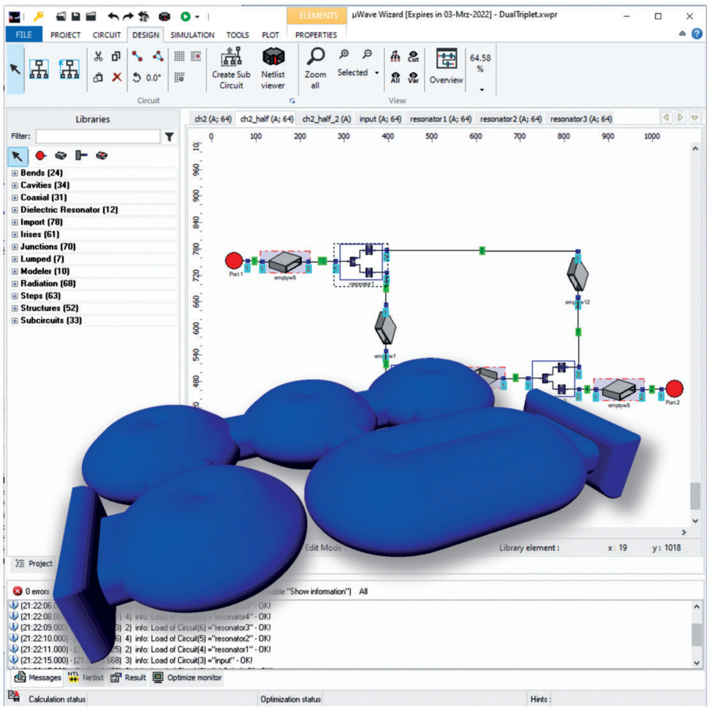
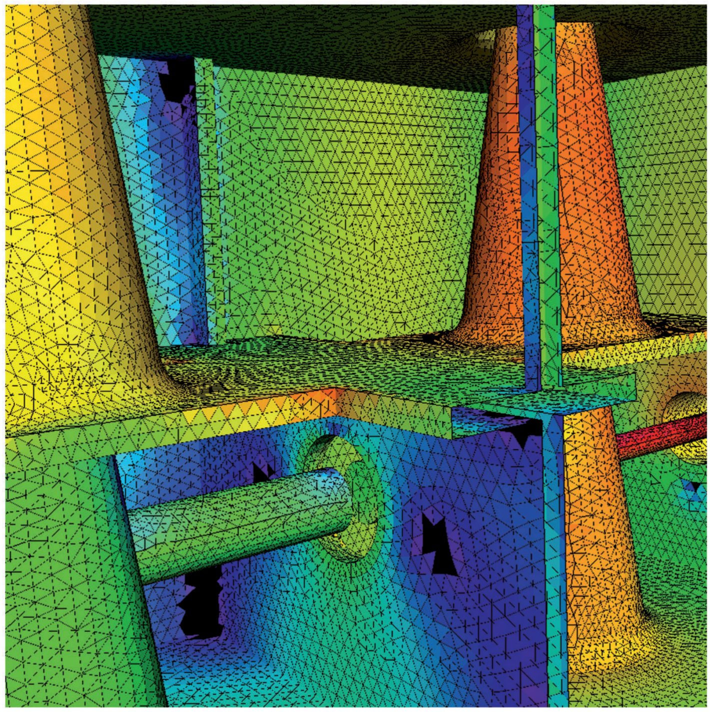
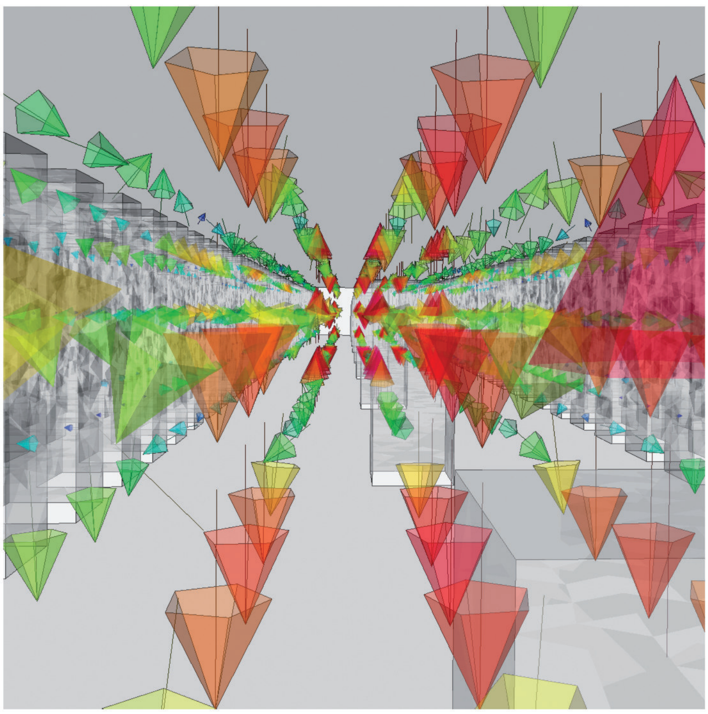
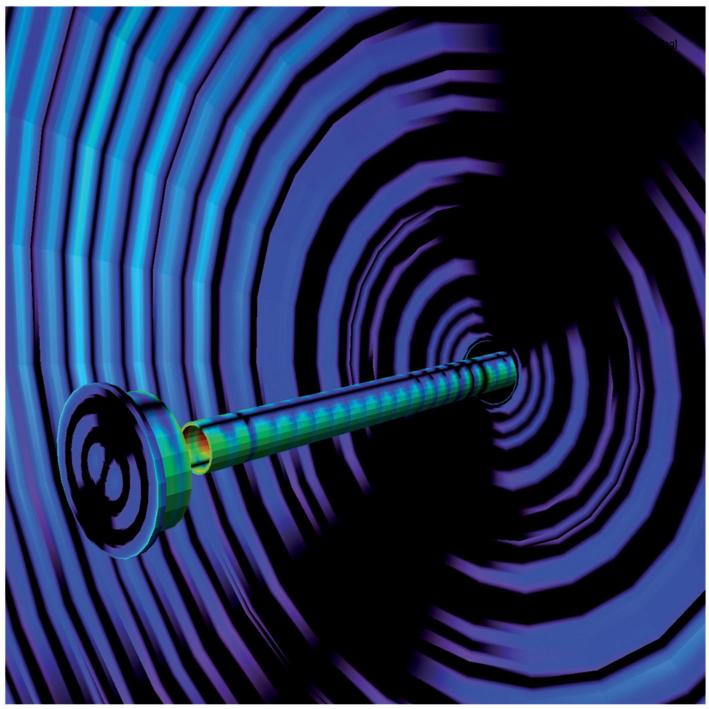
MiCIAN µWave Wizard









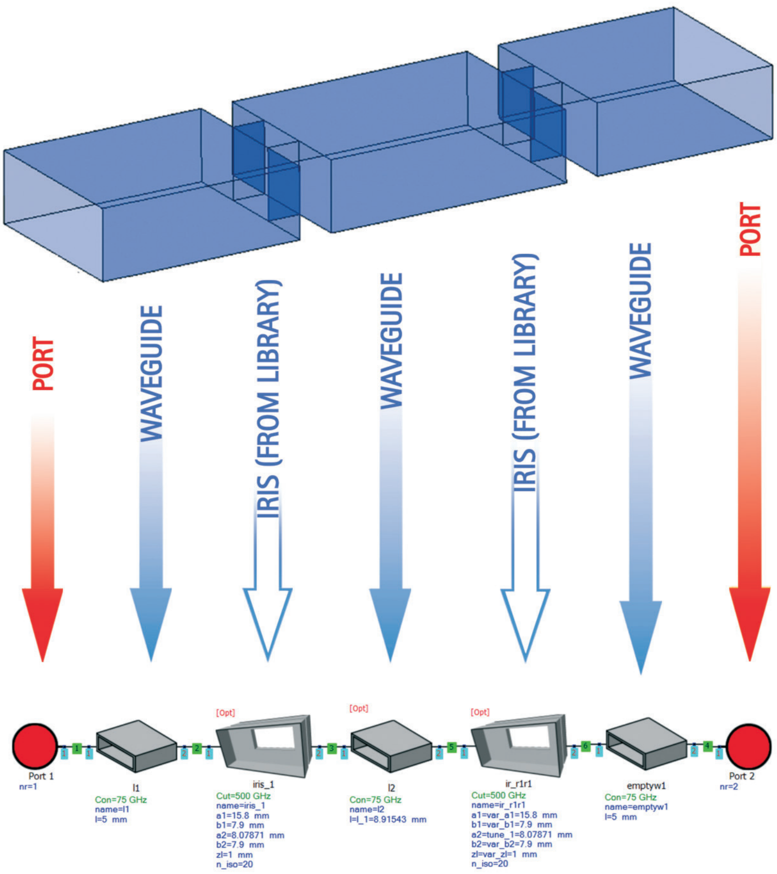
MiCIAN µWave Wizard

µWave Wizard™

µWave Wizard™ is a full wave 3D EDA-design suite that combines the flexibility of Finite-Element-Method (FEM) with the speed and accuracy of Mode-Matching (MM) for the simulation and optimization of passive microwave systems and components, including antennas.

The concept of µWave Wizard™

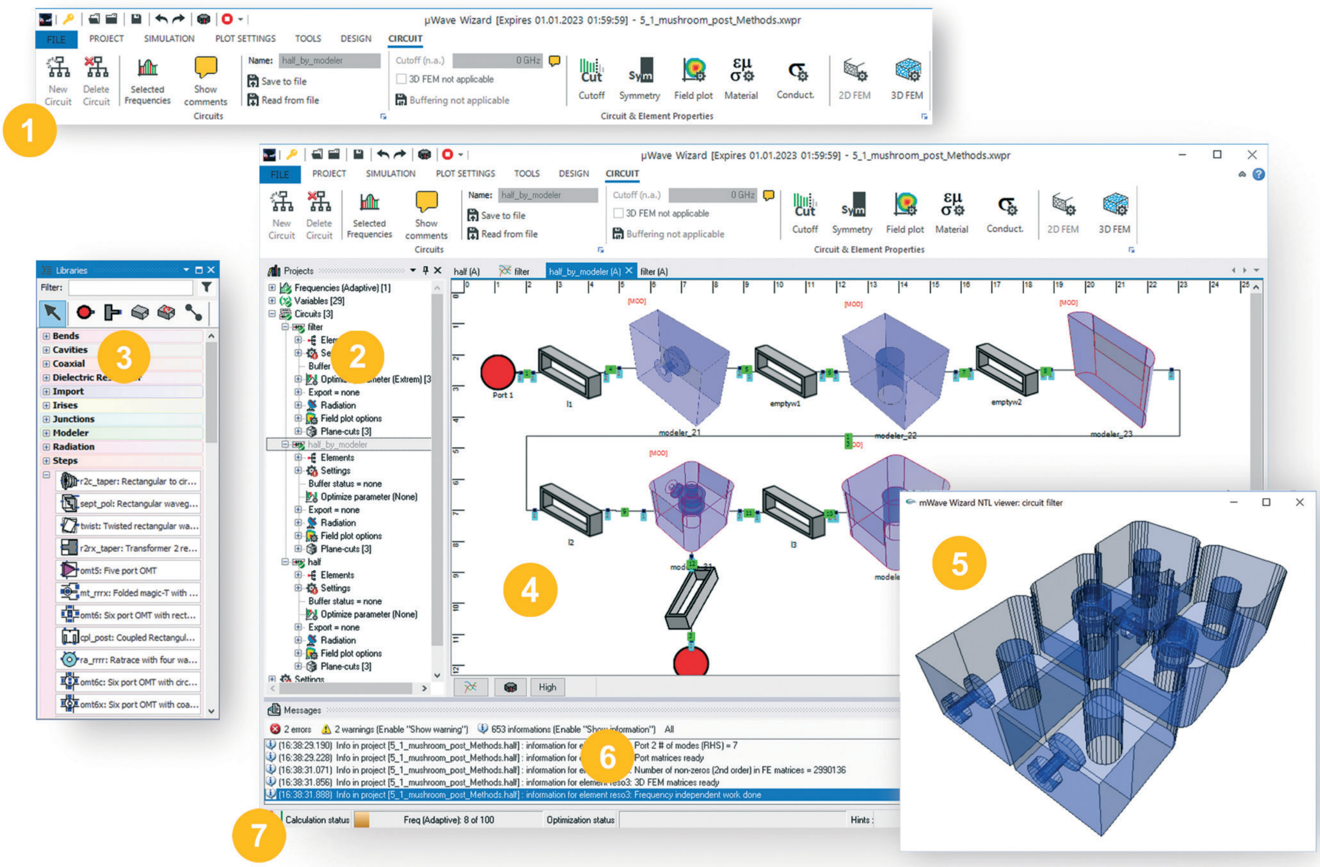
The conventional approach of drawing a complex structure entirely in 3D has been extended to cascade user-generated elements with pre-defined library elements. These libraries contain single elements such as irises, cavities and junctions but also complex structures such as OMTs, polarizers and horns. All elements are parameterized and enable the user initial designs as well as modifications within minutes. It also allows the user to optimize complex structures to meet challenging specifications. The µWave Wizard™ software suite offers optimizer and synthesis tools.



Complex structures can be composed from pre-defined library elements and user-defined elements in a schematic editor. By cascading simulated RF performance of all individual components, the frequency response of the complex structure can be accurately predicted. Each element is fully described by its modal scattering matrix. Applying a hybrid solver concept, each element is simulated using the fastest and most accurate solver for the respective geometry. The user can simply control accuracy and speed through the number of modes. The number of modes is defined by the cutoff ("cut") frequency of the highest considered mode.

"Rapid design and fast execution times shorten the development cycle of RF components. These major advantages of the concept of µWave Wizard™ will provide you a quick return on your investment."

User Interface



1. Ribbon type UI : µWave Wizard features a ribbon type User interface (UI) , offering a user friendly desktop environment with the familiar appearance and convenience of office software. Intuitive icon type shortcuts and editors, distributed across the ribbons, help understand each task more quickly and easily. Tabs for Project, Circuit, Design, Optimizer, Tools and Plots are easily accessible.

2. Project Tree View: The project tree view provides all information about the project such as frequency settings, variables, circuits including sub-circuits and default settings like units, accuracy, symmetries and material properties. The GUI features separate identification of variables belonging to a selected circuit.

3. Libraries: µWave Wizard offers an integrated library with over 450 pre-defined key building elements such as irises, cavities, steps, bends, junctions, coaxial probes, radiation, entire structures (i.e. tapers, OMT's) and more. Libraries for the import of scattering parameters and 3D CAD files, ideal filter parameters and sub-circuits are available.

4. Schematic Editor: µWave Wizard's schematic editor allows the creation of three dimensional structures based on key building blocks.

5. 3D-Viewer: The OpenGL based 3D viewer provides the visualization of circuit geometries, mesh files and field patterns. It offers a built-in postprocessor for 3D FEM solutions and enables the graphic to be exported to common CAD formats, like STL, DXF, STEP and IGES. Real time 3D visualization of all library elements is included.

6. Info Panel: The info panel displays messages, the current netlist and serves as an optimization monitor.

7. Status Bar: The status bar shows run time information such as analysis and optimization progress.

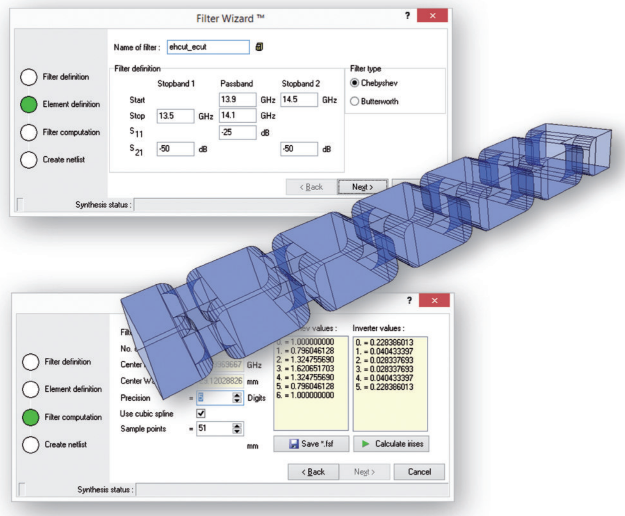
Filter Coupling Matrix Synthesis

The filter coupling matrix synthesis feature supports predefined topologies, including inline, triplets, quartets, dual-mode, and folded configurations, as well as the flexibility to create arbitrary user-defined topologies. It supports extracted pole filters with non-resonating nodes (NRN) and mixed extracted pole/cross-coupled topologies. The synthesis provides precise control with real and pairs of complex (equalization) frequency transmission zeros (TZ). The on-the-fly preview of the filter frequency response includes group delay and losses from finite Q-factor resonators. The synthesis offers easy manual tuning of the filter response with sliders and optimization.

Bandpass Filter Synthesis

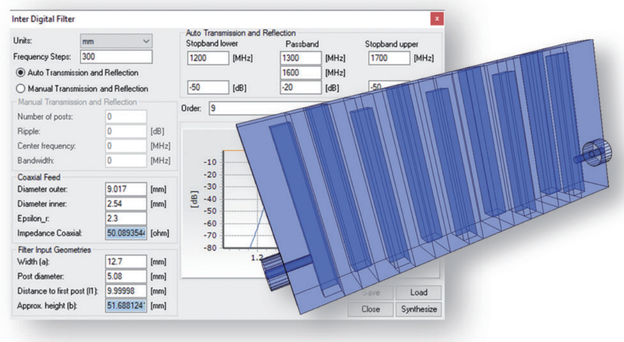
The waveguide filter synthesis tool automatically generates Chebyshev- or Butterworth bandpass filter models based on user specifications. A built-in spline interpolation algorithm significantly accelerates the calculation of inverter values. The synthesis process creates a complete 3D model of the filter. It also generates a schematic containing the set of geometries necessary to build the filter.

One project can include several synthesized filters in form of sub-circuits, a convenient feature for multiplexer designs. Individual filter channel specifications are automatically assigned to goal functions of the respective sub-circuit. Channel specific optimization goals can be selected and shared between individual filters or can be used to create optimization goals for the entire multiplexer.



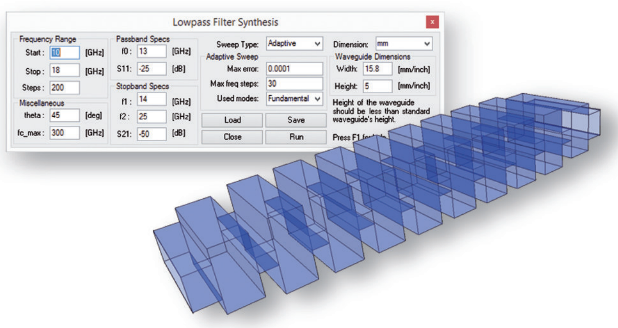
Interdigital Filter Synthesis

With the interdigital filter synthesis tool it is possible to synthesize interdigital filters in just a few steps. The desired filter parameters can be specified (desired order, insertion loss, ripple level, bandwidth, etc.), just as the input geometries of the filter and the dimensions of the coaxial feed. Analysis and optimization of the synthesized filter are supported.

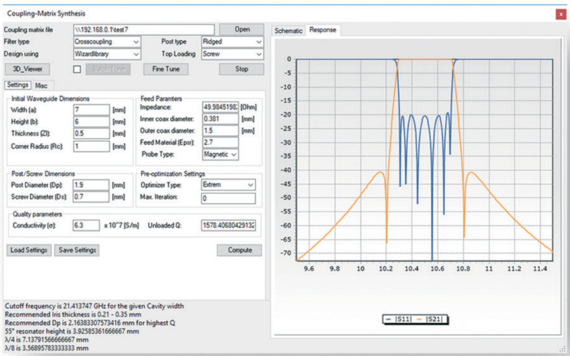


Lowpass Filter Synthesis

µWave Wizard™ supports a user-friendly lowpass filter synthesis tool. As a result of the low pass synthesis a complete schematic is being generated. This schematic includes a sub-circuit hierarchy, the setup of the variables including extensions and the setup of the goal function from given specifications. In exceptional cases a short post optimization may be required because µWave Wizard™ takes higher order modes into account while the synthesis is based on a fundamental mode connection.

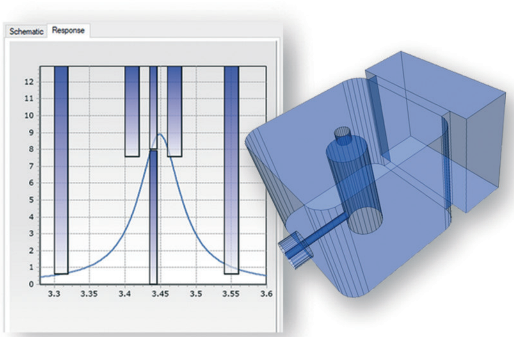


Filter Workbench Tool



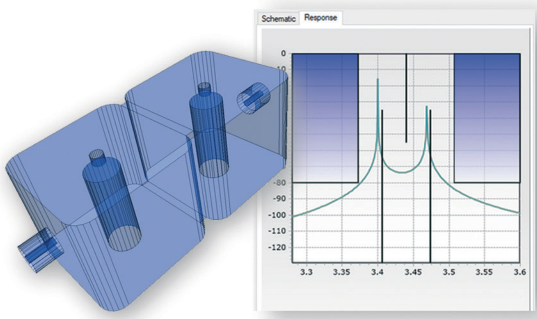
This tool is developed based on the relationship between the coupling matrix and physical dimensions of a filter starting with an imported coupling matrix scheme or by user provided specifications (like order, bandwidth, ripple, transmission zeros). The tool can be applied globally to any kind of microwave filters like waveguide, combline and microstrip.

The procedure towards designing a specific filter is straight forward and requires only a few manual inputs from the user to start the synthesis. The subsequent steps are fully automated and lead to the dimension of the filter for manufacturing. A major advantage is that the user can run later each intermediate step for an individual adjustment also.

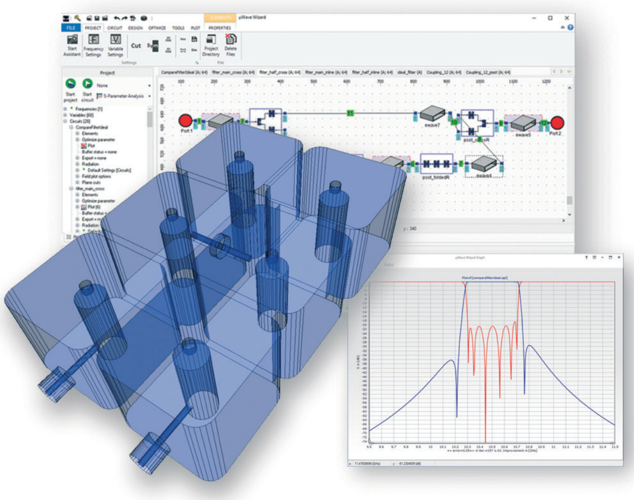


First, the user has to provide either the coupling matrix or the specifications of the filter such as, order of the filter, bandwidth, return loss, transmission zeros and conductivity. Secondly, a filter topology can be selected among various models: inline, cross coupled, waveguide filter, combline filter, electric probe, magnetic tapped probe, tuning screw etc.

Thereafter, initial dimensions will be required to be entered by the user according to the selected topology (waveguide housing, post and screw diameter, etc.). The program automatically calculates the impedance based on given feed parameters in case of a combline filter for example, hence, the user has the possibility to try out various combinations for a feed either with an electric probe or magnetic tapped probe.



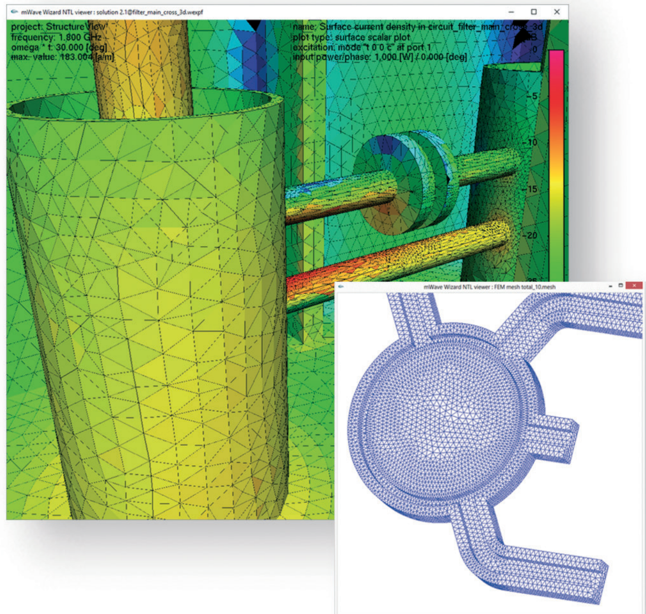
Once the theoretical filter and the topology parameters have been defined, the program computes in the first step the unloaded quality factor and informs the user about a few recommended geometry settings for an improved performance like iris thickness and post diameter for example. At this point the user can change the input geometry parameters according to the recommendations or simply continues with the provided dimensions. In parallel, a plot window visualizes the response of the specified ideal filter.



Once the topology and initially required geometries are fixed, the synthesis will start an automatic procedure. For each coupling the tuning of single resonators will be done individually while a phase correction take place afterwards. Thereafter, the initial construction of a complete filter can be obtained very quickly and leads to very good starting geometries for a post optimization. In case of a fast construction of an initial prototype, the program provides the possibility of a manual or half automated tuning of each individual coupling circuit towards the complete final filter.

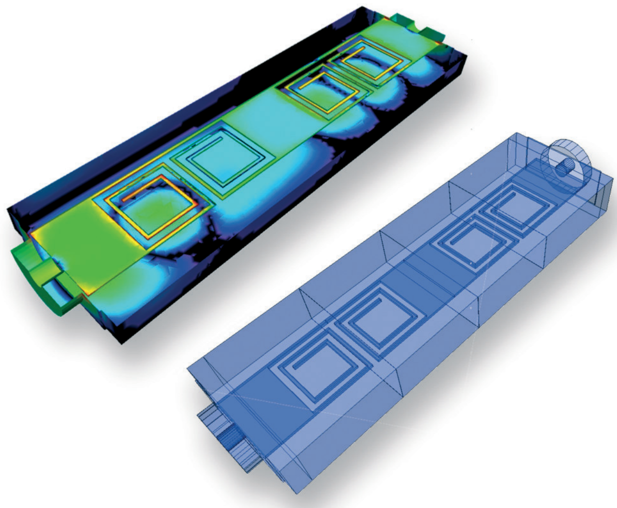
3D-FEM

Based on 3D vector finite elements (1st and 2nd order edge elements), µWave Wizard supports the analysis and optimization of elements with complex geometries not suitable for Mode Matching method. These are user defined elements from the modeler or library elements i.e. screws or probes penetrating into cavities, draft angles for die-casting technique and smooth wall profiled tapers. The modal absorbing boundary conditions at the element ports ensure full multi-modal compatibility and interchangeability with all other (MM, BCMM and 2D FEM) elements at the S-parameter level. Lossy and anisotropic materials, such as ferrites, are fully supported. Creation of the element surfaces and the tetrahedral volume meshes is fully automated, including automated local mesh refinement around critical geometries. User-supplied geometries can be imported from CAD files (STL/STEP/IGES).



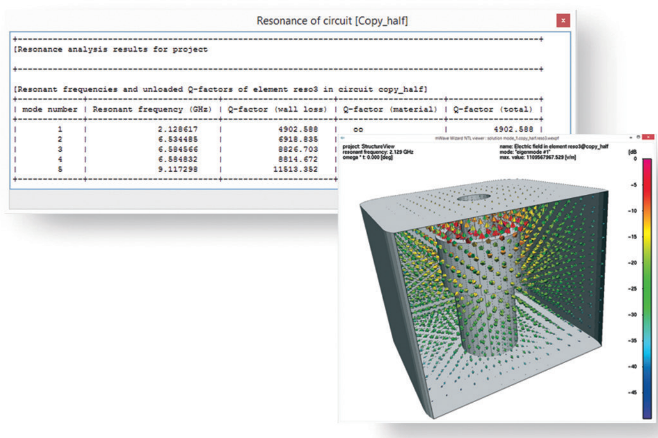
Field Analysis and Visualization

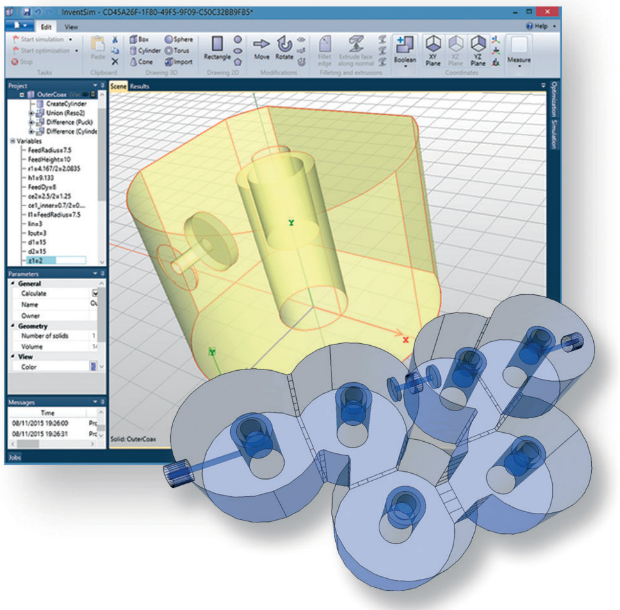
The field analysis is suited for the visualization of the electric and magnetic fields at critical parts inside waveguide circuits. From the output of the field plots the user can estimate the power handling capabilities of filters and transitions and thus eases the CAD of high-power microwave devices. for the "normal" field calculation with MM/BCMM and 2D-FEM. The difference between a field calculation of MM/BCMM/2D-FEM based elements to 3D-FEM elements or circuits is, that 3D vector plots of the fields are generated for the whole volume instead of plots along certain planes. Losses, either dielectric or caused by finite surface conductivity, are an integral part of the calculation. Furthermore the solutions can be exported to animate the propagation of the fields as a scalar of vector plot.



Resonance Analysis

The computation and optimization of resonant frequencies is of particular importance in the process of designing filters, especially in the design of combline and dielectric resonator filters. µWave Wizard™'s 3D-FEM solver offers the opportunity to determine and optimize the resonant frequency of almost any structure. Besides computing resonant frequencies, the resonance analysis tool also simulates the electromagnetic fields within the resonator and computes the resonator's Q-factor. Using µWave Wizard™'s 3D-viewer, the resonance analysis tool supports visualization and plotting of electromagnetic fields of resonant modes.

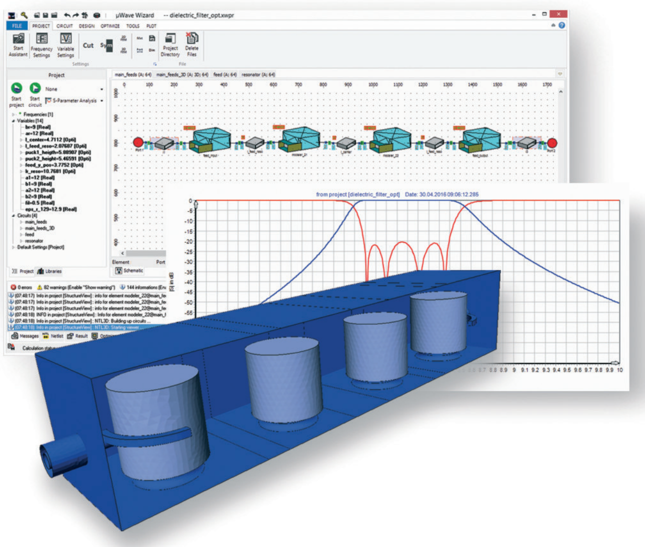




Modeler

µWave Wizard includes a graphic modeler which is directly accessible through the µWave Wizard modeler library. The integrated modeler is a versatile 3D editor capable of creating and modifying geometrical models of 3D and planar structures. Complex geometries are created from simple objects e.g. boxes, cylinders, rectangles and then modified and/or subjected to Boolean operations (union, subtraction, intersection). Whenever an object is created or modified, the action is added to the object's operation list which acts as a blueprint. This simplifies and speeds up the designs and further modifications of the structures.

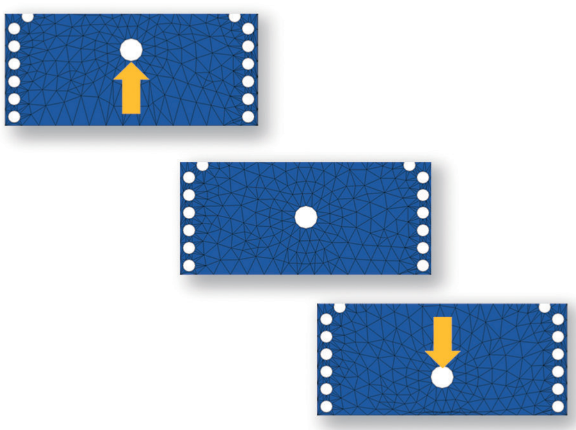
The modeler also offers a different design approach. First, a two-dimensional cross-sectional profile is created using 2D primitives. Second, the profile is extruded along a line to create a 3D structure. Other features for the construction include, creation of arrays of objects using the cloning tool, fillets and chamfers to create accurate models of devices manufactured with machining radii, and creating structures with ruled surfaces.



Thanks to parameterization of all operations on geometries, the dimensions and other parameters of structures can be quickly changed in particular during an optimization. The structure is rebuilt automatically according to the new parameters. All variables are synchronized between the modeler and µWave Wizard's GUI. The connection between modeler elements is supported by the multimodal scattering matrix. No normalization or manual sorting of modes is necessary.

Two different (direct/iterative) solvers are directly associated to the modeler. These solvers are using a set of hierarchical basis functions up to 3rd order and curvilinear tetrahedral elements which result in accurate shape modeling of curved and complex geometries.

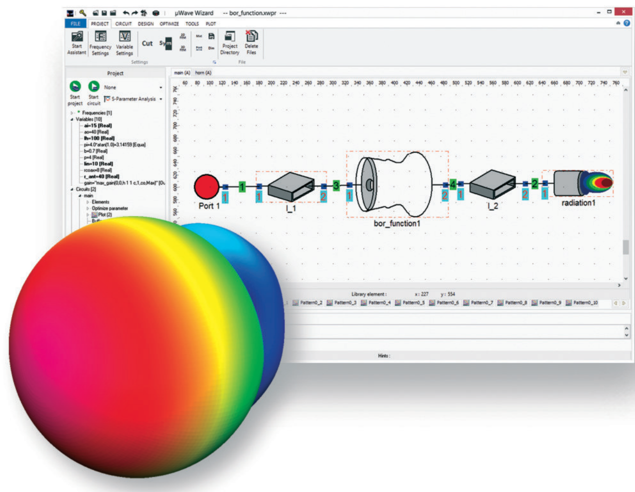
3D Mesh Morphing



Mesh morphing a is new feature for the acceleration of the 3D-FEM computation and optimization. With mesh morphing the mesh topology is kept constant as long as possible, instead the mesh nodes are moved only as the geometries are changed. Thus the "noise" introduced by mesh generation is significantly reduced, which improves the convergence of gradient type optimizers, like the "Extrem" or "Powell" optimizers. This convergence behaviour of the mesh morphing technique is comparable for gradient type optimizers to pure MM elements even with a very coarse discretization. The computation is faster, since the mesh generation is done only at beginning of the optimization. This feature supports the parametrized 3D-FEM based elements as well the 3D-FEM simulations on circuit level.

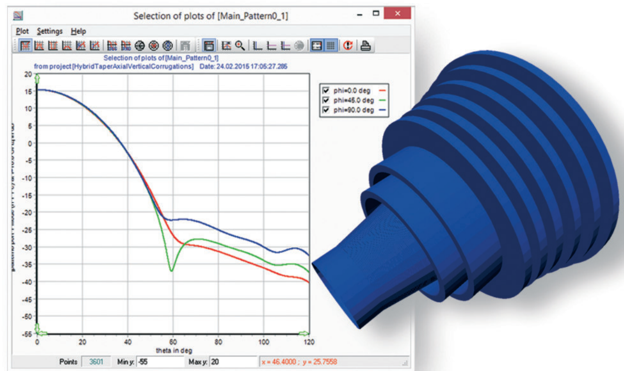
Radiation Feature

This feature supports computation and optimization of far and near field patterns of radiating elements. The excited mode can be selected from the variety of all accessible modes at the respective ports. This enables the design and optimization of complex multi-port feed networks and simultaneous optimization on telecom and tracking mode patterns.



The radiation element is typically connected directly to a circular horn, respectively to a circular waveguide aperture. Depending on the upstream network the radiation element even supports cluster feeds, patch antennas and slot arrays with a moderate number of slots, depending on the radius of the waveguide aperture.

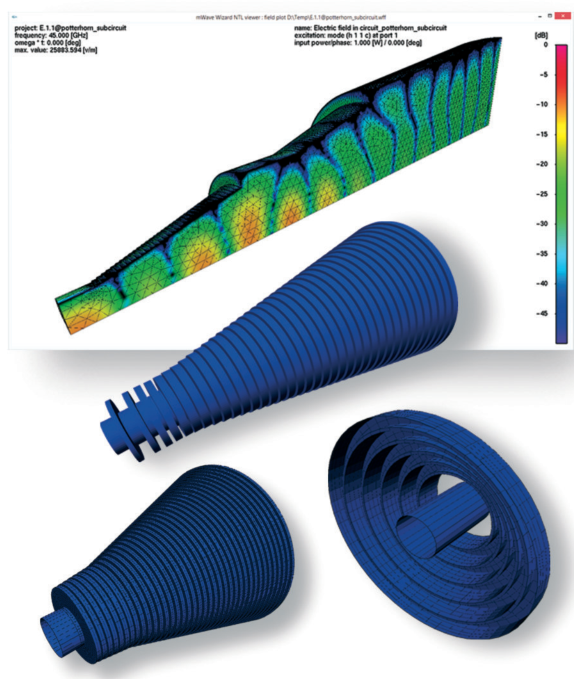
The field patterns are derived from spherical wave coefficients of the radiating element at a fixed radius. This method guarantees very fast computation of a radiating element and provides the pattern as typical 2D and 2D-isoline plots as well a complete 3D plot. The spherical wave expansion coefficients (SWE) are also used for the simulation of reflector antennas and can be exported in ASCII file format as an input for other reflector antenna tools.



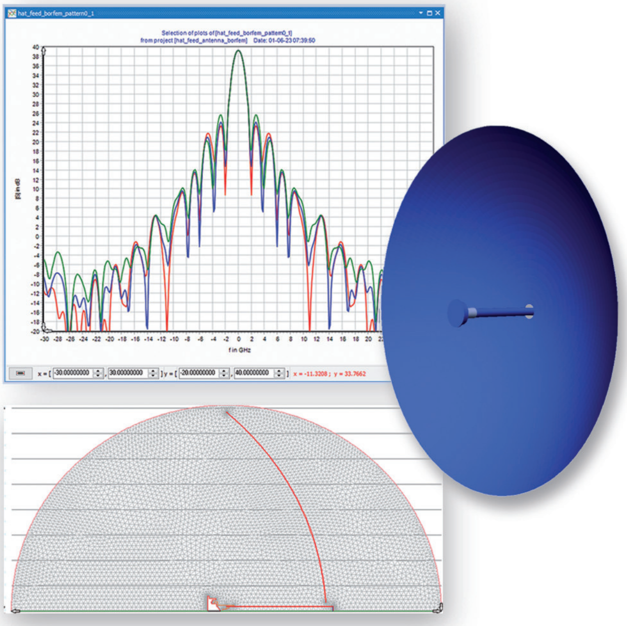
Pre-defined performance parameters such as max-gain, aperture efficiency, 3dB beam width, phase center location, edge taper etc. simplify setting up an antenna analysis or optimization.

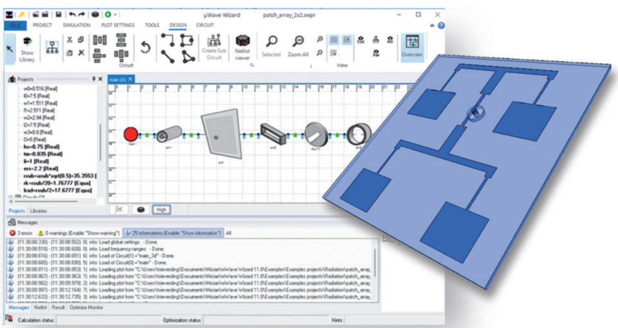
The radiation library includes a set of elements which exploit the body of revolution symmetry of circular waveguide horn antennas. Those library elements widely comply with the specifications for various horn profiles. There are i.e. elements for modified Potter horns, corrugated horns, ring loaded horns and user defined horn profiles. These elements facilitate a much easier setup of the entire horn geometry.

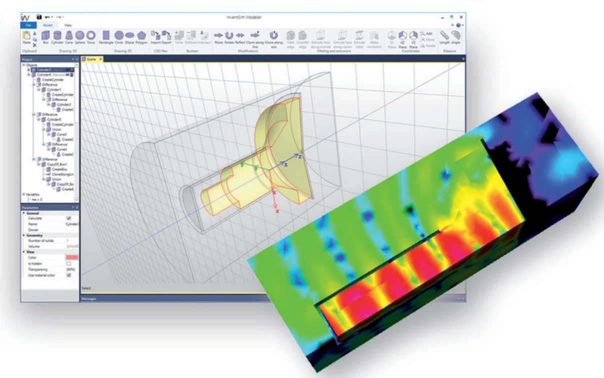
Although the set of BOR elements is being calculated with Mode Matching, the elements accelerate the computation for simultaneous analysis for fundamental and higher order mode excitations by sub-divisions of the set of modes into de-coupled axial orders. The elements are equipped with particular types of output and calculation capabilities. Unlike other elements where electromagnetic fields are calculated only at one given position (e.g. iris cross-section) and a single excitation (amplitude/phase), the filed calculation inside the BOR elements comprises the entire structure and calculates the maximum over all incident phases. Simultaneous analysis and optimization of the antenna pattern, of the transmission and of the reflection coefficients of complex networks is possible.

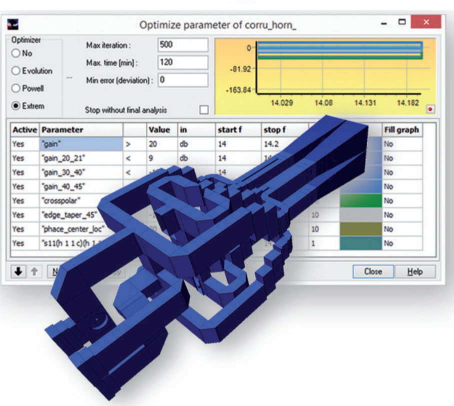


Furthermore, user-defined macros allow for a quick and simple definition of the antenna geometry by using only a few input parameters.









In addition to the default radiation pattern simulator which was based on Spherical Wave Expansion Mode Matching techniques there are two additional antenna simulation features.

BOR FEM

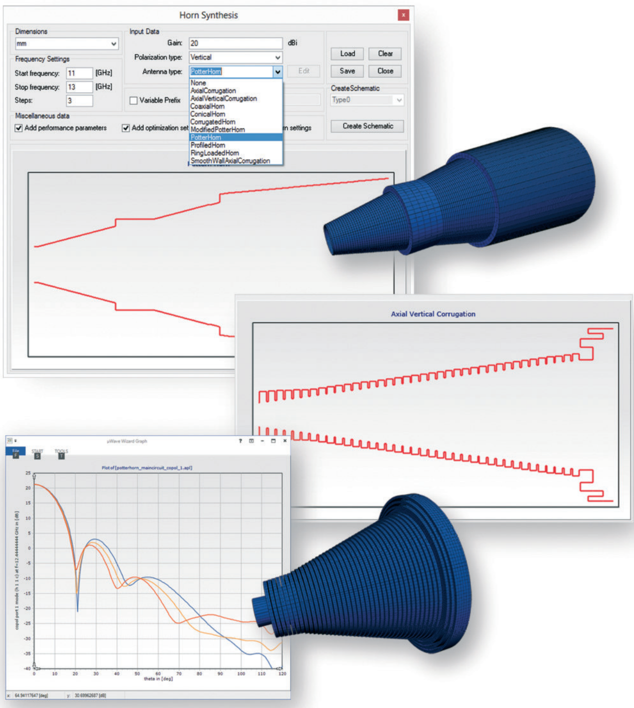
The new parallel direct 2D FEM solver, featuring 1st and 2nd order base functions, empowers the user to analyze radially symmetric structures significantly faster, using less computational resources and with improved accuracy compared to 3D FEM. The BOR elements as well user defined modeler elements support the automatic cutting of 3D structures, ensuring seamless integration with the modeling process. Mesh truncation for radiating structures with Spherical Wave Expansion (SWE) or Absorbing Boundary Conditions (ABC) allows accurate simulation of radiation patterns. An eigenvalue solver provides precise determination of resonant frequencies and Q-factors. For example, the computation time for the reflector antenna shown here is about 130 seconds per frequency point, using 498,000 unknowns, with back scattering strictly taken into account.

Radiation by user defined antennas

This method -although typically slower in comparison- has the advantage of being more versatile than the other radiation features. Conceptually, the method matches the fields of a 3D-FEM meshed volume with those radiating into free space, either using Spherical Wave Expansion (SWE) techniques or Absorbing Boundary Conditions (ABC) on the outer surfaces. For computational purposes, the tool wraps an artificial layer of roughly lambda/4 thickness around radiating areas. Subsequently, the entire volume will be discretized and meshed using 3D-FEM before applying SWE at the radiating boundaries for simulating free space far field patterns or applying ABC in conjunction with near-to-far field transformations. The method allows for simulating radiation patterns at any angle or direction of antennas of reasonable size, composed of arbitrary shapes or materials.

Optimization on antennas

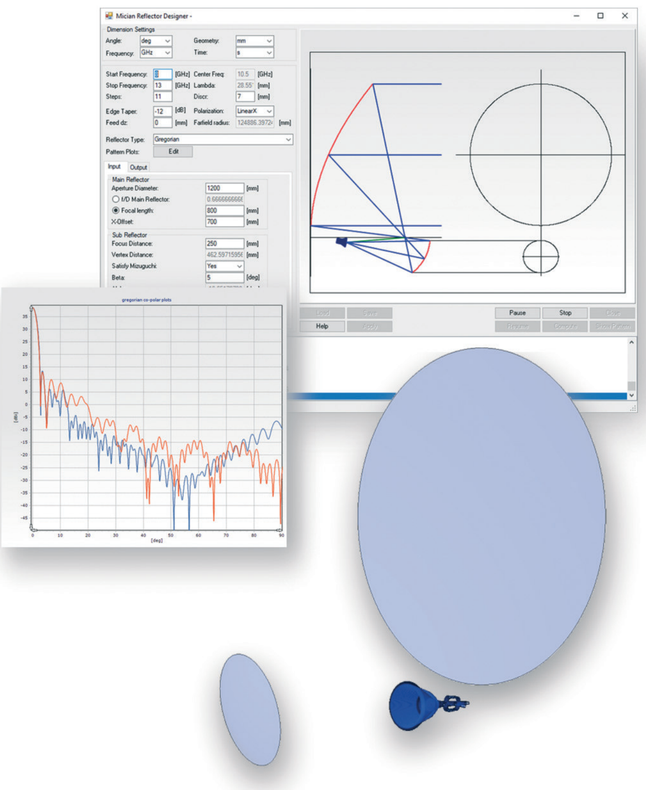
Besides supporting optimization of general scattering matrix parameters µWave Wizard also includes provisions for optimizing antenna specific parameters. Performance parameters such as co-polar and cross-polar gain, phase center location, edge taper, 3dB beam width as well as equation-based performance parameters can be defined within the optimizer window, allowing for optimization of feed or radiation pattern specific requirements. In terms of processing there is no difference between optimizing antennas and reflectors or optimizing feed networks. A complex assembly such as a feed network containing filters, couplers, junctions and polarizers can be optimized together with antenna and reflector as one single process whereby all geometries defined as optimization variables will be modified for optimum RF performance.



Horn Antenna Synthesis

The horn antenna synthesis tool supports synthesis of typical horn antennas. The synthesized horn antenna profiles are computed by µWave Wizard's™ Body of Revolution (BOR) horn antenna elements. Analysis and optimization of multimode and tracking horn designs are supported.

The synthesis tool offers choices for selecting from the following profiles: conical horns, dual mode horns (Potter horn), modified Potter horn, profiled smooth wall horn, corrugated horns with corrugation perpendicular to the horn axis, ring loaded corrugated horns, corrugated horns with axial corrugations, coaxial waveguide corrugated horns and hybrid geometry horns with axial and vertical corrugations. As a result, the schematic of the entire structure is automatically generated and commonly used performance parameters are assigned as optimization goals. A post optimization can be started directly after the synthesis to meet the performance specifications. Moreover the new antenna circuit can be connected to a feeding network and an optimization on the antenna performance parameters as well scattering matrix parameters of the complete network is supported.



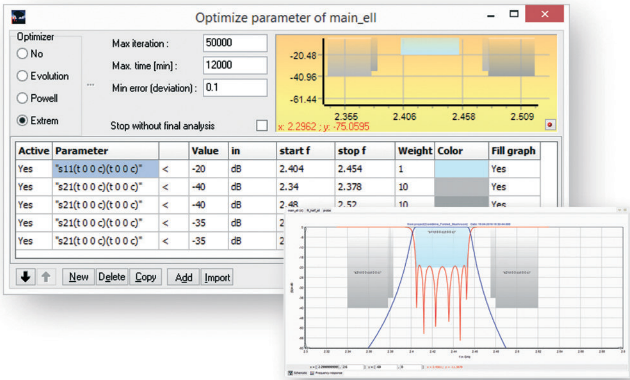
Reflector Designer

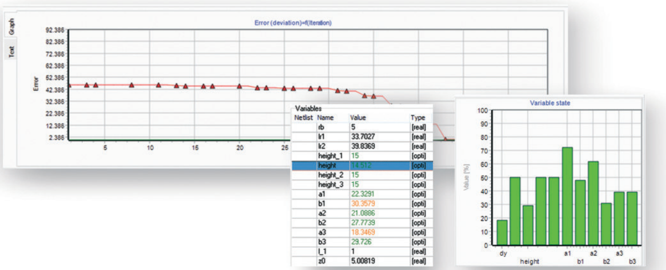
The Reflector Designer is capable of designing several reflector and sub-reflector types ranging from very basic structures like parabolic and hyperbolic to more complex structures such as Displaced Axis (DAX) Cassegrain/Gregorian reflectors. This tool also offers the option of creating any user defined reflector or sub-reflector.

The incident EM-field on the reflector is calculated using spherical wave expansion of the radiated horn antenna field. The calculation of the far field of basic reflectors such as paraboloid, hyperboloid and ellipsoid is being performed by Physical Optics (PO) approximation. The radiated reflector field is also available as spherical wave expansion coefficients, which can be applied as feeding system into other reflectors. The definition of the reflector geometry is completed by just a few parameters only.

Additionally to the computation of the reflector and the feeding by a horn it is also possible to use the Reflector Designer tool independent from the µWave Wizard engine. The design procedure and the synthesis are the same but the computation is based on a Gaussian beam excitation and this leads to very short computation times. For standard reflectors a Gaussion quadratur instead of triangles is supported too.

Optimization

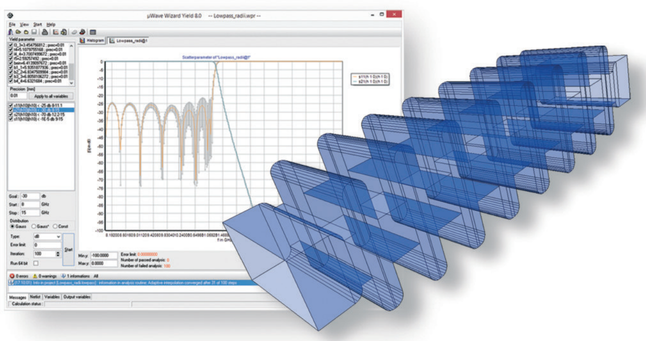




µWave Wizard™ includes three optimizers (Extrem "x", Evopt "e", Powell "p") for meeting user defined performance goals. Within the optimization panel, the user specifies performance parameters and their respective requirements. Dependent or user-defined performance parameters allow for customized optimization and can even be modified during the ongoing process. The most common optimization parameters are scattering matrix elements, beside derived quantities like group delay, isolation or phase differences, electric or magnetic field strengths or resonance frequencies. The optimization process is not limited to waveguide or coaxial structures, typical performance parameters like co- and cross-polar gain, beam width, phase center location, etc. critical for the optimization of antennas can be assigned and even be mixed to the goal functions as well to optimize a complex network.

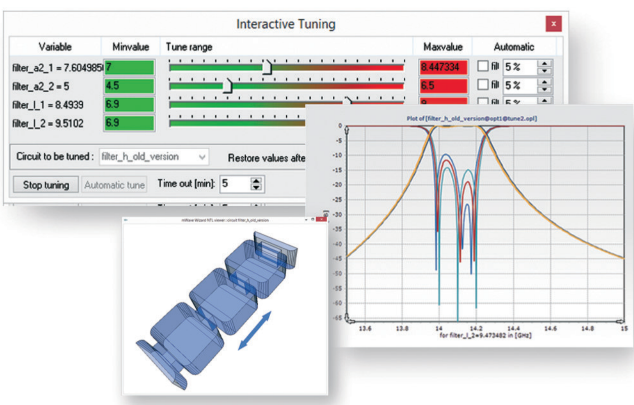
During optimization, the graphical user interface continuously displays performance data updates (i.e. goal function error, visualization of actual scattering parameters and the state of the optimization variables). Furthermore, the optimization monitor keeps the user continuously informed about improvements.

µWave Yield



The µWave Yield optimizer performs a yield driven tolerance analysis within user defined tolerance limits for any design. This feature is of importance for determining the sensitivity of any circuit or component design to machining tolerances. Using the precision field in the yield parameter list-box, users specify the tolerance boundaries. The yield analysis uses these parameters for generating a user defined number of designs, all with slightly different geometries within the tolerance boundaries. Finally the statistical data of the yield analysis are shown in graphs.

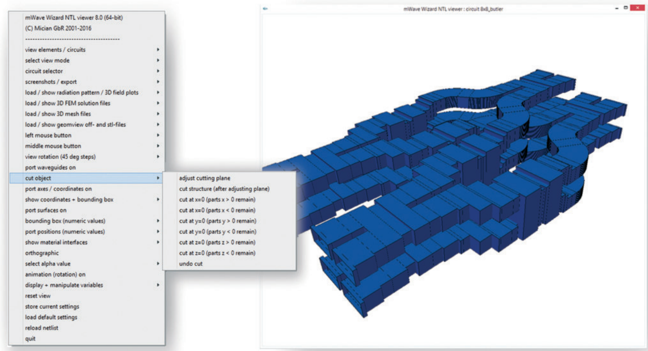
Interactive Tuner



The interactive tuner allows for "manual" tuning of components or circuits. By operating sliders representing parameterized geometries, components and assemblies can be tuned similar to turning tuning screws on the test bench. Users can perform a fast analysis of a device for various settings, especially if non-tuned elements are buffered for speed. Designers can take advantage of their own personal "bench tuning" experience when using this feature.

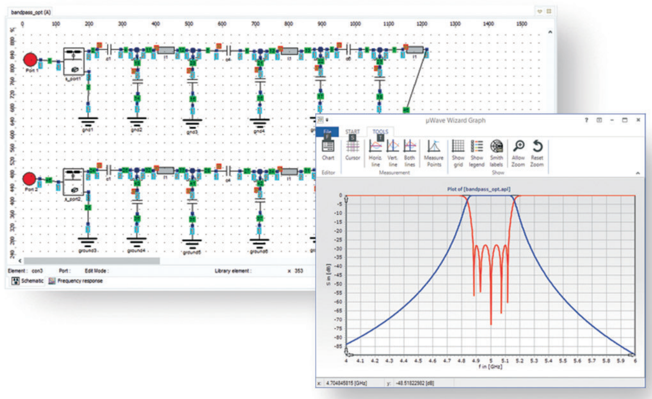
3D-Viewer

µWave Wizard™'s 3D viewer displays schematics, mesh, field and pattern plot files. There are no limitations regarding model size and complexity. It supports the design of the most complex components, regardless of the individual coordinate systems of their key building blocks. The 3D viewer shows the interconnection of elements or sub-circuits. Misalignments and erroneous connections will be flagged immediately within the 3D-plot window. Export of CAD files in STL, STEP, IGES or DXF format enable portability between graphical design platforms and can also be used for controlling CNC tools.



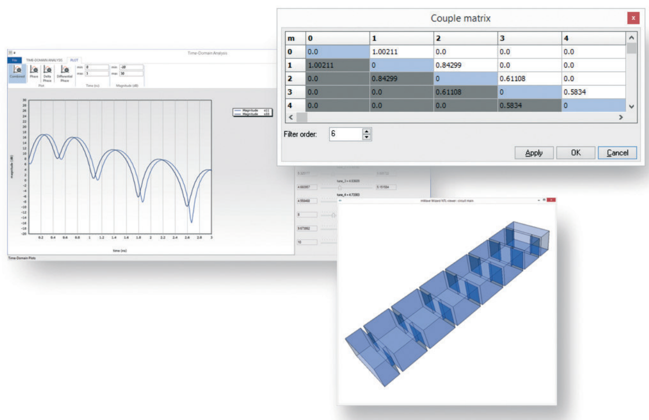
Lumped Elements

The lumped elements library supports user-defined RLC-networks. A lumped element circuit can be connected to waveguide components or waveguide circuits in form of a sub circuits, using the fundamental mode connection. Moreover there are additional low-level elements like 'ideal filter', 'ideal coupler', 'ideal polarizer' and 'through' which represent an ideal performance without specification of geometries. These elements are especially useful for an easy setup and fast pre- or cooptimization of complex structures (e.g. multiplexers) by equivalent networks and for fast feasibility studies.



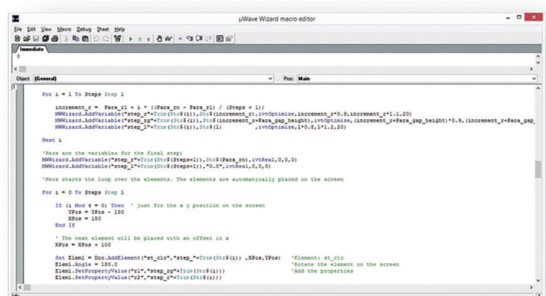
Time Domain Response

This feature aids in tuning filters by using their return loss time domain response, makes filter tuning significantly easier. By applying this method, individual tuning of each resonator is possible. In combination with the response of an ideal filter or a reference filter, the sliding controls in the Time Domain UI can be adjusted to match the response of the Device Under Test to the reference filter curve. This sliding control adjustment principle is similar to the Interactive Tuner feature of µWave Wizard.

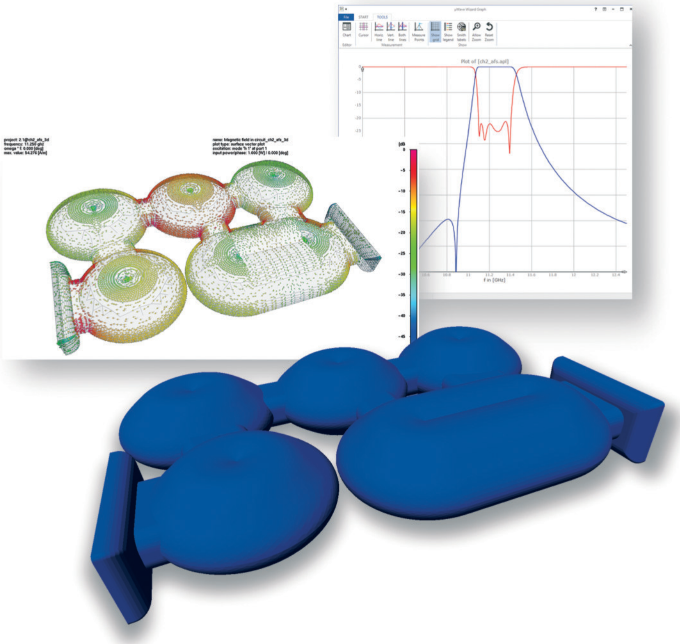


Basic Macro Editor

Beside the default integrated COM-based API the VBA like macro editor allows developing of own macros to steer µWave Wizard™ as a background engine. For example, the user can setup his own routines to generate individual horn antenna profiles, tapers, convergence tests, or couplers. Templates are included and can be modified for specific applications.

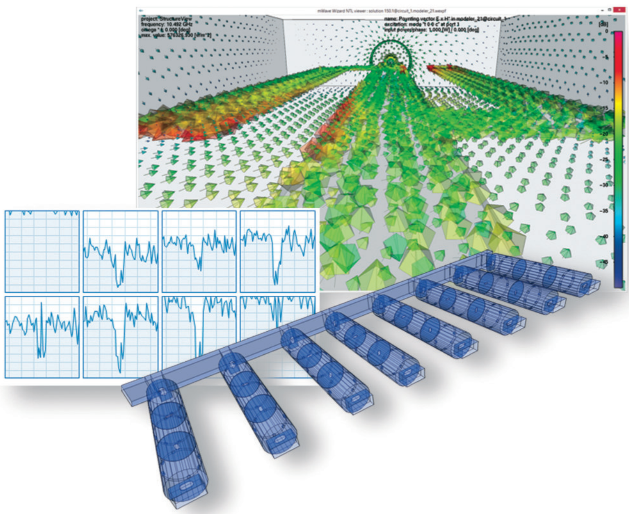


Adaptive Frequency Sweep



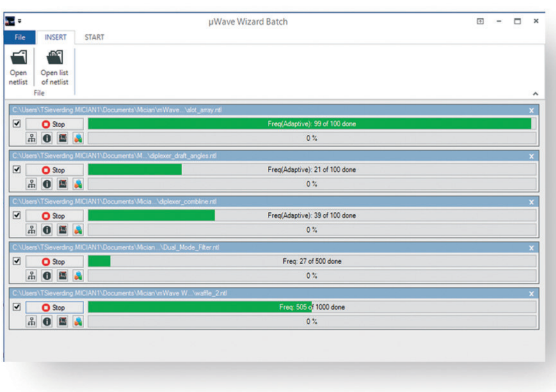
The Adapted Frequency Sweep (AFS) feature enables quick generation of „smooth" S-parameter plots. The S-parameters at intermediate frequencies are obtained from rational function interpolation S_ij(f)=P(f)/Q(f), where P/f) and Q(f) are polynomials with general complex coefficients. The sampling points for the calculation are obtained automatically by comparing two subsequent interpolations and selecting the one with th largest deviation. The improved AFS to sub-circuits or individual elements of an RF component shifts convergence goals from component level to circuit or element level. Especially for components heavily relying on FEM simulation, computation speed can be up to 2.75 times faster with same accurate results. Other measures such as mesh morphing complement the improved AFS for even faster simulations and optimizations. The figure shows an example of the improved AFS for a 3D printed triplet waveguide filter with a transmission zero over a full frequency sweep.
Full 3D-FEM and AFS: 791 sec CPU time
Conventional AFS: 145 sec CPU time
Improved subdivision AFS: 89 sec CPU time

Parallelization and Multicore



µWave Wizard offers different levels of parallelism for efficient use of multicore CPU architectures and supports multi-processor boards on all Windows® 64-bit versions. The parallelization of all 3D FEM solvers and many of the Mode-Matching and 2D FEM modules significantly speeds up the simulation of a single project. The solvers will use all available (physical or virtual) CPU cores, which are defined in the license file. The load of each core can be monitored under the Windows task manager under the "Performance" tab. Wave Wizard™ is built on a 64-bit computational kernel which allows utilization of the entire physical RAM on a Windows® 64-bit operation system without any restrictions. This feature enables the computation of particularly complex network designs and densely meshed 3D-FEM structures.

Batch Job Tool



The MwwBatch tool is the successor of the console version of µWave Wizard. The main advantage of this tool is the possibility of executing several processes in parallel. The number of processes is defined by the license file. In case of typical mode matching type structures such as filters, the scattering matrices are relatively small and simulations will be performed mostly on one single core. A significantly shorter overall processing time and be expected if two or more of these applications are running in the MwwBatch environment.

Testimonials

Jonathan Scupin, Custom Microwave:

„Over the past 10 years, Custom Microwave's business has continued to grow in large part due to our RF Design capability. Our RF Design team makes use of Microwave Wizard to design, optimize, and analyze antenna feeds consisting of feedhorns, OMTs, Polarizers, Filters, and Diplexers. Our ability to rapidly analyze the entire feed chain with high accuracy is of great benefit for risk reduction, as we do not need to fabricate breadboard hardware. We continue to be pleased with the excellent customer support and high quality simulation tools offered by Mician."

Rafael Garcia Sanchez, RYMSA:

„RYMSA is a company that design and manufacture microwave passive waveguide components (OMT, filters, couplers, polarizers...) and microwave antennas. MICIAN µWave WizardT allows us to speed up the design process due to its user interface, filter synthesis macros, speed and really good optimizer. Because its accuracy in comparison with respect to real measurements, we have managed to reduce tunning process in several devices. Another great value is the possibility to design each component of a device, and to have the possibility to estimate the behavior of a full assembly like a feed system thanks to the horn module recently developed. There is no assembly that we have done recently, that hasn't been simulated with MICIAN µWave Wizard."

Santiago Sobrino Arias, Thales Alenia Space:

„I've been using Mician Microwave Wizard for more than 10 years, developing RF devices like filters, couplers, Orthomode transducers,etc. The speed and accuracy of the software is fantastic, and it includes one of the best optimizers I have seen."

Gregory Shimonov, Ceragon

"Thank you very much. You give us excellent support. I do not remember any software that Ceragon bought and got support like you give us."

MiCIAN

Mician was founded in 1998. The establishment of the company was born out of the idea of providing microwave engineers with fast and accurate design tools that significantly speed up the development process by reducing cycle time.

Mician's software engineering team focussed on designing a powerful kernel in combination with an easy to use graphical user interface for their novel product, later to be known as µWave Wizard™. The goal was to avoid the use of time consuming 3D solvers wherever possible and to focus on applying the Mode Matching Technique and its derivatives instead, even on structures that at first glance seem to be suited for 3D solvers only.

Thanks to its user friendliness and performance it quickly became the tool of choice in many microwave departments across the globe. This was the beginning of a continuing success story for Mician and the µWave Wizard™. Today, engineers and designers in leading microwave companies throughout the world rely on µWave Wizard™ in an effort to reduce design cycles and to speed up the development process.

In 2020 Mician celebrated the 20th anniversary of µWave Wizard™'s market presence. The versatility and speed of the latest versions are due to remarkable new mathematical methods Mician's engineers have come up with. Users univocally laude the prompt support and the steady flow of software updates which incorporate latest design elements. The consequent implementation of the latest field theoretical and mathematical approaches is Mician's challenge for the continuous enhancements of µWave Wizard™.

Hardware Requirements

Minimum requirements: 64-bit compatible Intel® processor with at least 8 GByte RAM, Windows® 64-bit operating system.
Recommended: multi-core Intel® processor with >16 GByte RAM, Windows® 64-bit operating system.

Information and requests

For more information on our products and services, please visit us on the web at www.mician.com, email us at sales@mician.com or contact one of our sales representatives.
A time limited test for evaluation of µWave Wizard is available upon request through our website.

Sales representatives

A list of contact details and office addresses is available at www.mician.com

Trademarks

All trademarks cited herein are the property of their respective owners.

Product Feature Matrix

Features & Add-Ons	µWave Wizard™	FOR RENTAL ONLY µWave Wizard™ Full Version
UI	✓	✓
Hybrid Simulator	✓	✓
Libraries & Elements	All	All
3D-Modeler	o	✓
3D-FEM	✓	✓
FEM Mesh Morphing	o	✓
Waveguide Tool	✓	✓
Adapted Frequency Sweep	o	✓
Evopt-Optimizer	o	✓
Powell-Optimizer	o	✓
Extreme-Optimizer	o	✓
Yield Analysis	o	✓
Interactive Tuner	o	✓
Resonance Analysis	o	✓
Field Analysis	o	✓
Filter Synthesis	o	✓
Filter Workbench	o	✓
Taper Synthesis	o	✓
Lowpass Filter Synthesis	o	✓
Interdigital Filter Synthesis	o	✓
Time Domain Response	o	✓
Radiation / Antenna Analysis	o	✓
Horn Antenna Synthesis	o	✓
BOR FEM Solver	o	✓
Reflector Designer	o	✓
Batch Job	o	✓
Macro Editor	o	✓
Additional Cores	o	o
Filter Coupling Matrix Synthesis	o	✓

o: Optional; ✓ : Included

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