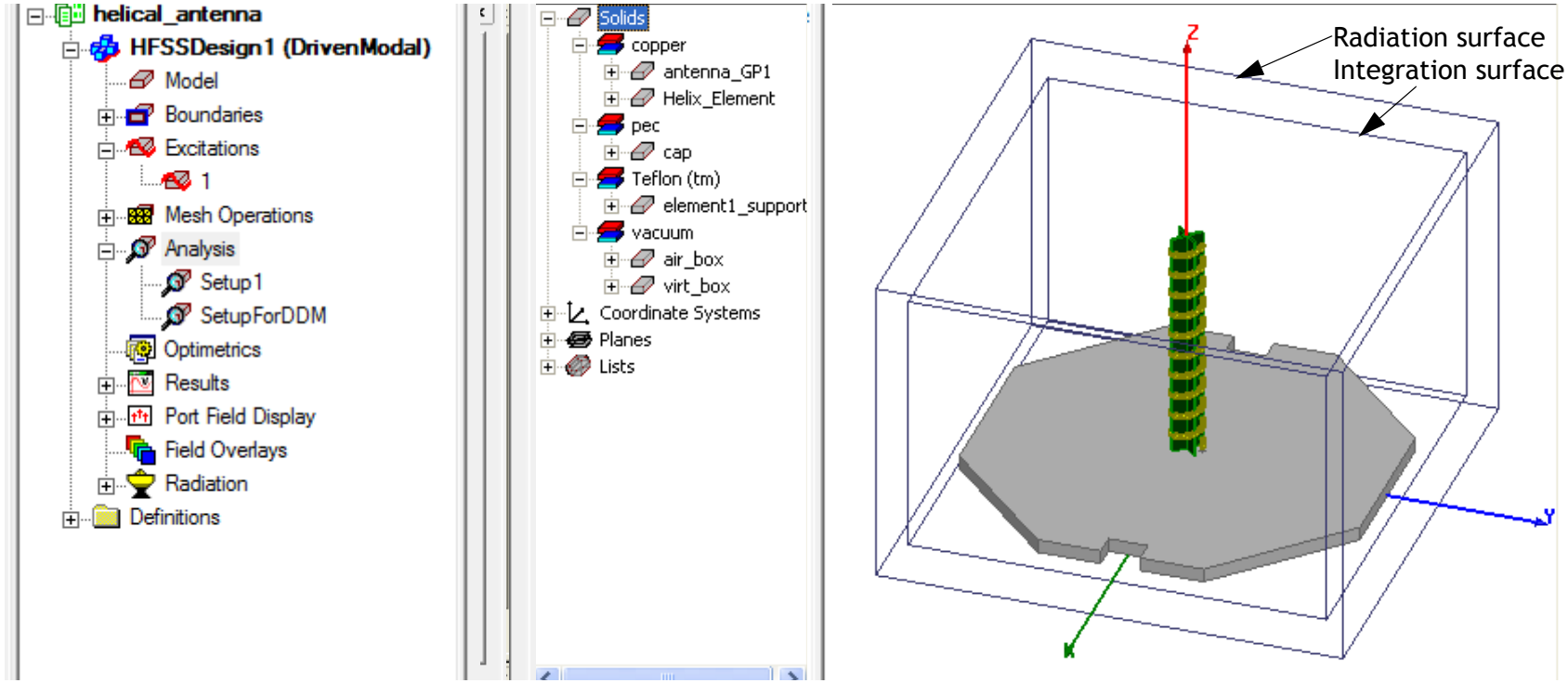
Helical Antenna

Description - A coax-fed helical antenna with a dielectric support on a finite ground plane makes up the design. The antenna is set up to run at 3.5 GHz. A smaller virtual object is defined as the integration surface for radiated field calculations. This is surrounded by an air box with a radiation boundary.*



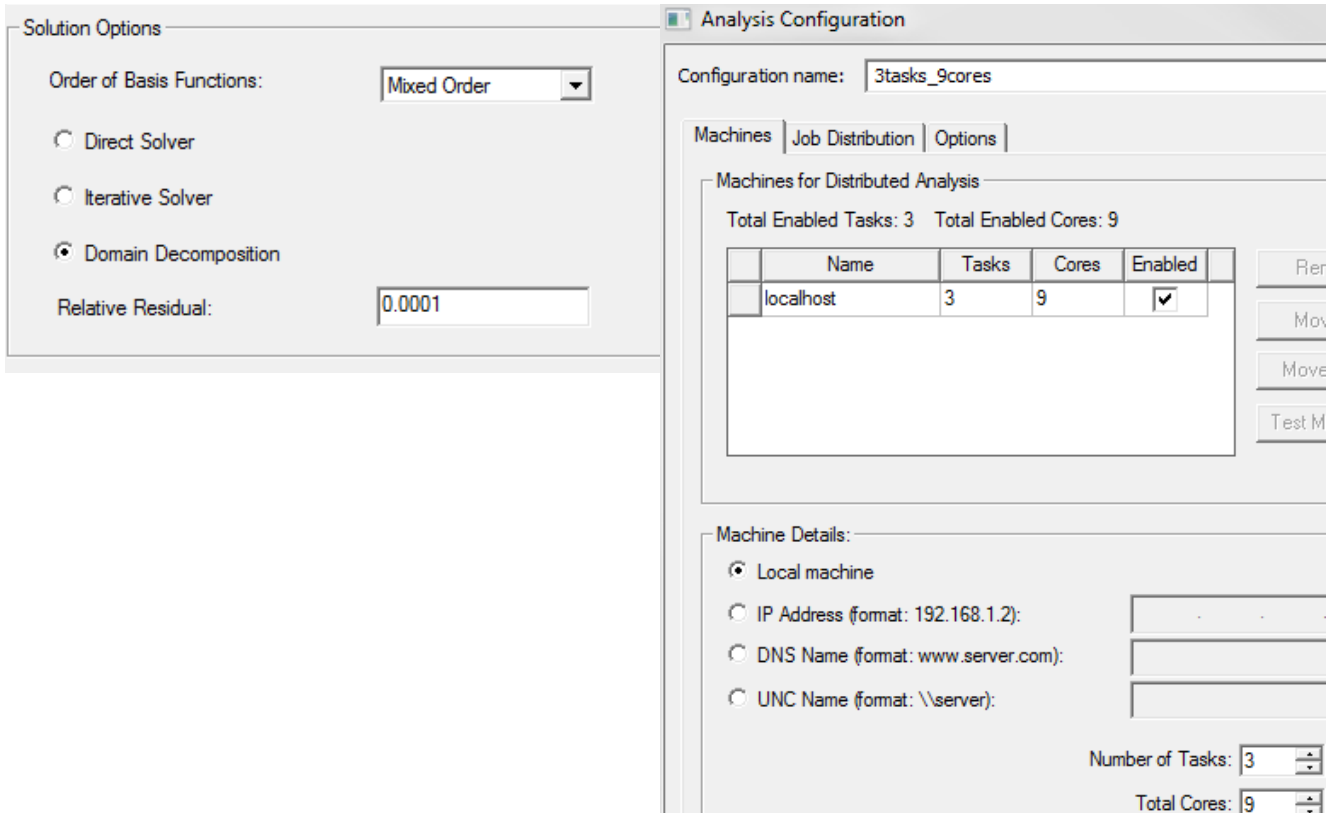
Model - the support is made of Teflon and the ground has thickness of 0.5 in. The coax port is internal and is capped by a conducting object. You can create a helix similar to this by using **Draw>User Defined Primitive>Sys-Lib>Segmented Helix.**

Note: To view a port or boundary, select the desired item in the Project Tree. It is then highlighted in the Model window and the properties are displayed in the Properties window. Selecting an object in the History tree will also displays its properties.

*For more information on using integration surfaces and creating sample antenna designs, see the antenna design kit at https://support.ansys.com/AnsysCustomerPortal/en_us/Downloads/Current+Release/Tools

HPC Analysis and Solution Setup

Solve this design at an adapt frequency of 3.5 GHz and use **Mixed Order** for **Order of Basis Functions**. This model has open air regions and the tightly spaced helix, so it is a good choice for mixed order. Since this is a large problem, you can enable **Domain Decomposition** so that HFSS automatically partitions the design into domains and solves them by separate processes. These processes can be executed on separate networked machines, allowing the problem to be solved with distributed memory. Before enabling solver domains, set up HPC on the **Analysis Configuration** window so that there are at least 3 tasks dedicated for this simulation. You can access the window from **Tools > Options > HPC and Analysis Options** and clicking the **Add** button.

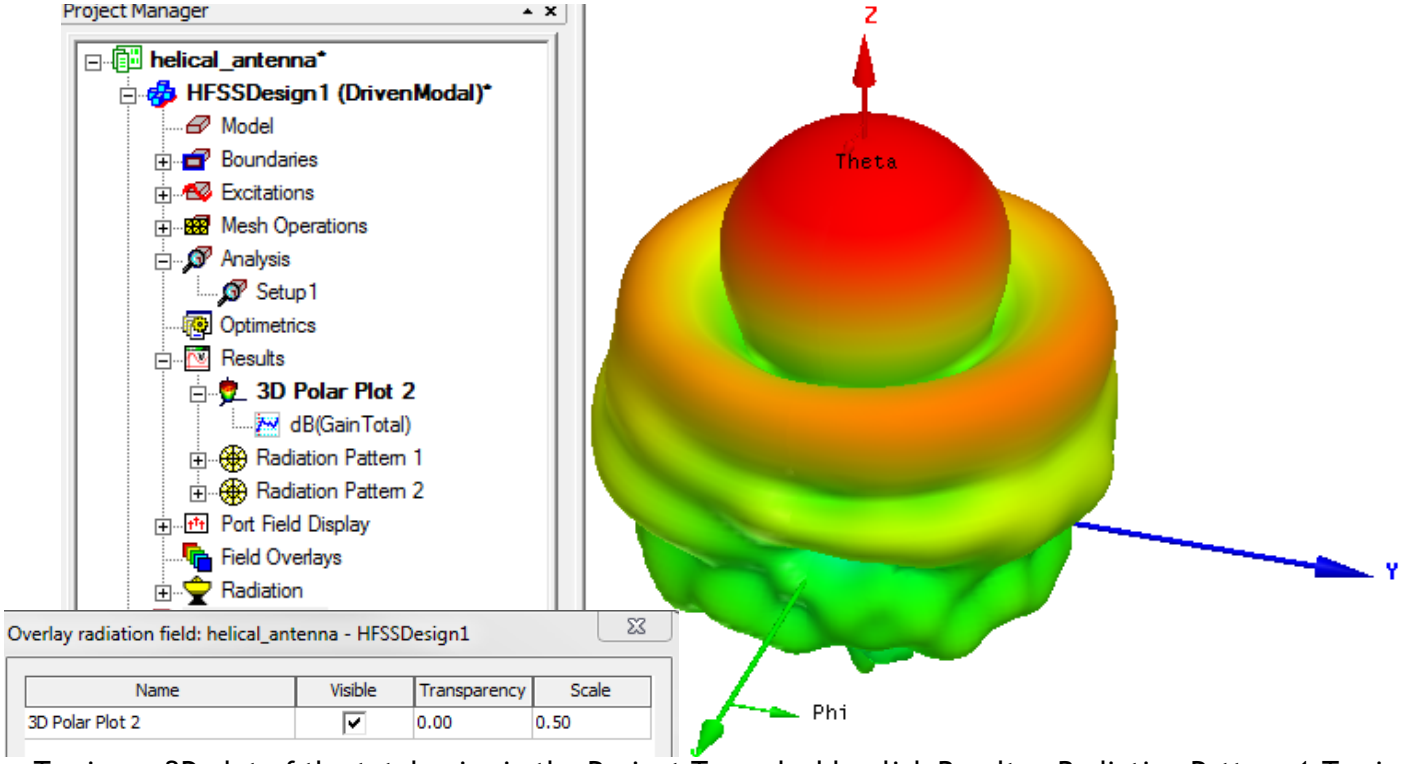


Note: For details see the **Enable Domain Decomposition** and **Setting HPC and Analysis Options** sections in the online help.

Results

After solving, you can view solution data by right-clicking on Setup1 and selecting **Profile** to display the **Solution** dialog. You also view the **Solution** tabs for **Convergence**, **Matrix Data**, and **Mesh Statistics**.

To view the 3D plot of the antenna gain, look in the Project Tree under Results and double-click on 3D Polar Plot 1. To overlay the 3D plot on the model, click **HFSS>Fields>Plot Fields>Radiation Field** to display the **Overlay radiation field** dialog. Check **Visible** for 3D Polar Plot 1, and set the transparency and scale as desired.



To view a 2D plot of the total gain, in the Project Tree, double-click Results - Radiation Pattern 1.To view a 2D plot of the circular polarization pattern for this antenna in the $\phi = 0^o$ cut, in the Project Tree, double-click Results - Radiation Pattern 2. You can add markers to the Radiation Pattern plots by right-clicking on the plot window and choosing **Marker>Add Marker**.