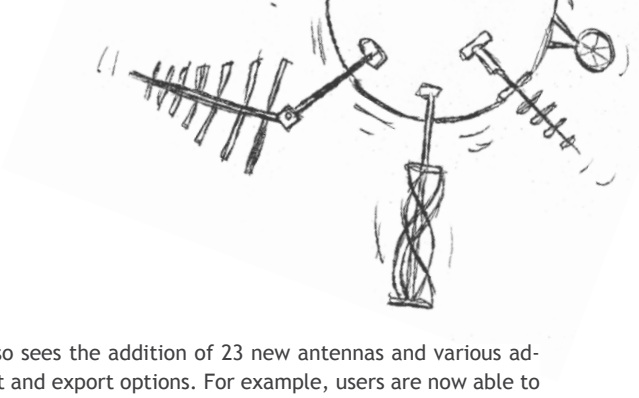
Newsletter 4

May 2012



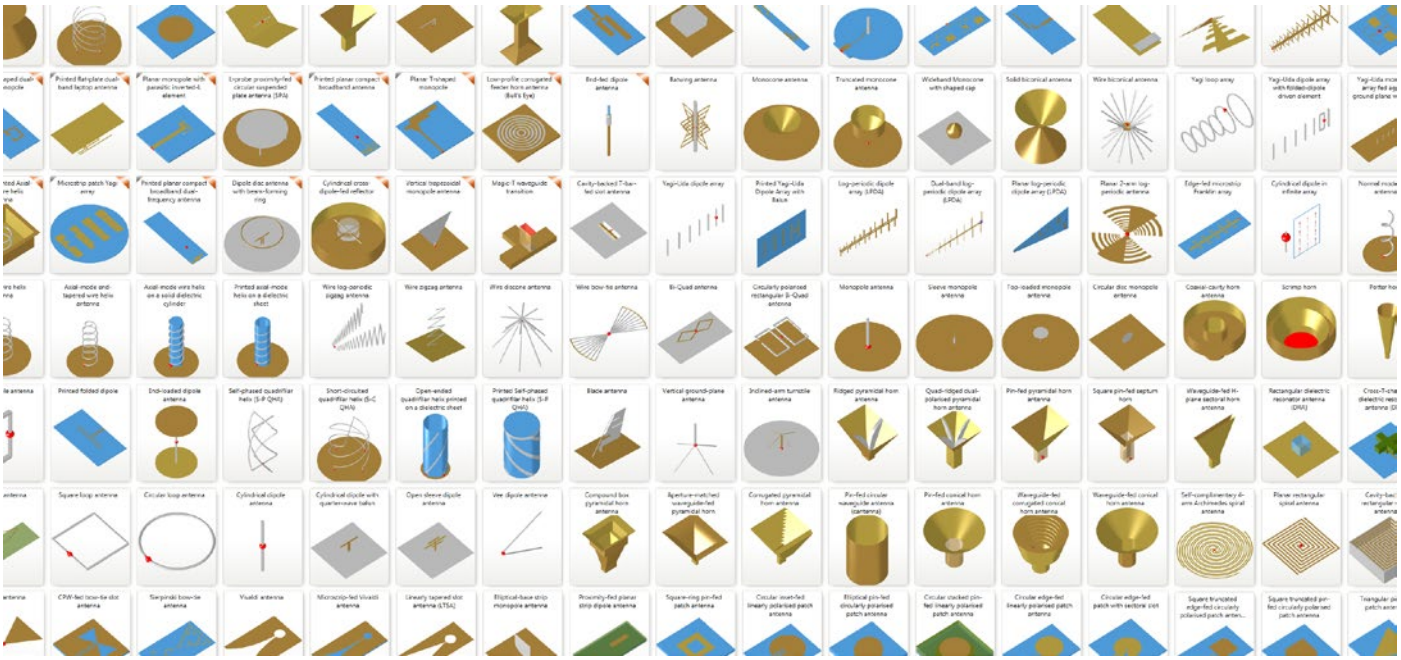
Antenna Magus version 4.0 released!

We are pleased to announce the fourth major release of Antenna Magus. Version 4.0 boasts over 200 antennas – the largest commercially available database of antenna designs in the world - further entrenching Antenna Magus as **the** leading antenna design tool.

Antenna Magus still offers validated designs, ready to run simulation models and invaluable design information. The accessibility of design capabilities for many applications has been improved in Version 4.0 by the addition of ***application-specific design*** options.

Version 4.0 also sees the addition of 23 new antennas and various additional import and export options. For example, users are now able to import and use 3D radiation pattern data to represent array element patterns when using the array synthesis tool.

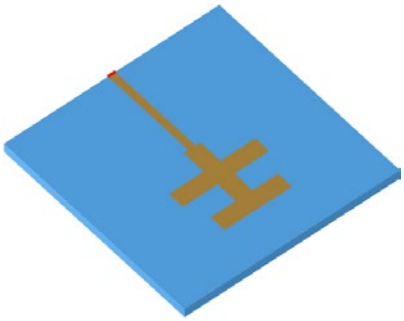
Many information and export model updates, as well as performance and UI improvements ensure that Antenna Magus Version 4.0 aids antenna designers in making excellent antenna choices while simplifying and accelerating everyday design work.

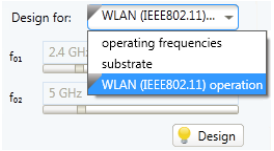


New feature: Application-specific design.

This new feature provides users designing within a particular application with better solutions - both in terms of complexity of antenna topologies as well as accuracy of design.

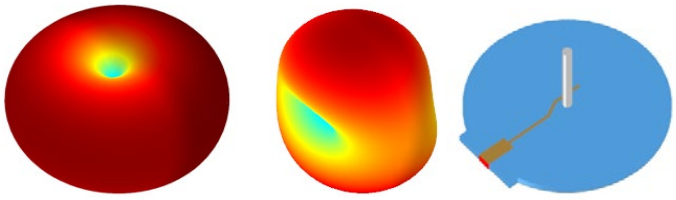
Design groups were added to Antenna Magus to give the user access to pre-optimised designs and structures that are tailored to a specific well-defined application – such as integrated GSM, WLAN, Bluetooth and GPS antennas or designs for standard antennas. The objectives used during the optimisation of these designs (like frequency range, shape and size) are based on the underlying requirements of the target application.





Example: The double-t monopole antenna now includes the application-specific design option for WLAN (IEEE802.11).

A further advantage of the pre-optimised designs is that pre-calculated estimated performance results are included in the Antenna Magus Database. These can be viewed instantly without requiring any performance estimate calculations. When using an application-specific design, the model export capabilities are exactly the same as for any other design in Antenna Magus.



Example: Wire monopole with annular-slot antenna for WLAN composed of quasi-omnidirectional radiators. This allows for pattern diversity capabilities.

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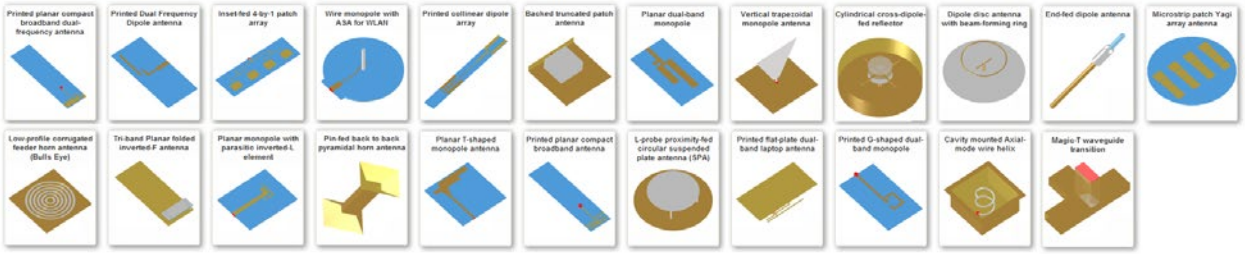
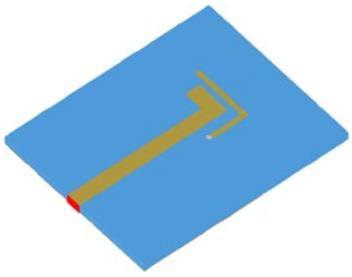
New antennas



There are 23 new antennas added to this release. Each of the added antennas (as shown in the above thumbnail images) is unique with great practical utility and deserves detailed attention. Due to limited space however, only a few examples can be discussed in the newsletter. More information on each antenna can be found in Antenna Magus or on our website.

Integrated, WLAN, GSM and multiband antennas

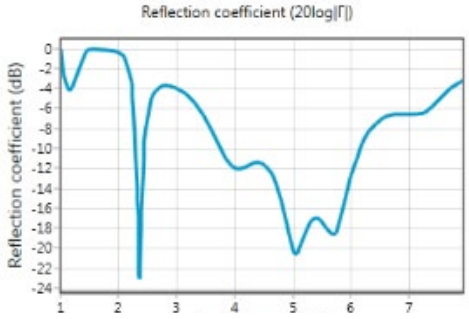
In response to numerous customer requests for more antennas that focus on the Wireless local-area network (WLAN) and GSM applications, we have added nine antennas in Version 4.0 which are typically used in such applications. Here are two examples:



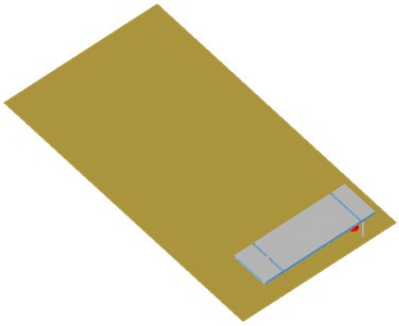
Planar monopole with parasitic inverted L antenna

The *planar monopole with parasitic inverted L antenna* is ideal for integration in WLAN applications. It operates in 3 WLAN bands and it is compact with low manufacturing costs.

The operation of this antenna can be understood by considering a printed L-monopole. The addition of a second parasitic L-strip (which is electromagnetically coupled to the driven L and supports an additional resonance) provides multiband performance. When correctly designed, the parasitic L-element is smaller than an L-monopole that would typically be required to support the lower resonance, resulting in a reasonably compact topology. The following graph shows the antenna's |S11| performance across the desired WLAN bands.



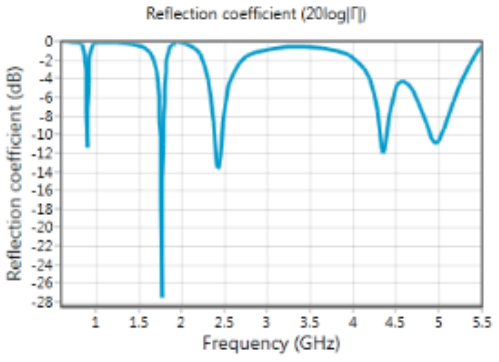
|S11| performance over 3 WLAN bands.

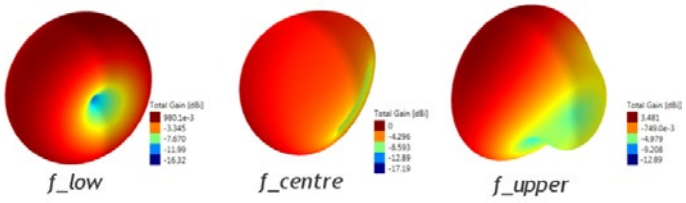


Tri-band planar folded inverted-F antenna.

Another example of a very useful antenna for tri-band integrated applications (for example GSM/DCS and Bluetooth handheld devices) is the *Tri-band planar folded inverted-F antenna.*

The radiating element is mounted above a conducting ground plane with slots etched out on both sides of the top and bottom metallization layers of the substrate, separating the layers into 5 sub-patches. This rather complex structure may be considered as a combination of simpler structures which interact co-dependently to achieve tri-band operation.





Reflection coefficient and radiation pattern performance of a design for the GSM and IEEE802.11 bands.

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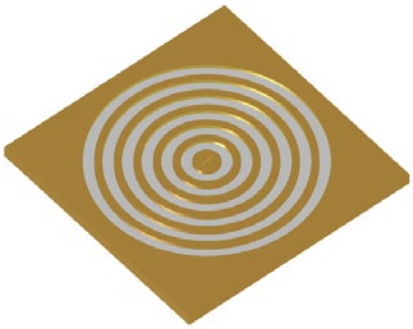
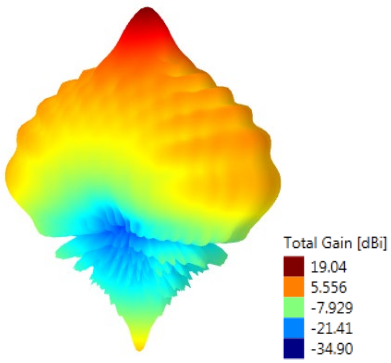
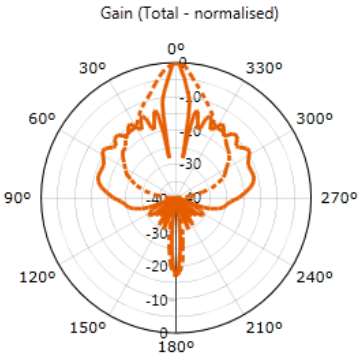
Low-profile corrugated feeder horn antenna (“Bull’s eye”)





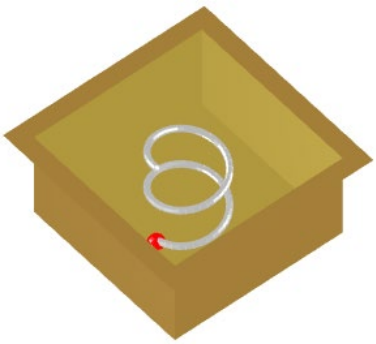
This interesting reflector feed antenna originated from optical studies which showed that sub-wavelength apertures in corrugated metallic films enhance transmission. By scaling the same concept to microwave frequencies, a very-low profile feeder antenna with approximately 20 dBi gain can be realized.

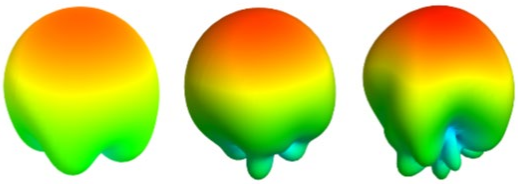
This very low-profile horn antenna consists of a waveguide terminated by a sub-wavelength aperture or slot in the centre of a conducting plate with concentric periodic corrugations. By correctly designing the corrugations, the radiation pattern of the slot can be dramatically adjusted, resulting in a highly directed beam as shown in the following radiation pattern images:



Typical 2D and 3D bull’s eye radiation patterns.

Cavity mounted Axial-mode wire helix



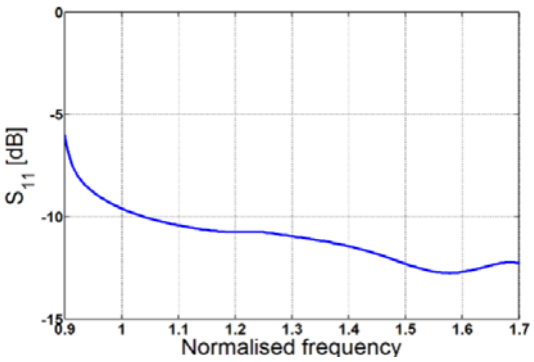


f_{min} **1.36 f_{min}** **1.72 f_{min}**

Typical circularly polarised gain patterns at the minimum, centre and maximum frequencies.

The requirement for a broadband elliptically-polarised antenna which can be flush-mounted on high speed aircraft is common in the aerospace industry. This antenna inherently fulfils the broadband, elliptical polarisation requirements. It is also mechanically simple, can be flush-mounted and is relatively small compared to other antennas that could provide similar operation at a given frequency.

The *cavity mounted axial-mode wire helix* provides good polarisation purity and constant on-axis-gain over the operating band, as shown in the following 3D circular polarised gain pattern image at three different frequencies in the operating band.



Typical reflection coefficient versus frequency.

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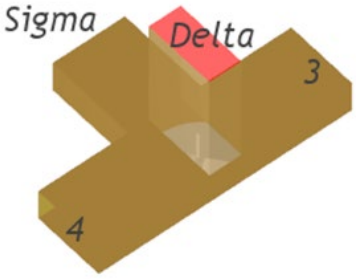
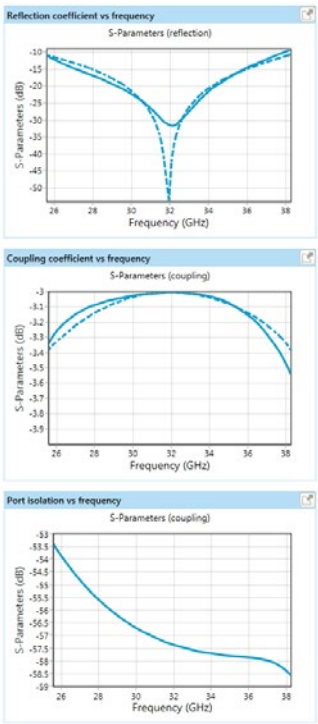
Magic-T waveguide transition



The *Magic-T* is a popular hybrid or 3 dB splitter/coupler used in many microwave systems. It was originally developed during World-War II and typically used in pulsed radar applications. One advantage of the *Magic-T* is when combining multiple power amplifiers, the input or output ports are well isolated from each other.

Like all other coupler and splitter structures, the *Magic-T* can be used as a power combiner or a divider. It is ideally lossless, so that all power into one port can be assumed to exit the remaining ports. Power entering the sigma port (port 1 ; also commonly referred to as the sum, H-plane, P or Parallel port) is divided equally between ports 3 and 4, with the resulting output signals being in phase. Power entering the delta port (port 2 ; also commonly known as the difference, E-plane, S or Series port) also divides equally between ports 3 and 4, BUT the resulting signals are 180° out of phase. Ports 3 and 4 are sometimes called the co-linear ports as these two ports are physically in line with each other.

Antenna Magus provides pre-optimised designs in popular waveguide bands (S, X, Ka and W bands) as well as a design group for any specific operating frequency.



Estimated |S11| performance showing reflection, coupling and isolation between ports for a Magic-T operating at Ka-Band.

Other new features in version 4.0

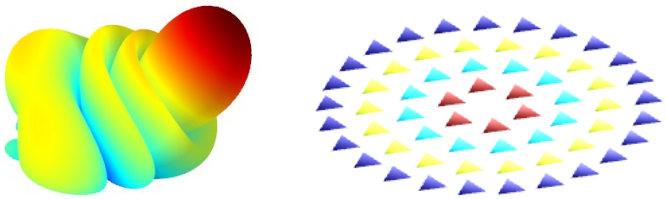
168 Added simulation models

Apart from the new antennas, 168 parametric CST MICROWAVE STUDIO® and FEKO simulation models and 10 AWR DESIGN ENVIRONMENT® models have been added or updated.

Import custom 3D patterns into the array tool

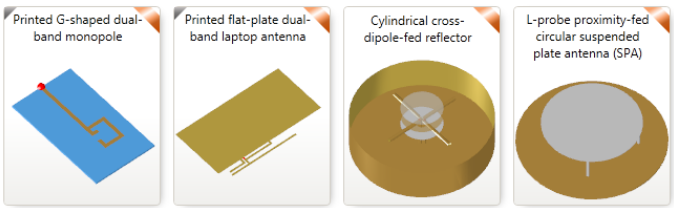
Custom 3D antenna patterns can now be used as array elements. The array tool now fully supports the synthesis of array patterns using custom layouts and custom patterns.

The example shown here is a concentric circular array with 30° tilt angle and imported 3D pattern of a circular EM coupled patch.



User interaction improvements

In order to distinguish between new and existing antennas, indicators have been added to the “Find view”. Indicators show which antennas are new (red indicator) and which antennas have application-specific designs (grey indicator).



These are a small selection of highlights for the version 4.0 release. Please see the release notes page for a more detailed list.

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