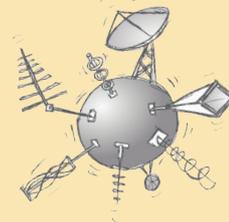# Newsletter 2018.0

January 2018

Antenna Magus Version 2018.0 released!

Version 2018.0 includes various features and improvements as well as a number of new antennas. This newsletter will discuss the new antennas as well as a selection of the features and extensions that have been made available. For more comprehensive information please visit the Antenna Magus website or read the full release notes.
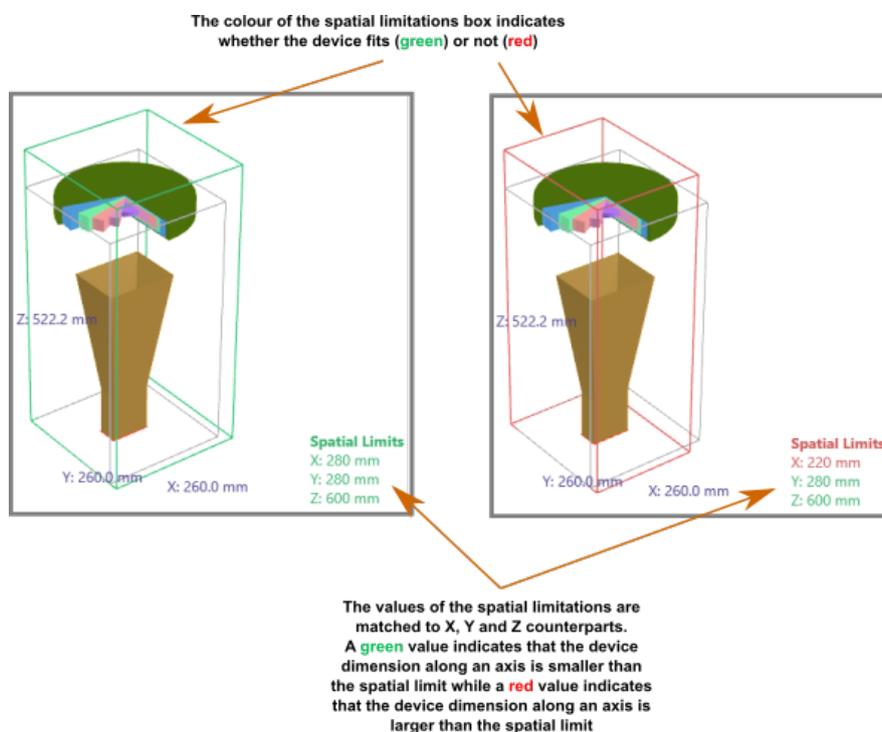
New Features and Extensions

Spatial Limitations

Spatial limitations can now be included as part of a Specification. When a spatial limit is specified, Antenna Magus will intelligently determine whether the designed device will fit into the available space and which orientation will achieve the closest fit. The specified limits are graphically shown together with the bounding box of the design to aid with visualisation of the fit in Design Mode and in the Compare Window.

When specifying spatial limitations, 1, 2 or 3 dimensions may be entered – representing maximum available length, rectangular area or cubic volume, respectively.

The colour of the spatial limitations box indicates whether the device fits (green) or not (red)

Z: 522.2 mm
Y: 260.0 mm
X: 260.0 mm

Spatial Limits
X: 280 mm
Y: 280 mm
Z: 600 mm

Z: 522.2 mm
Y: 260.0 mm
X: 260.0 mm

Spatial Limits
X: 220 mm
Y: 280 mm
Z: 600 mm

The values of the spatial limitations are matched to X, Y and Z counterparts. A green value indicates that the device dimension along an axis is smaller than the spatial limit while a red value indicates that the device dimension along an axis is larger than the spatial limit

### Consistent Trace Names for 2D Radiation plots

In order to simplify the performance comparison of different devices in the Compare Window, all trace names (legends) for 2D far field, impedance and S-parameter plots have been standardised. Far field plots particularly refer to Θ and Φ angles in accordance with the Spherical Coordinate System of the 3D previews of the device in question. Descriptive terms such as "E-plane" or "Broadside" have been removed. While these terms did offer further insight into the properties of specific devices, they could not be standardised across all devices, making comparison - especially in the Compare Window - difficult. The 3D preview of the device should be consulted to determine these device-specific definitions.

Panning of Model Preview

In addition to zoom and rotate functionality in the model preview, it is now also possible to pan the preview model by either holding down the mouse wheel or using alt+left-click while moving the mouse. This capability along with improved detail, colouring and lighting in the 3D Preview views makes it possible to better explore details of the structure. Panning is available in Design Mode, Export Mode and in the Compare Window.

Default Values for Toolbox Calculators

The Objectives (input fields) in all Toolbox Calculators are now pre-populated with sensible default values when opening the tool. This is especially useful in cases where certain required input values are inherent to the calculation and a typical value should be used. Changes to values are considered in subsequent calculations allowing the calculation to be refined iteratively.

AntennaMagus
Explore.Design.Deliver.
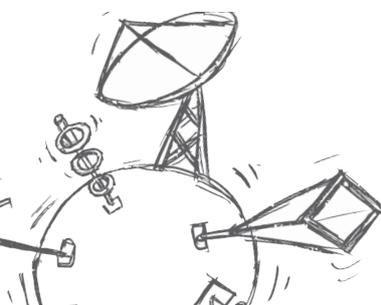
New Antennas and Arrays

Curved-aperture Corrugated Conical Horn

The smooth wall conical horn antenna is popular in the microwave band, where it is commonly used as a feed for communication or satellite dishes and radio telescopes. Its mechanical body of revolution symmetry supports any polarisation of the excited fundamental (TE11) mode - including circular (excited by using two orthogonal coaxial to waveguide transducers driven in phase quadrature).

While normal smooth-wall horns present problems that can be eliminated by corrugating the walls, the performance of simple linear corrugated horns may be improved through a number of techniques - one of which involves profiling the flare. Such a profiled flare has a number of advantages - most importantly the reduction of cross-polarisation.

Typical applications for the antenna include frequency reuse applications in satellite and terrestrial communications, where the cross-polar sidelobe level of -30dB or better over the band is required. When properly designed, curved aperture profiled horns can achieve a cross-polar sidelobe intensity below -50dB at the centre of the operating band.

The implementation of the design in Antenna Magus allows the degree of sidelobe reductions to be selected as 'Low', 'Average', 'Good' or 'Best' along with frequency. This selection impacts on the profile and corrugation design allowing for a trade-off between performance and complexity/size of the structure. Further refinement of the profile and corrugations can be completed using the parametric export model if needed.
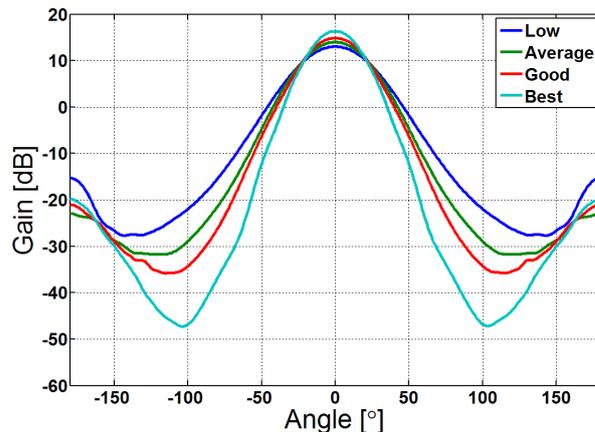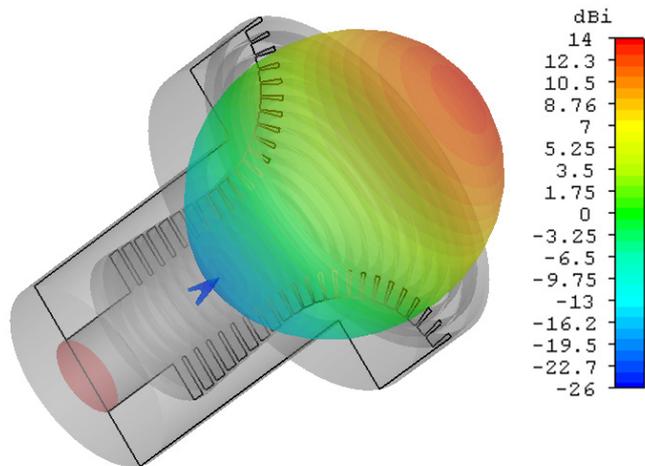

*3D gain pattern at the centre frequency for the 'Average Design Case'*

Elliptically Profiled TEM Horn

Horn antennas are used in many different applications - ranging from electromagnetic sensing to reflector feeds and biomedicine. Where a directional antenna that operates over a very wide band is required, TEM horns offer a good solution. These horns are designed by considering the transition from a bound TEM wave system to free space to achieve the best impedance match over a wide bandwidth.

The new TEM horn added to Antenna Magus is based on the basic TEM horn, but makes use of a modified Hecken taper in order to obtain an ultra-wideband impedance match. The separation between the metallic plates of the TEM horn is chosen based on an elliptic profile. Starting from a Hecken taper, an iterative optimisation is used to find the optimal width profile, achieving an excellent VSWR (below 2:1) across a bandwidth of 20:1 for a typical design.
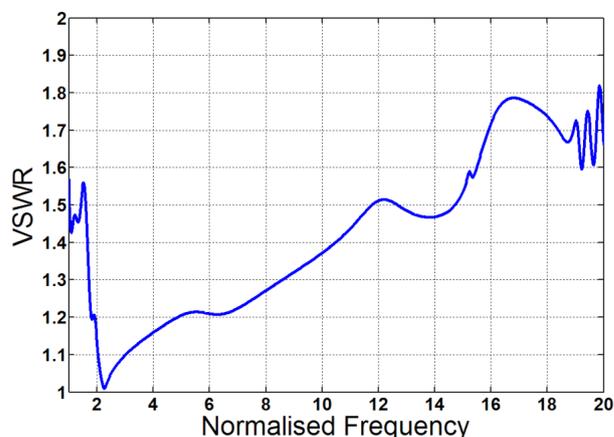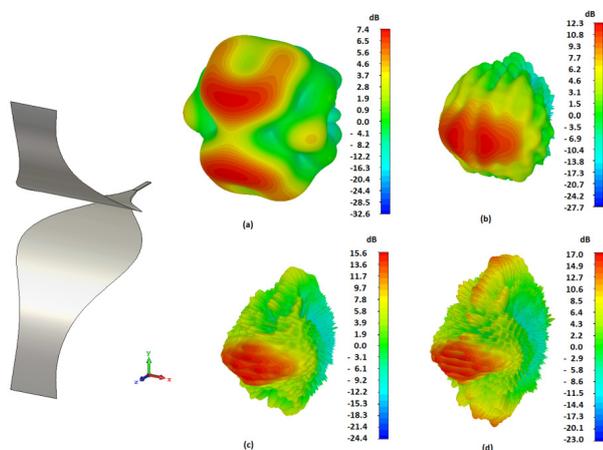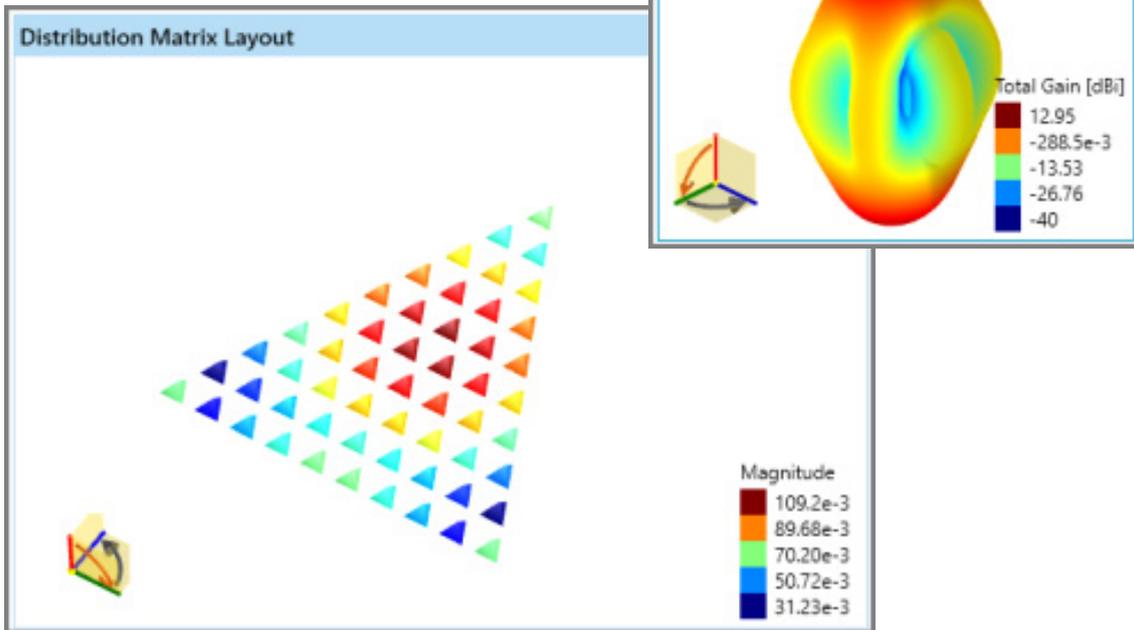

Total gain 3D patterns at (a) 2 x fmin, (b) 8 x fmin, (c) 16 x fmin and (d) 20 x fmin
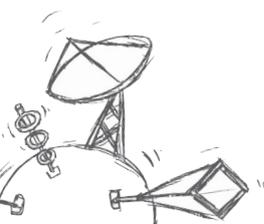
Triangular Array

A planar triangular array has been added to the Array Tool. This layout allows the operating frequency, number of elements, element spacing and distribution taper to be specified.

Conclusion

While continuing the expansion of the range of available antennas, arrays and tools, Antenna Magus 2018 introduces many extensions and internal changes impacting on performance and flexibility in the antenna design workflow. Features such as the Compare Window and Spatial Limitations are aimed at making the task of finding and designing the right antenna for your application more effective and easier than ever before.