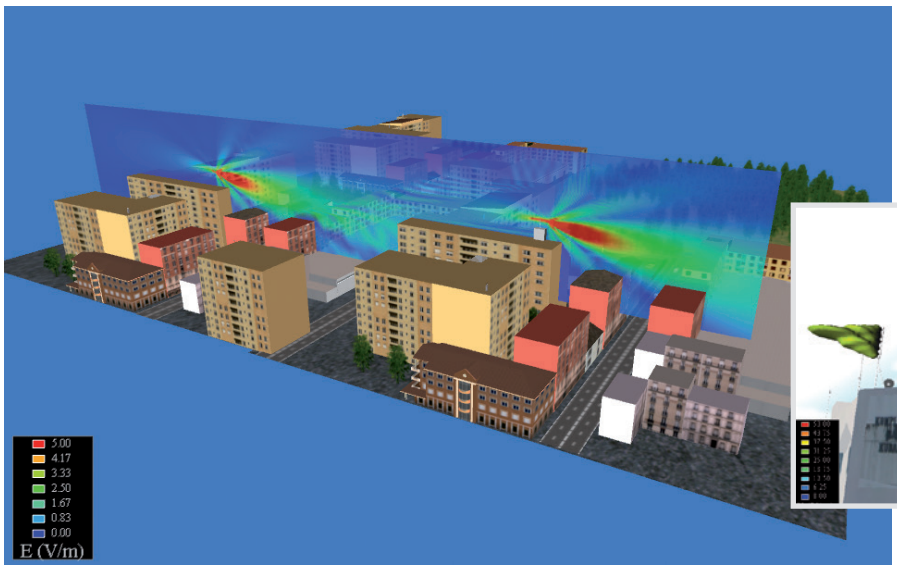
EMF Visual

3D simulation software to predict levels of human exposure to EMF



- **Import 3D objects function**
- **Special tools to assign electromagnetic properties to materials**
- **Special tool to define antenna characteristics**

Main features

Product category

- Electromagnetic exposure simulation software

Simulation capabilities

- EMF Visual is a prediction, analysis and communication tool, which can accurately simulate exposure within a few hundred meters of the antennas while taking into account its environment

User profile

- Broadcast, PMR and mobile phone operators and installers, municipalities, governmental agencies, regulatory and certification bodies

System Configuration

Software

- ■ EMF Visual on CD Rom with dongle key
- □ BSA Synthesis n CD Rom with dongle key
- □ cote2emf n CD Rom with dongle key
- □ EMF2ascii n CD Rom with dongle key

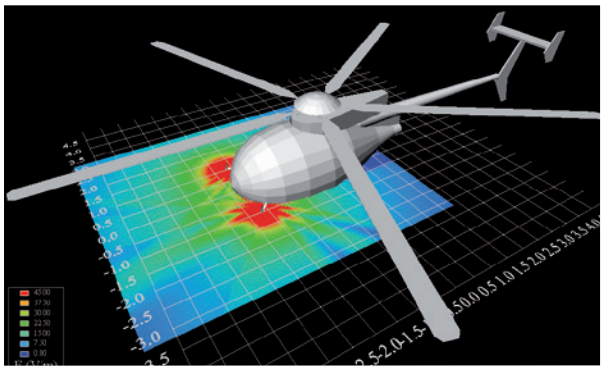
Services

- □ Demo version with short course
- □ Training
- □ Hotline

■ Included □ Optional

STEP 1: 3D Scenario construction

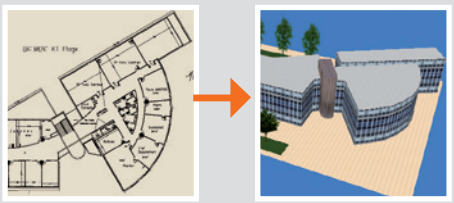
The EMF Visual software permits the creation of 3D scenes by importing 3D objects (*.wrl or *.dxf) from the EMF Visual generic database or using the Cote2emf module. This module allows the creation of a 3D scenario from a 2D map or by importing GIS files.

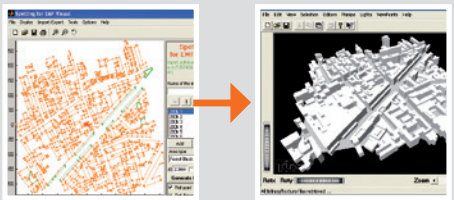


Import of VRML/Open Inventor or DXF 3D objects

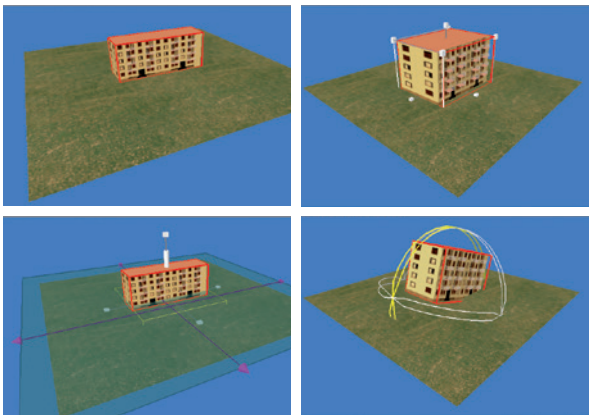
Cote2emf module: build & export 3D scenes from 2D map images or GIS files.

- **Definition of building and ground floor outlines with graphic tools.**
- **Special GIS file format for automatic definition of the outlines (*.shp files from 3 types: Type 5: « polygon » Type 3: « polyline » Type 15: « polygonZ »).**
- **Definition of element types: buildings, houses, trees, roads, pavement.**
- **Random generation of buildings for large areas.**

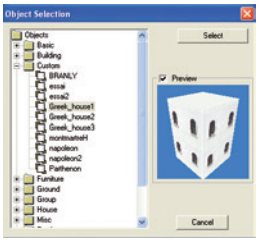




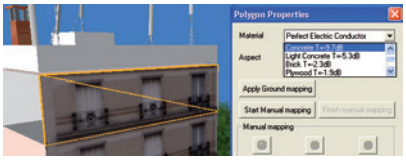
- Complete range of graphical tools to adjust the 3D object properties.

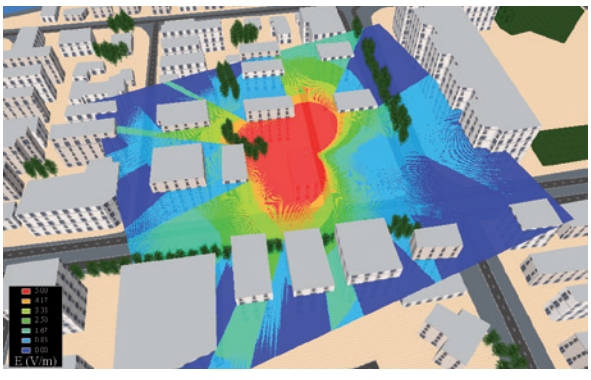


- Grouping of objects: create, move, copy and paste objects in group; translate or rotate a group.
- Wide choice of 3D objects to represent ground, buildings, houses, masts, towers, indoor objects.

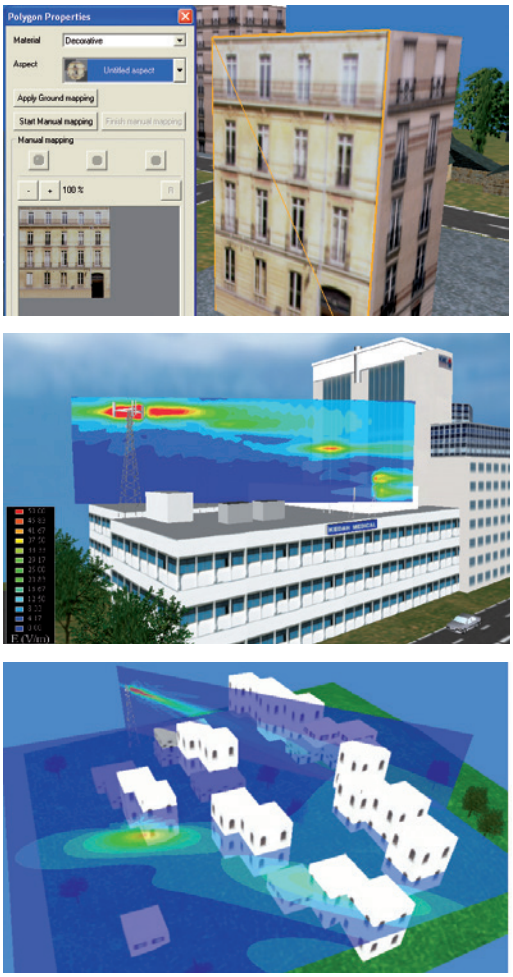


- Tools for assignment of the electromagnetic properties to materials.





- Advanced texture mapping of faces from a bitmap image.



STEP 2: Antenna selection and installation

The EMF Visual software permits the use of antenna models from the EMF Visual generic database or a custom antenna using BSA Synthesis modules. A library of antenna models.

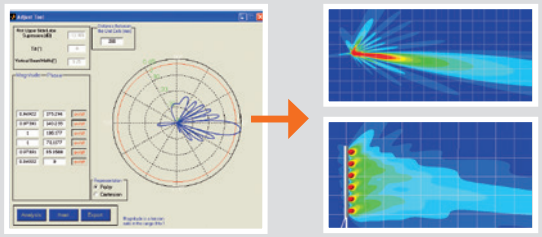
- A complete database of generic models of the most current antennas used in 2G, 3G, 4G cellular networks (800, 900, 1800, 1900, 2100, 2600MHz).
- Over 500 KATHREIN antennas for 2G, 3G, 4G cellular networks.
- An additional database of FM and Wifi antennas
- Possible integration of an ambient electromagnetic field at a specified frequency.

Antenna configuration tools.

- Geometric visualization of the antenna main beam cone in the scene together with graphic tools for adjusting position, tilt, azimuth and power.

BSA Synthesis Module: define antenna characteristics and create customized antennas.

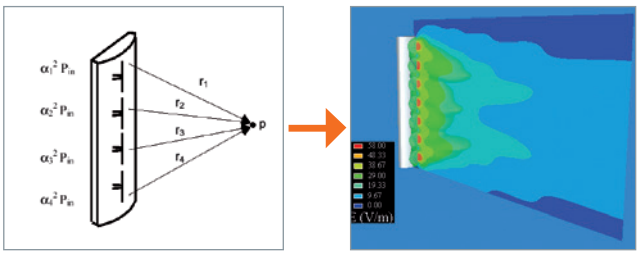
- **BSA Synthesis computes magnitude and phase for each unit cell to generate an antenna model that fits with far field radiation pattern:**
  - **vertical and horizontal -3dB beam width and frequency.**
  - **first upper side lobe suppression.**
  - **number of cell units or antenna length.**
  - **front to back ratio.**
- **Analysis of antenna model from unit cell magnitude and phase data (1D and 2D array antenna).**
- **Polar and Cartesian display of the radiation pattern.**
- **Exportation of the antenna model to the EMF Visual database.**

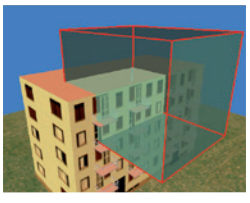


STEP 3: Computation

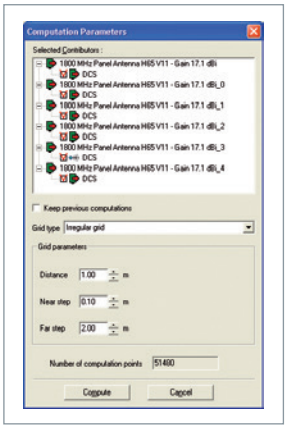
After defining the computation volume around the area of interest, the electromagnetic field level calculation is launched. The calculation is based on optical geometry (ray tracing). It allows simulation to be performed over a wide area in terms of wavelength and the interactions with the environment of the radiating sources to be taken into account.

- Accurate representations of the near field by considering the contribution of each sub-cell of the antenna.

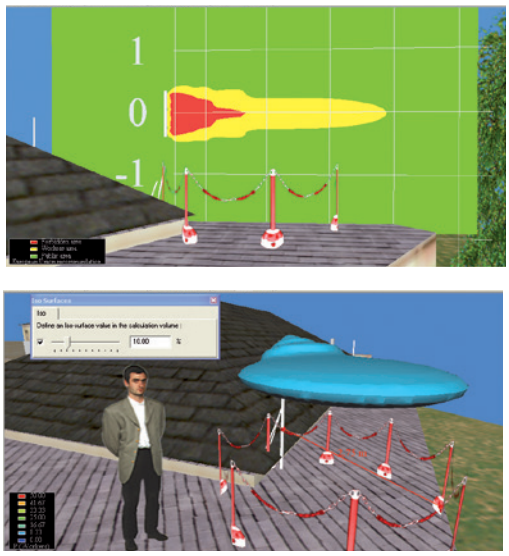




- Definition of a computation volume around the area of interest.

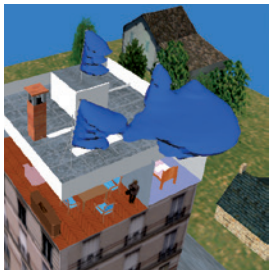


- Selection of the active antenna.
- Adjustment of the mesh step (number of computation points).
- Non-uniform grid to improve resolution around the antennas and to speed up the calculations.

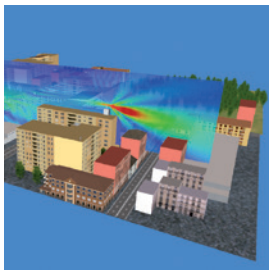


STEP 4: Result display

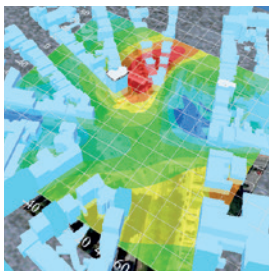
Once the computation is finished, the user can use iso-surface or cut plane tools to display the level of exposure in the vicinity of the 3D environment.



Iso-surface



Vertical cut plane



Horizontal cut plane

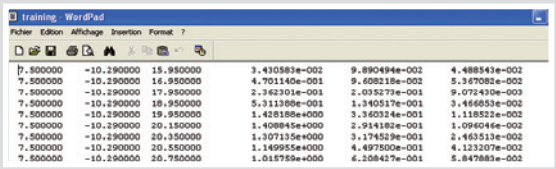
- Selection of the active antennas and adjustment of the input power of antennas to analyse co-sitting interactions.

- Multiple cut plane and multiple distance measuring possibilities for security perimeter definition.
- Evaluates the levels of exposure in terms of E-field (V/m), H-field (A/m), Power Density (W/m²), % of the E-field or % of the Power for multi-frequency sources.
- Determines the safety distances with respect to standards or recommendations (EU recommendation, ICNIRP, and so on …).
- Visual post-processing of the results: choice of colour or transparency.

STEP 5: Result exportation (optional)

EMF2ascii module allows for the conversion of the binary result files into an ASCII Txt file (permits result to be loaded in Excel, Matlab …).

- **Creates ASCII file that contains the E-field value (V/m) computed with EMF Visual.**
- **Displays the E-field values for each antenna with the corresponding Cartesian coordinates.**



Hardware requirements

Computer	PC Pentium > 1 GHz
PC interface	X 64 or USB port
Operating system	Windows XP 7/8
Memory	> 256 MB RAM
Free space	200 MB free space on hard disc

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