

TmlExpert: **Tml Modeling and Simulation**

TmlExpert is a fast and accurate Tml modeling and simulation tool.

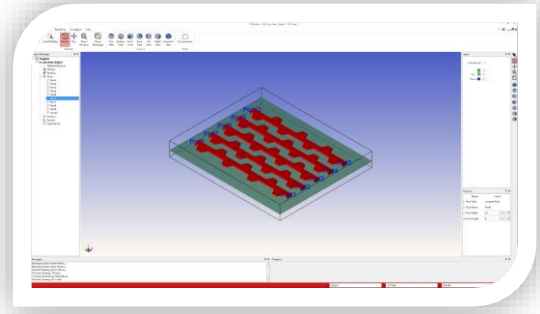
Transmission lines are key building components which plays an important role in signal integrity. As data rate increases to high Gbps speed, accurate modeling of transmission lines including wideband dielectric model, conductor surface roughness, and solder mask layer is becoming necessity. Calculating impedance with 2D RLGC solver is commonly used for impedance control purpose. Given the length of the transmission line, the S-parameter, TDR, delay, and resultant eye-diagram with bit stream input are often needed. In high speed PCB layout, serpentine traces are often used to meet timing specification. Tabbed routing is newly proposed to improve the route channel utilization However, the signal integrity impact is required to be evaluated.

TmlExpert Solution

TmlExpert is an application which is used to deal with Tml modeling and simulation. It provides a fast and convenient method to create Tml model, from simulation result check, such as insertion loss, return loss, crosstalk, also allows the designer do the simulation and tracking processing for the post layout. TmlExpert Support the main features as following:

- Tabbed Routing and Serpentine Routing calculator.
- Transmission line calculator, both Microstrip and Stripline.
- Glass Weave line modeling.
- Grid Plane line modeling.
- Fast 3D FEM and 2D solver offer better capacity.
- Make the model check easier and more intuitive with 3D view function.
- Easy export model, port, boundary and setup to HFSS.
- Use the SnpExpert tool to display the S parameters and TDR curves

FEATURES

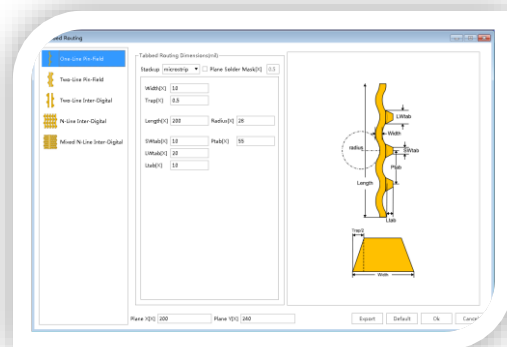


TmlExpert interface

Multiple Ways to Create Tml Models

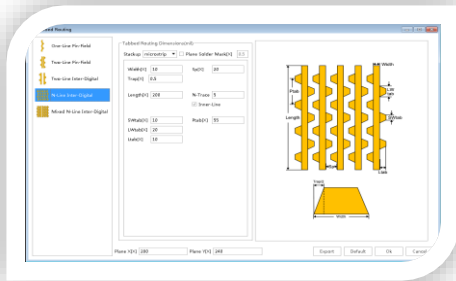
TmlExpert provides quick ways to create models:

- Tabbed routing Tml;

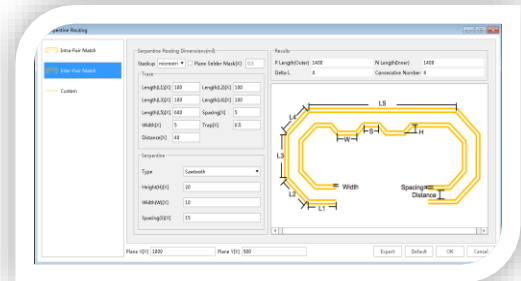


Single pin tabbed line

- Serpentine routing modeling Inter Pair;

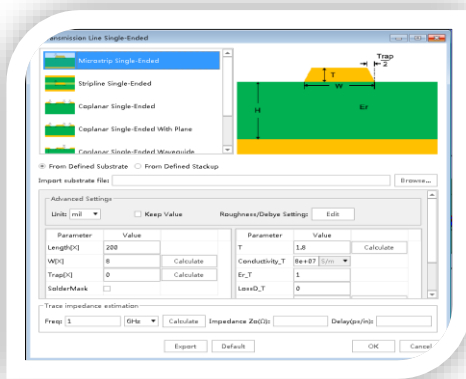


N-Line Inter-Digital tabbed line



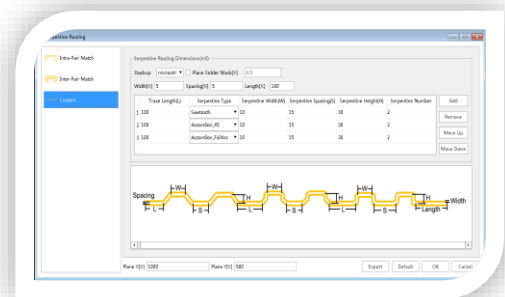
Serpentine routing modeling Inter-pair

- Common Tml modeling;



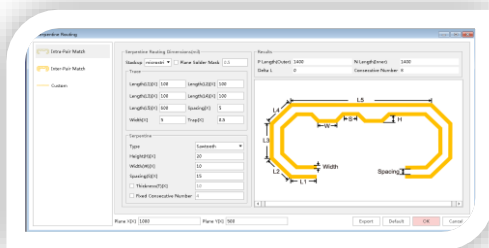
Common Tml modeling

- Serpentine routing modeling Customization;



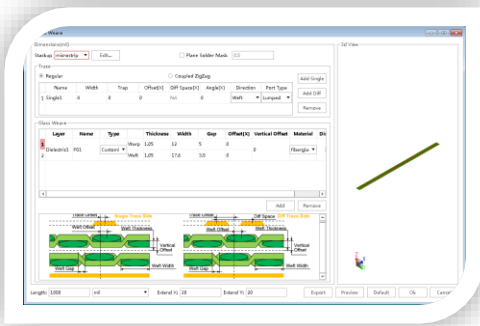
Serpentine routing modeling Customization

- Serpentine routing modeling Intra Pair;

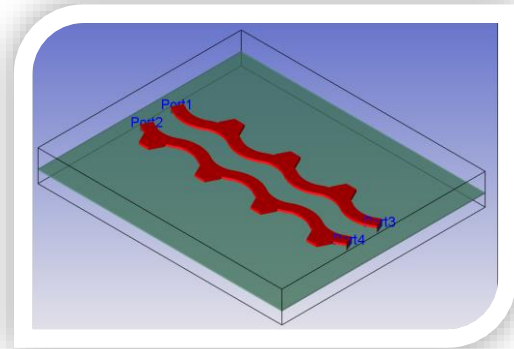


Serpentine routing modeling Intra-pair

- Glass Weave modeling;

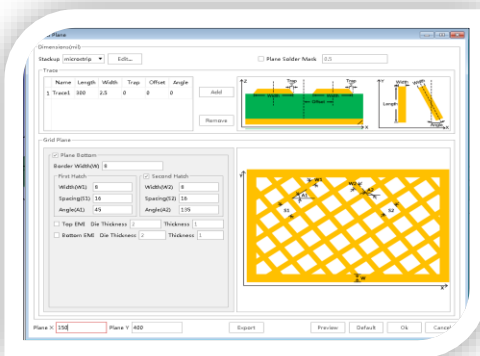


Glass Weave modeling



3D model view

- Grid Plane modeling;



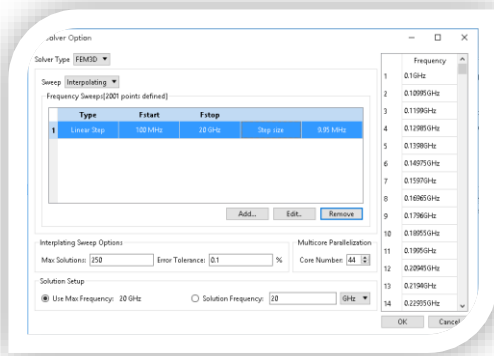
Grid Plane modeling

3D Model

3D view provides a more intuitive view of the model, the user can setup show/hide different modules, ports, plates, stacks, etc.

FEM3D Solver

Considering the requirements of precision and performance, TmlExpert provides three kinds of solvers: FEM3D solver has more reliable accuracy and more high quality results, Hybrid solver in ensuring the premise of certain precision with faster speed, greatly improving the solving efficiency, Cascading solver has high simulation efficiency, using Tline2DSolver solver to obtain the S parameters of transmission line, which simplifies transmission line simulation model; above three kinds of solvers are a combination of parallel technology to improve running efficiency, at the same time, the distributed and multi core processing, compared to similar products on market have more competitive advantage.



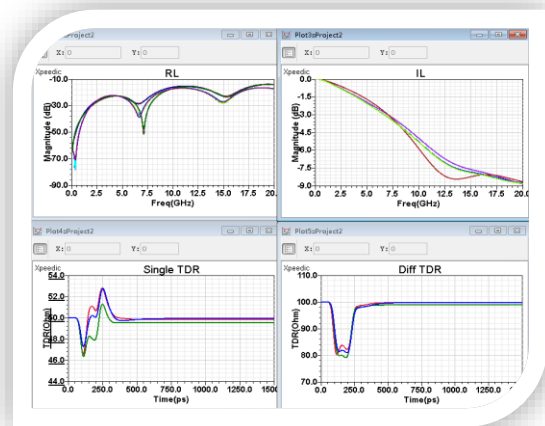
FEM3D Solver Console

Result Post-Process

S parameters generated by TmlExpert can be displayed through the SnpExpert. Users can view more features of the parameters and results:

- Single ended and paired port conversion
- Display S parameters, TDR and eye diagram

- Include FEXT, NEXT, PSXT, ILD, ICN, ICR and other graphics display
- Include comparison of standard parameters, such as 802.3ba OIF, CEI-25G/28G IEEE, etc.
- The calculation and display for passivity, causality, reciprocity, stability metrics, and enforcements.



S-parameter Display

Export to HFSS

TmlExpert provides rapid method to export model to HFSS as baseline analysis. The exported script have all settings, include stackup setting, port and trace etc.

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