

WIPL-D Pro CAD: What is New in v2019?

New features/improvements introduced in v2019 are:

1. **Advanced import of DXF(DWG) files:**
 - a. **Automated multi-layer model build starting from imported DXF files**
 - b. **Multi-layer stack definition using a technology file**
 - c. **Imaging technique for multi-layer DXF (for highly accurate EM modeling of strongly coupled layers)**
2. **Enhanced model validation:**
 - a. **Detection of wire to body intersections and automatic segmentation of wires**
 - b. **Detection of inconsistent wire domains and automatic assignment**
3. **Redesigned user interface – ribbons instead toolbars and menus**
4. **Import of fully-parameterized WIPL-D Pro CAD models**
5. **New platform – HOOPS 24.00, Parasolid v31.1, and 3D InterOp 2019**
 - a. **Improved reliability of Boolean operations**
 - b. **More robust manipulations for complex geometries**
6. **Export of selected model parts to various CAD formats**
7. **Other options/improvements:**
 - a. **Support for custom defined excitation waves**
 - b. **Determining required number of unknowns**
 - c. **Improved distance measuring tool**
 - ...

1. Advanced Import of DXF/DWG Files

DXF and DWG files are widely used in CAD 3D modeling. A set of 2D layers describing a multilayer planar structure is very convenient for applications like PCB, LTCC, MMIC, thin film, etc. For such a structure electromagnetic analysis is often of great importance. Acknowledging the significance of multilayer circuits, automated 3D multi-layer model build starting from imported 2D DXF/DWG files has been introduced in WIPL-D Pro CAD 2019.

Fig. 1 shows an example of a 3-layer LTCC Coupled-Line 180° Hybrid, which is created starting from a DXF file.

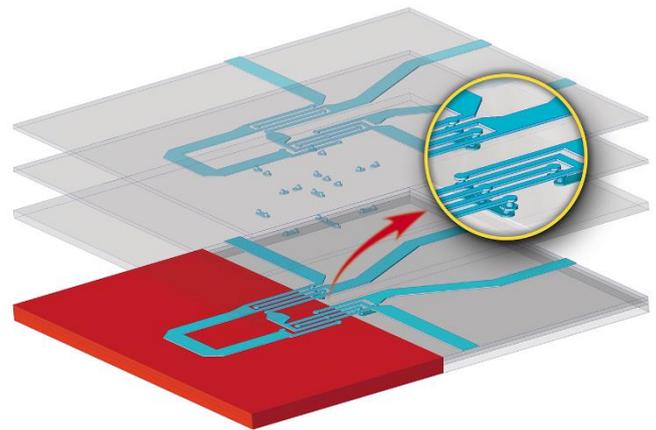


Fig. 1. A 3-layer LTCC Coupled-Line 180° Hybrid and its layers.

a) Automated multi-layer model build starting from imported DXF files

After a DXF/DWG file is selected, the layers are automatically identified and listed in a table. For each layer it is possible to:

- Include/Exclude it from the final 3D model,
- Specify the material,
- Specify the elevation and thickness of the layer.

It is also possible to duplicate or remove a layer.

Once the parameters are specified for each of the layers, the corresponding 3D model is automatically created.

b) Multi-layer stack definition using a technology file

Technology specified for the DXF/DWG import can be exported to an ASCII file in a single click.

This file contains information about the layer stack associated with a particular technology and can be reused as a pattern for subsequent model builds related to the same technology.

The format of the file is very simple, and it is straightforward to edit or even create such a file outside the WIPL-D environment.

c) Imaging technique for multi-layer DXF

In order to obtain highly accurate simulation results of a structure that contains very thin and strongly coupled layers, use of imaging technique is crucial. Automatic imaging can be specified together with the properties of DXF/DWG layers. Two types of imaging are possible:

- Local imaging for selected layers,
- Total imaging, which is applied to the entire structure.

The importance of imaging for highly accurate EM simulations will be demonstrated for the model of printed Inverted F Antenna (IFA), which is shown in Fig. 2. The antenna is created starting from an imported DXF file, and total imaging is applied. It can be seen that faces on two sides of the substrate are completely identical.

Comparison of measured and simulated results, which is given in Fig.3 shows excellent agreement between simulated and measured reflection coefficient for this antenna.

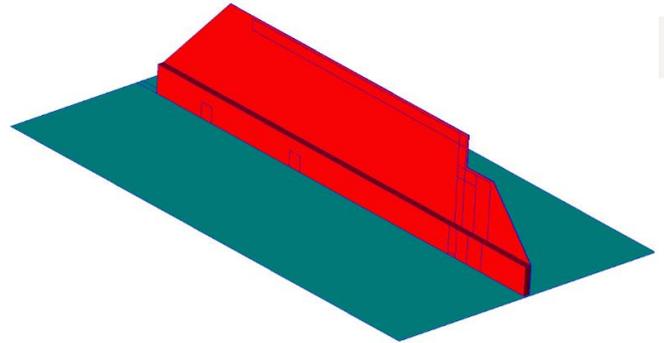


Fig. 2. IFA – imaging applied.

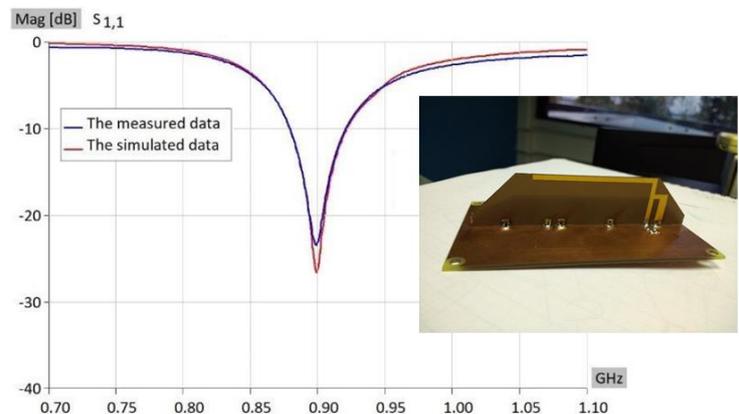


Fig. 3. IFA – measured and simulated S-parameters.

2. Enhanced Model Validation

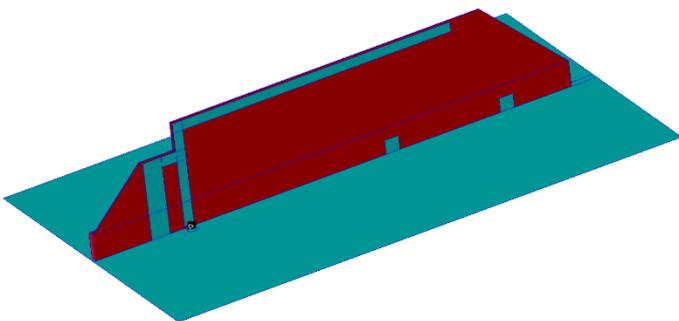
The model validation is additionally improved in the new release. This feature enables automated verification prior to simulation, providing information about inconsistencies in topology, geometry, symmetry planes and domain specification.

a) Detection of wire-to-body intersections and automatic segmentation of wires

The correct EM modeling of wire to plate connection requires junction where wire vertex lies on a face. The new validation functionality introduces checks of wire to body intersections. If any, the feature offers automatic split of wires into segments defined by the points where wires penetrate bodies.

b) Detection of inconsistent wire domains and automatic assignment

This functionality locates wires with incorrect domain specifications and automatically adjusts domain definition to prevent invalid EM simulations.



3. Redesigned User Interface – Ribbons instead Toolbars and Menus

Modern ribbon concept replaces existing user interface with traditional menus and toolbars. This allows easy and more intuitive operation.

User actions (named commands) are done more efficiently and directly, with a minimum number of clicks. This reduces referring to the User Manual or Help. The commands are labeled in groups (with self-explanatory names), with improved keyboard accessibility and enhanced tooltips, supporting dynamic sizing and scaling.

4. Import of Fully-Parameterized WIPL-D Pro CAD Models

This option allows import of an existing WIPL-D Pro CAD project, into the current project. The model is imported with all the symbols and commands being transferred into the current project, and therefore model parameterization through symbols is fully preserved. This feature enables creation of complex WIPL-D Pro CAD models by merging several models into a single one.

For example, an antenna that is simulated and optimized in free space can be imported into the platform model at a position of interest. Further optimization steps can then be easily performed to fine-tune the antenna performance in the presence of the platform, as the antenna is symbolically parameterized.

An example of such a scenario could be a patch antenna array placed on a car bumper, as shown in Fig. 4.

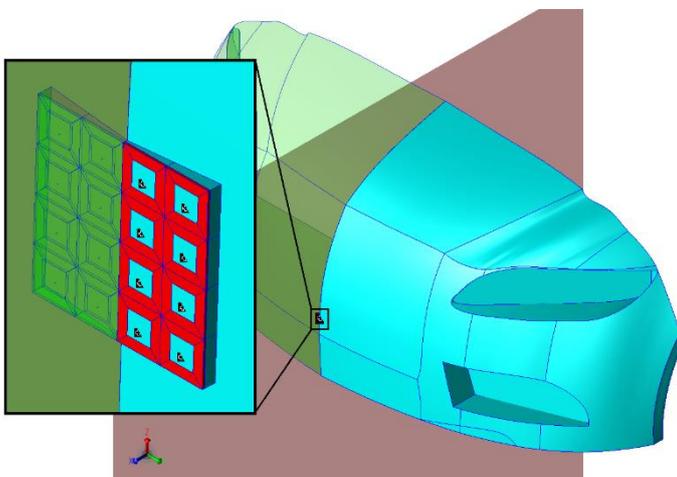


Fig. 4. Patch array placed on a car bumper.

5. New Platform – HOOPS 24.00, Parasolid v31.1, and 3D InterOp2019

WIPL-D Pro CAD 2019 introduces the latest released platforms for (part of) core operations such as:

- Geometry creation and modeling (Parasolid),
- Visualization and rendering (HOOPS Visualize),
- 3D CAD data translation i.e. import/export of geometry from/to various industry standard CAD formats (InterOp – 3D CAD data interoperability).

The new Parasolid release brings improved performance in the area of Boolean operations that are the most important and most common part of geometry creation. Therefore, this enables state-of-the-art quality and robustness in creation of complex geometry.

The example that shows that the new version outperforms the previous one is shown in Fig. 5. This figure shows a Boolean Unite applied to two bodies: a cylinder and a helical tape. The operation is very demanding, because the helical tape intersects the cylinder occasionally (leftmost picture in Fig. 5.). The reason for that lies in the fact that the helix is not an exact analytical surface, but is rather created during complex modeling operations such as sweep or loft, thus possessing very small and invisible deviations, negligible from the user's point of view, but influencing the Boolean operation. The previous Parasolid version fails to unite these two bodies (pops up error code, middle picture in Fig. 5), while the latest release succeeds (rightmost picture in Fig. 5).

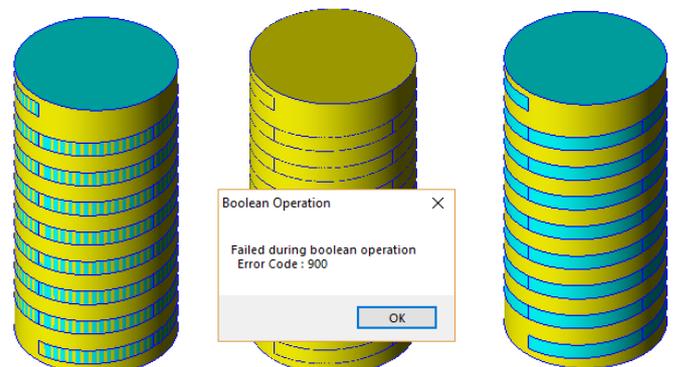


Fig. 5. Boolean Unite applied to cylinder and helix - two scenarios for previous and new version of Parasolid.

WIPL-D Pro CAD 2019 introduces the new HOOPS Visualize release, where a rich and flexible graphics display is furthermore enhanced, and the new Spatial's InterOp standard as well.

6. Export of Selected Model Parts to Various CAD Formats

Enhanced with the new InterOp, besides exporting the entire geometry, the export procedure now allows the user to export only parts of the model to various CAD formats.

This is very useful when dealing with very complex geometries, where the export can be performed part by part, and then prepared for EM simulation. Once all parts are prepared for EM simulation, they just have to be merged into a single project.

7. Other Options/Improvements

a) Support for custom defined excitation waves

This feature allows the user to define the excitation waves and the angles of their RCS response through a file. This way, RCS in a different set of directions can be calculated for each excitation wave. Furthermore, a non-uniform grid for both, excitation waves and RCS directions, can be specified.

b) Determining required number of unknowns

This option enables to user to check the required number of unknowns for a model, before running the EM simulation itself.

c) Improved distance measuring tool

The operator for measuring distance is improved so as to now measures distances between arbitrary combination of entities in the model, which include bodies, faces, edges and vertices.

Fig. 6. shows the measurement of a distance between a vertex of one cube and an edge of another one.

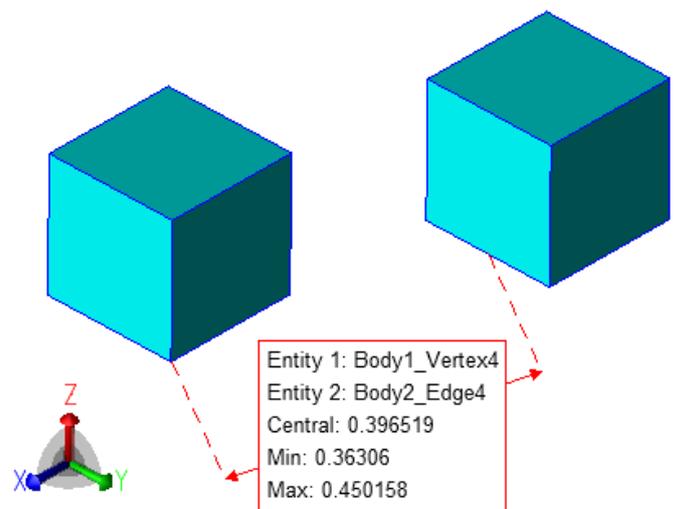


Fig. 6. Measurement of a distance between two cubes.