NATOMAS ENGINEERING

PyroTech FSE Modeller

Add-in for Autodesk Revit

User Guide

01.09.2024

Table of contents

1. General information about the PyroTech-Reporter add-in

1.1 Purpose of the add-in

PyroTech-Reporter add-in is a add-in for the Revit program for creating fire technical models, exporting them to open BimML, PyroText and GLTF formats.

1.2 The main functions of the add-in

Creation of fire safety engineering models.

Export of fire safety engineering models to open formats IFC and GLTF.

Adding images of the 3D BIM and FSE model into FSE models for documenting and reporting.

Performing evacuation and fire dynamics simulations with external solvers .

Visualization FSE model data and simulation results.

Making PDF and HTML report with external reporting software

2. Terms and designations

Property domain is a data structure that describes a set of properties and their parameters for an application task.

Case is a set of data for simulations, viewing and reporting.

Classifier is a description of the encoding of concepts and properties of any objects for use in program algorithms.

Mapping is obtaining the classification code of an object based on a set of properties or codes of another classification of this object and, possibly, its parts or interconnected objects. Types of mapping:

Handler is an executable code that processes input data and creates new data. A handler may also consist of a sequence of handlers implemented in a single computer program or computing system.

The model properties object («Model cube») is a 3D object that is needed to set text properties related to the model as a whole in the comment field.

Door is an analytical object whose geometry corresponds to the geometry of the door leaf of the parent element, an object of the Revit "Door" system family.

text mapping dictionary of is a file with data for text mapping to types according to any classifier

pyroText file is data in the form of "flat" text for describing PyroTech models.

FSE model (FSEM) is a fire safety engineering model for simulations – a fire safety engineering model for fire and evacuation phenomena simulations .

3. Installing and removing the add-in

3.1 Installing the add-in

Important! One of the add-in packages or one version of the add-in can be installed on the PC at the same time, so you need to remove the previous add-in before installing.

The add-in is installed as follows:

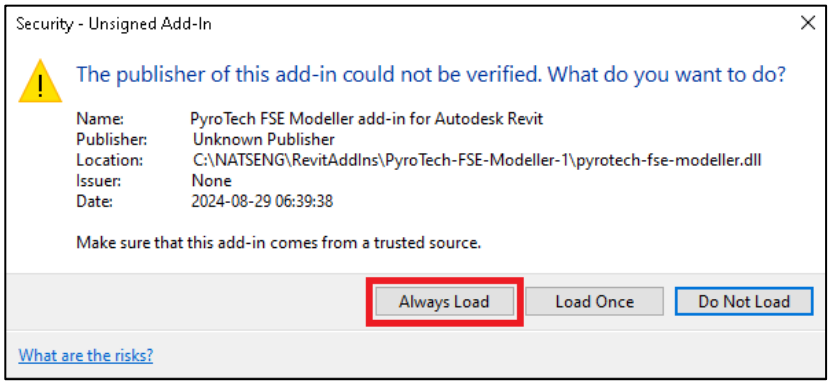
It is necessary to have the Autodesk Revit program installed.

You can install the add-in by running the exe file of the PyroTech-FSE-Modeller-Installer-XXX.exe , where XXX corresponds to the number of the current revision of the program.

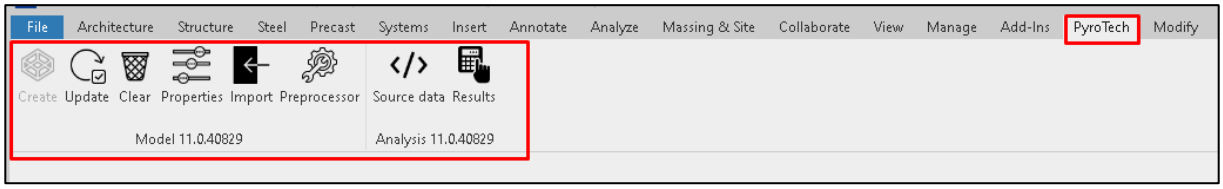
Next, follow the instructions in the installation windows.

By default, the add-in is installed in the folder C:\NATSENG\RevitAddIns\PyroTech-FSE-Modeller-100 . It is recommended not to change this location of the program.

Launch the Autodesk Revit program. When you first start the program with the add-in, a window will appear in which you need to click the "Always download" button.



After installing and activating the add-in, the Autodesk Revit program will display the "Desktop" tab, with the "Model" and "Analysis" panels.



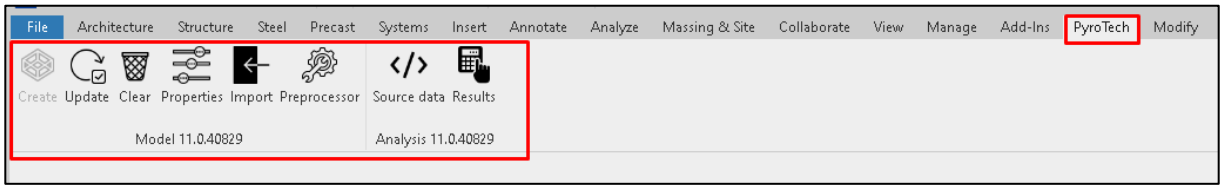
3.2 Removing the add-in

To remove the add-in, you need to go to the "Control Panel"/"Uninstall or modify the program" application. Find the "PyroTech FSE Modeller" add-in in the list, right-click on it and select the "Delete" context menu item.

4. Working with the PyroTech FSE Modeller add-in

4.1 Add-in Interface

The add-in panel looks like this:

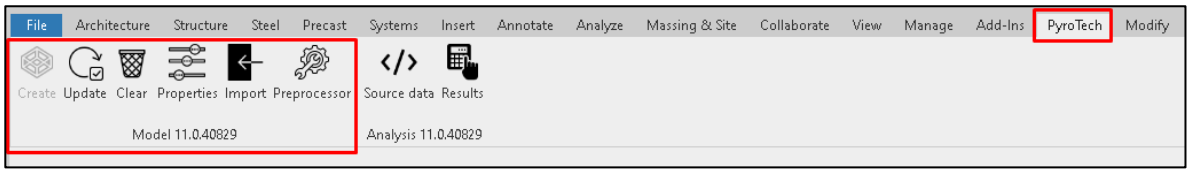


5. The "Model" panel

5.1 General information

The "Model" panel is designed for creating, configuring the display, importing and exporting FSEM.

The "Model" panel looks like this:

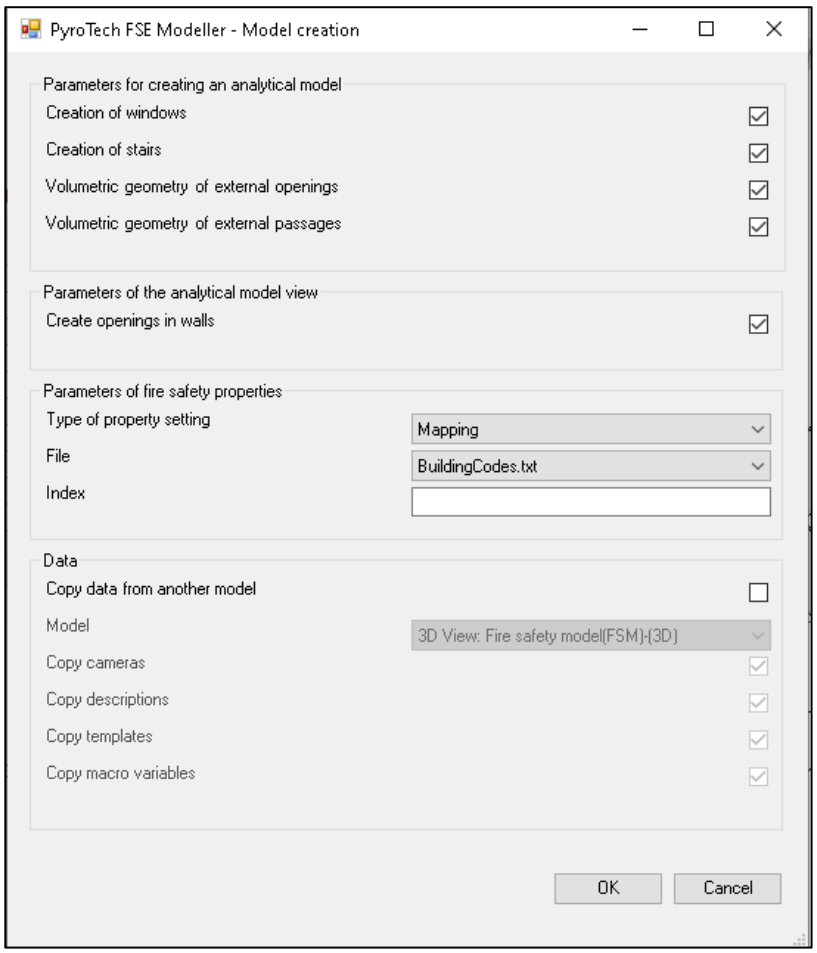


5.2 The "Create" button

The "Create" button is used to create an FSEM.

The "Create" button is active when any 3D model of the Revit project is the active view in the interface.

Clicking on the "Create" button opens the "Model creation" window.



Block "Parameters for creating an analytical model"

The "Parameters for creating an analytical model" block is designed to select parameters for building an FSE model.

Creation of windows – creating windows when creating an FSE model.

Creation of stairs – creating stairs when creating an FSE model.

Volumetric geometry of external openings – adding volumetric geometry of external openings when creating an FSE model.

Volumetric geometry of external passages – adding volumetric geometry of external passages when creating an FSE model.

Block "Parameters of the analytical model representation"

Create openings in walls – create holes in walls when creating an FSEM.

The "Parameters of fire safety properties" block

The "Parameters of fire safety properties" block is designed to select the type of property assignment.

Type of property setting – a drop-down list that specifies the type of property assignment.It can take two values:

Mapping – when this value is selected, the mapping dictionary file will be available in the "File" field.

Text normalization - when this value is selected in the "File" field, a selection of the standard text file will be available.

File - Depending on the selected type in the "Type of property setting" field, the File field can be selected:

Mapping Dictionary is a dictionary file with mapping parameters. The default path to the dictionary file is set in the add-in configuration file.

A typical text is a file with text format commands that is added to the exported data in text format. By default, the path to the file with the standard text is set in the add-in configuration file.

Index is a field for specifying an index (string) that will be added to the end of the identifier of each property created as a result of mapping.

For example

```
 Index = 13:
Created Properties: tenant13 1 0 1 1; cway13 2; и т.д.
```

The "Data" block

The "Data" block is used to select objects to copy from another model.

Copy data from another model – selecting objects to copy from another model. The following objects can be selected for copying:

Copy cameras

When adding images to the analytical model, the camera position settings at which the image was created are also added to the model, so that the images can be updated when the model changes. This checkbox is intended to indicate the need to copy camera settings from previously created models to a new one.

Copy descriptions

This checkbox is intended to indicate the need to copy descriptions (@A-DOC-N) from previously created models to a new one.

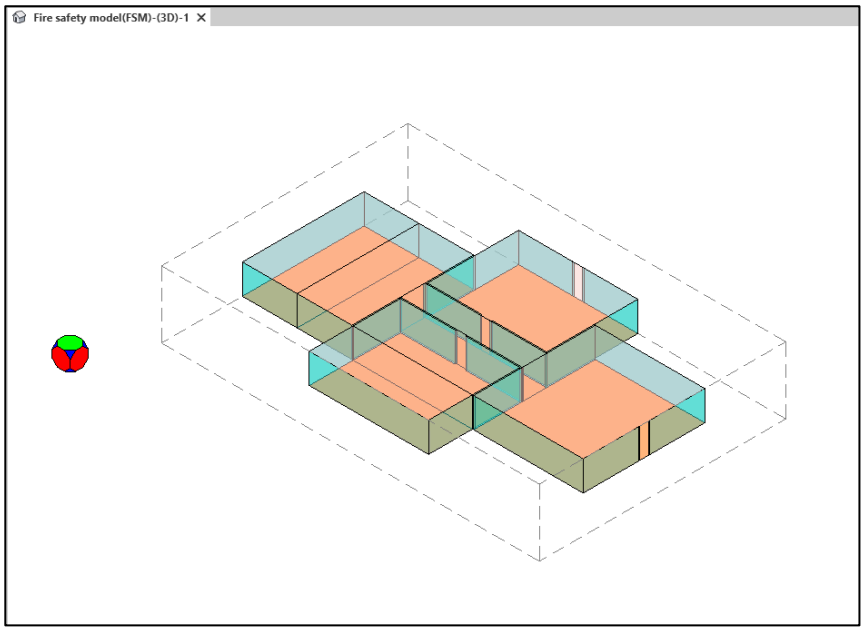
Copy templates

This checkbox is intended to indicate the need to copy report templates (@A-TEMPLATE) from previously created models to a new one.

Copy macro variables

This checkbox is intended to indicate the need to copy macro variables (@A-MACRO) from previously created models to a new one.

After clicking on the "OK" button, a new 3D window with FSEM is created in the Revit program interface.



The FSEM consists of objects of the "shape" type, which are copies of objects in a 3D window for which a fire technical model has been made.

The FSEM is created only from analytical elements with a minimum number of faces.

An object "Model Properties Object" is created for the FSEM. The object of the model properties looks like a "game cube".

The model properties object (Cube) is a conditional object that is needed to set text properties related to the model as a whole in the comment field.

5.3 The "Update" button

 The "Update" button is used to update the selected FSEM.

When the "Update" button is activated, the current model is deleted and a new FSEM is created based on the current parent model and the parameters for creating the model being deleted.

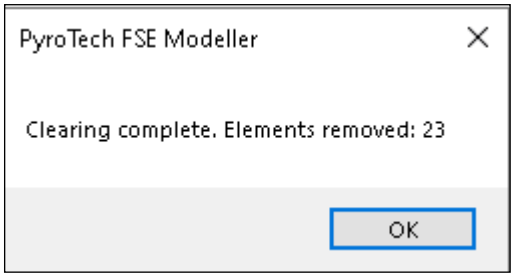
The "Update" button becomes active when any FSEM of the Revit project is active in the interface.

5.4 The "Clear" button

 The "Clear" button is designed to clear the project of irrelevant fire engineering objects.

After clicking the "Clean" button, the project is cleaned of irrelevant fire engineering facilities.

After finishing the work, an information window is displayed with a message about the number of deleted objects.



5.5 The "Properties" button

 The properties button is used to display model properties, display the visibility of object groups, and export models to BimML, Pyrotext, and GLTF formats

The "Properties" button is active when an FSEM is an active view in the interface.

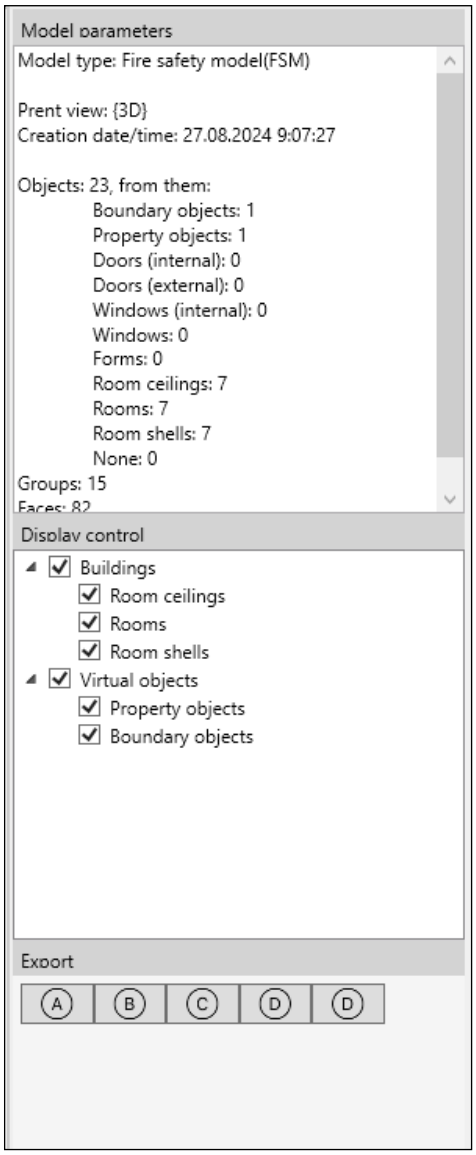
By clicking the "Properties" button, the "Model properties" panel is displayed with interface elements for displaying model properties.

The "Model properties" panel is divided into 3 panels:

Model parameters

Displav control

Export



The "Model Parameters panel"

This panel displays information about the model:

Model type

Prent view

Creation date/time

Objects

Groups

Faces

The "Display control" panel

Groups are displayed/hidden in this panel. To show/hide a group, you need to set/remove a check mark in the corresponding checkbox. The changes will be displayed in the FSEM window.

Buildings – in this group, the groups belonging to the building are displayed/hidden. Objects that can be displayed/hidden:

Windows

Doors (external)

Stairs

Room ceilings

Room

Room shells

Other

Virtual objects – groups of virtual objects are displayed/hidden in this group. Objects that can be displayed/hidden:

Property objects

Virtual objects

The "Export" panel

 The "Export as BimML" button is designed to export the model to BimML format.

 The "Export as Pyrotext (file)" button is designed to export the model to a monolithic Pyrotext text file.

 The "Export as Pyrotext (folder)" button is designed to export the model to a folder with Pyrotext text files.

 The "Export as Pyrotext (zip)" button is designed to export the model to a zip archive with Pyrotext text files.

 The "Export as GLTF" button is designed to export a 3D fire engineering model (in the future).

5.6 The "Import" button

 The "Import" button is used to import a model from the Pyrotek text format.

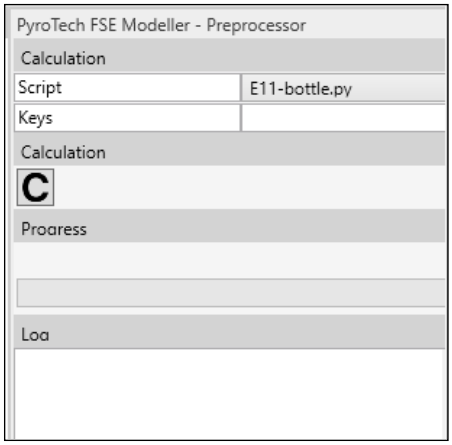
Important! Only geometry is imported.

Clicking on the "Import" button opens a dialog box through which the user can select the file to import.

5.7 The "Preprocessor" button

 The "Preprocessor" button opens the "Preprocessor" panel designed to run FSEM creation scripts.

Important! To work with the "Preprocessor" panel, you must first install the common components of RevitPythonShell and restart the PC.



"Calculation" panel

In the "Script" field - in the drop-down list, the user selects the necessary script for creating the FSEM.

In the "Keys" field, the script launch keys are set. This field must be filled in only when creating scripts with parameters other than those specified in the default scripts.

C The "Start calculation" button starts the script execution.

The Progress panel

"Progress" panel - in this panel there is a progress bar that displays how many tasks are completed when performing the calculation.

The "Log" panel

The "Log" panel is designed to display add-in messages when executing FSEM creation scripts.

6. The "Analysis" panel

6.1 General information

The Analysis panel is designed for:

adding images of the source data,

adding descriptions of the source data.

data preparation for generating a report with images and a description of the source data using the Pyro-Tech Reporter handler.

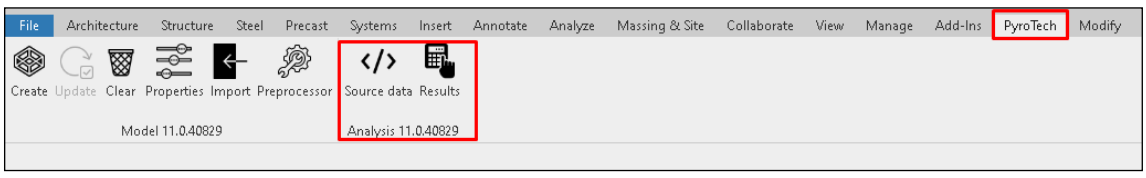
preparation of initial data for performing evacuation calculations and blocking evacuation routes using a zone model and integral models using handlers - PyroTech-Evac 1.0, PyroTech-Reporter 1.0, PyroTech to CFAST and FDS convertor, PyroTech to FDS-Evac convertor.

visual viewing of the initial data and calculation results.

viewing the calculation results in the form of animation.

preparing data for generating a report with tables and graphs based on calculation results using the Py-roTech-Reporter solver

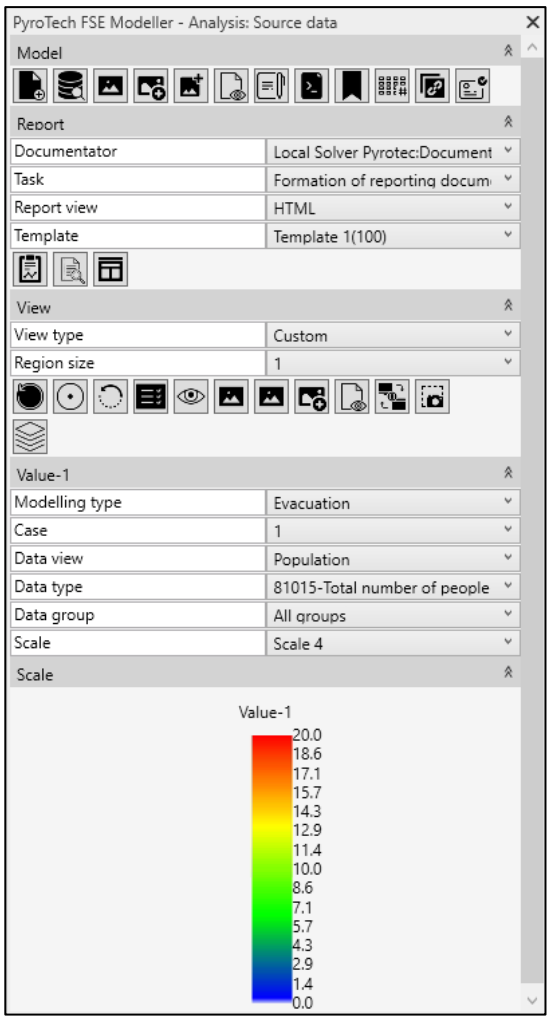
The "Analysis" panel looks like this:



6.2 The "Analysis:Sourse data" panel

The "Analysis:Sourse data" panel is designed to work with source data. To start the panel, click on the "Source data" button </> on the add-in panel.

The "Analysis:Sourse data" panel looks like this:



The "Model" panel

The following buttons are located on the "Model" panel:

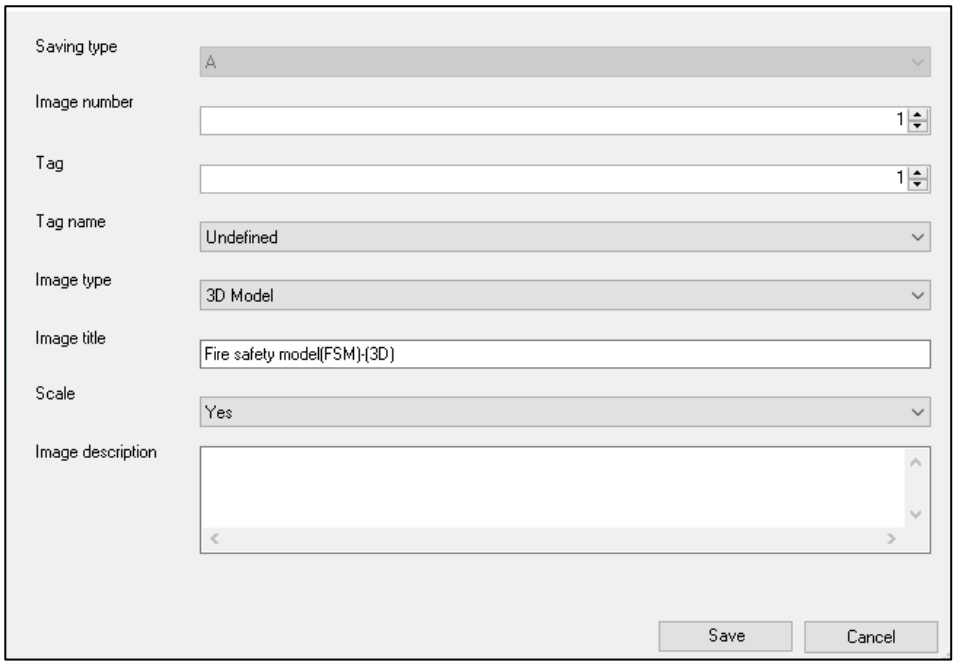
The "Load typetext file" button - is designed to select a file with "typical" data for calculation

The "Browse data" button - is designed to display a list of data (solver, calculation time, size, database (entity) or file) with the ability to delete from the database or transfer from the database to an external file. (in the long run).

The "Save view" button - is designed to create and save a raster file of the model view.

The "Add view" button - is designed to create and add a Pyrotext to the file in section A of the raster file.

After clicking on the "Add view" button, the "Image appending parameters" window opens.



Saving type – the type of saving a raster file to a Pyrotext file in section A. This field cannot be edited by the user.

Image number – image number. By default, the first available number is specified. This field can be changed by the user. If an image with the number selected by the user exists, then when creating a bitmap image, the add-in will display a warning message with the option to cancel the addition.

Tag is the tag number. This field can be edited by the user.

Tag name is a drop–down list that accepts values from the A-TAG file. If the value is "Underfined", then the tag can be edited by the user and take any value except the values from the A-TAG list.

Image type– a drop-down list for the user to select the type of bitmap image. It can take the following values: 3D model, floor, section, drawing.

Image title – the name of the bitmap image.

Scale – creating and saving a raster file of the scale view.

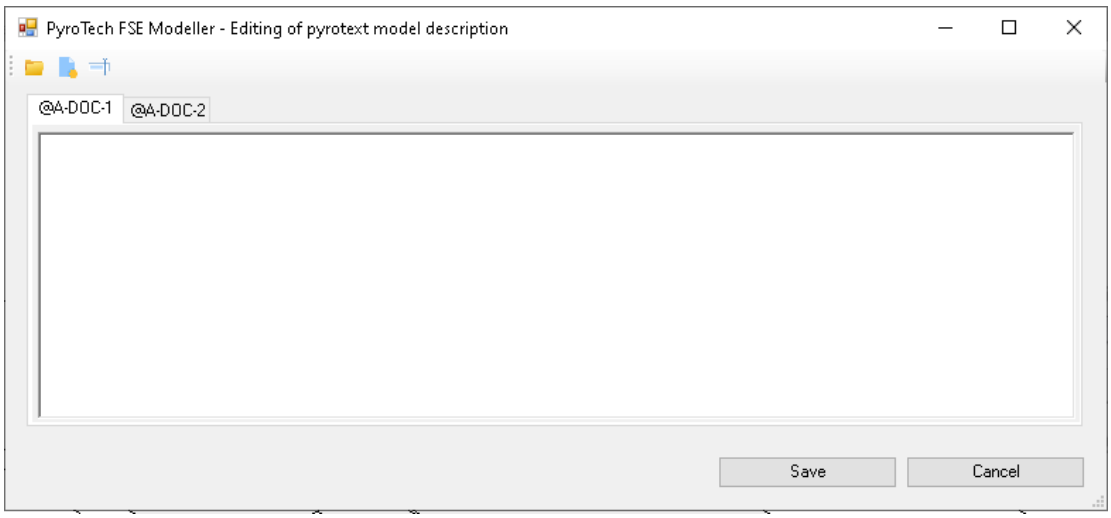
Image description - description of the bitmap image.

The "Image import" button - is designed to import a raster file, save and add the Pyrotext to the file in section A. The interface for adding an imported image is the same as for the "Add View" button.

The "Browse" button - is a pop-up window with viewing A-IMG images indicating their numbers, pixel sizes, and file size.

The "Description" button - is designed to create and/or edit text by the user in the A–DOC-N Pyrotext dataset and set a name, description and tag in the A-DOCSET. The text added by the user is saved in the Revit project along with the analytical model.

After clicking on the "Description" button, the "Editing of pyrotext model description" window opens.



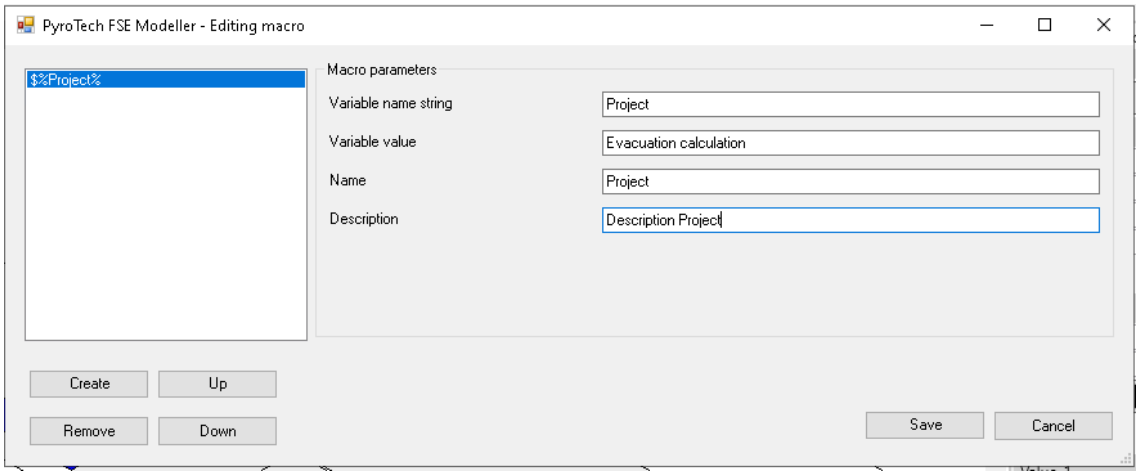
The "Create" button is designed to create and/or edit text by the user in the A-DOC-N Pyrotext dataset

The "Open" button is designed to open the description from a file in .txt format. Important! Before importing, you need to click on the "" buttonTo create».

The "Rename" button is designed to specify the number, tag, name and description of the @A-DOC tables.

The "Macro" button is designed to create and edit macro variables and their values by the user. If there are no macro variables in the model, then when editing, you need to take a "standard" set from the "template" text file as part of the add-in installation. The location of this template is described in the documentation, the user can edit this file.

After clicking on the "Macro" button, the "Editing macro" window opens.



Variable name string – this field is intended for the user to specify the name of the variable.

Variable value - this field is intended for the user to set the value of a variable.

Name – this field is intended for the user to specify the name of the variable.

Description – this field is intended for the user to specify a description of the variable.

"Create" button - this button is designed to create a variable by the user.

"Up" button - this button is designed to move up one line of the macro variable in the list of macro variables.

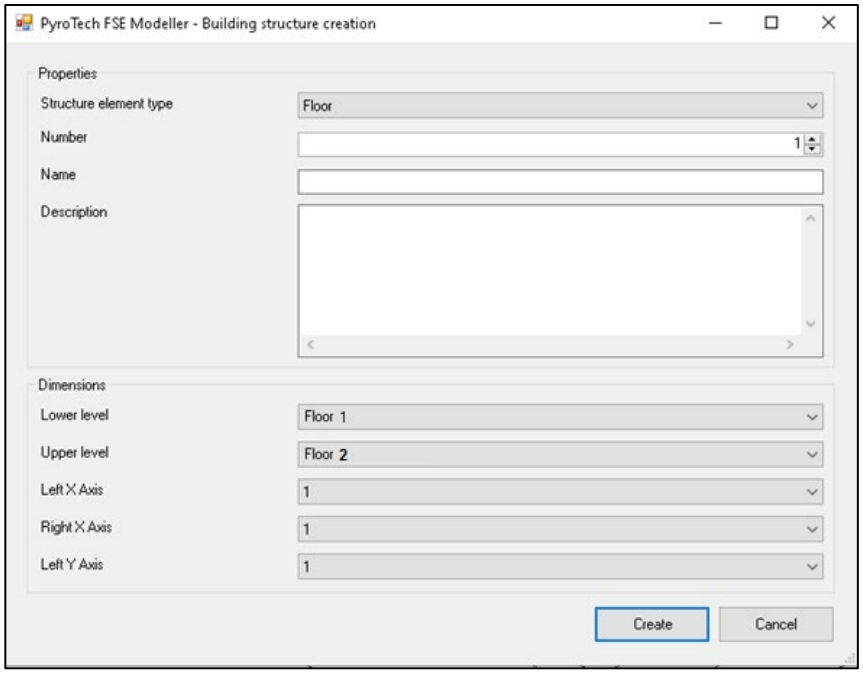
"Down" button - this button is designed to move a macro variable down one line in the list of macro variables.

"Remove" button - this button is designed to remove macro variables by the user.

The "Tags list" button is designed to create and edit a list of tags in the @A-TAG table. The added list of tags will be saved in the Revit project for later export.

The "Building structure" button is used to specify the structure of the building.

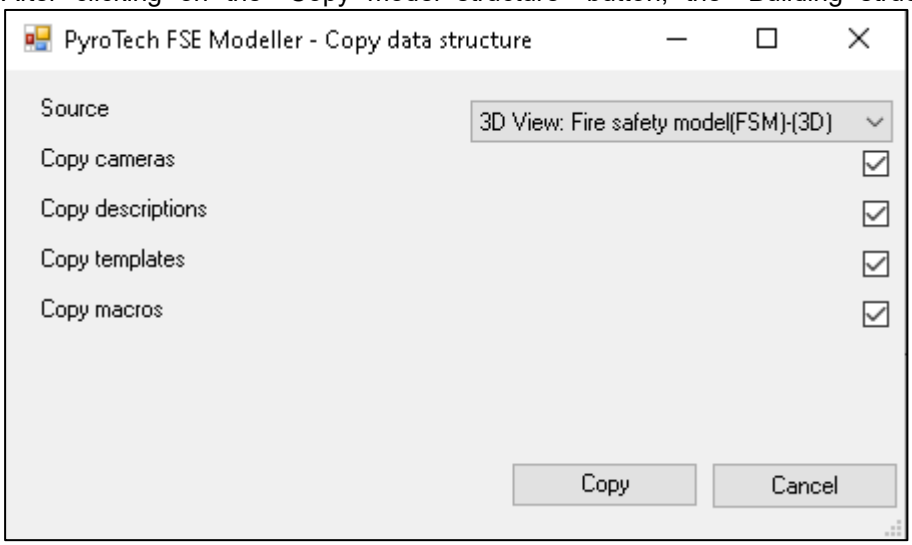
After clicking on the "Building structure" button, the "Building structure creation" window opens.



In the window that appears, the user must specify the structure of the building and click on the "Create" button.

The "Copy model structure" button is designed to copy data from another FSEM.

After clicking on the "Copy model structure" button, the "Building structure creation" window opens.



In the "Soure" field, the user needs to select the FSEM from which to copy the data and mark the necessary data with checkboxes.

The "Editing model identification and model design" button is designed to edit the identification and designation of the model.

The "Report" panel

In the "Documentator" field – in the drop-down list there is a list of handlers for creating reports specified in the configuration file.

In the "Task" field, the drop–down list contains a list of tasks for the selected handler specified in the configuration file.

In the "Report view" field, the drop–down list contains a list of report formats for the source data specified in the configuration file.

In the "Template" field, the drop-down list contains the names of the templates specified in the configuration file for this type of report. Templates can be generic – created by the developer, or custom – created by users.

 **The "Create report" button** starts the creation of a report in the handler selected by the user in the "Documentator" field.

 **The "View report" button** opens the created report for viewing.

 **The "Template import" button –** imports the report template, templates of its parts, and logo images into the FSEM.

The "View" panel

In the "View type" field - in the drop-down list, the user selects the type of view.

Custom – view any models and scenario set for values

Interrelated – models and scenarios of magnitudes2 correspond to magnitudes1. If, when changing the parameters of magnitude 1, magnitude 2 becomes incompatible, then it is not displayed.

In the "Region size" field - in the drop-down list, the user selects the size of the area of detail – the number of objects (types - rooms, staircase elements) around the selected object to be displayed in detail.

The value 1 corresponds to the display of only the selected object

The value 2 corresponds to the selected object and its immediate neighbors, etc.

Doors, windows, openings between objects of detail and other "connecting" objects in the number of objects of the environment are not taken into account, but the values are displayed in them.

 The "Refresh results" button is designed to update the results after the user selects new values.

 The "Select region" button is used to view the selected area of detail. To select a given area, you need to select an object on the FSE model with the left mouse button and click on the "Select region" button.

 The "Reset region view" button is designed to reset the selected area.

 The "View Pyrotext" button opens a window where you can view the model file in the Pyro-text format.

 The "Save view" button is designed to create and save a raster file of the model view.

 The "Save view" (Scale) button is designed to create and save a raster file of a model view with a scale.

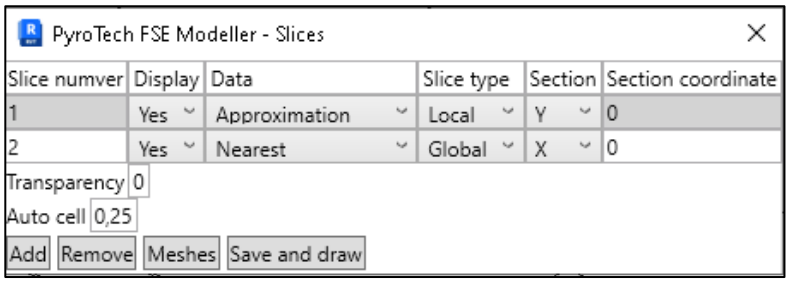
 The "Append view" button is designed to create and add a of the raster file.

 The "Show view" button opens a window with a view of A–IMG images.

 The "Load soure" button is designed to load the source data.

 The "Make value screenshots" button is designed to create and save a raster file of the model view to a folder

 The "Slice" button is used to edit the table of slices.



The slice number is indicated in the "Slice number" column.

In the "Display" column, the display selection is set.

In the "Data" column, the data is indicated. nearest / approximation

The "Slice type" column indicates the type of slice. This cell can take values (Global or Local)

In the "Section" field, you can select a section along the X Y Z axes.

In the "Section coordinate" field, the coordinates of the section are set.

Transparency is set in the "Transparency" field.

"Auto cell" field – in this field, the step of the "auto grid" nodes is set equal to the size of the grid cell when displaying the values of the zone models. The value is initialized from the configuration file, by default 0.25 m.

The "Add" button adds a slice with user-defined parameters.

The "Remove" button is designed to delete a line.

The "Meshes" button switches the display of SMESH grids or auto grids. Lines are drawn forming rows of nodes. . Each grid is shown in an individual color, the color is taken one by one from the list of colors in the configuration file. If there are more grids than colors in the configuration file, then the color is selected cyclically.

"Save and drow" button - saves and draws slices.

"Value-1" panel

In the "Modeling type" field - in the drop-down list, the user selects the type of modeling. This field can take the following values:

Evacuation

Fire hazards

Classification

In the "Case" field, in the drop–down list, the user selects the necessary scenario.

In the "Data view" field – in the drop-down list, the user selects a value, depending on the type of modeling. This field can take the following values:

Population

Passes

Wayouts

In the "Data view" field – in the drop-down list, the user selects the data type. This field can take the following values:

81015 - Total number of people in the premises for all population groups (persons)

81025 - Total density of people in the premises for all population groups (persons/m2)

In the "Data group" field - in the drop-down list, the user selects a data group. This field can take the following values:

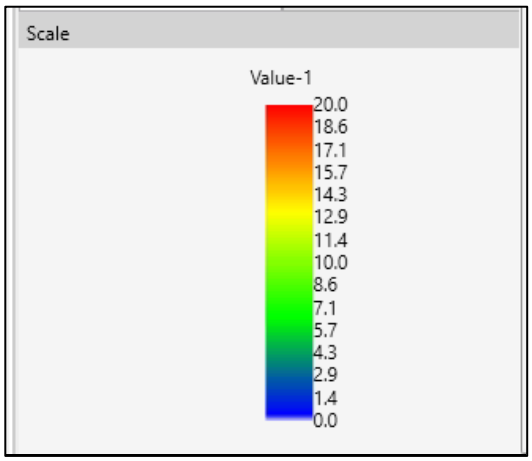
All groups

A separate group is a population group, type of fire load, etc.

In the "Scale" field - in the drop-down list, the user selects a scale to display the results. The selected scale will be uploaded to the "Scale" panel.

The "Scale" panel

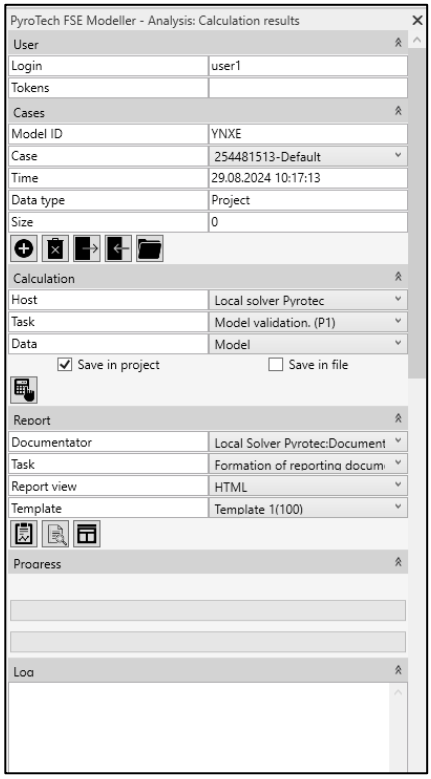
The "Scale" panel is designed to display scales.



6.3 "Analysis:Calculation results" panel

The Analysis:Calculation results panel is designed to work with calculations and their results. To launch the panel, click on the "Results" button  on the add-in panel.

The "Analysis:Calculation results" panel looks like this:



The "Users" panel

The "Users" panel is designed to enter the login and the token package code.

The "Login" field is intended for entering the user's login.

The "Tokens" field is intended for entering the token package code.

If the user uses handlers locally or on the server of his organization, then "Login" and "Tokens" do not need to be filled in.

The "Cases" panel

The "Cases" panel is designed to select a set of data for calculations, viewing and documentation.

The "Model ID" field is intended for displaying the LKID of the 3D window model.

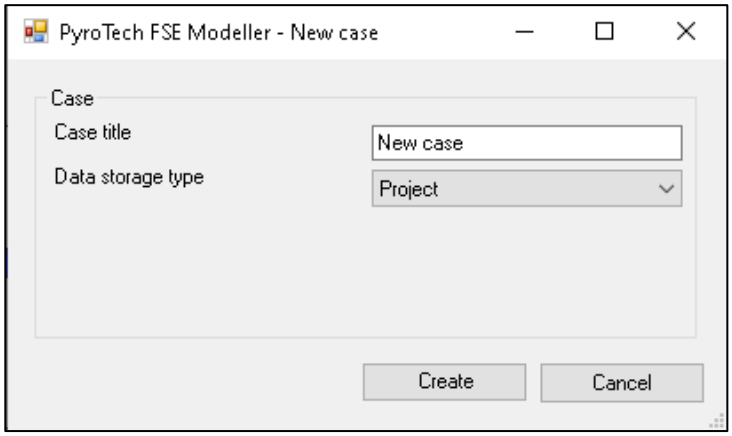
The "Case" field is a drop–down list of cases, calculations and/or importing calculation results. The "Case" field contains a string with the case ID and its name.

The "Time" field displays the time when the case was created.

The "Data type" field is intended to show the type of data storage – in the Revit project or in an external file.

The "Size" field shows the size of the case data.

 **The "New case" button** is designed to create a new case. Clicking on the "New case" button opens the "New case" window.



The "Case title" field is intended for entering a new case name.

The "Data storage type" field is used to select the type of data storage. The type of data storage can be:

In the Revit project file

In an external file on the hard disk.

When creating a case, the "Model ID" identifier is assigned automatically.

"Create" button - starts the creation of a new case.

 **The "Remove case" button** deletes the selected case and its data in the "Case" field.

 **The "Export" button** is designed to export the data of the current case to the hard disk in the case folder.

 **The "Import" button** is designed to import the calculated model to the data of the current case to display the calculation results.

 **The "Open case folder" button** is designed to open the case folder.

"Calculation" panel

The Calculation panel is designed to select handlers, servers, tasks and run calculations by handlers.

In the "Host" field, there is a list of servers and handlers in the drop-down list. The list of servers and handlers, and the path to them is specified in the configuration file.

"Task" field - in the drop-down list there is a list of tasks to perform the calculation by the processor. The "Task" field depends on the handler selected by the user. The list of tasks is set in the configuration file.

"Data" field – in the drop-down list there is a list of the volume of Pyrotext data transmitted to the processor. The default value of the data volume for the handler is set in the description of the handler in the configuration file. The "Data" field can take the following values:

Model - only the model (data of type A) is transmitted from the Protest file. The handler creates and returns calculation results that overwrite previous results.

Full case – the entire Pyrotext is transmitted, handlers can process the results of previous calculations, handlers return new results that are added to the case.

The "Save in project" checkbox is designed to save the data obtained as a result of the work of the solvers to the Revit project database.

The "Save in file" checkbox is designed to save the data obtained as a result of the work of the solvers on the hard disk (To the folder of the current case, without writing to the Revit project database).

 **The "Start calculatoin" button** is designed to start performing calculations with the processor selected by the user.

The "Report" panel

In the "Documentator" field – in the drop-down list there is a list of handlers for creating reports specified in the configuration file.

In the "Task" field, the drop–down list contains a list of tasks for the selected handler specified in the configuration file.

In the "Report view" field – in the drop-down list there is a list of report formats for the source data specified in the configuration file.

In the "Template" field, the drop-down list contains the names of the templates specified in the configuration file for this type of report. Templates can be generic – created by the developer, or custom – created by users.

 **The "Create report" button** starts the creation of a report in the handler selected by the user in the "Documentator" field.

 **The "View report" button** opens the created report for viewing.

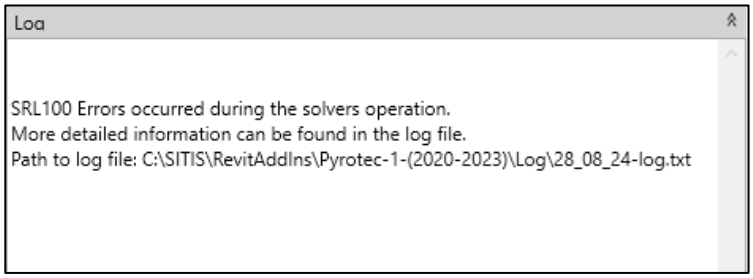
 **The "Template import" button –** imports the report template, templates of its parts, images of logos into the FSEM.

"Progress" panel

"Progress" panel - in this panel there is a progress bar that displays how many tasks are completed when performing the calculation.

The "Log" panel

The "Log" panel is designed to display messages from handlers.



The "View" panel

In the "View type" field - in the drop-down list, the user selects the type of view.

Custom – view any models and scenario set for values

Interrelated – models and scenarios of magnitudes2 correspond to magnitudes1. If, when changing the parameters of magnitude 1, magnitude 2 becomes incompatible, then it is not displayed.

In the "Region size" field - in the drop-down list, the user selects the size of the area of detail – the number of objects (types - rooms, staircase elements) around the selected object to be displayed in detail.

The value 1 corresponds to the display of only the selected object

The value 2 corresponds to the selected object and its immediate neighbors, etc.

Doors, windows, openings between objects of detail and other "connecting" objects in the number of objects of the environment are not taken into account, but the values are displayed in them.

 The "Refresh results" button is designed to update the results after the user selects new values.

 The "Select region" button is used to view the selected area of detail. To select a given area, left-click to select an object on the FSEM and click on the "Select region" button.

 The "Reset region view" button is designed to reset the selected area.

 The "View calculated values" button is designed to view static values in the form of a table in a separate pop-up window.

 The "View Pyrotext" button opens a window where you can view the model file in the Pyro-text format.

 The "Save view" button is designed to create and save a raster file of the model view.

 The "Save view" (Scale) button is designed to create and save a raster file of the model view with a scale.

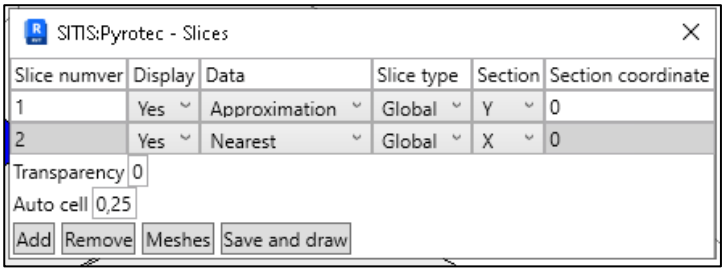
 The "Append view" button is designed to create and add a snapshot of the current Revit view to the specified data section to the analytical model.

 The "Show view" button opens a dialog for viewing images added to the analytical model

 The "Load soure" button is designed to load the source data.

 The "Make value screenshots" button is designed to create and save a raster file of the model view to a folder

 The "Slice" button is used to edit the table of slices.



The "Slice number" column indicates the slice number.

In the "Display" column, the display selection is set.

In the "Data" column, the data is indicated. nearest / approximation

The "Slice type" column indicates the type of slice. This cell can take values (Global or Local)

In the "Section" field, select the section along the X Y Z axes.

In the "Section coordinate" field, the coordinates of the section are set.

Transparency is set in the "Transparency" field.

"Auto cell" field – in this field, the step of the "auto grid" nodes is set equal to the size of the grid cell when displaying the values of the zone models. The value is initialized from the configuration file, by default 0.25 m.

"Add" button - adds a slice with user-defined parameters.

The "Remove" button is used to delete a line.

The "Meshes" button switches the display of SMESH grids or auto grids. Lines are drawn forming rows of nodes. . Each grid is shown in an individual color, the color is taken in order from the list of colors in the configuration file. If there are more grids than colors in the configuration file, then the color is selected cyclically.

"Save and drop" button - saves and draws slices.

The "Value-1" panel

The "Value-1" panel is designed to select the display settings for viewing the calculated value.

In the "Modeling type" field, the user selects the type of modeling in the drop-down list. This field can take the following values: Evacuation, Fire hazards, etc

In the "Calculation" field, the user selects modeling in the drop-down list.

In the "Case" field, in the drop-down list, the user selects the necessary scenario.

In the "Data type" field, the user selects the data type in the drop–down list. This field can take the following values:

Static - static calculation results

Dynamic - dynamic calculation results

The "Model view" field - in the drop-down list there is a list of display types of model objects, with the exception of detail objects.

None – nothing is displayed

Object – generalized data for rooms and stairs.

Element – data of model elements (sections of escape routes, OFP zones, etc.)

Gradient – gradient field.

Markers – the field of markers.

Path graf - designed to calculate evacuation. When using this type of mapping, a path graph is drawn for the edges of the graph corresponding to sections of type 1 (traffic section) and type 2 (connector), the color and length of the edges are selected on a scale for the corresponding value on the section).

Vector field - designed to display the selected value as a vector field (a set of color-tinted vectors located in the plane of the face)

Epura - values are represented by vectors from the nodes of the path graph, directed upward along the normal to the surface of the object, in proportion to the unit vector. In the middle of the edge is the value of the value on the site. At the nodes of the edge – the average of the values in the sections corresponding to the edges of the graph that connect at the node.

Diagramm is a plot displayed by the Diagram API Revit tool

Zones by room height - designed for calculating zone values. Displays zones by room height.

Slice (Gradient) – designed for calculating zone values. Displays slices for the values in the nodes of the SVALUE 3D grid and the automatic grid for the zone model.

Slice (Markers) – slices with markers. It is intended for calculating zone values.

Slice (vectors) – slices with markers. It is intended for calculating zone values.

In the "Value" field, the drop-down list contains a list of values that are possible for this type of viewing.

In the "Objects group" field -

In the "Units" field, there is a list of values in the drop-down list.

The "Unit vector" field is designed to display and edit the length of a unit vector used to display a value in vector form (Vector field, Epura).

In the "Scale" field, in the drop-down list, the user selects a scale to display the selected value. The selected scale will load in the "Scale" panel.

The "Value-2" panel

The "Value-2" panel is designed to select the display settings for viewing the calculated value. This panel displays values and their types that are compatible with the value from the "Value-1" panel.

The interface of the Value-2 panel is similar to the interface of the Value-1 panel.

Панель «Animation player»

The Animation player panel is designed to view the calculation results as an animation.

In the "Time step" field, the time step with which the animation will be played is indicated.

The "Animation delay" field is designed to delay or speed up the playback of the animation, depending on the entered value.

 The Rewind backward button is designed to rewind the lost animation.

 The "Start" button is designed to start playing the animation.

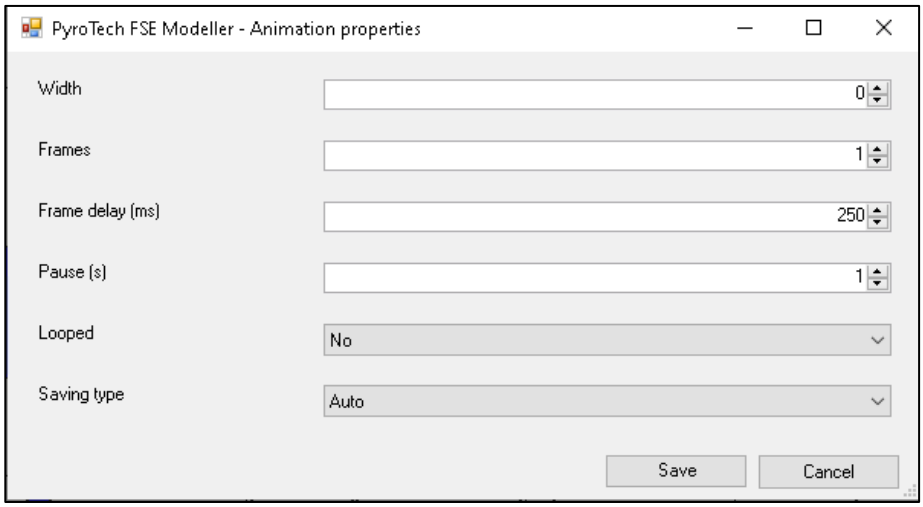
 The "Record" button is designed to play and create a file with gif animation.

 The "Appending" button is designed to play and create a file with gif animation and add the created animation to the Pyrotext file in the Rss section.

 The "Stop" button is designed to stop the animation playing.

 The Rewind forward button is designed to fast-forward the animation.

 The "Parametrs" button is used to set animation saving parameters. Clicking on the "Parameters" button opens the "Animation properties" window.



The "Width" field specifies the size of the image (in pixels) that is the animation frame. If 0 is set, the default value (500) is used.

The "Frames" field indicates the multiplicity of recording animation frames to the file. The list of values is set in the configuration file. The default value is 1.

The Frame delay (ms) field indicates the frame rate. The default value is 250..

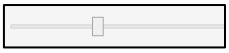
The "Pause (s)" field specifies the delay time between playback cycles (in seconds). The list of values is set in the configuration file. The default value is 1.

The Looped field indicates the playback cycle.

The "Saving type" field sets the saving settings. This field can take the following values:

Auto - files are written to the animation folder. The path to the folder and the prefix of the animation file name are specified in the configuration file.

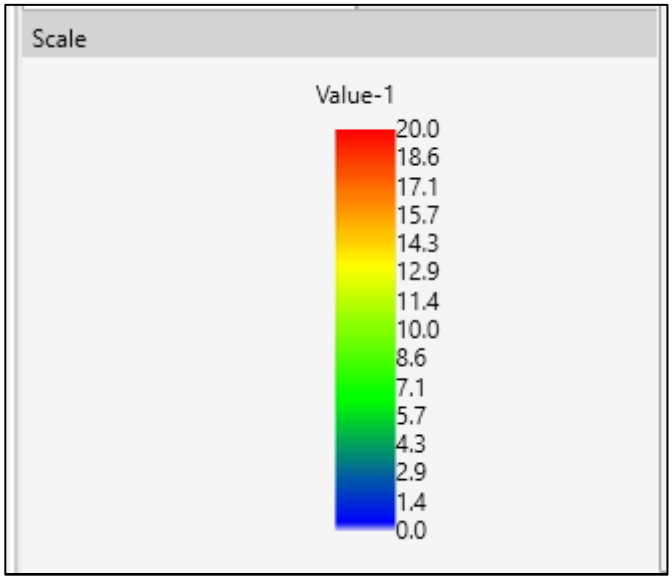
By request – after creating the file, a request is displayed to save it.

The school of the player with a slider  - Using the player scale, you can rewind the animation.

The "Time" field is used to display the playback time. In this field, the user can set the time from which to play the animation or stop playing the animation.

The "Scale" panel

The "Scale" panel is designed to display scales.



7. Service files

7.1 Calculation log

The calculation log is a txt file that is designed to record information about the operation of the add-in.

By default, the calculation log is located in the folder C:\NATSENG\RevitAddIns\PyroTech-FSE-Modeller-1\Log .

The name of the journal is the current date, for example, "27_08_24-log.txt ".

The calculation log displays information about the actions of the add-in, the creation of the FSEM, the time of creation and a list of error messages due to which the calculation cannot be performed.

If there are problems with the add-in, you need to send this file to the developer.

7.2 Configuration files

Configuration files – a file in json5 or txt format with a word named cfg or config in its name, the lines of which contain a list of parameters. The configuration files are located in the folder C:\NATSENG\RevitAddIns\PyroTech-FSE-Modeller-1 \.

7.3 Using different languages

The add-in can be configured in different languages. To do this, you need to change the localization files by specifying the names in the language that the user needs.

Language files are text files with a name of language code (e.g. en es cn …) with an extension.txt.

The language files are located in the folder C:\NATSENG\RevitAddIns\PyroTech-FSE-Modeller-1\Lang .

8. Setting the design parameters

8.1 General information

The data for performing the calculation is set in the comments of objects (rooms, doors, model properties object, etc.).

You can set the data for performing the calculation in the add-in in the following ways:

Using mapping, see clause 8.2

Manually setting the calculated properties in the object comments, see clause 8.3.

Using the Property Editor add-in.

The add-in has a built-in "Parser", which, when transferring the model to the calculation, parses the lines specified for comments on objects, converting them into calculated data in the Pyrotext format.

Important! When specifying data to perform calculations, it is necessary to observe the structure according to the domain of properties, otherwise the parser will not be able to recognize the data specified by the user. The description of the property domain is given in clause 8.5 Description of the property domain.

8.2 Setting calculated properties using mapping

Mapping - setting calculation parameters for objects according to their names. The name of the object can be set in the corresponding property of the object, if it exists (for example, you can set a name for the objects), or in the "Comment" property. At the first stage of mapping, the classifier code is assigned to each object, depending on its name (the name of any classifier is determined in the mapping file). At the second stage, depending on the classifier of the object defined at the first stage, a string with calculated parameters is assigned and written to the "Comment" property. The correspondence of classifiers and calculated properties is also set in the mapping file. Assignment of calculated properties to comments of Revit objects is performed in accordance with the mapping file. The calculated property added to the comment line of the Revit object is written as the string "Property value name ;".

Example of calculated properties

```
tenant 1 20 0 0 1; - it is set in the comment of the "Room" object
cway 1; - it is set in the comment of the "Door" object
```

A mapping file *is a text file containing entries specifying prefixes, codes, calculated properties and their description.*

By default, the mapping file is located in the folder C:\NATSENG\RevitAddIns\PyroTech-FSE-Modeller-1\MappingLib .

Example of a mapping file:

```
==CLASS - classifier block
@@@ GeneralizedModelCodes (GMType) R7 generalized model objects

@A Room design
A11 Premises with a given occupancy
A12 Premises, with specified fire
```

```
@B Room opening
B1 Doors, openings

@C Property Objects
C1 Model property objects

@N Undefined objects
N00 Undefined object

==MAPTEXT – text mapping block

$$MAP GeneralizedModelCodes Test classifier

$N00 Undefined object

@A11 { netto=1 tenant=1,0,0,0.15 } Room, room floor
Office
Administrative
Meeting rooms
Cabinets

@A12 { fload=1,1 fire=1,0,0,0,1 } Room, floor of the room
Non-working premises
Rooms

@B1 { cway=1 } Doorways
Door
Pass

@C1 { ecase 1 10 1 1 1 1 0 0 S1;job 1 3 10;dt 0.3;ds 1;} Model property objects
Model

  ==MAPCLASS – classifier mapping block
==VACAB – dictionary block
==COLORAT - coloring book
```

Format of entries in the mapping file lines:

==CLASS - classifier black

Classifier Description:

@@@ classifier id (Property name Type Name) Default value comment

Property Name is the name of the property of the model object to which the classifier code is assigned. If the Type name is not specified, then the property value is the classifier code. If a type name is specified, then the substring Type name=Classifier code is specified in the text value of the property

Description of the classifier section:

@@ id (prefix prefix ...) section

If the list of prefixes in parentheses is empty, then this section is the default section and contains all codes that are not included in other sections

Description of classifier prefixes:

@ prefix description_refix_

```
Example
==CLASS - classifier block
@@@ GeneralizedModelCodes (GMType) R7 generalized model objects

@A Room design
A11 Premises with a given occupancy
A12 Premises, with specified fire

@B Room opening
B1 Doors, openings
```

==MAPTEXT – text mapping block

The string starting with the $ character is the default classifier code string. It is assigned to objects for which text mapping has not found any match.

@@ Classifier name (list of domain names of properties) description of the dictionary.

@ the list of types of model objects (rooms, doors, windows, etc.) may be missing.

The Classifier code has parametric properties.

A mask is a sequence of lines from which the words in the object name should begin sequentially. (the case of the letters does not matter).

For example, the mask "work rooms" will satisfy the sequences of words "work room", "Work room", "work rooms", etc., and will not satisfy "large work room", "work room", "room", "work room", etc.

```
Example,
==MAPTEXT - text mapping block

$$MAP GeneralizedModelCodes Test classifier

$N00 Undefined object

@A11 { netto=1 tenant=1,0,0,0.15 } Room, room floor
Office
Administrative
Meeting rooms
Cabinets

@A12 { fload=1,1 fire=1,0,0,0,1 } Room, floor of the room
Non-working premises
Rooms
```

To set the data for performing calculations using mapping, the user must:

Configure the mapping file.

Set the names or comments of the rooms in the building model according to the configured mapping.

In order to set the data for the model properties object according to mapping, you need to add "model" in the comments of the "Room" object.

Create an FSEM.

8.3 Setting the calculated properties manually

To set data for performing calculations using calculation properties, the user must:

In the comments of the objects of the construction model, set the calculated properties according to clause 10. Property domain

Create an FSEM

In the comment of the model properties object, set the calculated properties according to clause 10. Property domain

Also, the user can first create an FSEM and only then set the calculated properties.

Example of calculated properties,

```
    tenant 1 20 0 0 1; - it is set in the comment of the "Room" object
    cway 1; - it is set in the comment of the "Door" object
    ecase 1 10 1 1 1 1 0 0 S1;job 1 3 10;dt 0.3;ds 1; - the Model (cube) is set in
the comment of the object
    Important aspects when using complex software
```

9. Appendix 1. Property Domain

9.1 Property domain file format

Property domain file is a text file with property domain data

Property domain is a data structure describing a set of properties and their parameters for an applied task (for example fire safety engineering, etc.).

Format of entries in the lines of the property domain file:

@@@ Domain name domain description

@@ list of Types of Objects

@ Property name uniqueness of the Property Sorting index description of the property

Parameter Type Uniqueness of Parameter Parameter Name Default Parameter Value Parameter description

The list of property parameters is ordered according to the order of setting the parameter description lines in the property

Domain name – a short domain name without spaces, used as an identifier

List of object types - a list of types of model objects (for example, rooms, doors, windows, etc.) for which these properties are applicable. it may be missing. By default, for all types of objects

Property name – the short name of the property without spaces and special characters

Uniqueness of the property is the number 0 (no) or 1 (yes). Only one unique property can be set for an object.

Parameter type . spic types can only be the last parameter of a property

int – integer

real – real number

str – text string without spaces

ilist – list of integers

rlist – list of real numbers

slist – list of text string without spaces

The uniqueness of the Parameter is the number 0 (no) or 1 (yes). For an object in properties of this type, the value of this parameter cannot be the same

Parameter name is the short name of the parameter without spaces and special characters

Parametric properties are set by the name of the property and a list of values of its parameters.

Parametric properties can be set in different formats.

9.2 PyroTech Property Domain structure

@@@ PyroTechDomen

@@ model room

ecase 0 1 setting the parameters of the evacuation scenario.

sn	int	1	1	Evacuation Scenario Number
mt	int	0	1	movement type number
to	int	0	1	Population option number
po	int	0	1	option number of movement paths
mo	int	0	1	option number of movement functions
pl	int	0	1	Type of initial location of people
mt	int	0	1	Option of the start time of movement
bl	int	0	0	boundary layer accounting – yes/no
name	str	1	0	name

@@ room

@ netto 1 1 the net coefficient for the room

val	real	1	1.0	meaning

@ tenant 0 1 setting the parameters of the room's population

sc	int	0	1	Population Scenario number
pp	Int	0	1	base number of people
pn	rea	l 0	0.0	density of distribution of people by room area Net
pb	real	0	0.0	density of distribution of people by room area Gross
tg	int	0	1	population group number

@ rway 1 2 scenarios of traffic paths in which the dividers of the rooms bordering the outer space are exits to the outside.

sc	ilist	1	1	script number

@@ door

@ cpass 1 2 scenarios of traffic paths in which this opening is closed.

sc	ilist	1	1	script number

@ cway 1 2 scenarios of traffic paths in which this technique is an exit to the outside.

sc	ilist	1	1	script number

@@ model room

@ mref 0 1 setting model references (one value, all types of calculations, all scenarios)

num	int	1	1	Number

vtype	int	0	1	Standard size of the Value
ts	int	0	1	the type of calculation by space
tt	int	0	4	the type of time calculation
time	int	0	0	time
name	str	1	0	title

@ mrefc 0 1 setting model references with a reference value (one value, all types of calculations, all scenarios)

num	int	1	1	Number
vtype	int	0	1	Standard size of the Value
ts	int	0	1	the type of calculation by space
tt	int	0	4	the type of time calculation
time	int	0	0	time
cv	real	0	1.0	the value of the reference value
name	str	1	0	title

@@ room door stair

@ oref 0 1 setting object references (one value, all types of calculations, all scenarios)

num	int	1	1	Number
vtype	int	0	1	Standard size of the Value
ts	int	0	1	the type of calculation by space
tt	int	0	4	the type of time calculation
time	int	0	0	time
name	str	1	0	title

@ orefc 0 1 setting the references of an object with a reference value (one value, all types of calculations, all scenarios)

num	int	1	1	Number
vtype	int	0	1	Standard size of the Value
ts	int	0	1	the type of calculation by space
tt	int	0	4	the type of time calculation
time	int	0	0	time
cv	real	0	1.0	the value of the reference value
name	str	1	0	title

fcase 0 1 setting fire scenario parameters .

sn	int	1	1	The number of the Fire Scenario
lo	int	0	1	number of the fire load distribution option
vo	int	0	0	number of the openings status option
bl	ilist	0	1	list of fires

@ fload 0 1 fire load

flo	int	1	1	num number of the Load Option
flt	int	0	1	Type of Fire Load;

fire 0 1 The ignition parameters/ coordinates of the ignition point are set relative to the center of the envelope rectangle of the floor of the room.

bo	int	0	1	The number of the Fire Scenario
bt	int	0	0	The Time Of The Start of the Fire
X	real	0	0.0	the coordinate of the ignition point
Y	real	0	0.0	the coordinate of the ignition point
ft	int	0	1	Type of Fire
name	str	1	0	title