

ArCADiasoft Chudzik sp. j.

ArCADia-TERIVA CEILINGS

User Manual

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Introduction

Publisher

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Computer program and User Manual have been prepared with the utmost diligence and with all necessary control precautions.

Nevertheless, one cannot completely exclude the possibility of error occurrence.

Therefore, we wish to point out that we cannot grant a guarantee, as well as be liable for resulting from that consequences.

We will be grateful for providing us with information about possible errors.

Introduction

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Introduction

1 Introduction

Introduction

1.1 About program

Program ArCADia-TERIVA CEILINGS is a program intended for building engineering designers (constructors and architects) making building projects, for complex design of ceilings Teriva. The purpose of the application activity is possibly maximal user support in making drawings (projections) of Teriva ceilings construction sets in CAD software. These drawings contain all basic elements such as: ceiling beams, reinforcing ribs, reinforcing beams, trimmers, support nets and additionally all necessary material lists containing specified elements completed with reinforcing steel and monolithic concrete, necessary for making the ceiling.

The program was created in response to many years of designers' waiting time, for whom design of framed ceiling construction sets constituted field relatively simple, but very laborious. Additionally, becoming popular of ceiling systems revolutionized technology of making framed ceilings, especially in matter of wall copings development, but at the same time brought up a challenge of tidying up and introduction to projects new elements, as well as unambiguity of their designation in drawings and material lists. The program clears up the matters, thanks to it they become obvious for designer and understandable for investor.

1.2 Basic properties and possibilities of the program

- Automatic and manual settlement of all Teriva ceilings types (4.0/1; 4.0/2; 4.0/3; 6.0; 8.0) on ceiling areas of any shape.
- Possibility of automatic arrangement of Teriva ceiling beams for polygon, rectangle, selected ceiling area or whole level, in single beam or double beam system.
- Automatic solving of ceiling to wall side ways.
- Possibility of ceiling beams arrangement in any, selected by the user, support direction.
- Automatic selection of ceiling beams length to walls span, together with checking of resting depth on support layers.
- Possibility of any modification of ceiling beams arrangement (deleting, moving, automatic settlement from selected beam).
- Automatic installing of reinforcing ribs with possibility of their deletion, movement or other modification.
- Automatic selection of number and spacing of reinforcing ribs, adjusted to ceiling span in given area.
- Automatic recognition of partition walls placed on ceiling in direction of its support, together with receipt of proper solution under such wall (depending on its thickness – double beam option or reinforcing beam).
- Automatic installing of trimmer arrangement at holes of width up to 108 cm.

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- Settlement of number of necessary air bricks and air bricks endings in all possible areas from real geometry of accepted ceiling.
- Automatic determining of locations of necessary monolithic counter-floors (plates) in areas, in which Teriva ceiling elements (beams and air bricks) cannot be arranged.
- Possibility of free individual modification of reinforcing beams and trimmers (moving, lengthening, deleting, change of rib section dimensions).
- Possibility of setting of reinforcing beams (under partition walls) with section protruding over floor level.
- Possibility of manual control of assumed longitudinal and crosswise reinforcement (in available, limited range), in all monolithic elements of the ceiling: wall copings, binders, reinforcing beams, trimmers, reinforcing ribs and monolithic counter-floors.
- Automatic settlement and installing of necessary flat and folded nets, together with recognition of multi-bay ceiling system with adjacent bays ratio minimum 0.7 .
- Possibility of manual setting and deleting of single flat and folded nets.
- Correctness inspection function of designed Teriva ceiling.
- Possibility of creation of material list on CAD drawing and in separate RTF format of prefabricated and monolithic elements.
- Possibility of joining of window and door lintels with ceiling wall coping (changing of wall coping parts to lintel parts).
- Possibility of making of any constructional sections through Teriva ceilings.
- Possibility of previewing of designed ceiling in dynamic 3D view.

1.3 General characteristics of Teriva ceilings

Teriva framed ceilings are monolithic-prefabricated beam/air brick ceilings, consisting of prefabricated, truss style ceiling beams and concrete air bricks, as well as concrete laid directly on building site.

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Tab. 1 Basic characteristic parameters of Teriva ceilings are presented in tables below:

Type of ceiling	Beam distance module	Height of ceiling	Thick-ness of over-concrete	Lengths of ceiling beams	Characteristic load**		Load calculated except ceiling weight**
					except ceiling weight (technolog.)	total	
	[cm]	[cm]	[cm]	[m]	[kN/m ²]	[kN/m ²]	[kN/m ²]
TERIVA 4.0/1	60	24	4	2.4-7.2*co 0.2	4.0 (1.5)	6.7	4.9
TERIVA 4.0/2	60	30	4	2.4-8.0 co 0.2	4.0 (1.5)	7.15	4.9
TERIVA 4.0/3	60	34	4	2.4-8.6 co 0.2	4.0 (1.5)	7.40	4.9
TERIVA 6.0	45	34	4	2.4-7.8 co 0.2	6.0 (3.0)	10	7.5
TERIVA 8.0	45	34	4	2.4-7.2 co 0.2	8.0 (5.0)	12	10.2

Type of ceiling	Weight of ceiling construction	Necessary reverse arrow 15 mm from span	Minimum depth of beam resting	Ceiling span above which are used:		Notes:
				flat nets	folded nets	
	[kN/m ²]	[m]	[cm]	[m]	[m]	
TERIVA 4.0/1	2.68	>=6.4	8	<=6.0	>6.0	
TERIVA 4.0/2	3.15	>=7.2	8	<=7.2	>7.2	
TERIVA 4.0/3	3.40	>=7.8	8	<=7.8	>7.8	
TERIVA 6.0	4.0	>=7.2	8	<=7.6	>7.6	
TERIVA 8.0	4.0	>=6.4	8	<=6.6	>6.6	

* - ceiling of span above 6.0 m should be designed as continuous with minimum 2 bays and with adjacent bays ratio min. 0.7.

** - accepted in table values of allowed ceiling loads concern typical single beam option ceilings.

Reinforcing ribs of width 7-10 cm, by span (4.0 m; 6.0 m) – 1 piece in the middle; by span >=6.0 m – 2 pieces in 1/3 of span .

Individual ceiling areas and segments may be designed as single or double beam option, depending on accepted loading conditions.

1.4 Program requirements

ArCADia-TERIVA CEILINGS is not an independent application and for proper work needs CAD program installed (**ArCADia-INTELLICAD**, **ArCADia-START** or **AutoCAD**). Beside graphical engine and DWG format handling in CAD application, for proper work of ArCADia-TERIVA CEILINGS presence of **ArCADia-START** (installed as overlay or independently) is needed. Finally, ArCADia-TERIVA CEILINGS can work in one of the three following configurations:

- **ArCADia-START** (CAD graphical engine and basic architecture) + ArCADia-TERIVA CEILINGS
- **ArCADia-INTELLICAD** (CAD graphical engine) + **ArCADia-START** (basic architecture) + ArCADia-TERIVA CEILINGS

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- **AutoCAD** (CAD graphical engine) + **ArCADia-START** (basic architecture) + ArCADia-TERIVA CEILINGS

CAD graphical engine makes the whole graphical work environment available, together with all tools necessary for work in CAD type programs, making available operations on lines and enabling saving and reading of DWG files. **ArCADia-START** is object-oriented application, enabling insertion to project basic architectural elements, such as: walls, windows, doors, binders, holes in ceilings, etc. ArCADia-TERIVA CEILINGS is also object-oriented application, enabling insertion to project elements of Teriva ceilings, together with wall copings and lintels.

1.5 Scope of documentation

In presented below documentation we show application and functional range concerning entering of Teriva framed ceilings and other elements of STROPEX CEILING SYSTEM connected with these ceilings. In the study we omitted for obvious reasons description of functionalities concerning entering of architectural objects of **ArCADia-START** system (e.g. walls, windows, doors, binders, holes, etc.) and work with CAD programs. We also omitted basic guidelines of work with use of: Project Manager, levels, views, sections, and other elements of **ArCADia** system. All information concerning above mentioned scope user will find in separate documentations for programs: **ArCADia-INTELLICAD** and **ArCADia-START**, attached to these applications.

2 Installing and running the program

Installing and running the program

2.1 Hardware requirements

- Pentium IV PC (PIV D recommended)
- 2 GB RAM (4 GB recommended)
- Approximately 1GB of free HDD space for the installation
- DirectX 9.0 compatible graphics card
- Windows Vista 32/64-bit OS, Windows 7 32/64-bit or Windows 8 32/64-bit
- DVD-ROM drive

2.2 Installing

By default program installation starts automatically after insertion of CD to drive. If Autostart is switched off, you should run installation by yourself. Open contents of CD (My computer/Drive with CD), and then run Setup.exe file. After starting installation, act according to instructions displayed on screen.

2.3 Running

Program can be run by double clicking on CAD program icon, mostly present on Desktop, and then by selecting one of icons on ribbon or toolbox of ArCADia-TERIVA CEILINGS program.

2.4 Opening project (CAD)

You can open any of the following files:

- Standard drawing file with DWG extension.
- Any of the sample drawings attached to **ArCADia-INTELLICAD**.
- Drawing exchange format DXF.
- For sending in web format DWF.
- Drawing templates DWT.

To quickly open recently used drawing, choose File > <filename>. Program saves names of four last drawings. To quickly open drawing from Open Drawing dialog box, double click on the drawing name.

You can open drawing during drawings browsing with the help of e.g. Windows Explorer. It is enough just to double click on file to open it in **ArCADia-INTELLICAD** program. Identification of desired drawing is facilitated by displaying of drawing miniatures during their browsing.

Way of opening of existing drawing

1. Use one of the following methods:
 - Select File > Open.
 - On Standard toolbox click Open tool.
 - Write open, and then press Enter.
2. In file type select type of file you want to open.
3. Select directory containing given drawing.
4. Perform one of the following:
 - Select drawing you want to open and click Open.

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- Double click on drawing you want to open.

If the drawing needs password, give the password, click OK, to check the password and click Open again.

2.5 Saving project (CAD)

Drawing can be saved in any moment.

To save the drawing, use one of the following methods:

- On Standard toolbox click Save.
- Select File > Save.
- Write *save*, and then press Enter.
- Write *qsave*, and then press Enter.

When you save given drawing for the first time, program displays Save Drawing As dialog box, which enables selection of directory and writing drawing name. By the first drawing save you can use any name. To later save the same drawing using other name, select File > Save as, and then write new name.

2.6 Autosave and safety copy (CAD)

To avoid loss of data in case of supply failure or other system error, you should often save your drawing files. Program can be configured for periodic automatic saving of drawings. *Autosave* setting specifies interval in minutes between automatic saves. Program resets this time interval at each save of drawing file by user.

When *Autosave* function is switched on, program creates copies of the drawing. This file is saved in directory given in Options > Paths/Files > Temporary file, with extension specified in Extension of drawing autosave file field (by default SV\$).

Way of configuration of **ArCADia-INTELLICAD** for automatic save of drawings

1. Perform one of the following actions:
 - Select Tools > Options.
 - Write *config*, and then press Enter.
2. Click General tab.
3. In *Autosave* area mark checkbox to switch *Autosave* function on and select autosave frequency.
4. Click OK.

3 Work with program

Work with program

3.1 Toolbox and ribbon of ArCADia-TERIVA CEILINGS

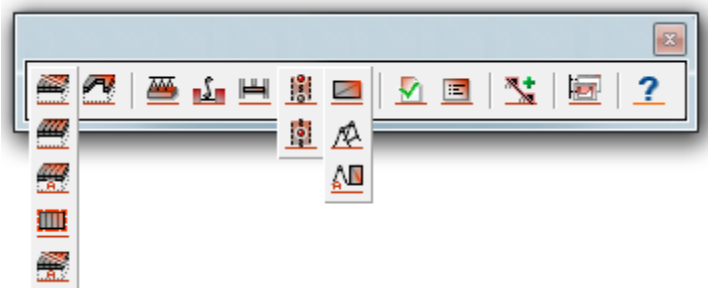








Fig. 3.1 Main toolbox of ArCADia-TERIVA CEILINGS in AutoCAD and ArCADia-INTELLICAD

Appearance of program main toolbox in CAD applications – **AutoCAD**, **ArCADia-INTELLICAD** is shown above. It contains the following functional range of program:

***BIM** – options available to ArCADia BIM license holders, i.e. after purchasing one of the following programs: ArCADia, ArCADia AC, ArCADia LT or ArCADia PLUS.

Icon	Option	Description	*BIM
	Framed ceiling above zone	Insert framed ceiling above zone.	✓
	Framed ceiling	Insert framed ceiling.	✓
	Framed ceiling with rectangle	Insert framed ceiling with rectangle.	✓
	Insert framed ceiling above active level	Insert framed ceiling above active level.	✓
	Insert framed ceilings above zones	Insert framed ceilings above zones.	✓
	Ceiling opening	Insert hole in ceiling.	✓
	Ceiling beam	Insert ceiling beam.	✓
	Reinforcing rib	Insert reinforcing rib.	✓
	Trimmer	Insert trimmer.	✓
	Reinforcing beam	Insert reinforcing beam through one point.	✓
	Reinforcing beam (2 points)	Insert reinforcing beam through two points.	✓
	Distribute nets on given level	Distribute nets on active level.	✓

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	Flat net	Flat net.	✓
	Folded net	Folded net.	✓
	Check correctness of ceiling elements	Check correctness of ceiling elements.	✓
	Constructional section	Insert constructional section.	✓
	Item list	Insert Stropex ceiling elements list.	✓
	Help	Display help.	✓

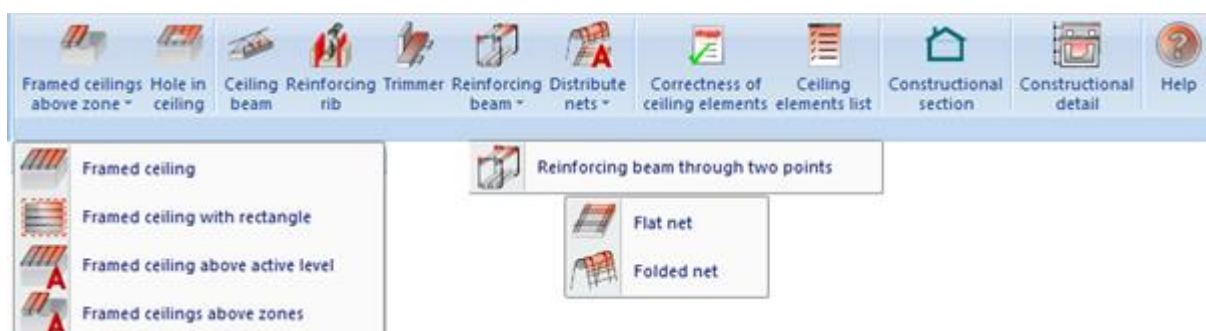


Fig. 3.2 Main ribbon of tools of ArCADia-START application with ArCADia-TERIVA CEILINGS program

3.2 Insertion of Teriva framed ceilings

3.2.1 General conditions of insertion and automatic settlement of Teriva ceilings

Insertion of Teriva ceilings in program should take place on earlier prepared architectural projection. However, this cannot be any projection. This should be drawing made with use of object-oriented tools for insertion of architectural elements, in **ArCADia-START** program. If user has projection made in other program (e.g. basic CAD program— **AutoCAD**, **ArCADia-INTELLICAD** or other), such drawing should be redrawn with the help of **ArCADia-START** architectural program. It is very significant in this case that all basic elements of architectural projection, especially such as: walls, windows, doors, holes in walls, holes in ceilings, binders, etc. were drawn as object-oriented with the help of **ArCADia-START**. It is a necessary condition for full use of possibilities of described ArCADia-TERIVA CEILINGS program. You must also remember that project made in **ArCADia-START** should (before you begin to insert ceilings) have prepared all levels of designed building, stacked one over the other. During entering of ceiling, this option will allow the program to recognize size and arrangement of partition walls on higher level and holes in ceiling, and appropriately prepare ceiling construction under these elements. From these dependencies, it can be concluded that the correct operating expenses in the program is in the first design of the holes in the ceilings, and then proceed to process of ceilings insertion (which will take into account in distributions arrangement of the holes). Similarly, in the case of construction walls, use of object-oriented tools of **ArCADia-START** allows for e.g. proper development of wall copings for ceilings and to ensure appropriate resting

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depths of ceiling beams. Such conditions as the sample, as described above, in the program is very much and keep them in mind when working with the program.

Proper insertion of described below Teriva ceilings elements is possible on earlier prepared architectural projection, when currently worked out level is set as active.

3.2.2 Insertion and automatic settlement of Teriva ceilings above zone

Insertion of Teriva ceiling above zone is the basic function of ceiling insertion in the case where on the designed level are to exist different directions of ceiling beams support. By the zone we understand in program space above room or several rooms, around selected projection point, limited by the closest neighborhood of wall supporting layers and binders. In case of choosing this function user does not have to select zone limits (which program will find itself), and only should select a point in its interior.



Call of the command follows with button from ribbon or main toolbox of ArCADia-TERIVA CEILINGS, with function  – (*isa_ifchc*) - **Insert framed ceiling above zone**. After its running, action bar for Insert framed ceiling command appears:

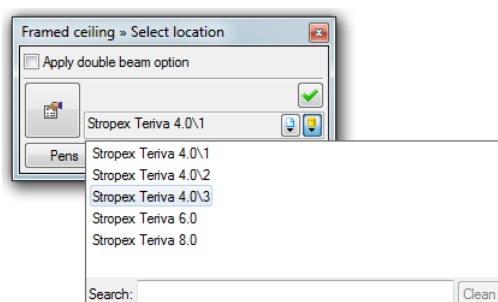


Fig. 3.3 Action bar for Insert framed ceiling above zone function

On the bar user selects one of five available Teriva ceiling styles and specifies by switching on/off of appropriate checkbox if the inserted ceiling uses single beam or double beam option. In the lower-left corner of the bar is a large button calling **Element properties: Framed ceiling** dialog box, where you can preview parameters of accepted ceiling and set ceiling suspension height above floor level (calculated to upper surface of the ceiling) or specify whether during creation of prefabricated elements lists for given ceiling are to be included ending bricks (**Insert ending bricks** checkbox).

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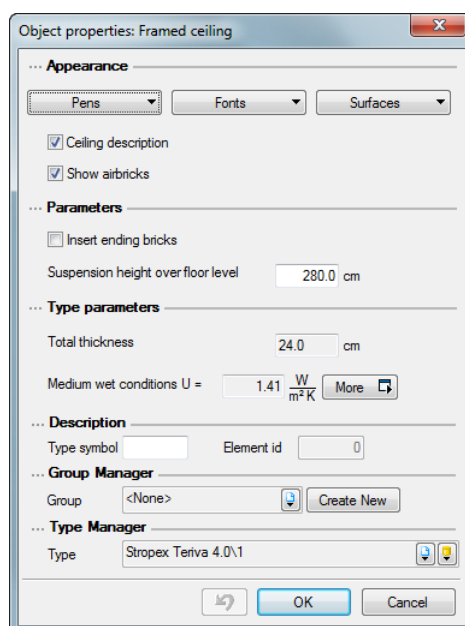


Fig. 3.4 Element properties: Framed ceiling dialog box

After calling **Insert framed ceiling above zone** function, program expects from user next data given according to questions appearing in the header of action bar and on lower command bar (or command line in case of **IntelliCAD** or **AutoCAD**). In turn, are:

- **Select location** – user should select any point within zone, which the ceiling is to be placed above.
- **Select framed ceiling support direction (start)** – we select start point of support direction vector.
- **Select framed ceiling support direction (end)** – we select end point of support direction vector.

During function operation, by giving direction, on action bar additional graphical support button: Parallel appears.

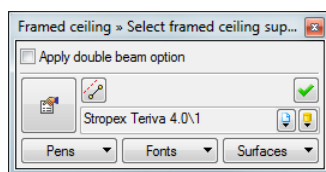


Fig. 3.5 Change in action bar during function operation

Effect of function operation is arrangement of prefabricated ceiling beams with solution of lateral accesses to walls, appropriate selection of beams lengths, ensuring them needed resting depth on wall support layer, installing of necessary reinforcing ribs, filling of not matched elements with monolithic plate and automatic selection of wall copings and wall coping parts on internal and external construction walls. In case of existing holes in the ceiling or partition walls placed in direction of beams resting, construction conditions of automatic ceiling distribution will take into

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account also these elements in appropriate beams arrangement. Effect of operation of function above three zones is shown on simple example below:

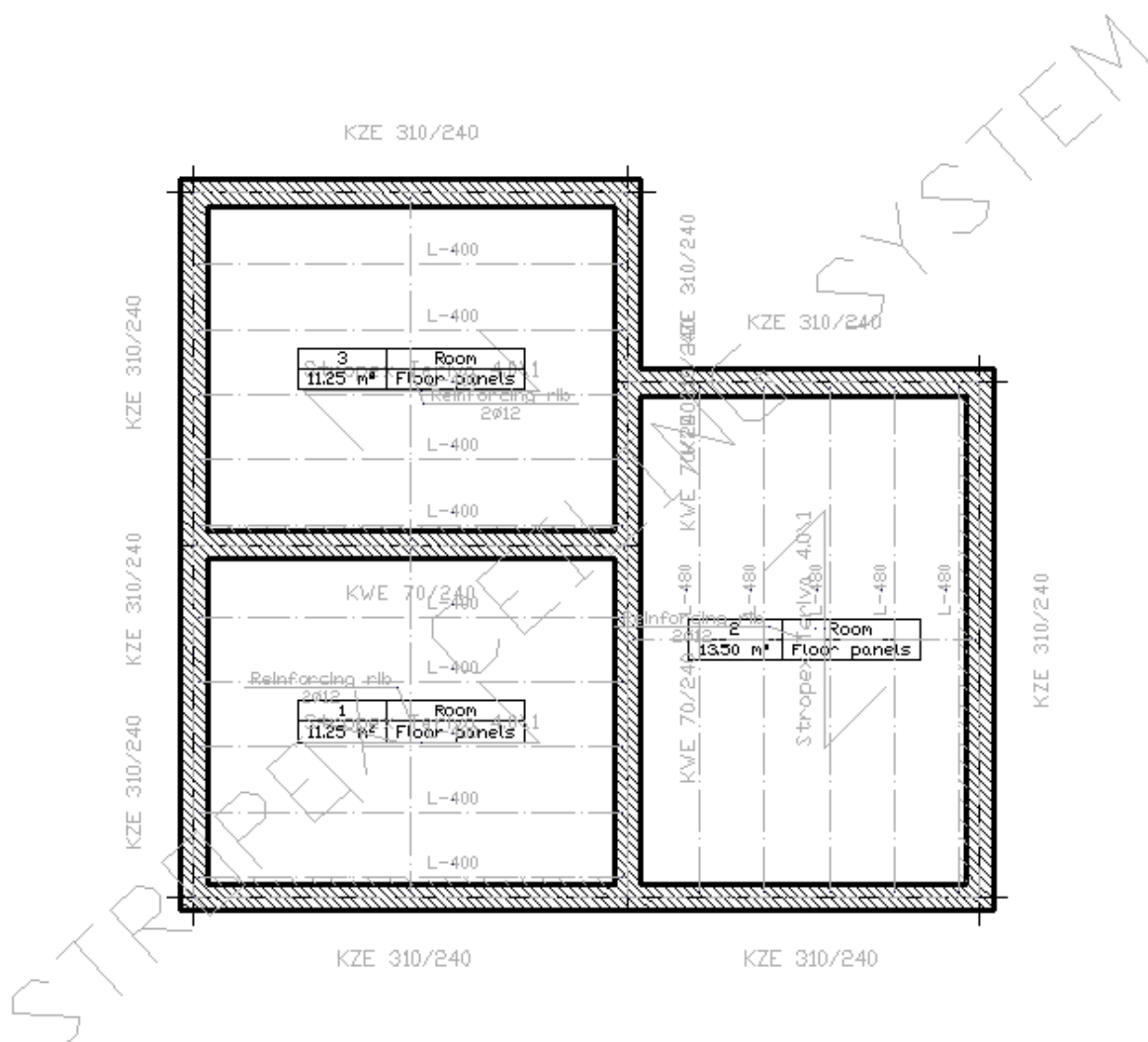


Fig. 3.6 Effect of operation of function distributing ceiling above zone


Because inserted Teriva framed ceiling is a complex element (beams, ribs, etc.), each of these elements is a ceiling separate subobject, which can be selected separately. The only graphic representative of the whole of inserted framed ceiling (independently of the way of its insertion) is a direction of its support and ceiling contour. Single click on ceiling support direction symbol calls action bar connected with framed ceiling edition tools, and double click on direction symbol again opens **Element properties: Framed ceiling** dialog box. Ceiling support direction symbol can be switched off on drawing by unchecking **Ceiling description** checkbox in **Element properties** (it is not recommended). Its renewed switching on is possible after selecting ceiling contour on drawing or from Project Manager of ArCADia system, after reselection of **Element properties. Insert framed ceiling above zone** function recognizes separated ceiling zones of any shape (rectangular and polygonal).

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3.2.3 Insertion and automatic settlement of Teriva ceilings above level

Insertion of Teriva ceiling above the whole level is usually the case when the system of all ceiling beams for given level retains constant support direction, indicated by user.



Call of the command follows with button from ribbon or main toolbox of ArCADia-TERIVA CEILINGS, with function  – (*isa_ifclc*) - ***Insert framed ceiling above active level***. After its running, action bar for Insert framed ceiling command appears, with the possibility of access to ***Element properties: Framed ceiling*** dialog box, similarly as in the case of previous command.

After calling ***Insert framed ceiling above active level*** function, program expects from user next data given according to questions appearing in the header of action bar and on lower command bar (or command line in case of **IntelliCAD** or **AutoCAD**). In turn, are:

- ***Select location*** – user should select any point within active level, which the ceiling is to be placed above.
- ***Select framed ceiling support direction (start)*** – we select start point of support direction vector.
- ***Select framed ceiling support direction (end)*** – we select end point of support direction vector.

Effect of operation of the function is shown on simple example below:

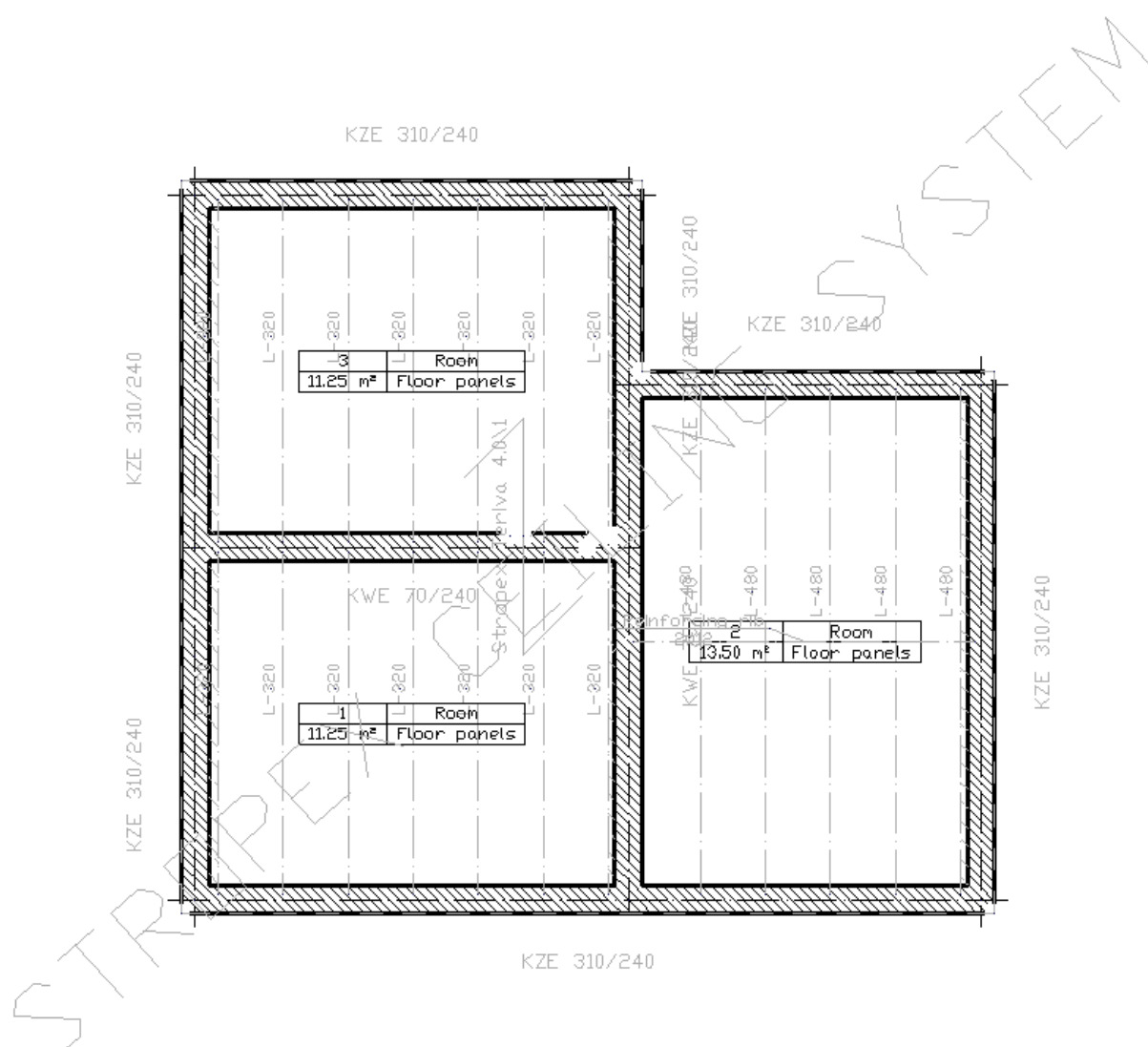


Fig. 3.7 Effect of operation of function distributing ceiling above level

Effect of function operation and conditions of ceiling elements arrangement are analogous to operation of previously described function of ceiling insertion above zone, but this time ceiling area includes whole surface of active level, that is instead of separate ceilings created above each separated zone, we get one ceiling surface covering whole active level. Within its framework on areas of any shape (rectangular and polygonal) separated by wall support layers and binders, beams and other ceiling elements distributions are made. In this case, ceiling support direction symbol is one for the whole level.


3.2.4 Insertion and automatic settlement of Teriva ceilings above all zones of given level

Function of insertion of Teriva ceilings above all zones of given level is a composition of earlier described functions of ceiling insertion above zone and above level. The function works in the same way as option of automatic ceiling distribution on whole level, while each ceiling zone is recognized (separated with support walls layers and binders) and ceiling in each zone is installed separately, but by default in the same direction in all zones. This function enables automatic

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arrangement of the ceiling above whole level in one direction, and then individual change of ceiling arrangement direction in several selected zones.



Call of the command follows with button from ribbon or main toolbox of ArCADia-TERIVA CEILINGS, with function  – (*isa_ifchca*) - **Insert framed ceiling above zones**. After its running, action bar for Insert framed ceiling command appears, with the possibility of access to **Element properties: Framed ceiling** dialog box, similarly as in the case of previous command.

After calling **Insert framed ceiling above zones** function, program expects from user next data given according to questions appearing in the header of action bar and on lower command bar (or command line in case of **IntelliCAD** or **AutoCAD**). In turn, are:

- **Select framed ceiling support direction (start)** – we select start point of support direction vector.
- **Select framed ceiling support direction (end)** – we select end point of support direction vector.

3.2.5 Insertion and automatic settlement of Teriva ceilings with rectangle


Function of insertion of Teriva ceiling with rectangle allows for insertion of any rectangular fragment of framed ceiling above any level area or outside it. Use of this function recognizes all supports and accesses to support layers of construction walls and binders, holes in ceilings and partition walls of higher level, placed along support direction and existing within selected ceiling rectangle. With the help of this function you can arrange ceilings containing e.g. fragment of zone separated with support walls and binders. Because function of ceiling insertion with rectangle is so general function that allows for insertion to drawing a ceiling even completely outside level contour, its use contrary to the construction conditions of designed ceiling gives big flexibility in design, but in extreme cases can lead to systems which do not conform with the art of building.

Basic condition of installing framed ceilings on rectangle area is not overlapping of entered to project successive ceiling areas. In case of entering Teriva ceiling with rectangle, between construction walls, it is recommended to define such area along geometrical axes of wall support layers and binders. Compliance with such recommendations guarantees on the one hand lack of overlapping of successive ceiling areas (this can happen in case of laying ceiling along external edges of the walls), on the other ensures arrangement of ceiling beams with proper support thickness.

Important:

Error is an indication of the ceiling area along internal edges of the walls, because ceiling area does not contain then these walls as elements within ceiling area and in consequence, does not provide the proper support of ceiling beams on support layers of walls and binders.



Call of the command follows with button from ribbon or main toolbox of ArCADia-TERIVA CEILINGS, with function  – (*isa_ifcrc*) - **Insert framed ceiling with rectangle**. After its

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running, action bar for Insert framed ceiling command appears, with the possibility of access to **Element properties: Framed ceiling** dialog box, similarly as in the case of previous command. In this case, on action bar is available additional button for precision placement definition of selected points in reference to other selected points:

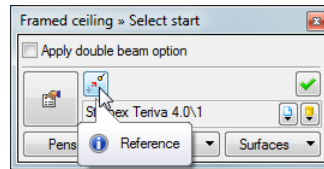


Fig. 3.8 Action bar with Reference function

After calling **Insert framed ceiling with rectangle** function, program expects from user next data given according to questions appearing in the header of action bar and on lower command bar (or command line in case of **IntelliCAD** or **AutoCAD**). In turn, are:

- **Select start** – we select start point of ceiling arrangement, being at the same time the beginning of support direction vector.
- **Select end** – we select end point of support direction vector, which at the same time determines first side of the rectangle.
- **Select width** – we select width of ceiling arrangement, making second side of the rectangle.

During operation of the function, on the action bar appear successive buttons of graphical support for entered data. These are in turn: **Angle, Length, Parallel and Width**:

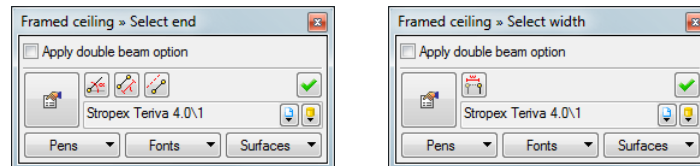


Fig. 3.9 Graphical support buttons in action bars

Effect of function operation was shown on simple example below, while the ceiling, placed above right side of the rooms with function of insertion with rectangle, does not include the whole area between construction walls. Separation line of right and left ceiling areas (both entered with rectangle option) is the vertical geometric axis of the middle wall:

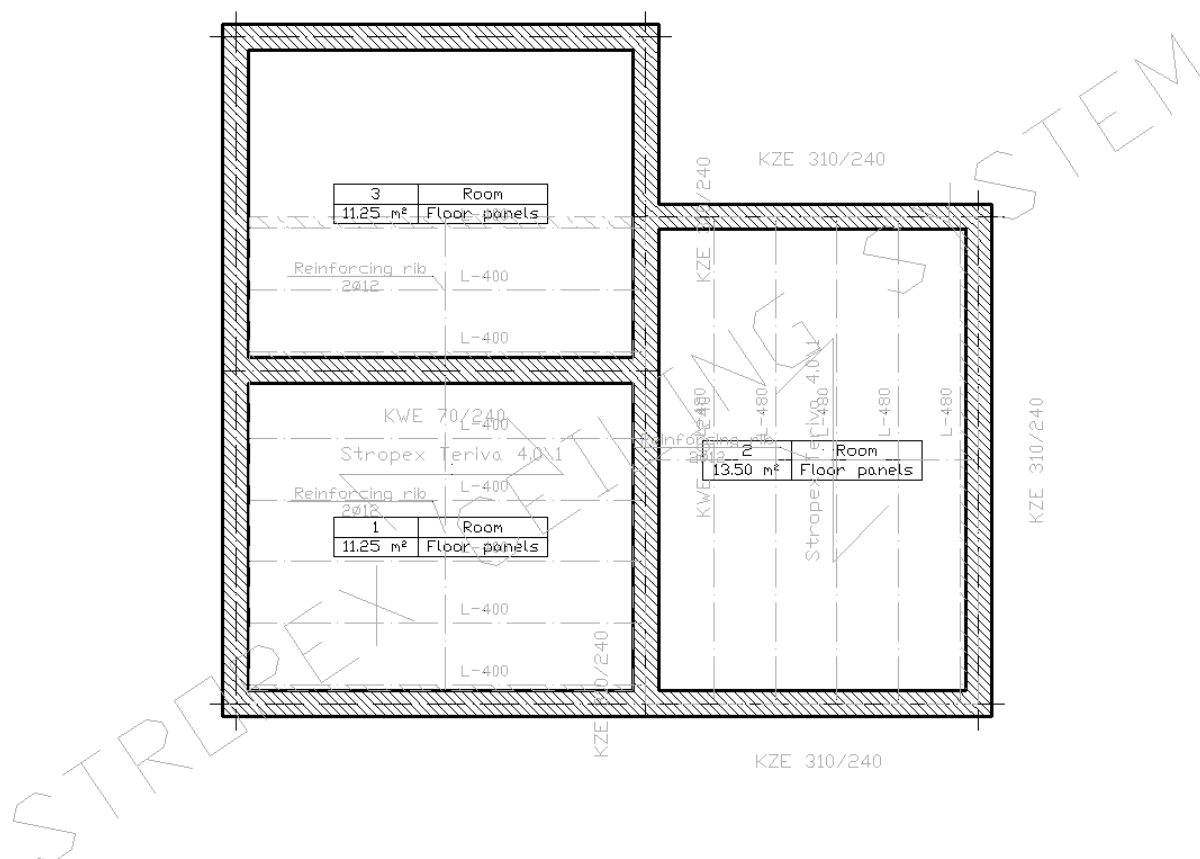


Fig. 3.10 Ceiling arrangement made with Insert framed ceiling with rectangle function

3.2.6 Insertion and automatic settlement of Teriva ceilings with any polygon

Function of insertion of Teriva ceiling with any polygon is a function still more general than insertion with rectangle and allows for insertion of any shape fragment of framed ceiling above any level area or outside it. Use of this function recognizes all supports and accesses to support layers of construction walls and binders, holes in ceilings and partition walls of higher level, placed along support direction and existing within selected ceiling polygon. With the help of this function you can arrange ceilings containing e.g. fragment of zone separated with support walls and binders. Use of function contrary to the construction conditions of designed ceiling in extreme cases can lead to systems which do not conform with the art of building.


Basic condition of installing framed ceilings on polygon area is not overlapping of entered to project successive ceiling areas. In case of entering Teriva ceiling with polygon, between construction walls, it is recommended to define such area along geometrical axes of wall support layers and binders. Compliance with such recommendations guarantees on the one hand lack of overlapping of successive ceiling areas (this can happen in case of laying ceiling along external edges of the walls), on the other ensures arrangement of ceiling beams with proper support thickness.

Important:

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Error is an indication of the ceiling area along internal edges of the walls, because ceiling area does not contain then these walls as elements within ceiling area and in consequence, does not provide the proper support of ceiling beams on support layers of walls and binders.



Call of the command follows with button from ribbon or main toolbox of ArCADia-TERIVA CEILINGS, with function  – (*isa_ifcc*) – **Insert framed ceiling**. After its running, action bar for Insert framed ceiling command appears, with the possibility of access to Element properties: Framed ceiling dialog box, similarly as in the case of previous command. In this case, on action bar are available additional buttons for precision placement definition of selected points: in reference to other selected points, in the middle between points and between points - in percentage terms:

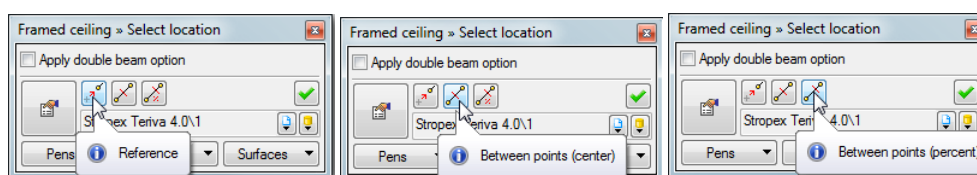


Fig. 3.11 Buttons for precision placement definition on action bar

After calling **Insert framed ceiling** function, program expects from user next data given according to questions appearing in the header of action bar and on lower command bar (or command line in case of **IntelliCAD** or **AutoCAD**). In turn, are:

- **Select location** – we select first point of defined ceiling polygon.
- **Select location** – we select next point of defined ceiling polygon.
-
- **Select location** – we select last point of defined ceiling polygon. Insertion of points we end with pressing of mouse right button.
- **Select framed ceiling support direction (start)** – we select start point of support direction vector.
- **Select framed ceiling support direction (end)** – we select end point of support direction vector.

For successive selected polygon points, on action bar are available buttons for precision definition of placement of selected points, such as: **Angle**, **Length**, **Close** (polygon), **Parallel**.

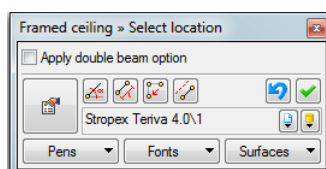


Fig. 3.12 Buttons for precision placement definition

At each in turn selected point of the polygon, we have for disposal additional button with blue arrow, allowing for undoing of the last selected polygon vertex placement. During defining of ceiling support direction vector, we can use graphical help in form of parallelism to selected line on drawing. Effect

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of function operation was shown on simple example below (polygon was entered along geometrical axes of support walls):

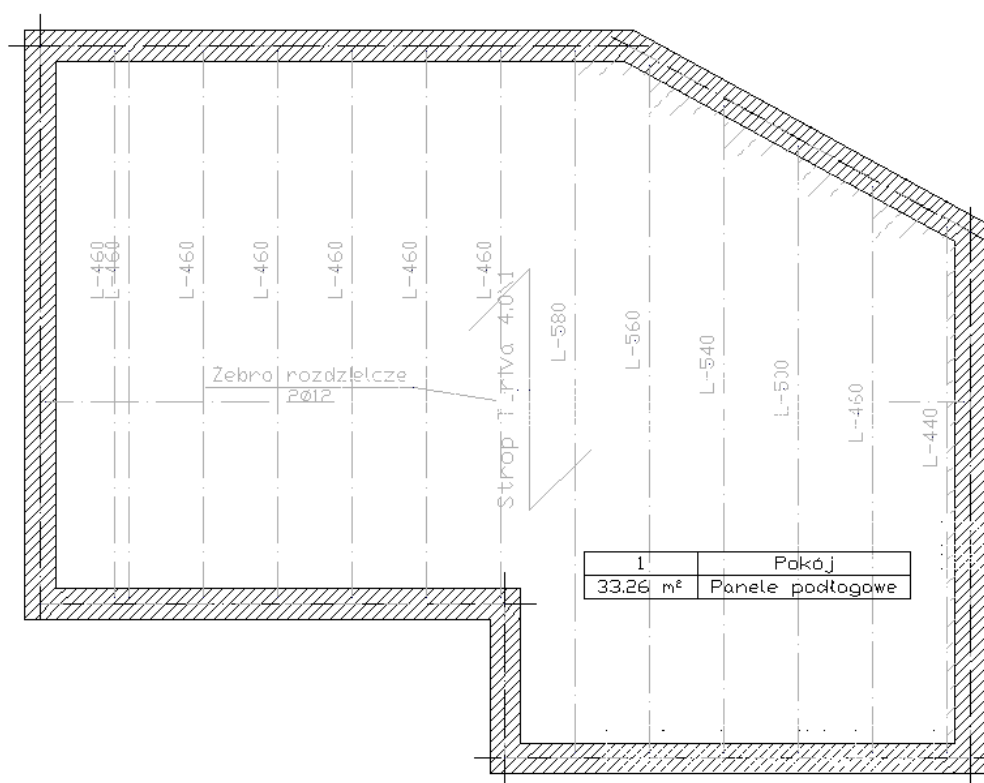


Fig. 3.13 Example of ceiling defined on polygon contour

3.2.7 Edition of Teriva framed ceilings

Selection of inserted to drawing framed ceiling for its edition is possible in program in several ways:

- By selection and marking given ceiling support direction symbol (option recommended).
- By marking ceiling contour (option is difficult to enforce because of the overlap of the outline with other objects on the floor).
- By marking framed ceilings in Project Manager (by several ceilings on one level, all are marked and mostly you need to unselect part of them).

Marking of single ceiling or several ceilings and pressing **Delete** key deletes marked elements from project together with belonging to given ceiling system of beams, ribs and trimmers.

It is not possible to select the whole ceiling by clicking on any element being subobject of given ceiling (e.g. on axis of prefabricated beam). Then given subobject of the ceiling is marked (e.g. beam), and not the whole framed ceiling. After selection of single Teriva ceiling, action bar for framed ceiling appears, as below:

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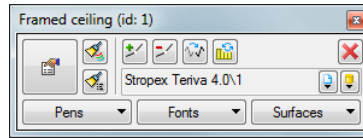


Fig. 3.14 Action bar for edition of framed ceiling

It contains in turn (counting from left) the following items:

- Button for access to **Element properties: Framed ceiling** dialog box.
- Ceiling style „painter” as well as fonts and pens „painter”.
- Button for adding of framed ceiling contour breaking points.
 - **Select location** – you should select location of new point.
- Button for deleting of framed ceiling contour breaking points (two closest points of ceiling contour will be then connected with straight line).
 - **Select location** – you should select location of appropriate corner point of the contour.
- Button of ceiling support direction change function – use of this function causes rearrangement of framed ceiling on earlier set contour in newly selected direction:
 - **Select framed ceiling support direction (start)** – we select start point of support direction vector.
 - **Select framed ceiling support direction (end)** – we select end point of support direction vector.
- Button of framed ceiling rearrangement function– use of this function causes deleting of the whole framed ceiling in set ceiling area (with possible, individual user modifications) and renewed, automatic ceiling arrangement on earlier defined area. This option should be used when inside the ceiling occurred significant changes connected with its arrangement, e.g. hole in the ceiling was added or partition wall along support direction on level above was added.
- Framed ceiling style selection lists (project list and global list) – change of Teriva ceiling style also causes renewed, automatic ceiling arrangement.

Selection of several objects of framed ceiling type (e.g. from level of Project Manager) also calls described above action bar, but this time considerably limited:

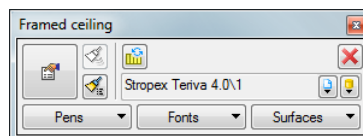


Fig. 3.15 Action bar appearance at simultaneous edition of several ceilings

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3.3 Basic elements of Teriva ceilings

3.3.1 Prefabricated beams of Teriva ceilings

3.3.1.1 Automatic arrangement of prefabricated beams

In most cases prefabricated beams of Teriva ceilings are inserted to project automatically (on given level) with one of described above framed ceiling insertion options. Automatic beam arrangement option meets the following construction conditions:

- All prefabricated beams are settled between wall support layers and binders, taking into account that none of them can protrude beyond entered framed ceiling contour.
- First prefabricated wall is placed 52 cm from internal face of support wall.
- Beams are arranged as single or double beam option in a constant spacing of 60 cm (for Teriva 4.0 ceilings) and 45 cm (for Teriva 6.0 and 8.0 ceilings).
- Length of beams is matched on base of model series available for given ceiling style, so that on both its sides is ensured minimum depth of support on wall support layer – 8 cm.
- For ceilings of spans greater than permissible beam span in the framework of given model series, monolithic counter-floor is automatically placed (monolithic ceiling).
- For ceilings of spans smaller than available beam model series (for given ceiling type) cut beam is placed by default, described as beam from model series of length stepped every 20 cm, which length corresponds to the hypothetical beam from model series, if there was such beam. Thus, in program hypothetical model series of ceiling beams always begins from zero and ends on maximal length available for given Teriva ceiling style.
- Under partition walls of thickness up to 12 cm arranged along ceiling support direction, two prefabricated beams of Teriva ceiling are placed (under thicker walls reinforcing beam is placed, situated under wall, between two prefabricated beams).

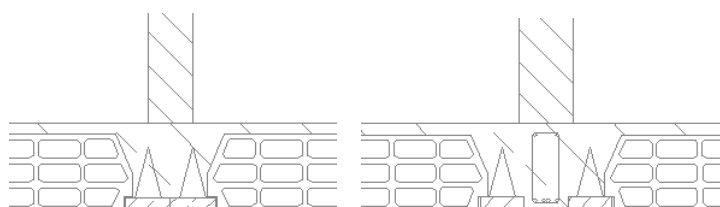


Fig. 3.16 Solution of support of partition wall situated along ceiling beams


- Construction under holes in ceiling of width up to 114 cm (for Teriva 4.0 ceilings) and to 84 cm (for Teriva 6.0 and 8.0 ceilings) is solved with the help of prefabricated beams or prefabricated beams and trimmers. By holes in ceiling of greater width, around the hole monolithic ceiling is placed.
- Beams arranged on slanted and arched walls are matched from model series on base of real beam span in the light of the walls and necessary support depth on construction layer.
- Resulting approaches to side walls are solved to double beams and air brick, cut air brick and monolith, depending on resulting distance of last beam from internal face of support layer.

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- Each entered to ceiling prefabricated beam contains on drawing text description identifying its length according to accepted beam model series for given ceiling.

3.3.1.2 Individual insertion of prefabricated beams



Beyond functions of automatic beams arrangement, in program you can at any time add a single ceiling beam. For this purpose in program is provided function:  - (isa_icbc) – **Insert ceiling beam**. After its calling, user is asked for doing the following actions:

- Select ceiling** – to identify the ceiling, you should select any point existing inside framed ceiling contour, to which the ceiling beam will be added.
- Select location** – we select beam start point.
- Select location** – we select beam end point.

During entering of beam start point, on action bar are available the following means of graphical help: in reference to other selected points, in the middle between points and between points - in percentage terms.

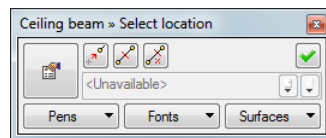


Fig. 3.17 Action bar during adding prefabricated beam

On action bar there is also button for access to prefabricated beam properties dialog box, which contains basic information about prefabricated beams properties.

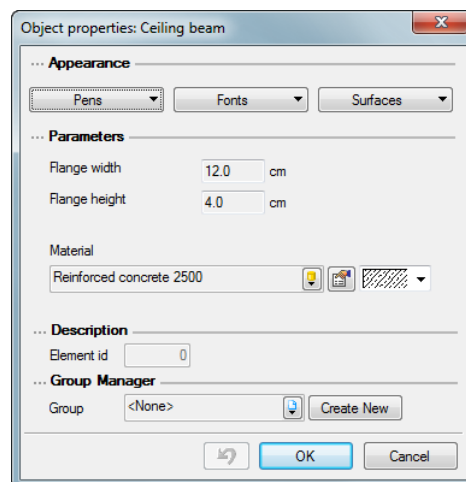


Fig. 3.18 Element properties: Ceiling beam

By single insertion of prefabricated beam you should remember that the beam can be inserted only in support direction of given ceiling, therefore, after selection of beam start point, its direction is prompted by the program. Also in this case you are not allowed to insert any beam segment beyond framed ceiling contour.

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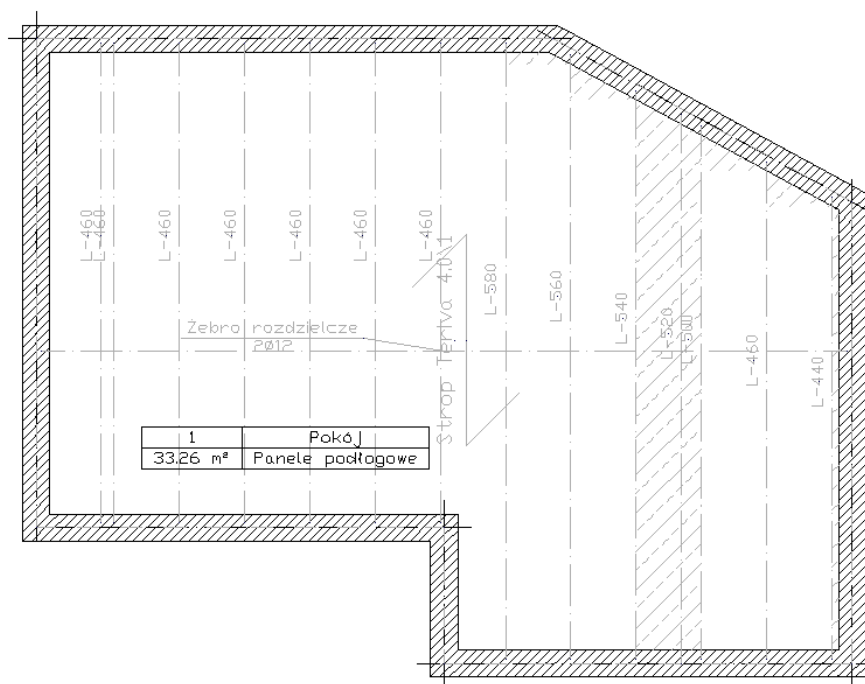


Fig. 3.19 Example of adding of prefabricated ceiling beam

Adding beam between two placed beams (being in modular spacing of given ceiling) causes deleting of air brick row and filling of created spacing with non-modular monolith. You should remember that length of automatically arranged beams is matched on base of walls distance in the light subject to the condition of support on the wall. If you want to add beam separately and adjust its length to beams already existing, by its definition you should select as beam start and end points, points on internal edges of supporting beams wall support layers. In other case, when selected points are inside the wall, it may turn out that inserted beam is longer than the other or similarly selecting points inside the room, the beam will be too short and will not rest on support walls. In summary, the most optimal choice of the length of the beam will be executed by the program, when its selected start and end will be on internal edges of wall support layers.

3.3.1.3 Edition of prefabricated beams and ceiling beam system

Single click on beam axis and description marks prefabricated beam for edition. Together with marked beam on drawing are shown assigned to it handles. These are: beam start point, middle point and end point, as well as description handle. Graphical edition of the beam is just simple modification of beam handles:

- Handle in beam axis start point and end point allows for modification of its length.
- Handle in beam axis middle point allows for modification of its position towards other beams.
- Handle of beam description allows for modification of beam description position on drawing without edition of beam itself.

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- Marking element (beam or beams) and pressing **Delete** key deletes marked elements from project.

Beyond beam graphical edition with the help of handles, after its marking we have access to additional functions placed on action bar:

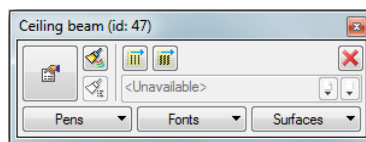


Fig. 3.20 Action bar during edition of ceiling beams

These are in turn counting from left:

- Big button for access to **Element properties: Ceiling beam** dialog box.
- Fonts and pens painter buttons.
- Two buttons of uniform beams rearrangement (single or double beam option) from selected beam: **Rebuild beams at side** and **Rebuild double beams at side**. Both functions act similarly, and the difference is single or double beam option only. After choosing any of them, program expects from user selection of direction (from marked beam), in which to make beams rearrangement.

Function of beams arrangement matching (single or double beam option) from selected beam is very useful and allows for any modifications of automatically settled ceilings, and specially for creation of mixed systems, partially single beam and partially double beam option. You should remember that uniform matching from selected beam ignores recognition of such elements as holes in the ceiling and partition walls placed on the ceiling, and their appropriate construction should be done manually. In case of selection of **Rebuild double beams at side** option, first beam added to the selected one is always situated in distance of 12 cm, and next double beams are added every ceiling module.

3.3.2 Airbricks and ending bricks

Airbricks and ending bricks are placed on the ceiling in a way generally invisible to the user. Each space between prefabricated beams, which width corresponds to given ceiling module, is filled with suitable for given ceiling airbricks and plugging elements in form of ending bricks. On ceiling projection, filled with airbricks areas between beams are empty areas (without hatching). Whereas all the other ceiling fillings, which are monolithic counter-floors, are indicated on projection with corresponding hatching. About that space between beams is filled with concrete airbricks we can see on ceiling constructional section. Sample arrangements of concrete airbricks on ceiling constructional sections are shown below:

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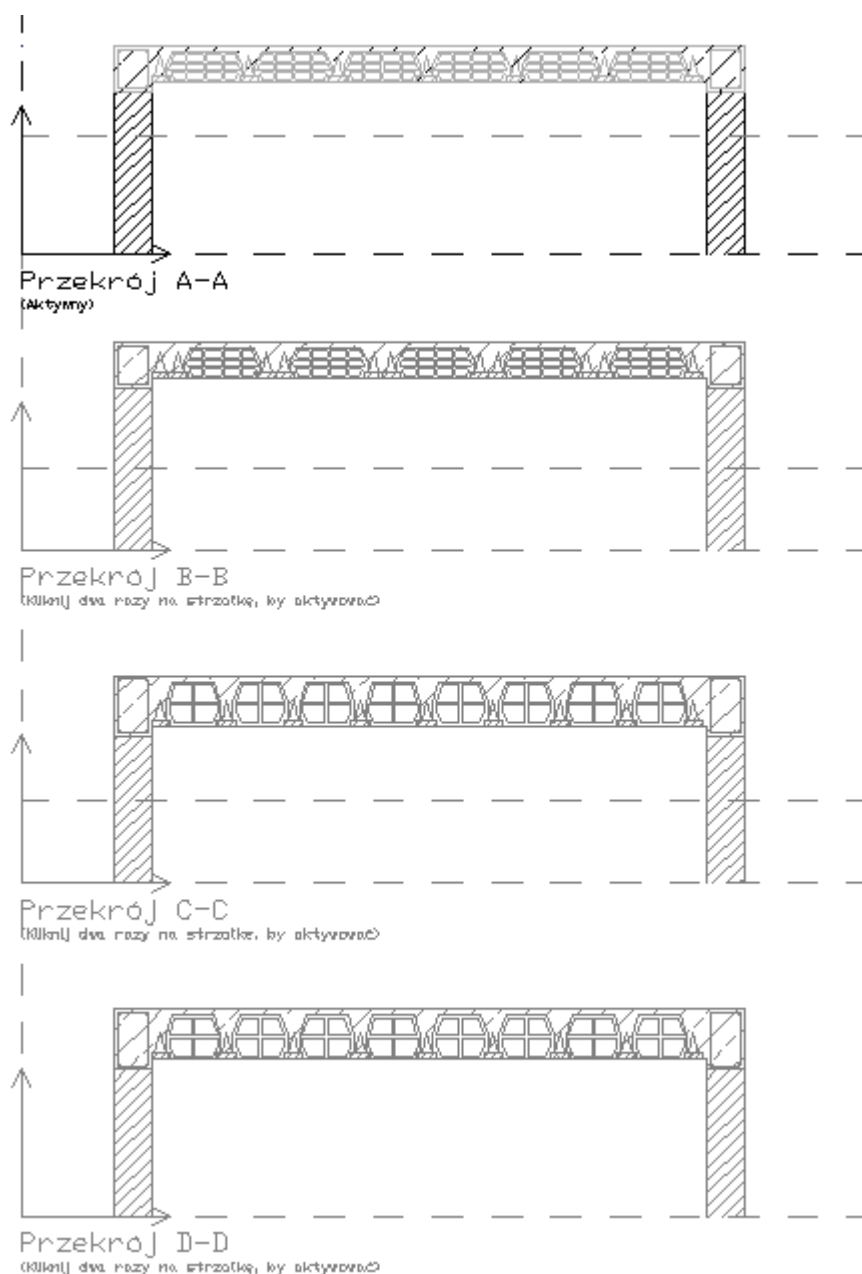


Fig. 3.21 Examples of airbricks arrangement for different types of ceilings and their entablature

Ending bricks (plugging elements) are placed on ends of each airbrick row (at their approaches to the wall) in area between ceiling beams and on both sides of each ceiling reinforcing rib. In case of resulting side approach of ceiling to wall, it is often solved with the help of airbrick cut to the resulting distance, depending on the distance of the last beam from wall face (e.g. two lower ceilings on the figure above). Settlement of airbricks and ending bricks in project (although generally not fully visible for user) serves for making of full material lists and in this case it concerns airbricks and ending bricks for the whole project.

3.3.3 Teriva ceiling wall copings

During installing of framed ceilings, on their connection with construction walls are placed corresponding wall copings. In program wall copings are placed only automatically, and user has only

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possibility of modification of some wall coping parameters. Wall copings cannot be deleted from project, also cannot be added individually. Correctness of their placement is watched by program algorithm only. Teriva ceiling wall copings are placed on construction layers of support walls (internal and external) and on binders.

Made in program sample solutions of wall copings for Teriva ceilings are shown on figures below:

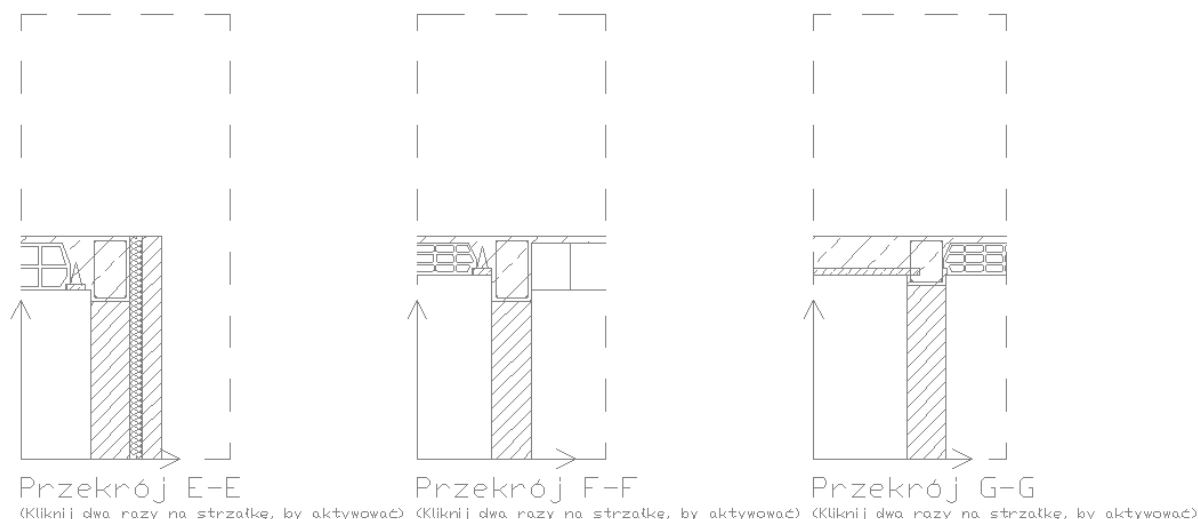


Fig. 3.22 Examples of wall coping solutions for internal and external walls

After double clicking on wall coping designation (on level projection) or clicking on appropriate button on action bar, **Element properties: Wall coping** dialog box appears.

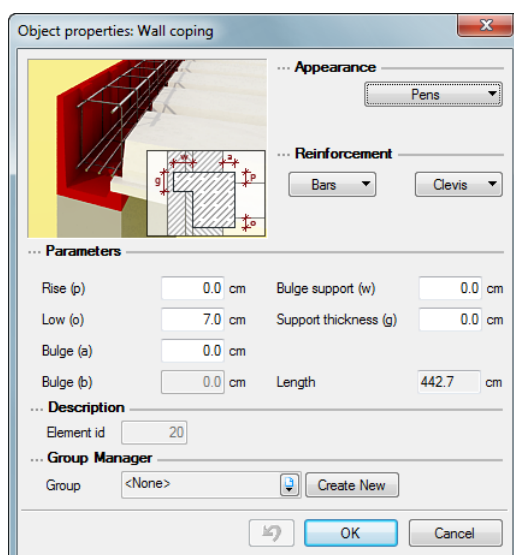


Fig. 3.23 Element properties: Wall coping dialog box

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In wall coping properties dialog box, by default are set geometric parameters (Parameters group) of wall coping section adapted to Teriva ceilings characteristics (wall coping lowered). User can change wall coping section geometry, but in case of framed ceilings from ArCADia-TERIVA CEILINGS program it is not recommended. Essential information, which can be seen in wall coping properties dialog box, is its length on given wall. This parameter is used by program for estimated determination of amount of ceiling parts for given wall coping and calculation of estimated amount of reinforcement.

In program user has possibilities (in limited range) of forming of monolithic elements reinforcement. This option also concerns wall copings. For this purpose, in wall coping properties dialog box were entered two extendable lists concerning definition of wall coping longitudinal and crosswise reinforcement: **Bars** and **Clevis**. View of both lists after extending is shown below:

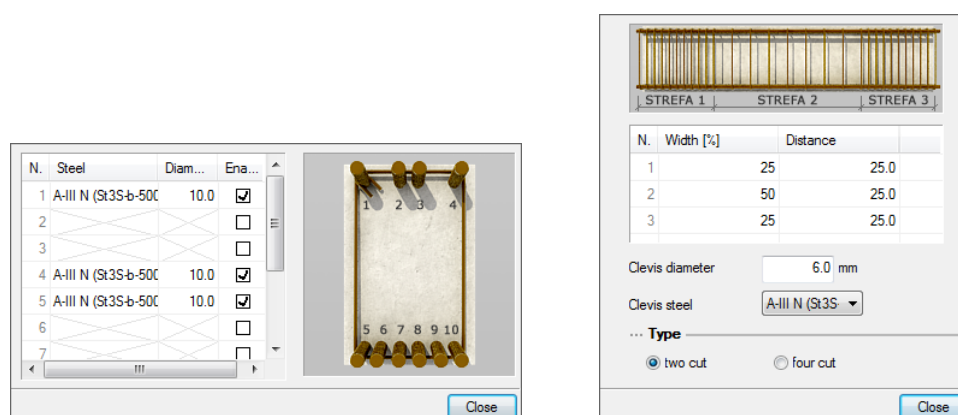


Fig. 3.24 Definition of wall coping longitudinal and crosswise reinforcement dialog boxes

First of them concerns definition of wall coping longitudinal reinforcement. By default, in wall coping is set construction reinforcement 4 \varnothing 12 (after two bars top and bottom). User has however possibility of changing this reinforcement in a range stipulated by the program. This function allows for modification of the reinforcement if you need to strengthen the wall coping or when wall coping segment is at the same time a lintel element (beam element). In wall coping, you can use maximum 10 longitudinal bars of any accepted diameter (up to 4 top and up to 6 bottom). These rods are numbered from 1 to 10, and on the list at the left side you can choose steel grade (acc. to PN-B-03264: 2002 standard), write bar diameter in millimeters and check (or uncheck) checkbox of occurrence of given bar in wall coping section.

Similarly on the second list looks the situation concerning wall coping crosswise reinforcement, that is clevis. By default, in wall coping are set two cut \varnothing 6 clevis, of A-III N steel, arranged every 25 cm on whole wall coping length. However, in situation when wall coping is at the same time a lintel element, we can adapt crosswise reinforcement as for beam element. Whole length of the wall coping was divided (in percentage terms) to maximum three zones of potentially different clevis density. Length of zones (in percentage terms) and clevis spacing in given zone (in cm) is set by user. Additionally, you can choose clevis type (two cut or four cut), change clevis diameter or select from list different grade of steel provided for crosswise reinforcement. Clevis in wall coping

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section are placed on its whole height, together with lowered part of wall coping, including wall coping parts occurrence.

Prefabricated ceiling beams in program can also be supported on binders placed under the ceiling. Then, also in place of support or approach of Teriva ceiling to binder, on the binder wall coping is formed. In this case, it is very important for the constructional correctness of the wall coping to properly install the binder (especially in height). Properly constructed binder under Teriva ceiling should have correctly determined distance from top edge of the ceiling to the binder bottom (distance „a“). This value should be the sum of: Teriva ceiling height, facing height (for Teriva ceilings equals wall coping lowering size 6.5 cm) and height of designed binder. For ceilings of height 24 cm and installed binder of height 40 cm, this will be $24 + 6.5 + 40 = 70.5$ cm. For the rest of Teriva ceiling heights this will be 6 and 10 cm more (for binder of height 40 cm). If entered in binder properties distance „a“ is bigger than calculated value, then, to properly construct the wall coping, you should increase of the same value the facing height „b“ in binder properties. If entered in binder properties distance „a“ is smaller than calculated value, program will not be able to construct wall coping in ArCADia-TERIVA CEILINGS program, and in extreme case the binder will partially cover with the wall coping. Settings of described above parameters are shown below in **Element properties: Binder** dialog box.

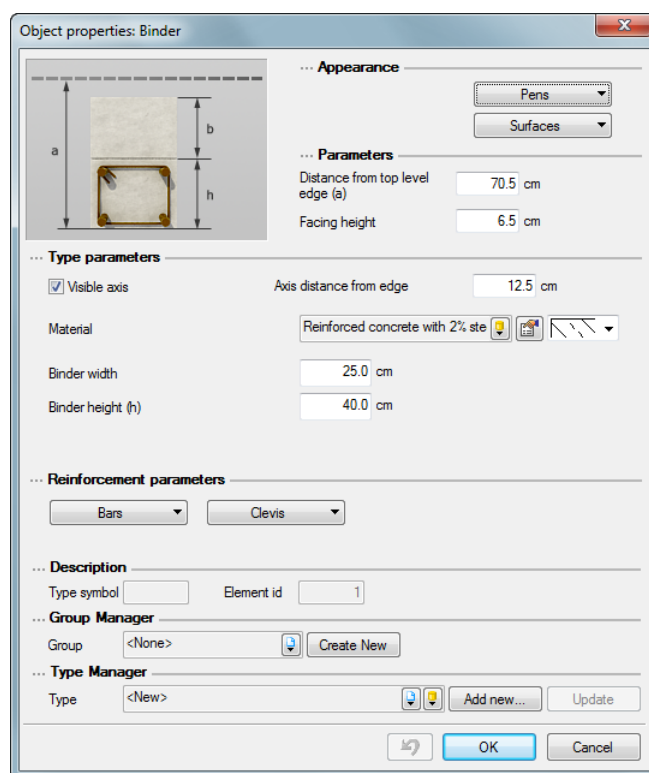


Fig. 3.25 Element properties: Binder dialog box

Sample solutions of wall copings in case of ceiling support on binder are shown on sample drawings below:

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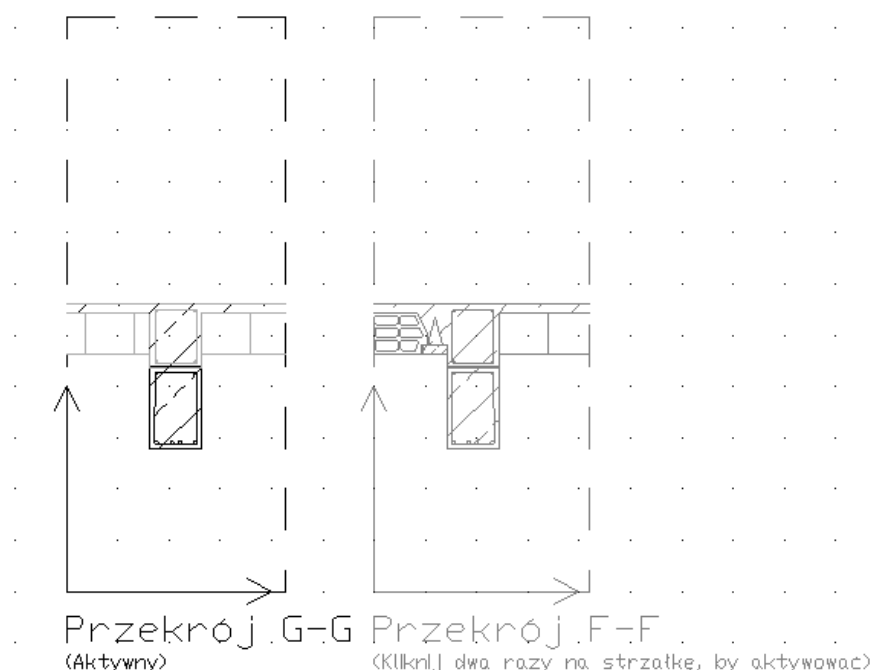


Fig. 3.26 Examples of wall coping solution by approach and support on binder

3.3.4 Teriva ceiling reinforcing ribs

3.3.4.1 Reinforcing ribs– general information and automatic arrangement

Reinforcing ribs have task to ensure spatial cooperation of framed ceiling beams in crosswise arrangement. According to technical conditions of Teriva ceilings implementation, by ceiling span above 4 m one reinforcing rib should be installed, and from ceiling span of 6 m and more – two reinforcing ribs. By automatic ceiling arrangement in program, these conditions are taken into account. By one rib it is given in half of the ceiling span, and by two ribs in 1/3 and in 2/3 of the ceiling span. Automatically arranged reinforcing ribs are always led from construction wall to construction wall. If in one area occur beams of different length (e.g. for slanted walls), reinforcing ribs are placed as for beams of the largest length. When automatically placed rib meets hole in the ceiling, it is divided to two parts running to hole and from hole (on hole width the rib is cut). Reinforcing rib is separated in the ceiling from bottom by special rib part, put in a place of airbrick, and from sides by placing ending bricks. Real width of the rib is approx. 12 cm.

In program, on architectural projection, reinforcing rib is represented by rib axis always led perpendicularly to ceiling beams axes and text description: **Reinforcing rib**, situated parallel to rib axis. Example of automatically inserted reinforcing ribs on projection is shown below:

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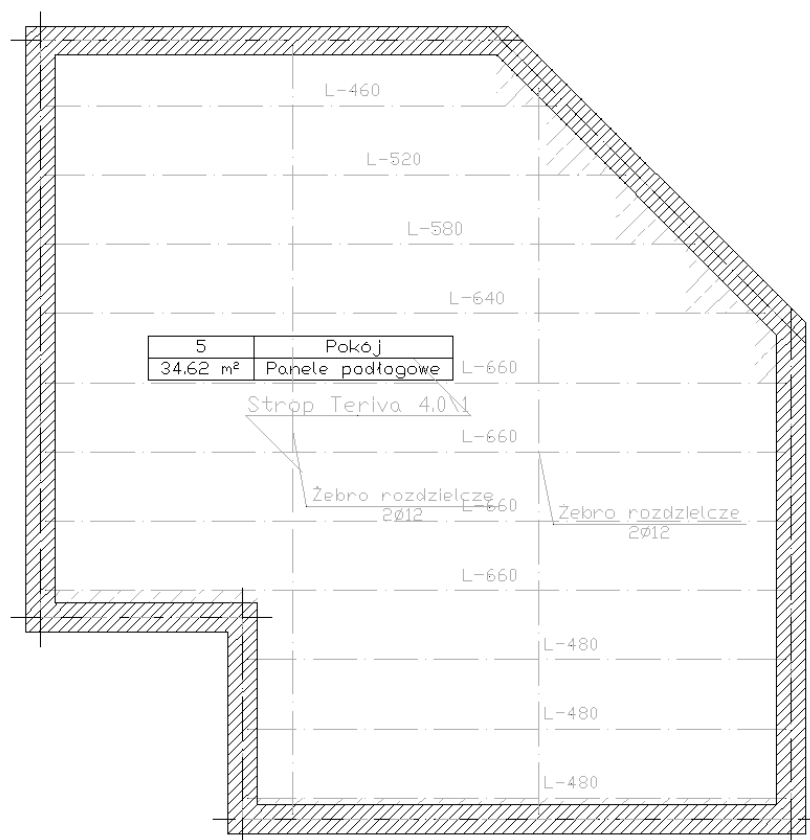



Fig. 3.27 Example of automatically arranged reinforcing ribs

3.3.4.2 Individually installed reinforcing ribs

Beyond ribs arranged on the ceiling automatically, user has possibility of manual reinforcing rib insertion. Reinforcing ribs can be inserted on projection, in framed ceiling contour only. If you want to insert reinforcing rib individually, you select from ribbon or toolbox of ArCADia-CEILLINGS TERIVA option:  - (*isa_irrc*) - **Insert reinforcing rib**. After calling the function, user is asked for doing the following actions:

- **Select ceiling** – to identify the ceiling, you should select any point existing inside framed ceiling contour, to which the reinforcing rib will be added.
- **Select location** – we select reinforcing rib start point.
- **Select location** – we select reinforcing rib end point.

Both selected points, of start and end of the reinforcing rib, must be inside earlier selected ceiling contour and both must be on line perpendicular to Teriva ceiling support direction (such direction is by default prompted by the program). During placing of reinforcing ribs, you should try to retain their continuity in given area of the ceiling.

3.3.4.3 Edition of reinforcing ribs and their properties

Single click on reinforcing rib axis or its description marks the rib for edition. Together with marked rib on drawing are shown assigned to it handles. These are: rib start point, middle point and

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end point, as well as description handle. Graphical edition of the rib is just simple modification of placement of its handles:

- Handle in reinforcing rib axis start point and end point allows for modification of its length.
- Handle in reinforcing rib axis middle point allows for its movement along ceiling width.
- Handle of rib description allows for modification of rib description position on drawing without edition of rib itself.
- Marking rib or several reinforcing ribs and pressing **Delete** key deletes marked elements from project.

Making on projection double click on given reinforcing rib or choosing appropriate button on action bar for this element, we can move to edition of its properties - **Element properties: Reinforcing rib**.

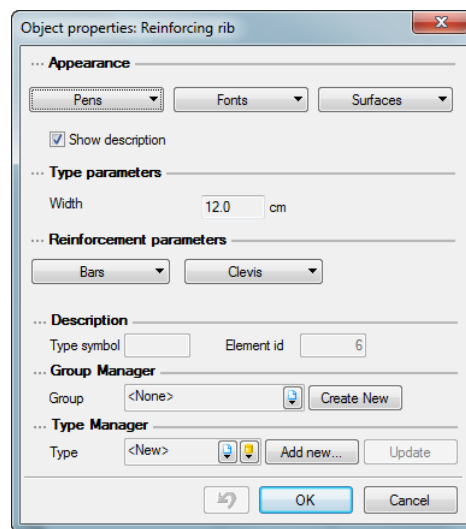


Fig. 3.28 Element properties: Reinforcing rib dialog box

Properties dialog box contains information about reinforcing rib width and access to editable **Reinforcement parameters** group, containing two lists concerning rib longitudinal and crosswise reinforcement: **Bars** and **Clevis**:

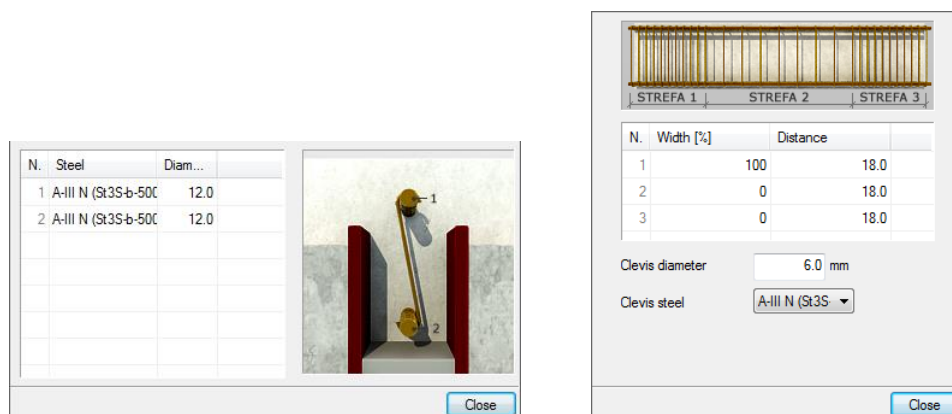


Fig. 3.29 Definition of reinforcing rib longitudinal and crosswise reinforcement dialog boxes

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First of them concerns definition of reinforcing rib longitudinal reinforcement. By default, in rib is set construction reinforcement 2 \varnothing 12 (after one bar top and bottom). User has however possibility of changing this reinforcement. In rib can exist a maximum of 2 longitudinal bars of any accepted diameter (1 top and 1 bottom). These rods are numbered from 1 to 2, and on the list at the left side you can choose steel grade (acc. to PN-B-03264: 2002 standard), write bar diameter in millimeters and check (or uncheck) checkbox of occurrence of given bar in wall coping section (it is recommended that in rib always exist both longitudinal bars).

Similarly on the second list looks the situation concerning rib crosswise reinforcement, that is clevis in shape of letter "S". By default, in reinforcing rib are set one cut \varnothing 6 clevis, of A-III N steel, arranged every 18 cm on whole rib length. Length of the rib was divided (in percentage terms) to maximum three zones of potentially different clevis density. Length of zones (in percentage terms) and clevis spacing in given zone (in cm) is set by user. Additionally, you can change clevis diameter or select from list different grade of steel provided for crosswise reinforcement. Clevis and longitudinal bars are placed on rib section, in trough created by bottom rib part and two ending bricks plugging airbricks. Constructional section through reinforcing ribs is shown below:

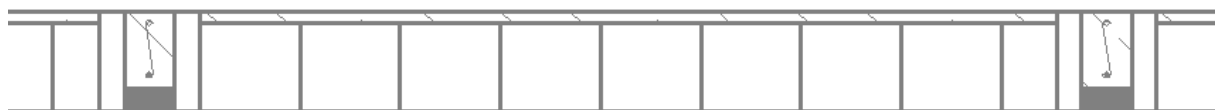


Fig. 3.30 Sample section through reinforcing ribs

3.3.5 Teriva ceiling reinforcing beams

3.3.5.1 Reinforcing beams– general information and automatic arrangement

By reinforcing beam in program we understand ferroconcrete monolithic element, arranged in ceiling support direction, in most cases between two prefabricated beams. Reinforcing beam is mainly made in ceiling thickness, but in program exists possibility of raising it above ceiling top surface. Most often it is used for local strengthening of the ceiling, under heavy partition walls placed in ceiling support direction. Reinforcing beam in most cases contains additional, defined by user, longitudinal and crosswise reinforcement, which, together with reinforcement of the adjacent prefabricated beams, should carry additional load from partition wall placed on reinforcing beam. In program, reinforcing beam has defined dimensions: width – as the distance in light of the adjacent prefabricated beams and height always calculated from bottom of framed ceiling. By any framed ceiling automatic arrangement method, reinforcing beam are by default placed under heavy partition walls, of thickness above 12 cm, placed in ceiling support direction, on higher level (under narrower walls by default Teriva ceiling double prefabricated beam arrangement is used).

Reuse of beam arrangement algorithm in given ceiling area takes into account placement of reinforcing beams under partition walls of thickness above 12 cm, if this is not to interfere with the already existing, entered by user reinforcing beam. Each manual adding of reinforcing beam causes

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adding of two prefabricated beams on its sides and resettlement of prefabricated beams in given ceiling area, taking into account already existing reinforcing beams. Each entered by user reinforcing beam will be taken into account by ceiling beams rearrangement.

Graphic representation of reinforcing beam on level projection are two dashed parallel lines, placed in ceiling support direction and offset on reinforcing beam width, filled with ferroconcrete hatching, with added reinforcing beam geometric axis. Graphic representation of reinforcing beam on section is additional, defined by user, longitudinal and crosswise reinforcement, in form of clevis and longitudinal bars, arranged between prefabricated beams. Sample drawing of reinforcing beam accepted automatically under partition wall of thickness above 12 cm is shown below:

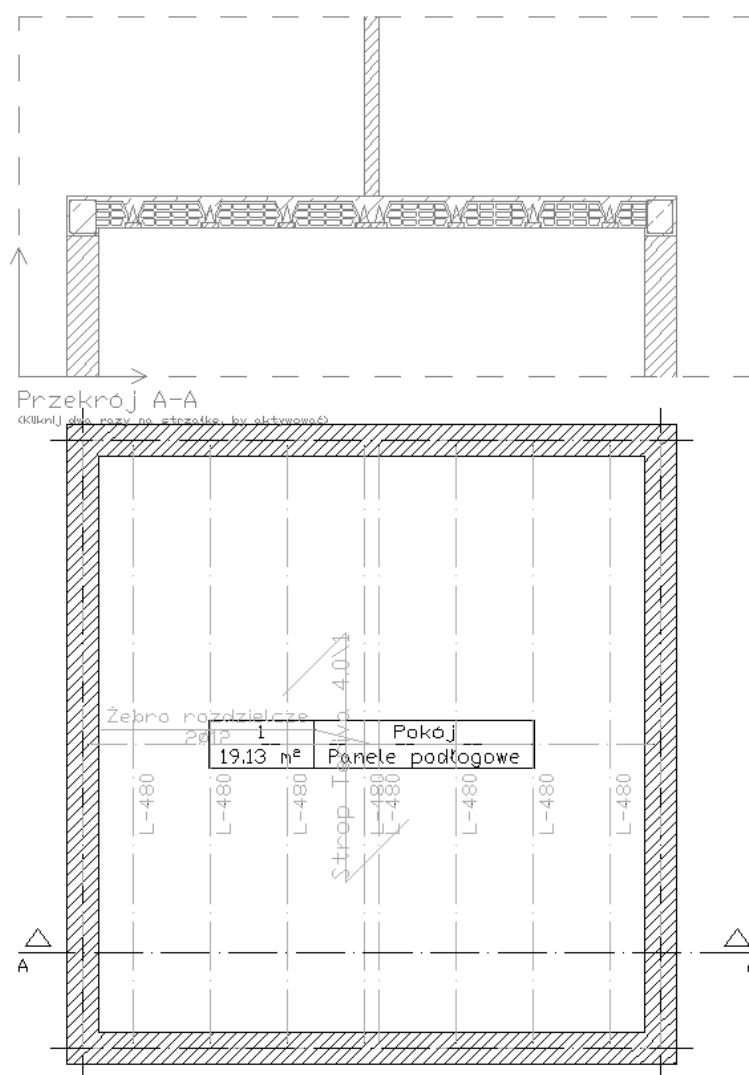




Fig. 3.31 . Sample drawing of reinforcing beam under partition wall of thickness above 12 cm

3.3.5.2 Individually installed reinforcing beams



Beyond reinforcing beams placed to the ceiling automatically, user has possibility of manual adding of single reinforcing beam. These reinforcing beams can be inserted on projection, in framed ceiling contour only, while both the start point and end point of the reinforcing

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beam must be inside the ceiling contour. If you want to insert reinforcing beam individually, you select from ribbon or toolbox of ArCADia-CEILLINGS TERIVA option:  - (*isa_irbca*) - ***Insert reinforcing beam through one point*** or  - (*isa_irbc*) - ***Insert reinforcing beam through two points***. After calling ***Insert reinforcing beam through one point*** function, user is asked for doing the following actions:

- **Select ceiling** – to identify the ceiling, you should select any point existing inside framed ceiling contour, to which the reinforcing beam will be added.
- **Select location** – we select appropriate point on the ceiling width, uniquely identifying reinforcing beam position (in this case always spanned from support wall to support wall, in ceiling support direction).

After calling ***Insert reinforcing beam through one point*** function, program expects from user next data given as above, according to questions appearing in the header of action bar and on lower command bar (or command line in case of **IntelliCAD** or **AutoCAD**). During entering of reinforcing beam placement point, on action bar are available the following means of graphical help: in reference to other selected points, in the middle between points and between points - in percentage terms.

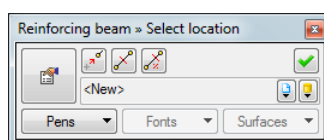


Fig. 3.32 Action bar during adding reinforcing beam

The second option of individual reinforcing beam insertion is ***Insert reinforcing beam through two points*** function. It differs from the previously described function only in sequence of actions made during insertion of reinforcing beam to architectural projection. After calling ***Insert reinforcing beam through two points*** function, program expects from user next data given as below, according to questions appearing in the header of action bar and on lower command bar (or command line in case of **IntelliCAD** or **AutoCAD**):

- **Select ceiling** – to identify the ceiling, you should select any point existing inside framed ceiling contour, to which the reinforcing beam will be added.
- **Select location** – we select appropriate reinforcing beam start point, most often on wall support layer axis, which supports the ceiling, which uniquely identifies reinforcing beam placement direction.
- **Select location** – we select appropriate reinforcing beam end point, lying with the start point on one line, parallel to the ceiling support direction.

This option allows for insertion of both reinforcing beams parallel to support direction and spanned between support walls, as well as reinforcing beams ending earlier or totally suspend in framed ceiling area. During entering of reinforcing beam start point, on action bar are available the following means of graphical help: in reference to other selected points, in the middle between points and between points - in percentage terms.

Work with program

3.3.5.3 Edition of reinforcing beams and their properties

Single click on reinforcing beam axis or one of its edges marks the beam for edition. Together with marked beam on drawing are shown assigned to it handles. These are: beam axis start point, middle point and end point. Graphical edition of the beam is just simple modification of placement of its handles:

- Handle in reinforcing beam axis start point and end point allows for modification of its length.
- Handle in reinforcing beam axis middle point allows for its movement along ceiling width.
- Marking beam or several reinforcing beams and pressing **Delete** key deletes marked elements from project.

Clicking on reinforcing beam drawn on level projection, user has access to two additional edition functions placed on action bar.

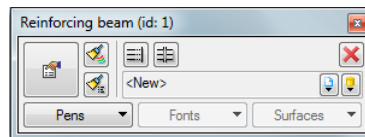


Fig. 3.33 Action bar during edition of reinforcing beam

These are in turn counting from left:

- Big button for access to **Element properties: Reinforcing beam** dialog box.
- Fonts and pens painter buttons.
- **Lengthen reinforcing beam** – function allowing for lengthening or shortening of reinforcing beam on selected end. After its calling, program asks for giving the following information:
 - **Select modification side** – user should select one of reinforcing beam ends, which will be shortened or lengthened.
 - **Select location** – user gives new location of earlier selected reinforcing beam end, being always on the extension of the existing axis of the beam.
- **Split reinforcing beam** – function allowing for splitting of one reinforcing beam to two beams in any point selected on its length.
 - **Select division point** – user selects appropriate point on beam axis, which is beam division point to two separate beams.

Making on projection double click on given reinforcing beam or choosing appropriate button on action bar for this element, we can move to edition of its properties - **Element properties: Reinforcing beam**.

Work with program

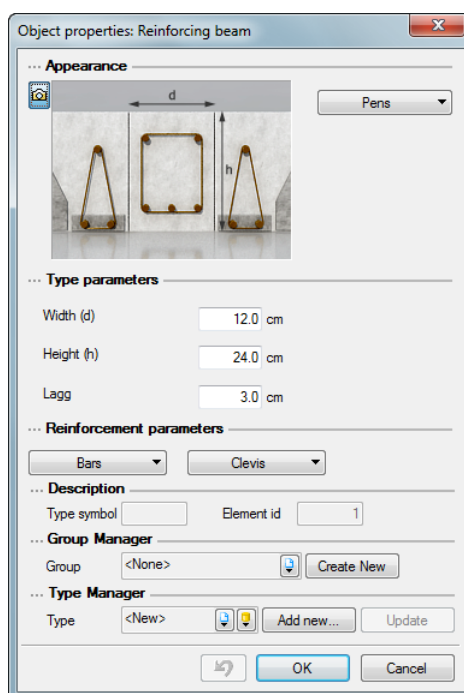


Fig. 3.34 Element properties: Reinforcing beam dialog box

Properties dialog box contains information about reinforcing beam width, height (measured from ceiling bottom) and reinforcement lagg for reinforcing beam (**Style parameters**). Entering of beam height bigger than ceiling height causes beam protruding above ceiling top edge. Access to editable **Reinforcement parameters** group, containing two separate lists: **Bars** and **Clevis**, allows for limited edition of reinforcing beam longitudinal and crosswise reinforcement.

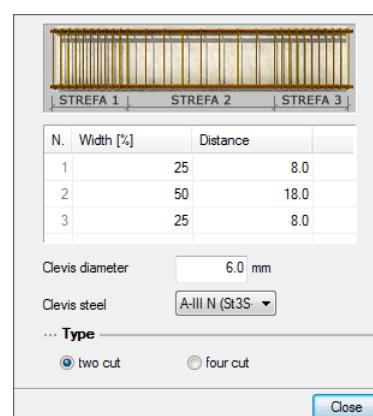
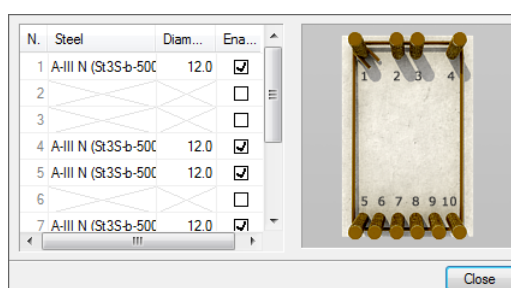


Fig. 3.35 Definition of reinforcing beam longitudinal and crosswise reinforcement dialog boxes

First of them concerns definition of reinforcing beam longitudinal reinforcement. By default, in beam is set reinforcement 2 \varnothing 12 top and 4 \varnothing 12 bottom. User has however possibility of changing this reinforcement in a range stipulated by the program. This function allows for reinforcement modification if you need to strengthen reinforcing beam, which, together with adjacent prefabricated beams, creates calculation ferroconcrete element, beam element of T-section. In reinforcing beam, you can use maximum 10 longitudinal bars of any accepted diameter (up to 4 top and up to 6 bottom). These rods are numbered from 1 to 10, and on the list at the left

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side you can choose steel grade (acc. to PN-B-03264: 2002 standard), write bar diameter in millimeters and check (or uncheck) checkbox of occurrence of given bar in beam section.

Similarly on the second list looks the situation concerning beam crosswise reinforcement, that is clevis. By default, in reinforcing beam are set two cut $\varnothing 6$ clevis, of A-III N steel, arranged every 8 cm in support zones and every 18 cm on the rest of beam length. This reinforcement can be adapted (in a range stipulated by the program) for needs resulting from individual calculations of designed element. Whole length of the beam was divided (in percentage terms) to maximum three zones of potentially different clevis density. Length of zones (in percentage terms) and clevis spacing in given zone (in cm) is set by user. Additionally, you can choose clevis type (two cut or four cut), change clevis diameter or select from list different grade of steel provided for crosswise reinforcement. Clevis in beam section are placed on its whole height, together with possible part protruded above ceiling surface.

3.3.6 Trimmers at ceiling holes

3.3.6.1 Trimmers at holes – general information and automatic arrangement

Ceiling holes of width up to 48 cm (for ceiling module 60 cm) and up to 33 cm (for ceiling module 45 cm) are solved in such a way that ceiling beams pass the hole. For ceilings of beam arrangement module of 60 cm, by holes in ceiling of width from 48 to 108 cm, at automatic beam arrangement trimmer system is used. Similar situation occurs for ceilings of beam arrangement module of 45 cm and holes in ceiling of width from 33 to 78 cm. Dimensions of maximal holes in the ceiling, solved automatically with the help of trimmers, are equal two modular spacings decreased by ceiling beam width (12 cm). If in ceiling occur real holes of irregular shape, on such hole is circumscribed theoretical rectangular hole of sides parallel and perpendicular to ceiling support direction and further dimensions of such hole are checked with described above conditions. If in ceiling occur holes of width bigger than in conditions above, in hole surroundings program places monolithic counter-floor, which construction details user should match individually, depending on hole size and ceiling load conditions in hole surroundings. Ceiling trimmers create two beam elements hidden in thickness of designed ceiling, placed perpendicularly to ceiling support direction, along edges of in mind circumscribed on hole rectangle. They create support for cut on hole width ceiling beam, from which load is carried with the help of trimmer to adjacent (not cut) ceiling beams. Trimmer dimensions are constant and amount: width – 20 cm, and height is equal to Teriva ceiling height. If designed hole in the ceiling is close to support wall which supports Teriva ceiling, by the hole can be placed only one trimmer, depending on the distance of hole edge from internal wall face (whether this distance is sufficient for placing of trimmer).

Graphical representation of a trimmer on projection are two parallel dashes offset on trimmer width (equal 20 cm), filled with ferroconcrete hatching. Example of automatic trimmers insertion by holes is shown on projection and section below.

Work with program

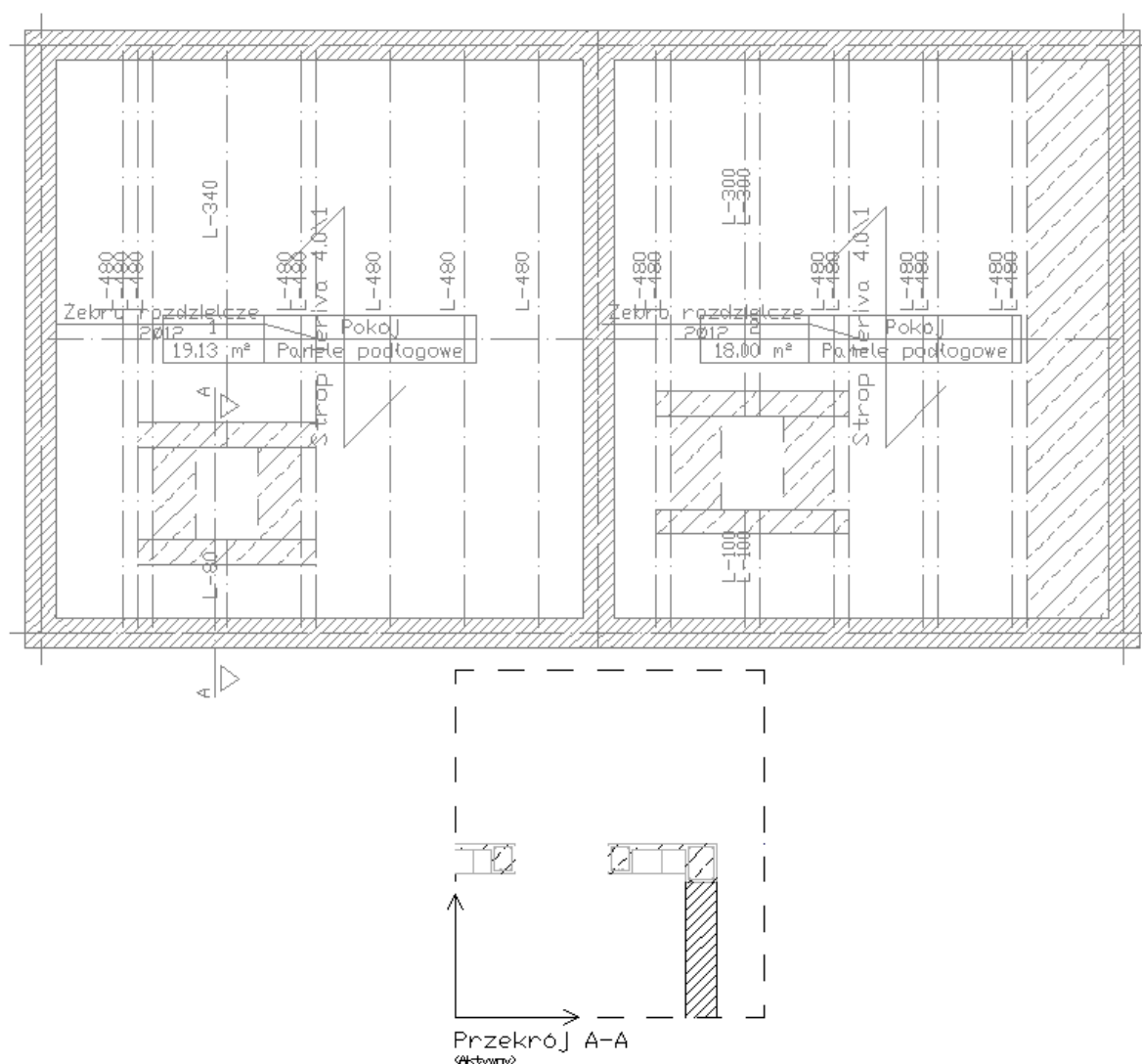



Fig. 3.36 Projection and section of automatically placed trimmer

3.3.6.2 Individual installation of the trimmer

Beyond automatic trimmers insertion by the holes, user has possibility of individual trimmer insertion. Trimmer can be inserted in framed ceiling area only, perpendicularly to support direction.



If you want to insert trimmer individually, you select from ribbon or main toolbox of ArCADia-TERIVA CEILINGS function:  - **(isa_its) – Insert trimmer**. After calling the function, user is asked for doing the following actions:

- **Select ceiling** – to identify the ceiling, you should select any point existing inside framed ceiling contour, to which the trimmer will be added.
- **Select start** – we select appropriate trimmer axis start point, lying on axis of any prefabricated beam of the ceiling.
- **Select end** – we select appropriate trimmer end point, lying in crossing point of line with start point, perpendicular to ceiling support direction and appropriate selected axis of ceiling prefabricated beam.

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During entering of trimmer start point, on action bar are available the following means of graphical help: in reference to other selected points, in the middle between points and between points - in percentage terms.

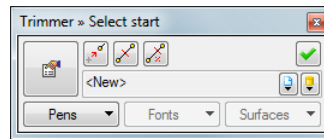


Fig. 3.37 Action bar during individual installing of the trimmer

3.3.6.3 Edition of trimmers and their properties

Single click on one of trimmer edges in projection marks the trimmer for edition. Together with marked trimmer on drawing are shown assigned to it handles. These are: trimmer (invisible) axis start point, middle point and end point. Graphical edition of the trimmer is just simple modification of placement of its handles:

- Handle in trimmer axis start point and end point allows for discrete modification of its length.
- Handle in trimmer axis middle point allows for its movement along ceiling support direction.
- Marking trimmer or several trimmers and pressing **Delete** key deletes marked elements from project.

Making on projection double click on given trimmer or choosing appropriate button on action bar for this element, we can move to edition of its properties - **Element properties: Trimmer**.

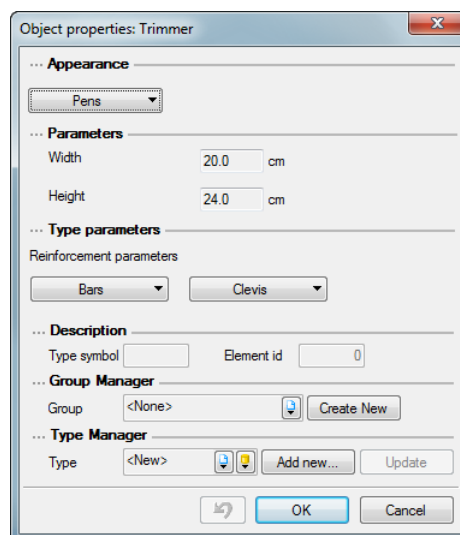


Fig. 3.38 Element properties: Trimmer dialog box

In properties dialog box we can preview trimmer height (equal to ceiling height) and its width of constant size 20 cm. The dialog box ensures also access to editable **Reinforcement parameters** group, containing two separate lists: **Bars** and **Clevis**, allowing for limited edition of trimmer longitudinal and crosswise reinforcement.

Work with program

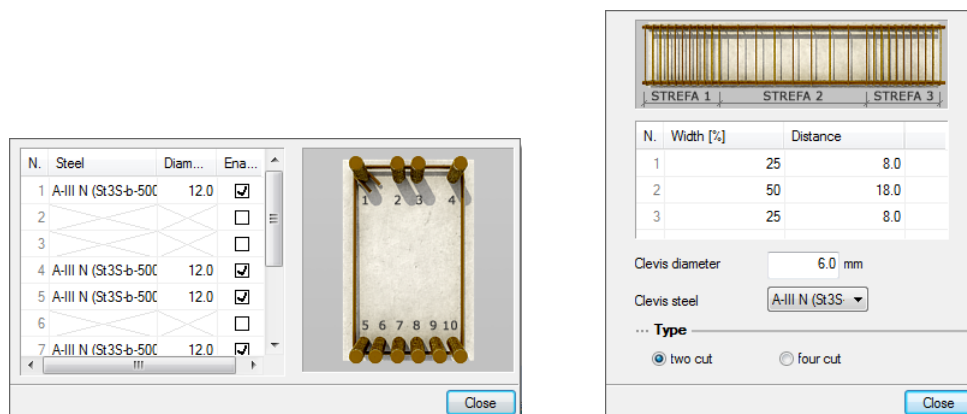


Fig. 3.39 Definition of trimmer longitudinal and crosswise reinforcement dialog boxes

First of them concerns definition of trimmer longitudinal reinforcement. By default, in trimmer is set reinforcement 2 \varnothing 12 top and 4 \varnothing 12 bottom. User has however possibility of changing this reinforcement in a range stipulated by the program. This function allows for reinforcement modification if you need to strengthen trimmer, which creates calculation ferroconcrete element, beam element of rectangular section. In trimmer, you can use maximum 10 longitudinal bars of any accepted diameter (up to 4 top and up to 6 bottom). These rods are numbered from 1 to 10, and on the list at the left side you can choose steel grade (acc. to PN-B-03264: 2002 standard), write bar diameter in millimeters and check (or uncheck) checkbox of occurrence of given bar in trimmer section.

Similarly on the second list looks the situation trimmer crosswise reinforcement, that is clevis. By default, in trimmer, analogously as in reinforcing beam, are set two cut \varnothing 6 clevis, of A-0 steel, arranged every 8 cm in support zones and every 18 cm on the rest of trimmer length. This reinforcement can be adapted (in a range stipulated by the program) for needs resulting from individual calculations of designed element. Whole length of the trimmer was divided (in percentage terms) to maximum three zones of potentially different clevis density. Length of zones (in percentage terms) and clevis spacing in given zone (in cm) is set by user. Additionally, you can choose clevis type (two cut or four cut), change clevis diameter or select from list different grade of steel provided for crosswise reinforcement. Clevis in trimmer section are placed on its whole width and height.

3.3.7 Ceiling monolithic counter-floors (plates)

In all ceiling fragments, which are not filled with airbricks, monolithic counter-floor in a form of monolithic plate is placed. By default, monolithic plates of framed ceilings are not reinforced. In every moment user can change in plate properties that it is reinforced, select direction of its support and assume longitudinal or crosswise reinforcement of the counter-floor. Ceiling monolithic plates can be reinforced only with orthogonal, bottom net of bars parallel and perpendicular to the direction of counter-floor support. In places of existence of such ceiling elements as reinforcing beam or trimmer, on their width also exists such object as counter-floor, but in his case it is mostly reinforced not with counter-floor reinforcement, but with beam reinforcement of reinforcing beam or trimmer. An exception is the situation when counter-floor exists on area of reinforcing beam (trimmer) and also beyond it. Then reinforcement of reinforcing beam (trimmer) can partially cover (overlap) with reinforcement of reinforcing beam (trimmer). You should remember that mostly

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reinforcement of counter-floor plate should support on reinforcement of adjacent reinforcing beams and trimmers.

All counter-floor plates in area of ceiling projection construction arrangement are represented on drawing in form of hatching (ferroconcrete) and it is the only graphical representation of counter-floors on level projection. An exception is reinforced plate, which additionally is represented by symbol of support direction. The other situation is on constructional sections through the ceiling, where, beyond counter-floors, graphical form of ferroconcrete hatching have also ceiling over-concrete together with all other monolithic fillings, such as: wall copings, reinforcing ribs, reinforcing beams, trimmers and monolithic fillings of framed ceiling beams.

All counter-floor monolithic plates are created automatically by program in places where cannot be placed basic filling elements of Teriva ceiling, concrete airbricks. Monolithic counter-floors cannot be inserted to the ceiling individually.

Single click on counter-floor plate hatching calls action bar dialog box, in which, beside big button of access to monolithic plate properties, user has for disposal smaller button of plate support direction change (for reinforced counter-floors) and button of ceiling support direction change.

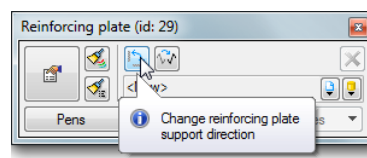


Fig. 3.40 Action bar for monolithic plate (counter-floor)

Monolithic plate support direction can be only perpendicular or parallel to framed ceiling support direction.

Making on projection double click on monolithic plate hatching or choosing appropriate button on action bar for this element, we can move to edition of its properties - ***Element properties: Monolithic plate.***

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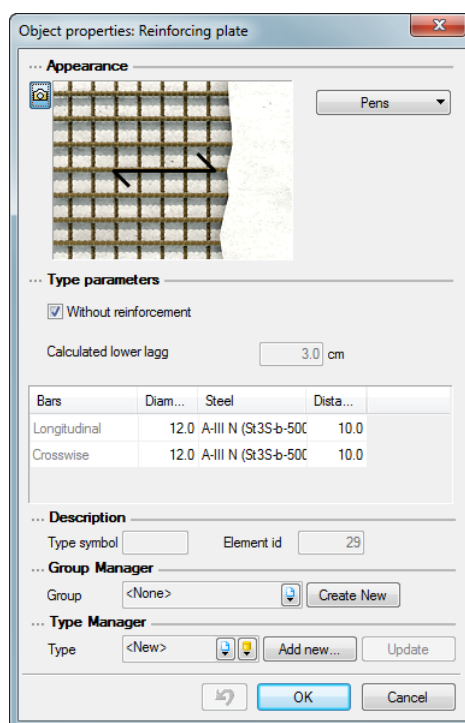


Fig. 3.41 Element properties: Monolithic plate dialog box

In **Element properties: Monolithic plate** dialog box unchecking of **Without reinforcement** checkbox in Style parameters group will cause appearing of counter-floor support direction mark on ceiling projection. This will be mark independent of given framed ceiling support direction mark, although its position may be parallel or perpendicular to ceiling support direction. Additionally, unchecking of **Without reinforcement** checkbox will give user access to parameters defining monolithic plate reinforcement, such as:

- Bottom calculation lagg of plate reinforcing net, calculated from ceiling bottom edge to net longitudinal rods axes [cm].
- Definition of longitudinal rods (parallel to monolithic plate support direction) in form of longitudinal rods diameter [mm], selected from list steel grade (acc. to PN-B-03264: 2002 standard) and net longitudinal rods spacing [cm].
- Definition of crosswise rods (perpendicular to monolithic plate support direction) in form of crosswise rods diameter [mm], selected from list steel grade (acc. to PN-B-03264: 2002 standard) and net crosswise rods spacing [cm].

3.3.8 Flat nets

3.3.8.1 Flat nets – general information and automatic arrangement

According to PN-B-03264 standard and Teriva ceilings specification guidelines, each framed ceiling should have top support construction reinforcement. These recommendations in Teriva framed ceilings are implemented with the help of additional flat and folded, placed above supports reinforcing nets.


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Flat nets should be installed for smaller ceiling spans according to guidelines given in „General characteristics of Teriva ceilings” chapter. Flat nets are placed along all supports of framed ceilings in ceiling over-concrete. In Teriva ceilings are used two types of flat nets, P-1 and P-2, differing in net width. P-1 nets (wider) are placed over all central supports (walls and binders), which support ceilings from both support sides. P-2 nets (narrower) are placed over all side supports (walls and binders), which support framed ceiling from one side of support only.

Because in program nets (especially P-1) can require placement of the same net above framed ceiling different areas, therefore in application they are one of not many elements that may be placed globally, beyond framed ceiling area. After arrangement, flat nets are not tied with given ceiling area and e.g. removal of the ceiling will not remove nets, which should be removed separately.

Also function of automatic flat net arrangement for given level is a function independent of individual framed ceiling zones and acts simultaneously for all the areas, for the whole level. In program, flat nets should be installed in final phase of the project, when ceiling construction arrangement of given level is already made and confirmed, that is all the other ceiling elements are properly arranged. When flat nets are already arranged, recalling of nets automatic arrangement function causes removal of all existing flat nets from the whole level and their automatic rearrangement on the whole ceiling.



Call of the function of automatic flat net arrangement we make from ribbon or main toolbox of ArCADia-TERIVA CEILINGS, choosing button:  - (*isa_rasf_ani*) - **Distribute nets on active level**. Program with one function distributes flat and folded nets on active level. Effect of operation of the function is shown on drawing below:

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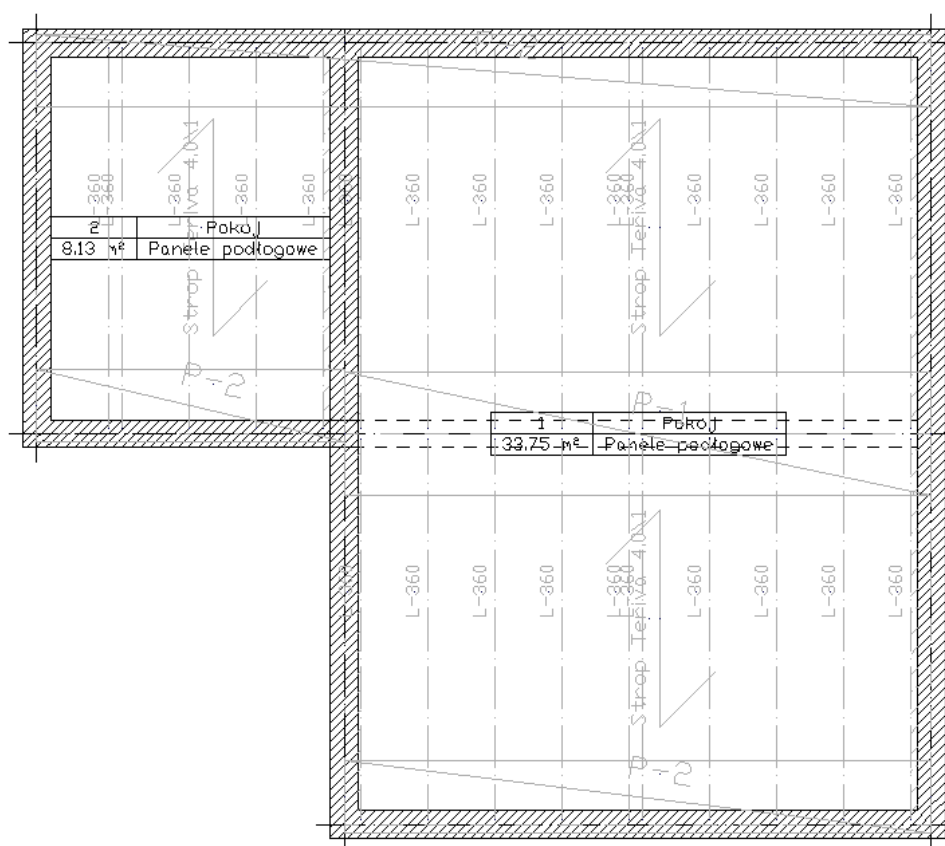


Fig. 3.42 Example of automatic flat nets distribution

Graphical representation of flat net area on architectural projection is a rectangle with drawn diagonal, above which is described net type (P-1 or P-2) for given area. Nets area shows on drawing space, in which should be installed nets of given type. Area width corresponds to the width of given type of net, whereas its length depends on ceiling support length and mostly this length consists of several nets of given type. From length of flat nets area (after taking into account the necessary overlaps) is set number of nets of given type for material list for given level.

Graphical representation of flat nets on individual building sections, in case of its passing through nets area, is a real net view in section. Also in case of 3D view, flat nets are shown in a form of their real view. The only concession (because of view readability) in relation to the actual implementation is here omission of necessary overlaps of individual nets.

Work with program

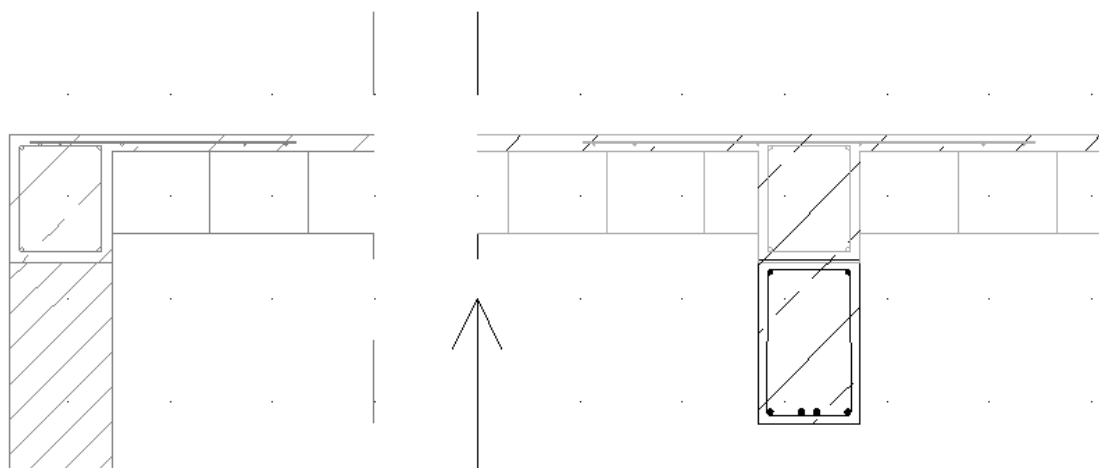



Fig. 3.43 Flat nets P1 and P2 on section

You should remember that, after automatic nets arrangement, if you need to make substantial changes in the construction layout of the ceiling, all nets should be reinserted automatically (automatic operation at nets reinsertion removes all existing nets). With minor changes to the pay may be manually modify nets. It is most convenient to remove all the net type from level marking them in **Project Manager**.

3.3.8.2 Flat nets – installed individually



Beside flat nets inserted automatically for the whole level, in program user has possibility of individual single net insertion. After choosing  - (*isa_ifnc*) – **Flat net** function, action bar for this element appears.

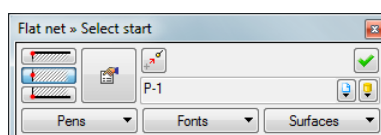


Fig. 3.44 Action bar during individual entering of the flat net

Before selection of start and end point of inserted net, user should select type of inserted net from the list, and then press button designating corresponding edge (left, right) or net axis, which it will be inserted to drawing with. Both edges and geometrical axis of the net are always counted along its length (net width is constant and dependent on the type of net). By selection of start and end point of the net we have possibility of use of visible on action bar reference option.

3.3.8.3 Flat nets – properties and edition

Single click on one of flat net edges in projection marks the net for edition. Together with marked net on drawing are shown assigned to it handles. These are: flat net (invisible) axis start point, middle point and end point, calculated in direction of its length. Graphical edition of the net is just simple modification of placement of its handles:

- Handle in net axis start point and end point allows for modification of its length.
- Handle in net axis middle point allows for movement of the whole net in any direction.

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- Marking net or several nets and pressing **Delete** key deletes marked elements from project.

Making on projection double click on given net or choosing appropriate button on action bar for this element, we can move to edition of its properties - **Element properties: Flat net**.

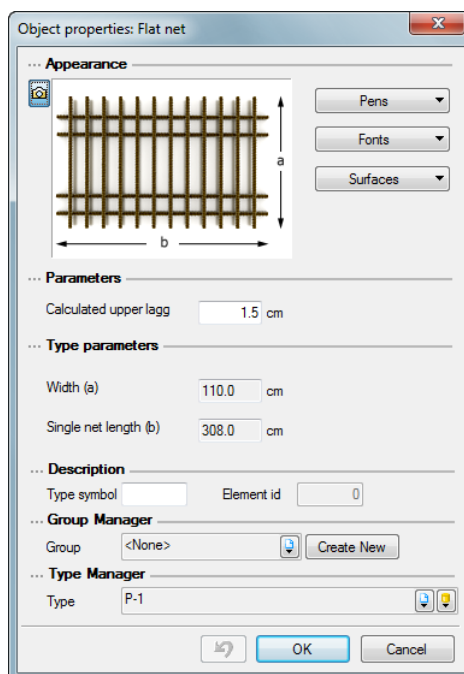


Fig. 3.45 Element properties: Flat net dialog box

In properties dialog box we can preview non-editable style parameters in form of width and length of single net (it is not the length of entered nets area). The only significant and editable parameter of flat nets properties is calculation lagging of net top rods, always counted from top of the level. Because for typical Teriva ceilings, top of the level mostly covers with the ceiling top edge, so calculated lagging is at the same time the distance of rods axes from ceiling top edge. The situation would be different in case of ceiling fragment lowered towards top of the level. Then, you should remember that lagging size is always calculated from top of the level, and not from top of the ceiling. This is because the nets are independent of the ceilings and theoretically (although, of course, this does not make sense) can be entered to projection, on which there are no Teriva ceilings installed.

3.3.9 Folded nets

3.3.9.1 Folded nets – general information and automatic arrangement

According to PN-B-03264 standard and Teriva ceilings specification guidelines, each framed ceiling should have top support construction reinforcement. These recommendations in Teriva framed ceilings are implemented with the help of additional flat and folded, placed above supports reinforcing nets.

Folded nets should be installed for ceilings of bigger spans according to guidelines given in „General characteristics of Teriva ceilings” chapter and also for both areas of Teriva 4.0/1 ceilings, treated as continuous, of span ratio minimum 0.7. Folded nets are placed bent on ends of each


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ceiling beam of proper length, along all supports of framed ceilings. The nets are folded in such a way that main net reinforcement is in ceiling over-concrete, and folded parts are placed along frameworks of prefabricated beams. For different heights of Teriva ceilings is used different width of net before its folding, adapted for ceiling height (after net folding). In Teriva ceilings are used two types of folded nets: Z-1 and Z-2, differing in net length. Z-1 nets (longer) are placed along ceiling beams of proper length, over all central supports (walls and binders), which support ceilings from both support sides. The condition enabling installation of Z-1 nets is corresponding of the axes of successive ceiling beams from left and right support side (when axes do not correspond, you should use Z-2 nets). This condition should be retained, in particular for Teriva 4.0/1 ceilings calculated as continuous, of successive spans ratio minimum 0.7. Z-2 nets (shorter) are placed on ends of ceiling beams of proper length, for all side supports (walls and binders), which support framed ceiling from one side of support only. Ends of Z-2 nets main reinforcement are folded on building site to wall copings.

Because in program folded nets (especially Z-1) can require placement of the same net above framed ceiling different areas, therefore in application they are one of not many elements that may be placed globally, beyond framed ceiling area. After arrangement, folded nets, similarly to flat nets are not tied with given ceiling area and e.g. removal of the ceiling will not remove nets, which should be removed separately.

Also function of automatic folded net arrangement for given level is a function independent of individual framed ceiling zones and acts simultaneously for all the areas, for the whole level. In program, folded nets should be installed in final phase of the project, when ceiling construction arrangement of given level is already made and confirmed, that is all the other ceiling elements are properly arranged. When folded nets are already arranged, recalling of nets automatic arrangement function causes removal of all existing folded nets from the whole level and their automatic rearrangement on the whole ceiling.



Call of the function of automatic folded net arrangement we make from ribbon or main toolbox of ArCADia-TERIVA CEILINGS, choosing button:  - (*isa_rasf_ani*) - **Distribute nets on active level**. Program with one function distributes flat and folded nets on active level.

Effect of operation of the function is shown on drawing below:

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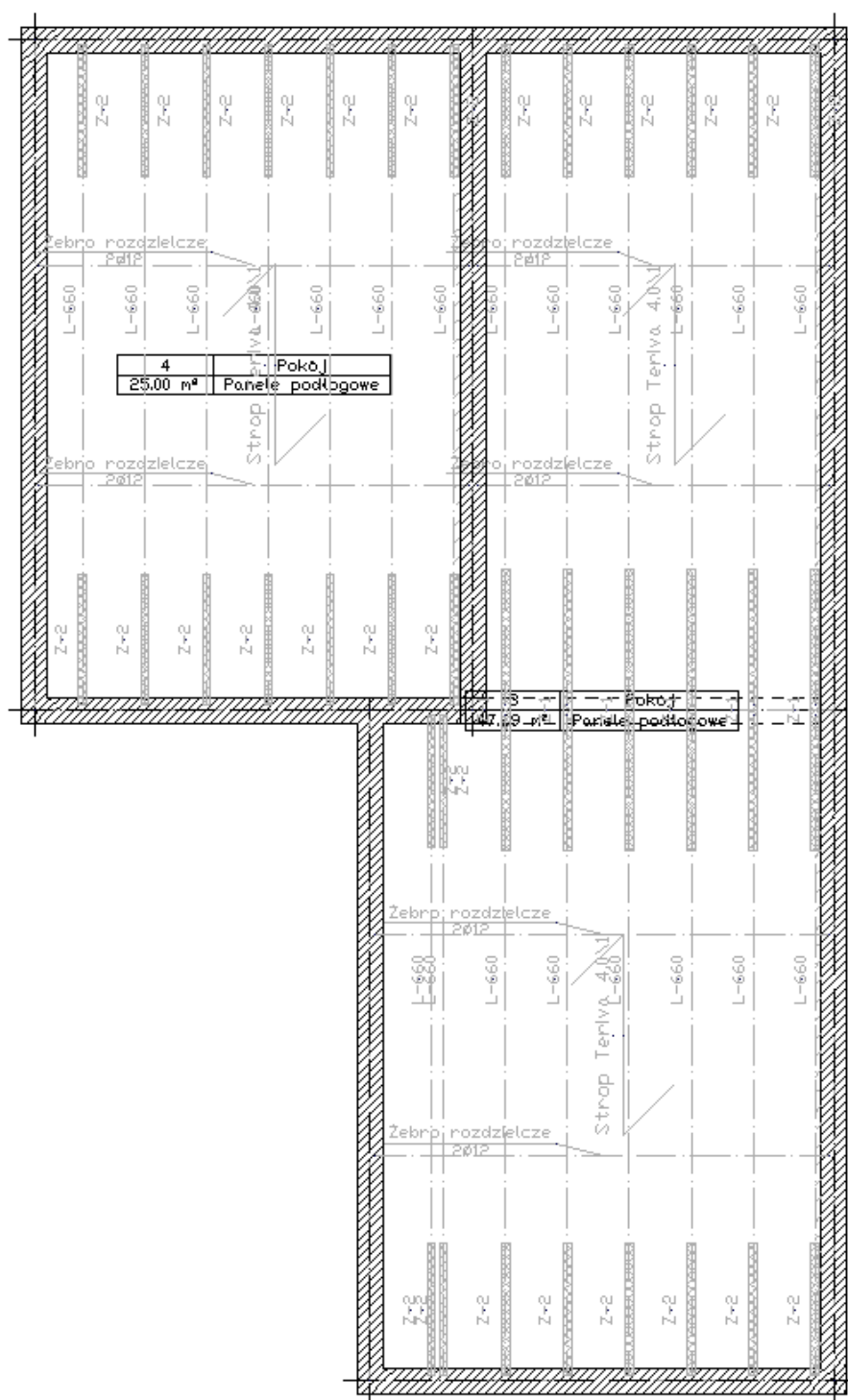


Fig. 3.46 Example of automatic folded nets distribution

Graphical representation of folded net on architectural projection is a lengthened rectangle with drawn hatching put on ends of corresponding ceiling beams. Width of the rectangle corresponds to net width after folding, while its length corresponds to length of Z-1 and Z-2 nets.

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Graphical representation of folded nets on individual building sections, in case of its passing through such nets, is a real view of folded on beam net in section. Also in case of 3D view, folded nets are shown in a form of their real view.

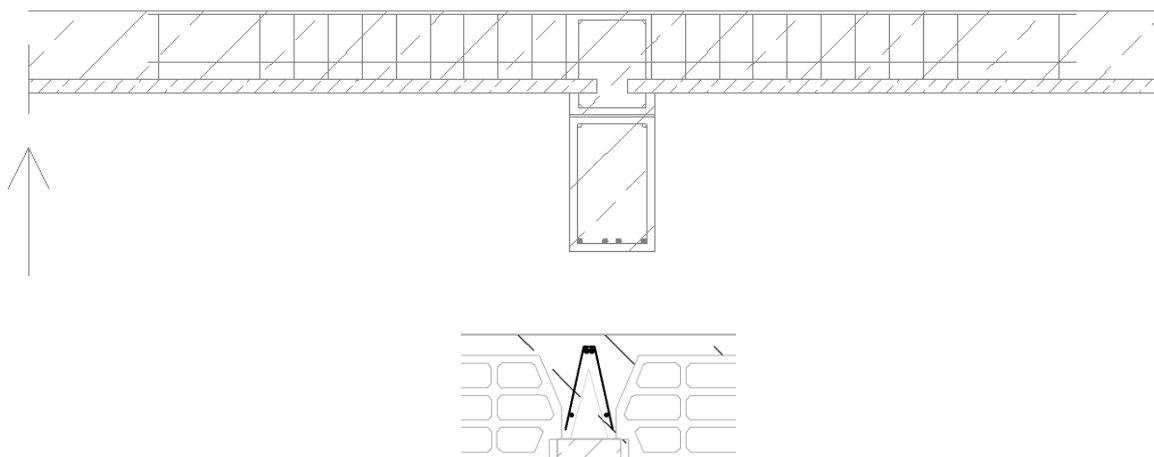



Fig. 3.47 Folded nets on section

You should remember that, after automatic folded nets arrangement, if you need to make substantial changes in the construction layout of the ceiling, all nets should be reinserted automatically (automatic operation at nets reinsertion removes all existing nets). With minor changes to the pay may be manually modify folded nets. With minor changes to the pay may be manually modify nets. It is most convenient to remove all the net type from level marking them in **Project Manager**.

3.3.9.2 Folded nets – installed individually



Beside folded nets inserted automatically for the whole level, in program user has possibility of individual single folded net insertion. After choosing  - (*isa_ifdc*) – **Folded net** function, action bar for this element appears.

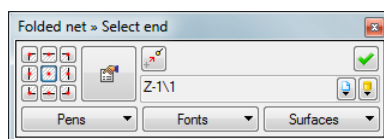


Fig. 3.48 Action bar during individual entering of the folded net

Before selection of position of inserted folded net (it has always invariable dimensions), user should select type of inserted net from the list (Z-1 or Z-2), and then press one of nine buttons designating corresponding net insertion point, which it will be inserted to drawing with. By selection of end (insertion) point of the folded net we have possibility of use of visible on action bar reference option. After selection of appropriate net localization point, we still select second point, which will specify direction of its placement (parallel to prefabricated beam axis).

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3.3.9.3 Folded nets – properties and edition

Single click on one of folded net edges or its hatching in projection marks the net for edition. Together with marked net on drawing is shown assigned to it handle which is at the intersection of the axes of the net. Graphical edition of the net is just simple modification of placement of its handle on projection. Graphical modification of the net allows therefore for its move, does not allow however for its rotation. To do that, you should delete entered net, and insert it again.

Making on projection double click on given folded net or choosing appropriate button on action bar for this element, we can move to edition of its properties - **Element properties: Folded net**.

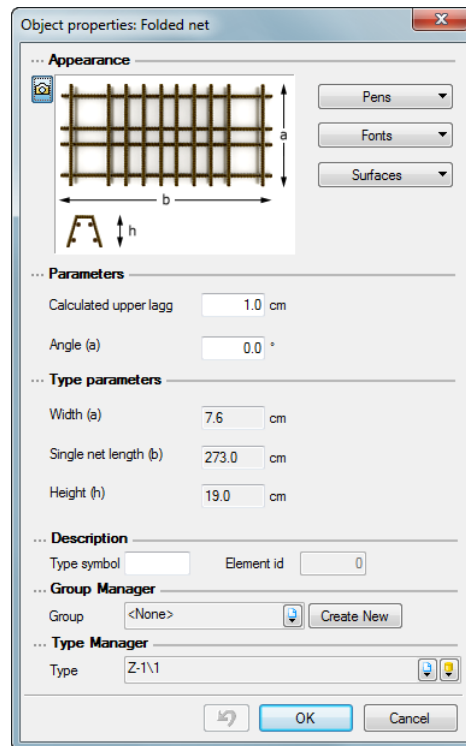


Fig. 3.49 Element properties: Folded net dialog box

In properties dialog box we can preview non-editable style parameters in form of width, length and height of single net (after its folding). The only significant and editable parameter of folded nets properties is calculation lagging of net top rods, always counted from top of the level and given in degrees net rotation angle on level projection. Because for typical Teriva ceilings, top of the level mostly covers with the ceiling top edge, so calculated lagging is at the same time the distance of folded net main rods axes from ceiling top edge. The situation would be different in case of ceiling fragment lowered towards top of the level. Then, you should remember that lagging size is always calculated from top of the level, and not from top of the ceiling. This is because the nets are independent of the ceilings and theoretically (although, of course, this does not make sense) can be entered to projection, on which there are no Teriva ceilings installed.

3.4 Material lists in ArCADia-TERIVA CEILINGS


Next elements automatically inserted and modified by program are material lists. Material lists should be made in the last phase of the project, when the project is finished and verified from a

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technical point of view. Inserting a list into the project at an earlier stage does not eliminate its correctness, which is updated on the fly, but burdens the program with additional calculations in the framework of any substantial modification of the project. In material lists are counted for each level amounts of basic prefabricated elements, such as: airbricks, ceiling beams, ending bricks, reinforcing rib parts, wall coping and lintel parts, and flat and folded nets. Lists of ceiling elements, such as: airbricks, ceiling beams, ending bricks, reinforcing rib parts and folded nets are possibly split to basic types (styles) of Teriva ceilings, used in the framework of one level. The other elements, such as wall coping and lintel parts, and flat nets are included in separate lists, total for the entire floor, whatever types of ceilings were used. Beyond amount lists of prefabricated elements, for each level program estimates necessary amount of monolithic concrete and mass of additional reinforcement, given in division to steel grades and diameter of individual bars. The value specified by the program evaluation will be the more accurate, the more precisely you will determine the actual level of longitudinal and crosswise reinforcement of individual monolithic elements of the ceiling. Lists of material are carried out automatically with the following assumptions:

- Ceiling beams are counted with the accuracy to one piece in accordance to their description on projection of level construction layout.
- Number of concrete airbricks is set from their real arrangement on given level, including ending bricks and by assumption that each cut airbrick constitutes an additional full piece included in the list.
- Ending bricks are counted assuming that in each airbrick row, from each side, they separate airbrick space with holes from wall coping and reinforcing rib or trimmer.
- Reinforcing rib parts are counted from number of parts per one reinforcing rib, corresponding to number of airbrick areas.
- Flat nets are determined from maximal length of given area of nets rounding up.
- Folded nets are determined according to their layout on construction projection of the ceiling, separately for each ceiling height.
- Monolithic concrete volume is determined from the difference of ceiling internal part volume and prefabricated elements volume (airbricks including cuts, beam feet, moulders, reinforcing ribs, etc.), then is increased by real volume of adjacent wall copings and additionally is increased by 5% of so calculated volume.
- Amount of reinforcement of monolithic elements is determined from dimensions of these elements (length and section) and set by user step of longitudinal and crosswise reinforcement.



Call of the function of automatic material list insertion we make from ribbon or main toolbox of ArCADia-TERIVA CEILINGS, choosing button:  - (*isa_iccs*) - ***Insert Stropex ceiling elements list***. After choosing ***Insert elements list*** function, action bar for the list appears, where we can choose one of nine points of the list insertion and move to dialog box of its properties.

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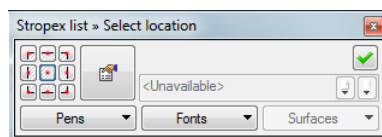


Fig. 3.50 Action bar during insertion of Stropex ceiling elements list

After selecting list position on the drawing, we get the list as in the following example:

System Strop TerIva 4.0\1

Pustaki	776 szt.
Kształtki zebra rozdzielczego	40 szt.
Belki	
L-360	25 szt.
L-660	21 szt.

Siatki płaskie

P-1	2 szt.
P-2	6 szt.

Siatki zaginane

Z-1\1	6 szt.
Z-2\1	30 szt.

Beton

Beton	14,0 m ³
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Zbrojenie

A-III N (St3S-b-500)		
6.0 mm	854.4 m	189.6 kg
10.0 mm	371.5 m	229.0 kg
12.0 mm	164.9 m	146.4 kg
16.0 mm	210.0 m	331.5 kg
Suma		896.5 kg

Fig. 3.51 Example of inserted to drawing list of elements

Clicking on any element of inserted to drawing list, we get access to action bar enabling saving the list in form of order in RTF format.

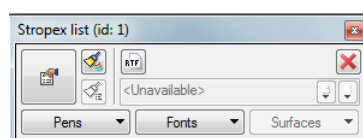


Fig. 3.52 Action bar during edition of the list, enabling getting order in RTF format

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3.5 Work on projection, in section and in 3D view


The main workspace in program is architectural projection containing basic elements, such as: support and partition walls, windows, doors, binders, holes in walls and ceilings, etc. On it is entered Teriva ceiling construction layout, that is: ceilings, ceiling beams, reinforcing ribs, reinforcing beams, trimmers, monolithic counter-floors, wall copings, flat and folded nets. During work on projection you should remember that before ceilings settlement we always build full building model, containing layout of all necessary levels, so that during framed ceilings arrangement program had chance to recognize partition walls placed in ceiling support direction, situated on higher level. Because not all Teriva ceiling elements (e.g. airbricks, ending bricks, etc.) have their graphical representation on projection, and representation of the rest is often limited to traditional symbols (element axes, descriptions, etc.) ensuring transparency of often quite complex ceiling construction layouts, in the course of the project work is a good idea to use the option of constructional section.

Constructional section in program is a normal direct section of view zero depth (visible on it are cut elements, and not visible are elements that are in view) and always is made in vertical direction from half of given level to the half of the next one. On constructional section, made through object real model, you can often see details that are hard to see on architectural projection, such as e.g.:

- Sections through full and cut airbricks.
- Sections through real ceiling beam layouts.
- Sections through wall copings and lintels together with suitably selected wall coping and lintel parts.
- Sections through ceiling monolithic elements, allowing to check correctness of individually set longitudinal reinforcement of such elements as: binders, wall copings, lintels, reinforcing beams, reinforcing ribs and trimmers.

Last from these possibilities is available on sections thanks to display the shape of crosswise reinforcement and showing of the number of longitudinal bars (top and bottom) in section of given element. Thanks to these possibilities, user during work on project can enter one or few constructional sections through Teriva ceiling, constituting control element of correctness of accepted construction solutions. It is possible especially thanks to function of constant and automatic update of inserted to drawing sections, by any change introduced to object model on construction layout projection.



Call of the function of ceiling section insertion we make from ribbon or main toolbox of ArCADia-TERIVA CEILINGS, choosing button:  - (*isa_icelc*) - **Insert constructional section**.

After choosing **Insert constructional section** function, action bar for the section appears, with available function for points selection with use of **Reference** option.

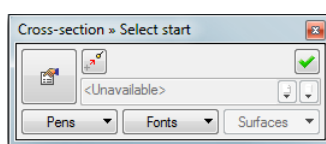


Fig. 3.53 Action bar during insertion of constructional section

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Then user will be asked for doing the following actions:

- **Select start** – user selects cut line start point on graphical screen containing architectural projection.
- **Select end** – we select appropriate cut line end point (with additional auxiliary options on action bar: **Angle, Length and Parallel**).
- **Select side** – we select any screen point on one side of cut line, indicating viewing direction.
- **Select location** – we select appropriate point beyond projection, locating section position on drawing.

In program you can make constructional section in any direction: horizontal, vertical or slanting (you cannot make offset sections). After insertion of the section to the drawing, it is seen by program as additional **ArCADia-START** system view with all options available for such view (as e.g. moving).

If you double click on section cut line on projection or select big button in action bar for section, **Element properties: Section** dialog box will be started.

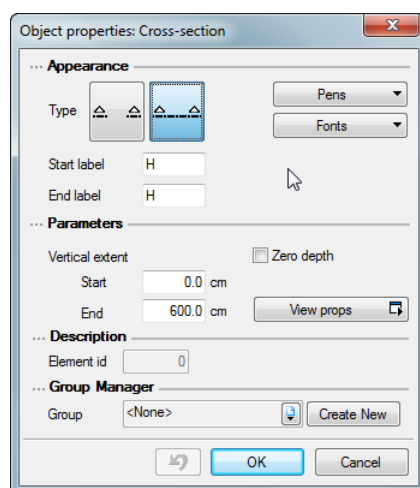


Fig. 3.54 Element properties: Section dialog box

In **Element properties: Section** dialog box user can select cut line graphical type and change designations of section start and end.

Single click on section cut line activates section basic handles enabling its graphical edition. User has for disposal:

- Start and end handle enabling lengthening or change of direction of given section.
- Central handle allowing for parallel movement of section place.

Each change of section cut line location on projection of constructional layout causes section update and redraw on the view in accordance with its new location.

Similar to section function in program performs **3D preview** option. It can be always activated from ribbon or main toolbox of **ArCADia-START** with **Hide/Show 3D view** option. In contrast to constructional section (which always concerns Teriva ceiling on one level), on 3D view we

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can always see the whole of defined in model project (view of all levels together). On 3D view are shown also basic elements of Teriva ceilings construction: beams, airbricks, ending bricks, etc., and also basic ceiling reinforcement. Examples of 3D view and reinforcement detail are shown below:

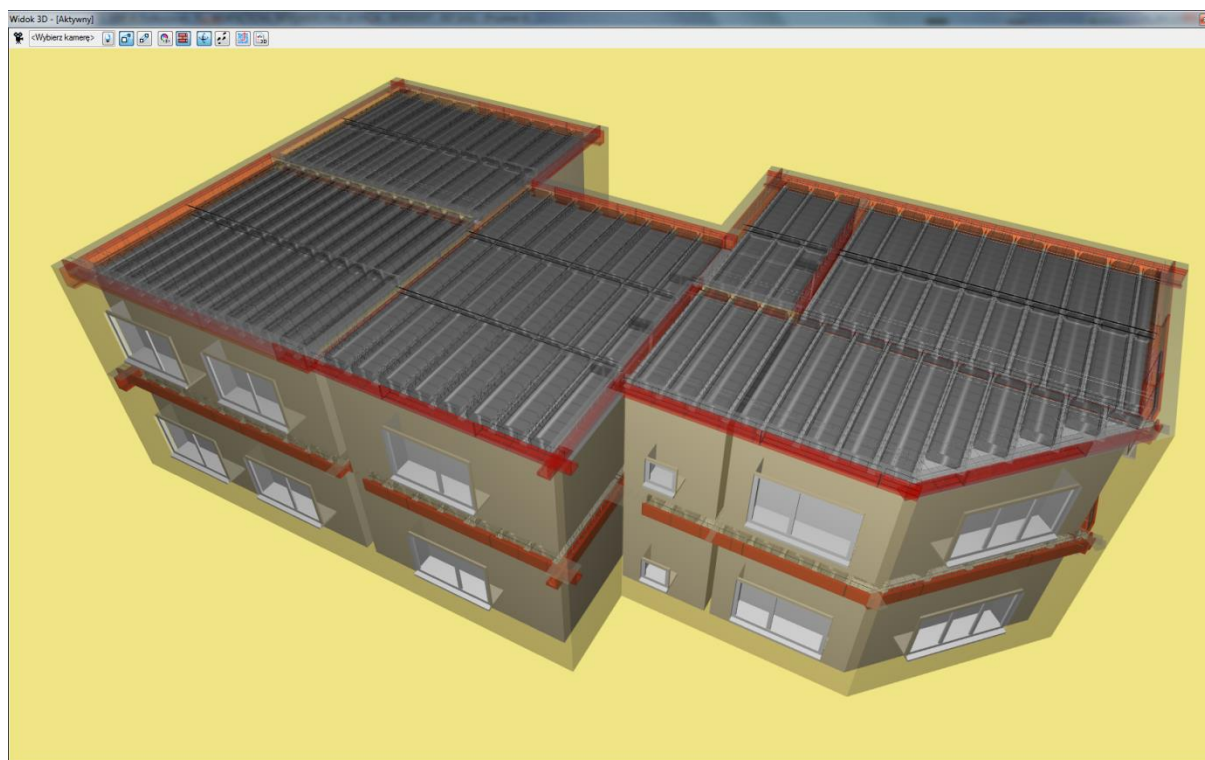
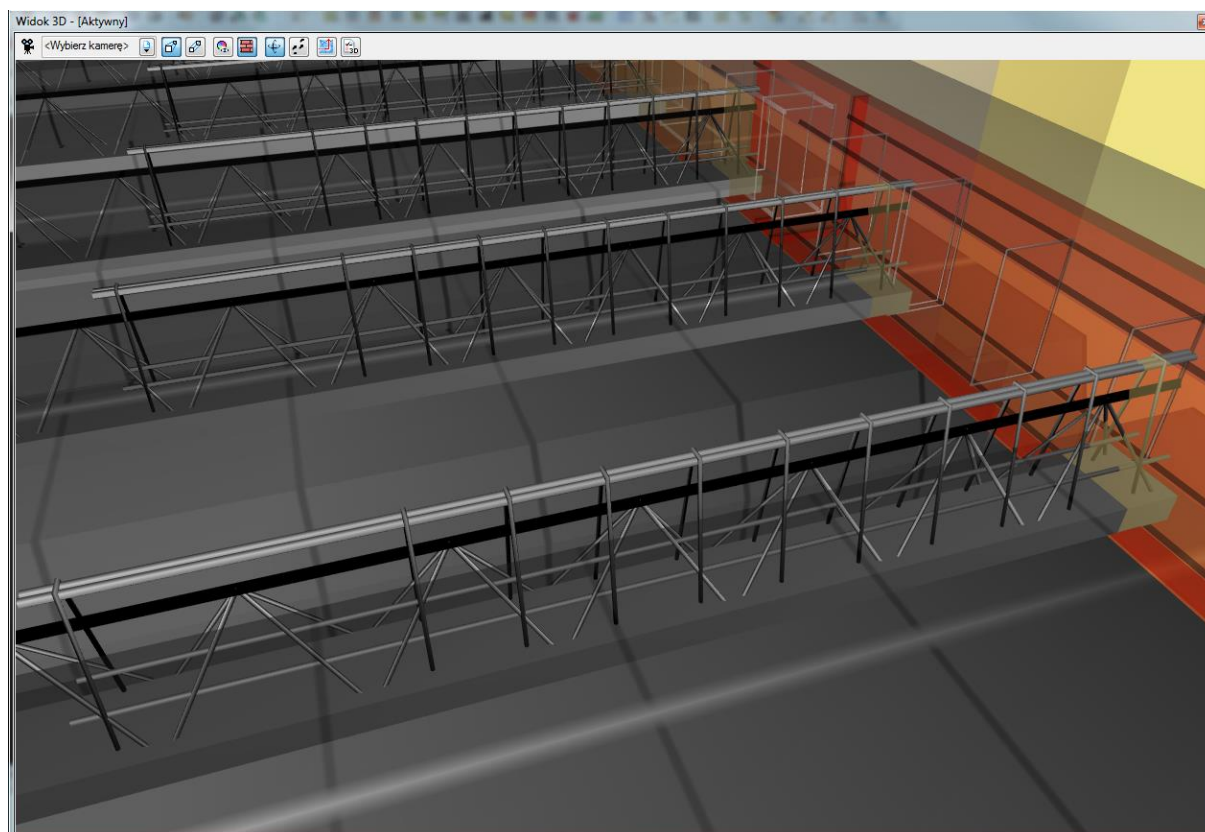


Fig. 3.55 Sample 3D view of arranged Teriva ceiling

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3.56 Ceiling reinforcement detail in 3D view


In 3D preview dialog box is available icon enabling saving of currently set view to file. After choosing - **Save scene as image** command, user gives file name, under which will be saved displayed image of the view.

3.6 Teriva ceilings correctness inspection

In program was introduced additional function of Teriva ceilings correctness inspection. This function always works for active level and connected with it Teriva ceiling constructional layout projection. Function of ceiling inspection consists of the following actions:

- Check whether all Teriva ceilings elements (beams, reinforcing ribs, reinforcing beams, trimmers, counter-floors) lie within areas of set ceilings. This option does not apply to flat and folded nets, which can be set for different ceiling areas.
- Check whether ceiling prefabricated beams do not overlap.
- Check whether both ends of prefabricated beams rest on wall support layers or binders. Resting end of cut prefabricated beam on trimmer is also recognized as proper.



Call of the function of ceilings correctness inspection insertion we make from ribbon or main toolbox of ArCADia-TERIVA CEILINGS, choosing button:  - (**isa_cfcsec**) - **Check correctness of ceiling elements** (remember that the check always acts for the active level).


As a result of function operation, ceiling elements, which do not fulfill one of described above conditions, will be displayed on projection in red. Their status (of improper elements) will be kept so long, until user enters necessary corrections to the ceiling constructional layout. After such changes

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and making another ceiling correctness inspection, for corrected elements will be restored the default color.

3.7 Insertion of title block

Program has also capability of insertion of ready title block. Title block is also inserted as 2D object and user himself, using text, must enter appropriate identification data to corresponding fields.

After choosing -  **Show Object Explorer** command from **ArCADia Architektura** menu, object selection dialog box appears. After selecting - **2D objects** tab and marking – **Project title blocks** branch, we will be able to select one of five available title block formats.

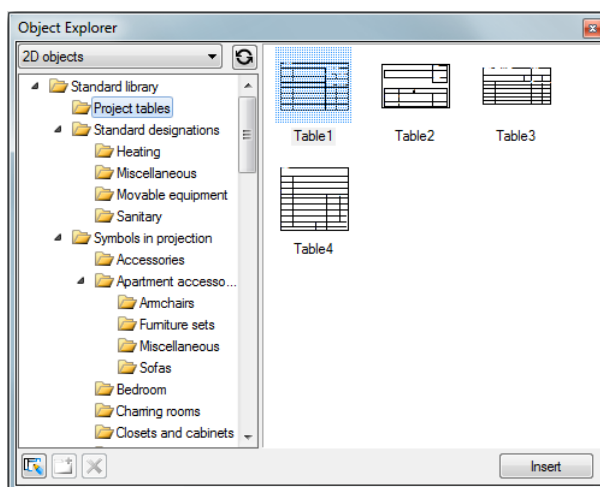


Fig. 3.57 Insertion of selected title block

After choosing proper title block format, we will be able to place it in selected location on drawing.