FloTHERM® New Functionality

Software Version fth10.0

November 2013

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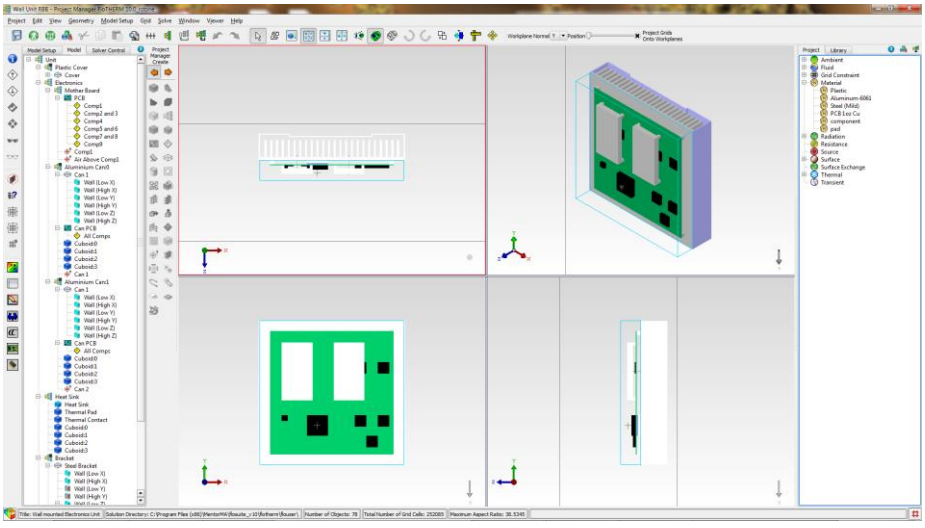
Detailed Change Description

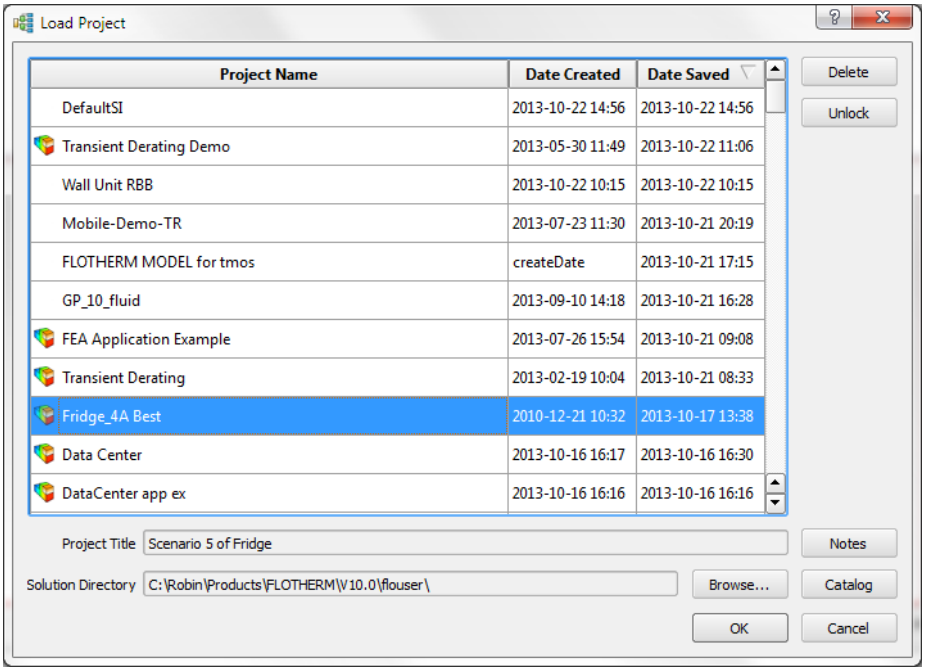
This document provides an overview of the changes available in FloTHERM fth10.0.

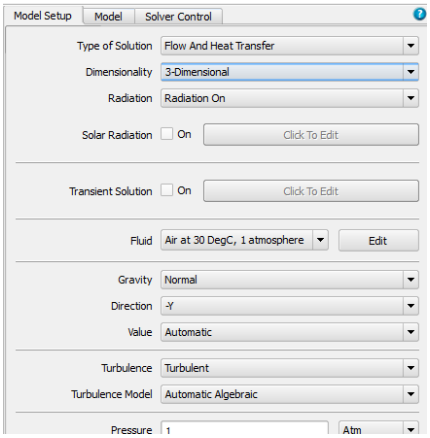
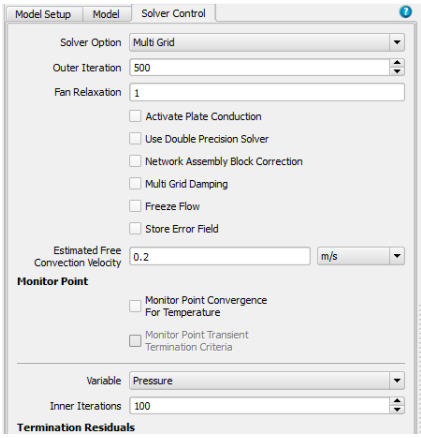
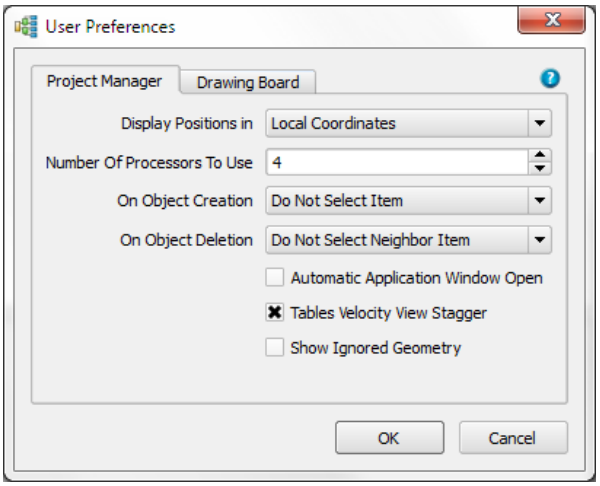
Licensing and Platform Support

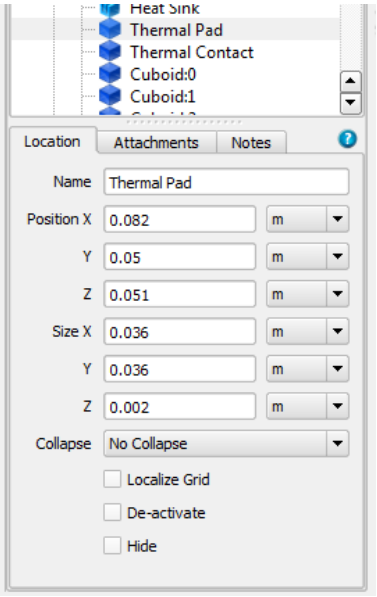
Ref.	Title	Description
1.1	Updated Mentor Flex version and daemon	The version of Flex is updated to 11.10, Flex will have to be reinstalled so that the latest Mentor MGCLD daemon is installed. You are advised to: • Stop the existing Flex service • Perform a Full or Flex Only installation • Run the /FLEXLM11.10/LicenseWizard.exe to re-import the license file and set up the new license server
1.2	Supported Operating Systems Changes	The following operating system are added to the list of those supported: • Windows 8 (32 bit, 64 bit, Core, Pro and Enterprise Editions) • Windows Server 2012 (32 bit, 64 bit, Standard Edition) The following operating system are removed from the list of those supported: • Windows Server 2003 • Linux Red Hat Enterprise 4

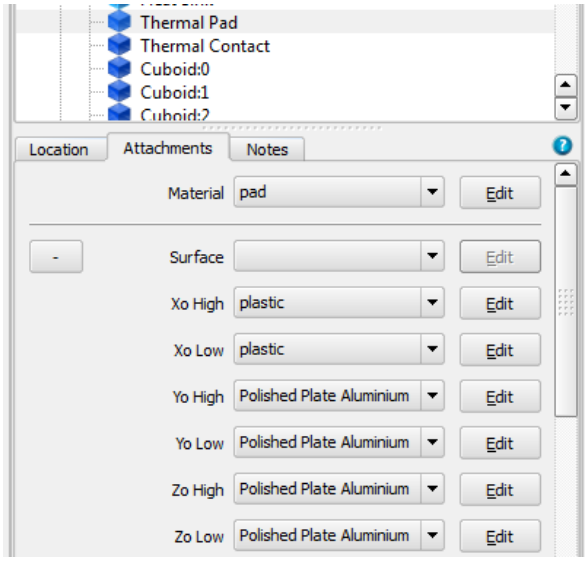
Combined Project Manager and Drawing Board Application Windows

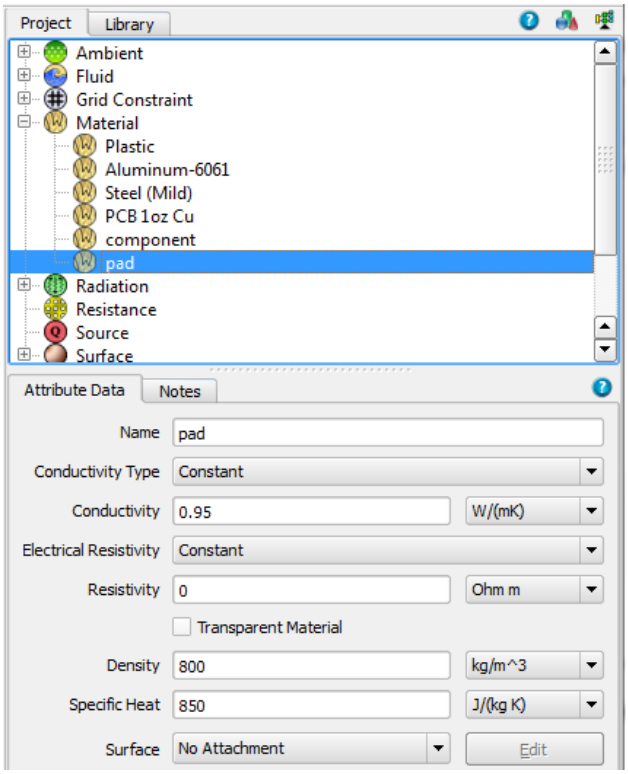
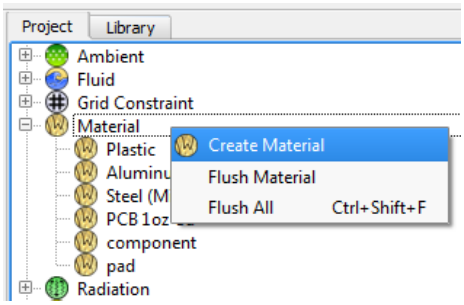
Ref.	Title	Description
2.1	Project Manager Application Window	The Project Manager and Drawing Board application windows have been combined into a single Project Manager application window with integrated drawing board and project node tree areas. 

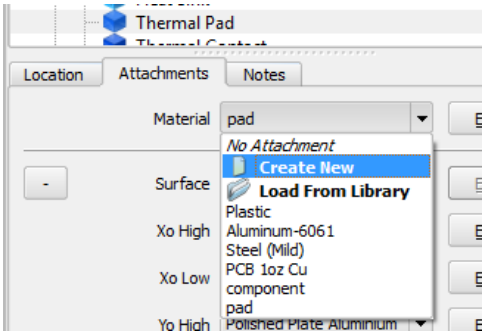
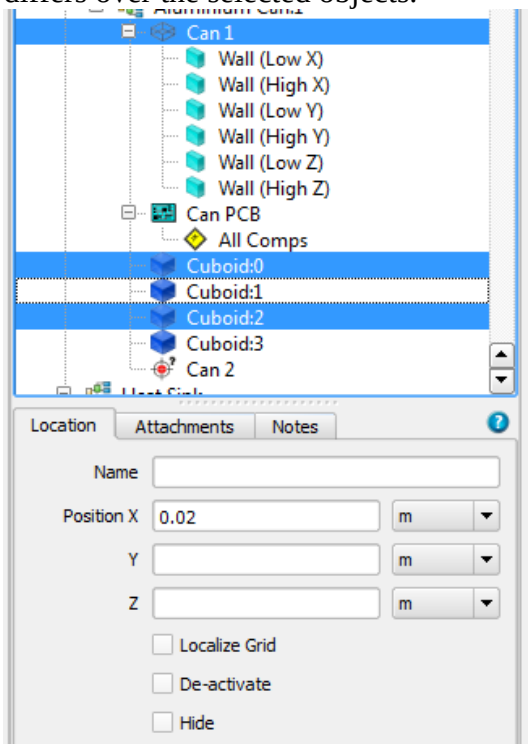
Ref.	Title	Description
2.2	[Project/Load…]	The project load dialog allows for sorting of projects based on Name, Create Date or Last Saved Date (by clicking on the column headings). Typing a character on the keyboard will search for the first project beginning with that character in the load list.  The colored icon indicates results availability.

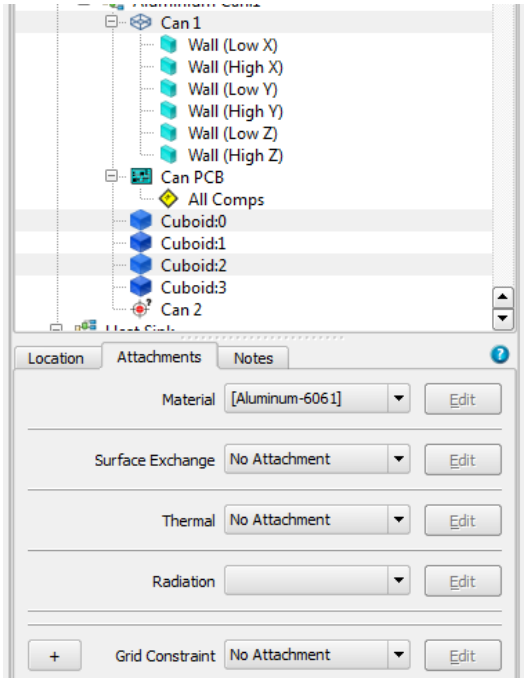
Ref.	Title	Description
2.3	Model Setup and Solver Control Tabs	All legacy [Model] dialogs have been consolidated into a ‘Model Setup’ tab. All legacy [Solve] dialogs and [Initial Variables] have been consolidated into a ‘Solver Control’ tab.  
2.4	User Preferences	The legacy Project Manager and Drawing Board Preference dialogs have been consolidated into a tabbed [Edit/User Preferences…] dialog  This dialog can also be accessed via a toolbar icon 

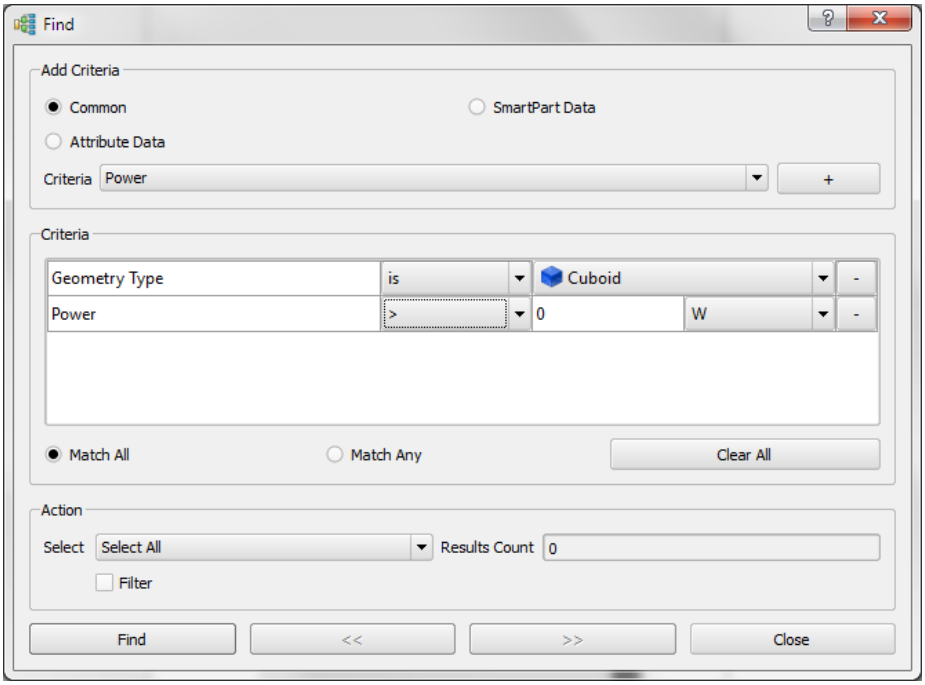
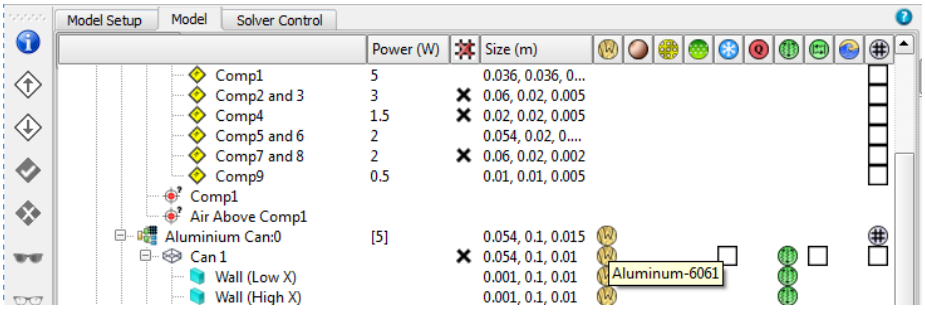
Ref.	Title	Description
2.5	Property Sheets for Data Entry	Object data, attachments, notes etc. that used to be accessed via pop-up menu and floating dialogs, is now available via a tabbed property sheet, shown on object selection  Data is applied on a carriage return or click away. There are no longer any Apply, OK or Cancel buttons. Numeric values are shown in either general or scientific notation, depending on which formatting would require the least number of characters.
2.6	Attribute Attachment	The Attachments tab shows all possible attachable attribute types, what is currently attached and an edit button to edit the currently attached attribute.

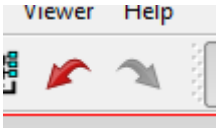
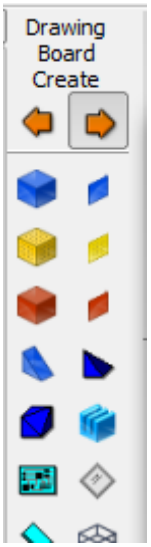
Ref.	Title	Description
		 Attributes that can be attached on a face or direction basis will be shown collapsed if that attribute is attached to all direction or faces. It will be shown expanded if not. This supersedes the legacy 'Default All' and 'Apply to All' attachment methods.
2.7	Project Attributes	The Project attributes (and Library) trees can be accessed via the [Window/Show Project Attributes/Library] menu entry, the F7 shortcut or by clicking on the Edit button in the object's Attachments tab.

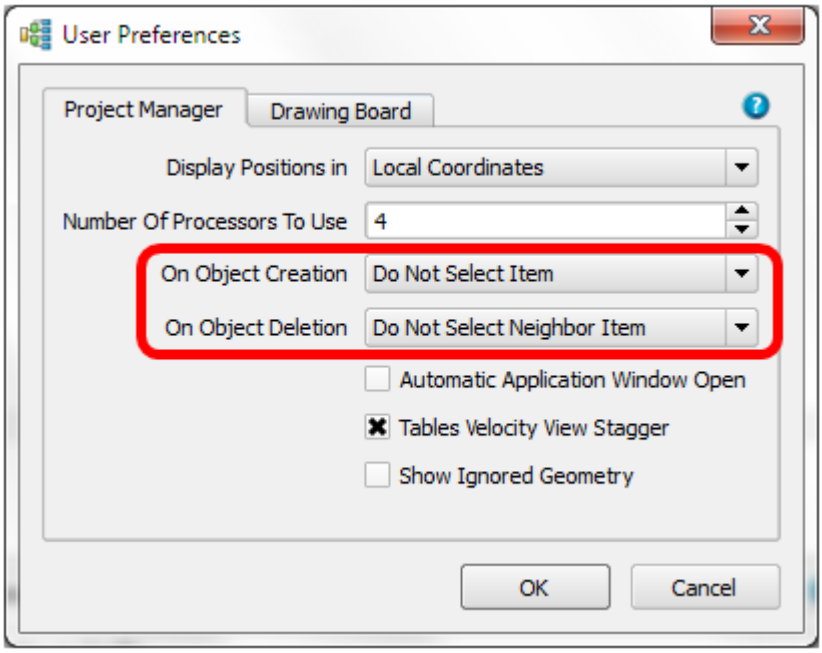
Ref.	Title	Description
		 New project attributes can be created by right mouse click on an attribute type:  Or via the ‘Create New’ drop down in the list of attributes from a selected object.

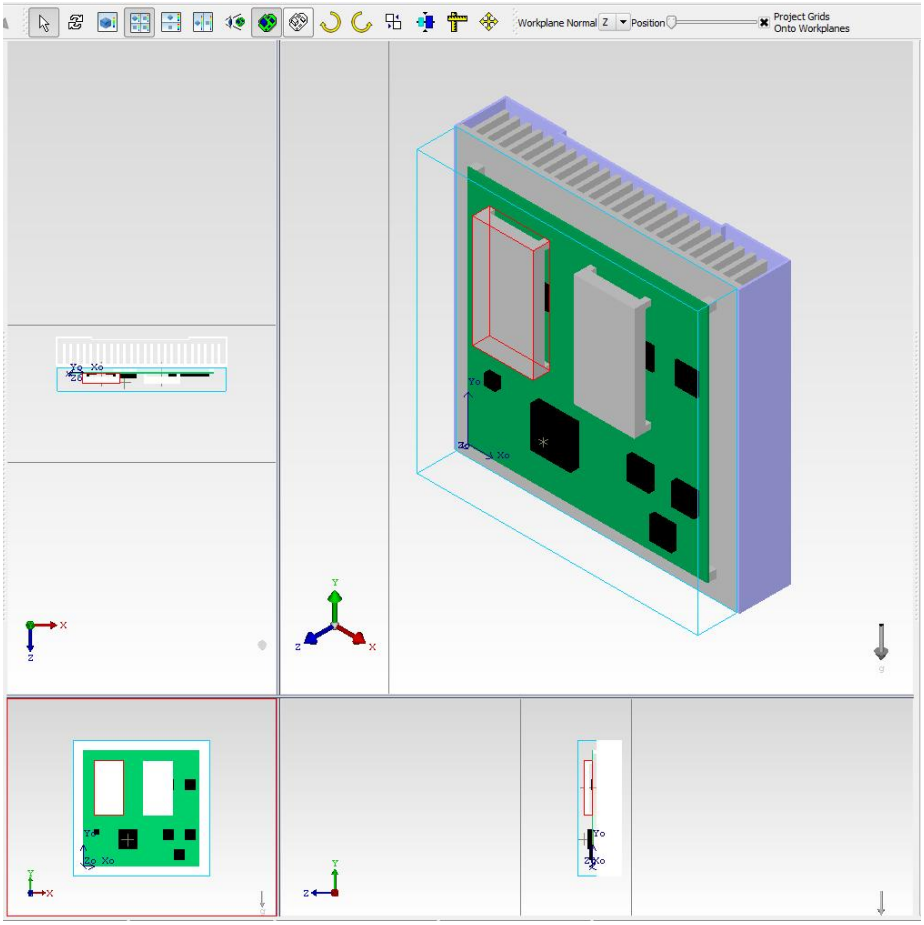
Ref.	Title	Description
		
2.8	Applying Data to Multiple Selected Objects	When two or more objects are selected (regardless of object type). Any data that is common between the selected objects will be shown in a combined property sheet. Data values or settings that are common to the selected objects will be shown, a blank will be shown if the data differs over the selected objects.  Editing any data will apply that changed data to all the selected objects. This is also true of attachments, allowing for attributes to be attached to multiple objects of differing type in a single operation.

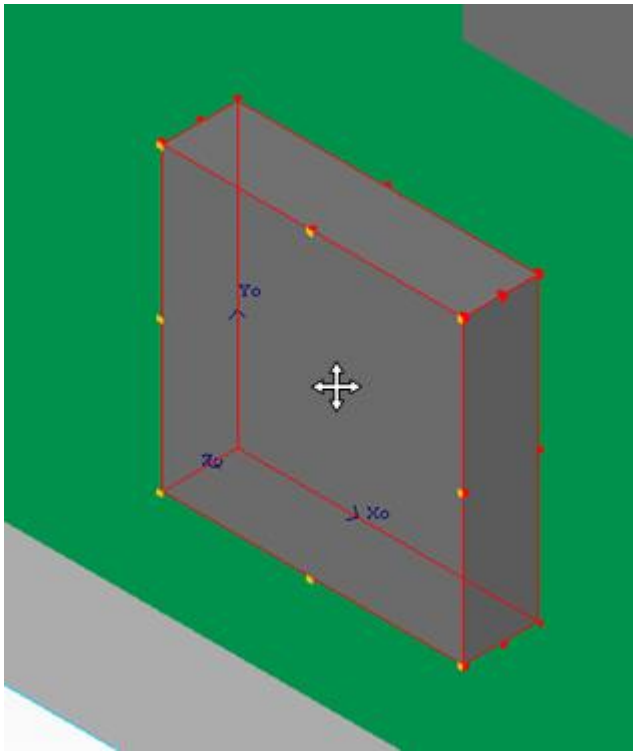
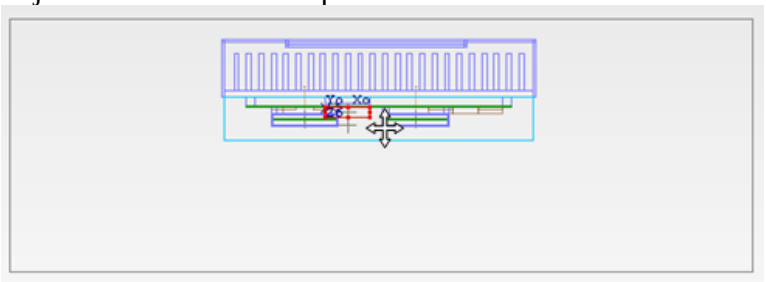
Ref.	Title	Description
		
2.9	[Edit/Find]	[Edit/Find] has been extended to allow for selection of objects based on any object parameter or attached attribute parameter. These criteria are grouped into 3 categories: • Common. For parameters that are common to different object types, e.g. power dissipation, hide state, attached attribute etc. • SmartPart Data. For parameters used in the Construction tab of SmartParts, e.g. Fixed Flow flow rate, Heatsink number of fins etc. • Attribute Data: For parameters of any attribute attached to the object, e.g. Material thermal conductivity, Source Temperature total source etc.

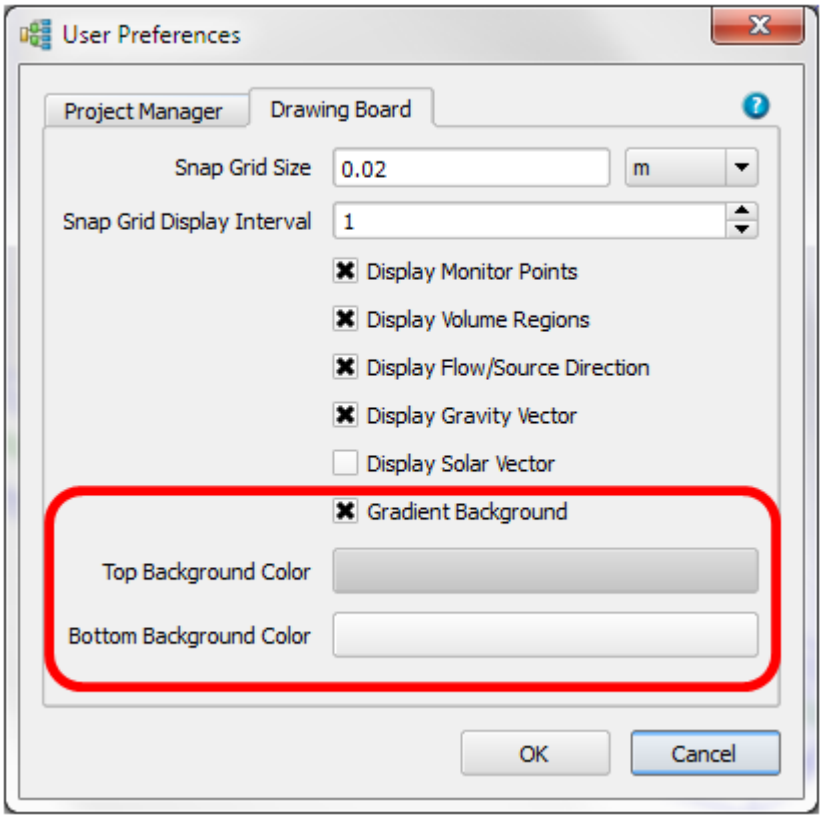
Ref.	Title	Description
		 Multiple criteria can be used with a 'match all' or 'match any' condition. The resulting objects that satisfy the find criteria can be all selected or selected sequentially. In addition the node tree can be filtered to just show the selected objects. This filtering is removed once the Find dialog has been closed.
2.10	Summary Columns	A tabular summary of object data and attachments can be accessed via [Window/Show Summary], the 'i' key or the i toolbar icon  Where icons are shown in these summary columns, mouse over tooltips will indicate what attribute is attached. An empty box indicates that an attribute could be attached, but isn't.
2.11	Undo/Redo	All actions performed in the new Project Manager application window can be undone/redone back until the previous Load, Import, Save or

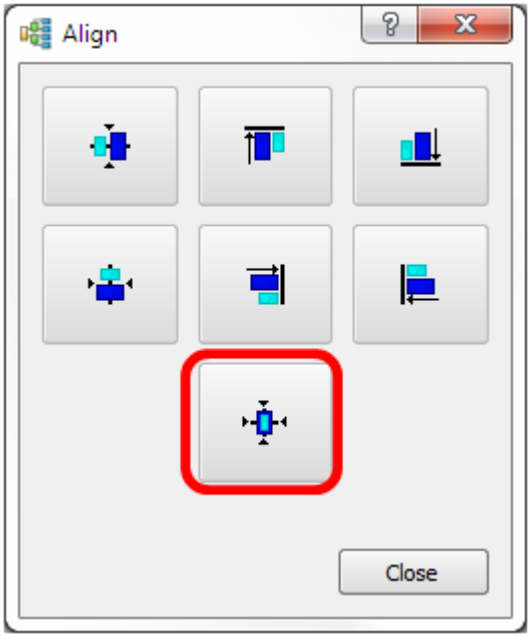
Ref.	Title	Description
		Solve action using [Edit/Undo], [Edit/Redo] , the Undo/Redo toolbar icons or the shortcuts Cntrl+U (Undo) and Cntrl+Y (Redo). 
2.12	Object Creation	New objects can be added directly to the project node tree by selecting objects from the palette when using the 'Project Manager Create' option at the top of the palette. Objects can be graphically created from the palette when the 'Drawing Board Create' option is selected.   Unless changed, the Project Manager or Drawing Board create state will be persistent during the FloTHERM session. On a start of a new session 'Project Manager Create' will be the default.
2.13	Object Selection on Create or Delete Preference	The [Edit/User Preferences…] dialog can be used to set the preference as to whether an object is selected on create, or a neighboring object selected on a delete operation.

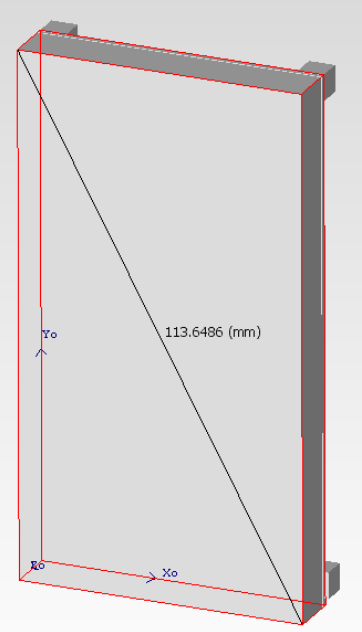
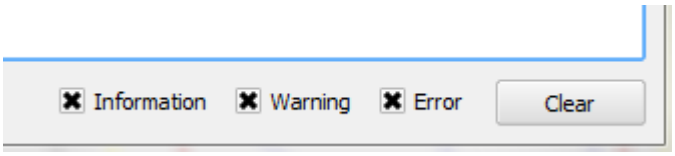
Ref.	Title	Description
		
2.14	Drawing Board Area	Graphical inspection and geometry modification can be done in the central Drawing Board area. The concept of object select and view manipulate modes is retained from previous versions. 1, 2 (horizontal and vertical split) and 4 window layouts can be chosen.

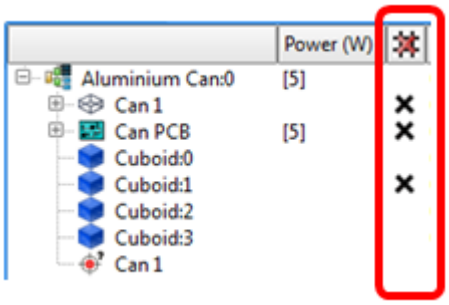
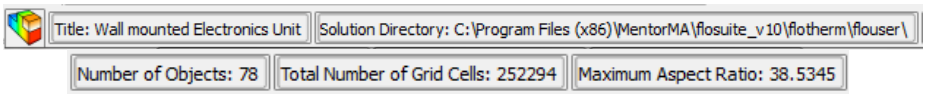
Ref.	Title	Description
		 Clicking and dragging on the splitters can be used to change the size of the view ports. In 4 view mode clicking on the intersection of both splitters can be used to alter the size of all 4 view ports. Double-clicking on this intersection will reset the 4 view layout. The active viewport is indicated via a red boundary.
2.15	Changing the Active Viewport	The active viewport is indicated via a red boundary. The active viewport maybe changed (without losing object selection) by using the middle mouse button to click anywhere in the viewport that is to be active. Alternatively the tab key can be used to change viewport focus so long as a viewport had focus originally.
2.16	Solid or Wireframe rendering	The model may be rendered in either solid or wireframe by clicking on ‘s’ or ‘w’ respectively or the equivalent toolbar icons. 

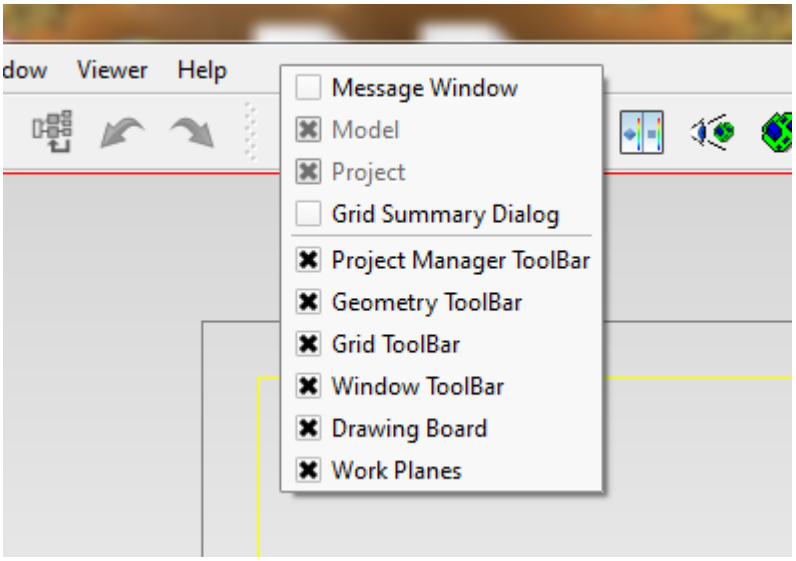
Ref.	Title	Description
		Enclosure objects, which are collapsed in the model node tree, are drawn wireframe when in solid rendering mode.
2.17	Graphical Object Translation	Selected object translation is dependent on the rendering mode: • In solid rendering mode, the object face that is click+dragged will define the plane of translation. Note the change of mouse cursor and the highlighting of the grab handles in the plane of translation:  • In wireframe rendering mode the workplane constrains the object translation to that plane 
2.18	Keyboard Object Translate	An object can be translated in a coordinate direction by using 'ALT+ up/down/left/right' keyboard arrow keys. The translation will be in the plane of the workplane. Note that either 'snap to object' or 'snap to snap grid' snap and object select (not view manipulate) modes should be active.

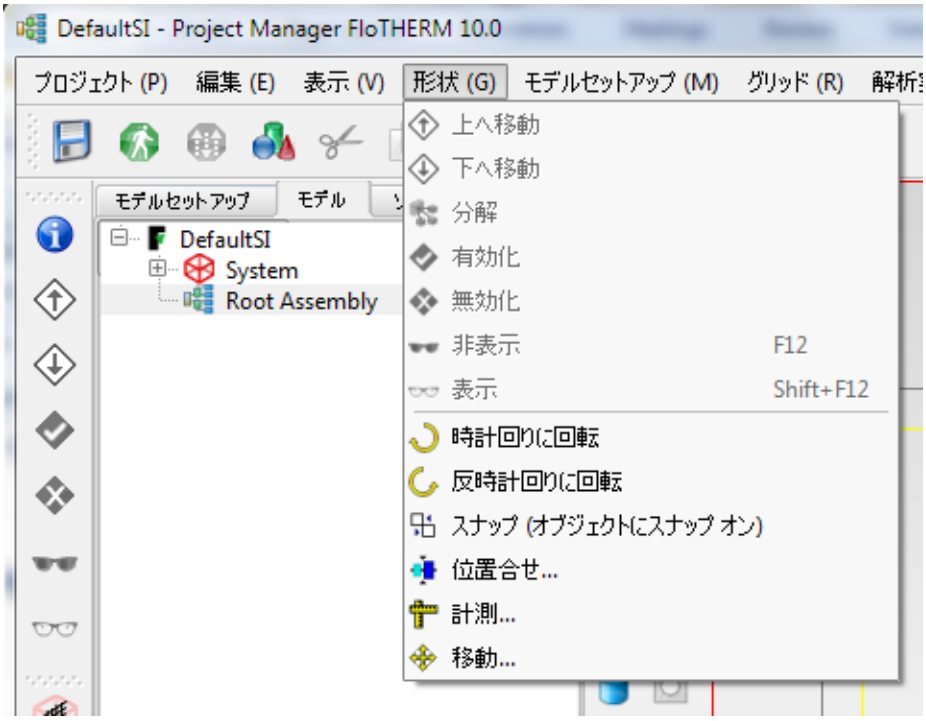
Ref.	Title	Description
2.19	Graphical Object Resize	Regardless of rendering mode, selected object grab handles can be used to resize objects. The mouse cursor will change, when going over a grab handle, to an arrow indicating what the resize direction will be.
2.20	View Zoom to Selected Objects	Graphical zooming into selected object(s) can be done using [Viewer/View Selected] or the V keyboard shortcut.
2.21	First and Third Angle Projections	[Viewer/First Angle Projection] (F keyboard shortcut) and [Viewer/Third Angle Projection] (T keyboard shortcut) automatically force a 4 viewport layout and refits each view.
2.22	Isometric View	An isometric view of a view port can be set using Shift+i.
2.23	Drawing Board Background Coloring	The background coloring of each Drawing Board viewport maybe changed from the default using the Drawing Board tab in the [Edit/User Preferences…] dialog. 
2.24	Workplane Grid Display	Grid can be plotted on the workplane by pressing ‘g’ or via [Viewer/Show Grid Toggle]. Regardless of where the workplane is located, checking the ‘Project Grids Onto Workplanes’ checkbox ON in the drawing board toolbar will show all grids from all localized grid spaces projected onto the

Ref.	Title	Description
		workplane. Checking that setting OFF will show only the grid bisected by the workplane.  Note also that the workplane location will NOT be reset when the view from direction is changed using the x, y or z shortcuts. When in 'Snap to Grid' mode, displaying the grid will show the snap gird point.
2.25	Align Centers	The ability to align, in one operation, the centers of two or more selected objects is now possible using the [Geometry/Align] dialog.  The workplane of the active viewport will determine which plane the align occurs in.
2.26	Measure	[Geometry/Measure], resulting in graphical annotated dimensioning, requires one or two objects to be selected first. Then two vertices of the selected object(s) are to be selected for the measure to complete. The dimension line and annotation will be anchored with the start and end points during view rotation, panning and zooming.

Ref.	Title	Description
		 Note that ‘selection mode’ is no longer necessary for the measure operation.
2.27	Solution Domain Hiding and View Refit on Object Topping	When an object is topped using [View/Top] the solution domain is automatically hidden and the view is refit to aid visual inspection of the topped object. Note that there is no other way to hide the display of the solution domain.
2.28	Message Window	The message window is now docked by default in the new Project Manager application window. It can be undocked to become a floating window by double clicking or dragging its top bar. It can be docked again by double clicking its top bar. Messages are color coded based on type; Information, Warning, Error. Message texts can also be copied using Cntrl+C. Any existing or to be generated message can be filtered using the checkboxes at the bottom of the message window. 
2.29	De-keypointed	Objects that do not have a grid line coincident with their edge (and thus

Ref.	Title	Description
	Object Indication	will automatically resize to snap to the nearest gird line during the solve) can now be identified directly. • By using the 'Common' [Edit/Find] criteria 'de-keypointed' • In the summary columns:  A tooltip when the mouse is over the **x** will indicate which faces of that object are de-keypointed
2.30	Bottom Status Bar	The bottom status bar contains these new items: • Icon to indicate whether results are available with the loaded project (colored icon and tooltip indicates results availability) • Number of Objects in the model or number of selected objects if one or more object is selected • Total number of grid cells 
2.31	Toolbar Configuration	Right mouse clicking on the tool bar area will bring up a menu that allows configuration of which toolbars are visible.

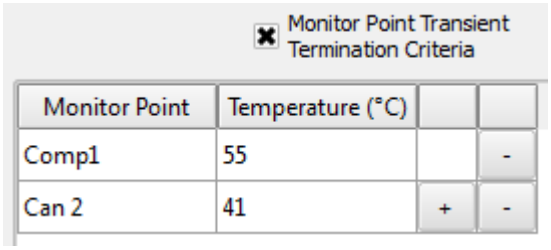
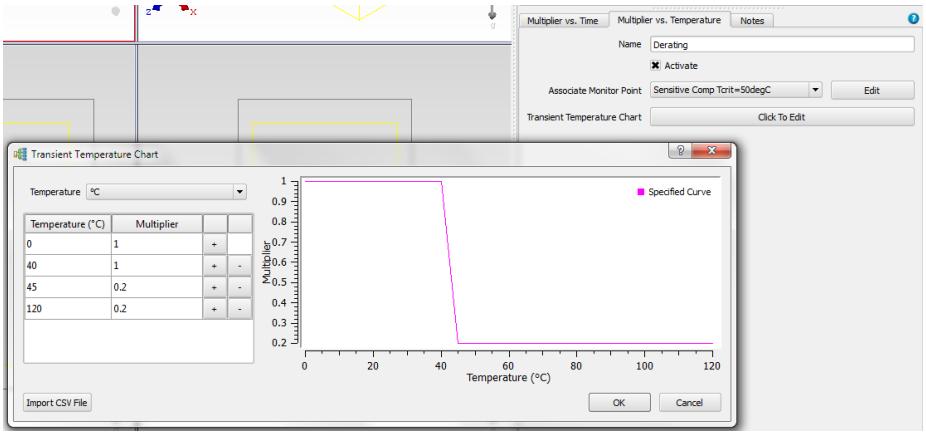
Ref.	Title	Description
		 Toolbars can also be un-docked and moved to new locations.
2.32	Japanese Translated GUI	By setting the environment variable `FLO_LANGUAGE = jp` Then restarting FloTHERM, the combined Project Manager and Drawing Board application window will be launched with Japanese translated GUI strings

Ref.	Title	Description
		
2.33	Imported library attributes retained	Attributes that are loaded from a library, either directly or when attached to other objects loaded from a library, will be retained on import if uniquely defined in terms of their name and settings compared to attributes currently in the project. This supersedes the previous approach whereby loaded attributes that may have been edits of attributes in the currently loaded model were not used, the current model attributes were retained. This is true for all attributes apart from ‘Sources’.

FloSCRIPT

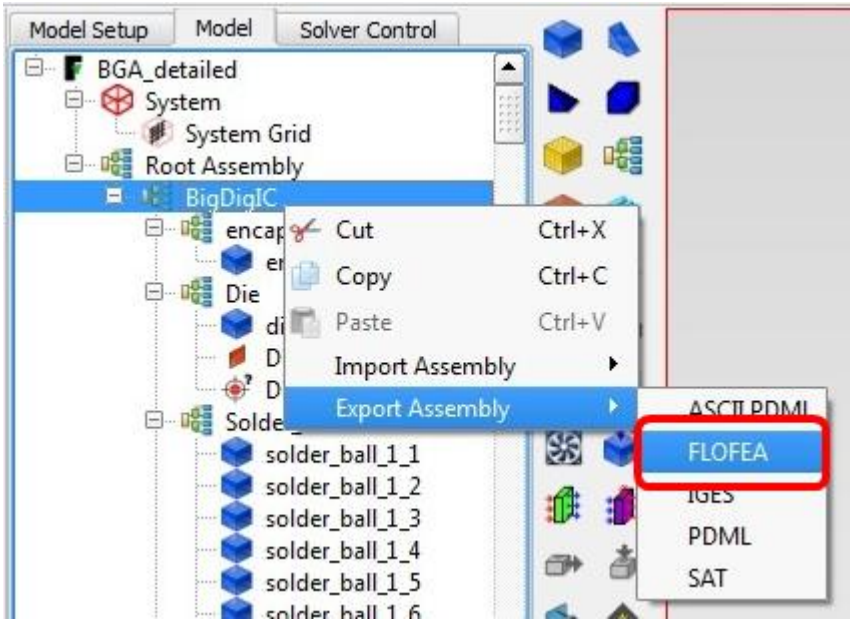
Ref.	Title	Description
3.1	FloTHERM session recorded to a FloSCRIPT file	Every operation performed in the new Project Manager application window will be logged to a 'FloSCRIPT' file. These files reside in the following directory: `\MentorMA\flosuite_v10\flotherm\WinXP\bin\LogFiles` One FloSCRIPT file is logged per FloTHERM session. FloSCRIPT files of the previous 5 session only will be retained. FloSCRIPT files are XML based with a .xml file extension.
3.2	Replaying a FloSCRIPT	A FloSCRIPT file can be replayed via the [Project/Run FloSCRIPT…] menu entry. Note that the successful replaying of a FloSCRIPT may rely on the existence of objects in the loaded model, or projects in the current solution directory, if they are referenced by the FloSCRIPT being replayed. Any failure to replay the FloSCRIPT will result in a message issued to the Message window indicating which FloSCRIPT command caused the replay failure.

Transient Modeling

Ref.	Title	Description
4.1	Monitor Point Temperature Transient Solution Termination	When a transient model is loaded a 'Monitor Point Transient Termination Criteria' can be defined in the Solver Control tab. This requires a monitor point to be nominated and a temperature defined. More than one monitor point may be selected, each with their own defined temperature.  The transient solution will automatically terminate as soon as one monitor point passes its defined threshold temperature. This then allows for manual modifications to be made to the project prior to solving the transient on.
4.2	Transient Attribute Multiplier as a Function of Monitor Point Temperature.	The transient attribute has been extended to allow for the transient multiplier to be defined as a function of a nominated monitor point temperature.  The multiplier vs. temperature relationship is defined as a point wise linear curve. This curve may also be set via import of a .csv file. The 'Multiplier vs. Time' and 'Multiplier vs. Temperature' transient

Ref.	Title	Description
		attribute options may be activated individually, or both at the same time. For the latter case, the transient multiplier at a given time step is calculated as the product of both multipliers.
4.3	Fan SmartPart Transient Attribute	A transient attribute can be attached to a Fan SmartPart. The transient multiplier, whether it is defined as a function of time or as a function of temperature, is applied to the fan derating factor during a transient simulation.
4.4	Time Step Distribution Plot	The time step distribution plot, showing the distribution of transient time steps, can be zoomed into using the middle mouse button or left mouse button zoom window. The plot can be refit using the right mouse button.

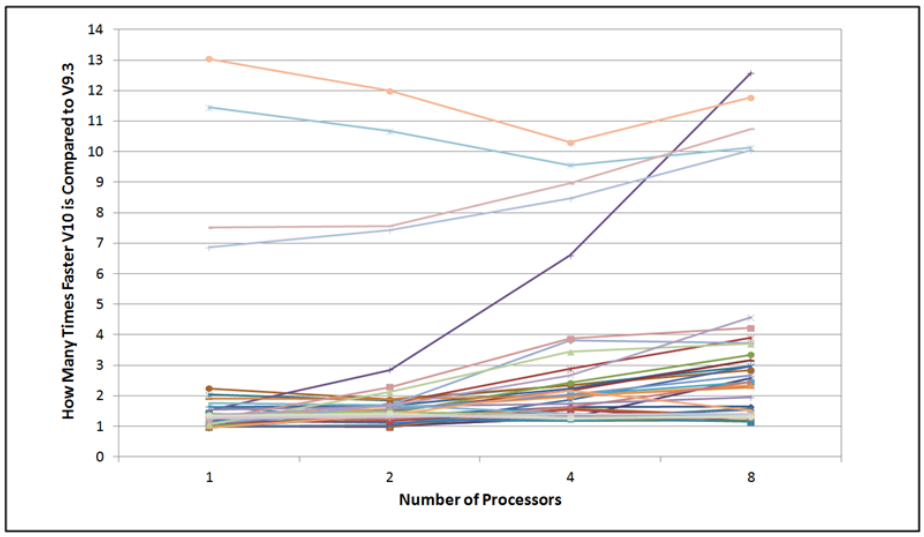
Interfacing

Ref.	Title	Description
5.1	Temperature Export to FEA Stress/Strain Simulation Tools	Solid cell temperatures within a selected assembly can be exported to a new '*.flofea*' file format.  This file, together with an existing FEA (finite element analysis) mesh, can then be loaded into the 'MpCCI FSI Mapper' software from Fraunhofer SCAI. The FloTHERM mesh temperatures are then interpolated onto the FEA mesh by MpCCI FSI Mapper, written to file and then used as boundary conditions for a thermo-mechanical stress/strain simulation in the FEA tool. Supported FEA tools include: • Abaqus Version 6.13 • ANSYS Version 14.5 • Nastran Version 2012.2 FLOFEA export from FloTHERM does not require an additional license. Please contact your local MpCCI sales office regarding purchase of MpCCI FSI Mapper.
5.2	FloMCAD Bridge Update	FloMCAD Bridge is updated to use ACIS R23. The FloMCAD Bridge direct CAD readers have been updated to support these versions:

Ref.	Title	Description

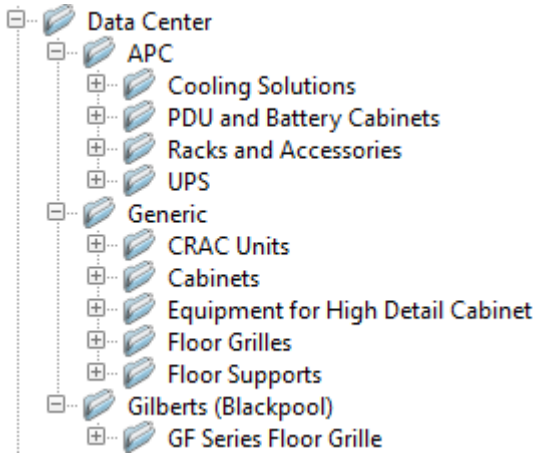
File Format	Versions Supported
ACIS	ACIS 1.0 – ACIS R23
CATIA V4	CATIA 4.1.9 – CATIA 4.2.4
CATIA V5	R6 – R21
IGES	Up to 5.3
Pro/E	16 – Wildfire 5
SolidWorks	98 – 2011
STEP	AP203, AP214 (Geometry Only)

Solver

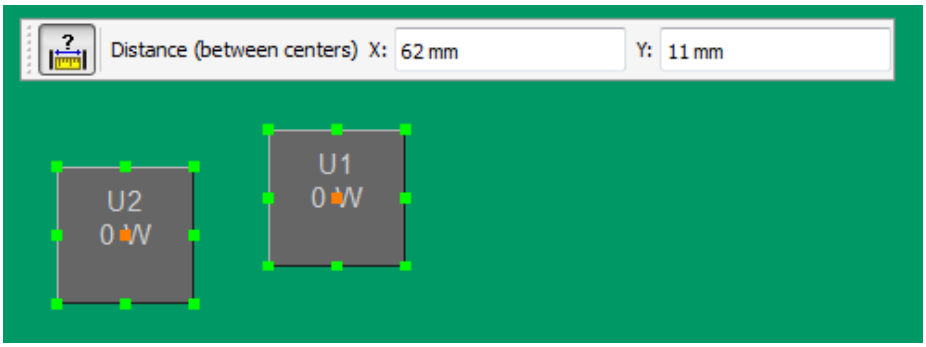
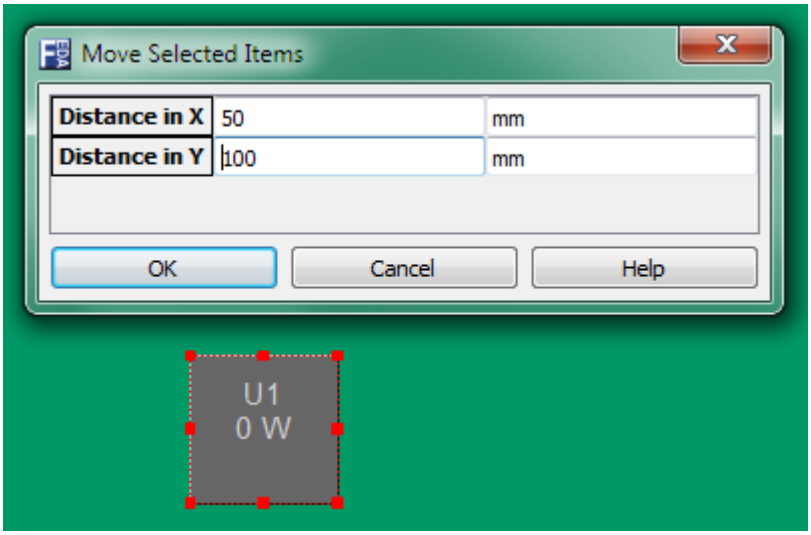
Ref.	Title	Description
6.1	Improved CFD Solver Performance	The CFD linear equation solver has been reimplemented to achieve better speed performance. Although model dependent, speed improvements are on average 2 to 3 times faster than V9.3 solver performance (and in some cases up to 15 times faster). 
6.2	Solver Clock Time reported	In addition to CPU time, the elapsed clock time for a solution is reported to the Message Window, or written to the floerror.log file for solutions in batch mode.
6.3	Solid Conductors Summary	The Solid Conductors Summary tab now correctly reports convective, conductive and radiative fluxes for objects that are overlapped by other objects.

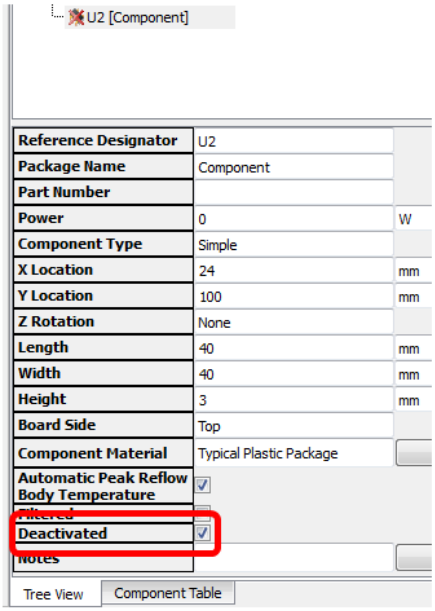
Data Center Applications

Ref.	Title	Description
7.1	Rack SmartPart	A new SmartPart is available to represent racks of electronic equipment. The Rack SmartPart is a modification of the Recirculation Device SmartPart extracting air from one or more rectangular regions, thermally conditioning the air then resupplying it to the solution domain, maintaining the vertical thermal stratification distribution of the extracted air. A cuboid block should be defined to represent the internal construction of the rack such that the Rack SmartPart supplies and extracts lie on the surface of that cuboid. 
7.2	Cooler SmartPart	A new SmartPart is available to represent in-row coolers and computer room air conditioning units generally. The Cooler SmartPart is a modification of the Recirculation Device SmartPart extracting air from one or more rectangular regions, thermally conditioning the air then resupplying it to the solution domain. A number of different options are available to define the flow rate, the temperature control and the cooling capacity. A cuboid block should be defined to represent the internal construction of the rack such that the Cooler SmartPart supplies and extracts lie on the surface of that cuboid. 

Ref.	Title	Description
7.3	Data Center Library Items	Data Center libraries are installed representing both generic and vendor items including floor tiles, equipment, coolers etc.: 

FloEDA Bridge

Ref.	Title	Description
8.1	Measure	Ability to measure x and y distances between object edges, corners, or centers. First select two components then use the Measure toolbar. 
8.2	Move	Ability to shift components via a [Edit/Move] command. User selects a single object then specifies distance in the x and y directions. 
8.3	Component Deactivate	Ability to deactivate components via their property sheet. The component will be retained but ignored from any subsequent solution.

Ref.	Title	Description
		
8.3	Flexible Reference Designators	Optionally disable the enforcing of letter-number syntax for reference designators (allow entries like CONN or TR0001)

Application Examples

Ref.	Title	Description
9.1	Application Examples	Two new application examples are installed, available via [Project/New] Application Examples tab: • Data Center • Transient Power Derating Example Refer to the notes of these projects for their description.
9.2	FloSCRIPT Example	The following files are available in the flotherm/examples/FloSCRIPT directory: • Setup-Transient-Powers.xlsm • Mobile_Demo-Steady_State.pack The spreadsheet captures required usage power profile, creates a FloSCRIPT file that can then be run using [Project/Run FloSCRIPT…] on the loaded ‘Mobile_Demo-Steady_State’ model. The FloSCRIPT will automatically impose the usage power profiles as attached transient attributes in the model, make the model transient and defining an appropriate time grid.

Removed Legacy Functions

The following features that are available in V9.3 have not been re-implemented in V10.0. They will be considered for re-implementation in future versions of FloTHERM.

- Grid patches
- ‘Zoom-in’ model creation
- Solver control - Linear relaxation for solved variables (unless set to non-default values in previous versions)
- Auxiliary variables (Total Pressure and Flow Angle)
- Initial sub-domains
- Drawing board ‘Selection Mode’
- Hiding of the solution domain (now done automatically during a ‘Top’ operation, see 2.26)