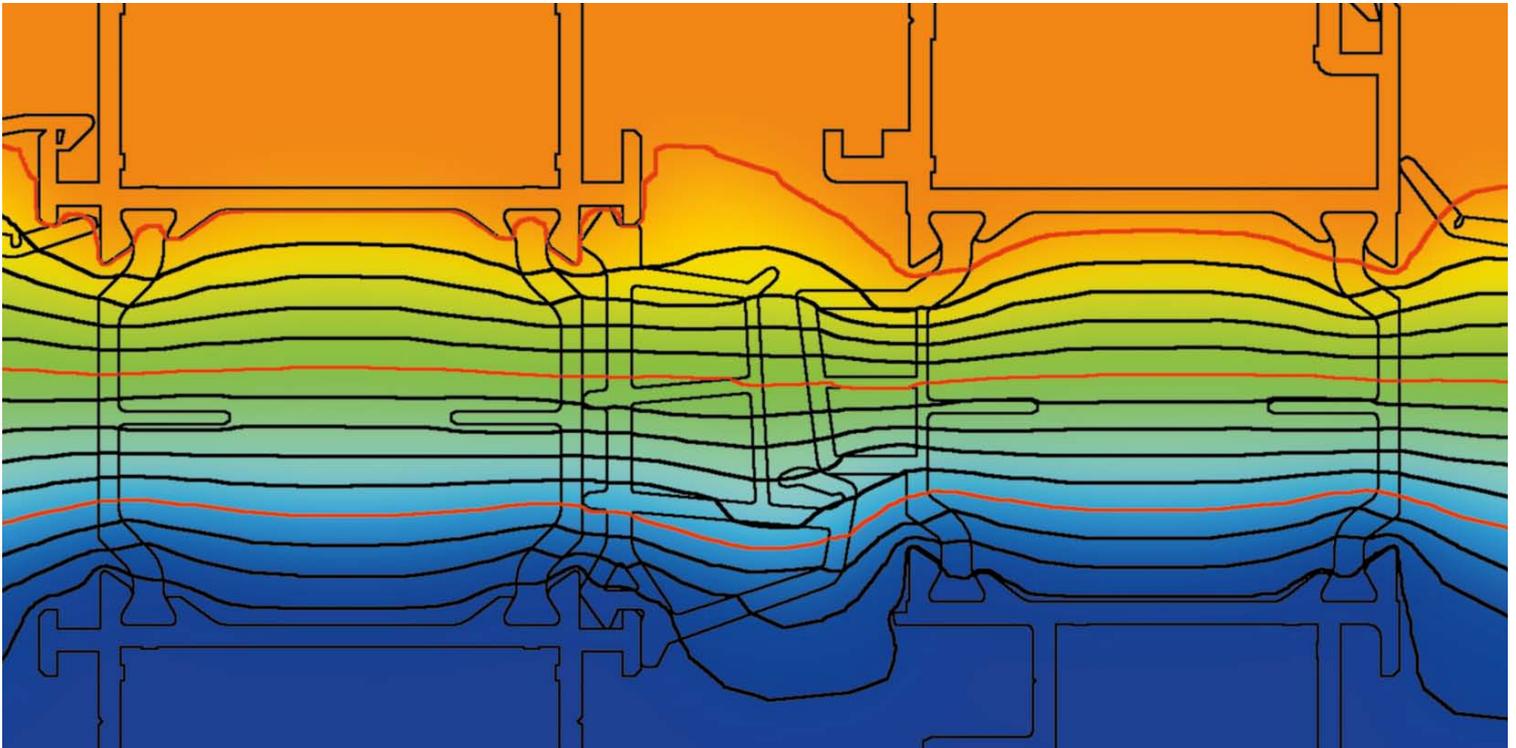# flixo

The thermal analysis and reporting program

flixo produces thermal-hygro analyses of the component and facade cross-sections. It has been developed by architects, computer scientists and physicists for architects, planners, energy consultants and building physicists.

With flixo thermal bridges, for example, can be detected at the planning stage and eliminated through changes in design.

The risk of the formation of condensed water and attack by mold fungus is found by the determination of temperature minima on building component surfaces and the ensuing surface moisture. In this way building damage can be prevented and heating energy saved.

flixo analyzes two-dimensional component nodes for stationary boundary conditions (room temperatures and thermal transfer coefficients).

The program is divided into a modeling and a computation/evaluation section. Whereas the modeling section defines the physical situation (geometry, boundary conditions, materials), in the evaluation section the results are quantified and presented graphically. Due to the well-proven and time-saving template model, individualized results reports are produced automatically and are dynamically updated during a renewed computation.

Interface ATHENA-flixo

Detail drawings produced in ATHENA can be integrated into flixo with a little effort. Areas and materials (where known) are transferred automatically and calculations become a child´s play. The usual time of 1.5 hrs. taken for the transfer of a detail drawing produced in CAD programs (plus the same time for modifications to the detail) is now reduced to a few minutes – because ATHENA tranferres the detail perfectly prepared into flixo.

Features

- Computation of temperatures according to the finite element method (triangular elements).
- Iterative solution of the arising linear equation system by means of an optimally conjugated gradient technique.
- Computation of equivalent thermal conduction coefficients for air cavities and automatic subdivision of air cavities according to EN ISO 10077-2.
- Certification as a thermal bridge program according to EN ISO 10211-1 and EN ISO 10077-2.
- Unrestricted number of nodal temperatures.
- Assistant for batch computation (automatic computation of several preselected Flixo files.
- Several models can be processed in a file, computed and output
- User interface in Englisch, German, French and Italian.
- Quick switching of the edited documents to another language.
- Extensive and up-to-date help with animated examples and tutorials.
- Convenient and understandable user guidance with informative texts appropriate to the current working step.

Inputs

- Direct import of DXF files from layout data is also possible. If required, the geometry can be scaled as desired during import (e.g. mm -> cm or inches -> m).
- Many models (e.g. various scenarios) can be computed in one document.
- The physical situation can either be imported via DXF files or be directly entered and processed with the integrated CAD editor.
- Automatic materialization based on layer assignment is possible.
- Import and export via the Building-SVG Interface. When importing additional information (e.g. material properties) is considered beside the geometry. The output is adjustable (e.g. for direct displaying in a web browser).
- The CAD editor/layout editor supports the following familiar concepts:
  - Layers: objects on different layers can be selectively superimposed or masked out, printed and frozen.
  - Snapping aids: Objects can be aligned with various auxiliary objects such as auxiliary lines, grids and special points on adjacent objects. Object rotation can be carried out freely or with the aid of an angular snap function (multiple of a user-selected base angle).
  - Associative elements such as local results and isothermals.
  - Geometrical operations such as grouping, merging, cutting, differences between objects.
- The integrated and expandable component library of flixo enables components to be simply transferred using the mouse (drag & drop) into the current design.
- A material data base with more than 1000 materials from various standards (EN ISO 10456, EN ISO 10077-2, EN ISO 673, EN 6946, DIN 4108-4) is available

Results

- Isothermals and false-color images of any building detail for qualitative thermal assessment and optimization.
- Simultaneous display and evaluation of several models (e.g. for comparison).
- Temperatures at freely determined design points.
- Heat flow density at freely determined design points.
- Minimum and maximum surface temperatures at freely determined design boundaries and critical room humidities for the assessment of possible mildew formation and condensation problems.
- Heat flow at freely determined boundary lines.
- Thermal transmission coefficients for quantyfying thermal bridging effects: "U-value" (with various boundary conditions to also analyze the critical surface temperature) and the length-related "Psi value" (also for models with more than two room temperatures).
- Heat flow lines for highlighting thermal bridges.
- Automatic computation of framework k values.
- Optionally the fRsi factor including the surface and the critical room humidity can be shown for any surface point.
- Graphical display of the temperature distribution along the surface.
- Vectorized and parallelized algorithms for speeding up the computation
- All texts and names in documents are multilingual.
- Simple displays and printouts of documents in another language.

Integration into the MS-Windows® environment

Well-known operation and concepts from the Microsoft Office® products:

- Cut/Paste and Insert as well as Undo/Restore.
- Different flixo documents can be edited in parallel.
- Interchange of data (design details, results) between flixo and other programs, e.g. Microsoft Word® or MS-Excel® via the clipboard or using drag & drop.
- Integration of Microsoft Office® objects such as text, tables or diagrams.

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