

RRF Antenna Editor

User Manual

Creating, calculating and studying conductive antennas and antenna structures

Rainbow RF Lab

Version 0.163.0

Manual language: English

Interface control names: English

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Purpose of the program

RRF Antenna Editor is intended for creating, editing, calculating and studying conductive antennas and antenna structures. You can start from a template or assemble geometry manually, set the frequency and installation conditions, add a feed point, run a physical OpenNEC calculation and inspect impedance, standing-wave ratio, radiation pattern and current distribution.

The program helps with these practical tasks:

- quickly create an initial dipole, vertical, loop or beam-antenna model;
- estimate starting dimensions for a target frequency;
- check matching at one frequency or over a selected frequency range;
- inspect the resistive and reactive components of input impedance;
- study horizontal and vertical radiation-pattern cuts;
- inspect the three-dimensional pattern and currents on conductors;
- compare geometry variants through repeatable edits and calculations;
- save a project for later work and export numerical results.

RRF Antenna Editor does not replace measurements on the completed antenna. Results depend on the entered geometry, ground, materials, segmentation and the selected calculation backend. A good SWR alone does not prove gain, efficiency, RF-field safety or regulatory compliance.

Initial window

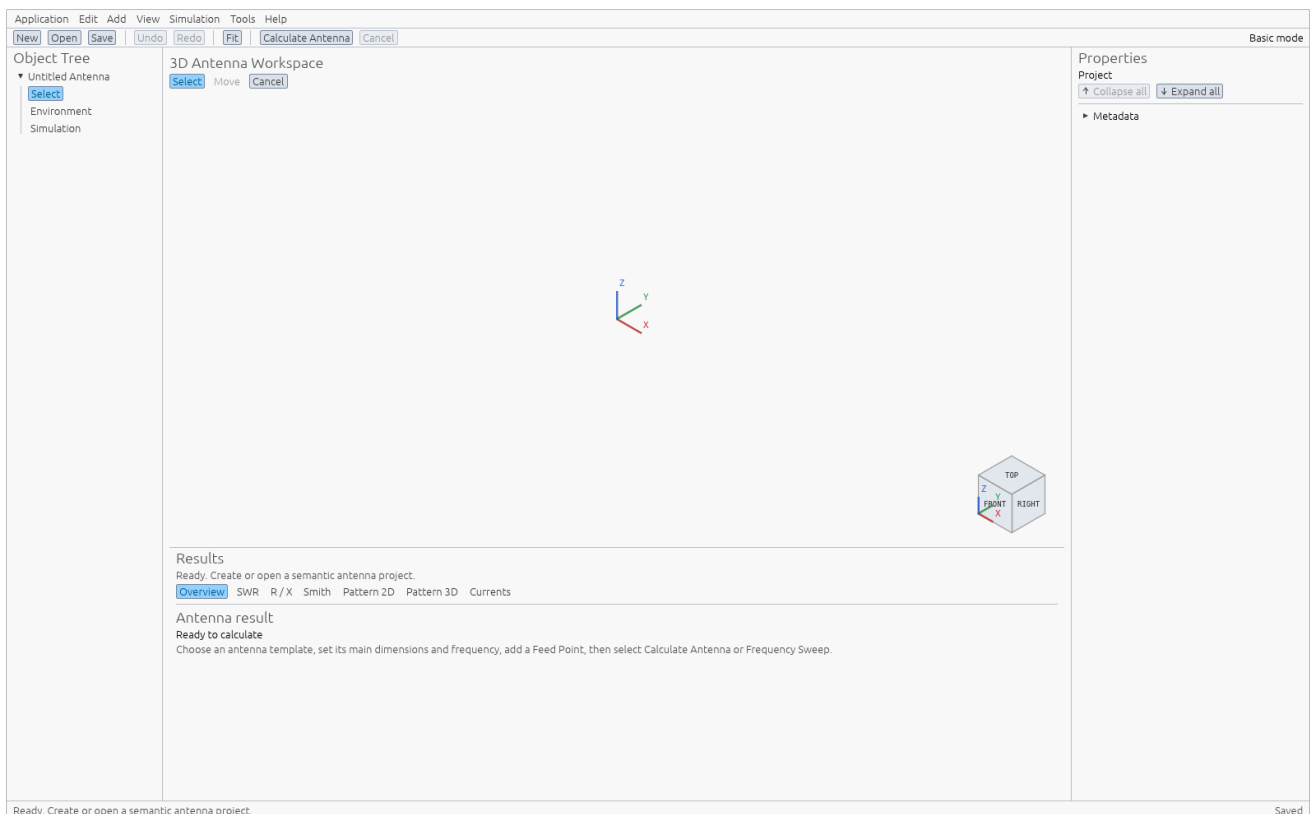


Figure 1. Initial RRF Antenna Editor window in Basic

The main window contains menus and quick actions, **Object Tree**, the central **3D Antenna Workspace**, the **Properties** panel, the lower **Results** or **Messages / Results** area and a status bar. **Basic mode** or **Engineer mode** at the right of the action bar always identifies the current interface presentation.

Basic and Engineer presentations

RRF Antenna Editor provides two presentations of the same project. **Basic** shows the commands normally needed for straightforward antenna design. **Engineer** exposes the complete engineering surface. They are not different file formats or copies of the antenna. Switching does not change geometry, frequency, feed point, **Undo** or **Redo** history, save state or an existing result.

Capability	Basic	Engineer
Initial presentation	Opens by default	Selected explicitly
Creation	New wizard and templates	The same wizard and templates plus Straight Wire
Editing	Main geometry, orientation, scaling, ground, frequency and Feed Point	All sections, materials, manual wires, exact segmentation and advanced actions
Calculation	Protected physical OpenNEC, single frequency or sweep	Backend choice, single calculation, sweep and optimization
Results	Overview, SWR, R / X, Smith, Pattern 2D, Pattern 3D, Currents	All results, exact tables, power, measurement history and optimization
Additional tools	Standard views and Fit All	Projection, Design or Solver view, exact scene table, Measure and export

Application menu in Basic

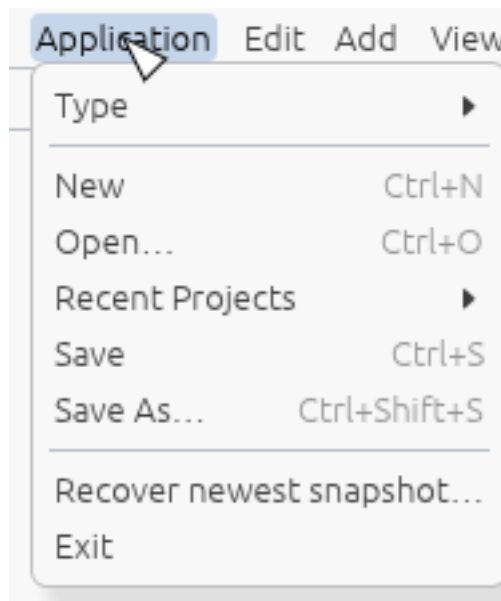


Figure 2. Application commands in Basic

Switching the presentation

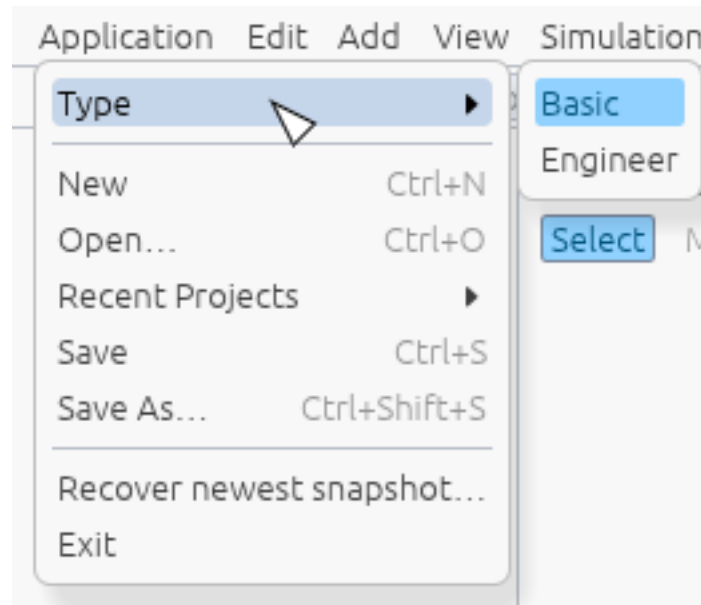


Figure 3. Selecting Basic or Engineer through Application Type

Choose **Application > Type > Engineer** to open the full surface. Choose **Application > Type > Basic** to return to the simplified workflow. Advanced sections are only hidden when you return to Basic. Data is not deleted or rounded, and the result is not recalculated.

Empty project in Engineer

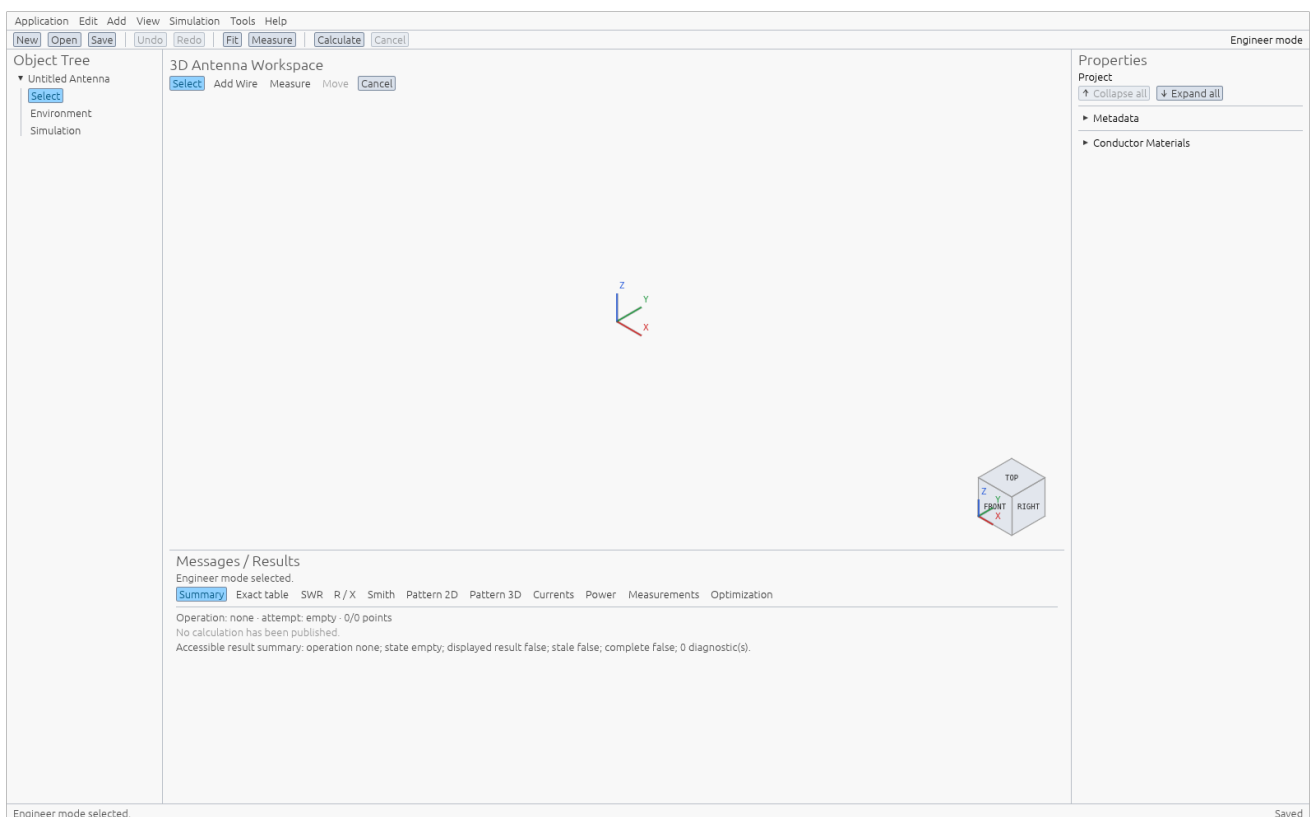


Figure 4. Full engineering surface for an empty project

Engineer adds **Add Wire**, **Measure**, advanced result tabs and additional properties. Use it for manual geometry, materials, detailed segmentation, exact numerical data, export or optimization.

Application menu in Engineer

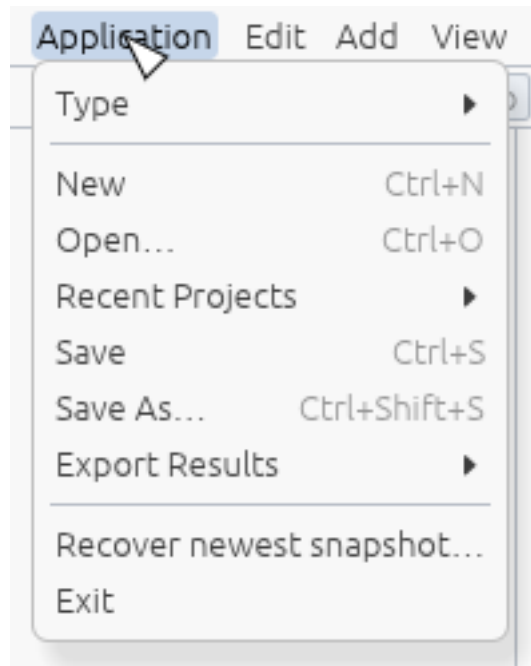


Figure 5. Application commands and Export Results in Engineer

The **Application** menu controls the project lifecycle in both presentations. Engineer also provides **Export Results**. The chosen presentation is not stored in `.rfaa`, so a new program launch starts in Basic again.

New antenna wizard

Application > New, the **New** button and Ctrl+N open the **New Antenna** wizard. The current project is not changed until you select **Create Antenna**. You can inspect alternatives, go back or close the wizard without losing current work.

Selecting a template

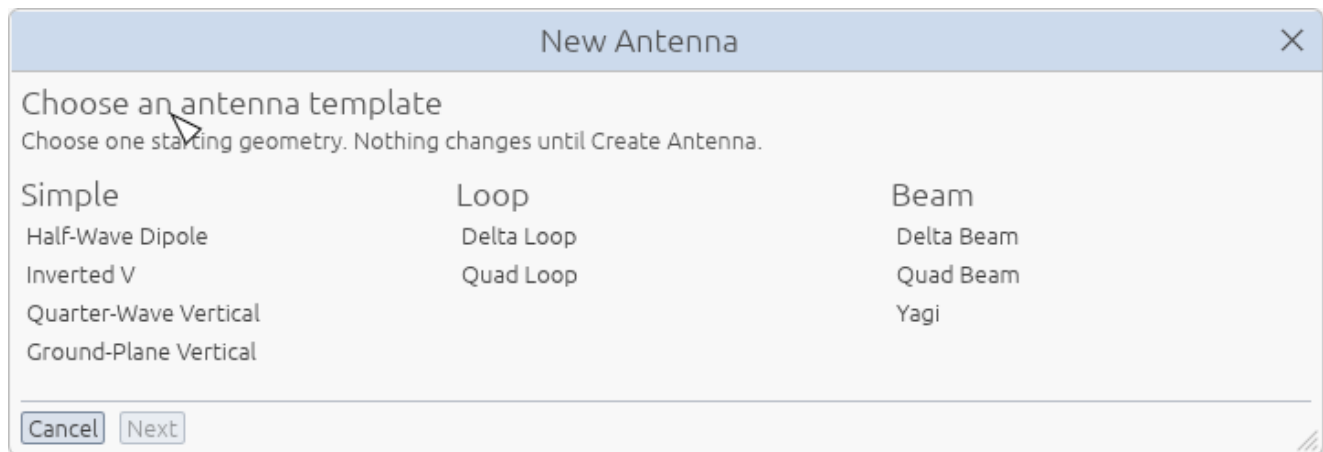


Figure 6. First wizard page with every template

The first page divides templates into three groups:

- **Simple** contains **Half-Wave Dipole**, **Inverted V**, **Quarter-Wave Vertical** and **Ground-Plane Vertical**;
- **Loop** contains **Delta Loop** and **Quad Loop**;
- **Beam** contains **Delta Beam**, **Quad Beam** and **Yagi**.

Select one name. **Next** becomes available after a selection. **Cancel** closes the wizard and leaves the current project unchanged.

Beam element count

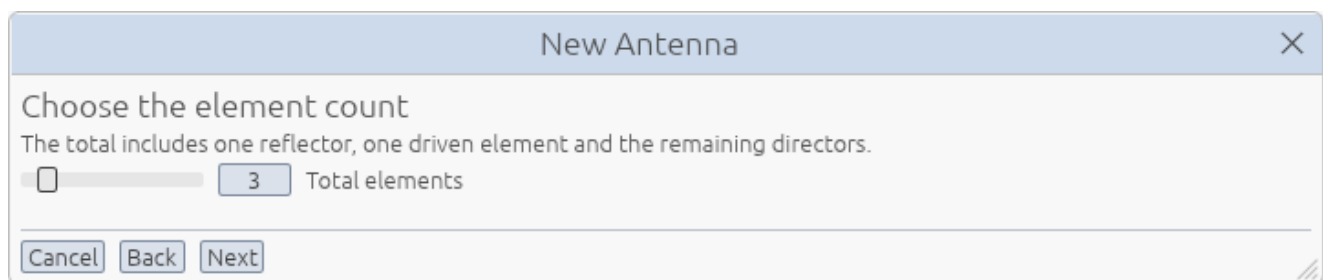
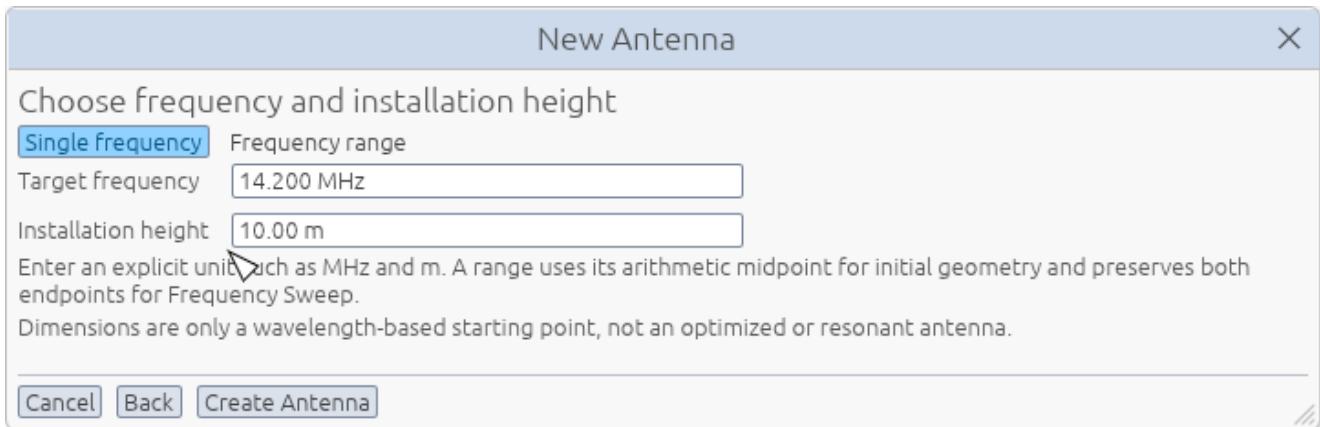


Figure 7. Total elements page for a multi-element antenna

For **Delta Beam**, **Quad Beam** and **Yagi**, the wizard shows **Choose the element count**. **Total elements** may be 2 through 12 and includes one reflector, one driven element and the remaining directors. The page is skipped for single-element antennas.

Back returns to the template page, **Next** proceeds to frequency and height, and **Cancel** stops creation.

Single frequency



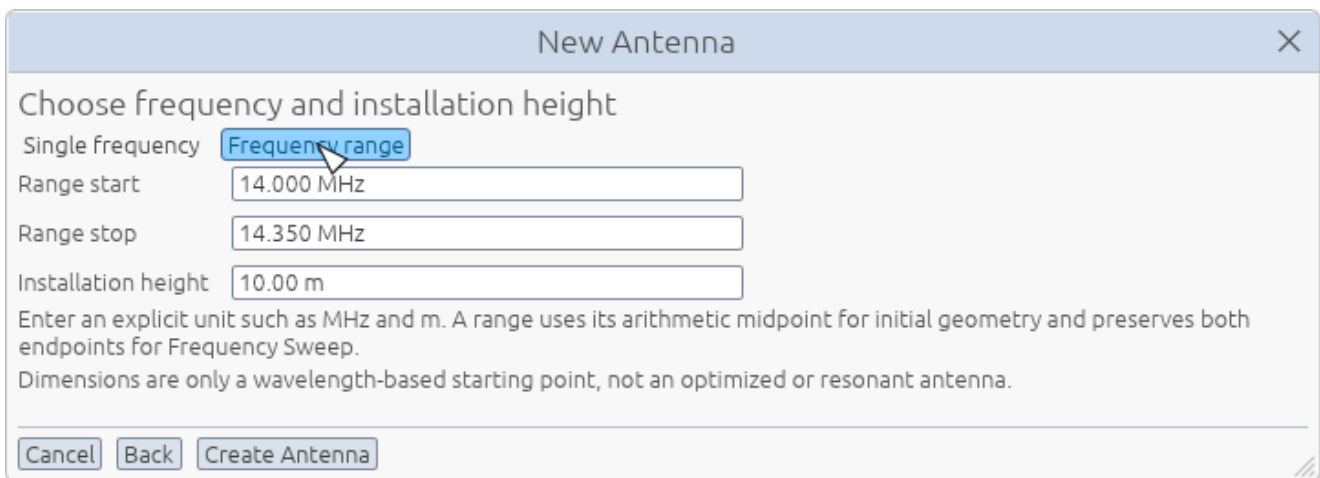
The screenshot shows the 'New Antenna' dialog box with the 'Single frequency' tab selected. The 'Frequency range' sub-tab is also active. The 'Target frequency' field contains '14.200 MHz' and the 'Installation height' field contains '10.00 m'. A mouse cursor is pointing at the 'Installation height' field. Below the fields, there is explanatory text: 'Enter an explicit unit such as MHz and m. A range uses its arithmetic midpoint for initial geometry and preserves both endpoints for Frequency Sweep. Dimensions are only a wavelength-based starting point, not an optimized or resonant antenna.' At the bottom, there are three buttons: 'Cancel', 'Back', and 'Create Antenna'.

Figure 8. Frequency and height page in Single frequency mode

Choose **Single frequency** when the starting model has one operating frequency. Enter a value with an explicit unit in **Target frequency**, for example 14.200 MHz. Enter a non-negative **Installation height**, for example 10.00 m.

Initial dimensions are wavelength-based estimates. The wizard does not run OpenNEC, optimize the design or guarantee resonance, SWR or gain.

Frequency range



The screenshot shows the 'New Antenna' dialog box with the 'Frequency range' tab selected. The 'Range start' field contains '14.000 MHz', the 'Range stop' field contains '14.350 MHz', and the 'Installation height' field contains '10.00 m'. A mouse cursor is pointing at the 'Frequency range' sub-tab. Below the fields, there is explanatory text: 'Enter an explicit unit such as MHz and m. A range uses its arithmetic midpoint for initial geometry and preserves both endpoints for Frequency Sweep. Dimensions are only a wavelength-based starting point, not an optimized or resonant antenna.' At the bottom, there are three buttons: 'Cancel', 'Back', and 'Create Antenna'.

Figure 9. Frequency and height page in Frequency range mode

Choose **Frequency range** when you plan a sweep. Enter increasing **Range start** and **Range stop** values. The midpoint supplies the starting geometry and active frequency. Both exact endpoints are transferred to the next **Frequency Sweep** window.

Invalid text stays visible with a diagnostic. Correct the unit, sign or bound order and select **Create Antenna** again.

Wizard result

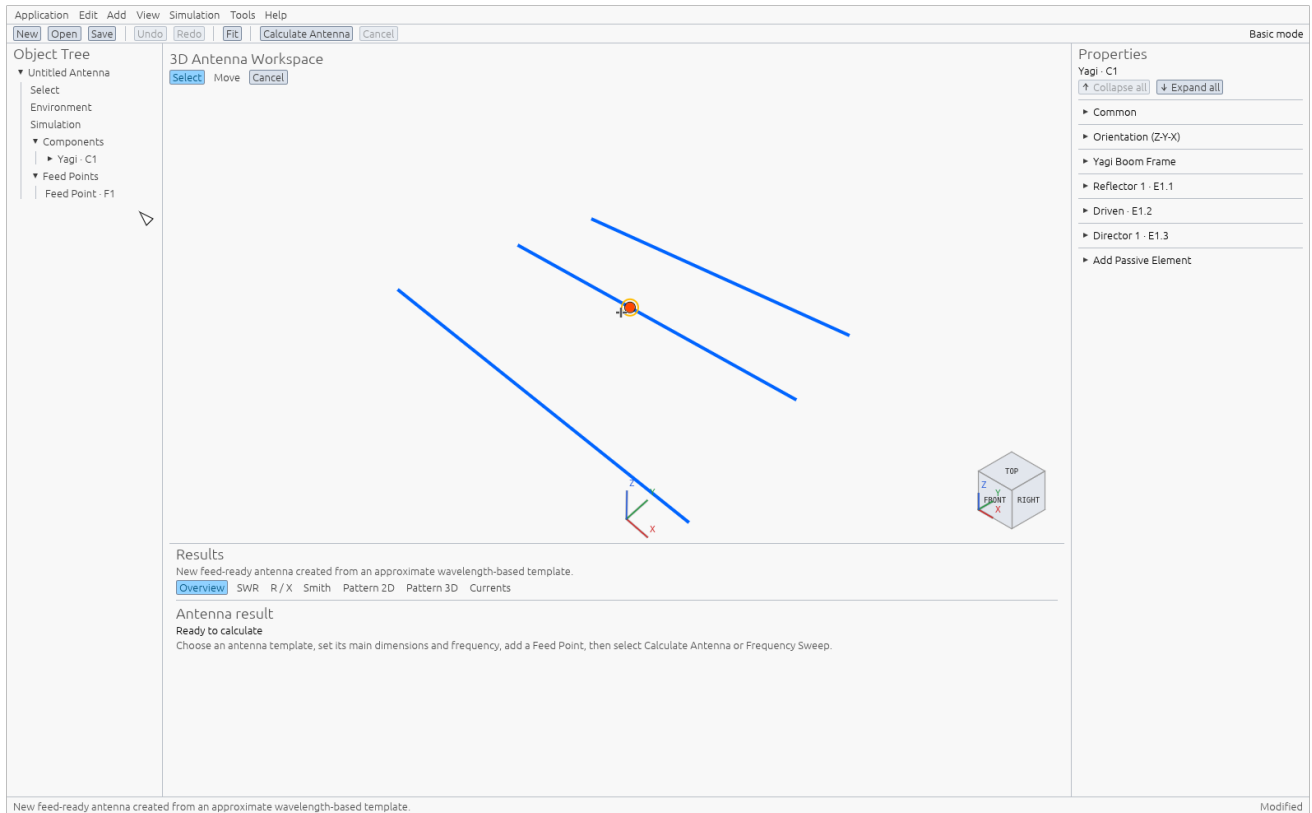


Figure 10. Wizard-created Yagi with a Feed Point and starting dimensions

Create Antenna produces an unsaved project with the selected antenna, an active frequency, one enabled 1 V feed point and **Real Ground** initially set to relative permittivity 13 and conductivity 0.005 S/m. These ground values are editable starting assumptions, not measured soil data. Change dimensions and ground values in **Properties**. For a range, open **Simulation > Frequency Sweep...** and verify the transferred bounds.

If the previous project was modified, the program first asks for **Save**, **Discard** or **Cancel**. **Cancel** returns to the previous project. A new candidate that fails validation also leaves current work untouched.

Projects and edit history

RRF Antenna Editor projects use the `.rfaa` extension. A file stores the antenna, properties, materials, environment and calculation settings. It does not store the Basic or Engineer presentation, expanded panels, camera position or temporary windows.

Main commands are:

- **Application > Open...** or Ctrl+O validates and opens an `.rfaa` file;
- **Recent Projects** reopens a recent file;
- **Save** or Ctrl+S writes the current project;
- **Save As...** or Ctrl+Shift+S selects another file;
- **Exit** closes the program after an unsaved-change prompt;
- **Recover newest snapshot...** offers separate recovery of the newest available snapshot.

Modified appears at the lower right while editing. **Saved** appears after a successful save. If writing fails, the previous file is not treated as successfully replaced and the project remains modified.

Edit menu

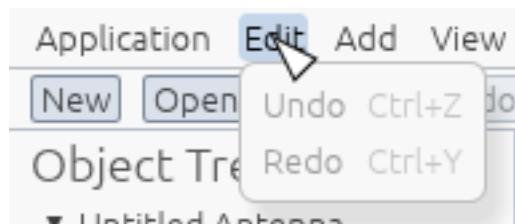


Figure 11. Undo and Redo commands

Every accepted edit uses the history. **Edit > Undo** or Ctrl+Z reverses the last action. **Edit > Redo** or Ctrl+Y reapplies it. The action name in the menu helps confirm what will be changed.

An invalid field value stays visible for correction and does not replace the last valid value. After an antenna edit, an older result may remain available as **Stale**, but it is no longer current.

Templates and starting geometry

In addition to the **New** wizard, use **Add > Antenna Templates** to add ready-made geometry to the current project. This is useful when adding another component or assembling a more complex model manually. Adding a template does not change the current project's electromagnetic-ground settings.

Add menu in Basic

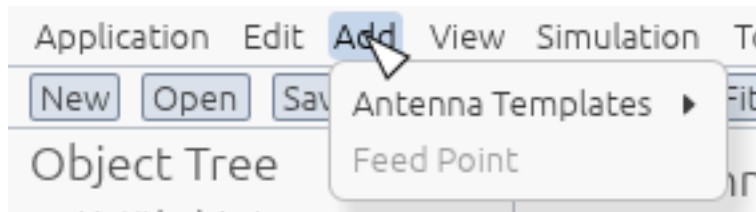


Figure 12. Add menu with templates and Feed Point

Simple antennas

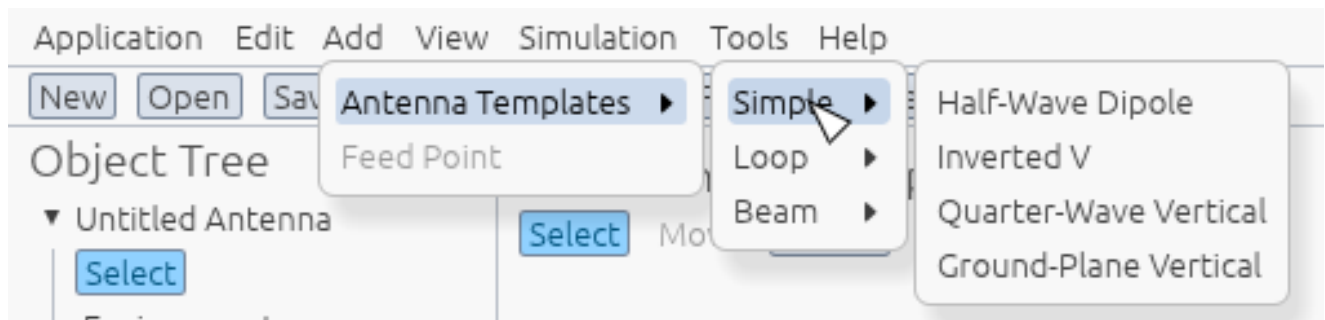


Figure 13. Simple group in Basic

Half-Wave Dipole creates a straight dipole, **Inverted V** creates a dipole with an included angle, **Quarter-Wave Vertical** creates a vertical radiator, and **Ground-Plane Vertical** adds a radial system. The inserted component appears in **Object Tree**, and its properties open on the right.

Loop antennas

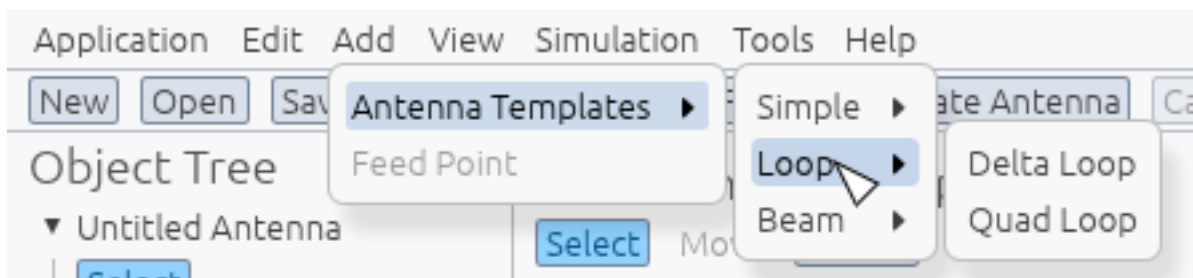


Figure 14. Loop group in Basic

Delta Loop creates a triangular loop and **Quad Loop** a square loop. Check the perimeter, orientation, height and feed location before calculation.

Beam antennas

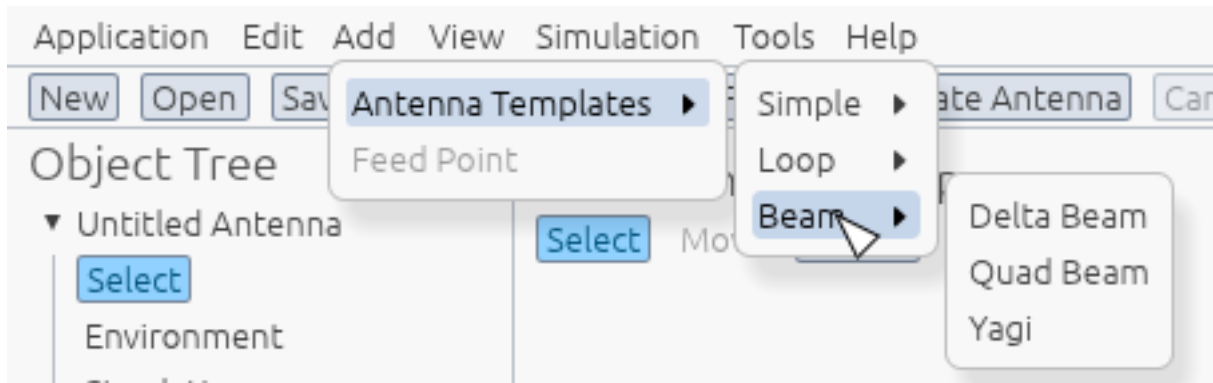


Figure 15. Beam group in Basic

Delta Beam and **Quad Beam** use loop elements along a boom. **Yagi** uses straight elements. Menu commands add an initial construction; the **New** wizard is more convenient when you also need an element count, frequency and height.

Manual wire in Engineer

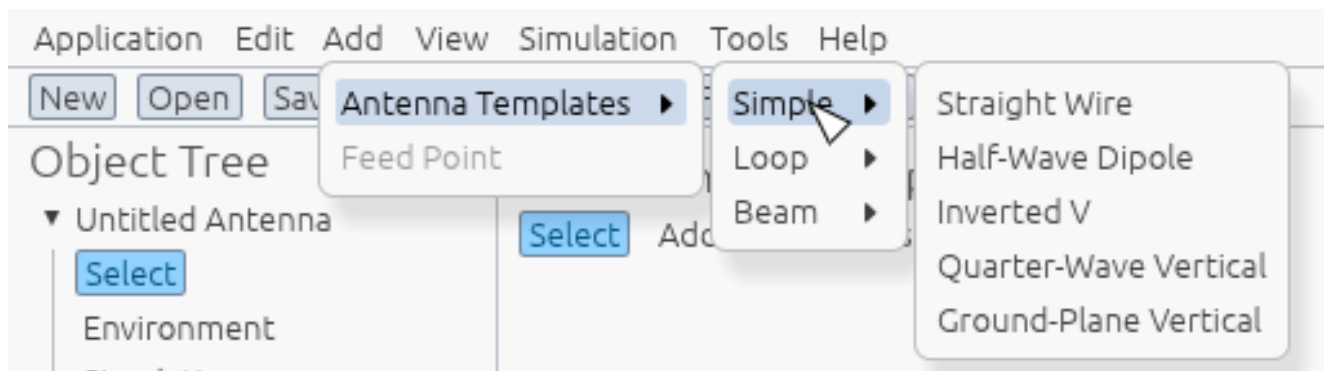


Figure 16. Simple group in Engineer with Straight Wire

Engineer adds **Straight Wire** to the **Simple** group. After selecting it, click the start and end positions in the workspace. To edit the raw wire, choose **Select** and drag the visible **S** or **E** square. There are no separate buttons for start and end markers.

Object Tree and Properties

Object Tree shows project composition. Select a node to open its **Properties**. Short references identify objects: **C#** is a component, **E#.#** a component element, **M#** a material, **F#** a feed point, **L#** a load, **J#** a junction, **P#** a parameter and **G#** a group.

These short numbers reflect current order. A number may change after deletion, so do not use it as a permanent external identifier.

Main properties in Basic



Figure 17. Expanded ordinary Half-Wave Dipole properties in Basic

Collapse all and **Expand all** collapse or expand the available sections. Basic retains the fields normally needed for design: name, material, orientation, main dimensions, construction settings, active frequency and electrical scaling.

Orientation (Z-Y-X) rotates the antenna around the axes in sequence. Values use the angle unit selected in **Settings**. **Electrical Size Adjustment** scales geometry for a frequency or relative size. It is a geometric operation, not a guarantee of resonance.

Project properties in Engineer

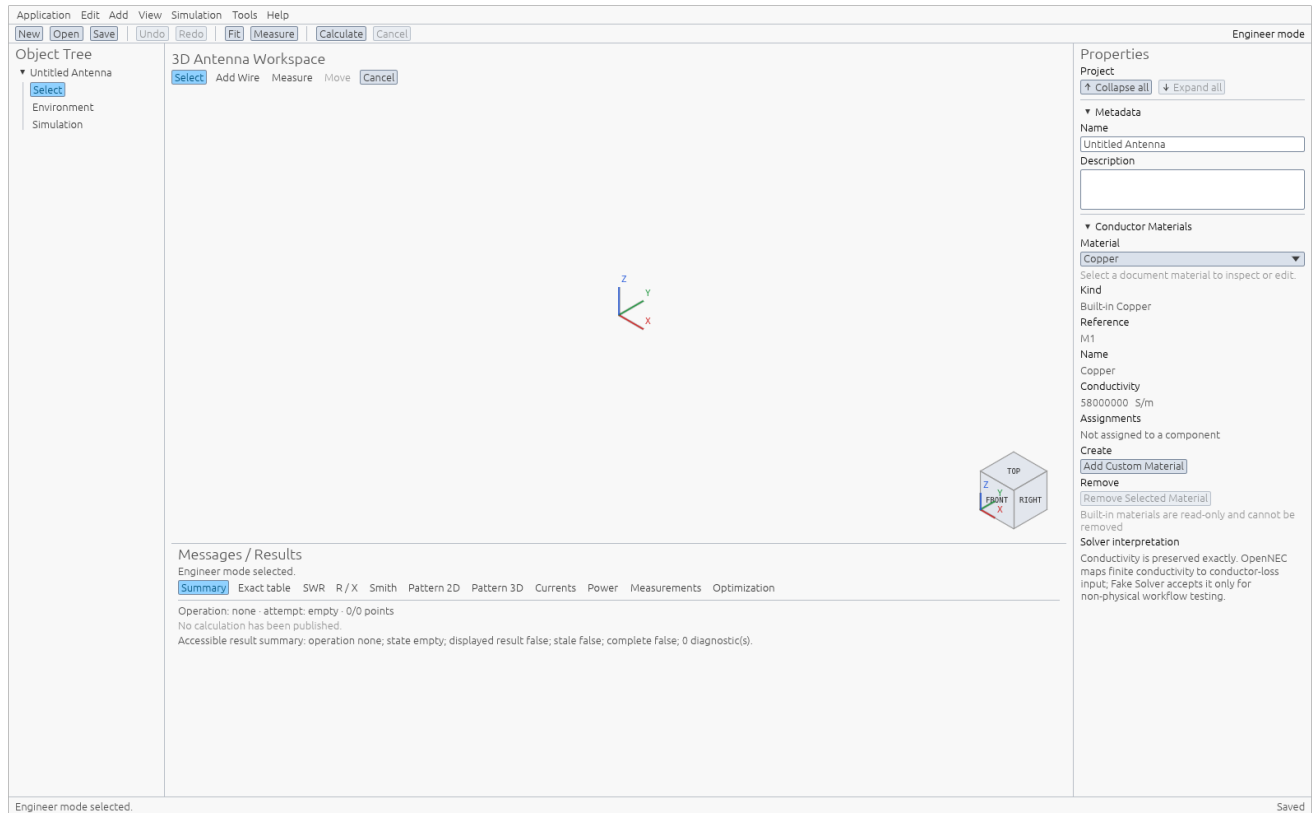


Figure 18. Project metadata and materials in Engineer

At the project node, edit **Name** and **Description**. **Conductor Materials** shows materials and their parameters. **Add Custom Material** adds a material; **Remove** deletes the selected material when the current model no longer requires it. Verify conductivity and other values against a reliable source.

Environment

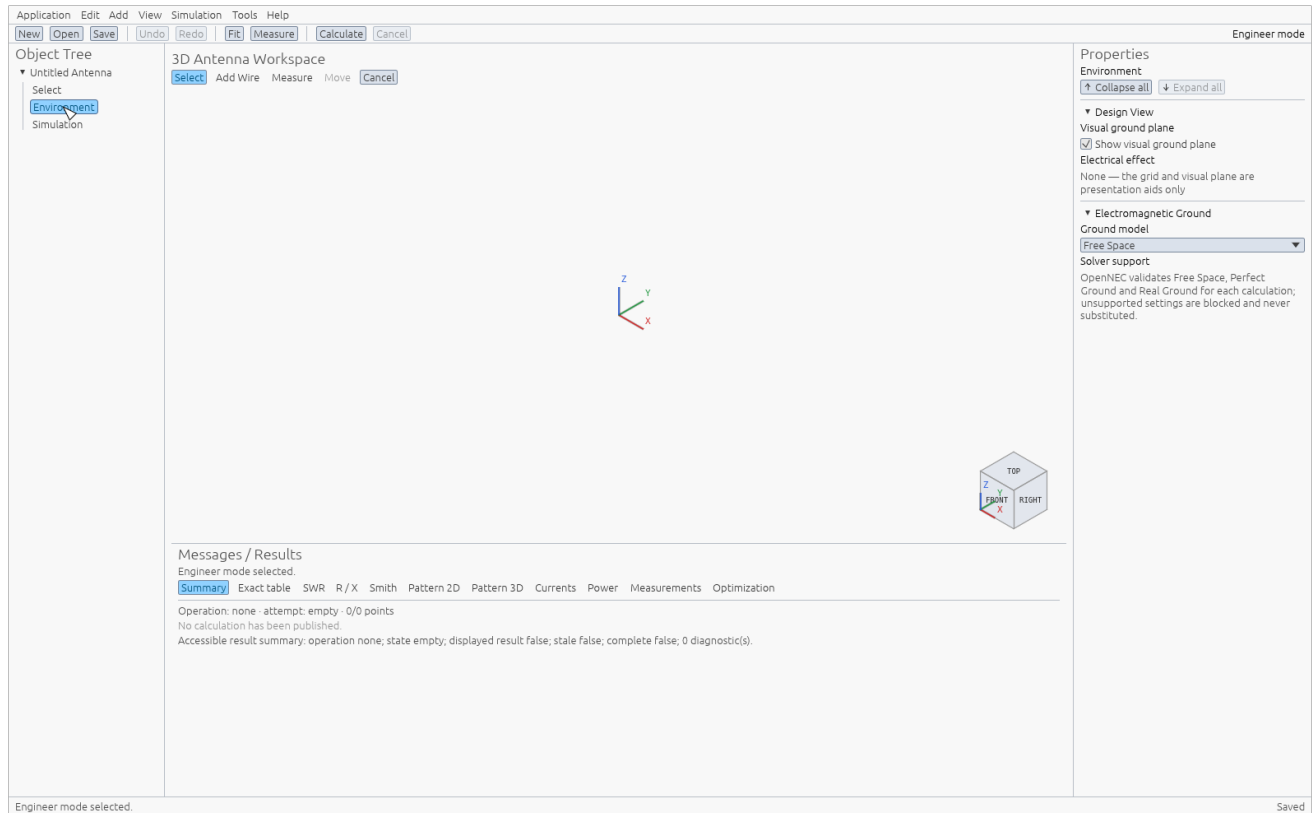


Figure 19. Environment properties in Engineer

The **Environment** node controls the ground plane and ground model. **Free Space** calculates without ground. Other choices need valid ground parameters. If results appear physically implausible, check this section together with antenna height and orientation.

Simulation parameters

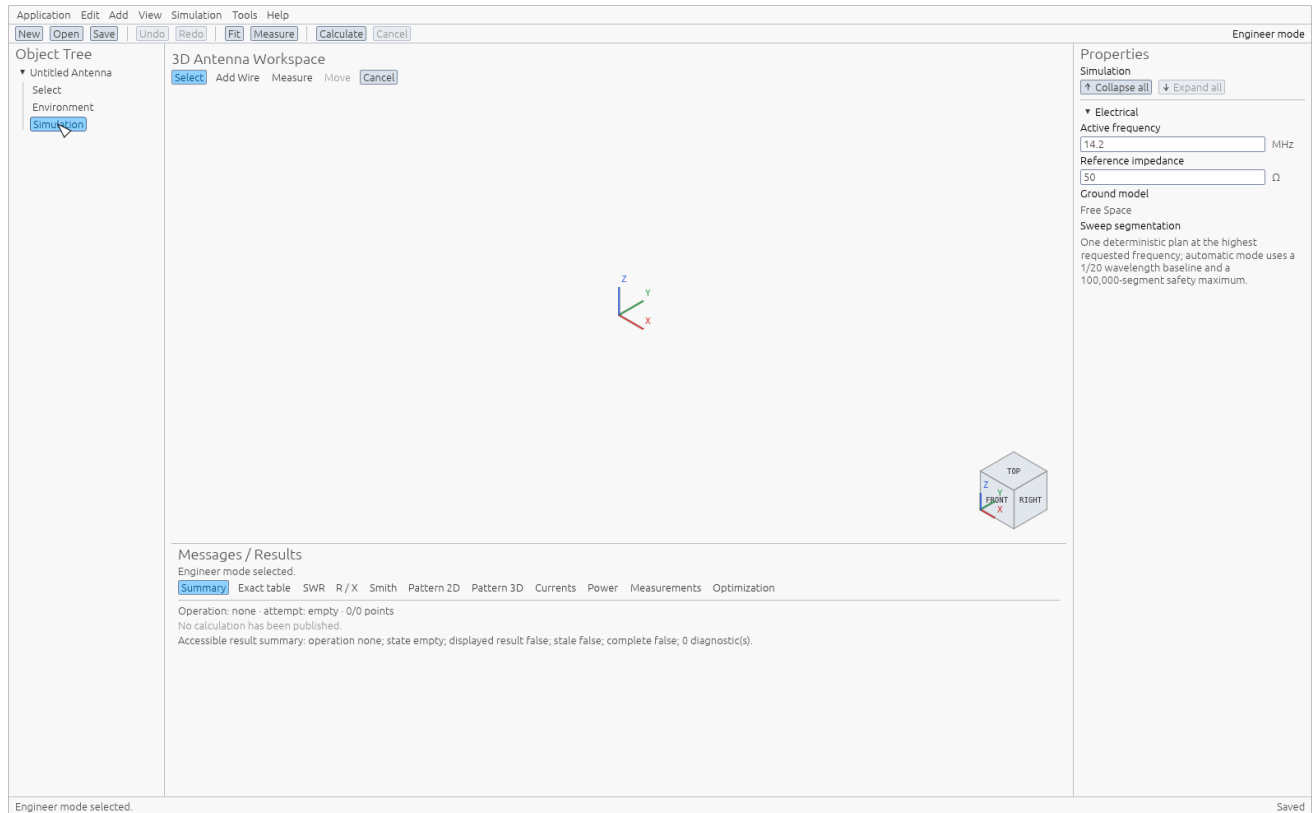


Figure 20. Simulation properties in Engineer

The **Simulation** node contains **Active frequency**, **Reference impedance**, the ground model and free-space settings. Frequency and impedance must be positive and appropriate to the task. Reference impedance affects SWR and the Smith chart but not antenna geometry.

Complete component card

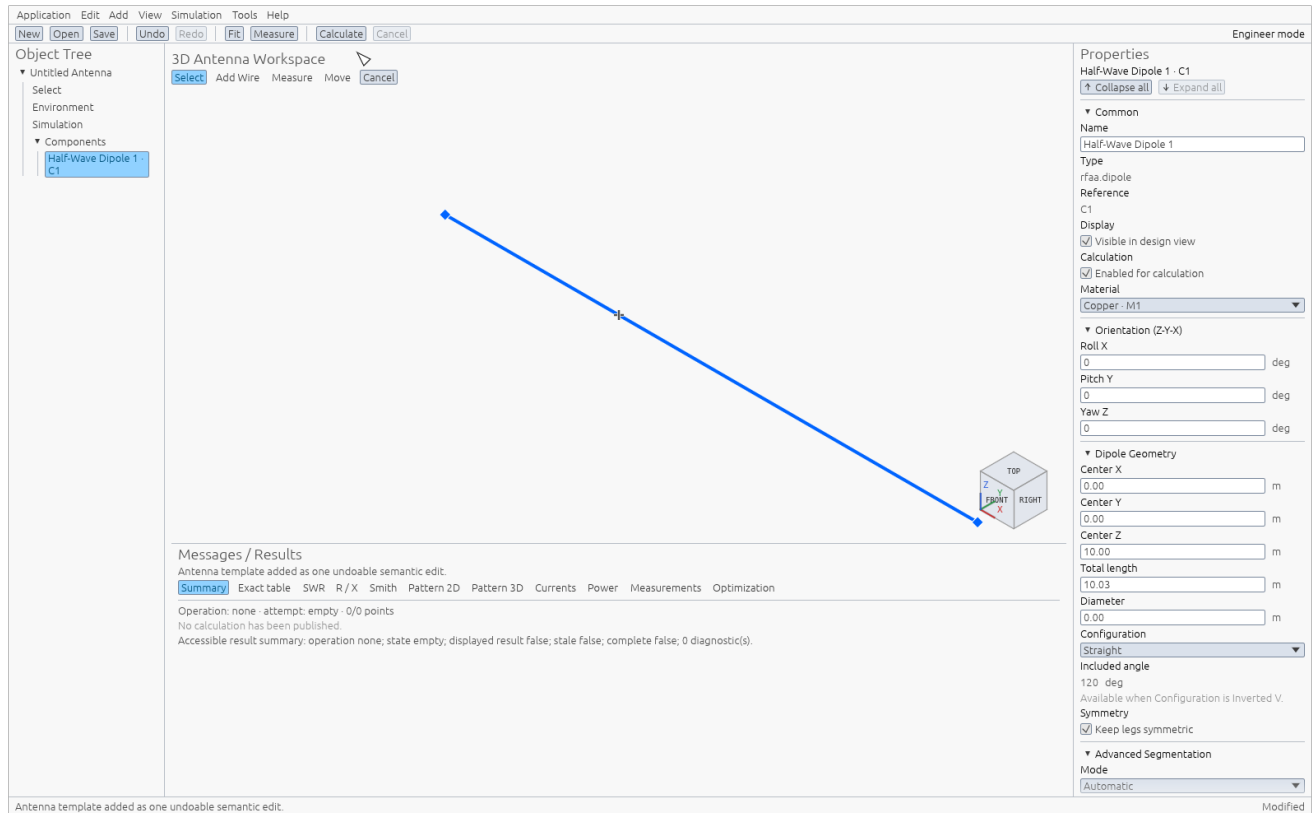


Figure 21. Expanded dipole properties in Engineer

Engineer exposes additional sections such as **Advanced Segmentation** and solver parameters. Change segmentation only when you understand its effect on accuracy and runtime. A coarse mesh can distort the result, while excessive segments increase calculation time.

Yagi element properties

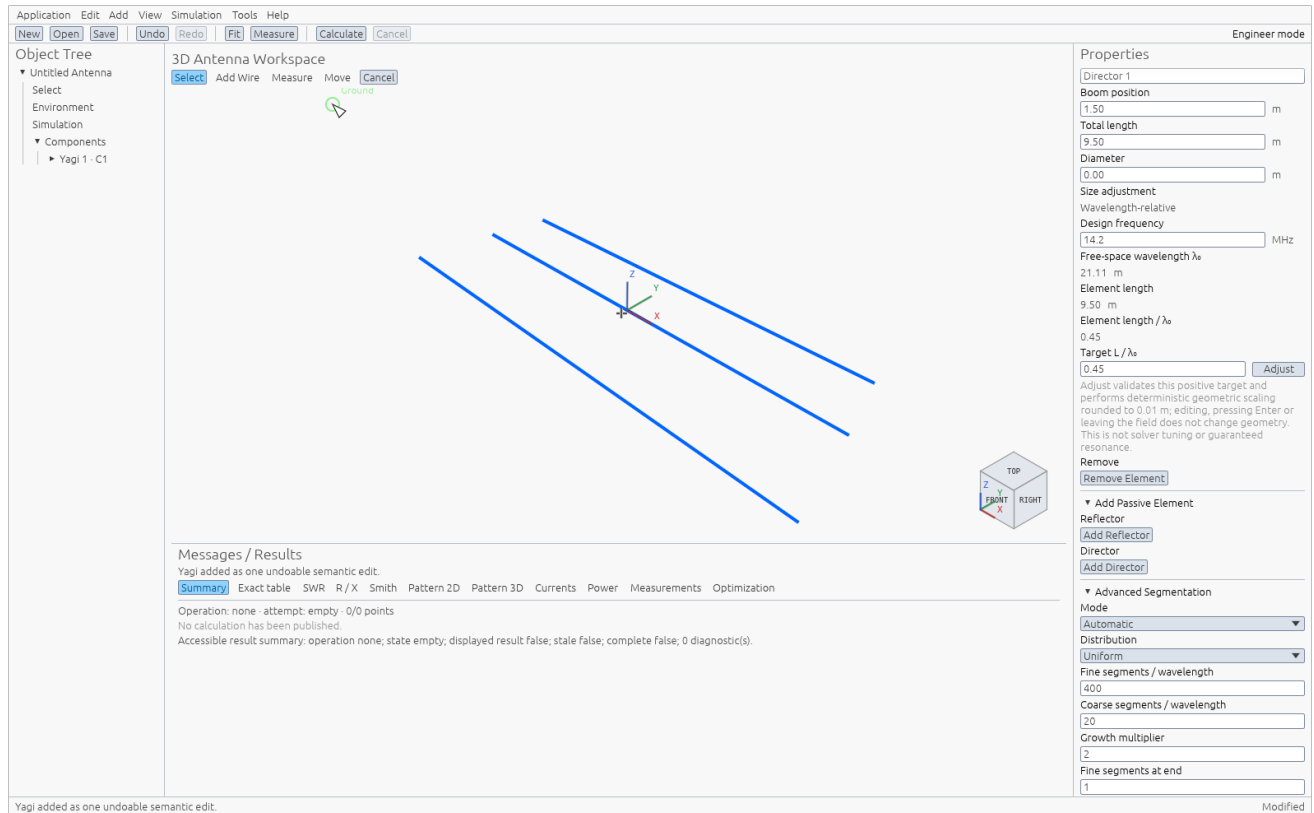


Figure 22. Yagi director properties and passive-element actions

A Yagi element has boom position, length, diameter, electrical scaling, deletion and passive-element insertion actions. Every geometry edit makes the previous result stale.

Workspace and views

Use **3D Antenna Workspace** to select geometry, change the view and check element placement. The colored axis indicator shows X, Y and Z, while the cube at the lower right helps orient the camera.

Standard views in Basic

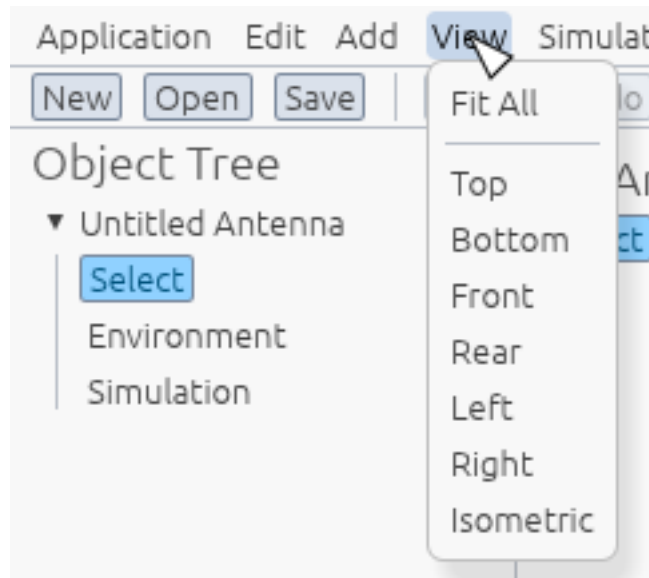


Figure 23. Fit All and standard view commands

View > Fit All or **Fit** scales the view to include the entire antenna. **Top**, **Bottom**, **Front**, **Rear**, **Left**, **Right** and **Isometric** set reproducible viewing directions.

Advanced views in Engineer

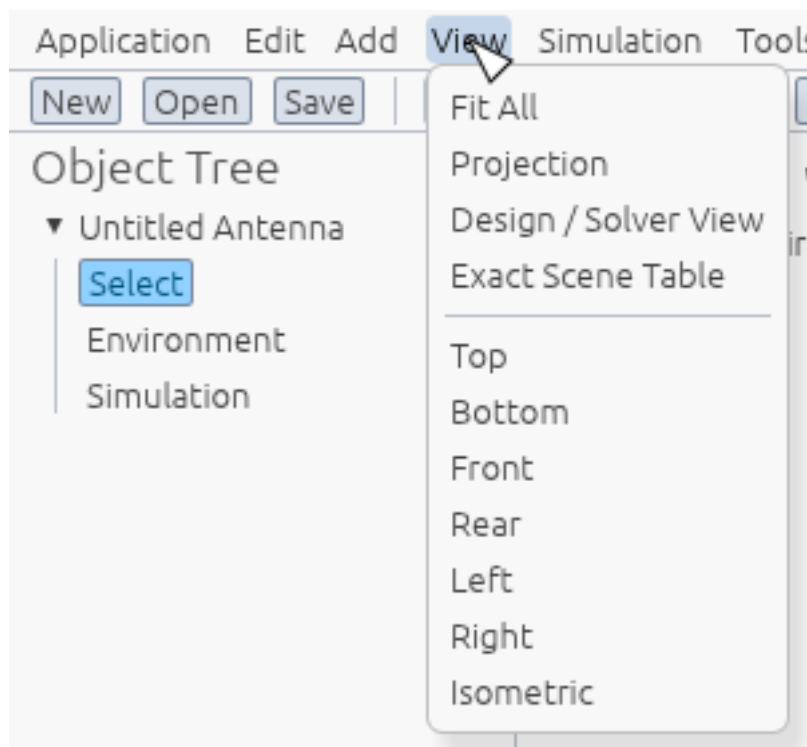


Figure 24. Projection Design Solver View and Exact Scene Table

In Engineer, **Projection** changes the projection method. **Design / Solver View** switches between editable geometry and the solver-ready representation. **Exact Scene Table** is an exact textual alternative to the scene. Use it to check coordinates instead of estimating positions from pixels.

Selected dipole

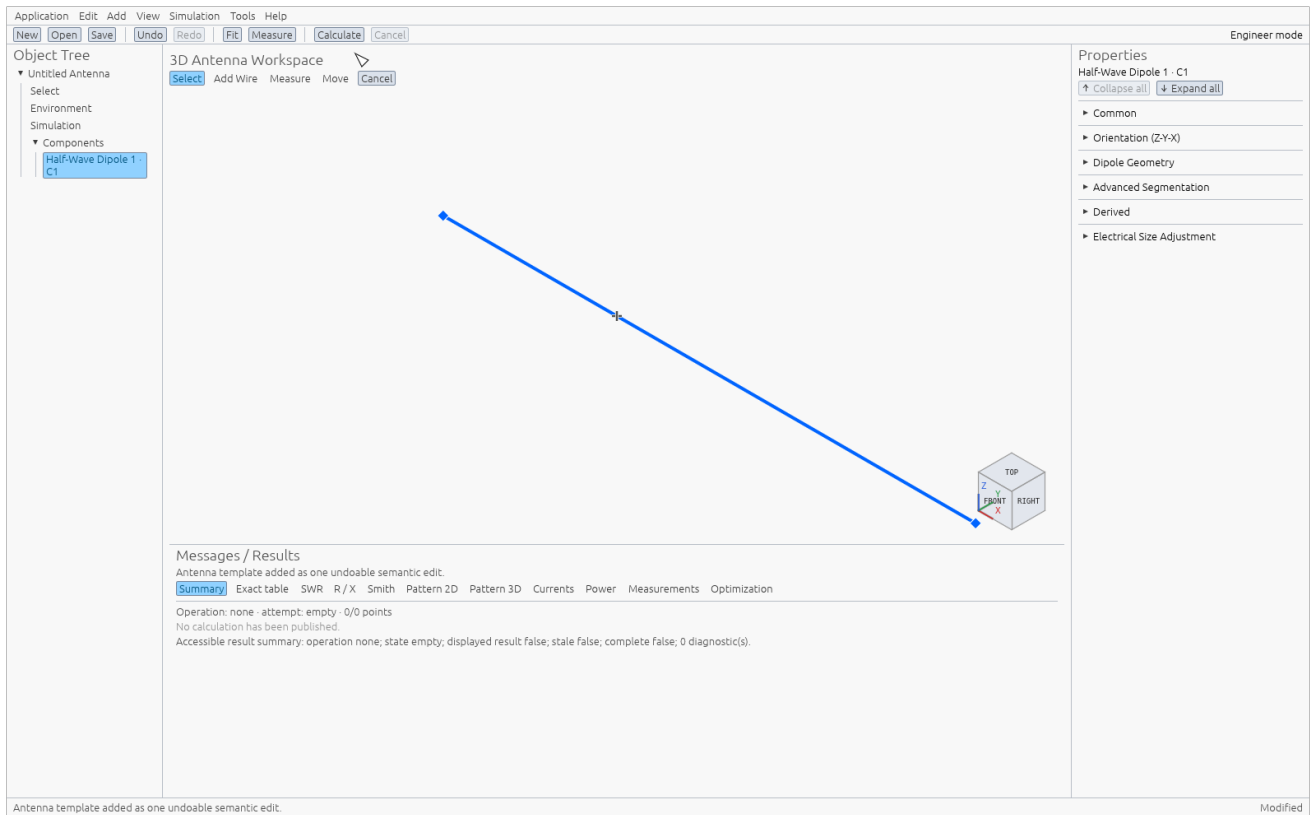


Figure 25. Dipole with visible geometry handles

Blue identifies selected geometry. Template edits use semantic properties and visible handles. Before dragging, confirm which component is selected in **Object Tree**.

Feed point

A physical calculation requires an enabled feed point on a supported conductive component. The **New** wizard adds one automatically. Add one manually for a template inserted through **Add**.

1. Select a conductive component in **Object Tree** or the workspace.
2. Choose **Add > Feed Point**.
3. Check the new node under **Feed Points**.
4. To move it, keep **Select** active and drag the orange marker onto the required point of any visible conductor.
5. Read the live percentage above the green target ring. Hold Ctrl to snap the proposed position to the nearest 5 %, or leave Ctrl released for continuous placement, then release the marker.
6. In **Properties > Placement**, check the target component and conductor.

For a normalized target, enter an exact value such as 25 or 25 % in **Position**, then press Enter or leave the field to commit it.

The move is one project edit, so **Undo** restores the previous attachment. If no target ring appears, release does not change the project; rotate or zoom the workspace until the intended conductor is visible and try again.

A named attachment is shown as **Named attachment** because it does not define one conductor percentage. Drag it to a conductor once to create a normalized position, then use the exact field. Empty, malformed or input outside the 0 to 100 range stays visible for correction and does not replace the current attachment.

Feed Point remains unavailable until exactly one supported component is selected. If it is disabled, select the component rather than the project, environment or simulation node.

Feed Point in Basic

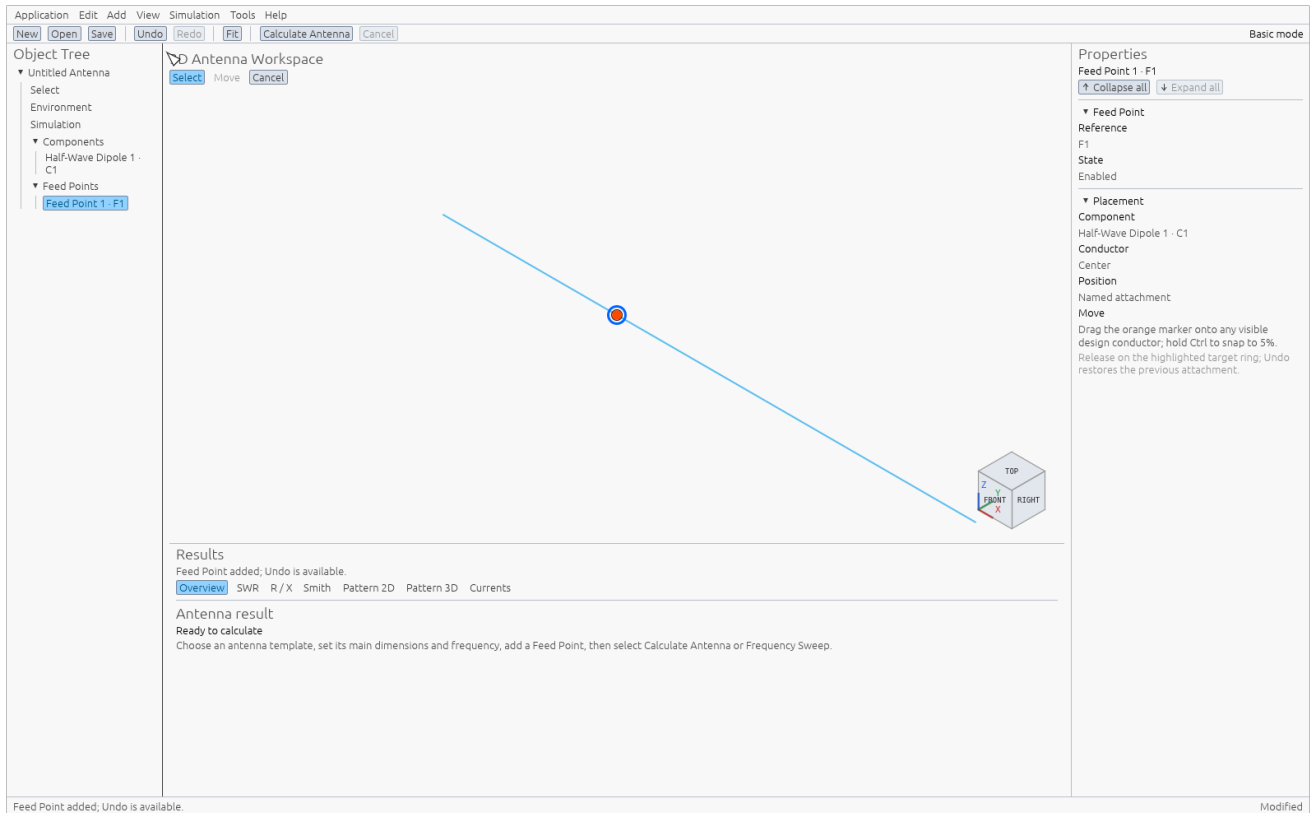


Figure 26. Orange Feed Point marker in Basic

The feed point is a saturated orange circle with a contrasting ring. A selected feed point also has a blue ring. The marker remains visible on a light background and does not rely on color alone.

Feed Point in Engineer

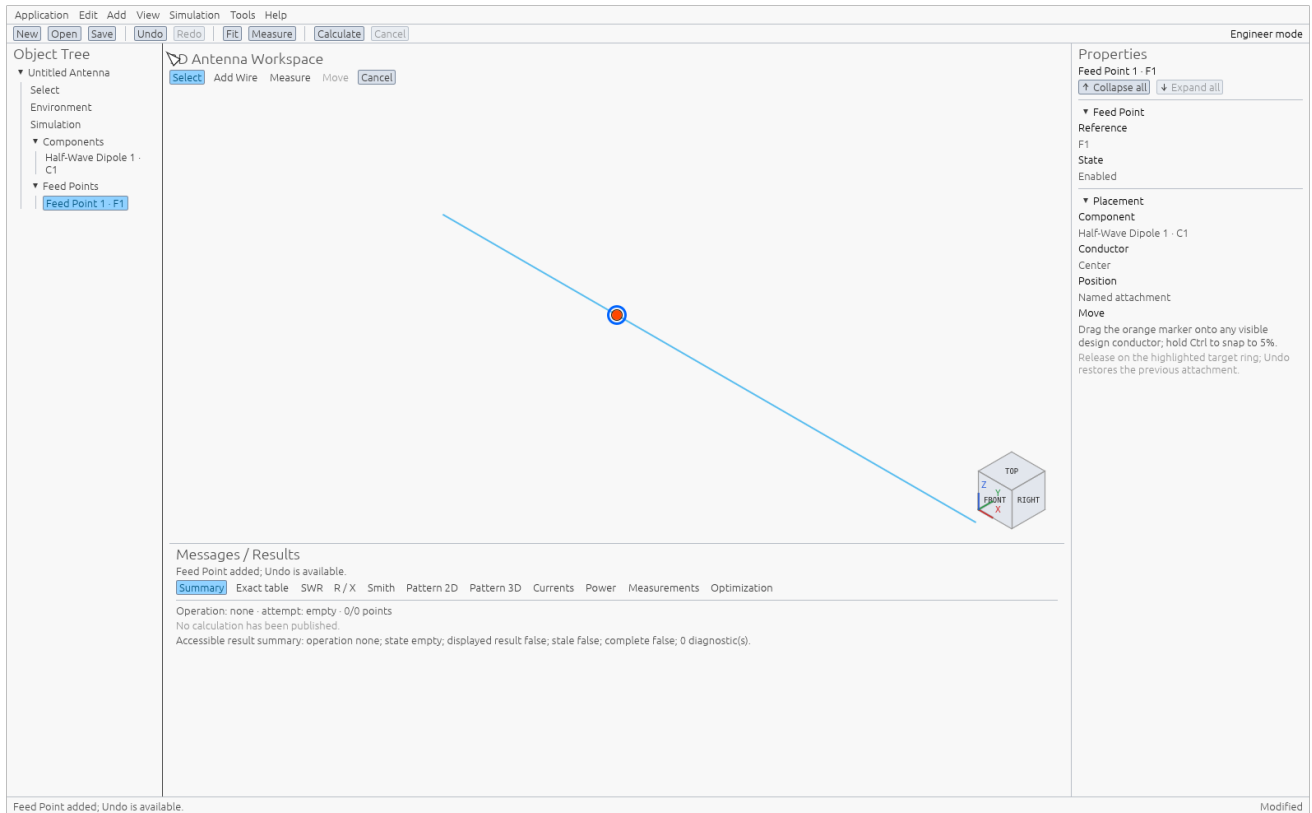


Figure 27. Feed point with its complete property card

Engineer exposes the same exact percentage field, live drag overlay, Ctrl snap and direct marker drag. Recalculate after moving the feed because the previous result is retained as stale.

Physical calculation in Basic

Basic always uses the packaged physical OpenNEC backend. It does not switch to **Fake Solver** or use a custom executable path selected in Engineer.

Before calculating, check that:

- the project contains visible conductive geometry;
- an enabled **Feed Point** exists;
- **Active frequency** is positive and appropriate;
- **Reference impedance** was chosen intentionally;
- environment, ground, height and orientation match the intended installation;
- every field was accepted without a diagnostic.

Simulation menu in Basic

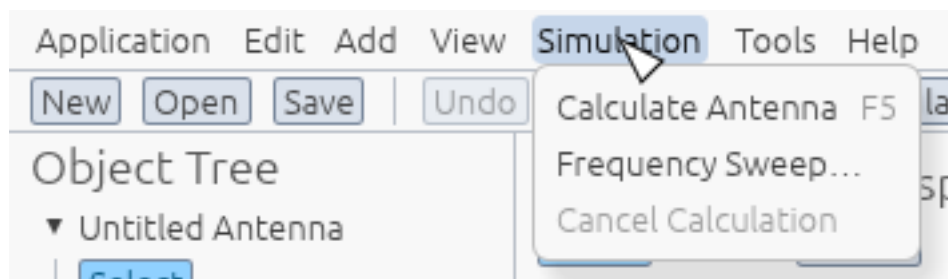


Figure 28. Calculate Antenna Frequency Sweep and Cancel Calculation

For one frequency, select **Calculate Antenna** on the toolbar, choose **Simulation > Calculate Antenna**, or press F5. During the run, **Cancel** and **Simulation > Cancel Calculation** are available.

If **Calculate Antenna** is disabled, point to the button for the reason. If packaged OpenNEC is missing, use the complete build or package. Switching to Engineer does not turn a non-physical backend into a physical one.

Current physical result

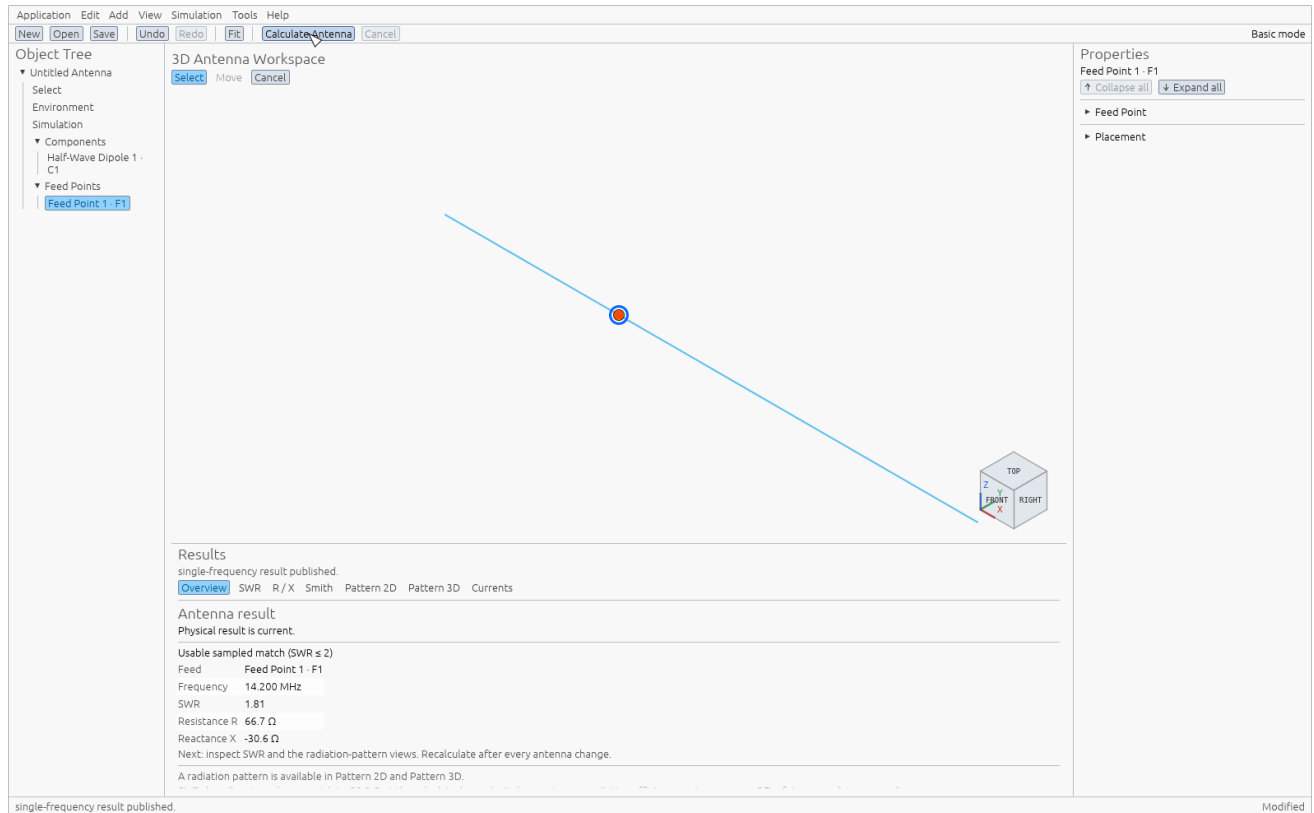


Figure 29. Overview after a successful single OpenNEC calculation

After success, **Overview** identifies the result as physical and current and shows the feed, frequency, SWR, R and X. When a radiation pattern is available, the interface offers **Pattern 2D** and **Pattern 3D**.

Recalculate after any antenna edit. **Stale** means old values are retained only for comparison and no longer correspond to current geometry.

Frequency sweep

A frequency sweep calculates input impedance at an ordered set of frequencies. Use it to inspect the operating bandwidth, the lowest SWR among sampled points and changes in R and X.

Frequency Sweep window

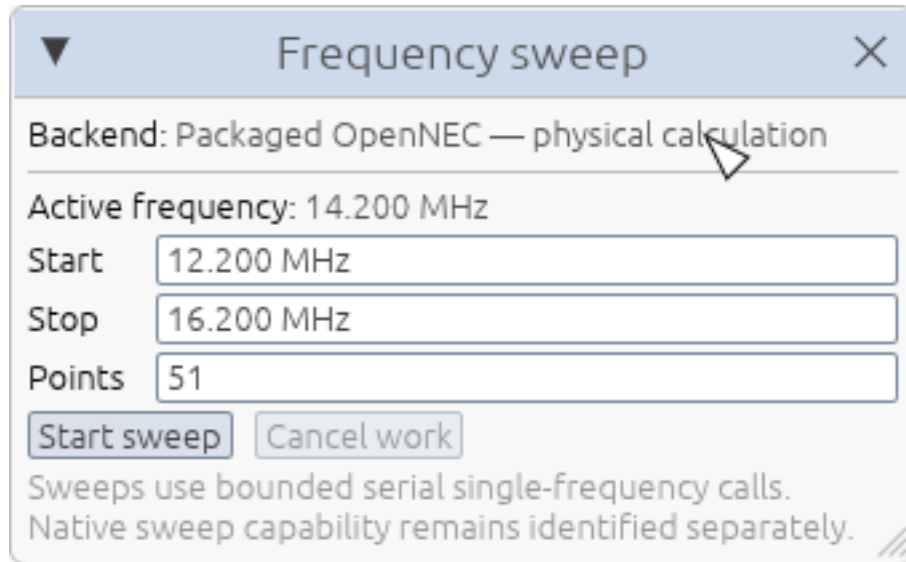


Figure 30. Start Stop and Points settings in Basic

1. Choose **Simulation > Frequency Sweep....**
2. Enter a positive **Start**.
3. Enter a **Stop** greater than Start.
4. Select 2 through 201 **Points**.
5. Select **Start sweep**.

The initial range is about 2 MHz below and above the active frequency with 51 points. It is not an official frequency plan. Enter bounds appropriate to your task and regional rules.

A sweep collects impedance points. **Currents** may correctly report that a current distribution is unavailable afterward. To obtain currents, set the required active frequency and run a single **Calculate Antenna** operation.

SWR over a range

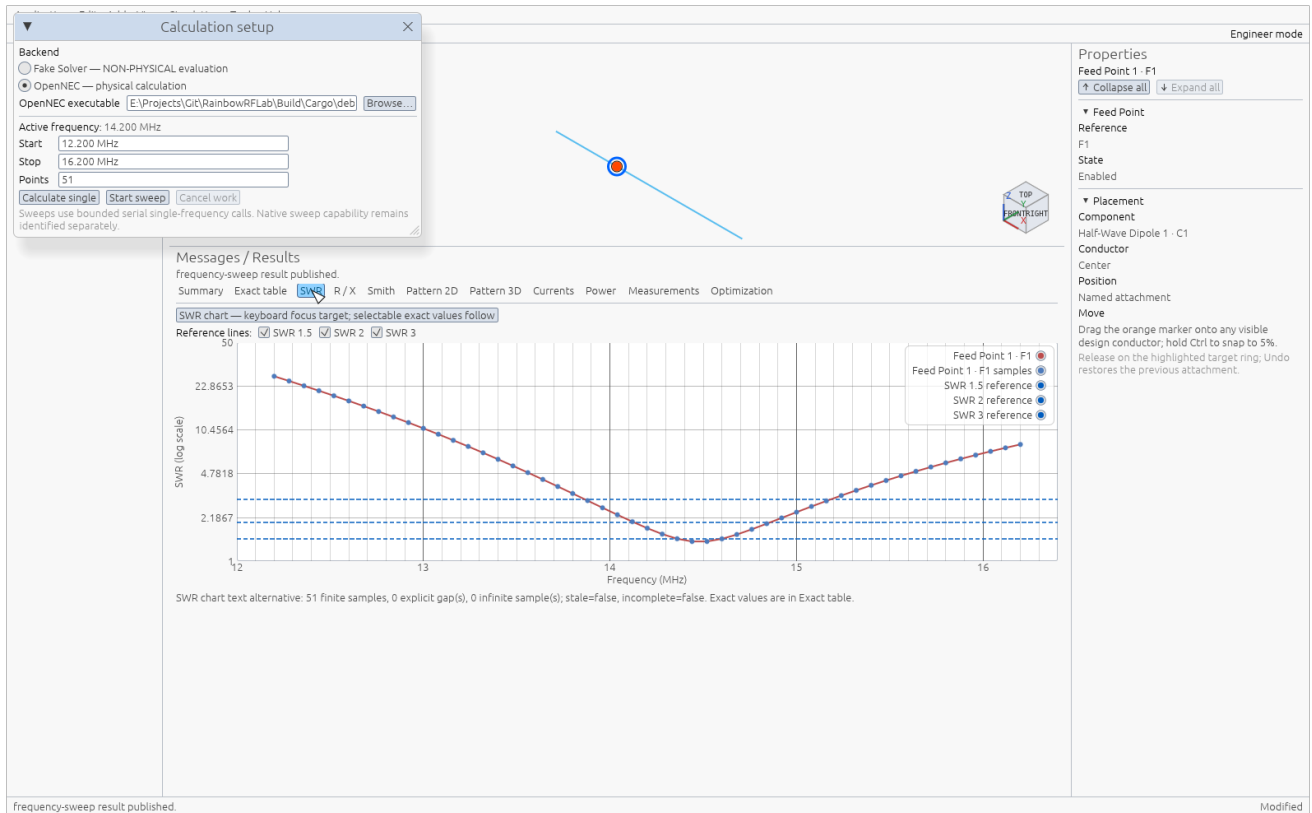


Figure 31. Example sweep on the SWR tab

The curve connects exact calculated samples for readability. Lines at 1.5, 2 and 3 help assess matching. The lowest sampled value is not an interpolated optimum frequency.

R and X over a range

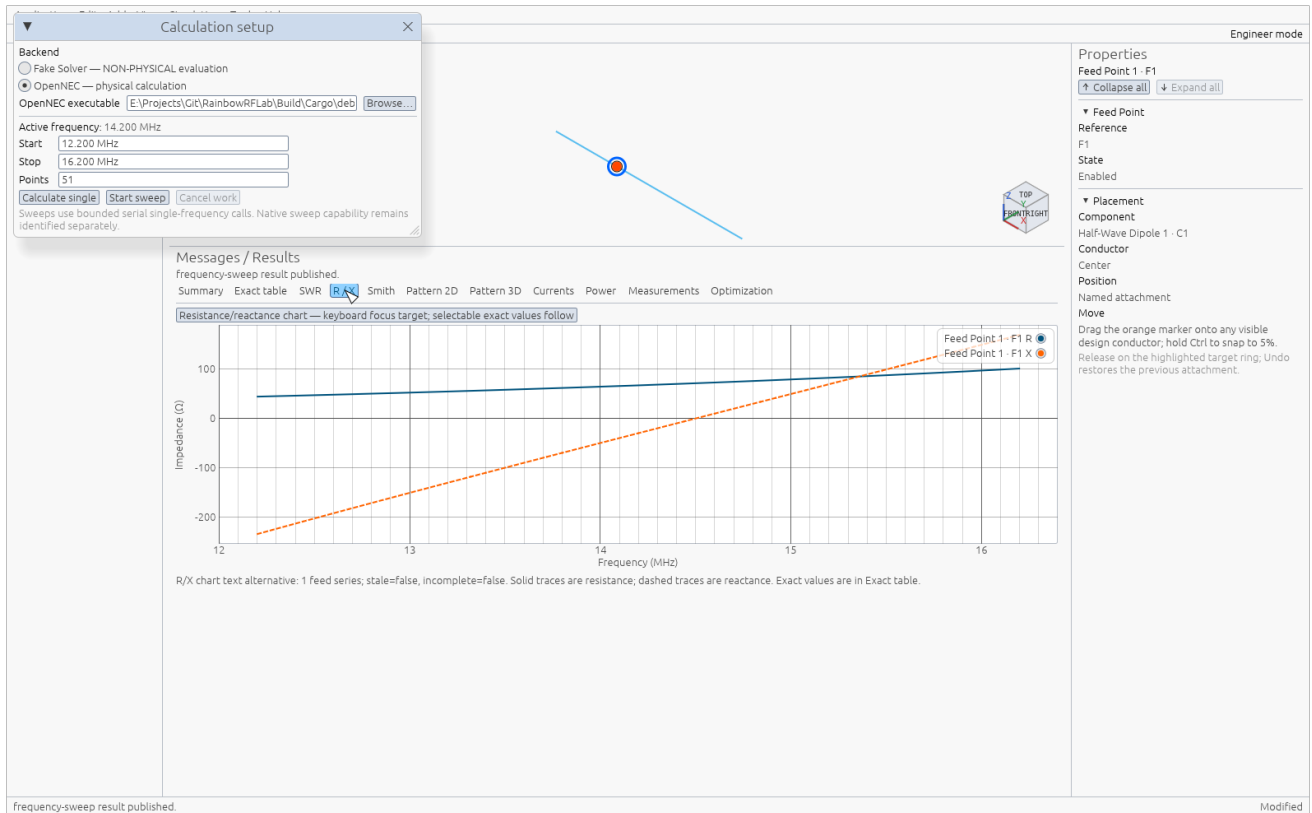


Figure 32. Example sweep on the R X tab

The solid curve is resistance R and the dashed curve reactance X . An X crossing near zero does not by itself guarantee the required SWR; also compare R with the reference impedance.

Overview and result states

Overview is the first Basic tab. It states whether a current successful physical result exists, where sampled SWR is lowest and what to do next.

For a finite result, it shows frequency, SWR, R and X for the selected point. Text interpretation uses these thresholds:

Interpretation	Condition
Good sampled match	SWR up to and including 1.5
Usable sampled match	SWR above 1.5 and up to 2
High sampled mismatch	SWR above 2 and up to 3
Poor sampled match	SWR above 3

These labels only explain the calculated number. They add no calculation and do not prove radiation quality.

Non-physical example in Engineer

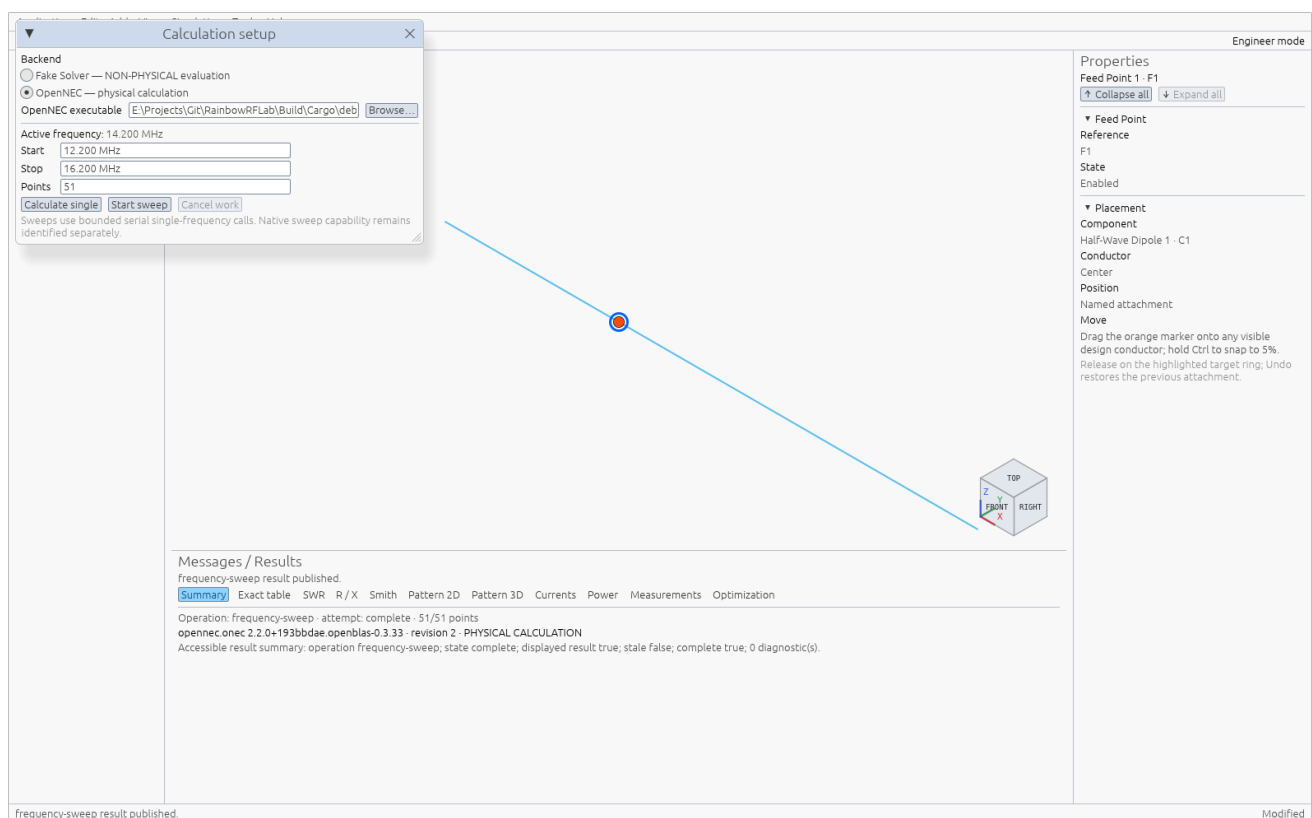


Figure 33. Overview after a demonstration Fake Solver sweep

Engineer can explicitly use **Fake Solver** for a non-physical demonstration. Its result is marked **FAKE / NON-PHYSICAL**. Do not use it for construction, tuning or antenna-performance claims. Fake Solver screenshots in this manual show available views; separate screenshots show physical OpenNEC results.

Impedance results

Basic contains **SWR**, **R / X** and **Smith**. Engineer also provides the complete **Exact table**. All views project the same result. Changing a tab does not recalculate.

Exact table

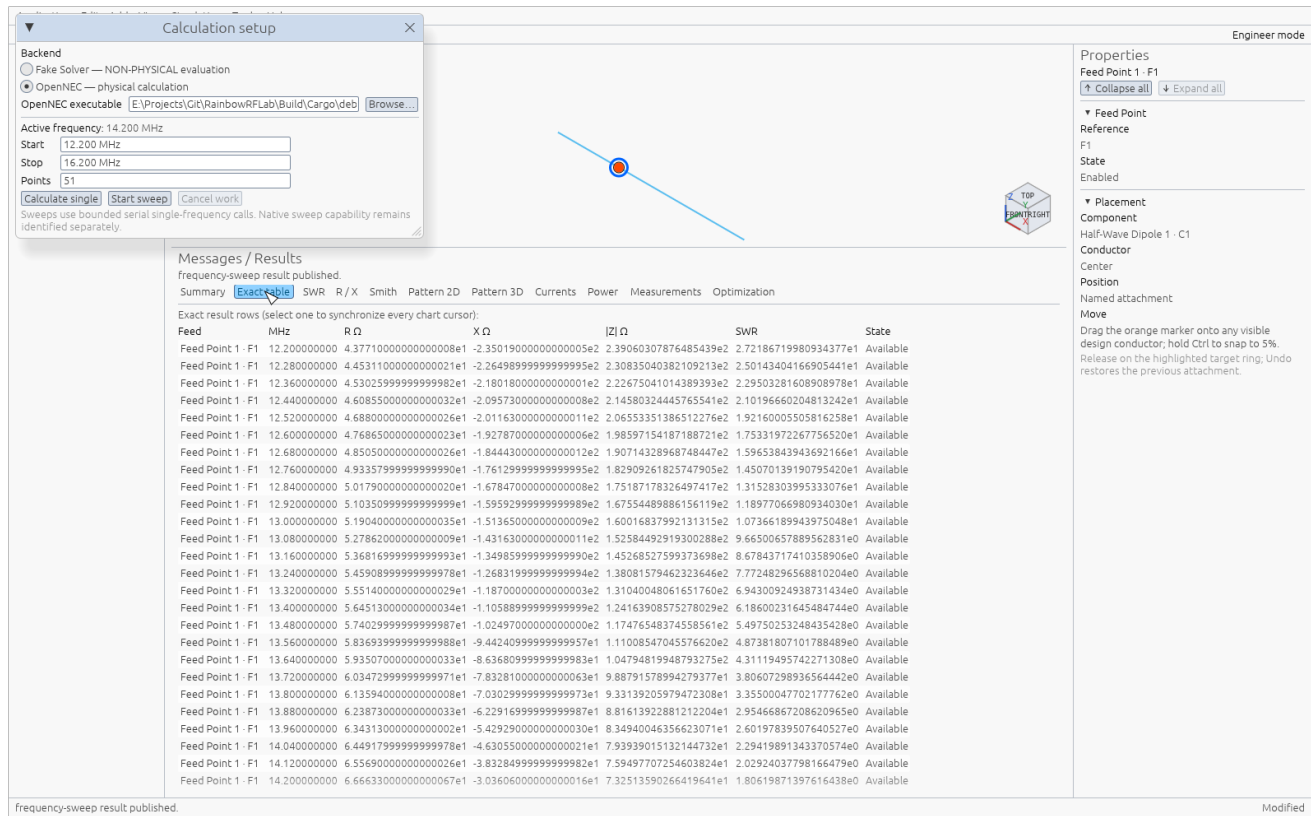


Figure 34. Exact numerical sweep rows in Engineer

The table shows Feed, frequency, R, X, impedance magnitude, SWR and point state. Use it as the exact textual alternative to plots. Prefer these values to pixel estimates for numerical analysis and export.

SWR at one frequency

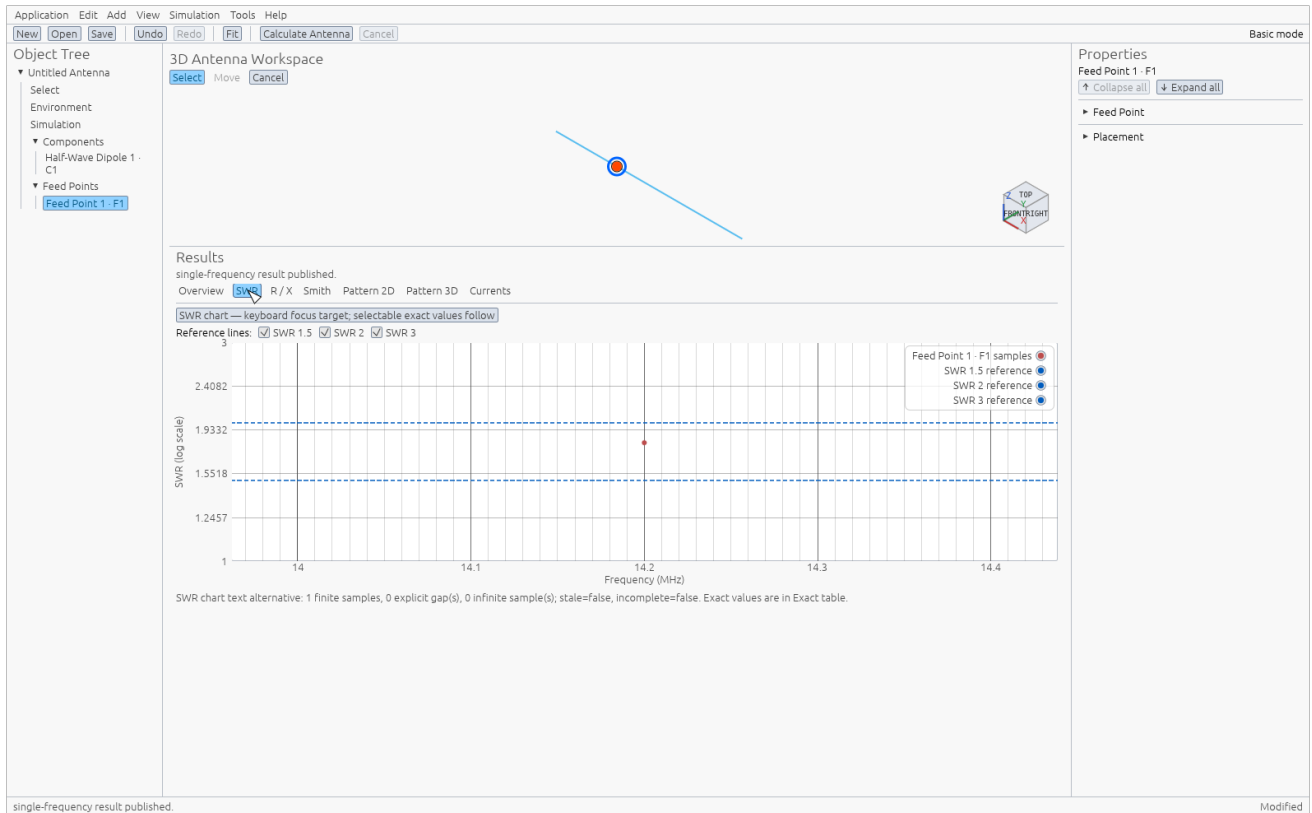


Figure 35. Physical SWR point at the active frequency

SWR compares input impedance with the displayed **Reference impedance**. The scale emphasizes the useful lower range. A point at the visible upper bound does not mean its exact value was changed; the exact row remains available.

R and X at one frequency

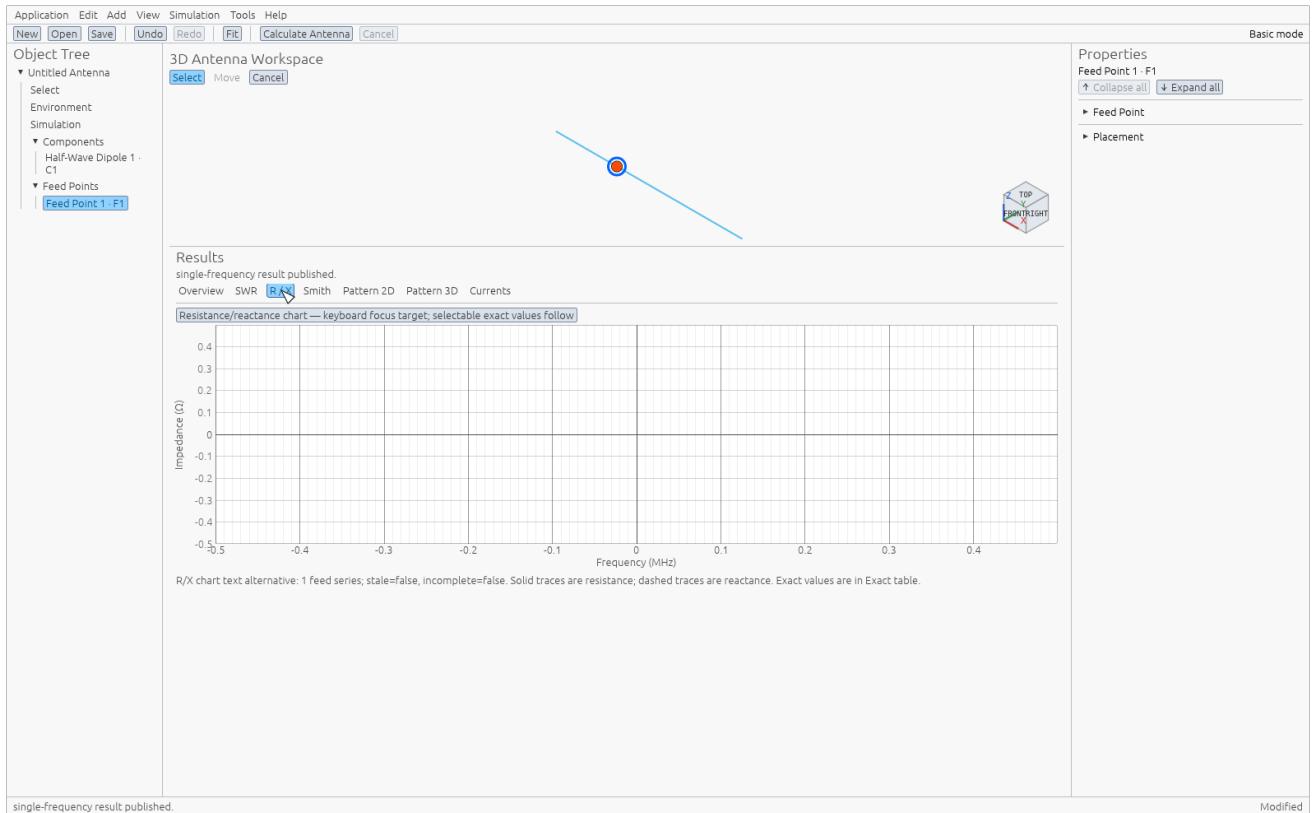


Figure 36. R / X after a physical single-frequency calculation

R is the resistive component in ohms. X is the reactive component, and its sign distinguishes a predominantly inductive or capacitive state. The **R / X** plot draws lines between adjacent frequency points, so one result does not form a visible curve. Read exact single-frequency R and X in **Overview**, and also in **Exact table** in Engineer. Run a **Frequency Sweep** with at least two points to see variation.

Smith chart

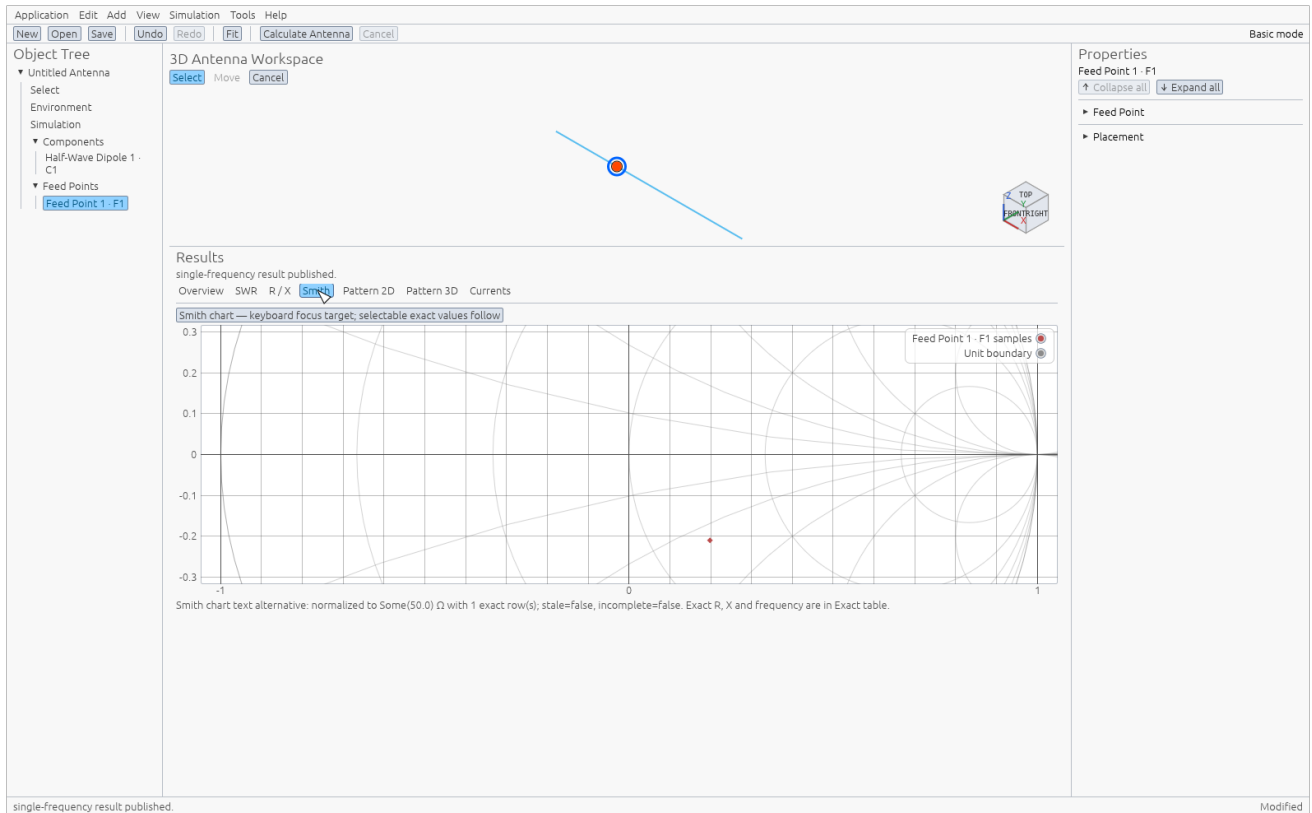


Figure 37. Physical point on the Smith chart

Smith normalizes impedance to the reference value. The center is a match to that impedance. Changing **Reference impedance** moves the point even when R and X are unchanged.

Sweep on the Smith chart

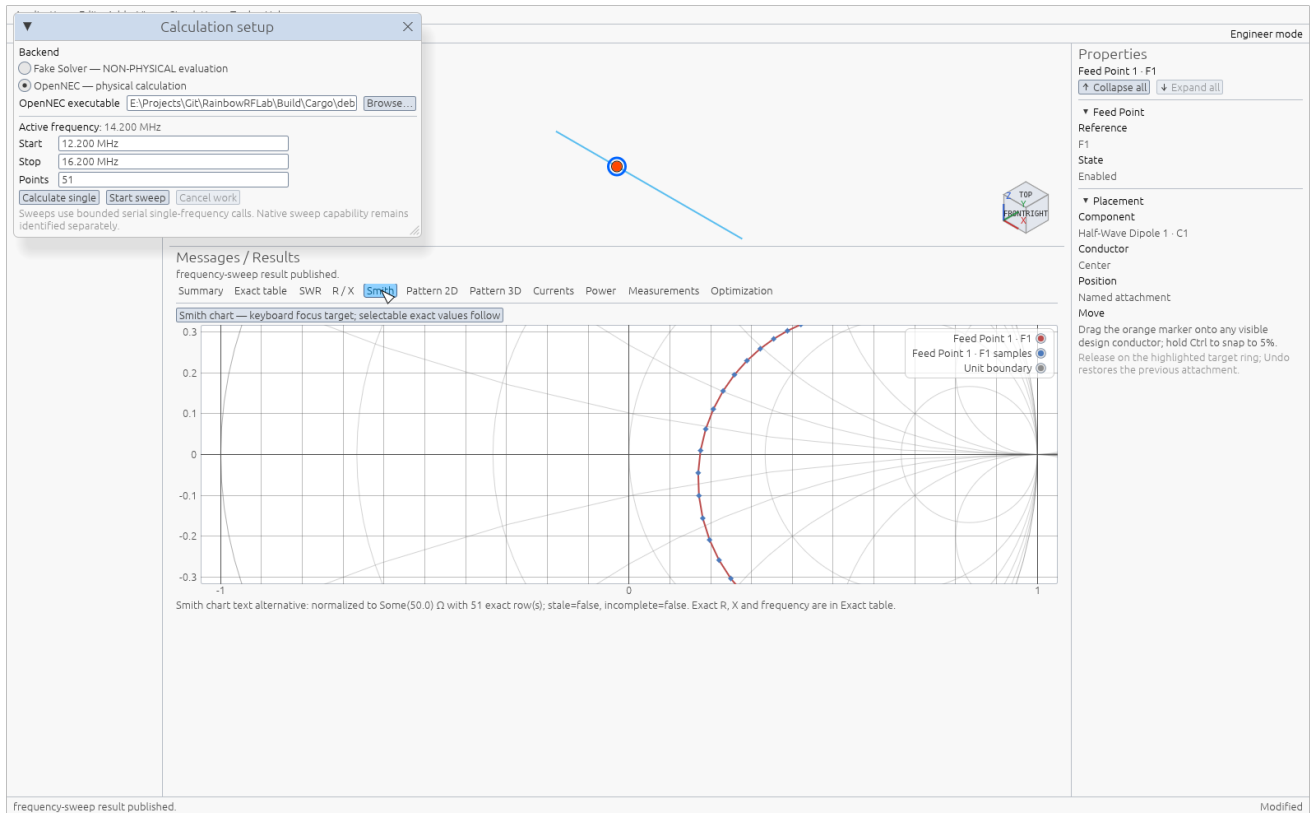


Figure 38. Demonstration sweep trajectory on the Smith chart

The trajectory shows how impedance moves with frequency. Use **Exact table** for exact frequencies and values.

Pattern 2D

Pattern 2D shows a polar radiation-pattern cut when the backend returned the required data. **Horizontal** uses azimuth; **Vertical** uses elevation. The relative level in dB is already logarithmic and is not logged again.

Empty view

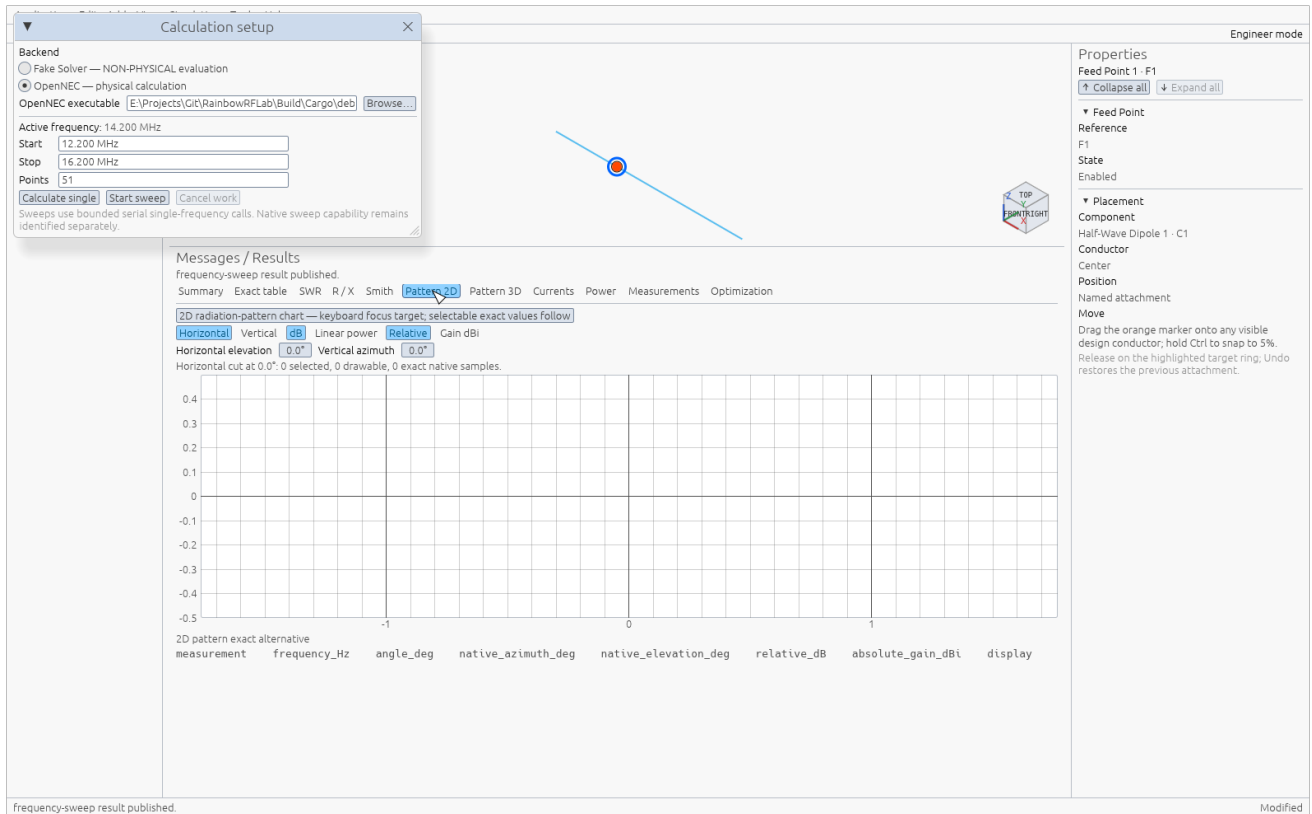


Figure 39. Pattern 2D without pattern data after a demonstration sweep

An impedance sweep may not contain a pattern. The unavailable-data message is normal. Run a single physical calculation at the required frequency.

Horizontal cut

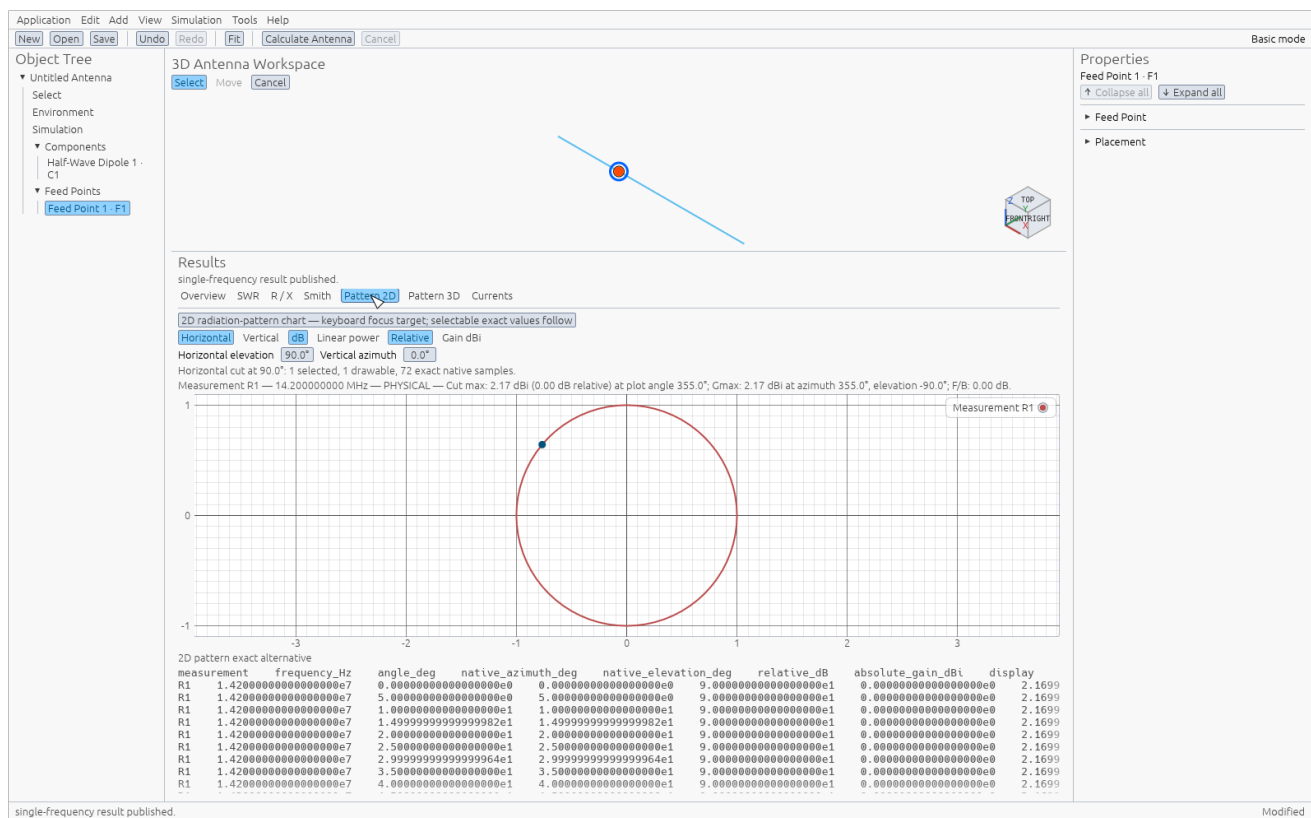


Figure 40. Physical horizontal Pattern 2D cut

Red and blue curves distinguish available presentation components, while text below the controls explains frequency and limits. All exact points are listed in **2D pattern exact alternative** below the plot.

Point inspection

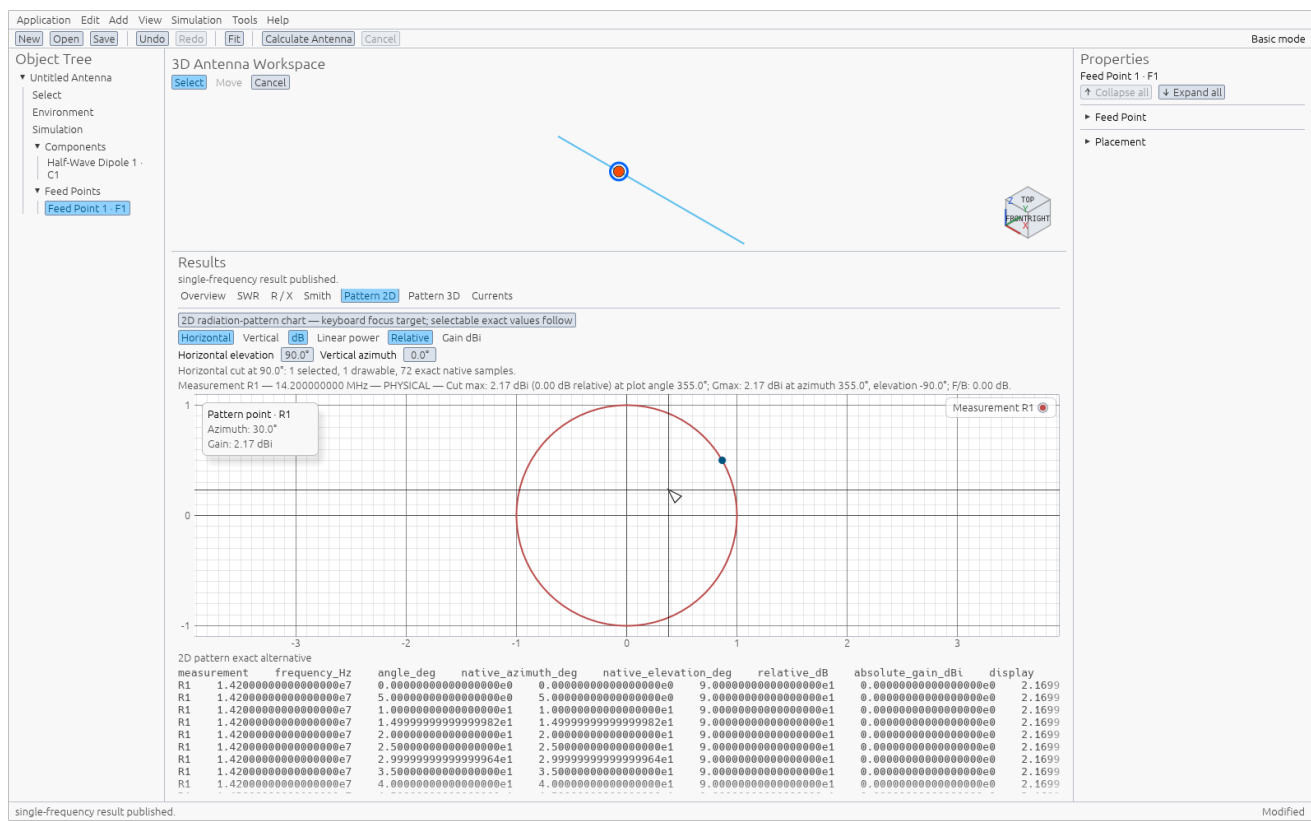


Figure 41. Pattern point panel with exact Azimuth and Gain

Move the pointer inside the plot. A small upper-left panel shows the nearest exact drawn sample and marks it on the curve. The horizontal cut displays **Azimuth** and the vertical cut **Elevation**. **Gain** is total absolute gain in dBi when OpenNEC supplied it.

The panel does not interpolate between samples. **Unavailable** means absolute gain is absent, not zero. Use the numerical alternative below the plot for copying and complete precision.

Vertical cut

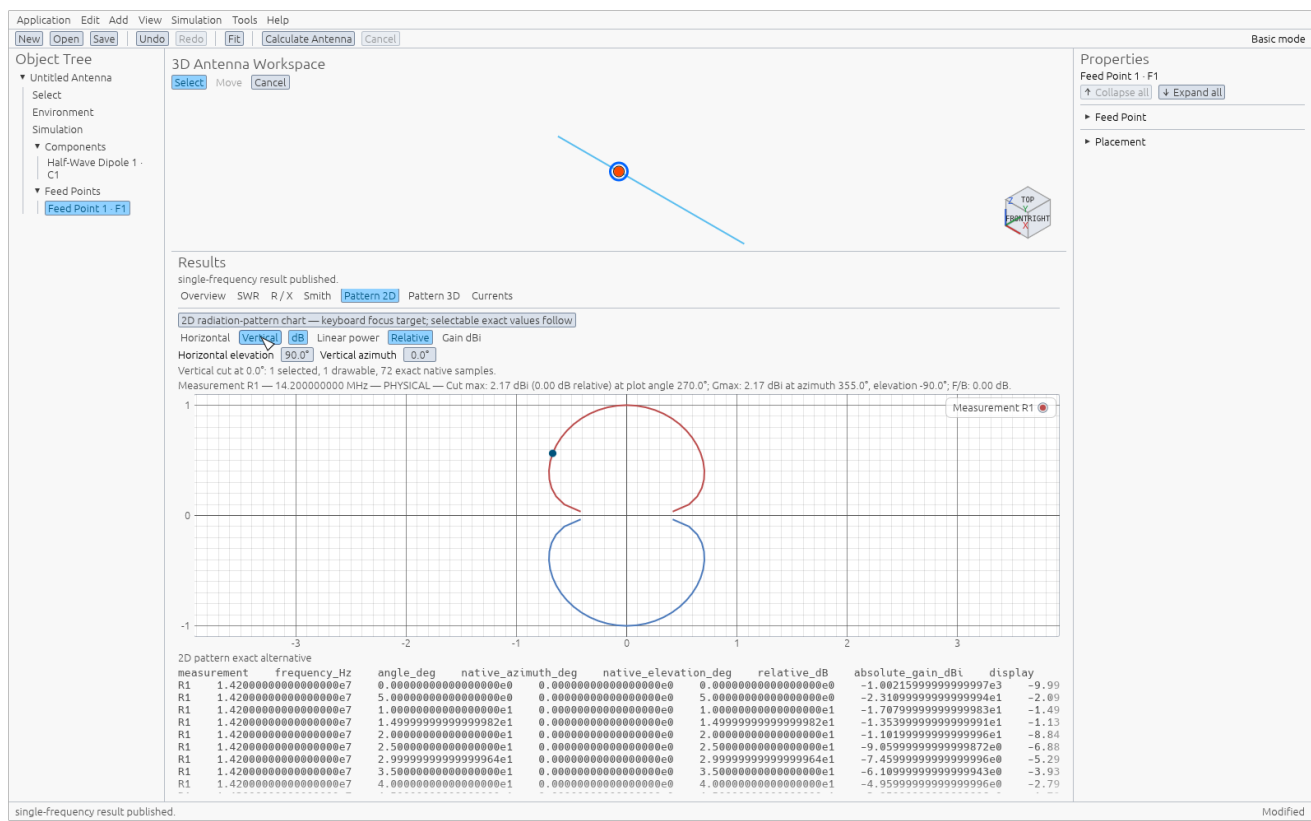


Figure 42. Physical vertical Pattern 2D cut

Horizontal and **Vertical** select cuts from the same result. If one cut is missing, the interface does not invent it from the other.

Pattern 3D and Currents

Empty Pattern 3D

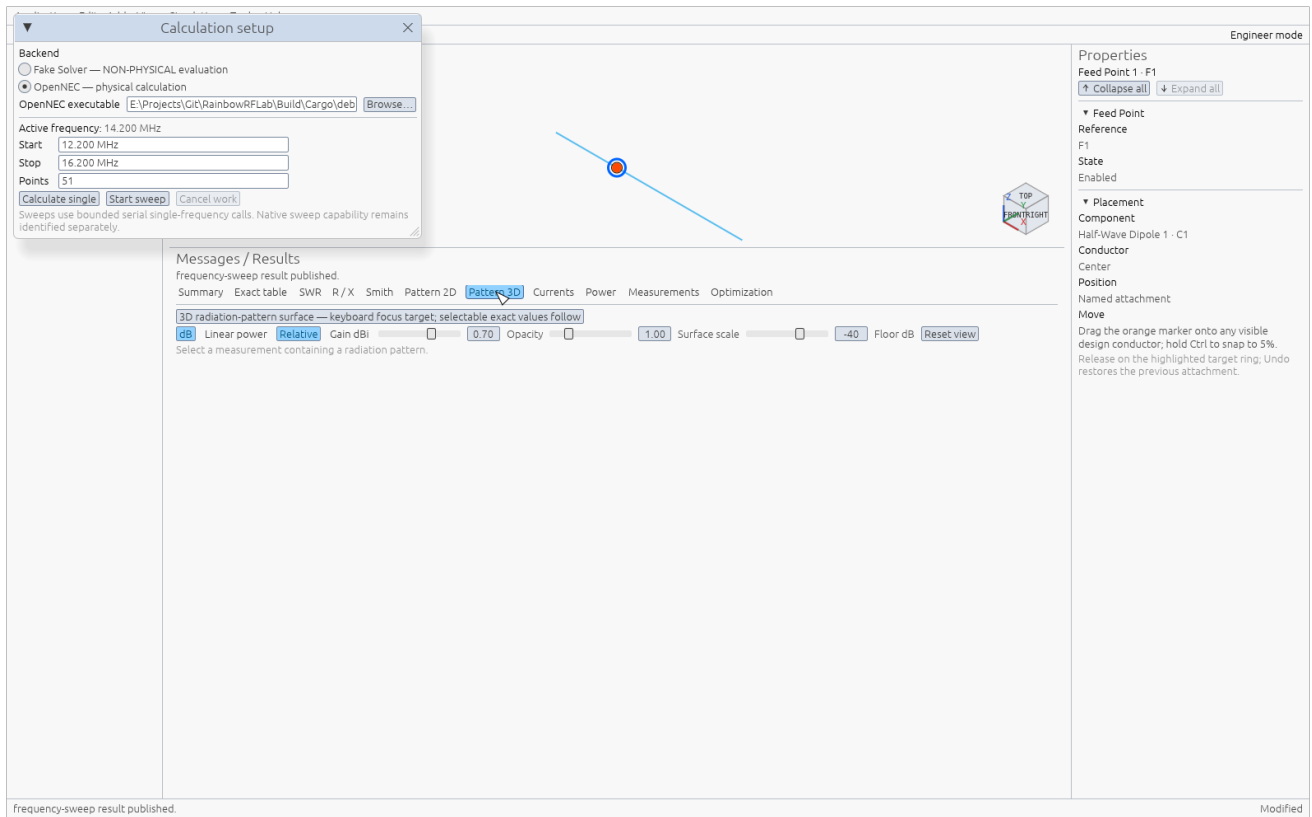


Figure 43. Pattern 3D without data after a demonstration sweep

If the result has no spatial pattern, the tab reports that state. It is not a plot error. Run a single OpenNEC calculation that requests a radiation pattern.

Empty Currents

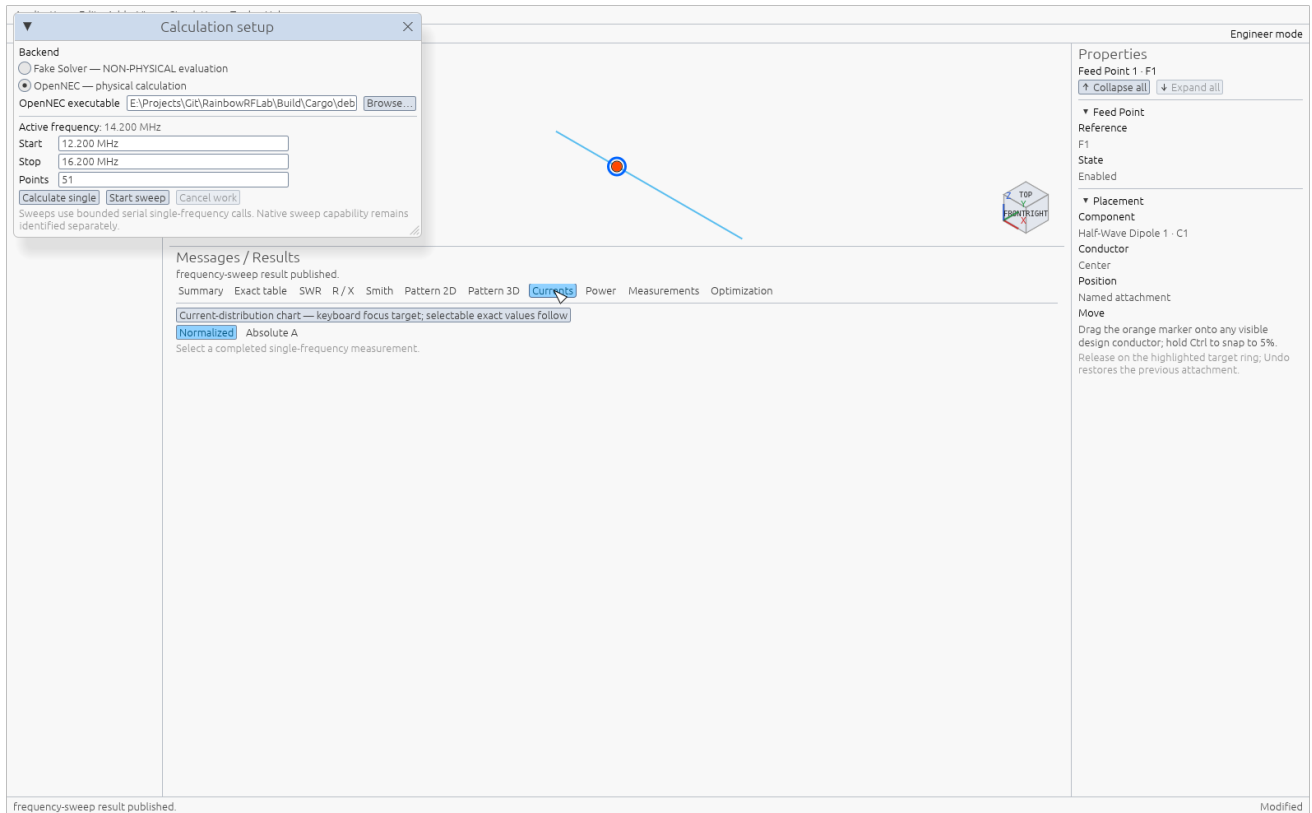


Figure 44. Currents without data after a sweep

An impedance sweep need not return currents. Set the required active frequency and run a single calculation.

Physical spatial pattern

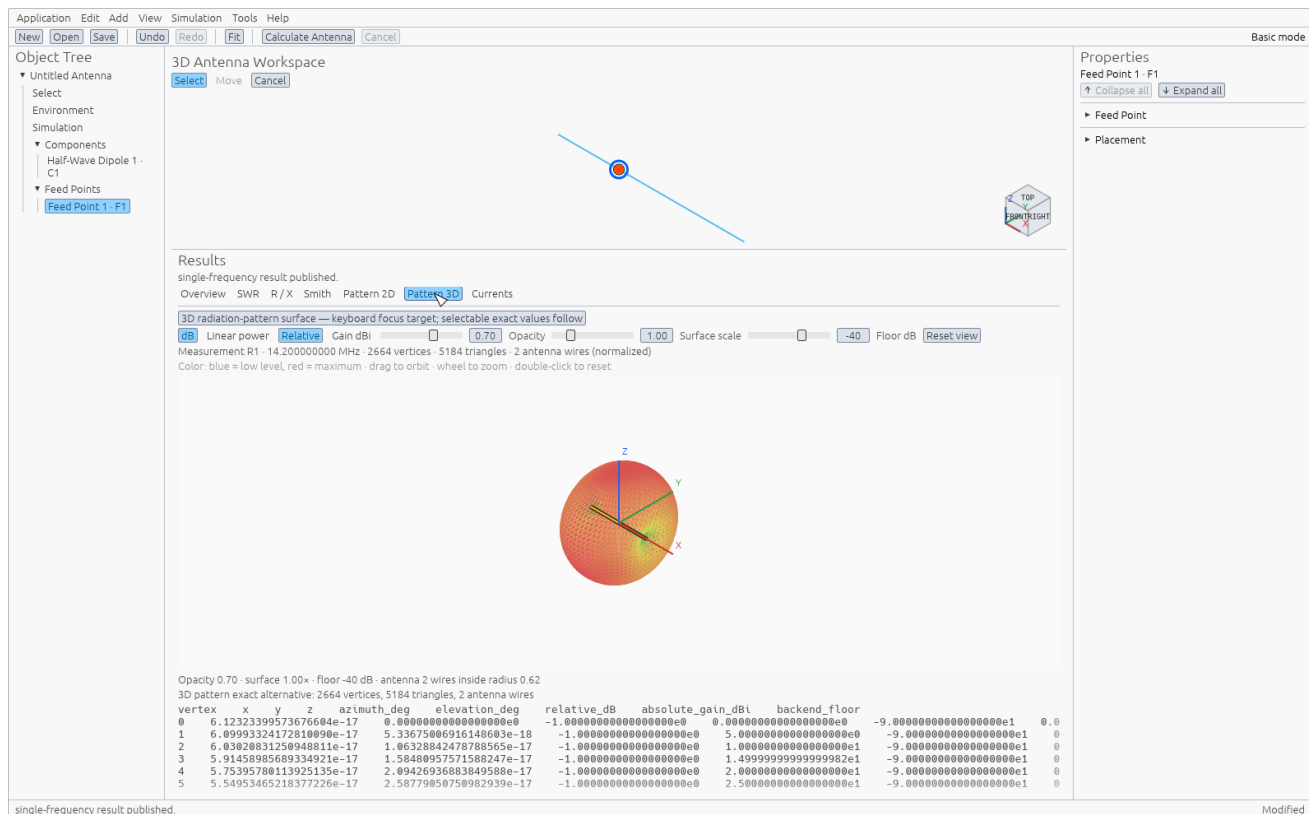


Figure 45. Pattern 3D with a physical OpenNEC result

Pattern 3D shows a spatial surface and, when possible, antenna placement. **Opacity**, **Surface scale** and **Floor dB** change presentation only. **Reset view** restores the initial camera. These actions do not modify the calculation and do not enter Undo history.

For a dense surface, the program may simplify the display only. Exact bounded data remains in the textual alternative.

Current distribution

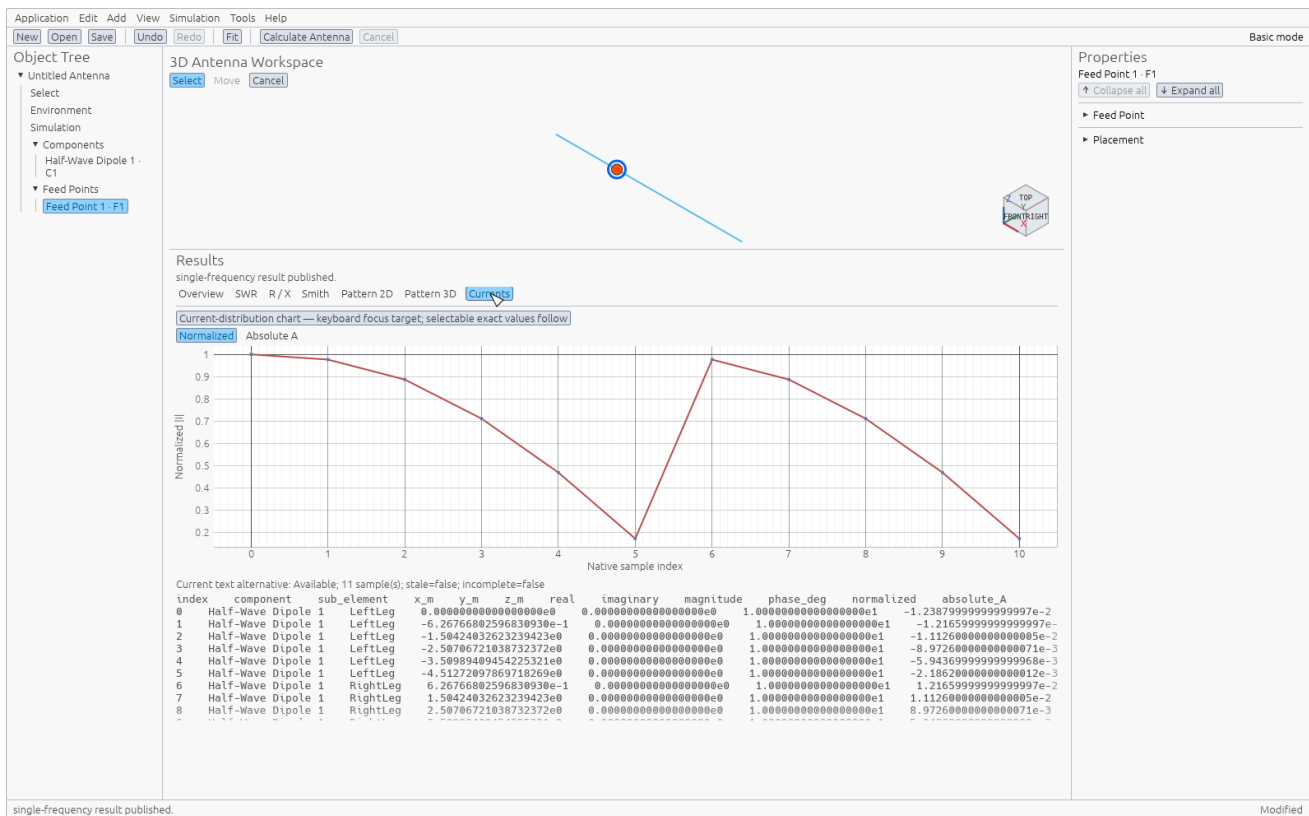


Figure 46. Currents with a physical distribution on a dipole

Normalized ||I|| shows normalized current magnitude along available segments. Exact rows below the plot include current components and phase when present. The normalized curve is not a direct ampere measurement on a physical antenna.

Calculation in Engineer

Engineer exposes **Calculation Setup...**, **Calculate Single**, **Frequency Sweep...**, **Cancel Calculation** and **Optimization**. Use these controls when you need to inspect the backend or use advanced functions.

Simulation menu in Engineer

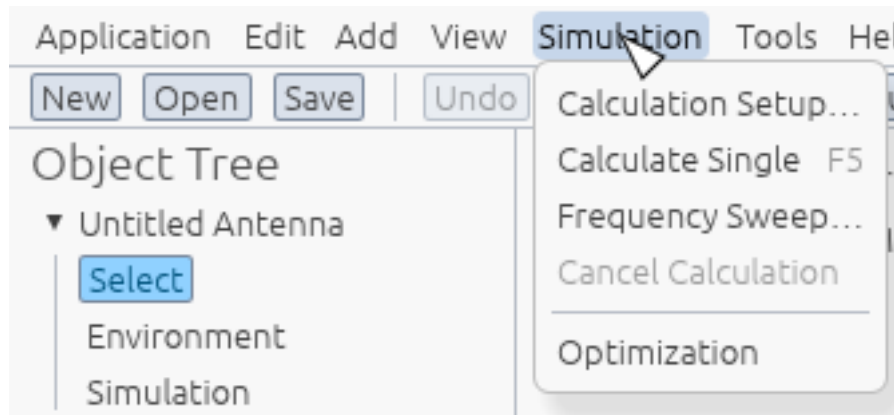


Figure 47. Complete Simulation menu in Engineer

Calculate Single uses the active frequency. **Frequency Sweep...** opens the range. **Cancel Calculation** is available only while work is running. **Optimization** opens the optimization tab.

Calculation Setup

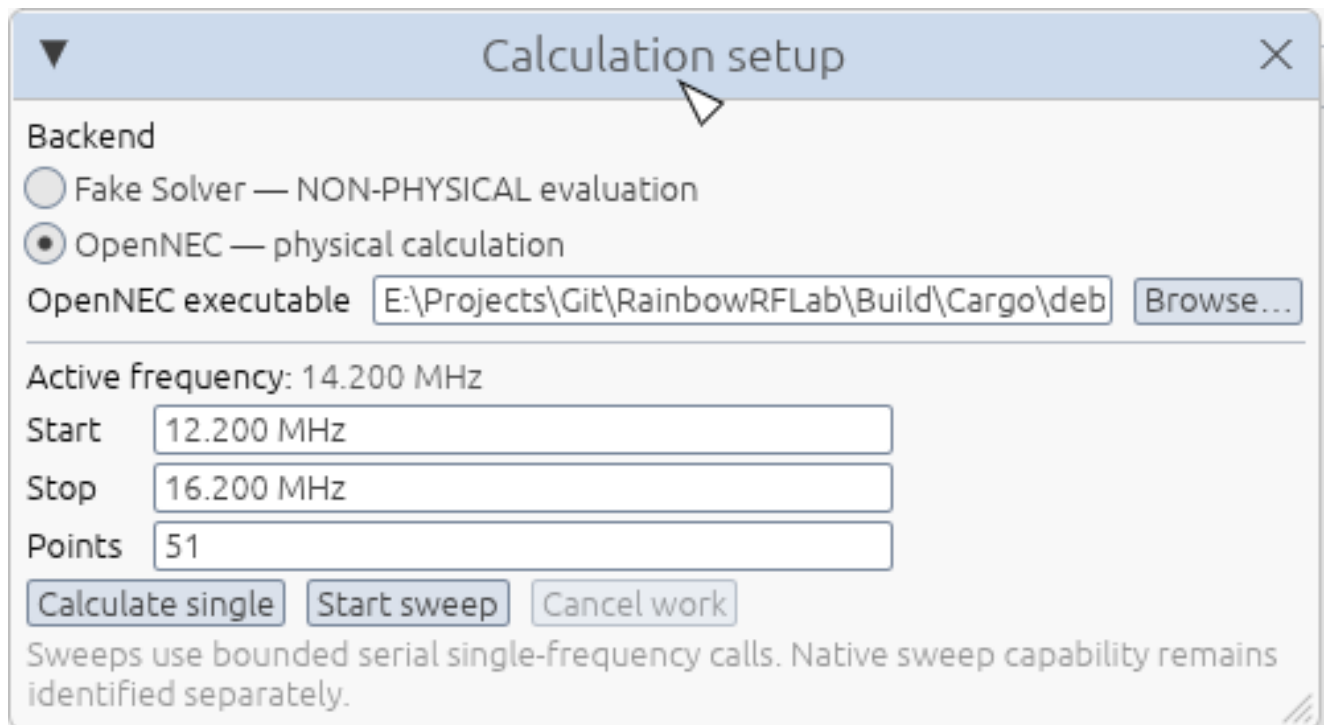


Figure 48. Backend and sweep settings window

Calculation Setup provides an explicit backend choice. **OpenNEC** is for physical calculation within its model. **Fake Solver** carries a yellow **NON-PHYSICAL EVALUATION** warning and demonstrates the interface only. Do not interpret its values as antenna performance.

If OpenNEC is selected but unavailable, check that the package is complete. A custom Engineer path is an advanced action and does not change the protected OpenNEC used by Basic.

Advanced Engineer results

Power

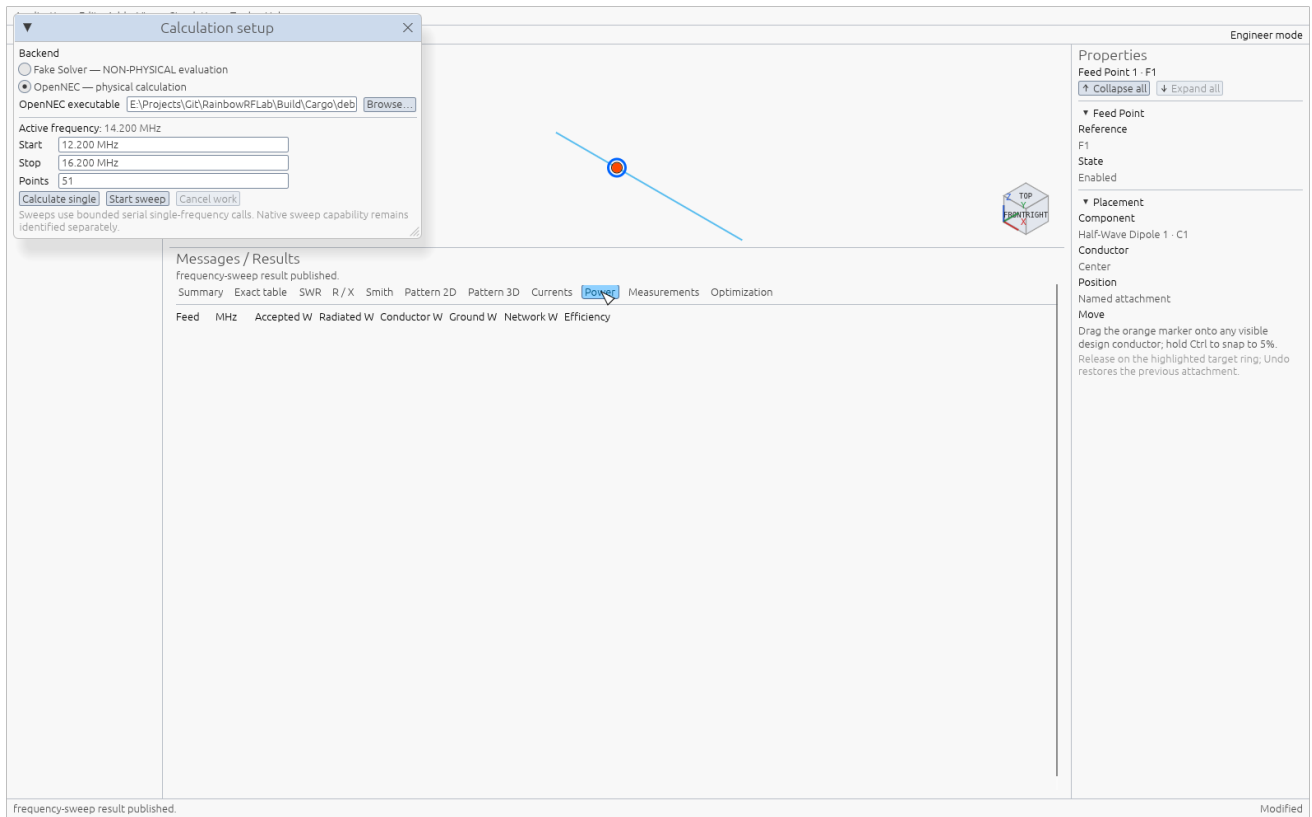


Figure 49. Power tab and its exact alternative

Power shows power or efficiency only when the backend returned the needed components. Missing losses are not shown as zero or reconstructed from assumptions.

Measurements

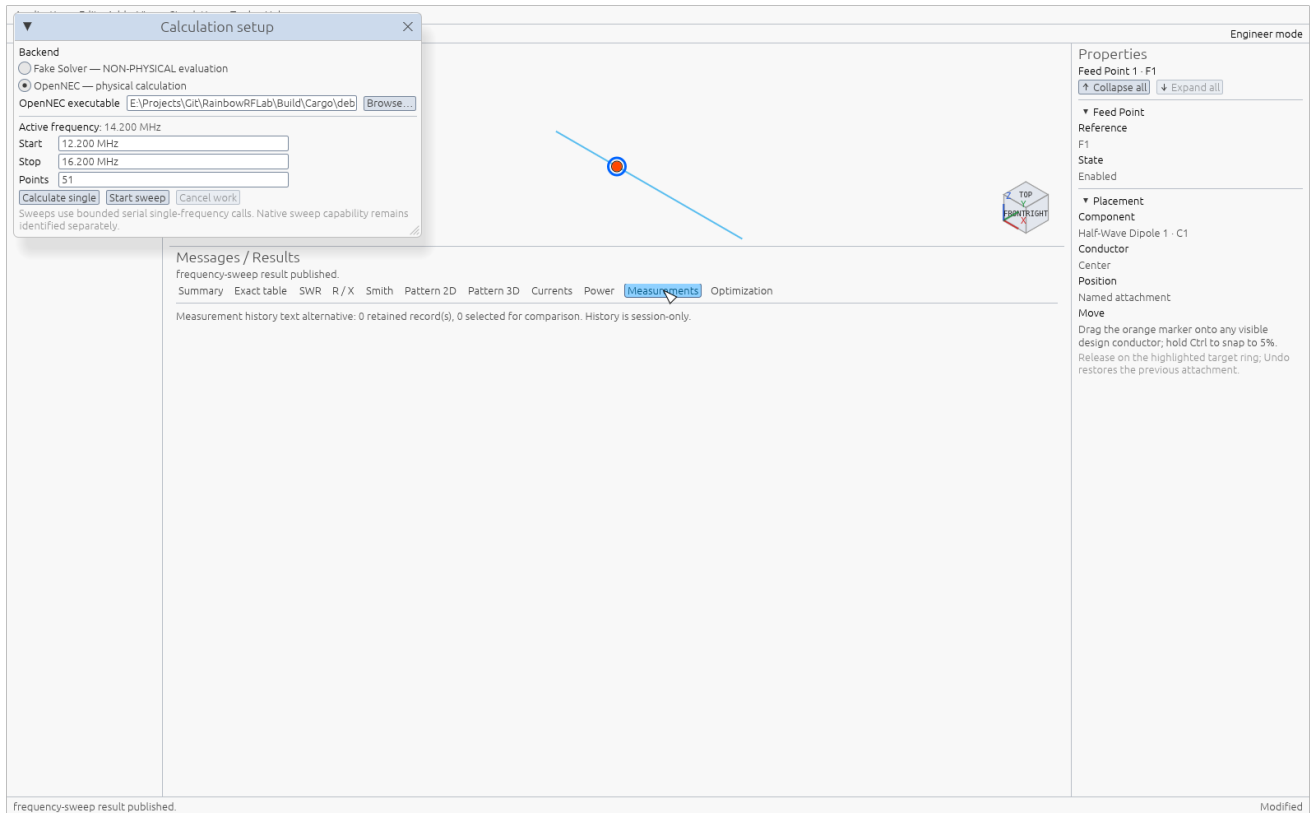


Figure 50. Measurements tab

Measurements retains results available in the current session for comparison and, when supported, can restore the corresponding model as one undoable action. An empty tab means no saved session measurements exist.

Optimization

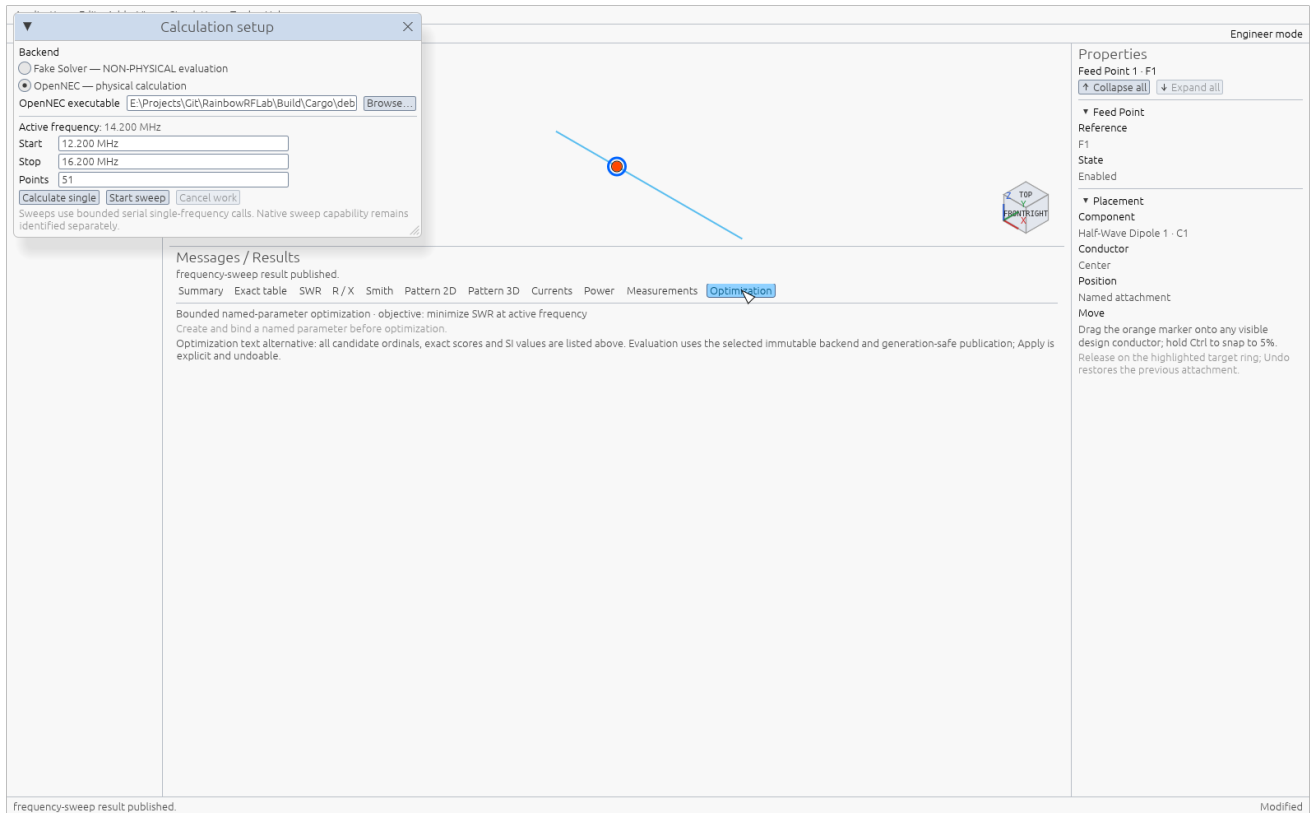


Figure 51. Optimization tab before creating a parameter

Optimization changes one bound named parameter within specified bounds and minimizes SWR at the active frequency. It requires a named parameter, a geometry binding, an enabled Feed Point and a usable backend.

1. Create and bind a named parameter.
2. Select it in the list.
3. Set **Minimum**, **Maximum**, **Step** and **Max evaluations**.
4. Select **Start optimization**.
5. Inspect candidates and exact scores after completion.
6. Select a candidate and choose **Apply candidate (one Undo step)**.

An optimization result is never applied automatically. Explicit **Apply** creates one **Undo** step. Verify the applied geometry with another physical calculation.

Editing a Yagi

Initial Yagi

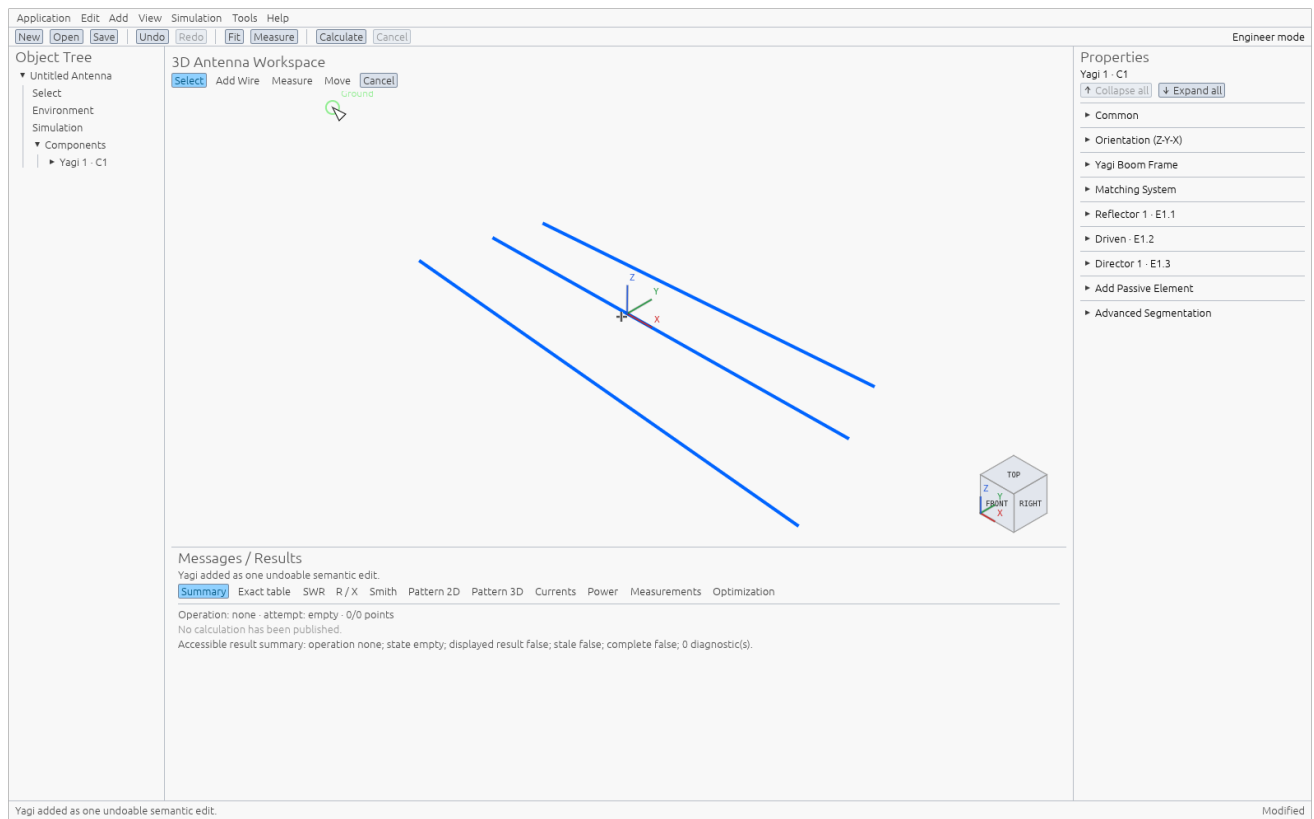


Figure 52. Yagi template in Engineer

The template contains a driven element and passive elements along a boom. Select an element in **Object Tree** or the component properties.

Adding a director

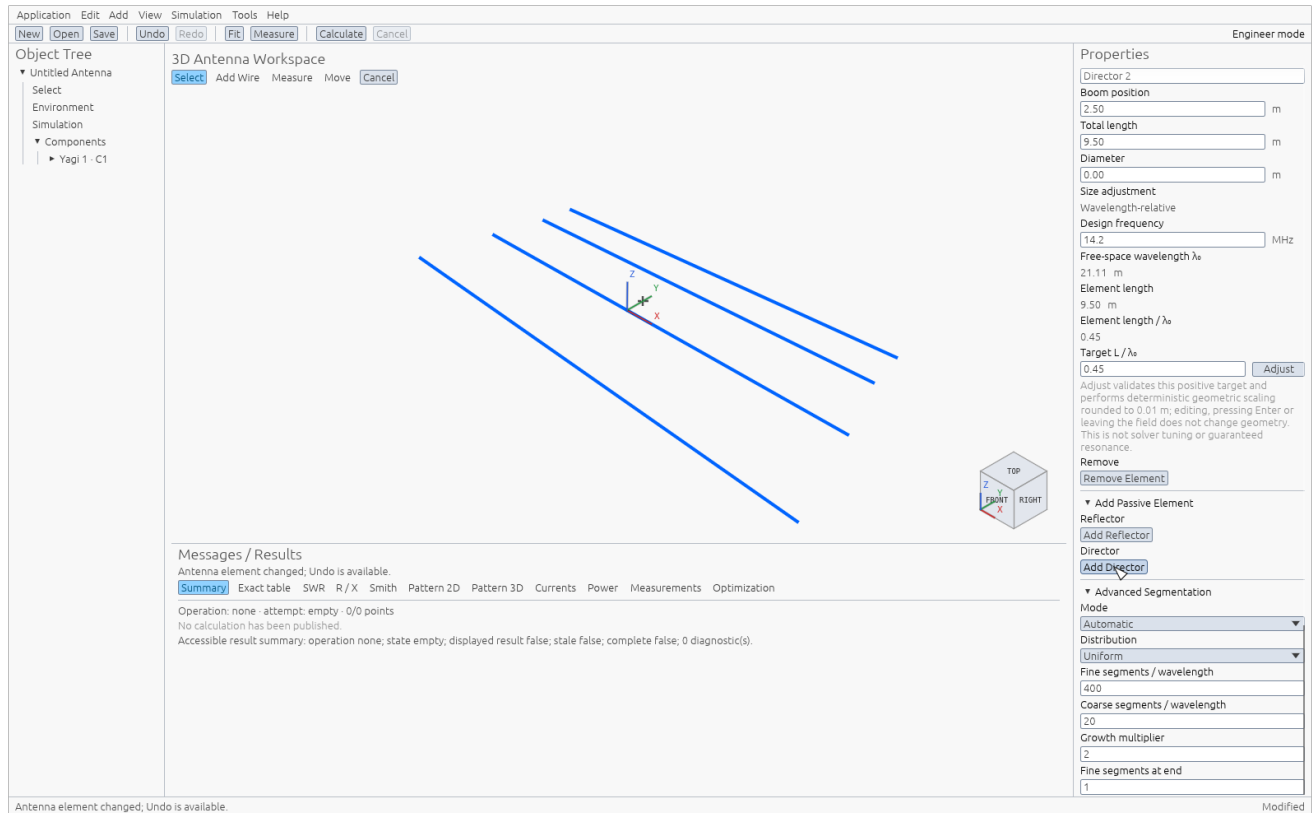


Figure 53. Yagi after Add Director with selection retained

Add Director inserts a director, **Add Reflector** a reflector, and **Remove Element** removes the selected passive element. Selection remains on the relevant element so you can inspect its fields immediately. Ensure boom position, length and diameter do not create accidental intersections.

For a practical variant, change one parameter at a time, run a sweep, compare SWR and R/X, and then inspect the pattern at the required frequency.

Measure tool

Measure is available in Engineer and measures geometric distance between two selected workspace positions.

Tools menu

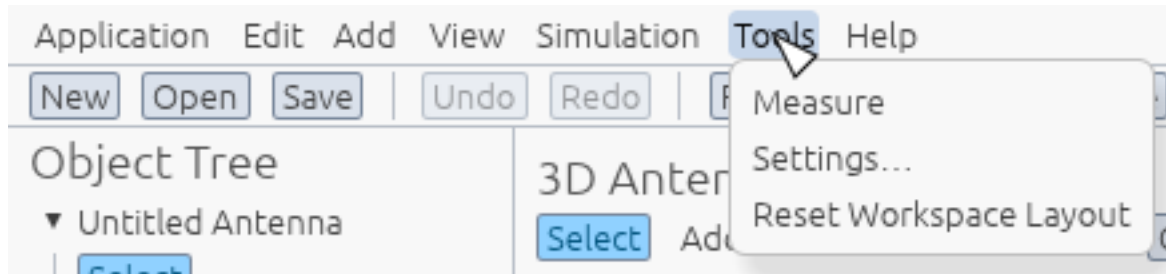


Figure 54. Measure Settings and Reset Workspace Layout

Choose **Tools > Measure** or the **Measure** button, then click the start and end positions. The floating **Measurement** window shows **Distance**, ΔX , ΔY and ΔZ on separate rows.

Active Measure mode

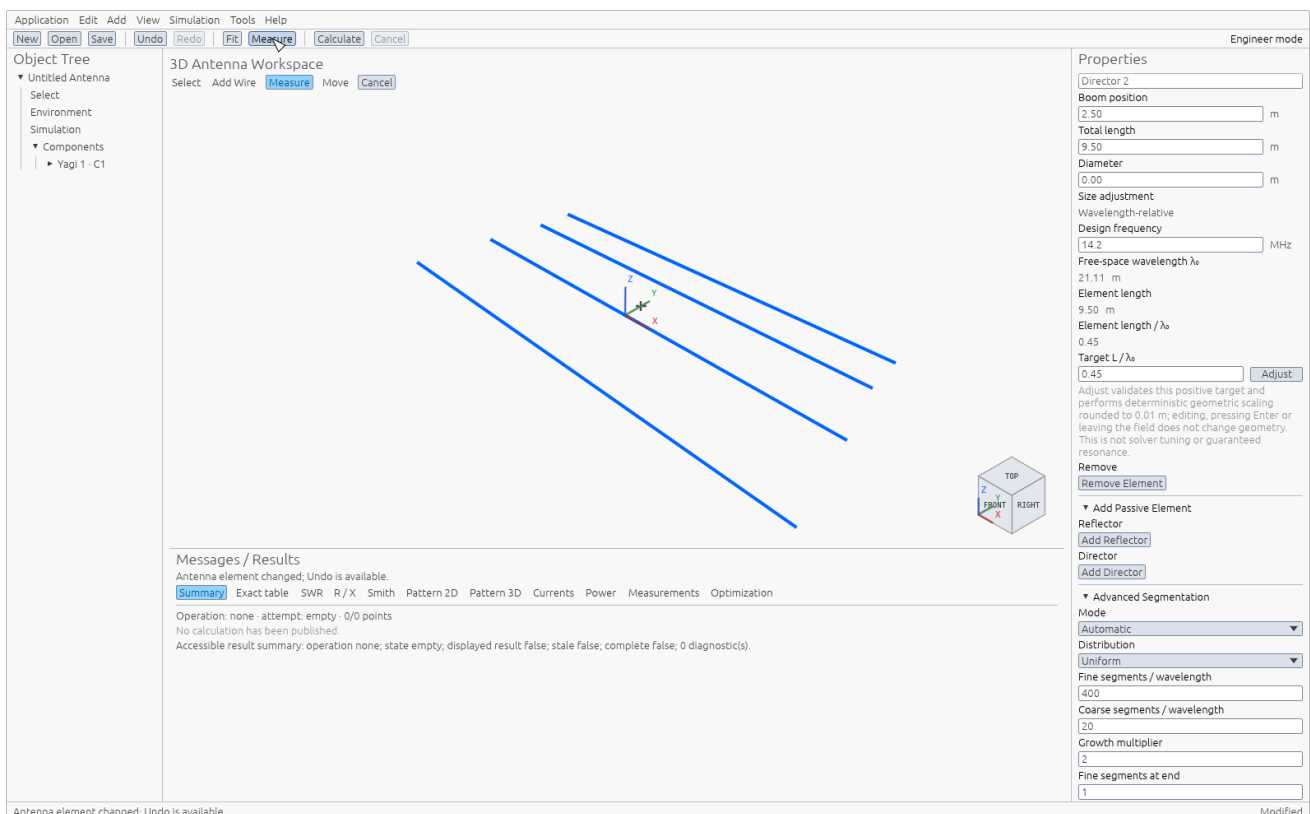


Figure 55. Yagi with the Measure tool active

The measurement line remains visible while the result window is open. Close it with **x** at the upper right. This is a transient inspection: it does not edit the antenna or enter the .rfaa file.

If panels become inconvenient, choose **Tools > Reset Workspace Layout**. It restores the initial arrangement without changing the project.

Exporting results

Application > Export Results is available in Engineer. First calculate and confirm that the displayed result is the intended current result.

Export formats

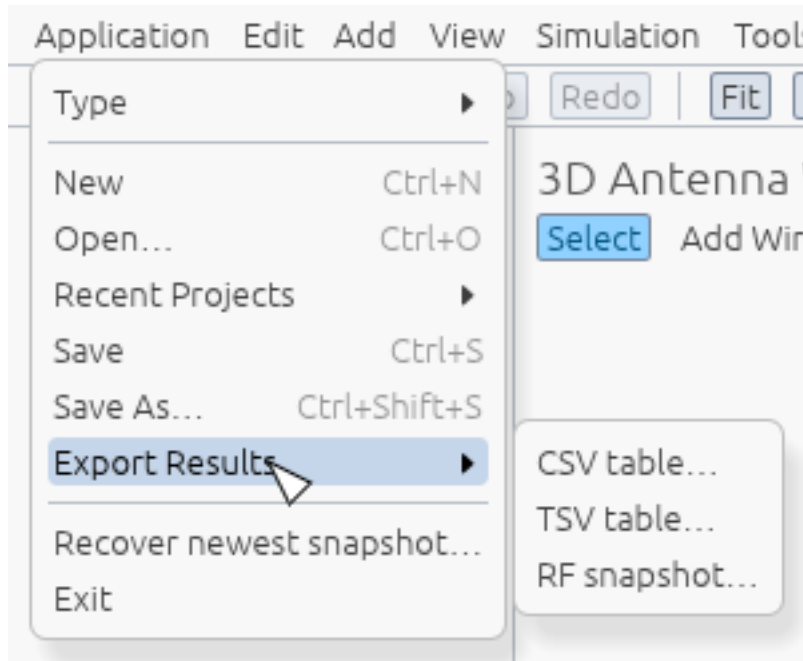


Figure 56. CSV TSV and RF snapshot under Export Results

- **CSV table...** writes a comma-separated numerical table;
- **TSV table...** writes the same table with tab separators;
- **RF snapshot...** writes a JSON snapshot of the selected Feed result for machine use.

Export does not modify the project. Canceling the dialog does not change the destination. If no result exists, the program reports that there is nothing to export. RF snapshot also requires a Feed in the current result.

Before sharing a file, check units, reference impedance, frequency grid, freshness and any non-physical label. Never present a Fake Solver export as a measurement or OpenNEC calculation.

Settings and Help

Settings

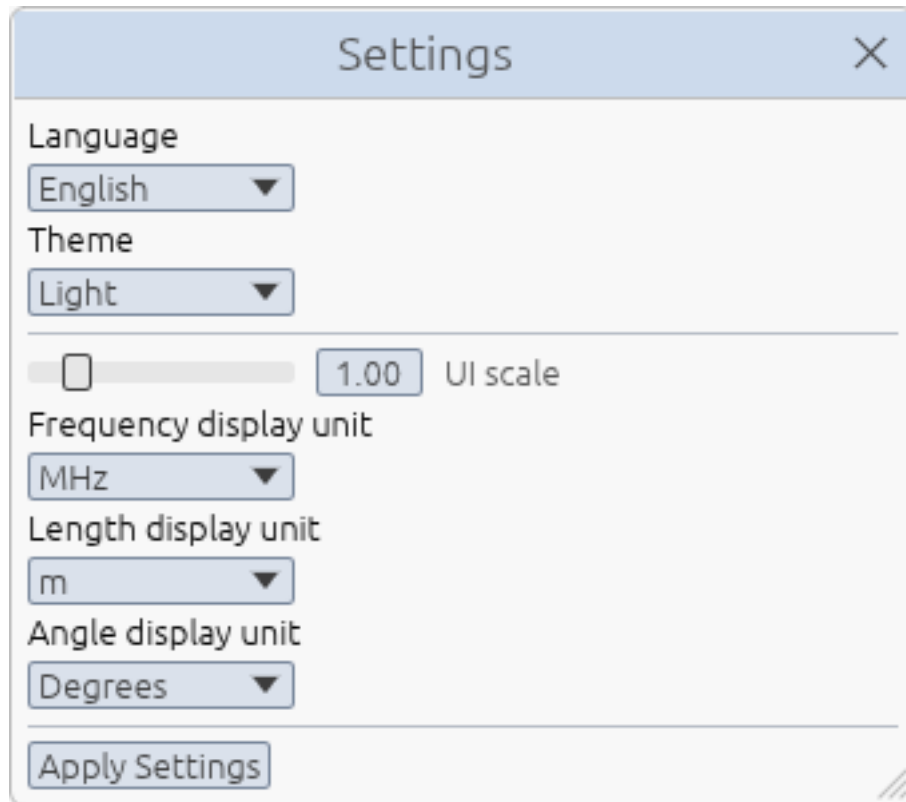


Figure 57. Language theme scale and shared units

Choose **Tools > Settings....** Available controls are:

- **Language** for English or Ukrainian interface text;
- **Theme** for light or dark appearance;
- **UI scale** for larger or smaller interface elements;
- **Frequency display unit**;
- **Length display unit**;
- **Angle display unit**.

Select **Apply Settings**. Unit changes affect presentation, not exact project values. They do not add an **Undo** step, modify .rfaa or cancel a result. Shared scale and units propagate to other open Rainbow RF Lab applications. Language and theme apply to this editor.

Help menu

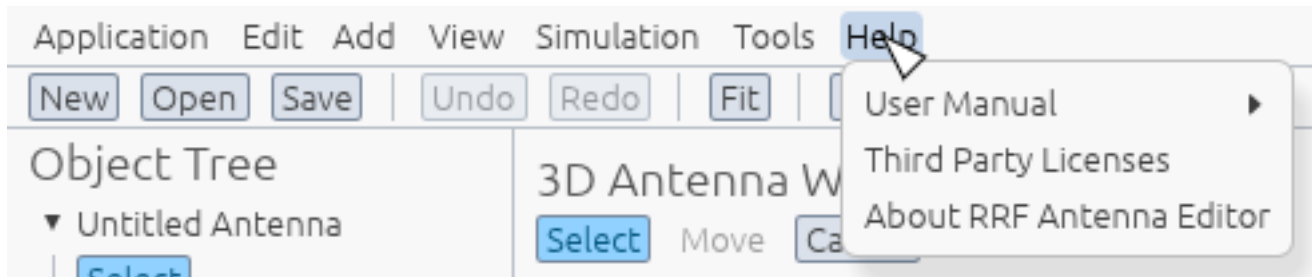


Figure 58. User Manual Third Party Licenses and About commands

User manuals

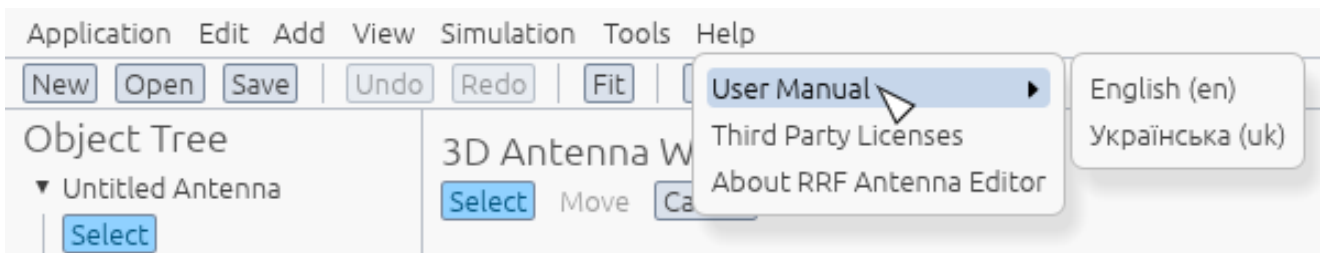


Figure 59. English and Ukrainian manuals in the User Manual submenu

Help > User Manual lists **English (en)** and **Українська (uk)** in every interface language. Select a language to open its PDF in the default viewer. The files are named `RRFAntennaEditor.en.pdf` and `RRFAntennaEditor.uk.pdf`.

If a selected translation is unavailable, the program opens the English manual and reports the fallback in the status bar. The English PDF is mandatory. If it is also missing, nothing else is opened and the status bar reports the error. Reinstall or extract the complete package with its Manuals directory.

Licenses

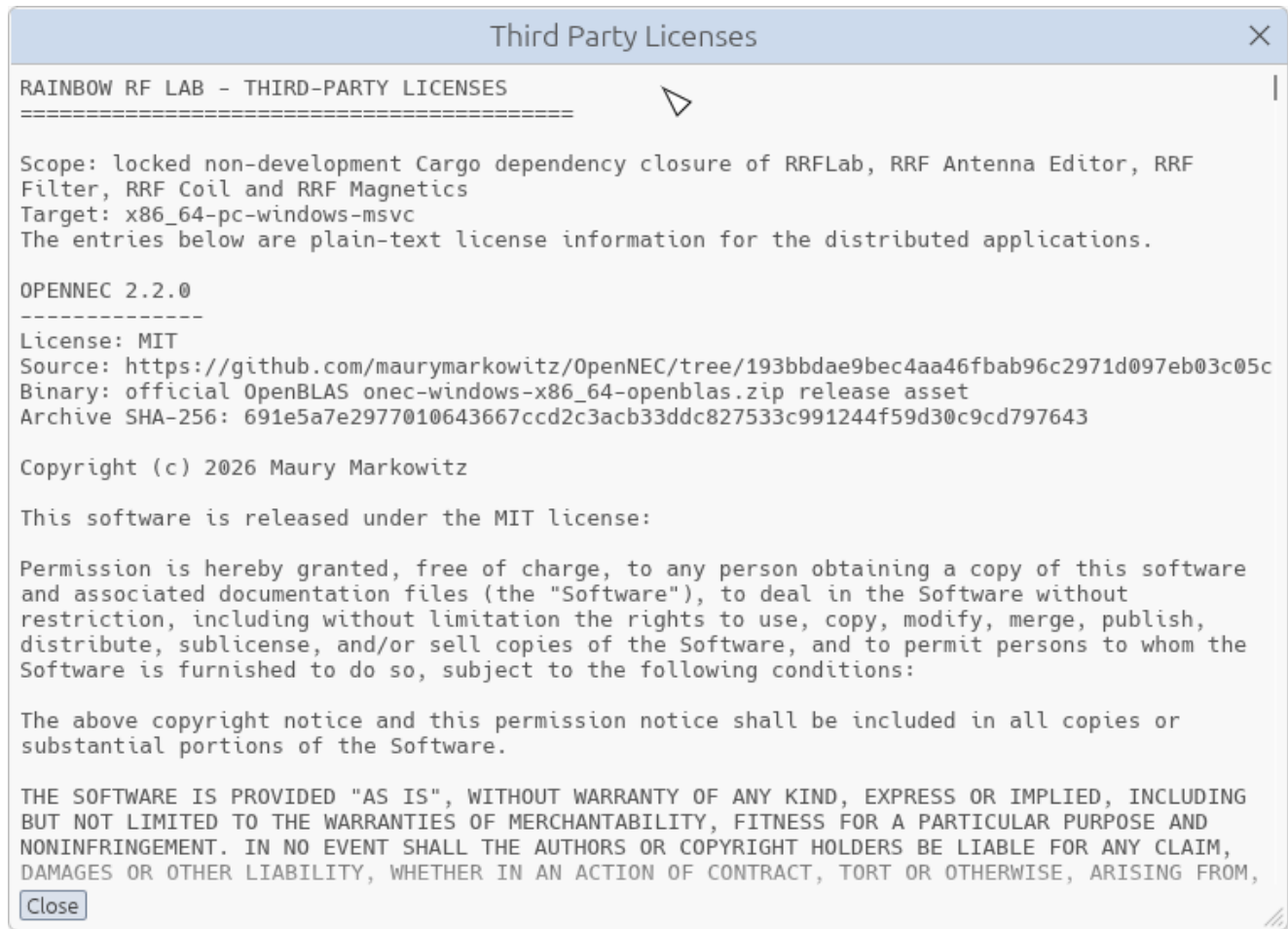


Figure 60. Third Party Licenses window

Help > Third Party Licenses lists third-party components, including solver software. Use it to check redistribution terms.

About

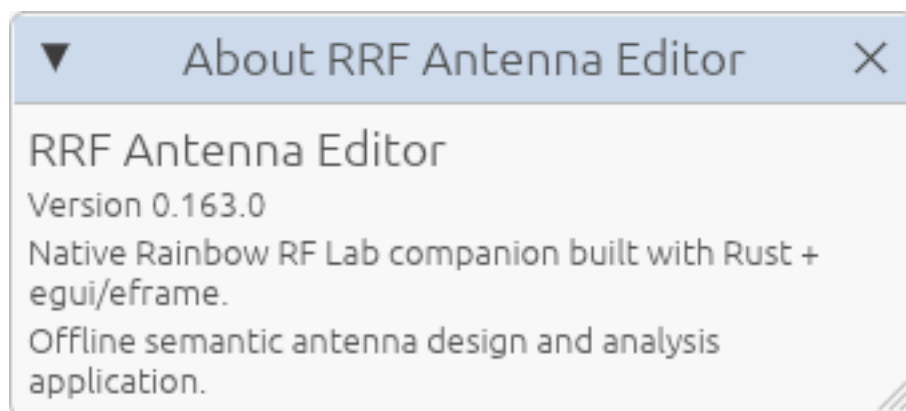


Figure 61. About RRF Antenna Editor window

Help > About RRF Antenna Editor shows the product name and shared Rainbow RF Lab version. Include this version when sharing a project or reporting a problem.

Common workflows

Quick dipole at one frequency

1. Select **New**.
2. Choose **Half-Wave Dipole** and **Next**.
3. Enter **Target frequency** and **Installation height**.
4. Select **Create Antenna**.
5. Check dimensions, ground and **Reference impedance**.
6. Select **Calculate Antenna**.
7. Read **Overview**, **SWR**, **R / X** and **Smith**.
8. Inspect **Pattern 2D**, **Pattern 3D** and **Currents** when available.
9. Make one change, recalculate and compare the result.
10. Save through **Save As...**

Checking operating bandwidth

1. Create or open an antenna with a Feed Point.
2. Choose **Simulation > Frequency Sweep...**
3. Enter task-appropriate **Start** and **Stop** values.
4. Select enough **Points**.
5. Select **Start sweep**.
6. Find the lowest sampled SWR in **Overview** and **Exact table**.
7. Check **R / X** and **Smith** over the entire range.
8. Set an important active frequency and run a single calculation for pattern and currents.

Tuning a Yagi

1. Create a **Yagi** with the wizard and set **Total elements**.
2. Switch to Engineer.
3. Select the driven element, reflector or a director.
4. Change one element length or position.
5. Run a sweep and inspect matching.
6. Run a single calculation at the target frequency.
7. Point inside **Pattern 2D** and inspect exact Azimuth or Elevation and Gain.
8. Repeat for the next change and save the accepted variant.

Manual geometry

1. Switch to Engineer.
2. Choose **Add > Antenna Templates > Simple > Straight Wire**.
3. Set start and end in the workspace.
4. Check coordinates, diameter, material and segmentation in **Properties**.
5. Add other wires and required junctions.
6. Add a **Feed Point** to the correct component.
7. Verify the exact scene through **View > Exact Scene Table**.
8. Run a physical calculation and address every visible diagnostic.

Diagnostics and recovery

Symptom	Action
Wizard Next is unavailable	Select one template
Cannot create antenna	Correct the visible field, unit, sign or bound order; the current project is unchanged
Feed Point is unavailable	Select one conductive component
Calculate Antenna is unavailable	Check the Feed Point and packaged OpenNEC; use the complete build or package
Start sweep is unavailable	Enter positive increasing Start and Stop and 2 through 201 Points
Result is Stale	Recalculate after the antenna change
Currents unavailable after sweep	Run a single calculation at the required active frequency
Pattern 2D or Pattern 3D is empty	Check whether the single-frequency backend returned a radiation pattern
Gain Unavailable	Absolute gain is absent; do not substitute a relative level
Export does not start	First obtain an available result and Feed
Optimization does not start	Create and bind a named parameter, add a Feed and check the backend
Panels are inconvenient	Change UI scale or choose Reset Workspace Layout
Save failed	Read the status bar and check directory access; do not treat the modified project as saved
Project did not open	The current project was preserved; check the extension, file and message, then retry
A snapshot exists after a crash	Choose Recover newest snapshot... , inspect the candidate and save it explicitly

Do not delete the last valid file until a recovered or converted copy opens and passes inspection. Recovery does not replace ordinary **Save**.

Keyboard and accessibility

Main shortcuts are:

Shortcut	Action
Ctrl+N	Open the New wizard
Ctrl+O	Open
Ctrl+S	Save
Ctrl+Shift+S	Save As
Ctrl+Z	Undo
Ctrl+Y	Redo
F5	Calculate at the active frequency

Control labels and exact numerical alternatives prevent conclusions based only on plot color or shape. Use a table or textual alternative for exact values. If text is too small, increase **UI scale**; do not change engineering units only to change font size.

Working with Rainbow RF Lab

In Rainbow RF Lab, open an RRF Antenna module in the visual editor through **Open visual editor...**. The editor works with the same antenna content. After **Save** and close, the accepted change returns to the selected module.

The module can also use **Load from file...** for .rfaa. After a successful load, **Antenna preview** helps recognize geometry. It does not mean OpenNEC has already calculated the antenna.

If editing is canceled, the editor fails, or it returns an unusable file, the Rainbow RF Lab module remains unchanged. If the target module changed while the editor was open, reopen its current version and repeat the edit instead of assuming automatic merging.

An impedance result can be passed to a compatible module through **Project Flow**. Before connecting it, check the frequency grid, reference impedance, reference plane, freshness and provenance.

Responsible-use limits

RRF Antenna Editor is an engineering calculation tool. Before construction, check mechanical strength, materials, insulation, clearances from people and structures, safe power, grounding, lightning protection and regulatory limits.

Use measurements on the completed construction to confirm the model. Calibration, cable, adapters, height, ground and nearby objects can materially change the result. Do not transmit merely because calculated SWR appears acceptable.

Keep the frequency, reference impedance, installation conditions, program version and accepted assumptions with the project. This makes later analysis and comparison with measurements understandable.