REVIT Truss Designer

Version 1.00
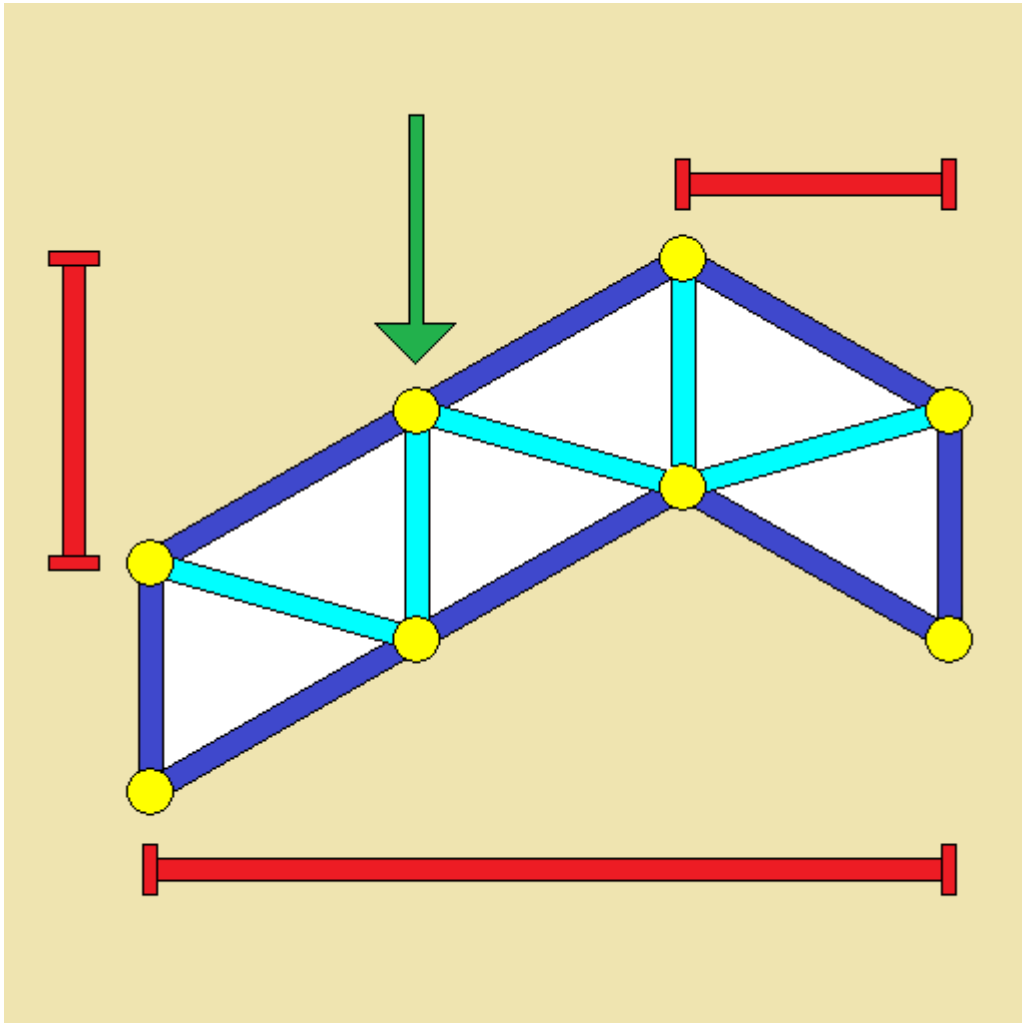

Users Guide

ÍNDEX

[A].- Goals

REVIT Truss Designer is a REVIT add-in that allows for the automatic generation of truss structures and their subsequent incorporation into a project.

The trusses are not defined by the coordinates of their joints and the connectivity of the members, but rather by global geometric parameters. The characteristics of the sections and materials are also parameterized.

When the user changes the value of any parameter, the truss is updated and the system dynamically presents the results. When the desired design is reached, it is inserted into a REVIT project with also configurable conditions.

[B].- Access and organization of the main panel

REVIT Truss Designer is accessed from the "Add-ins" tab. Clicking on "Truss Designer" you get its main panel.
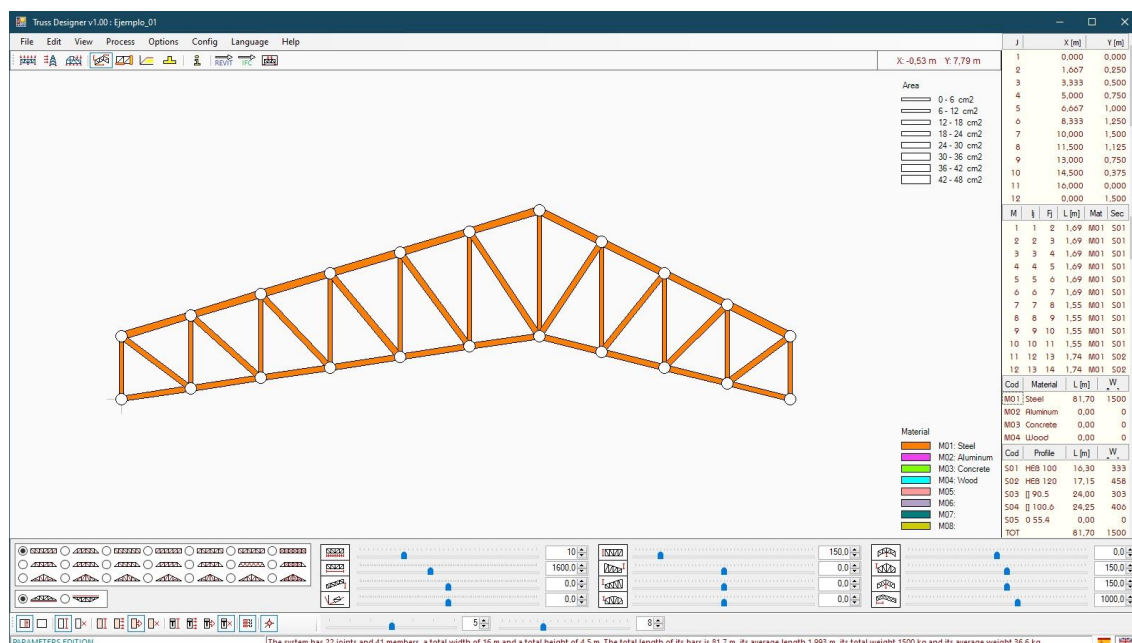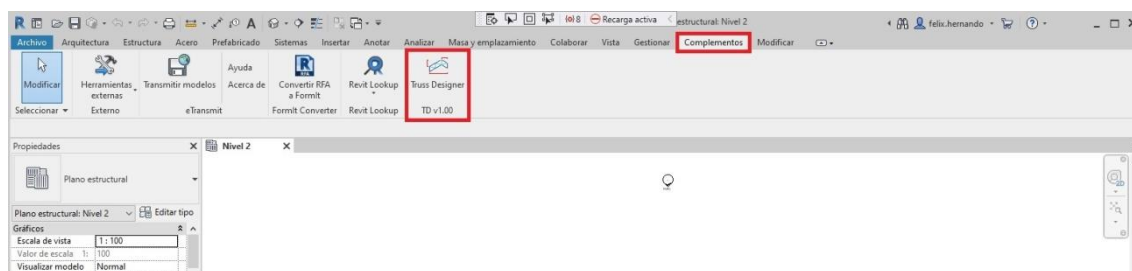
This window includes various areas, some of the areas can be hidden or vary in layout or content. The layout of the image corresponds to the initial example of the program. The following sections ([C] to [M]) describe the 11 possible zones.

[C].- Title bar

The upper title bar includes in the left area the icon and name of the add-in ("Truss Designer"), its version ("v1.00") and the name of the open file ("Example_01").

In its right area it incorporates the controls to minimize the window, move it to the upper left corner of the screen (or restore it) and close the application.

With the usual operation of Windows applications, the program icon (or pressing the right mouse button on the title bar) gives access to the keyboard control menu, dragging the title bar allows changing the position of the window and double-clicking the left mouse button toggles the positions on the screen.

[D].- Main menu
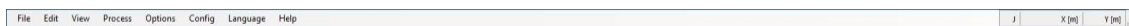
Although most of the operations can be carried out through direct icons on the screen, the add-in's main menu collects the commands that give access to all of them and functionally organizes them into 8 submenus:

The *File* submenu includes the functions for creating the different types of structures and opening and closing them, as well as saving them in the corresponding files.

The *Edit* submenu contains access to the control blocks for the definition of parameters, members, materials and sections.

The *View* submenu contains the different configuration and display options for the work screen.

The *Process* submenu includes those corresponding to the insertion of the truss in the REVIT project and its export to a DXF file.

In the *Options* submenu, the possibilities of establishing the background color in the graphic area and data, parameter and editing grids are provided, as well as the activation/deactivation of warning messages (confirmation requests and notifications) and the automatic detection of joints and members in the vicinity of the cursor.

The *Config* submenu allows the storage and loading of customized configuration files.

With the *Language* submenu, all the add-in texts are exchanged between Spanish and English at any time.

Finally, the **Help** submenu includes the control to activate or deactivate the presentation of pop-up messages, the download of the user manuals (in Spanish and English) and the features video, as well as the access to the "About Truss Designer" panel.

[E].- Toolbar

Below the main menu is the toolbar, which gives direct access to the most common functions. When you hover over an icon a pop-up text indicates its meaning. They are all listed below:

SYMBOL	DESCRIPTION
	New beam type parametric structure
	New column type parametric structure
	New lattice type parametric structure
	Parameter edition
	Members edition
	Materials edition
	Sections edition
	Display mode
	RE&VIT elements generation
	DXF graphic file generation

On the right side of the same line, the system shows the coordinates of the cursor at each moment.

[F].- Graph area
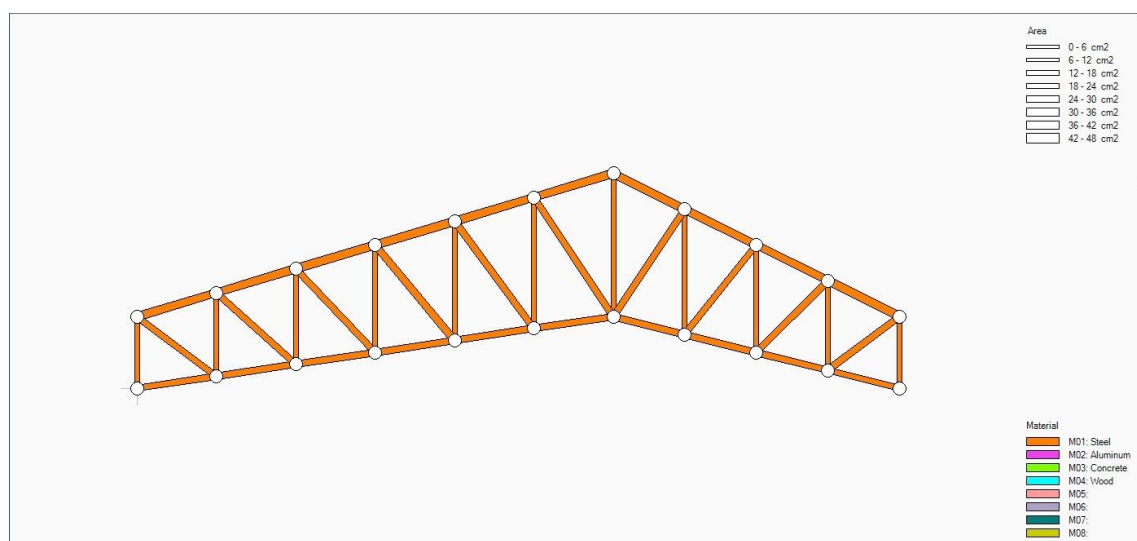
Arranged in the central area of the screen, the graphic area contains the representation of the structure with the geometric distribution of its joints and members. For a better visualization, the system performs an automatic scaling based on the dimensions of the model.

The thicknesses and colors of the members can be fixed or variable depending on the area of the section, the type of section and the corresponding material.

The equivalence between the thicknesses or colors and the corresponding ranges of values is represented in the legends located to the right of the graph. These legends automatically adapt (in position and scales) to the variables they represent and to the maximum ranges of their corresponding values.

In addition, each member can be associated with a text with different possibilities of information (area, section type or material).

Each time the cursor passes over a member, the system automatically identifies it with a thick line and yellow color and shows, also in yellow, the corresponding ranges in the legend and the associated line in the member data grid. Similarly, if the cursor is placed on a joint, the program represents it with a circle with a larger radius and yellow color, like its corresponding line in the joint data grid.

[G].- Data grids

The data values corresponding to the joints, members, materials and sections are represented to the right of the graphic area in four grids with lateral scroll bars (vertical scroll).

These grids indicate the coordinates of the joints, the initial and final joints of each member, its length, material and assigned section, the length and weight of all the members of each material, of each section and totals.

When the cursor is passed over the header lines of the grids, the system presents a pop-up help text with the meaning of each column.

The width of each column is modifiable by the user dragging with the mouse (to the right or left) the separation line with the adjacent column in the title bar.

In any case, if a quantity is not fully displayed, when you move the mouse over it for a few moments, the system presents a pop-up message with the full value.

The data grids are automatically updated when any data or parameter changes, even if it is not included in them.

J	X [m]	Y [m]
1	0,000	0,000
2	1,667	0,250
3	3,333	0,500
4	5,000	0,750
5	6,667	1,000
6	8,333	1,250
7	10,000	1,500
8	11,500	1,125
9	13,000	0,750
10	14,500	0,375
11	16,000	0,000
12	0,000	1,500

M	Ij	Fj	L [m]	Mat	Sec
1	1	2	1,69	M01	S01
2	2	3	1,69	M01	S01
3	3	4	1,69	M01	S01
4	4	5	1,69	M01	S01
5	5	6	1,69	M01	S01
6	6	7	1,69	M01	S01
7	7	8	1,55	M01	S01
8	8	9	1,55	M01	S01
9	9	10	1,55	M01	S01
10	10	11	1,55	M01	S01
11	12	13	1,74	M01	S02
12	13	14	1,74	M01	S02

Cod	Material	L [m]	W.
M01	Steel	81,70	1500
M02	Aluminum	0,00	0
M03	Concrete	0,00	0
M04	Wood	0,00	0

Cod	Profile	L [m]	W.
S01	HEB 100	16,30	333
S02	HEB 120	17,15	458
S03	[] 90.5	24,00	303
S04	[] 100.6	24,25	406
S05	0 55.4	0,00	0
TOT		81,70	1500

These grids are computerized linked to the graphic area. When the different elements are selected in the graphic (joints, members, materials or sections), the system automatically marks the corresponding rows with a yellow background in the grids.

On the other hand, to identify a joint or member in the graph, or all the members with a certain material or profile, it is enough to select the corresponding rows in the grid with the mouse.

In addition, once a row is selected, with the grid active, the cursor movement keys allow you to go through the structure (the right and lower arrows forwards and the left and upper arrows backwards). The [Page Down] and [Page Up] keys are also available to jump forward in each frame.

[H].- Parameter edit controls

Below the graphic area and the data grids are the panels that contain the various parameter editing controls. For each type of truss ("Beam", "Column" or "Lattice") there is a parameter grid and all of them are listed below.
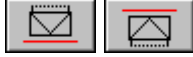
EDITING PARAMETERS OF BEAM-TYPE STRUCTURES

DESIGN OPTIONS

BEAM options

Mirror
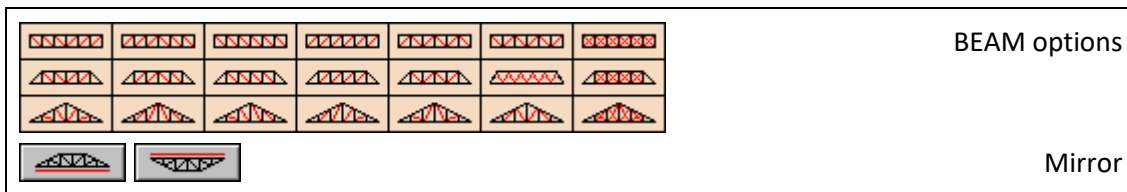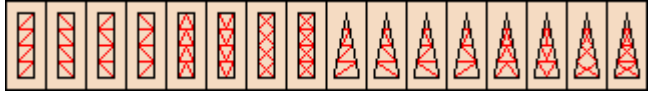
NUMERIC PARAMETERS

	Number of panels	[]
	Total length	[cm]
	Height increment between ends	[cm]
	Truss rotation	$[10^{-2}\ º]$
	Depth	[cm]
	Depth increment on left end	[cm]
	Depth increment on right end	[cm]
	Parabolic depth variation	[cm]
	Parabolic height variation	[cm]
	Intermediate depth increment	[cm]
	Intermediate height increment	[cm]
	Intermediate position	[cm]

EDITING PARAMETERS OF COLUMN-TYPE STRUCTURES

DESIGN OPTIONS

	COLUMN options
	Mirror
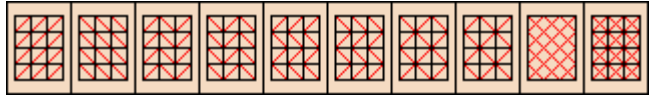
NUMERIC PARAMETERS

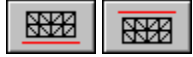|		
	Number of panels	[]
	Total height	[cm]
	Width increment between ends	[cm]
	Truss rotation	$[10^{-2}\ º]$
	Base width	[cm]
	Top width	[cm]
	Left side parabolic variation	[cm]
	Right side parabolic variation	[cm]

EDITING PARAMETERS OF LATTICE-TYPE STRUCTURES
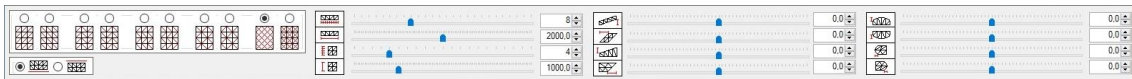
DESIGN OPTIONS

	LATTICE options
	Mirror

NUMERIC PARAMETERS (1 TO 6)

	Number of horizontal panels	[]
	Total length	[cm]
	Number of vertical panels	[]
	Total height	[cm]
	Height increment between ends	[cm]
	Width increment between ends	[cm]

NUMERIC PARAMETERS (7 to 12)

	Horizontal linear variation	[cm]
	Vertical linear variation	[cm]
	Upper side parabolic variation	[cm]
	Bottom side parabólic variation	[cm]
	Left side parabólic variation	[cm]
	Right side parabolic variation	[cm]

All the numerical parameters have editing controls that consist of three computerized linked components: the identification icon on the left, the central slider bar and the editing box on the right.

The user can interact with each of them in nine different ways:

- To provoke the gradual variation of the variable, you can select with the mouse the blue marker of the sliding bar and drag it hor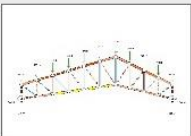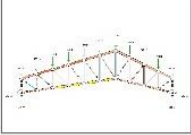izontally to the left or right with the left button pressed. When this is done, the new number of spans is automatically reflected in the edit box, and the structure dynamically adapts its geometry.

- You can also click the mouse on the slider area on either side of the marker. By holding down the left button, the marker slides to the cursor position and the system updates the variable and represents the new truss.

- When selecting the scroll bar, the system frames it with dotted lines and the horizontal and vertical forward and backward keys (arrows) are activated. Each time the right (or down) arrow is pressed, the marker advances one position, the variable is increased by one unit, and the structure adapts. With the left arrow (or the upper one) the values are gradually reduced. It is a very comfortable procedure to analyze the influence of changes in the variable. If the arrows are held down for a while, the changes increase their speed.

- With the scroll bar also selected, the Page Up and Page Back keys ([Page Down] and [Page Up]) produce a similar effect to the arrows but with a much greater rate of change per press. With these keys you can analyze the relevant changes of the variables, leaving the arrow keys for a more precise adjustment.

- In any case, a specific value can be directly assigned to the variable by clicking the mouse on the editing box (it is marked with a blue background) and entering the desired numerical quantity with the keyboard. When finished with the [Enter] key, the system updates the position of the marker on the slider bar and represents the new structure.

- The selection of the editing box also enables the use of the upper and lower arrows (using the keyboard or clicking on the icons on the right) for the gradual variation of the parameter.

- All numeric controls are assigned a default value. This can be automatically reset by clicking the right mouse button on the variable icon.

- For a better identification of each control, a system of pop-up information messages has been provided that are activated by placing the mouse over the icon, without pressing any button (indicating its meaning), on the sliding bar (indicating its description). or on the editing field (indicating, where appropriate, the units used).

- Finally, when clicking on the icon of a numerical parameter, the add-in presents a panel with all its features and configuration possibilities:

The upper zone contains the identification data (icon and number) and the name and description of the parameter.

The center left area shows an example with two different parameter values. This allows us to graphically appreciate the effects of its variation.

In the right area, the units are indicated and the operating values of the parameter are displayed and/or configured: variation range, characteristics of the slider, operation of the numerical field, default value and observations.

The lower left zone includes the buttons for modifying these operating characteristics and exiting the panel.

If, while keeping the panel visible, you click on the icon of another parameter, the system updates the panel with the information of the latter. This allows sequential scrolling of all parameters.

[I].- Member edit controls

The *Members Edit* mode is accessed by activating the "*Members*" option from the "*Edit*" submenu or the icon located in the fifth place of the tool bar. When this happens, the system presents the following panel of editing controls.

| M01 : Steel | S02 : HEB 120 [34,00 cm2] |

The panel contains, from left to right, the options provided for the assignment of materials and sections to the previously selected members.

The add-in contemplates multiple possibilities of member selection. The most immediate is the individual selection on the graph. With the arrow-shaped cursor, when the user clicks the left mouse button on the chart, the system searches for the member with the center closest to the cursor position, adds it to the selection, reflects a rectangle in its central area yellow and also mark its line in the corresponding data grid.

This procedure is iterative. To add more members to the selection, click on them with the left mouse button. To remove any member from the selection, you can click on it with the right mouse button.

If you right-click on an unselected member (or on a point on the chart away from the members) the system removes the entire selection.

Selection based on data grids supports different possibilities depending on the data grid used.

By left-clicking on a line in the member data grid, the corresponding member is selected and automatically represented by a yellow rectangle on the graph.

In this first case, the system also removes the selection (if it exists) from the rest of the members. If you want to keep this previous selection and simply add new members from the grid, you must hold down the [Ctrl] key when clicking the lines.

Also here, when pressing the [Shift] key and pressing a line, the system automatically selects all the existing ones, the previously selected one and the current one.

If, keeping the left button pressed, the mouse is dragged through the members grid, all of them are selected (with [Ctrl] they are added to the previous selection).

When the left button is clicked on a line of any of the two material or section grids, the program automatically adds to the selection all the members that have the material or section of the indicated line.

In this case, each click on a new line adds the corresponding set of members without deleting the previous selection. Therefore, it is possible to act globally on the complete set of members of various groups of materials and/or sections.

All selection methods can also be combined with each other and in any order to create the desired set of members. There is no problem in selecting a member several times.

Deselection from the member data grid is achieved by clicking the left mouse button again on the selected lines (in yellow). In this case, the [Ctrl.] and [Shift] keys are also operative.

Once the members have been selected, materials and/or sections can be assigned to all of them.

Model members always have a material assigned to them. When they are registered, the default program associates all the M01 material. It is the user who must, where appropriate, select them and change the material if necessary.

To do this, the left control of the Members Edit panel is used. When activated, the system displays the list of materials defined so far and allows assigning any of them to all the members of the selected set.
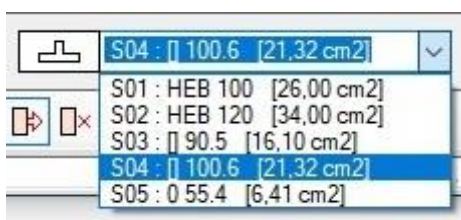

The cursor movement keys (arrows) and Pages ([Page Down] and [Page Up]) are operative in the drop-down list. If they are used, the assignment occurs with the [Enter] key. You can also click directly with the left mouse button on the chosen line.

The assignment made can be easily verified by deselecting the previous selection and clicking on the corresponding line in the material data grid.

Similarly, all members in the model always have a section assigned to them. When they are registered, the program associates all S01s and it is the user who must select them and assign them to the corresponding section.

The control provided for this occupies the second position of the Member Edit panel. When activated, the system displays the list of sections defined so far and allows assigning one of them to all the members of the selected set.

You can use the cursor movement and Pages keys and make the assignment with the [Enter] key, or click directly on the chosen line with the left mouse button.

To verify the assignments made, cancel the existing selection of members and then click on the chosen line in the section data grid.

If an assignment is attempted without any member selected, the program cancels the action and presents the corresponding message on the screen.

[J].- Material edit controls

All the structural models include their own catalog of materials, to which the different members are associated.

When a new structure is defined, the program incorporates, as a starting point, four materials in its catalog (steel, aluminum, concrete and wood) and identifies them with the codes M01 to M04. The user can modify their properties, define new materials or remove them from the model.

The *Materials Edit* mode is accessed by activating the "*Materials*" option from the "*Edit*" submenu or the icon located in the sixth position of the tools line. When this happens, the system presents the following editing control panel.

The panel is automatically updated with the data of the selected material at all times and incorporates the corresponding options for registration, modification and cancellation.

The control on the far left of the editing panel allows the user to add new materials, up to a limit of 10 per structural model.

When the left mouse button is clicked and the confirmation is accepted, the add-in inserts a new material in the model, places it at the end of its specific catalog and automatically assigns the code immediately above the last existing one.

In order for the new material to also have some initial reference data, all the characteristics of the steel are copied by default into its property fields.

The selection of materials can be done in two ways: through the graph or through the data grid.

When the left mouse button is clicked in the vicinity of a member on the chart, the program automatically selects the material corresponding to that member, represents all other members of the same material as selected, and marks the corresponding line in yellow in the grid of data (with the precise displacement to present it on the screen).

You can also make the selection directly in that data grid. By clicking on one of its lines with the mouse, the system selects it and marks all the members of the corresponding material on the graph.

With the material data grid active, it is also possible to use the cursor movement keys (the arrows and Page forward and backward). By repeatedly pressing them, the program changes the selected material and indicates the associated members in the structure.

In this case, the use of the [Ctrl] and [Shift] keys for multiple selection of lines does not make sense. Material selection is not cumulative. To avoid confusion with the properties reflected in the edit controls, multiple materials should not be selected at the same time.

Each time a material is selected, the system accesses its property values and displays them in the corresponding data fields of the Material Edit panel. Modifying this data, followed by pressing the [Enter] key, directly updates the properties of the selected material.

The first field in the panel is the name of the material. It is a short and purely descriptive name on screen and listings.

The other property is the specific gravity. The following control is used to define its value in Kg/m3.

It can be entered directly in the editing field and also modified dynamically via the slider bar or cursor movement keys. Pressing the right mouse button on the icon restores the default values (those corresponding to steel).

Finally, the control located at the far right of the editing panel provides the user with the possibility of deleting materials in the active model.

To do this, first select the material to be deleted, and by clicking on the icon the system displays the message with the mandatory request for confirmation. After acceptance, the material is removed from the catalog and from the corresponding data grid.

The system always maintains the sequential and correlative order in the materials catalog and, if necessary, after each elimination, automatically changes the numbering of the rest of the materials until the end of the catalog.

For example, if at a given moment there are 4 materials (M01, M02, M03 and M04) and the user deletes the M02 material, the add-in now designates the old M03 material with the M02 code and the old M04 with the M03 code.

Logically, with the numbering changes made by the system, the real associations of materials to the members are not altered. The program automatically assigns the material M02 to all the bars that previously had the material M03 assigned and the M04 to the members that had the

M04. The consistency in the changes is controlled by the system and is thus immediately reflected in the members data grid on the screen.

With this procedure, there are never gaps in the numbering and any registration occurs at the end of the catalogue.

Other controls carried out by the add-in are the existence of bars associated with a material to be eliminated and the guarantee of existence of at least one material in the catalog.

[K].- Section edit controls

In a similar way to the catalog of materials, the program contemplates in each model its own catalog of sections, to which the different members are associated.

When a new structure is defined, the program initially incorporates 4 sections in its catalog (variables depending on the type) and identifies them with the codes S01 to S04. The user can modify its properties, define new sections or remove them from the model.

The *Section Edit* mode is accessed by activating the "*Sections*" option from the "*Edit*" submenu or the icon located in the seventh position of the tool line. When this happens, the system presents the following editing control panel.

This panel is dynamically updated with the data of the section selected at all times and incorporates the corresponding options for registration, modification and cancellation.

The first control of the editing panel allows the user to add new sections. The system supports up to 20 sections per structural model.

When the left mouse button is clicked and the confirmation is accepted, the add-in inserts a new material into the model, places it at the end of its specific catalogue, automatically assigns the code immediately above the last existing one and adopts its characteristics. the values of the HEB 120 profile (default).

The selection of sections can be done in two ways: through the graph or through the data grid.

When the left mouse button is clicked in the vicinity of a member on the graph, the program automatically selects the section corresponding to that member, represents all other members in the same section as selected, and marks the corresponding line in yellow on the data grid.

You can also define the selection directly in that grid. By clicking on one of its lines with the mouse, the system selects it and marks all the members in the corresponding section on the graph.

With the section data grid active, it is also possible to use the cursor movement keys (arrows and Page forward and backward). By repeatedly pressing them, the program changes the selected section and indicates the members associated with it in the structure.

As in the case of materials, there is no point in selecting several sections simultaneously, since it would cause confusion in the association of values in the edit controls.

When a section is selected, the program automatically displays the values of its properties in the corresponding data fields of the editing panel. If these data are changed, the system directly updates the characteristics of the selected section.

The first block of panel options is made up of two icons that characterize the type of section.

The first icon clicked indicates that the section is generic. The user defines all its characteristics. In the second case, the user selects the section within a catalog of profiles grouped into series. The program then adopts the values corresponding to the chosen profile.

The following two controls are used to define the catalog profile associated with the section (unless it is generic, in which case they are disabled by the system).

By clicking on the first one with the left button of the mouse, the system displays the list of series and by clicking on any of its lines, the program activates the second control and displays the list of catalog profiles for this series.

When a line in this second list is clicked, the program assigns the chosen profile to the section and updates the rest of the editing fields with the values corresponding to this profile.
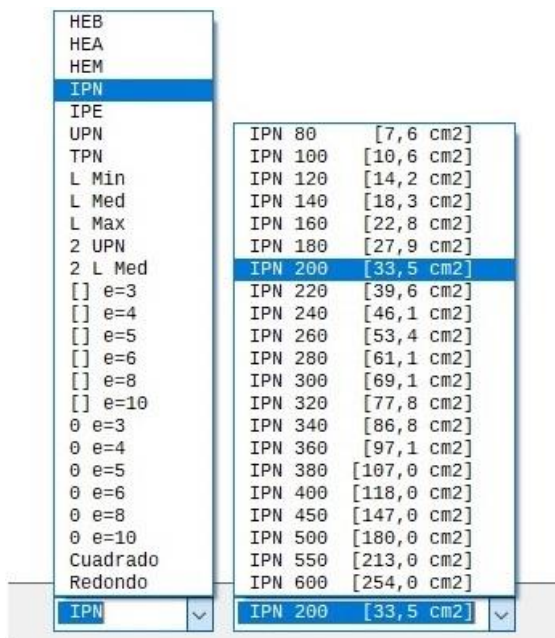
Both drop-down lists are shown in the figure. In the first, the IPN series is selected and therefore the second offers all the profiles of this series. In the latter, the IPN 200 profile is marked and it is this that is assigned to the lower editing field.

For the choice of profiles in this catalog you can also use the cursor movement keys.

The following edit control is only used for the definition of characteristics of generic sections. The system automatically prevents its modification when the section corresponds to a catalog profile.
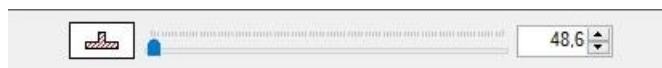
This control assigns the area in the sections defined by the user. The area is expressed in cm2 with an approximation decimal.

The control on the far right of the Section Edit panel is used for deleting sections in the active model.

Once the section to be deleted has been selected, the system icon has been pressed and the corresponding confirmation request has been accepted, the system (if applicable) removes the section from the catalog and from the corresponding data grid.

By means of a procedure similar to that of the materials catalogue, the program always guarantees the sequential and correlative order in the catalog of sections and, if necessary, after each elimination, automatically numbers the rest of the sections until the end of the catalogue.

As an example, if at a certain moment there are 3 sections (S01, S02 and S04) and the user deletes section S02, the program now designates the old section S03 with the code S02.

In order not to alter the associations of the real sections to the bars, the program automatically assigns section S02 to all the members that previously had section S03 assigned. These changes are logically reflected in the data grid on the screen.

The system, therefore, controls the consistency of the assignments and the absence of gaps in the numbering of the sections. Additions always occur at the end of the catalogue.

It also automatically verifies that there are no members associated with a section that you want to delete, and also checks that the section catalog of the model is never empty.

[L].- Display options

Below the parameter and data editing grids is the display options line.

To the left of it are 14 icons grouped into 6 blocks. Its meaning is reflected on the next page for each of the blocks.

DATA GRIDS

|	
	Data grids to the right of the graphics area
	Data grids not visible

MEMBER THICKNESS CONFIGURATION

	Member thicknesses proportional to the section areas
	Uniform size member thicknesses

MEMBER COLOR SETTINGS

	Member colors by section area ranges
	Member colors by sections (profiles)
	Member colors by materials
	No colors on the members

CONFIGURATION OF THE TEXTS IN MEMBERS

	Values of the section areas in each member (in cm2)
	Name of sections (profiles)
	Materials name
	No texts on the members

LEGEND SETTINGS

	Legend display indicator

JOINTS DISPLAY

	Joints display indicator

These display controls can also be assigned from the "*View*" submenu of the main menu, and the system synchronizes the status marks between the menu and the icons.

Two numeric controls are shown on the right. They respectively indicate the values of the thickness of the members (if they are fixed) and the size of the joints.

[M].- Message and information line

On the bottom line, the add-in provides various status messages in its left zone and the information related to the selected elements in its central zone. The right zone includes two icons for changing the language at any time.

PARAMETERS EDITION   The system has 22 joints and 41 members, a total width of 16 m and a total height of 4,5 m. The total length of its bars is 81,7 m, its average length 1,993 m, its total weight 1500 kg and its average weight 36,6 kg.

The *Display* mode is accessed through the icon [i] in the eighth position of the upper toolbar. In this mode, when the cursor passes through the vicinity of a joint or member, the system marks it in yellow and reports its characteristics on the bottom line: the numbering and coordinates in the case of joints and the numbering, profile, material, length and cross-sectional area in the case of members.

In the *Parameter Edit* mode, in addition to continuing the previous operation, when the parameter panel is activated, the system provides global information on the truss.

This information includes the number of joints and members, total width and height, total length of its members, average length per member, total weight and average weight per member.

In this way, the global impact produced by the variation of any parameter can be easily verified.

[N].- Truss creation

The program contemplates three series of basic types of truss: beam, column or lattice structures.

To define a new truss, use the icons located on the top toolbar of the graphic area. Each facilitates the generation of the corresponding type of structure.

All have a high level of customization based on their corresponding parameters. Below are the initial designs of each type and a series of examples of their parametric design possibilities:
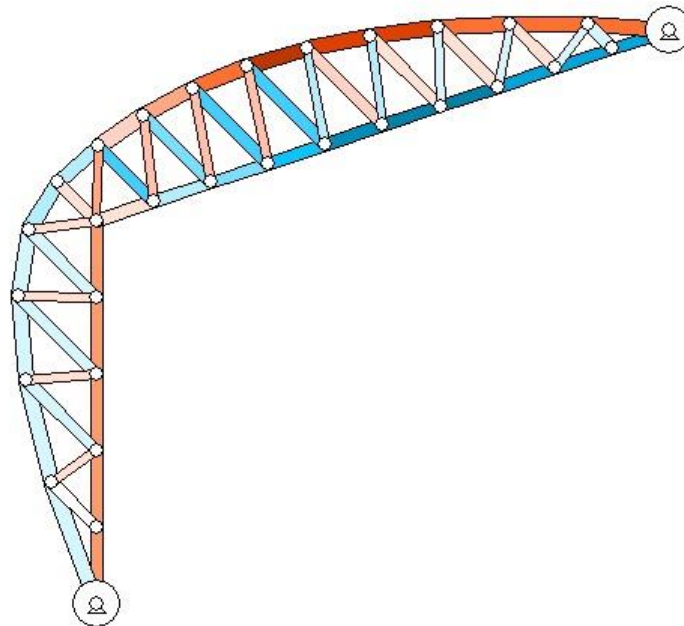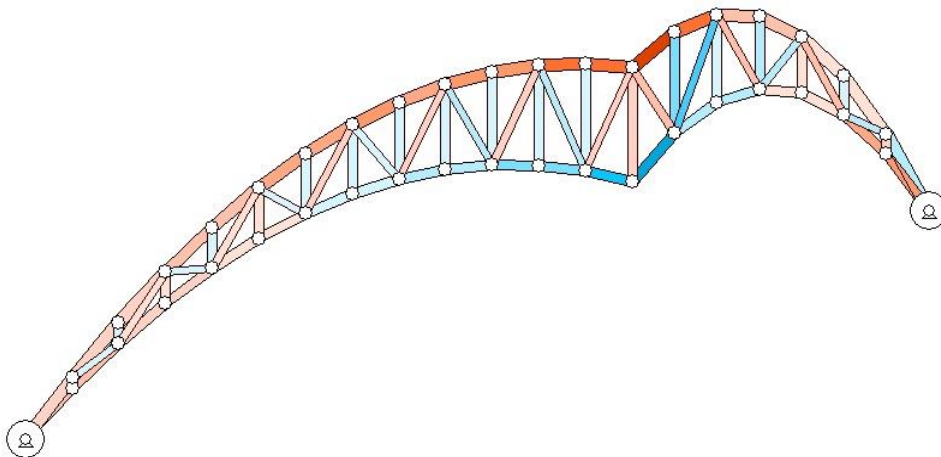
BASE DESIGN OF THE "BEAM" TYPOLOGY
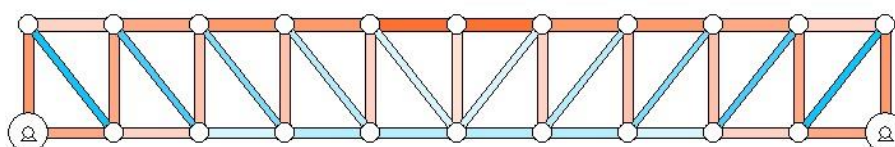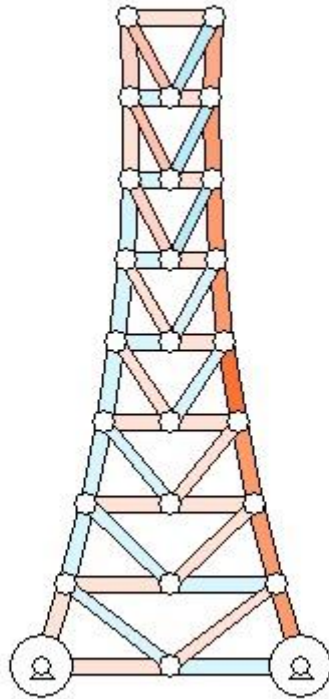
PARAMETRICALLY GENERATED STRUCTURE: EXAMPLE A
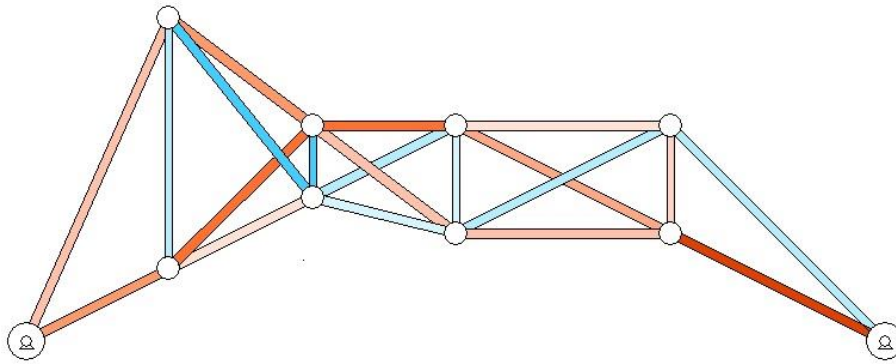
PARAMETRICALLY GENERATED STRUCTURE: EXAMPLE B
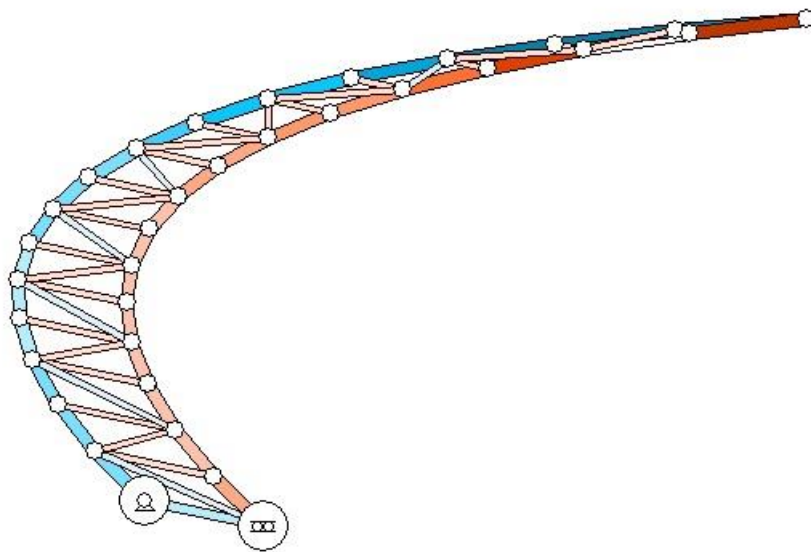

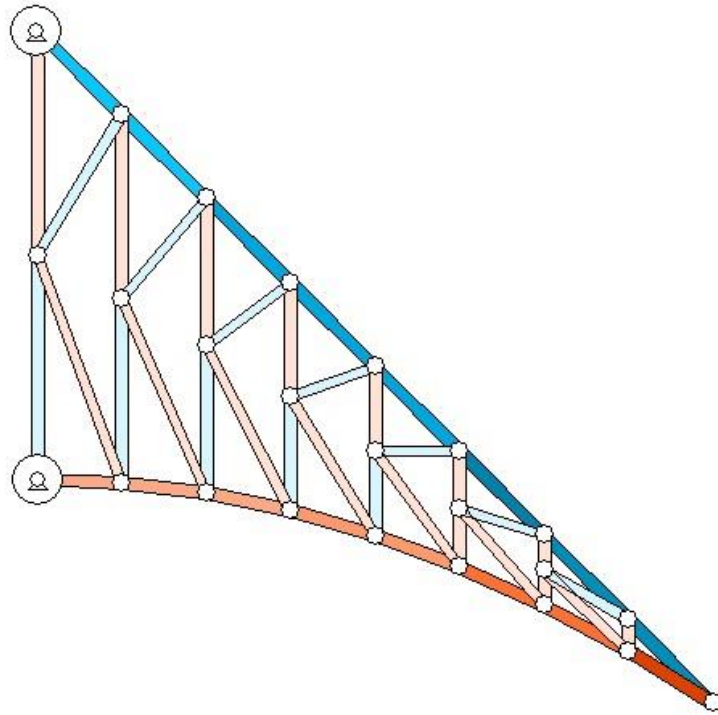**PARAMETRICALLY GENERATED STRUCTURE: EXAMPLE C**

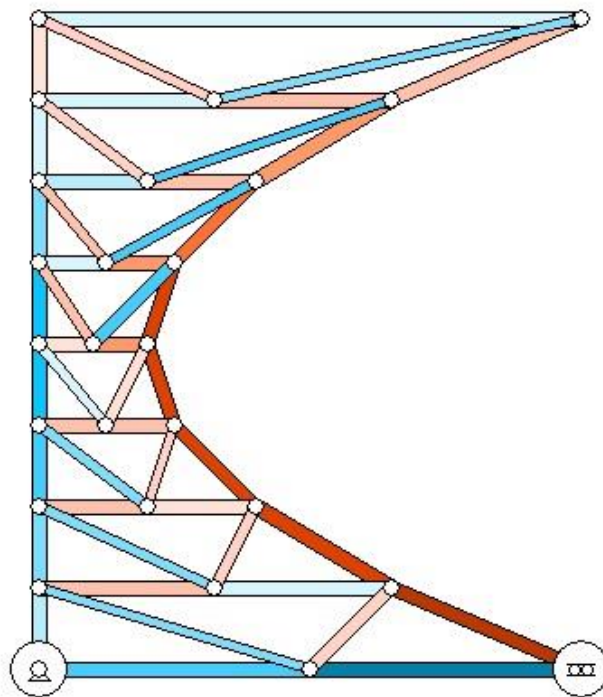**Base design of the "column" typology**

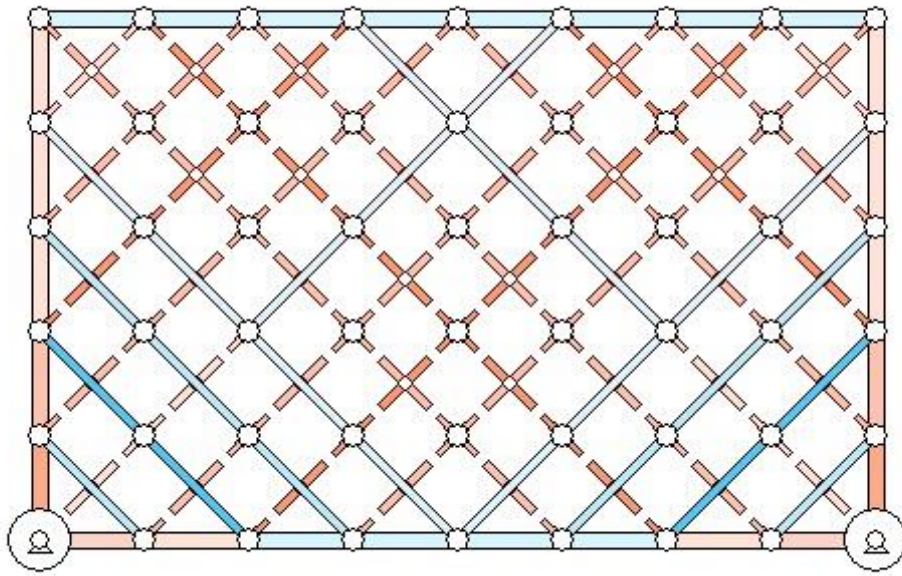**Parametrically generated structure: Example D**

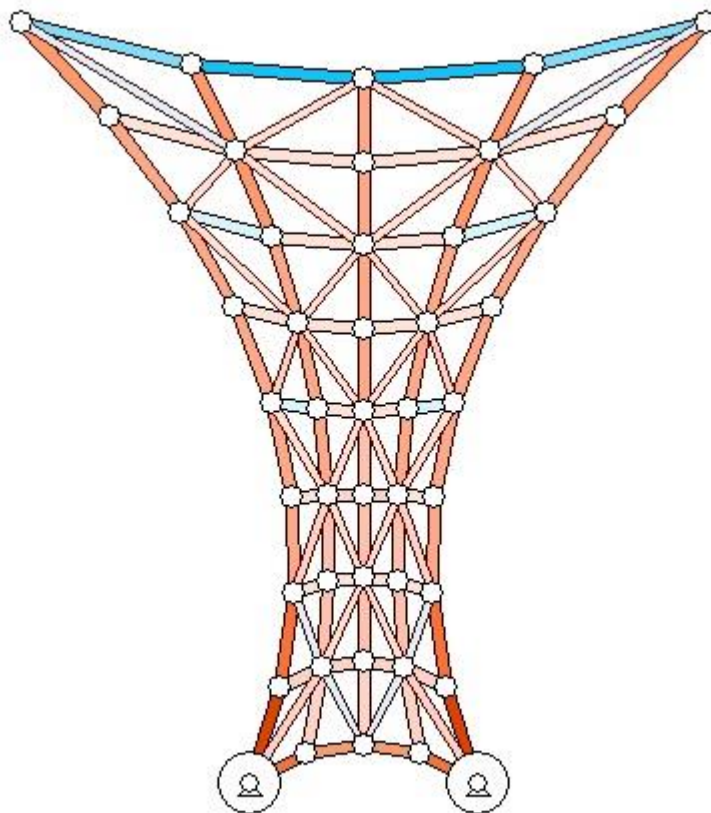**PARAMETRICALLY GENERATED STRUCTURE: EXAMPLE E**

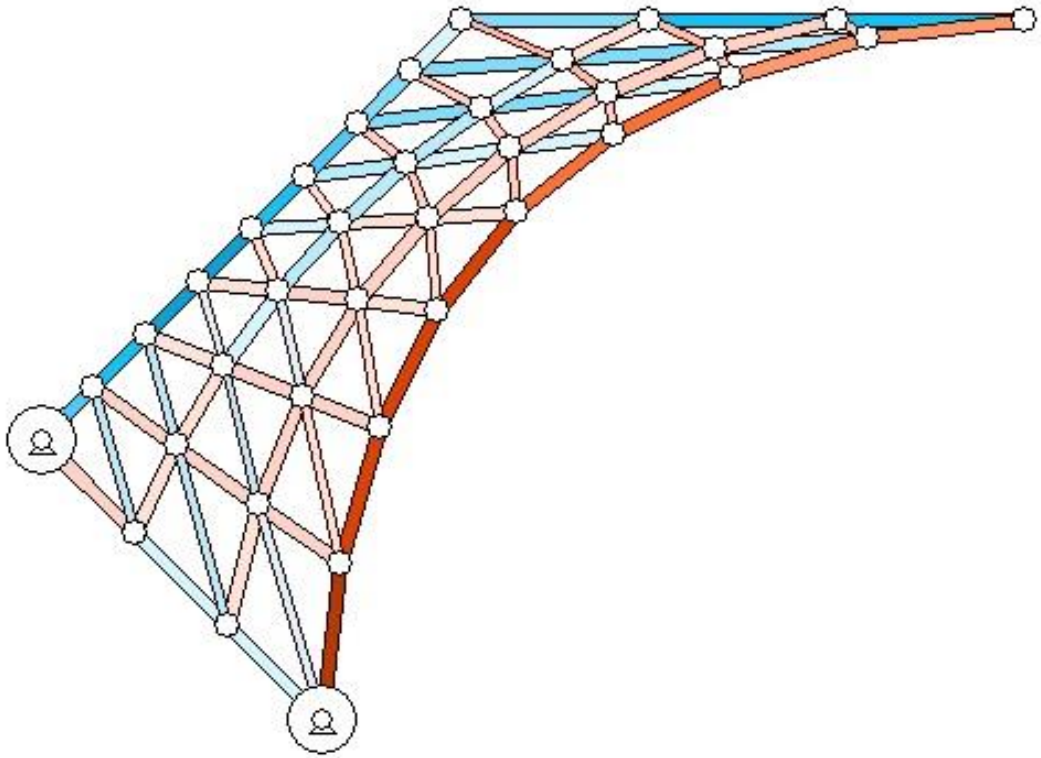**PARAMETRICALLY GENERATED STRUCTURE: EXAMPLE F**
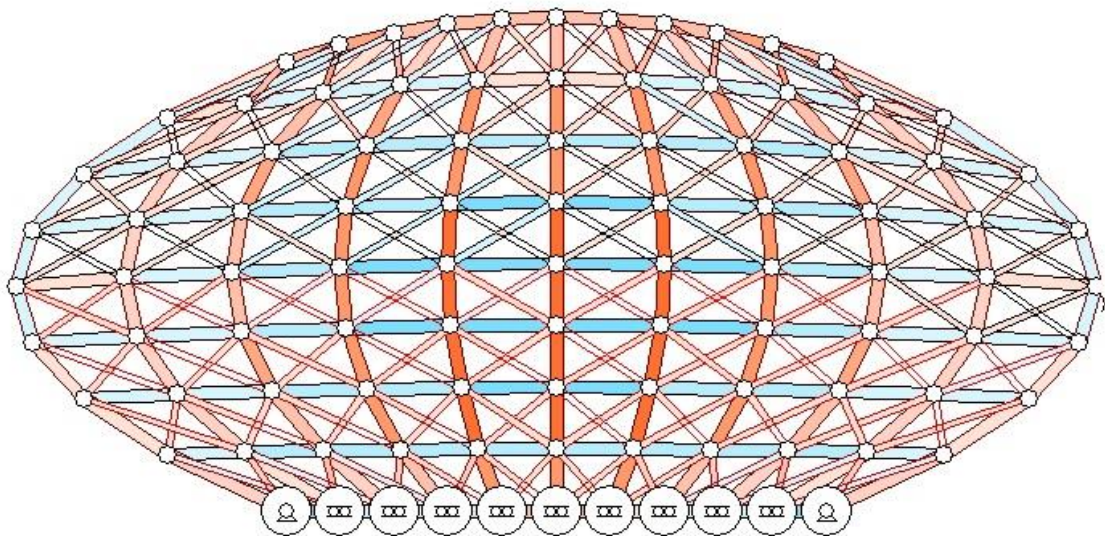
Base design of the "lattice" typology

Parametrically generated structure: Example G

PARAMETRICALLY GENERATED STRUCTURE: EXAMPLE H

**PARAMETRICALLY GENERATED STRUCTURE: EXAMPLE I**

[O].- Truss storage and loading

The REVIT Truss Designer add-in includes a convenient external storage system for truss models.

All the definition data of each structure can be automatically incorporated into an individual file with the name that the user wishes and the extension ".tdp". These files can be archived in any directory or device and the system has the capacity to read and write them directly, at any time.

The size of the files is moderate (very few Kb) as the information is stored in text mode. Its internal organization is specific and the user does not need to know it in detail for its correct use.

Access to the reading and writing functions of these TDP files occurs from the corresponding options in the "File" submenu (located on the far left of the application menu):
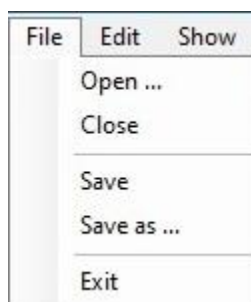
By selecting the "Open..." option, the system displays the file search dialog and through it the user can access any device, drive or directory where the TDP file is stored.

Once located, it is selected in the "Name" field and the "Open" button activates the process of reading its data and incorporating it into the add-in. The system directly replaces the current structure on the screen with the new model read from the file and automatically configures its corresponding parameter values.

TDP files are readable and editable by any word processor, but it is recommended that they are always modified by the plugin (to avoid possible inconsistencies in externally modified data that could cause system malfunction).

After loading a TDP file, the system displays a notice on the screen of the action taken.

The "*Close*" option of the "*File*" submenu discards the current truss and proposes the creation of a new one of the "Beam" type.

The storage of a structure and its archiving for later use is achieved with the options "*Save*" and "*Save as ...*" of the mentioned submenu.

The "*Save*" option directly updates the data of a previously generated TDP file. It is a useful option to keep the current state of the structure under analysis updated on disk or to define a structure in various time stages.

To generate a new TDP file, use the "*Save as...*" option, which leads to the presentation of the file management dialog box.

In it, the user can select the directory, unit or device where he wishes to store the new file and then indicate the chosen name in the "*Name*" editing field.

By pressing the "*Save*" button, the system automatically concatenates the ".tdp" extension to the file name, extracts the data from the structure on the screen and generates the new file in the indicated location.

The "*Save as...*" mode is particularly interesting for archiving the different states resulting from the analysis of a structure, and being able to return to a specific one of them at any time.

After the process of storing the truss in a TDP file, the system presents a notice on the screen of the action carried out.

Finally, the "*Exit*" option from the submenu closes the REVIT add-in. The system automatically creates an internal TDP file and allows it to be loaded when the add-in is reopened. In this way you can continue working with the same truss.

[P].- REVIT elements generation

Through the first option of the "*Process*" submenu or the icon located in the ninth position of the toolbar, you access the configuration panel of the truss insertion process defined in the REVIT project.

The REVIT project must already contain the appropriate FamilySymbols from the OST_StructuralFraming category.

The upper box allows the assignment of each of the sections of the truss to its corresponding FamilySymbol. The system indicates the number of members detected in each section and provides a drop-down with the assignable FamilySymbol in each case. If the FamilySymbol is not assigned in any section, the system selects the first of the series.

Next, in the lower drop-down menu, you must assign the REVIT level in which you want to insert the truss.

The next line has three numeric edit fields for specifying the point REVIT insertion XYZ coordinates (0,0,0) of the truss.

Although the truss is flat, it can be inserted rotated in space, with the angle in plan in relation to the X axis indicated on the bottom line.

Finally, during insertion the add-in can optionally perform scaling with different factors on the horizontal and vertical axes.

The "Insert truss" button executes the element generation process in REVIT and exits the add-in. When the add-in is reloaded the system allows to recover the previous truss and also all the configuration values. Therefore, the insertion process can be repeated as many times as desired (and with different parameters each time).

A new insert does not remove the REVIT elements generated in the previous insert, but they can be easily deleted from REVIT (if desired).

Below are several screens with the result of an example truss insertion test (in the Spanish version of REVIT).
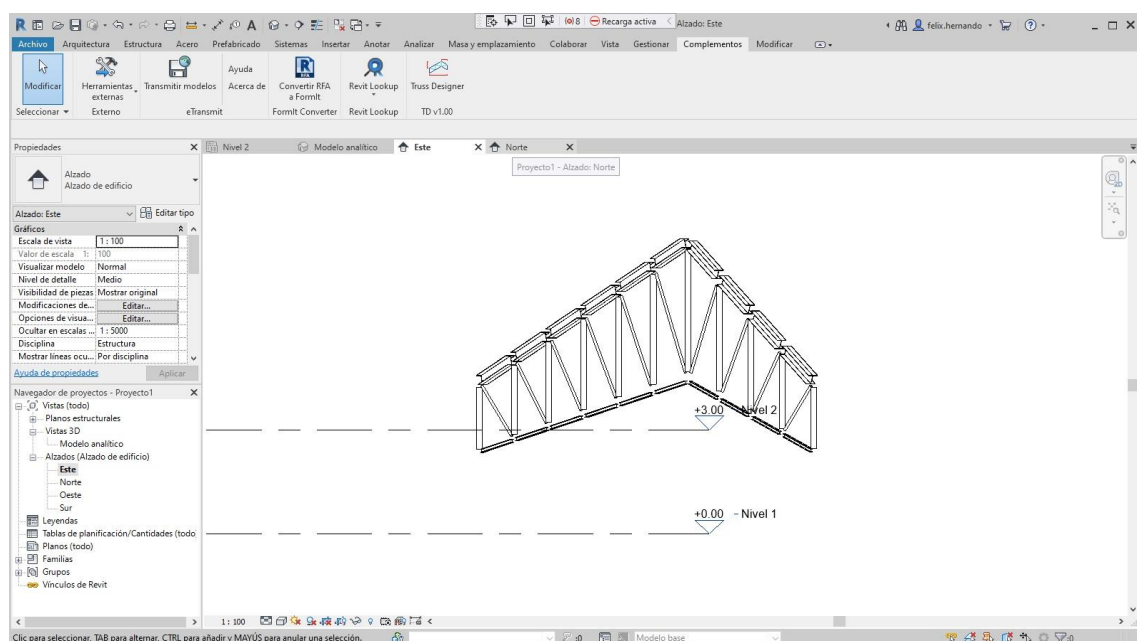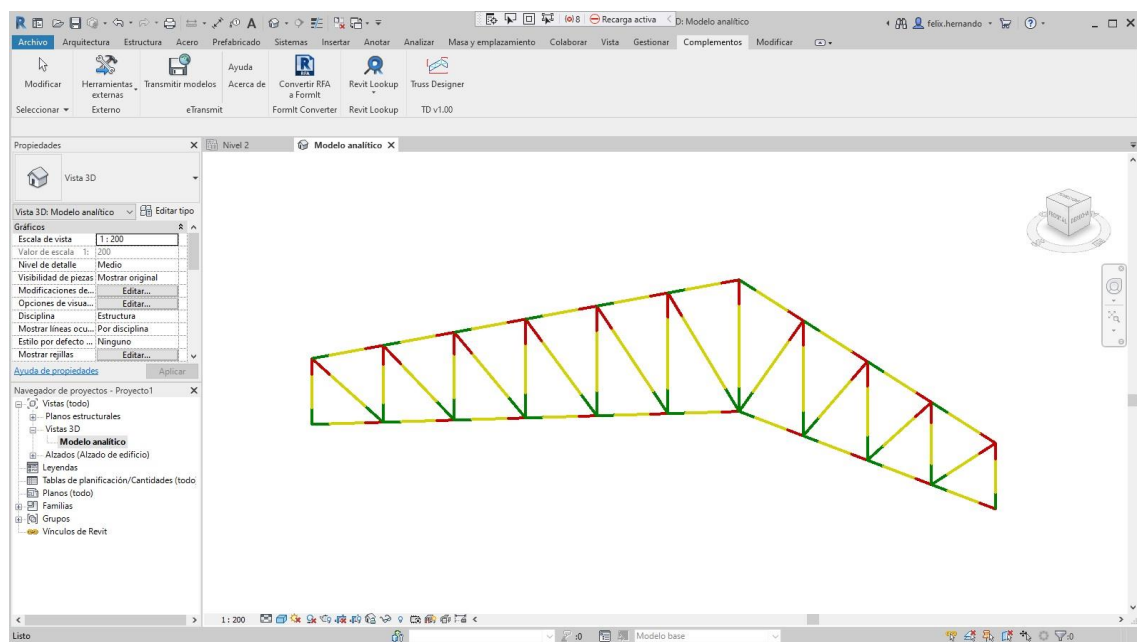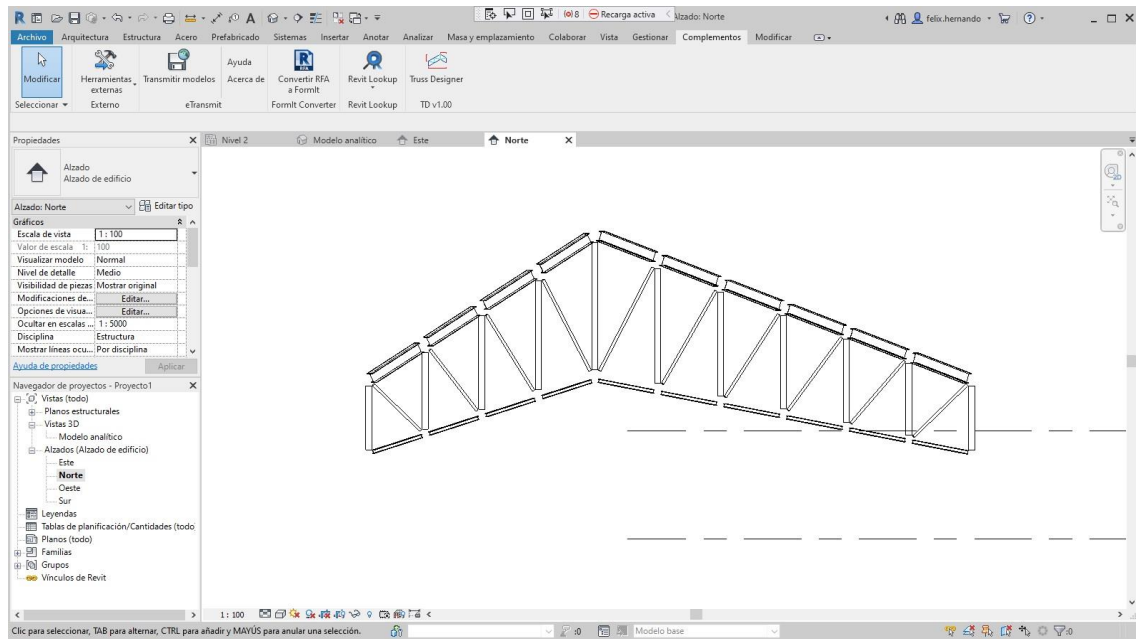
[Q].- DXF graphic file generation

By means of the penultimate icon ![icon] in the upper area, the add-in provides the possibility of automatically generating graphic files in standard DXF format for later use by AutoCAD© or other graphic editing programs.

The system also carries out an automatic dimensioning and incorporates an organization in layers that allows a more controlled and versatile use of the graphic.

The layers created by the system are listed below, with their name, their color code, the visibility indicator and the description of the elements it contains.

Layer	Color	Visible	Elements
0	7	X	Default layer
DIMENSIONS	6		Horizontal and vertical dimensions
JOINTS	4	X	Joint symbols
MEMBERS	7	X	Member lines
TXT_JOINTS	4		Joint numbers
TXT_MEMBERS	7		Member numbers
TXT_LENGTHS	1		Member lengths
TXT_MATERIALS	6		Member code materials
TXT_SECTIONS	6		Member code sections
TXT_PROFILES	6		Member profiles
TXT_AREAS	1		Section Areas

The third column identifies the initially visible layers with an X. The user can change this assignment, as well as the color and name, in the graphical editor.

The build process can be executed at any time and with different model situations. By pressing the aforementioned icon, the system requests the location and name of the file, in each case.

Once the process has been carried out, the program informs the user of the availability of the new file, through the appropriate message.

Below is an example of the result of the generation of the DXF file corresponding to the sample model (with the English version of AutoCAD © 2022)
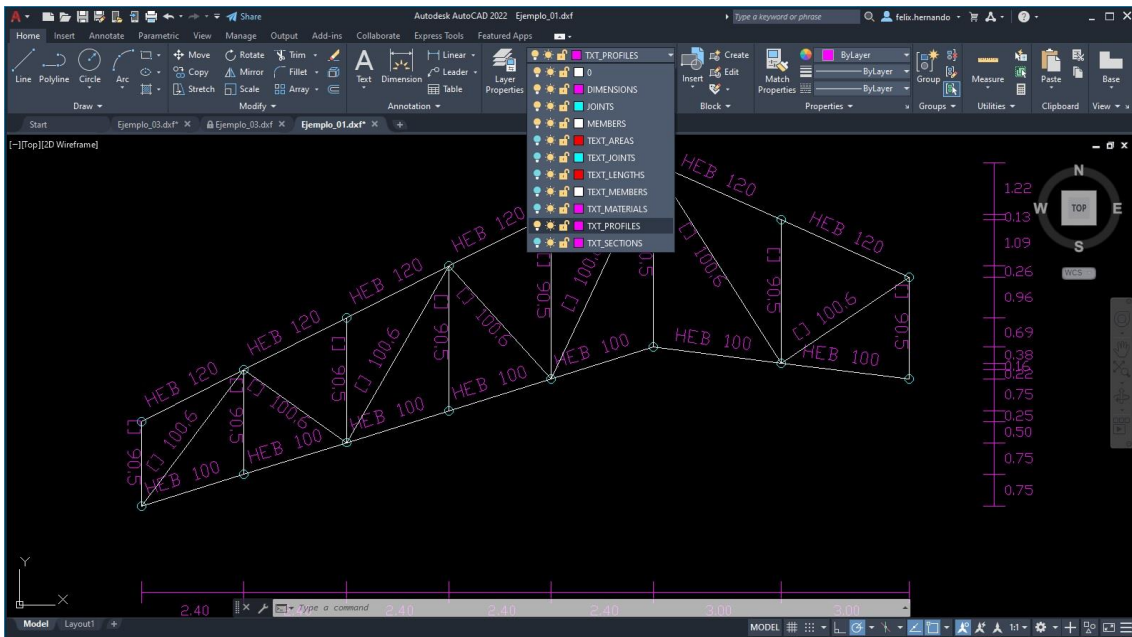

[R].- Customization options

REVIT Truss Designer has several customization possibilities in its image and operation. All of them are found in the "*Options*" submenu of the main menu.
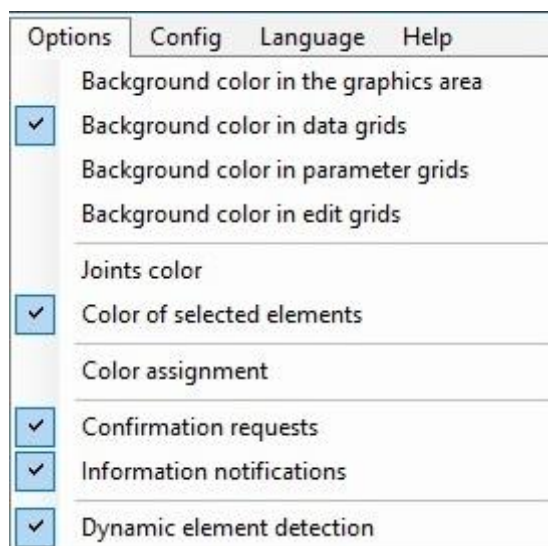
The first 6 allow the backgrounds of the different areas of the screen, the knots and the selected elements to have color. If these options are deactivated they are represented in different shades of gray.

When they are activated, they are shown with default colors, but these can be customized in each case through the "Color a*ssignment* " option:
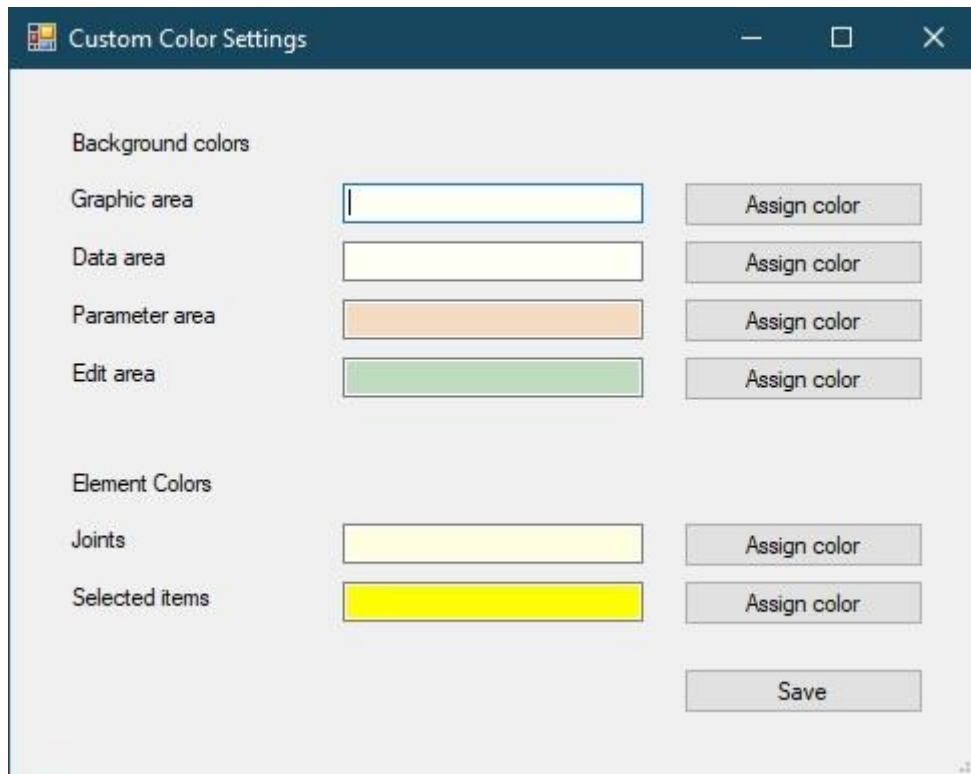
When pressing "*Assign color*", the system presents the color selection panel (spanish versión)
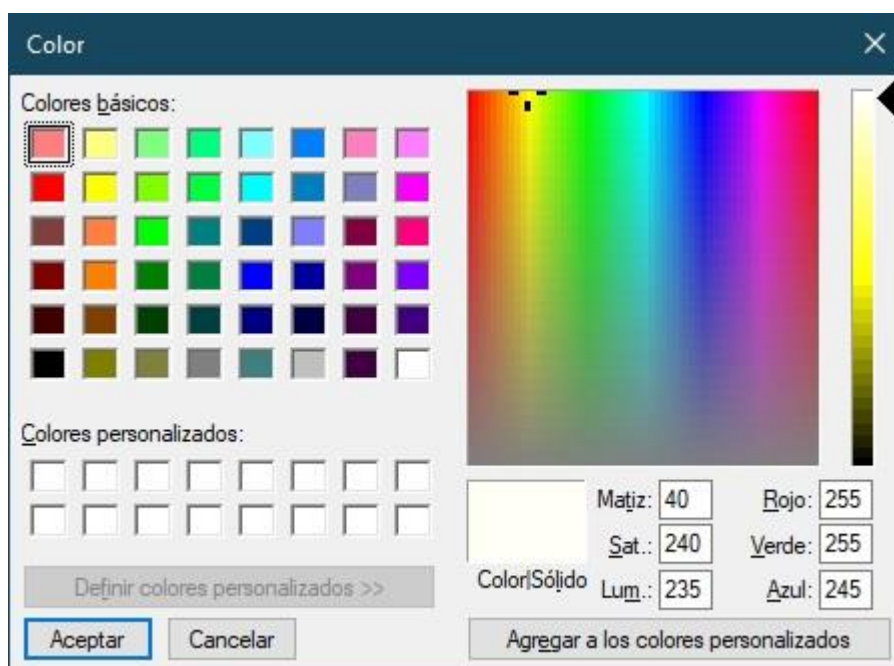
The next two options allow confirmation requests and system information notifications to be shown (or not).

Initially it is interesting that they are activated. When the user masters the system, they can be disabled if desired.

The last option ("*Dynamic element detection*") makes it possible for the system to mark and provide information on each element when the cursor passes through its vicinity (in the "*Parameter edit*" and "*Display*" modes).

If this option is disabled, the items are marked and the system provides its detail information only when that item is clicked.

[S].- Config files

All system customizations (parameter operation, display modes, colors, and other options) can be stored in configuration files and retrieved at any time.

The configuration files can be multiple and are managed through the "*Config*" submenu:
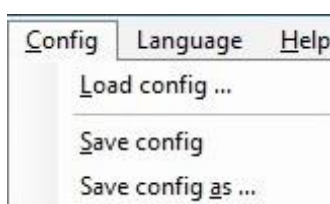
Its operation is similar to that of managing TDP files, but in this case the files have a TDC extension and their format is logically very different.

When the REVIT add-in is exited the system automatically creates an internal configuration file and allows it to be loaded when the add-in is reopened. In this way, all customization made is maintained.


[T].- Change of language

All REVIT Truss Designer texts can be presented in Spanish and English. To change the language at any time, you can use the "Language" submenu of the main menu:
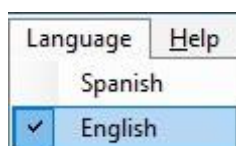
You can also change the language with the icons in the lower right corner. The system synchronizes the indicator of the active language between the menu and the icons and maintains the previously selected language when the plugin is reopened.

Below is an example of a screen in Spanish. The language change also affects all help windows, warnings, confirmations, notifications and information messages.
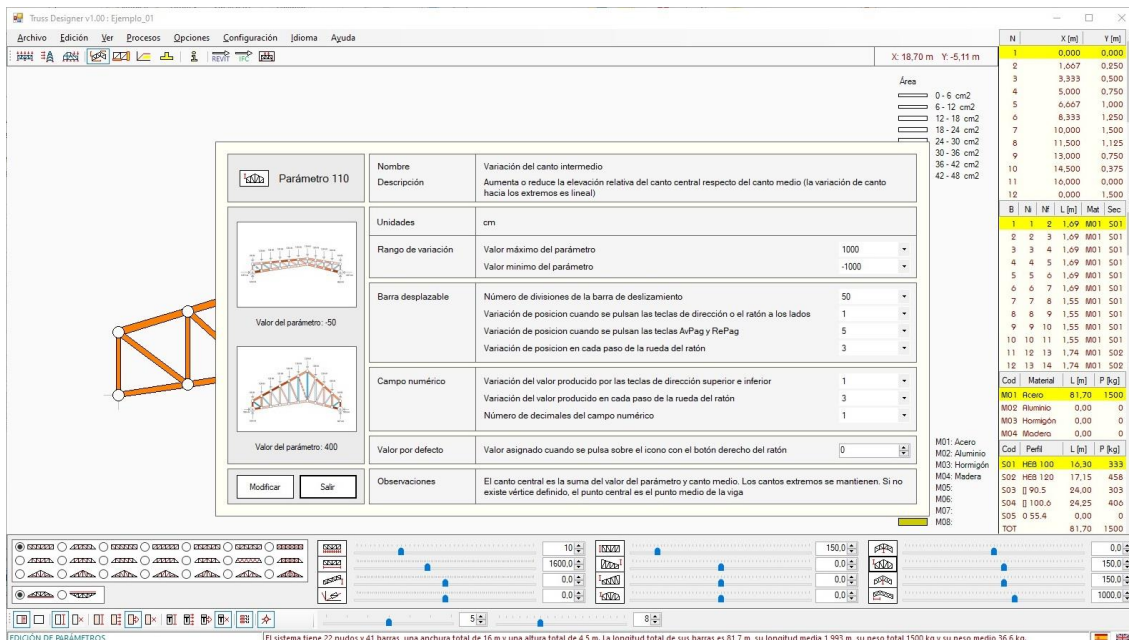
[U].- Help system

Las distintas posibilidades de ayuda del add-in REVIT Truss Designer se indican en el submenú "*Ayuda*" del menú principal:
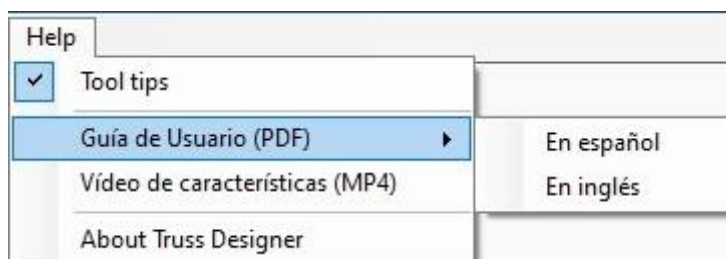

Its first option allows you to enable or disable popup help messages when the cursor passes over the icons or columns of the grids. At least until the system is mastered, it is convenient that they are enabled.

The following option provides downloads of the PDF files with the user guides, in Spanish or English.

Downloading the feature video in MP4 format is achieved by the third option.

Finally, the last option of the submenu presents the "About..." panel with the information corresponding to the Truss Designer add-in:
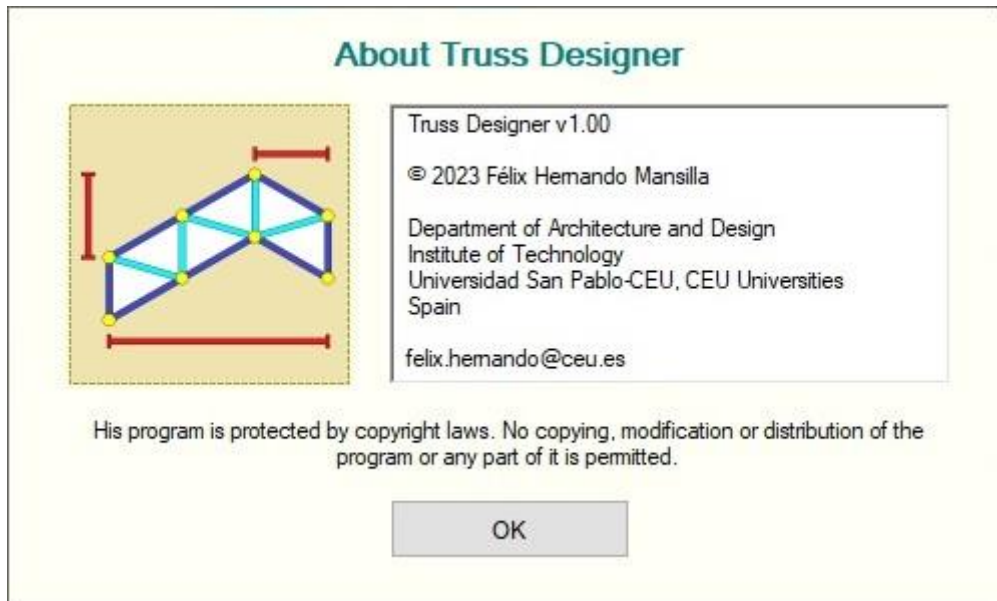
[V].- App limitations

The REVIT Truss Designer add-in is able to design planar truss structures with the following maximum sizes:

LIMITATION	VALUE
Maximum number of joints	200
Maximum number of members	1000
Maximum number of materials	10
Maximum number of sections	20
Maximum length of the structure	100000 cm
Maximum height of the structure	100000 cm