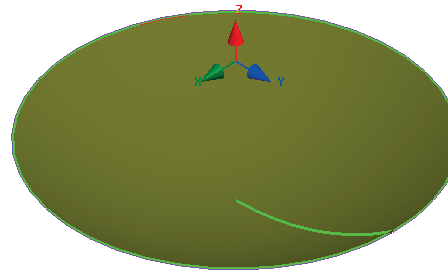
- Select the menu item **View > Fit All > Active View**. Or press the **CTRL+D** key

• Assign PEC

- Select the menu item **Edit > Select All**
- Select the menu item **HFSS-IE > Boundaries > Assign > Perfect E**
- Click the **OK** button



Note: The *End_t* intrinsic variable is going to control the radius of the reflector. For this example, if you would like, you can use a smaller radius to decrease the simulation time, for example set *End_T* = 15, and continue with the steps as described in this workshop.



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