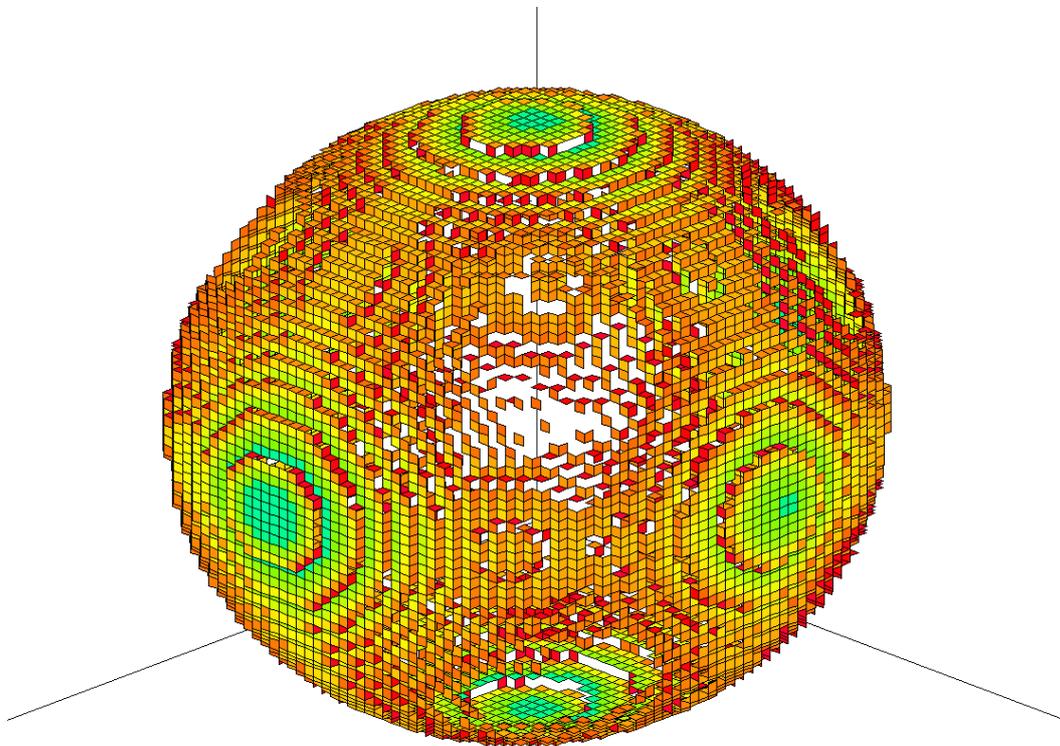


HEAT3 6

A PC-program for heat transfer in three dimensions

Update manual



June 20, 2011

BLOCON

www.buildingphysics.com

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1. What's new in HEAT3 version 6

Blocon is proud to present a new version of HEAT3. Many new important features have been added. Up-to-date information is given on www.buildingphysics.com.

This update manual covers the new features that have been added since version 5. New users should also read the update manuals for version 5, and the full manual for version 4 at

http://www.buildingphysics.com/manuals/HEAT3_5_update_manual.pdf

http://www.buildingphysics.com/manuals/HEAT3_4.pdf

Tips for reading for beginners: For a quick start read Chapter 4 in Manual [HEAT3 4.0](#). The examples in Chapter 5 would also be useful. After this, look at [Update manual for HEAT3 5.0](#). Also see the examples for the test cases: [ISO 10211 validation test cases](#).

1.1 Increased sizes for data fields

Many data fields have been increased in sizes. The maximum number of numerical nodes has been increased from 2,197,000 (130·130·130) to 50 million 50,653,000 (370·370·370). Other changes are shown below. See Chapter 2.

Maximum number of	HEAT3 version 5	HEAT3 version 6
Nodes	2,197,000 (130·130·130)	Up to 50 million (370·370·370)
Material boxes	250	500
Boundary condition boxes	12	30
Heat sources/sinks	40	100

1.2 Cylindrical and elliptical shapes

Cylindrical and spherical shapes can now easily be generated. See Chapter 3.

1.3 Miscellaneous

Hundreds of minor improvements are made. The most important are shown below:

- Dialog added to change and set default material file.
- The chart for temperatures/heat flows (menu item Output/Temperature along line) has been updated. The chart editor is also updated.
- The Solve-window (F9 and F10) now shows the sum of all positive boundary flows (earlier the sum of all absolute boundary flows was shown).
- Check for software updates added.
- New report generator with export to PDF, HTML, XLS, RTF, TXT, XML, QRP, QRX.
- Now also adapted for Windows 7 and Vista.

Enhancements in post-processing:

- Faster drawing/updating
- Mouse cursor sometimes “froze” for a small moment in earlier versions. This has been fixed.

Note that the “Movie recorder/player” is not available in the release version of version 6. We plan to add this later on.

1.4 Requirements

HEAT3 6 requires only about 0.1 GB RAM (a pc with 1 GB is recommended), and less than 10 MB hard disk space for the version with 2 million nodes. HEAT3 runs on both 32-bit and 64-bit Windows 7, Vista, XP, and compatibles.

1.5 Light version

The light (demo) version has the following restrictions:

- Data cannot be saved.
- Materials cannot be added or changed.
- Max 1,000,000 (100·100·100) nodes.
- Results for heat flows are hidden for larger problems with more than 25,000 nodes and with more than 30 nodes in each direction.
- Thermal coupling coefficients (L2D) will not be calculated.
- Report preview is disabled.
- Some other restrictions apply.

2. Increased sizes for data fields

There are different versions of HEAT3 with maximum number of nodes. All versions are installed in the same directory by default. Consider e.g. the version with 50 million nodes (HEAT3-50M.exe). The program needs about 1.7 GB RAM allocated space when all nodes are used. A PC with 3 GB RAM is recommended when using all 50 million nodes.

Version	Max number of nodes	Required memory RAM	Recommended RAM for PC
HEAT3.exe	2,197,000 (130·130·130)	90 MB	1 GB
HEAT3-50M.exe	50,653,000 (370·370·370)	1.7 GB	3 GB

A good tip is to close down other applications to increase the available memory. If HEAT3 is swapping data to/from the hard disk it is a sign that virtual memory beyond the installed RAM is used. This will happen if you try to run large cases on a PC with too little memory. This can cause very long calculation time since the hard disk will be used for some of the memory for the allocated matrices.

Memory is allocated only for the nodes used, but there is a decrease in performance that becomes greater with the number of allocated nodes. Note that the response time for various menu choices (the user interface) is greater for a version with many nodes. The calculation time for the same problem will also take longer time. E.g., a problem with 130·130·130 nodes will be solved perhaps 25% quicker with “HEAT3” compared to using “HEAT3-50M”. **So, always use a smaller version if you do not need that many nodes.**

The max number of polygons (each cell surface is drawn as a polygon) that may be viewed in the post-processor window is 150 000. If many cells are used, part of the volume may still not be shown (if drawn polygons exceeds 150 000). In that case you can zoom in particular details. Note that it is only the viewing that is limited. The calculation is made for the full geometry.

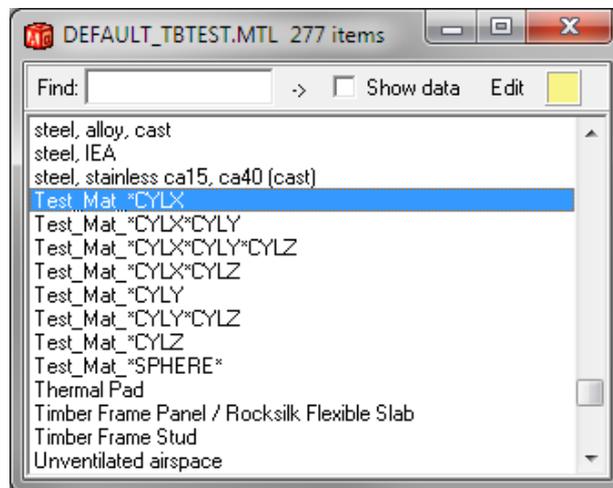
Also note that it is possible to turn off the surface grid (cell interfaces at the boundaries) in menu item "Details/Always surface mesh". Otherwise, a drawn picture may be too dark when many cells are used due to that the cell interfaces are drawn in black.

3. Cylindrical and elliptical shapes

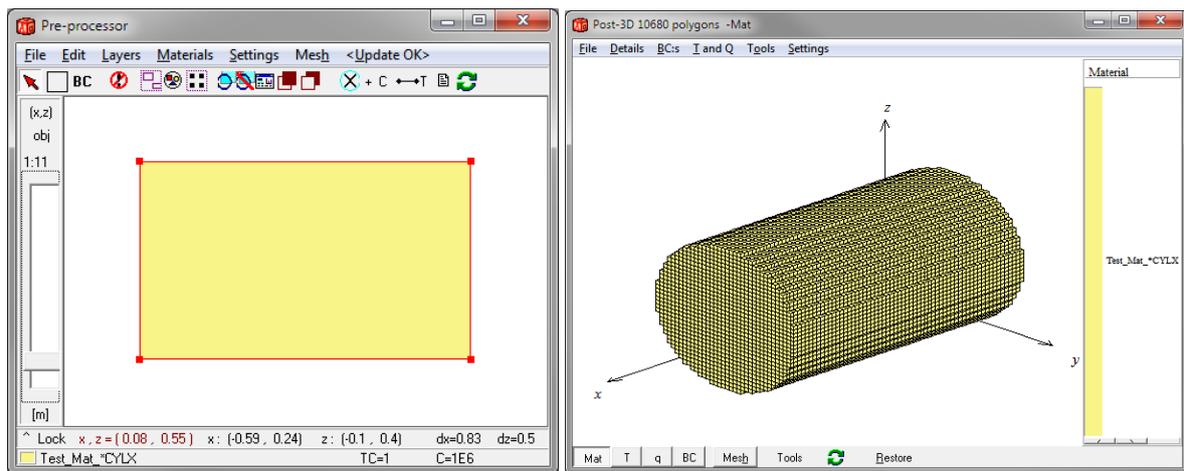
Cylindrical and spherical shapes can be generated by using a material name that include a string with a specific format. The table below shows the eight different available options. If the string “*CYLX” is contained within a material name a cylinder (or elliptical cylinder) will be generated in the x-direction. The string “*CYLX*CYLY” will give the intersection (\cap) of two cylinders in x and y-directions. The string “*SPHERE” will result in a sphere (or spheroid if it is not perfectly round).

String within material name	Generated result
*CYLX	cylinder (or elliptical cylinder) in x-direction
*CYLY	cylinder (or elliptical cylinder) in y-direction
*CYLZ	cylinder (or elliptical cylinder) in z-direction
*CYLX*CYLY	Intersection of two cylinders (or elliptical cylinders) in x- and y-directions
*CYLX*CYLZ	Intersection of two cylinders (or elliptical cylinders) in x- and z-directions
*CYLY*CYLZ	Intersection of two cylinders (or elliptical cylinders) in y- and z-directions
*CYLX*CYLY*CYLZ	Intersection of three cylinders (or elliptical cylinders) in x, y- and z-directions
*SPHERE	Sphere (or spheroid)

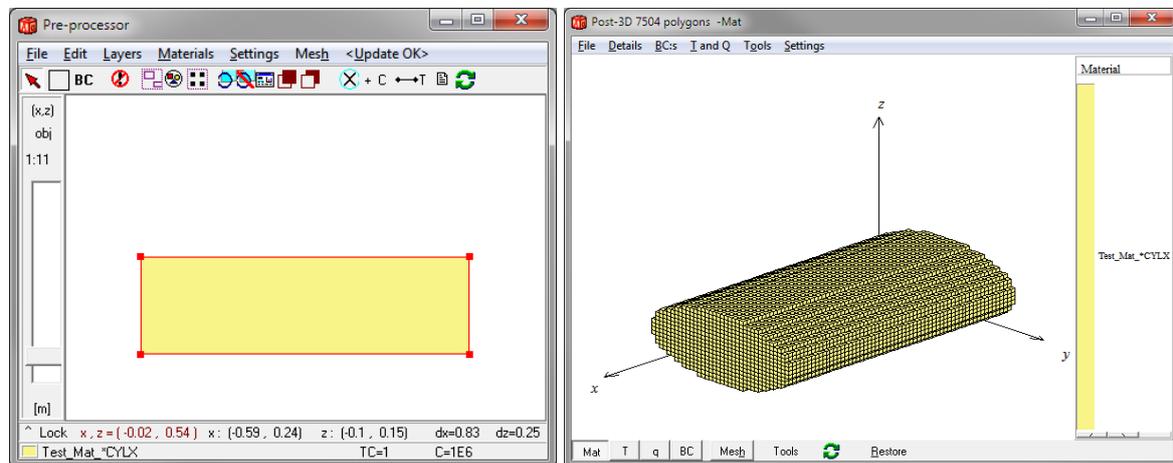
Below shows an example of eight materials that will generate different shapes (these are included in the material list by default).



The material “Test_Mat_*CYLX” will generate the following for the drawn geometries:

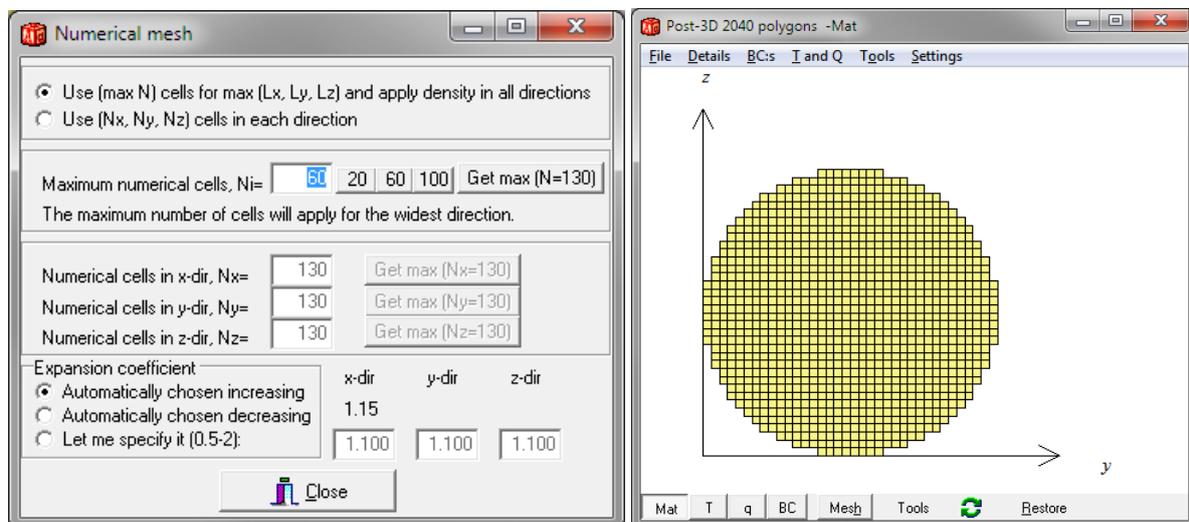


A cylinder in x-direction.

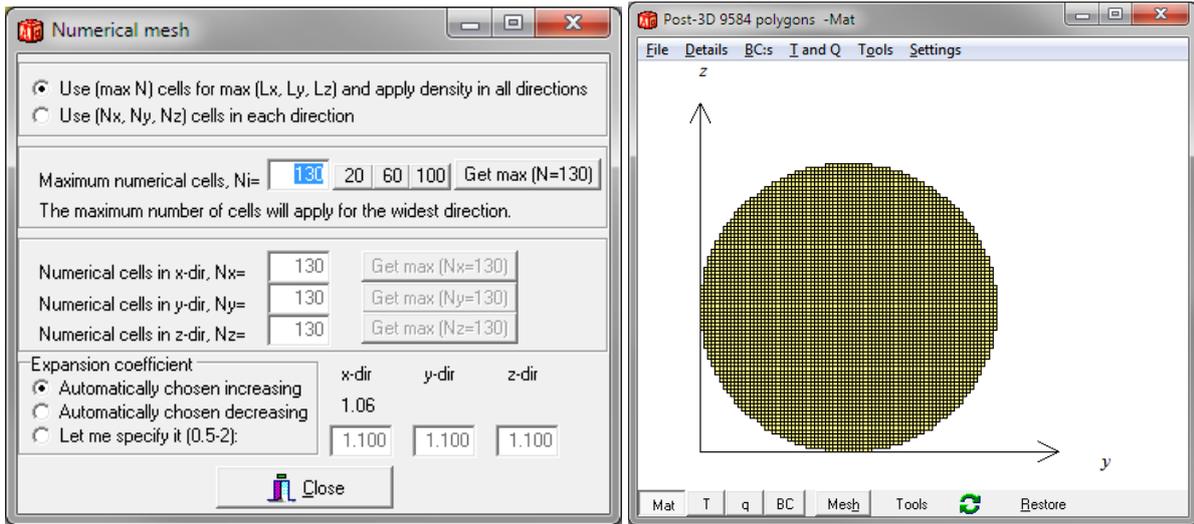


An elliptical cylinder in x-direction.

The number of numerical cells (menu item Mesh in the pre-processor) defines the approximation:

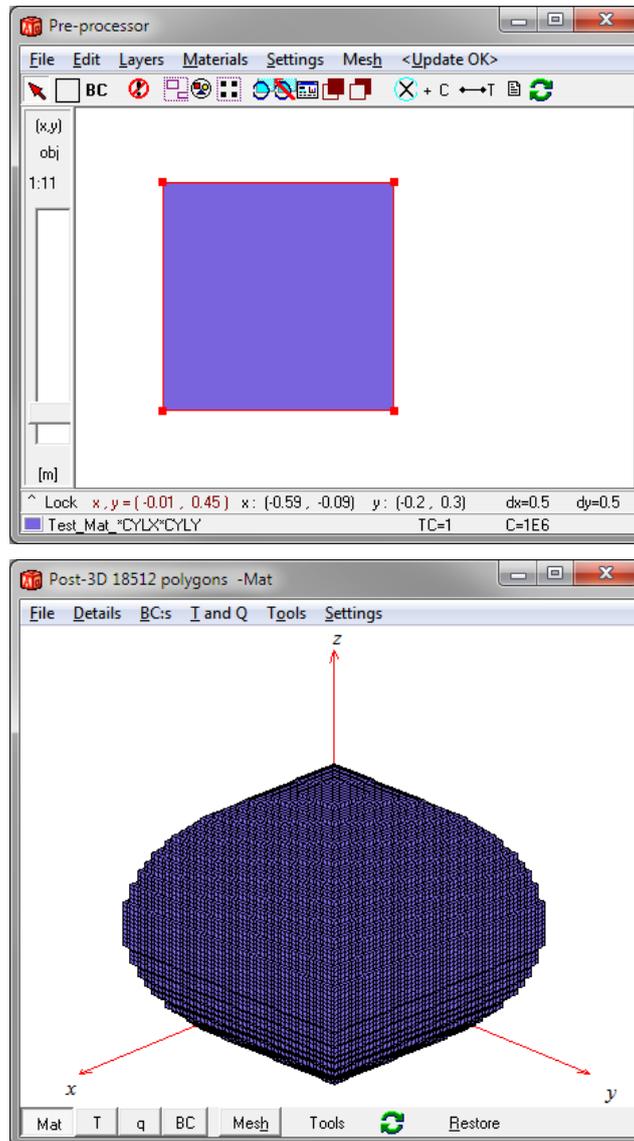


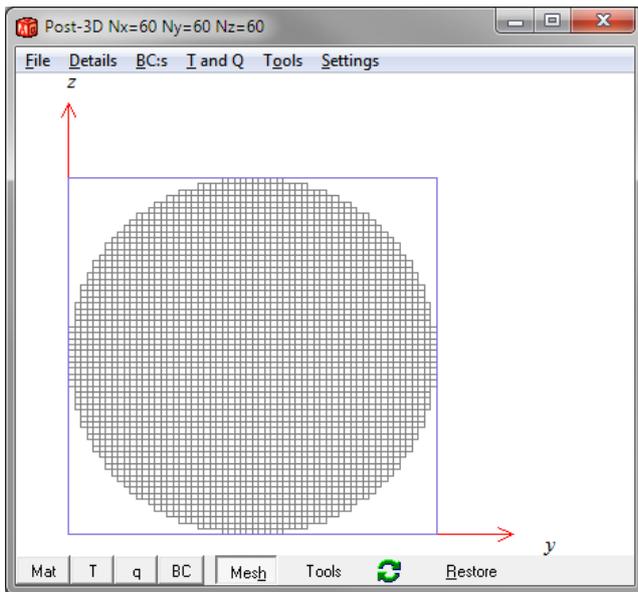
Approximation with 60 numerical cells in each direction for the cylinder.



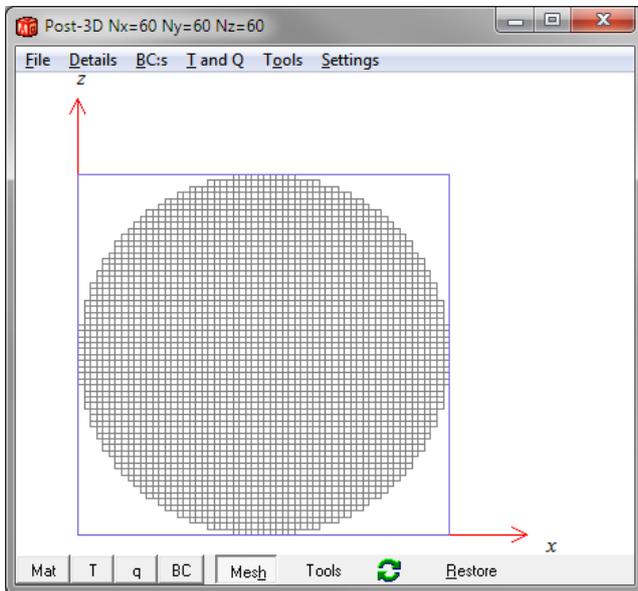
Approximation with 130 numerical cells in each direction for the cylinder.

The material “Test_Mat_*CYLX*CYLY” will generate the following for the drawn geometry:

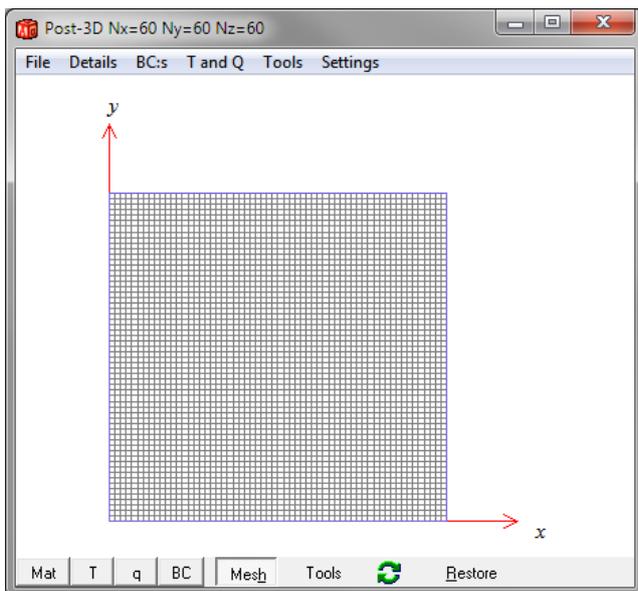




cross section y,z

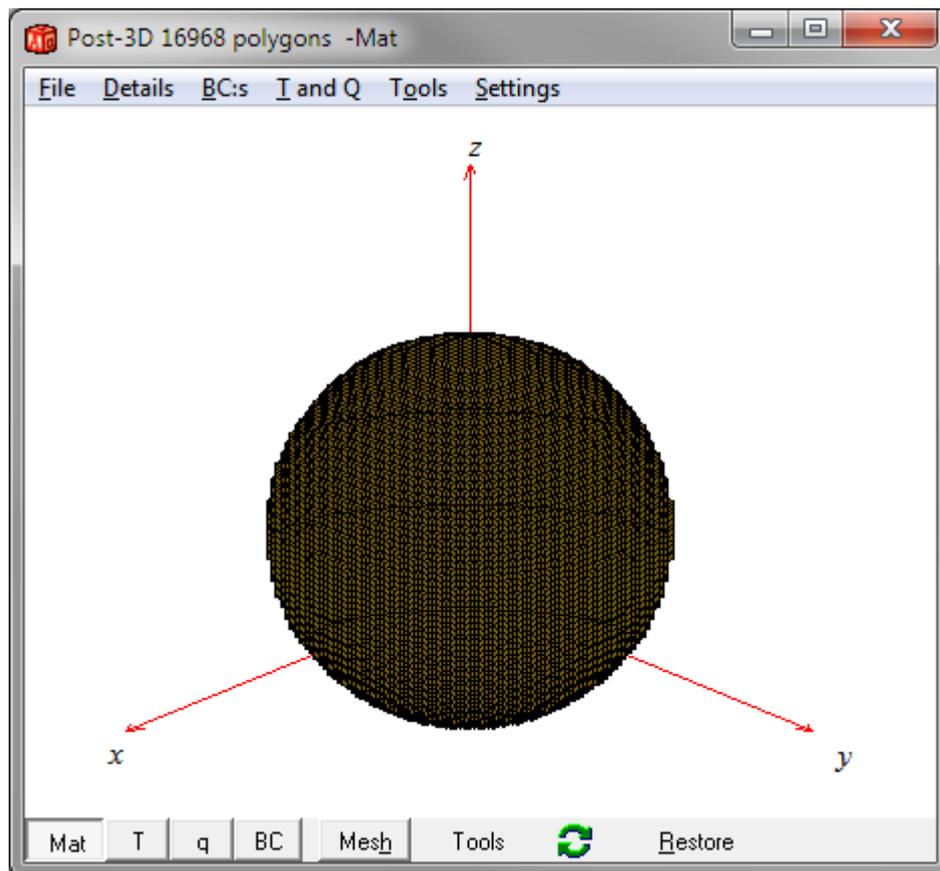


cross section x,z

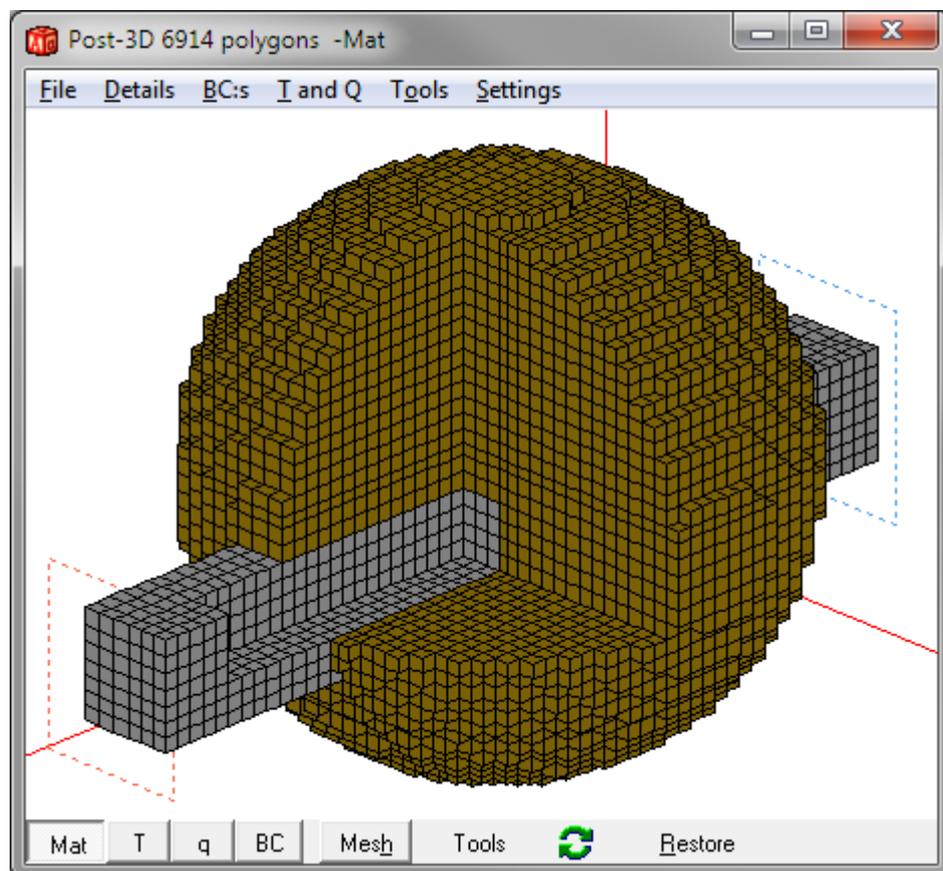
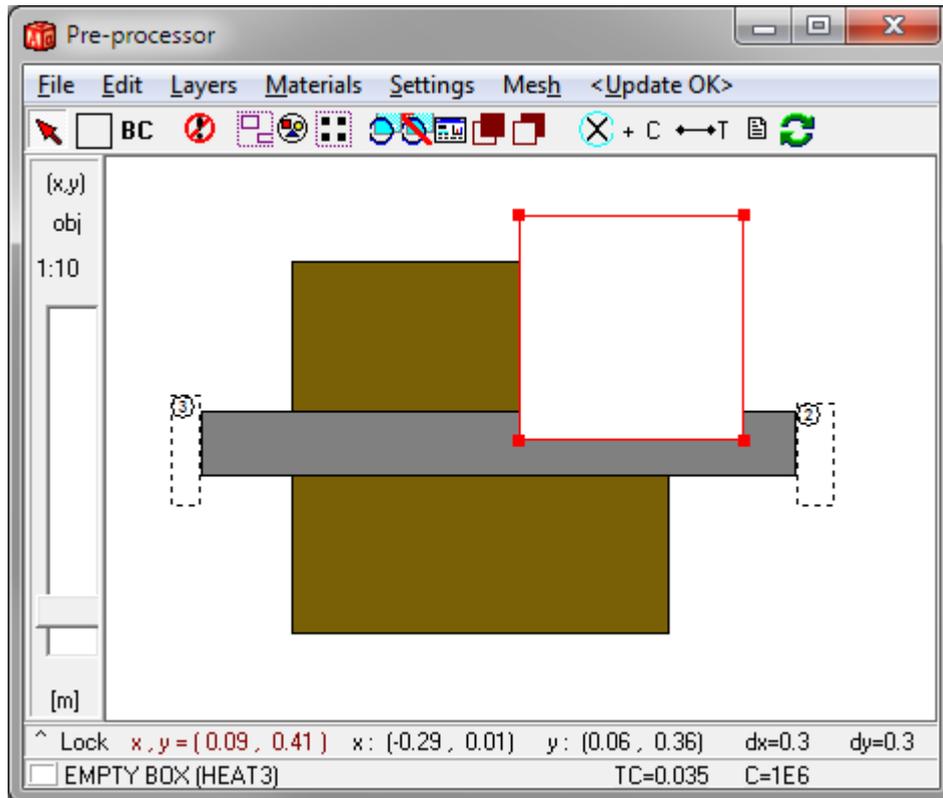


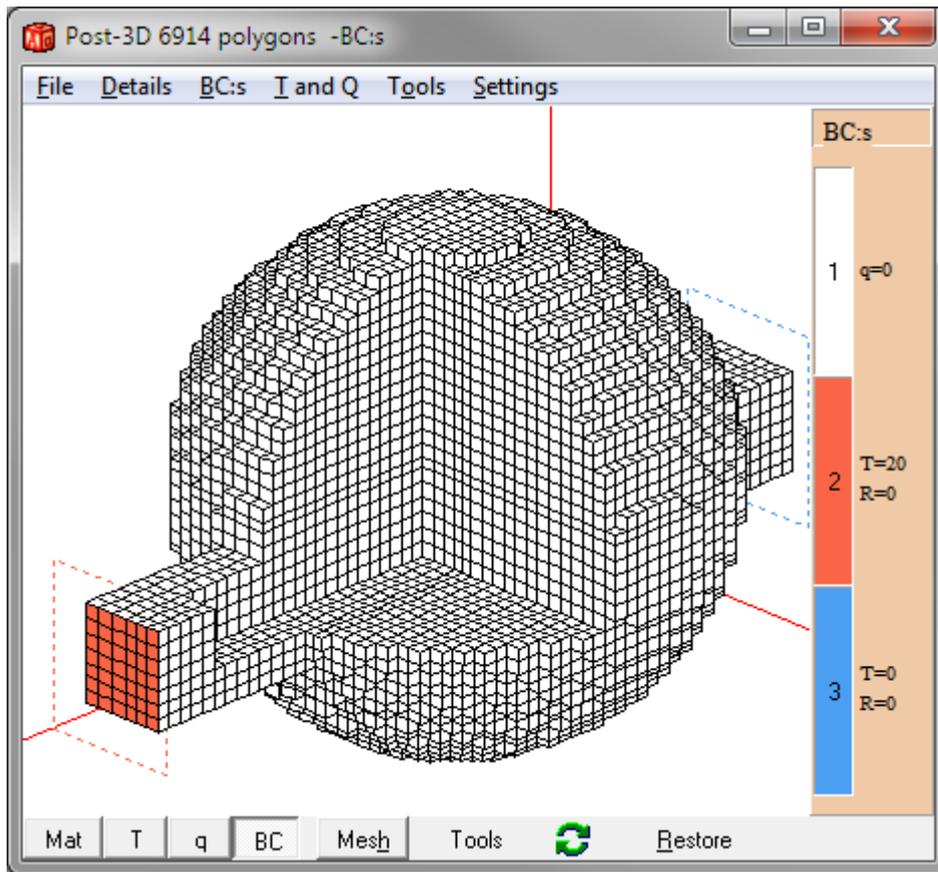
cross section x,y

The material "Test_Mat_*SPHERE" will generate the following for a drawn cube:

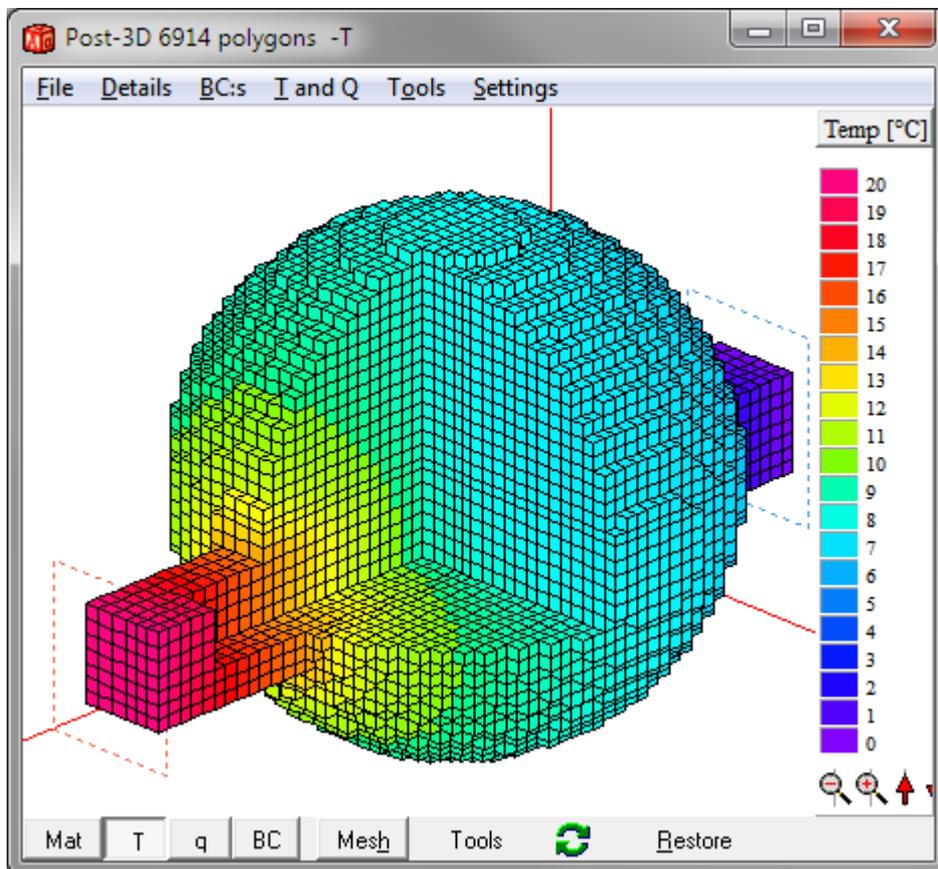


Below is an example with a steel rod penetrating a sphere. A part has been cut out by using “EMPTY BOX (HEAT3)” from the material list. We apply a cold and warm surface at the ends of the rod.





Boundary conditions applied.

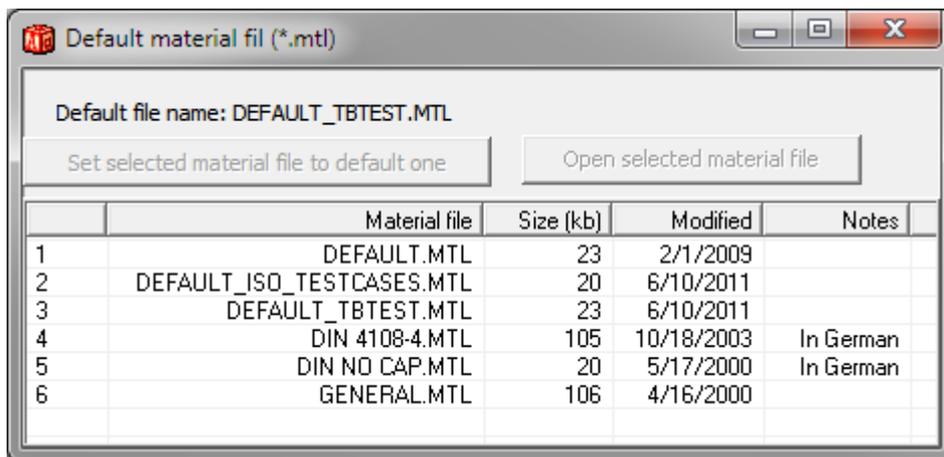


Calculated surface temperatures.

4. Miscellaneous

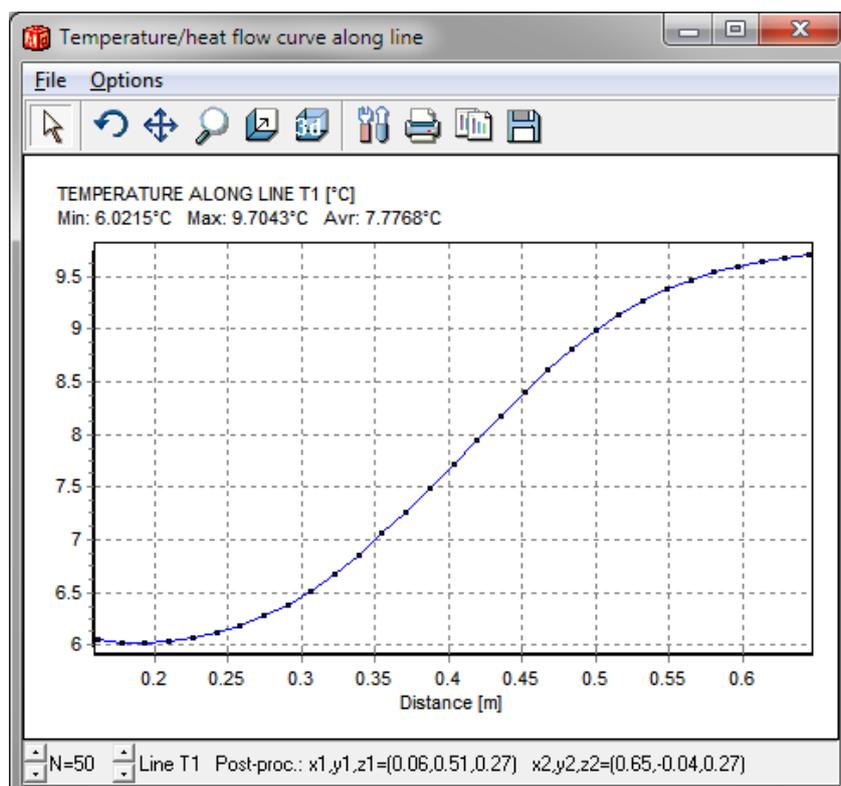
4.1 Dialog to set default material file

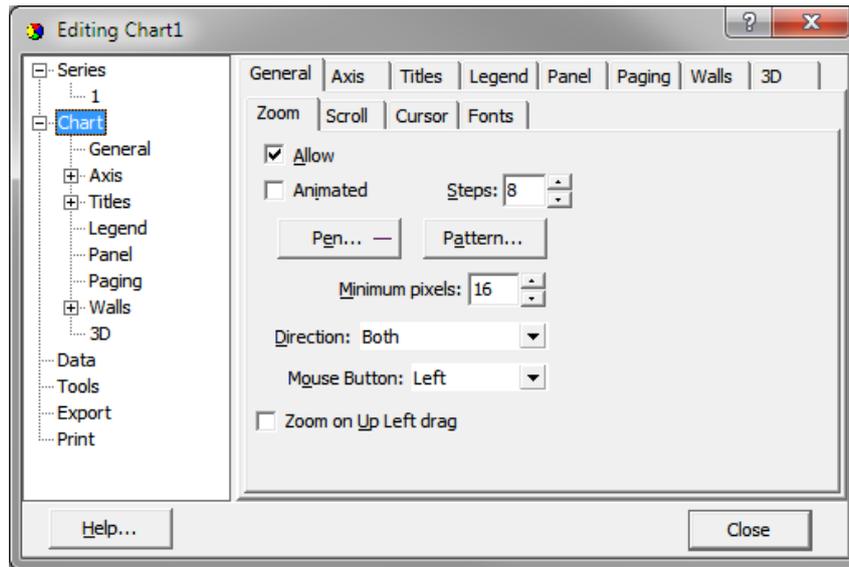
The default material file that will be used when HEAT3 starts can be changed in menu item “Options/Default material file”. All material files (*.mtl) available in the root directory (e.g. My Documents\Blocon\HEAT3 6) will be listed.



4.2 Updated temperature/heat flow chart

The chart for temperatures/heat flows (menu item Output/Temperature along line) has been updated. The chart editor is also updated:





4.3 Adapted for Windows 7 and Vista

HEAT2 is now fully adapted for windows Vista and Windows 7. HEAT2.exe is placed in folder %ProgramFiles(x86)” during installation.

One important change from previous versions is that the startup folder now is “My Documents\Blocon\HEAT2 8”. This means that the path in Windows Vista/7 would be ”C:\Users\[user name] \Blocon\HEAT2 8”. The materials files (*.mtl) should be placed in this folder.