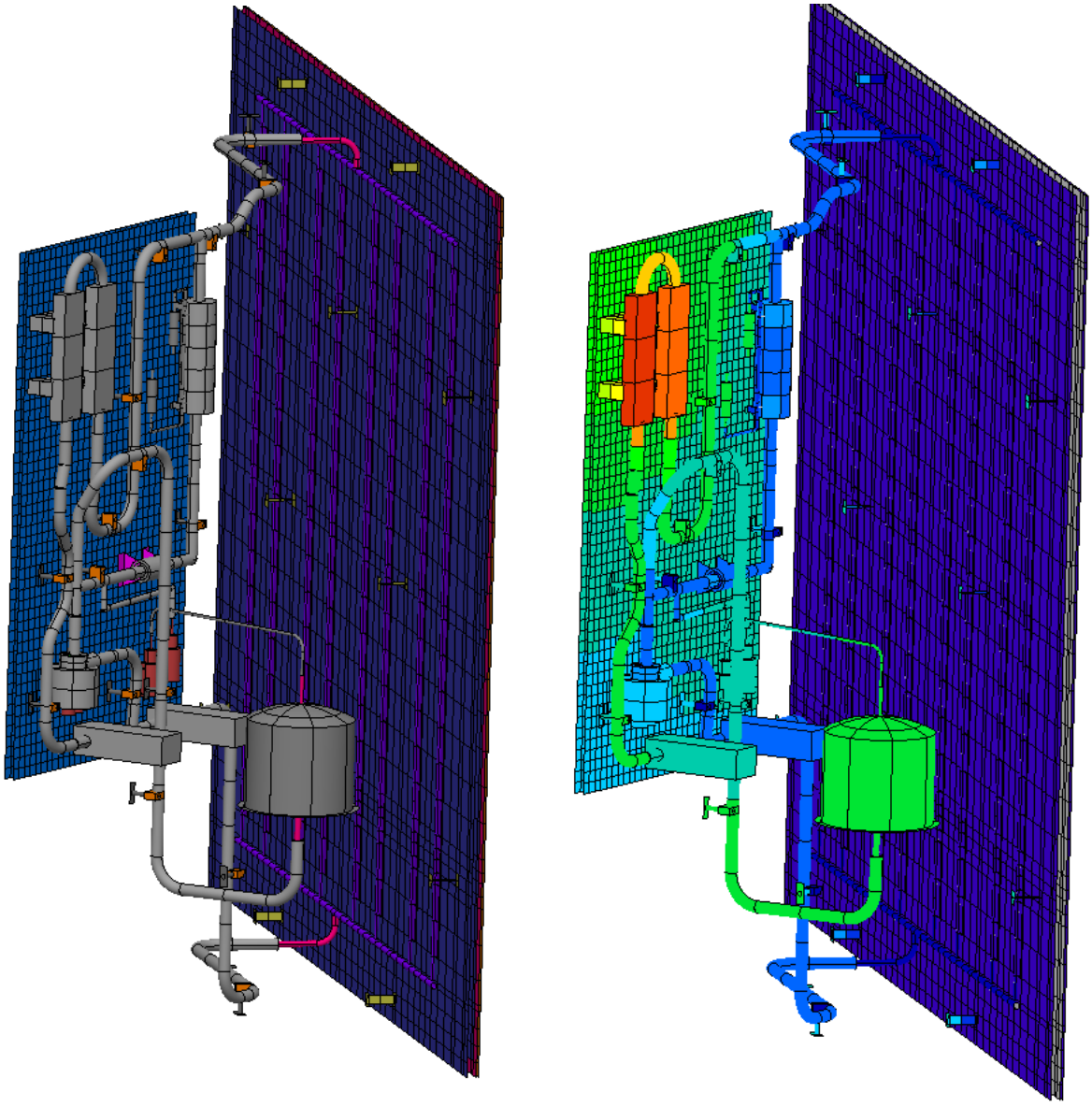
ESATAN-TMS

Release Notes



Front page picture courtesy of OHB System AG

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1 Introduction

ESATAN-TMS 2026 is another significant evolution of the product, providing new functionality that significantly enhances the thermal modelling capability of Workbench. The major new features are support for variable geometry, the ability to override capacitance definitions, a significant update to both the insulation and frequency response functionality and the option to merge solid surface nodes into solid volume nodes.

The ESATAN-TMS 2026 development also delivers several feature enhancements that result from discussions with and requests from users. The following sections describe the main changes introduced within the release.

- **Support for multiple geometry configurations in a single model** <more detail>
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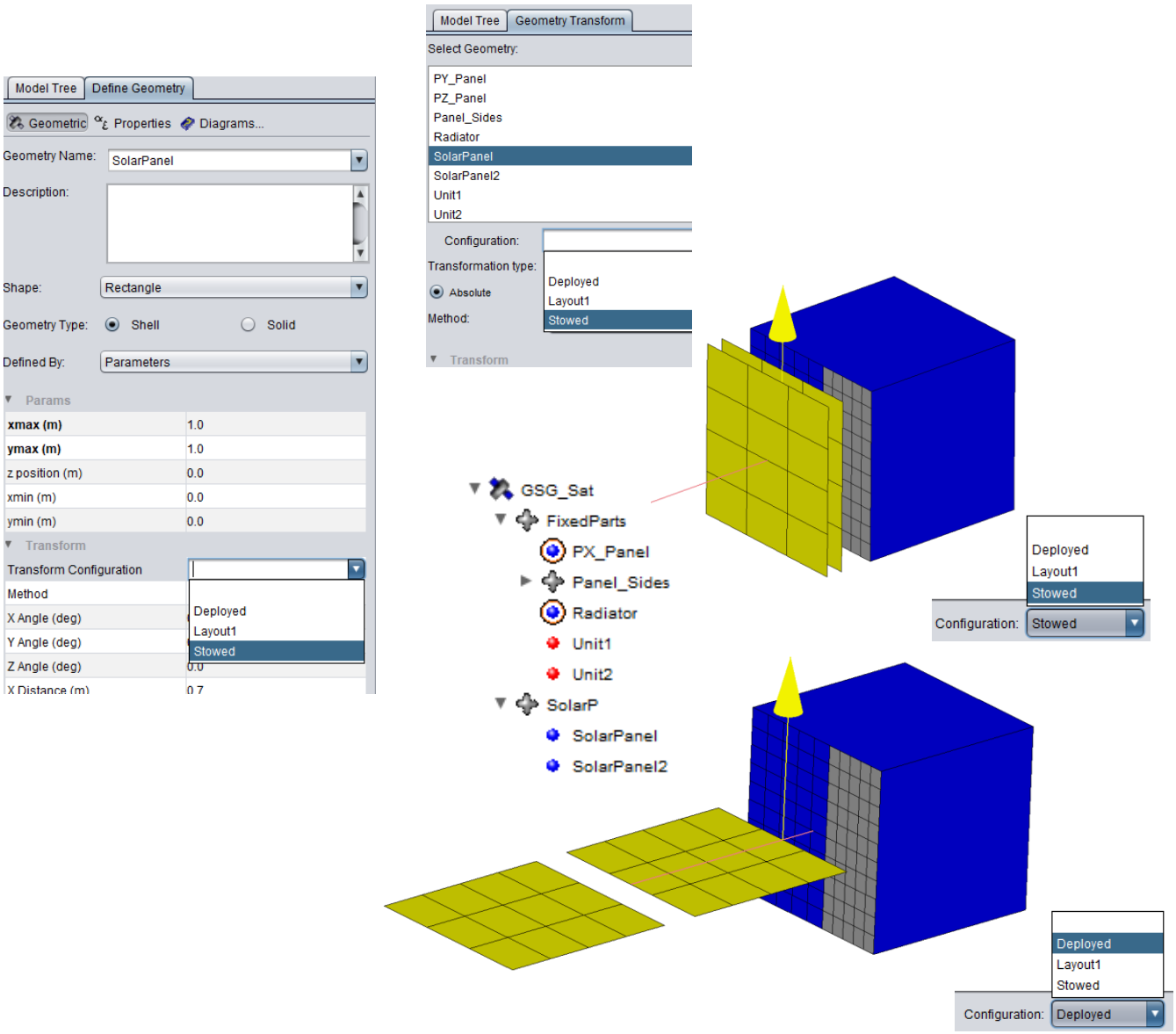
2 Developments

ESATAN-TMS 2026

Support for multiple geometry configurations in a single model

A new configuration symbol type has been added to ESATAN-TMS. Each configuration symbol can disable any combination of assemblies, and override transforms on any number of geometry objects.

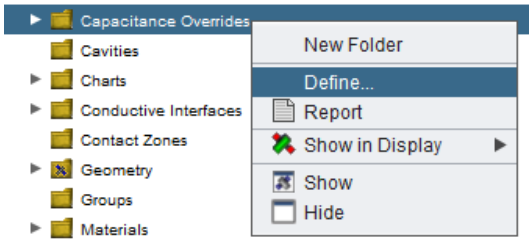
Each radiative case and cavity can specify a configuration to analyse the model in, enabling the results for different transformations to exist alongside one another. Note that this movement is considered analogous to assembly movement for this release, and prevents the definition of contact zones or conductive interfaces across objects with overridden transforms.

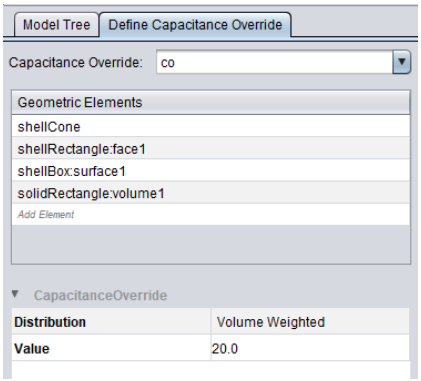


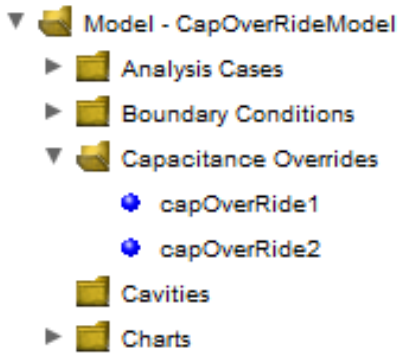
Support for capacitance override property

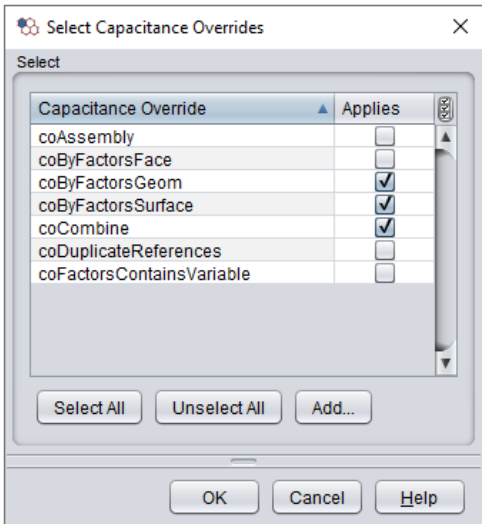
ESATAN-TMS is now providing a new property called Capacitance Override, which allows for the capacitance of geometric elements to be overridden at the node level.

Each Capacitance Override property can specify the geometric elements to be overridden, the method for distributing the override value, and the capacitance value to use. Capacitance can be automatically distributed by volume or manually distributed using a list of factors. The capacitance values are then automatically generated into the analysis file.









A new field has been added to the analysis case, that determines which capacitance override symbols are applied to each analysis case.

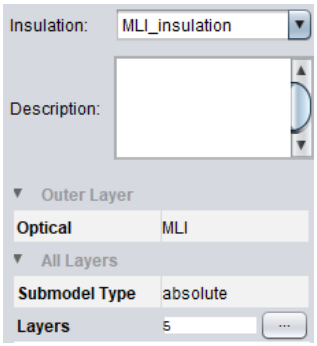
```
C Capacitance Override - coAssembly
      C421 = 5.D-01 * 1.D+02
      C422 = 5.D-01 * 1.D+02
C
C Capacitance Override - coByFactorsFace
      C130 = 1.D-01 * 1.D+02
      C132 = 1.D-01 * 1.D+02
      C166 = 1.D-01 * 1.D+02
      C170 = 1.D-01 * 1.D+02
      C191 = 1.D-01 * 1.D+02
      C192 = 1.D-01 * 1.D+02
      C204 = 1.D-01 * 1.D+02
      C207 = 2.D-01 * 1.D+02
      C208 = 1.D-01 * 1.D+02
C
```

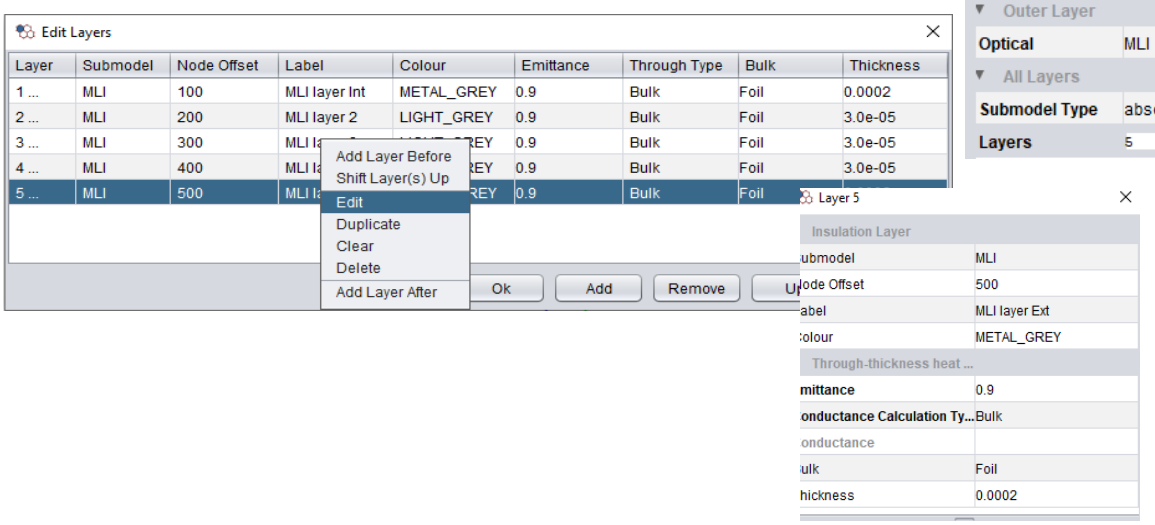
Insulation property enhancements

ESATAN-TMS 2026 enhances the insulation functionality added in ESATAN-TMS 2024 with multi-layer support, more sub-modelling/numbering options and a number of fields relating to the appearance of insulation in the visualisation or charts. Insulation can now be defined in the user and site libraries for re-use between models. Finally, insulated geometry can now be referenced in contact zones (including insulation layers).

Multiple Layers

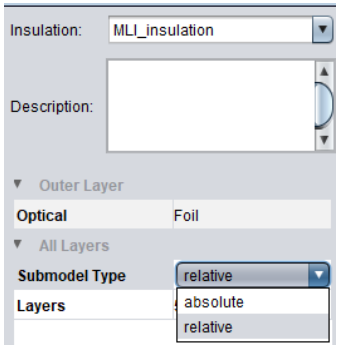
Insulation symbols can now define multiple layers of properties via a new table-based dialog. Each layer implies a new node in every insulation stack added to insulated geometry.



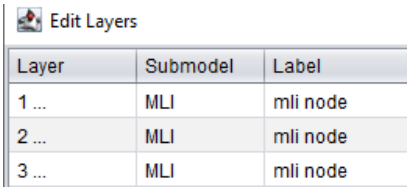


Submodelling and Numbering

A new field ”Submodel Type” can be set to “relative” to place insulation nodes within the submodel of their underlying geometry node. If an insulation submodel is not set, this has the effect of using the geometry submodel. The setting ”absolute” supports the previous behaviour.

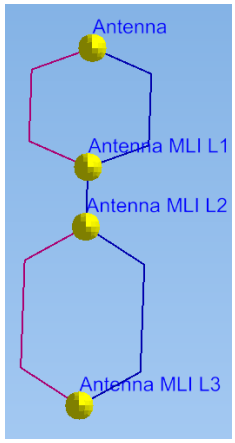


Node Offset can now be left unset to auto-number insulation nodes, if manual numbering is not needed. The same auto-numbered insulation symbol can be re-used on both sides of a single composition shell.




```
$MODEL PANEL
  $MODEL MLI
#
    $LOCALS
      $REAL
        #
        # Mate
```

Appearance



A new field Label has been added, which is appended to the labels of insulation nodes. (It is combined with the underlying geometry node label.) This can be used to identify nodes in the analysis file, in the results, or in a post-processing chart.

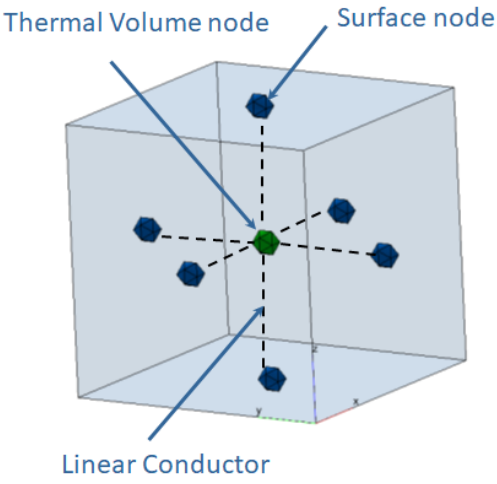
The nodal entities FX, FY and FZ read by schematic charts to position nodes have been adjusted to offset insulation nodes by accumulating thickness in the direction of the face normal - also offset are dual shell nodes. To accommodate this, thickness can now be set regardless of through type. This makes it easier to see the thermal model and view different layers of results on schematic charts.

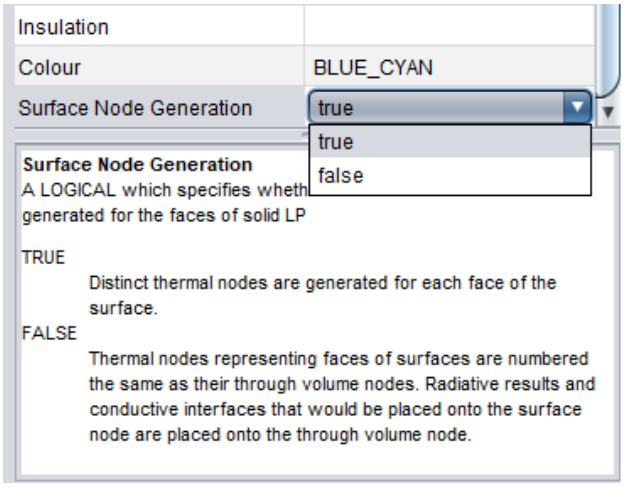
Insulation symbols now have a colour field which can be set to shade geometry in the colour overlay. This can be used to visually distinguish insulated and uninsulated geometry, or different layers of insulation, without having to switch to the insulation properties overlay. (In the image to the left, the pale red colour is applied to the geometry, the green and dark green are different insulation materials. Removed insulation is visually apparent.)

Layer	Submodel	Node Offset	Label	Colour	Emittance	Through Type	Bulk	Thickness
1 ...	PANEL_MLI	100	Panel Insulation	METAL_GREY	0.9	Bulk	Foil	0.001

Optional Solid Surface Node Generation

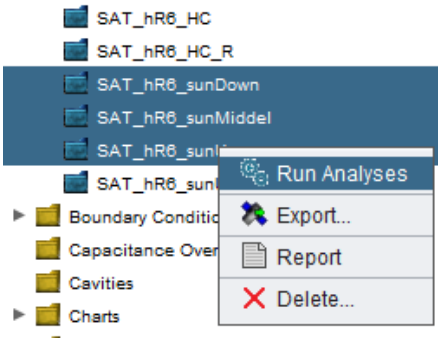
ESATAN-TMS 2026 provides the option, through a surface parameter, to disable generation of surface nodes for solid geometry using the Lumped Parameter analysis type. This new option can be used to exclude surfaces and faces from generating thermal nodes, instead using solely the volume node for radiative exchange and conductors. The change improves thermal analysis speed by reducing the number of thermal nodes in a model and significantly lessens the time taken for automatic conductor generation.





Support for parallel runs of thermal analyses

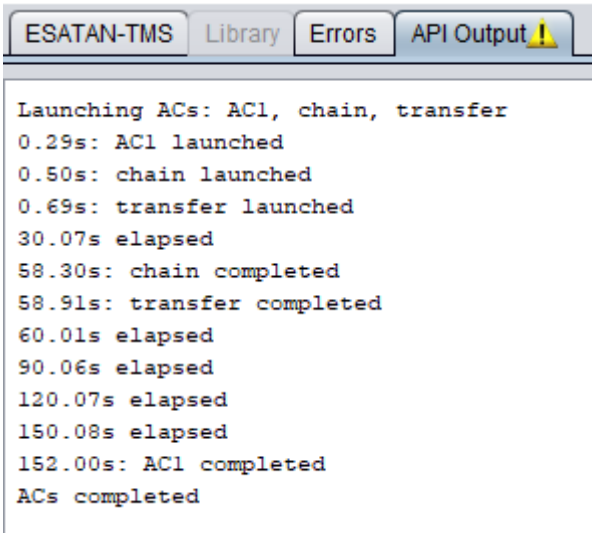
It is now possible to select and run multiple analysis cases in parallel from the model tree. Enough licenses must be present to run all at once, else some will fail. Additionally, “Run Analysis” no longer requires cases to be open.



Two enhancements have been made to the API function *etms.lang.run_analysis* via new optional *bool* parameters:

- *await_completion* = *False* can be supplied to launch an analysis without waiting for it to complete. This can be used to run analyses in parallel via the API, or to monitor the progress of a launched case.
- *monitor* = *False* can be supplied to run an analysis without launching the pre-process or monitor dialog. This is useful when running many cases through the API to avoid the need to close each window.

Additionally a new attribute *AnalysisCaseAttribute.RUNNING* allows the API to detect if an analysis case is currently being ran. The plugin on the left uses the new parameters to launch three analyses at once without monitor dialogs. It reports every 30s, or whenever it detects via get_attribute polling that an analysis case is no longer running.



General improvement of the Python API

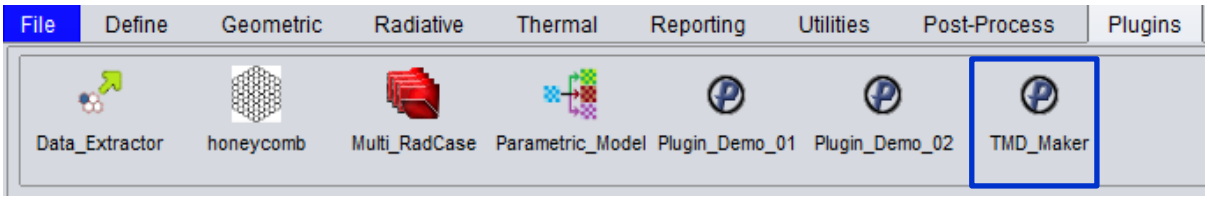
Currently selected points can now be retrieved with the API via the new *etms.vis.current_point_selection* function. This includes geometric references for FE vertices and then names of point variables or vector and matrix elements, along with the literal co-ordinates.

A new *elements* flag has been added to *etms.lang.get_symbol_names*, to support retrieving the names of vector and matrix elements along with the names of scalar symbols. For example if *shellVect* is a geometry vector with 2 elements, then *get_symbol_names(GEOMETRY, elements = True)* would include *shellVect[1]* and *shellVect[2]*.

Certain plugins defining large numbers of basic primitives might be several times faster in 2026 compared to 25SP1. Additionally some performance improvements have been made to etms.lang.get_attribute, which can be up to 3x as fast when making many calls in batch mode in some cases.

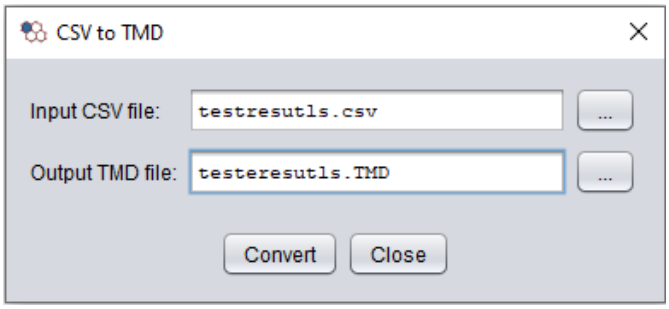
New plugin – Create custom TMDs

The Python API has a new utility class *etms.lang.TmdMaker* for creating TMD files from user-supplied data. This can include custom constants, nodes, attributes (nodal entities) and conductors. Generated TMD files can be used for node attribute overlays, thermal heat flux overlays, in post-processing charts, as an analysis case initial conditions file, and as input to other API methods retreiving TMD data.



An example plugin *TMD_Maker* has also been provided with ESATAN-TMS 2026 to generate TMD files from node temperatures stored in a CSV file. This plugin can be found under *API\examples* inside the ESATAN-TMS installation directory.

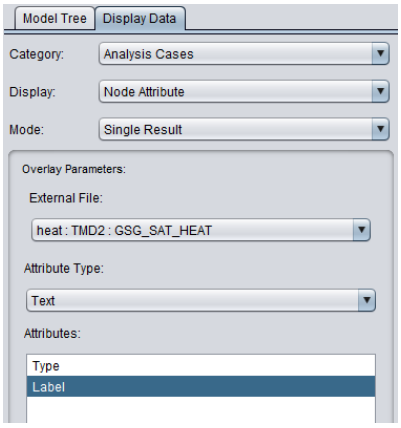
Overlay of a TMD created by the API assigning the total volume to each connected face's node to a custom real nodal entity. (This can also be used with the text attribute overlay mentioned below.)

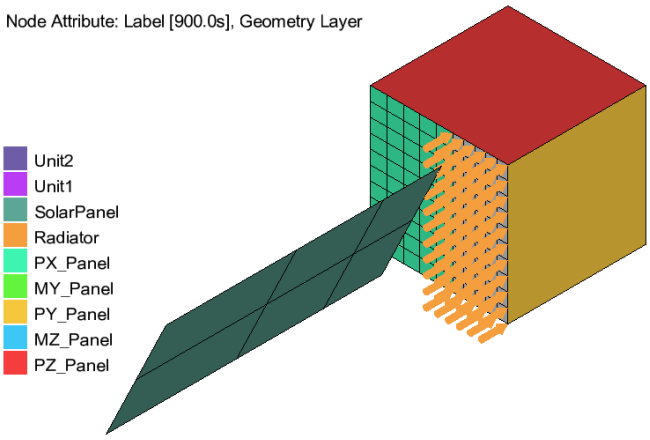


TMD Text Attribute Overlay

ESATAN-TMS now supports the display of text attributes from TMD files, on top of the existing support for real attributes. An extra combo-box on the display dialog's node attribute panel allows switching between the two. Note that Node Attribute Delta is not supported for text attributes.

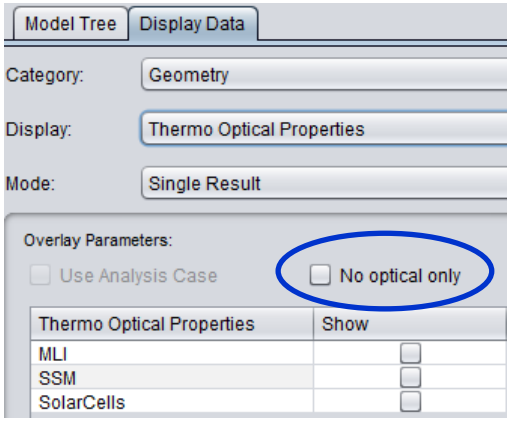
The distinct string values are listed in the legend and shaded in the model (with arrows for Finite Element nodes). This can be used in conjunction with the API's new custom TMDs facility, to display custom text overlays.

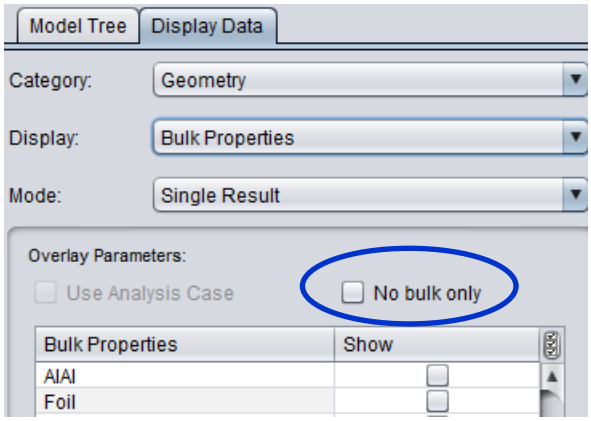




Support for no material overlays

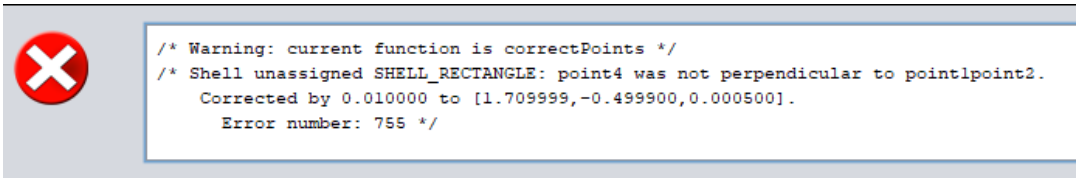
ESATAN-TMS has new overlay functionality to find active geometry missing thermo-optical and bulk material properties. A checkbox labelled "No [bulk or optical] only" above the bulk or optical properties table can be checked to disable the table and instead display missing properties.



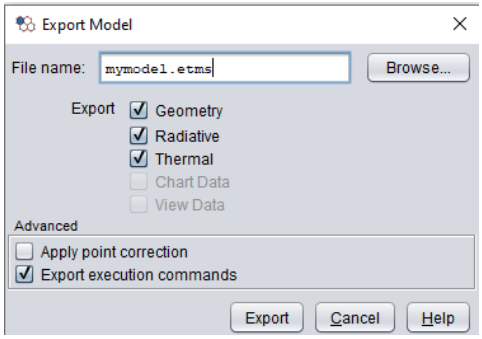


Exporting Corrected Points

The Export Model functionality has gained a new option to apply point corrections. For models containing geometry defined by points the option exports the geometry definitions with point corrections applied. The exported geometry language file will not output point correction warning messages when re-imported.



When a point correction is applied to a parameter in the exported model a comment is output alongside it to indicate its original value.

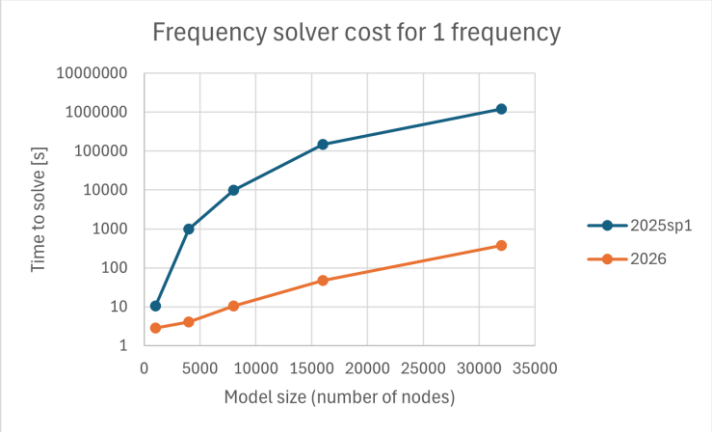


Frequency Response Transfer Function Solver

ESATAN-TMS 2026 provides a new method to calculate the transfer function for frequency response analysis. The new method scales significantly better for large systems (several orders of magnitude faster and half the RAM memory footprint). The previous method, using the SLFRTF subroutine, is still available, but deprecated, with a warning displayed if called.

The main changes are:

- New method to calculate the transfer function based on an LU factorization to solve the linearized system. This method is one or two orders of magnitude faster, per frequency, than the previous method based on a generalized eigenvalue problem. The speedup of this method increases with the size of the system to be solved, and cases that take weeks to be solved with the previous method, can be solved in hours with the new method.
- New, Lapack-compatible, linear algebra library (OpenBLAS). This high-performance library, distributed with ESATAN-TMS 2026 instead of the previous reference implementation, is significantly faster (one or two orders of magnitude) and it uses multithreading parallelism to improve speed in multicore CPUs.

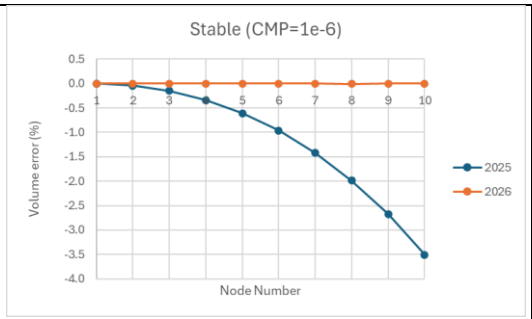


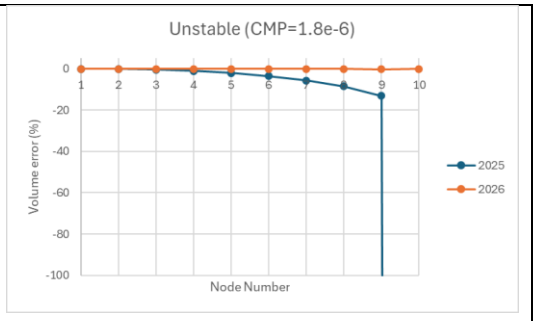
The new method is invoked simply by calling either of the existing routines EVALFR or DMPFR; there is no need to call a preparatory routine.

Both the old and the new methods use the OpenBLAS library.

Improved Calculation of Volume Change Due To Compliance in Fluid Nodes

In fluid nodes with compliance (CMP), the volume changes with the pressure. The integration of this volume has been improved in ESATAN-TMS 2026, using an exact integration formula instead of the previous finite difference one. This increases both the precision of the solution and the stability of the method.





Transient flow in flexible pipe modelled with 10 nodes, showing 2026 increased accuracy (left) and stability (right)

3 Problems fixed

ESATAN-TMS 2026

Workbench

1. In Python API disallow passing non-finite floats to define co-ordinate or min/max values for radiative reports.
2. Python API relying on model data outside of batch mode.
3. Non-geometric fluid node function in the Python API has invalid blank defaults for mandatory parameters.
4. Model tree does not retain selection after renaming a symbol.
5. Matrix reports should use matrix[row,col] and not matrix[row][col].
6. Visualisation window appears corrupted when moving the application window from a lower to a higher resolution display.
7. ESATAN-TMS exits unexpectedly when closing or saving a model if a symbol name exceeds the maximum storage length of 254 characters.
8. Non-geometric nodes should not be able to redefine geometric attributes using a face reference.
9. Creating an analysis case that refers to a radiative case with view factor results causes a validation error in the analysis case definition dialog.
10. Node attribute overlay is changed to Temperature when moving to the next orbit position.
11. The contact zone folder's right click menu is missing entries for the menu items "Expand All" and "Contract All".
12. Celestial body image rotation in orbital displays was being incorrectly applied to bodies other than the Earth. Image rotation is only supported for the Earth.

13 Reported solar constant values inconsistent for certain radiative case calculations.

14 Non-standard environment and inactive node numbers are not reset to default values upon closing model.

15 Sun and secondary body direction arrows displayed incorrectly when post processing TMD file results in the visualisation.

16 Secondary body position arrow cannot be selected or is ignored when displaying results from a chained analysis case.

17 Animate assemblies loses manually entered timesteps in the toolbar below the visualisation window on the subsequent click of previous, next or play.

18 Picking and properties table displayed incorrect mass values for Finite Element volumes.

19 Manually entering a timestep into animate assemblies displays a step ahead. Manually typing maximum timestep into animate assemblies does not update the display.

20 Planet Scale label within the Display Data dialog’s Draw Orbit Parameters panel does not update when changing Radiative Case if displaying chained TMD results across different orbit centres, e.g. Planet / Moon or Sun.

21 Animate Assemblies model tree right-click option should start with the specified assemblies selected.

22 Python API redirect_on function wrongly returns warning as error.

23 The model update from 2024, 2025 and 2025sp1 can leave behind old datasets in the HDF file. These can cause a problem in future versions if they are not removed before a subsequent update to the same dataset. The model update code in 2026 now removes these datasets before updating the model.

24 Importing references into delta charts from large CSV files is slow.

25 Groups containing surfaces or geometries do not expand properly in the cavity dialog.

26 Failure to generate an analysis file, results in ESATAN-TMS exiting unexpectedly when an attempt is made to run the analysis case.

27 Importing a STEP-TAS file containing a geometry and a material with the same name generates an invalid ESATAN-TMS input file.

28 Combinations referenced within a group are not exported by export model.

29 Updating a model containing contact zones from ESATAN-TMS 2023 or earlier using ESATAN-TMS 2024, 2025 or 2025 sp1 can result in invalid contact zones due to the number of samples points being read incorrectly.

30 The DEFINE_INSULATION error_code parameter is not set when function is called with a missing mandatory parameter.

31 Groups referencing different layers of the same face are rejected as insulation (e.g. both the geometry and insulation node).

32 Display contact option of contact zone overlay will show non-contact faces when the contact faces are hidden.

33 Setting a solid's volume base node number, using the define geometry attributes dialog, sets the volume node numbers to -1 (until the model is reloaded).

34 Properties tab incorrectly displays some properties for geometry part of a geometry vector.

35 Default value_max for Python API heat flux reports is very low.

36 Visualisation displays conductors with an insulation surface or geometry reference to uninsulated faces.

37 Memory leak in Python API using vector/matrix element name support in get_attribute e.g. get_attribute('vector[1]', ...).

38 Incorrect power factors are generated in the analysis file for a heat load per unit area boundary condition using thermostat control.

39 Exception logged when tabbing in Define Geometry combo-boxes for solid criticality or activity if surface properties are mixed.

40 Shared literal solid surface optical property not loaded into define geometry dialog.

41 With multiple monitors, nested modal dialogs can launch behind the blocked Workbench window.

42 Real scalar text field editors in the library have a modal dialog button that defines matrices.

43 No error is produced when generating an analysis file that includes REF or heat fluxes in the result, for an analysis case with no radiative case.

44 Interrupting a python plugin in the midst of showDialog or begin_batch does not always act like a raised exception and may ignore handlers.

45 Point modal editor should only allow the creation of point variables.

46 GR definitions missing from analysis files for multiple radiative cases when face order differs from node order (submodels, custom node numbering).

47 Errors occurring whilst updating the model file format between versions can leave a model in an incomplete state and unable to be opened in the earlier version.

48 Workbench on Linux depends on Python and might not execute without libpython3.12.so findable from PATH or LD_LIBRARY_PATH.

49 Python API TMD retrieval functions do not support integer user-defined nodal entities.

50 Rotating the camera after modifying geometry can leave geometry near the camera clipped.

51 Allow contact zones to be defined between moving geometry, provided that the source and destination are not moving relative to one another (e.g. children of the same moving combine).

52 Python API components etms.gui.ComboBox and RadioButtonGroup are now annotated as invariant.

53 Certain linear conductors both within a primitive and across a conductive interface are not generated in some cases for shells with poles where cutting has been applied. The missing conductors go to or from the thermal node associated with the highest-numbered face on the shell. This is true for any shell that has a pole where the adjacent faces are all completely cut away, and the highest-numbered face is not cut.

The affected shell types are: cone, disc, paraboloid, sphere, triangle (a pole being a point where the adjacent faces are degenerate, one edge having collapsed to the point).

54 Doubling clicking the name of an analysis case from the Referenced By Entities dialog generates an exception.

55 Importing ESATAN_TMS_HOME directory plugins folder as a plugin may get stuck in a loop creating nested subdirectories.

Thermal

1. Incorrect node number reported when solving a fluid model without diffusion nodes.

2. Errors in frequency response files created with SaveFreqResp and also using LoadFreqResp to read them.

4 Points to note

1 The developments undertaken for ESATAN-TMS 2026 have required an update to the model store format. Models will therefore be updated from the ESATAN-TMS 2023, 2024, 2025 and 2025 sp1 formats when first opened in ESATAN-TMS 2026.

Due to changes in ESATAN-TMS 2026 it will be necessary to rerun some Radiative Cases after upgrading the model to regenerate the results.

2 The version of the FLEXlm licence manager used by ESATAN-TMS was most recently updated with the release of 2025 sp1. Users updating from ESATAN-TMS versions that pre-date 2025 sp1 will need to ensure they are running a licence server using the latest version of the FLEXlm utilities supplied with the ESATAN-TMS software. Attempting to use an older version of the utilities to licence the software will fail with an error message due to the age of the vendor daemon. The new licence utilities will work with all versions of ESATAN-TMS.

5 Migrate from previous version

ESATAN-TMS Workbench provides a smooth upgrade path from ESATAN-TMS 2023, ESATAN-TMS 2024, ESATAN-TMS 2025 and ESATAN-TMS 2025 sp1.

On launch of Workbench, ESATAN-TMS checks the version of the associated user-library file (if present) and prompts to update the library. On opening the model, Workbench checks the model version number and, if a model from one of the versions listed above is detected, the option is given to automatically update the model to the new version.

Note that the upgrade of the model and the user-library is a permanent update and therefore after the update the files will not open in the previous version. It is therefore recommended that a copy of the model and the user-library file be made before proceeding with the update.

Please also note that due to changes in ESATAN-TMS 2026 it will be necessary to rerun some Radiative Cases after upgrading the model to regenerate the results.

The API deprecation cycle that began in ESATAN-TMS 2024 is now complete. Deprecated functionality includes:

- DESCRIPTION attributes other than CommonAttribute.DESCRIPTION such as BulkAttribute.DESCRIPTION have been removed. These should be replaced directly with CommonAttribute.DESCRIPTION.
- RadiativeEnvironmentAttribute.CELESTIAL_BODY_IMAGE, Environment.celestial_body_image and the CelestialBodyImage enum class have been removed. There is no direct replacement as the data no longer exists on radiative cases – to determine the primary or secondary body consult the RadiativeEnvironmentAttribute constants ORBIT_CENTRE, PLANET and MOON. (The former can be useful in identifying a Sun-centred case.)
- Passing parameters positionally other than those described by the ESATAN-TMS 2025 API documentation is no longer supported. Pass these by keyword argument.

To ensure plugins conform to the interface described by the 2025, 2025 sp1 or 2026 API documentation consider using an IDE to easily identify non-conforming code (see the API Guide for set up).

6 Contact information

If you have any questions regarding the new version or require further information, please contact our customer support at:

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