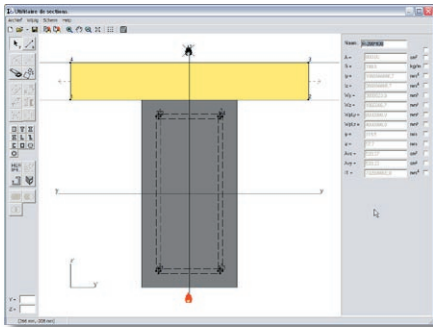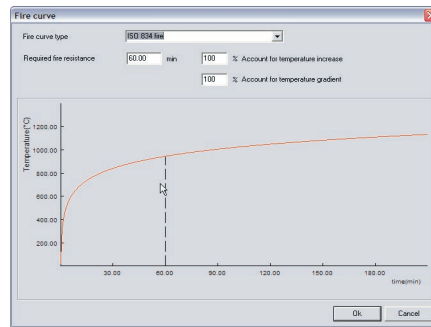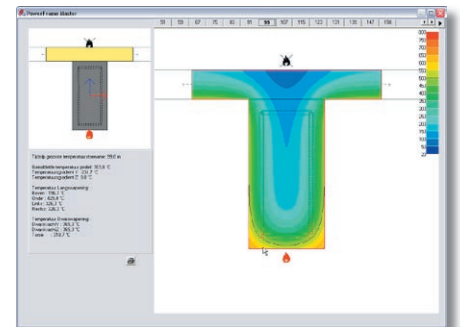# PowerFrame

Fire resistance analysis

Intuitive

Within PowerFrame's user-friendly environment, the user completes model geometry, boundary conditions and loads with all model data needed for a fire safety analysis. Cross-section definitions can easily be extended with all relevant thermal properties, while the fire load can simply be defined through an appropriate fire curve and imposed fire resistance requirements. At any time, the user keeps a clear view on all fire safety analysis parameters.
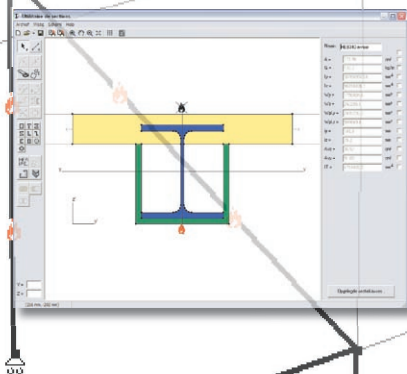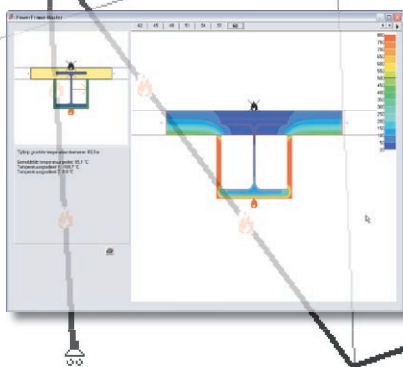
Powerful

Thanks to its perfectly integrated thermodynamic finite element solver, PowerFrame allows the user to perform a fire safety analysis even for solid type of sections. Cross-section temperature distribution is calculated as the fire develops, monitoring mechanical and thermal property changes for any type of section subject to fire loads. All derived data are exploited to the fullest possible extent within both the elastic structural analysis and all subsequent code checks.

Complete

The fire resistance analysis module is available as an add-on to each PowerFrame version (Starter, Standard & Master). Fully integrated with design rules for reinforced concrete and steel, this module offers a complete and powerful fire safety design tool.

BuildSoft

PowerFrame

The fire resistance analysis module is available as an add-on to all PowerFrame versions (Starter, Standard & Master). Each version offers a complete set of analysis capabilities dedicated to a specific application range.

Features

Extensive material library, fully customizable by the user. Several material types can be defined using an appropriate set of material properties: idealized fire buffers, fire protection materials, general construction materials and several steel, concrete & timber grades.

Efficient definition of composite sections using an embedded section utility tool, perfectly integrated with the material library.

Fast assignment of reinforcement areas within concrete sections of arbitrary shape.

Definition of fire loads through an appropriate fire curve and the imposed fire resistance requirements. Choice between ISO 834, external, hydrocarbon and parametric fire curves.

Transparent allocation of fire loads to selected elements. Sections can be exposed to fire loads at one side only, or on all sides.

Automatic generation of accidental combinations upon activation of a loads group which includes fire loads.

Thermodynamic analysis of structural members subjected to fire loads, accounting for heat radiation, convection and conduction. Automatic selection of most appropriate analysis strategy depending on cross-section type (solid vs. slender cross-sections).

Calculation of indirect actions (tension, compression, bending,...) caused by a global temperature increase and/or temperature gradient, considering imposed deformation restraints. Indirect actions can be limited to account for plastic behaviour of nodes.

Evaluation of impaired mechanical properties as a function of temperature.

Verification of steel member resistance and stability, considering fundamental and accidental loads combinations. Impaired mechanical properties are automatically accounted for within the verifications for accidental loads combinations.

Calculation of reinforcement quantities for concrete members, considering fundamental, accidental & serviceability loads combinations. Effective area of concrete section and impaired mechanical properties of reinforcement bars are automatically accounted for when considering accidental loads combinations.
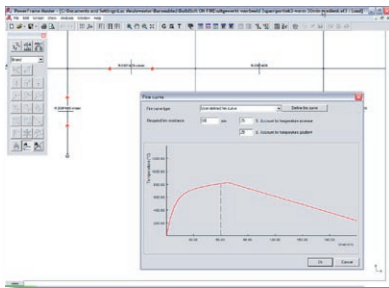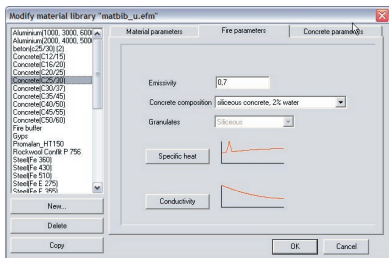
Benefits

Thanks to its fire resistance analysis module, PowerFrame enables engineers to design steel & concrete structural frames for maximum economy, while maintaining sufficiently high safety margins with respect to fire hazards.

PowerFrame's extensive material library and flexible section utility tool allow for a quick and efficient definition of a wide range of composite cross-sections, both in terms of mechanical and thermal properties.

As PowerFrame includes an advanced thermodynamic solver, both solid and slender type of cross-sections can be analysed accurately with respect to fire safety requirements.