



BOOST YOUR VISION WITH

Insight



## + Computing Precise Antenna Insights

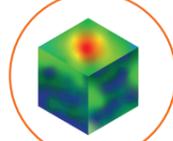
Insight™ software leverages advanced algorithms to compute authentic electromagnetic current distributions and extreme near fields. Experience accurate analysis and rapid identification of antenna performance issues, empowering efficient development, and faster time to market.

Thanks to an innovative formulation of the inverse electromagnetic problem, Insight™ is the first software able to compute authentic electromagnetic current distributions and extreme near fields on your antenna under test from measured near-field or far-field data. Multi frequency formulation based on interpolation techniques and upgrade of fast method have been integrated for fast computations.

Antenna measurement, analysis and diagnosis



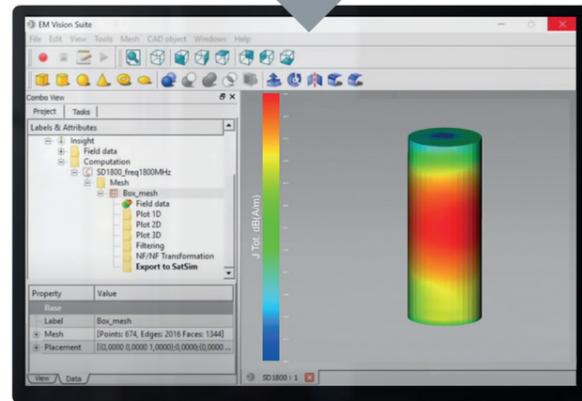
Insight EQC model



Insight™ provides a new link between measurements and simulations. This feature enables the creation of an equivalent model, in the form of a near-field Huygens' box, based on antenna measurements. The equivalent model obtained can be used as a measured source in complex numerical simulations, even with antenna gain normalization included.

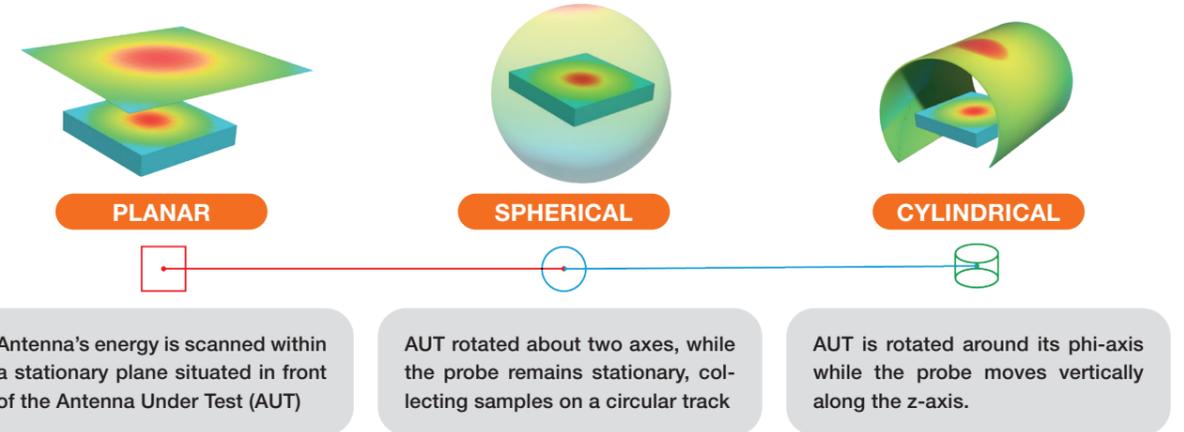
In the antenna design or EMC testing process, the measured radiation pattern or shielding performance does not always correspond to what is expected. Identifying the source of the discrepancies can be a time-consuming process. With Insight™, you can reconstruct the equivalent currents and extreme near-field on the antenna: it allows for quick and clear identification of the cause of problems observed during measurement. Further post-processing tools are available for in-depth investigation and to take things further Insight™ also lets you export the EQC to simulation and EMC tools.

EQC, NF CEM softwares



## + Applicable Near-Field Configuration

Insight software supports data from traditional near-field setup configurations: planar, spherical, and cylindrical geometrical surfaces. Near-field scanned surfaces are used to calculate the far-field pattern using post-processing techniques.



## + Key Features

### General

- Native Graphical User Interface based on Windows XP, Windows Vista, Windows 7, Windows 10
- High accuracy results proven by extensive validation campaigns
- Multi frequency formulation based on interpolation techniques for fast computations
- Fast method investigating even large antennas
- Applicability to any antenna measured data, such as near-field (NF) data (spherical, planar, cylindrical) and far-field (FF) data
- Link for importing the computed EM antenna models (NF sources or Huygens' boxes) to the CEM software CST, Microwave Studio, Ansys HFSS, Ansys Savant, FEKO, ADF, WIPL-D
- Export of gain calibrated measured NF sources for gain normalized radiation patterns in CEM tools

### Measurement import

- Import of measurements from MVG measurement systems
- Import of measurement in EDX format
- Import of measurement in GRASP format
- Possibility to request a custom link for importing custom format data

### Reconstruction geometry modelling

- Integrated 3D CAD designer
- Import/Export 3D CAD models in file formats such as STEP, IGES, STL and others
- Meshing capabilities of the reconstruction geometry

### Visualization and results computation

- 3D view of the current on the surface of the antenna
- 3D view of the fields anywhere around the object under test
- Dynamic 3D cuts, 1D and 2D field visualization
- Animated current visualization
- Animated radiated field visualization

### Results computation

- Prediction of the computational time and of the allocated RAM before calculation of the equivalent currents
- Filter unwanted currents on a selected area
- Reconstruct the field from the filtered currents to "clean" the measurement
- Far Field calculation from the equivalent currents
- Export of the Far Field to CEM software CST Microwave Studio, Ansys HFSS, Ansys Savant, FEKO and ADF
- Export equivalent currents in form of NF Huygens model to the CEM software CST Microwave Studio, Ansys HFSS, Ansys Savant, FEKO and ADF

## + Insight for Telecommunications Applications

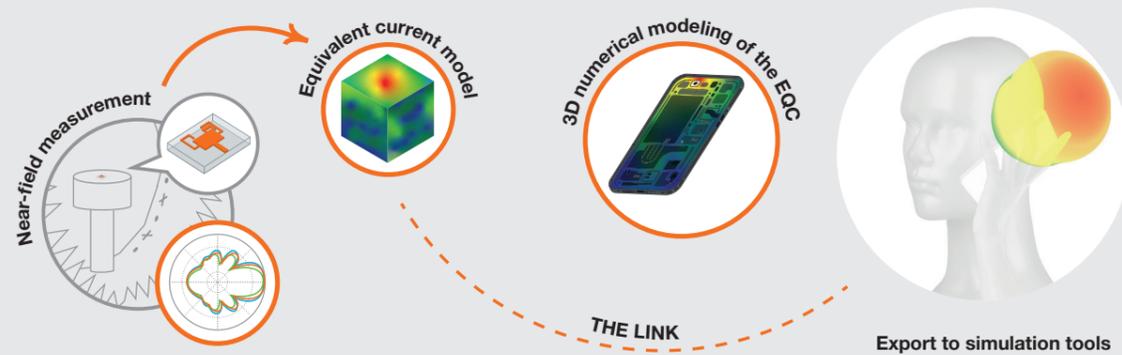
With increasing demands for faster and more reliable communication. Antennas play a pivotal role in the telecommunication transformation, ensuring efficient wireless communication for various applications, including 5G networks, IoT devices, and satellite communication systems. However, integrating antennas in ultra-compact, close-to-the-body devices poses significant challenges.

### Antenna measurement in telecommunications

To meet the ever-increasing demand for connectivity and seamless communication, accurate antenna measurement is crucial. Measuring antenna performance helps optimize signal propagation, assess signal strength, and identify potential interference sources. By understanding the characteristics of telecom antennas, we can ensure optimal coverage, reduced signal loss, and improved data transmission rates, ultimately enhancing the end-user experience.

### Insight™ software for user's devices antennas

Insight software is a powerful ally in the design and deployment of antennas for consumer devices. By using equivalent model based on near-field measurements of an antennas enables the right decisions to be made in antenna placement, leading to more efficient product designs. Rapid prototyping is the key to success in a highly competitive market thanks to accelerated development phases.



## + Insight for Automotive Applications

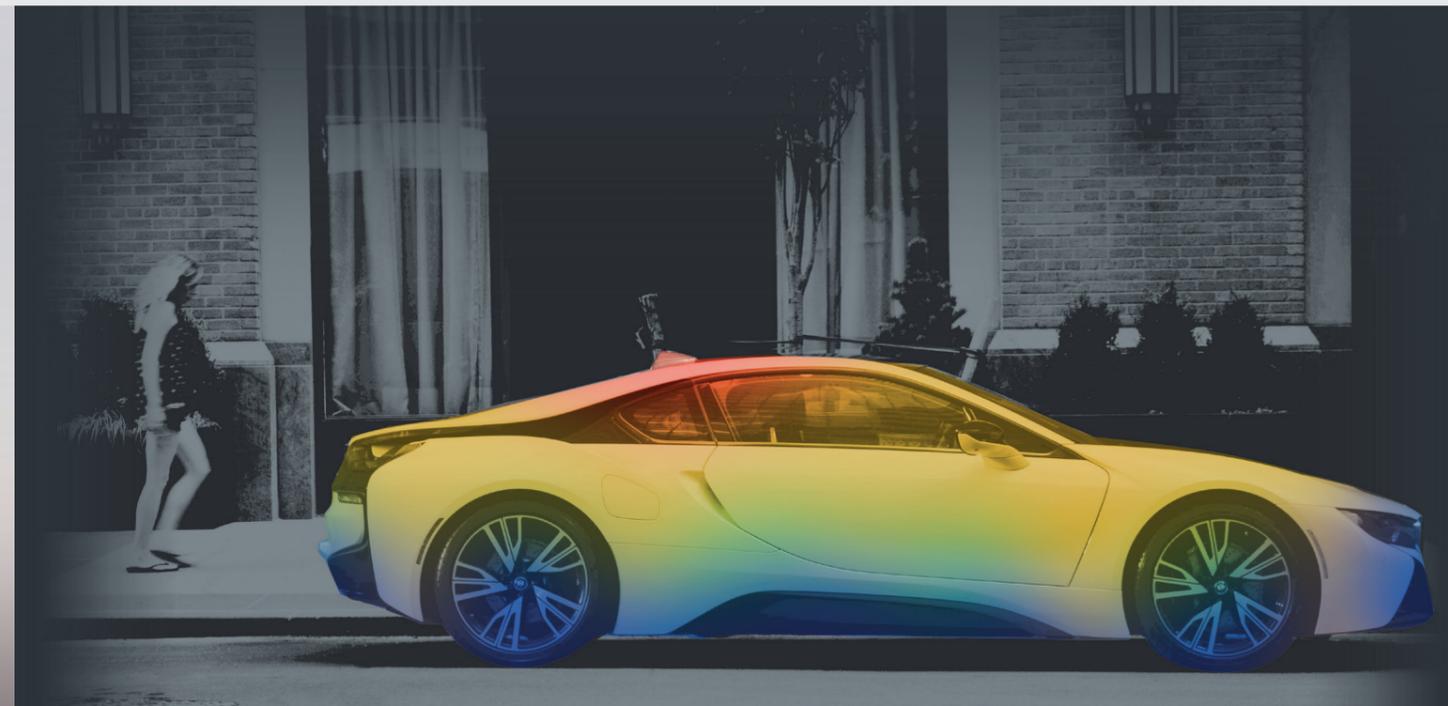
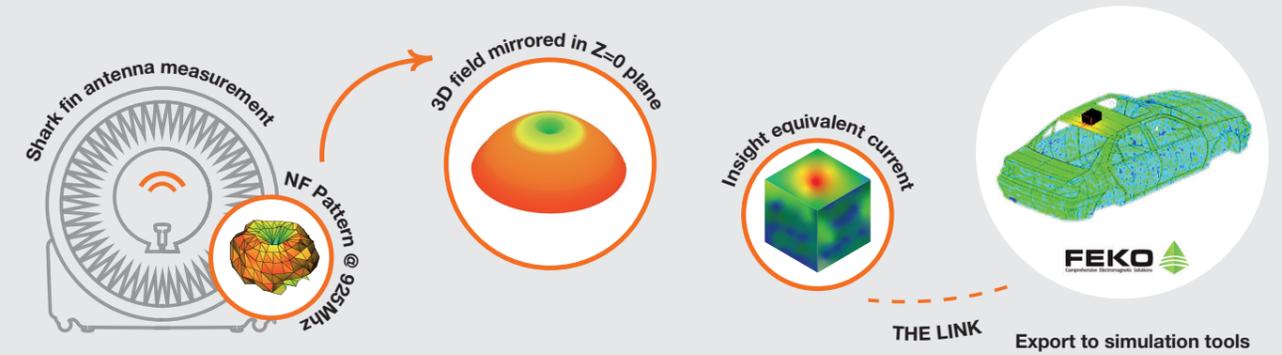
Electric, connected, autonomous and shared cars are four super-trends that are having game-changing effects on the automotive industry. Cars are expected to communicate but also to assess and react to the external environment. Placing numerous antennas that operate across the KHz, MHz and GHz frequencies on the same vehicle and in close proximity to each other brings many challenges.

### Antenna measurement for connected vehicles

The structure and geometry of an antenna has a direct influence on its operation and performance. If a proper design can guarantee optimal performance. It is important to understand how much it will change after integration.

### Insight™ software for antenna placement an electromagnetically-dense environment

Simulation is an important tool for the design of automotive antennas. It allows decisions to be made on how to integrate antennas into and onto the vehicle while ensuring their proper operation and coexistence. With ever increasing frequencies, vehicles are becoming electrically very large, therefore approaches using a near field source representation of the antenna can allow for efficient and simple simulation of antenna performance on entire vehicles.



## + Insight for Aerospace Applications

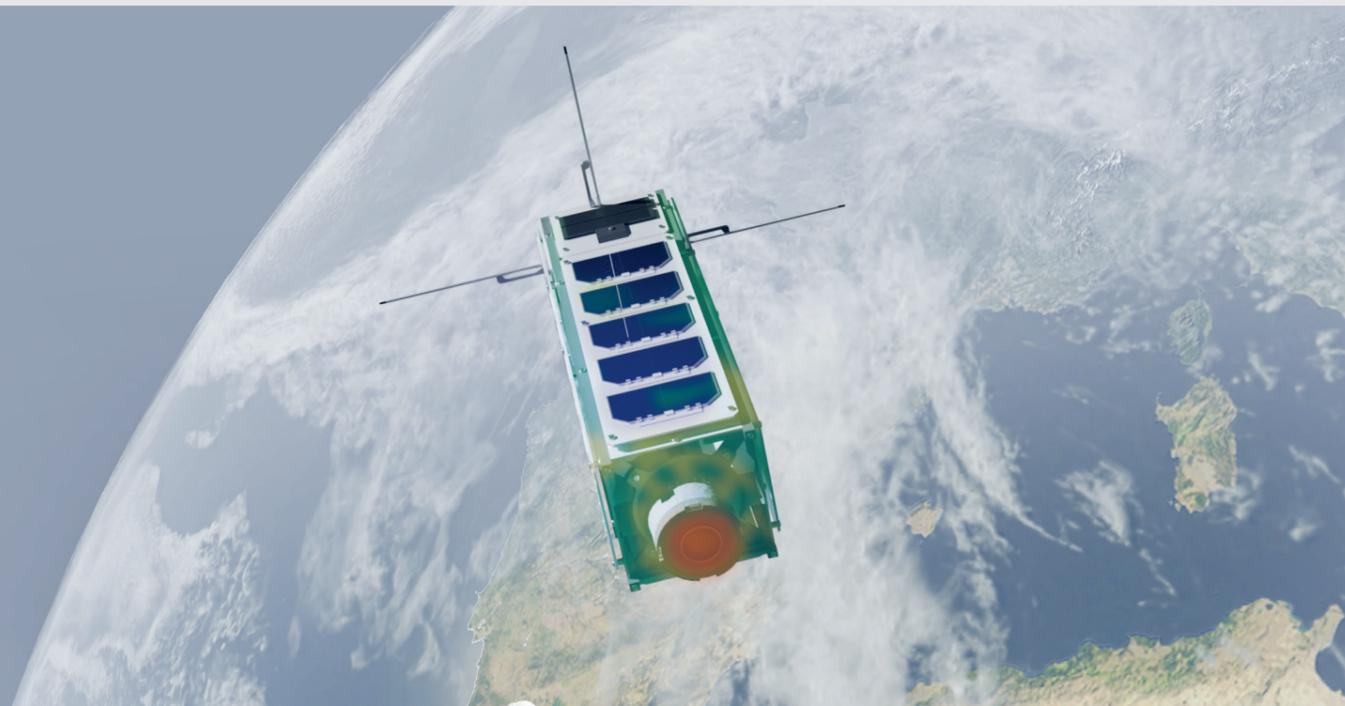
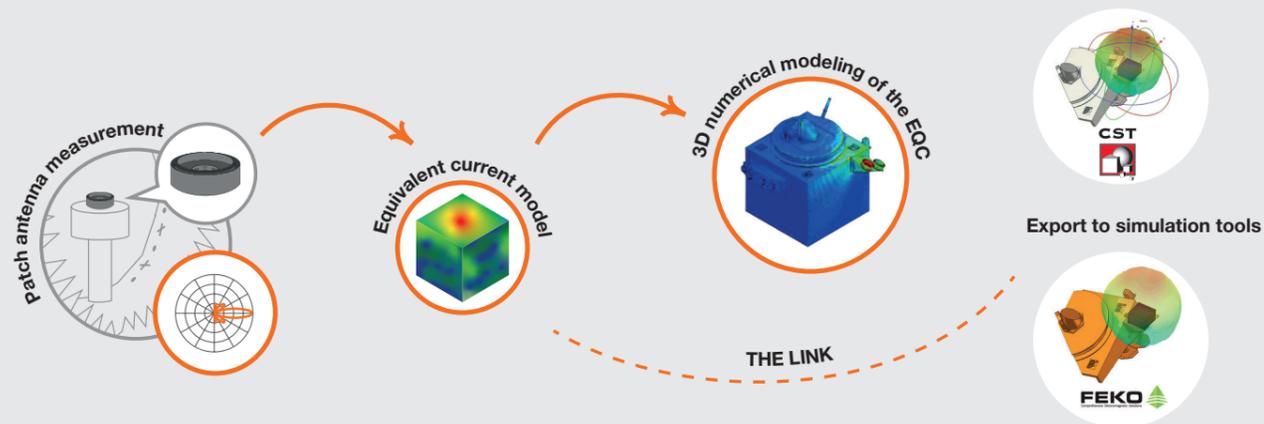
Aircraft, spacecraft, and satellites demand reliable and high-performing communication systems to ensure communication, data transmission, navigation, tracking and target acquisition. Their unique design constraints, such as limited space, aerodynamics, furtivity or to the contrary detectability, make the placement and optimization of antennas a critical task.

### Antenna measurement in aerospace

In the aerospace industry, antenna performance is directly related to the safety and critical functionality of aircraft in flight. Accurate antenna measurements are essential to ensure that antennas on aircraft or satellites have the desired power and directivity. When using active array and UHF antennas, it is necessary to evaluate performance in the far field, from the final structure and in its operating environment.

### Measurement and simulation for atmospheric and outer space communications

In the aerospace sector, antenna performance is directly linked to the safety and vital functionality of aircraft in flight. The use of phased array antennas requires powerful post-processing tools to verify the conicity of the desired aperture, or the shape of the vessel. For space applications, and especially for satellites, measurement and simulation techniques are also very useful when numerous antennas from different suppliers are integrated.



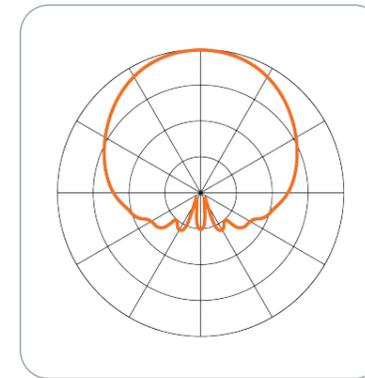
## + Key Benefits

INSIGHT software reconstructs the equivalent currents and the extreme near-field on the antenna. It allows for the quick and clear identification of problems detected during the measurement. Discover how its innovative approach to significantly improve the understanding of an antenna's radiation characteristics facilitates its development and reduces time to market.

1

### Speed up Antenna Development

Insight provide in-depth understanding of antenna radiation characteristics.



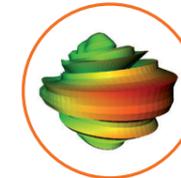
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### Diagnose Antenna Radiation Pattern

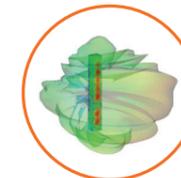
Determine the location of discrepancies between the actual field sources and the predicted performance:



Antenna measurement setup

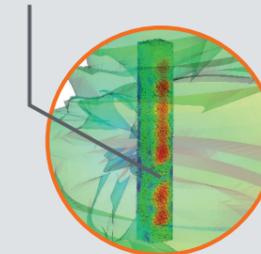


Problem detected in the measured pattern



Currents and fields reconstructions

BTS1940 LINEAR ARRAY ANTENNA WHERE ONE ELEMENT HAS BEEN SWITCHED OFF

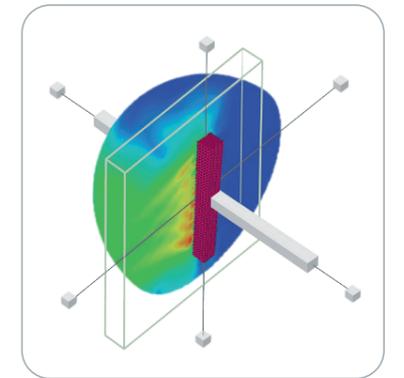


Power densities around the BTS1940 linear array antenna

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### Calculate Safety Perimeters

Evaluate power densities very close to the radiating antenna surface with near-field to near-field transformation.



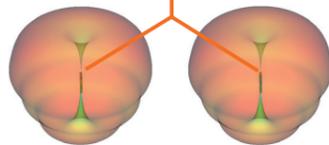
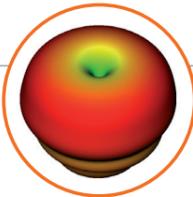
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**Investigate Measurement Setup**

Find array element failure, excitation errors, loose connections...

View sources of asymmetry / unwanted coupling / de-polarization

Discover antenna electrical and/or mechanical errors including surface shape and material properties.



The problem is due to currents on the cable in the measurement setup

5

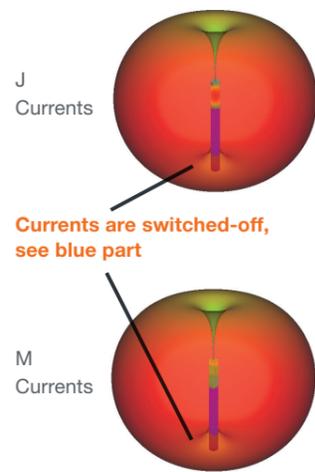
**Filter the Measurement**

The EQC is a highly accurate source for numerical computations of the antenna in a larger EM problem, such as antenna placement evaluations on large devices like automobiles or aircraft.

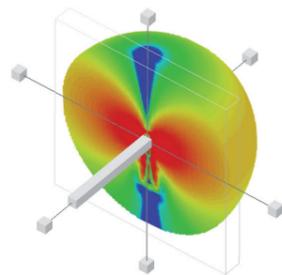
**SD1800 SLEEVE DIPOLE - UNWANTED CURRENTS ON THE FEEDING CABLE IN THE MEASUREMENT SETUP**

A problem of unwanted currents on the cable in the measurement setup has been diagnosed with INSIGHT. Unwanted currents on the cable are filtered with INSIGHT.

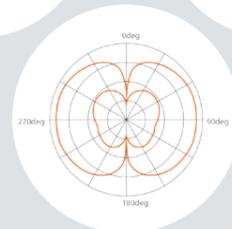
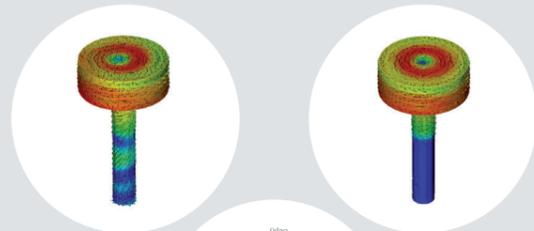
The near-field of the measurement is processed by INSIGHT. The result is clean. The problem was indeed due to the currents on the cable.



Currents are switched-off, see blue part



D1800 @1800 MHz



Currents are reconstructed with INSIGHT - Broken cable is diagnosed (left). Unwanted contributions are filtered (right).

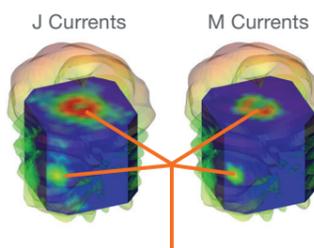
6

**Detect Spurious Radiation**

Troubleshoot EMC shielding, EMS investigation - Pinpoint sources (bright spots) on the shielding structure allowing for the identification of unwanted radiation sources.



From the antenna measurement performed a problem is detected on the radiation pattern collected since no outside field were expected

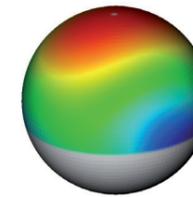


Spurious radiation from slots

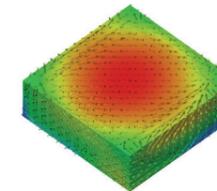
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**Extrapolate Truncation Areas**

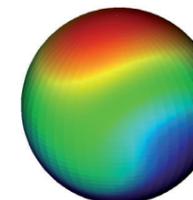
Sparse and missing acquisition data can be compensated with the EQC approach.



The antenna near-field pattern shows truncated area



Insight™ is used to reconstruct equivalent currents on the antenna



With Insight™, the currents are used to reconstruct and show the complete antenna pattern

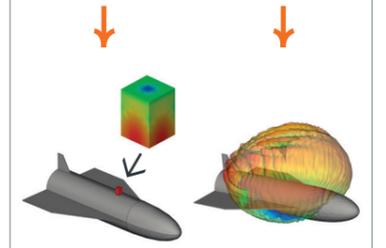
8

**Source for Numerical Computation**

The EQC is a highly accurate source for numerical computations of the antenna in a larger EM problem, such as antenna placement evaluations on large devices like automobiles or aircraft.



Generic measured source antenna is measured on a minimum of representative ground plane in the StarLab range.

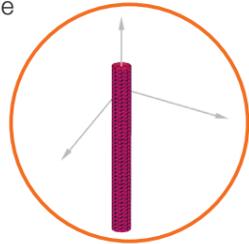


# + Computing Equivalent Currents, Filtering and Near-field Computation

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## Load measurement data and import/create the geometry

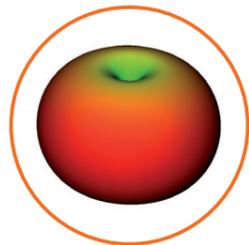
- Load the measurement data: near-field (NF), far-field (FF) or both
- Manage the geometry for the current/field reconstruction
- Import CAD or mesh files
- Draw a generic geometry using the CAD functionalities
- Create a geometrical surface (box, cylinder, sphere, ellipsoid). A set of predefined geometries is available



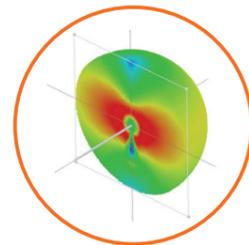
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## Investigate the problem in-depth by post processing the results

- Filter unwanted currents after the diagnostics
- "Switch off" the electrical and magnetic reconstructed currents on a selected area of the reconstruction geometry.
  - Compute the radiated field from the filtered current
  - Compare the reconstructed field and currents before and after the filtering



- Perform a near-field computation over arbitrary, user-defined observation points
- Compute the field on a predefined set of points; a predefined set of points enclosed in a box, cylinder or sphere; or discrete points.
- Visualize the field in the visualization functionalities



- Evaluate power densities very close to the radiating antenna surface

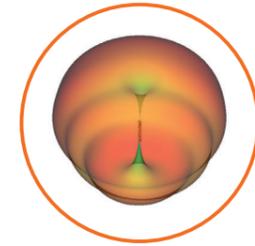
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## Perform the measurement post-processing and visualize the results

3D visualization and animation of the currents



- Filter unwanted currents after the diagnostics
- Configure the measurement data and the geometry
  - Perform the INSIGHT measurement post-processing
  - Visualization of the measured field and fields reconstructed from equivalent currents



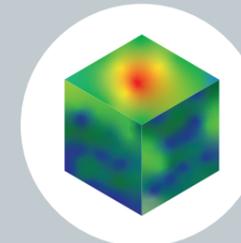
- Electrical (J) and magnetic (M) currents can be simultaneously visualized due to the multi-window ability of the visualization functionalities.

# INSIGHT WORKFLOW

## + Bringing together measurement



After the measurement of the source antenna, the measurement data is loaded. A geometrical surface box is then created.



The reconstructed currents are computed on the box /NF source from the measured radiated field.



The exported NF source can be used in CEM tools, and even gain calibrated for normalized gain radiation patterns.

# MVG - Testing Connectivity for a Wireless World

The Microwave Vision Group offers cutting-edge technologies for the visualization of electromagnetic waves. With advanced test solutions for antenna characterization, radar signature evaluation and electromagnetic measurements, we support company R&D teams in their drive to innovate and boost product development.



## WORLDWIDE GROUP, LOCAL SUPPORT

Our teams, in offices around the world, guide and support you from purchase, through design, to delivery and installation. Because we are local, we can assure speed and attention in project follow through. This includes customer support and maintenance once the system is in place.

For the exact addresses and up-to-date contact information:

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