Oct 2005

ESATAN / TMG

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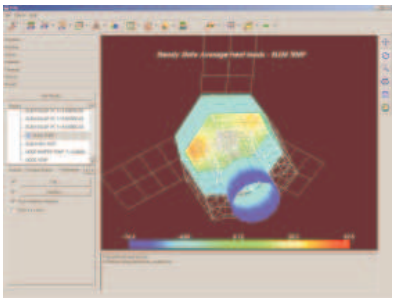
Preview



- ***New product*** combining strengths of ESATAN and TMG.
  - Versatility & robustness of ESATAN.
  - Powerful, FE like, pre- and post-processing capabilities from TMG.
  - An optimal solution for linking to FE based thermo-elastic analyses.

- "Stand-alone" Solution -

Interface to FEA Model

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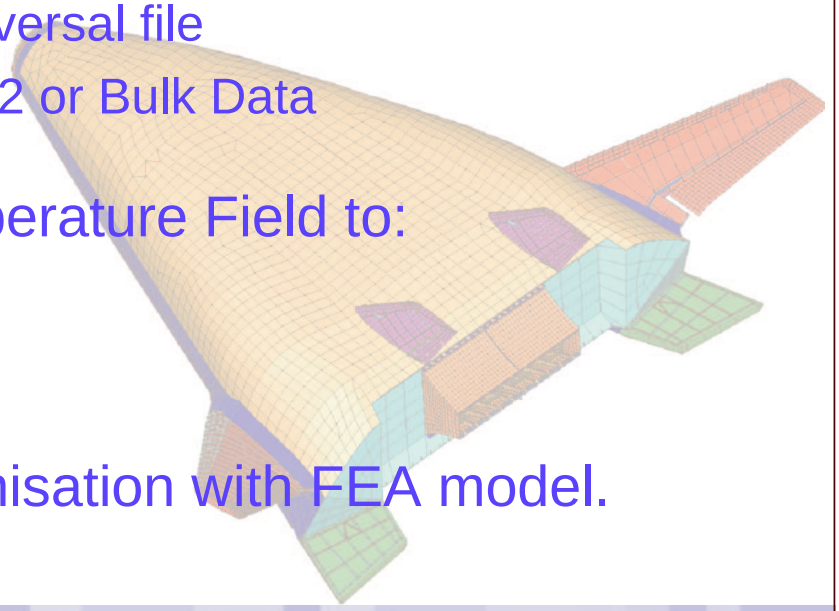
- Import of FE mesh and bulk data from:
  - I-DEAS Universal file
  - Nastran OP2 or Bulk Data
- Export Temperature Field to:
  - Nastran
  - ANSYS
- (re)Synchronisation with FEA model.



Material Data

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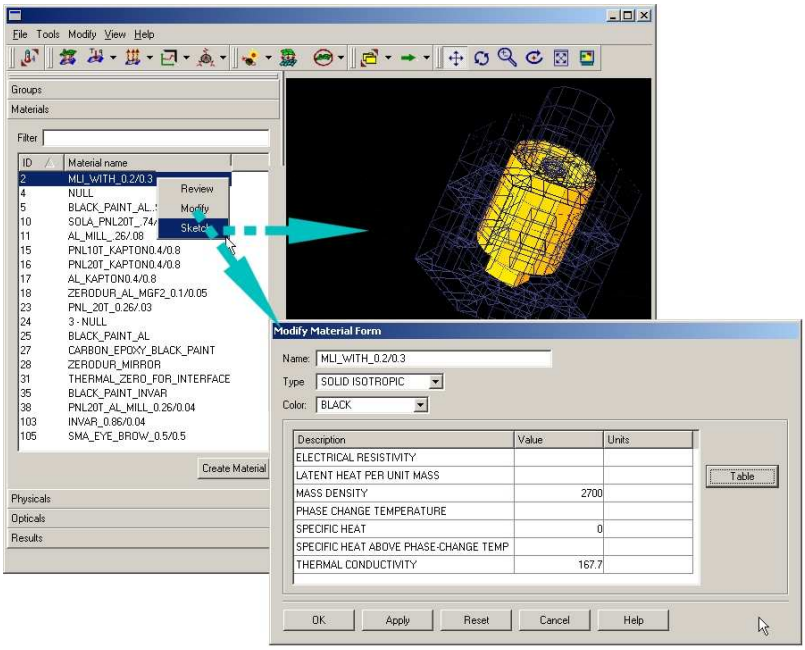
- Imported with model
- Defined within ESATAN / TMG:
  - Material
  - Physical
  - Optical



Boundary Conditions

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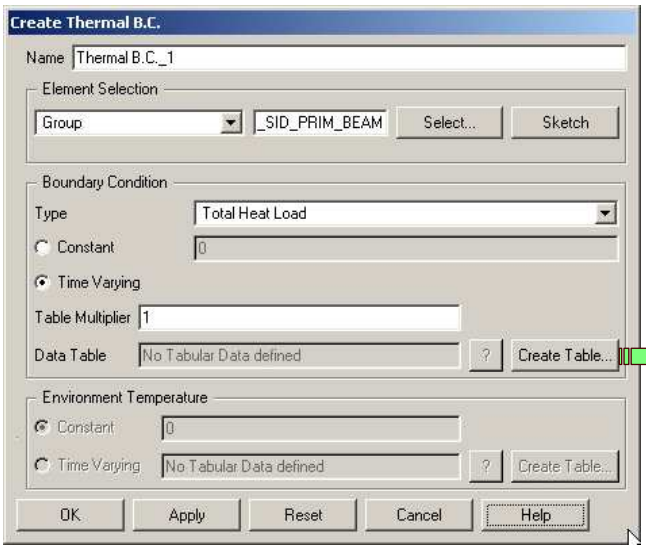
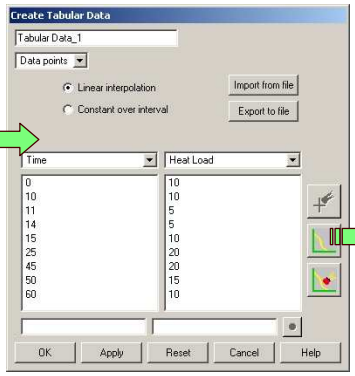
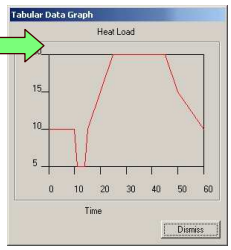


- Temperature
- Heat Loads / Flux
- Radiative, etc…





Pre-processing

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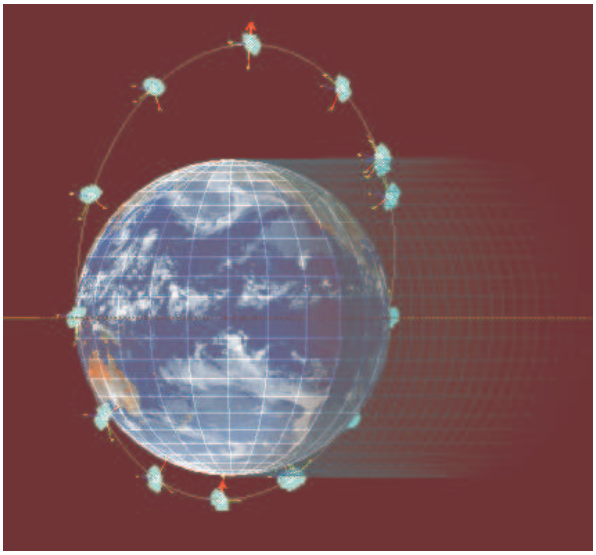
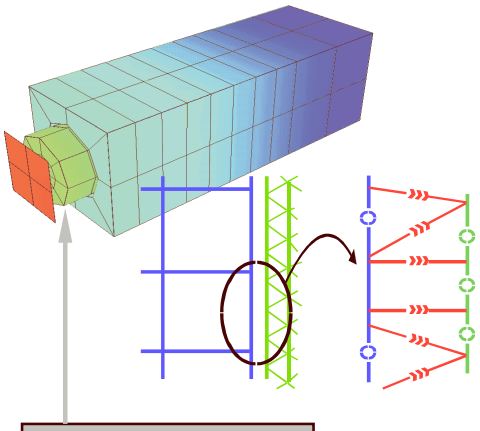
- Couplings
- Radiative analysis
- Orbital Analysis



Thermal Couplings

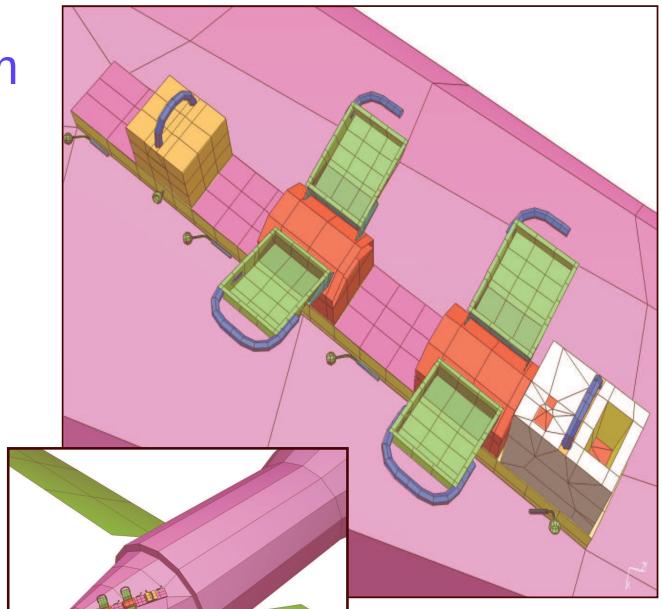
- Couple dissimilar meshes.
- Defined using engineering properties
  - easy to understand and capture the physics precisely
- Applications such as...
  - interface & contact resistances
  - bolted & bonded connections
  - Sliding contacts
  - Spacecraft applications: MLI, honeycomb, structural connections



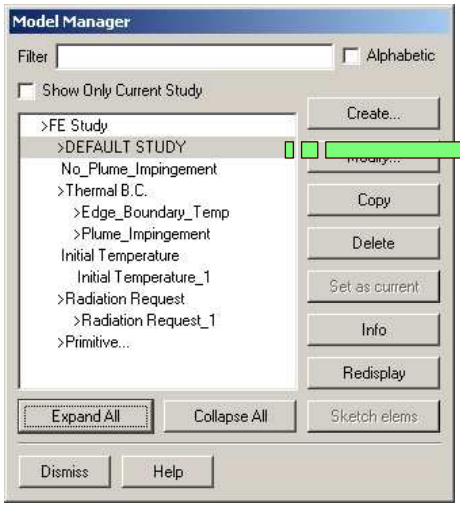
Create a path for heat to flow between independent parts at part interfaces along surfaces and edges

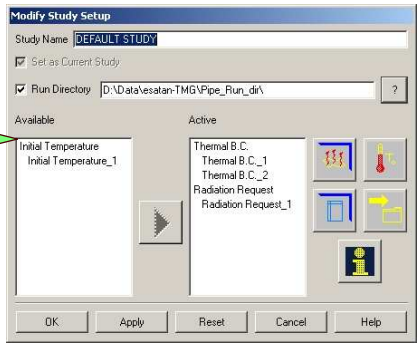
View Factor Calculation

- Hemi-cube algorithm
  - uses graphics hardware
  - implementation based on OGL
  - very fast, especially for large models
  - error detection and correction



Analysis Management

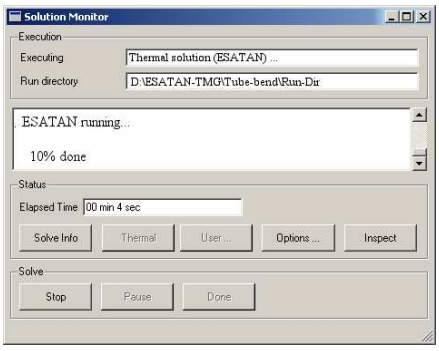




- Manage multiple sets of conditions (boundary cases , starting temperature, etc).

Thermal Solution

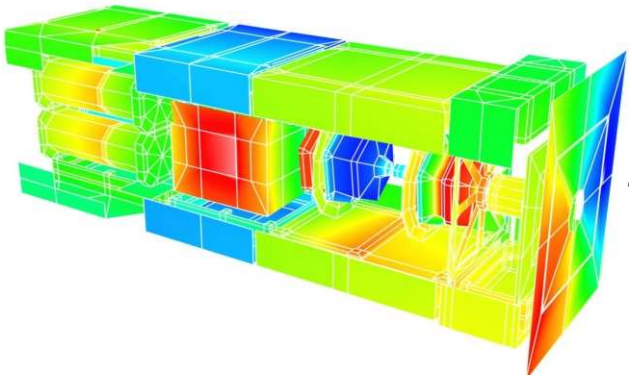
- Works with “standard” ESATAN but includes new ESATAN compatible FEMLIB library:
  - New solver optimised for very large models.
  - Interfacing routines for passing data back to the ESATAN/TMG environment.
- Execution
  - Via interface
  - Run externally - model file can be accessed and modified in the normal way if required.

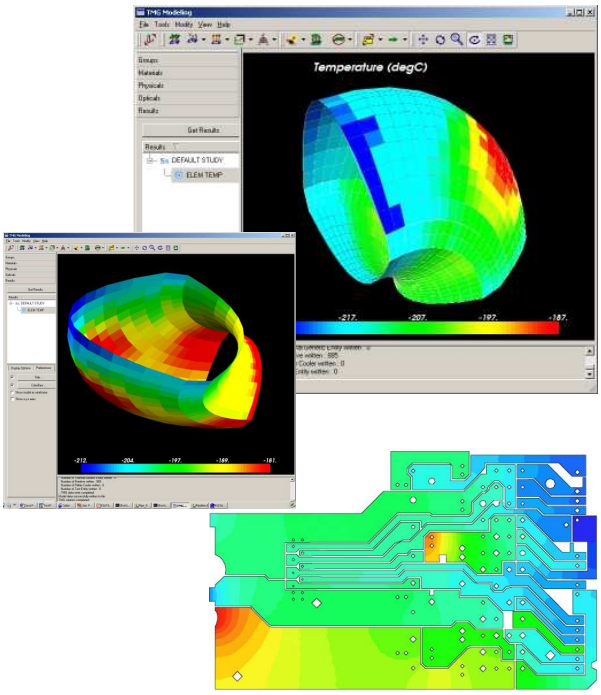


- Models can be exchanged with ESATAN Suite users.

Review Results

- Graphic Post-processing.

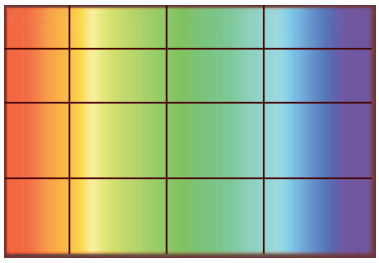


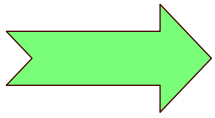


Map Temperature to FEA

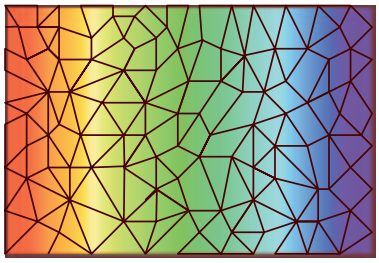
Mapping to MSC Nastran and ANSYS

Thermal Mesh





FE Mesh

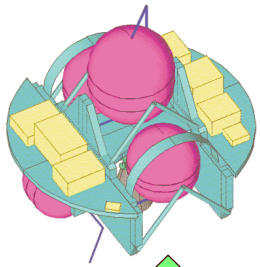


For example, for thermo-elastic analysis

- Dissimilar meshes: proximity based
  - Can use “zoning” of model.
  - Mapping to neutral axis
    - Transverse temperature gradient
    - Fixed offset.

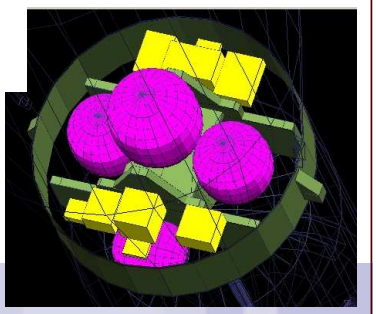
Other Key Features

- Support for thin-shells, solid and beam elements.
- Import models from ESARAD, ThermicA and TSS.
- Non-geometric features.
- Element grouping.
- Element merging.



ESARAD

ESATAN-TMG



ESATAN/TMG: Summary

New Product

- Retain
  - Flexibility and robustness of ESATAN.
  - ESATAN users skills and knowledge.
  - Model compatibility with ESATAN Thermal Suite.
- Gain
  - Links with FEA.
  - Analysis of arbitrary 3D geometry, including solids.
  - Powerful pre/post-processing.

- **Arriving Early 2006** -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