

# Reference: Stairs, Roof, and Enhancements

Stairs and roof can present design challenges.

## 7

### In this chapter:

- ✚ Insert a staircase
- ✚ Add a roof
- ✚ Insert skylights
- ✚ Work with room definitions
- ✚ Work with floors

## Getting an Overview

Not all buildings require a staircase, but they do need a roof. ZAC helps you create both. In comparison, defining rooms and floors is simple.

### Objectives

You will be able to:

- Insert a staircase
- Add a roof
- Insert a skylight
- Trim walls to roof
- Work with room definitions
- Work with floors

## Inserting a Staircase

Creating stairs is a lot more complicated than taking windows and doors from a database and inserting them in an opening.

### Define Stair Opening

Designate an area on your drawing for the stairwell. Although stairs can be freestanding in a house, they are often placed in an enclosed stairwell for a commercial project because of building and fire safety codes.

### Create and Modify a Staircase

No matter what type of staircase you want to install in your drawing, you must set flight parameters and make a few more decisions that affect the widths of steps, treads, and tread overhangs in addition to the height of risers. Also keep in mind that a flight of stairs has a minimum of three and a maximum of 36 steps.

➔ To create a staircase:

1. Click on the Model 3D Stair icon in the ZAC toolbar. The Stairs menu appears.

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ZAC may ask if you want to “Accept last stair model?” If you want to create a new staircase entirely, select No. If you select Yes, ZAC displays the last staircase you created.

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2. Select StairCon. The StairCon menu appears.
3. Set the flight parameters by using the FlgtPara option in the StairCon menu. See instructions for this procedure below.
4. Set the width of the steps within the staircase by using the Widths option in the StairCon menu.
5. Activate Contour if you want a curved staircase or FixShape if you want a rectangle-based flight. These are mutually exclusive toggle switches.
6. Place the staircase in your drawing and modify it if necessary. For example, you may want to add landings or distribute steps evenly in a switchback (dogleg) staircase.
7. Generate the 2D model.
8. Generate the 3D model.

## Set Flight Parameters

The flight parameters determine how many treads are required based on the height of the flight from its first step to its last. Since ZAC may revert to its defaults, you should set the flight parameters each time you design a new staircase.

→ To set flight parameters for a staircase:

1. Click on the Model 3D Stair icon in the ZAC toolbar. The Stairs menu appears.

ZAC may ask if you want to "Accept last stair model?" If you want to create a new staircase entirely, select No. If you select Yes, ZAC displays the last staircase you created.

2. Select StairCon. The StairCon menu appears.
3. Choose FlgtPara. The FlgtPara (flight parameters) menu appears.
4. Select Calculat. The Stairs Rise Ratio definition screen appears.

Rise ratio			
Storey height .....	8'-9 1/2" ft	FFL, bottom .....	0" ft
Stair height .....	8'-9 1/2" ft	FFL, top .....	0" ft
Number of risers ...	15		
Rise .....	7 1/32" ft	Thickness of tread .....	1 31/32" ft
Tread .....	10 3/4" ft	Thickness of riser .....	0" ft
Rise Going of Flight:	12'-6 9/32ft	Depth of tread overhang ..	0" ft
Rise ratio 2R+G .....	2'-0 13/16ft	Chase width .....	6 5/16" ft

F1=Mark | F2=Calculate | F3=LimitValue | F0=Accept

Your mouse has no effect in this screen. You can move from one item to another in this text-based screen by pressing the up and down arrow keys. When an option is highlighted, you can change it.

5. Highlight Storey height, input the value you want, and press **[Enter]**. The new height appears and Number of risers is highlighted.
6. Use the **[UpArrow]** to highlight Storey height again and press **[F1]** for Mark.

STAIRS

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Rise ratio

Storey height .....> 8'-0" ft FFL, bottom .....: 0" ft

Stair height .....: 8'-9 1/2" ft FFL, top .....: 0" ft

Number of risers ...: =15

Rise .....: =7 1/32" ft Thickness of tread .....: 1 31/32" ft

Tread .....: =10 3/4" ft Thickness of riser .....: 0" ft

Rise Going of Flight: =12'-6 9/32ft Depth of tread overhang ..: 0" ft

Rise ratio 2R+G ....: =2'-0 13/16ft Chase width .....: 6 5/16" ft

F1=Mark | F2=Calculate | F3=LimitValue | F0=Accept

The values in the other fields on the Stairs Rise Ratio definition screen are preceded by the = sign.

7. Press **F2** for Calculate. ZAC makes changes to the definition based on the height of your opening.

8. Use the arrow keys to make changes in the other fields to reflect your requirements.
- |                      |  |
|----------------------|--|
| Number of risers     | Total number of risers, not treads.  |
| Rise                 | Height of each riser.  |
| Tread                | Depth of each tread.   |
| Rise Going of Flight | Length of flight.  |
| Rise ratio 2R+G      | Rise versus run ratio.   |
| FFL, bottom          | Finished floor level at bottom of staircase. If this is 0, ZAC assumes you have already defined the finished floor level for the zone and are using that figure. |
| FFL, top             | Finished floor level at top of staircase. If this is 0, ZAC assumes you have already defined the finished floor level for the zone and are using that figure.    |
| Thickness of tread   | Thickness of each tread.   |

Thickness of riser	Thickness of each riser.
Depth of tread overhang	Amount of tread that overhangs the riser that supports it.
Chase width	Amount of space between parts of a winding flight of stairs.

9. Press **F10** once you are satisfied with the settings. The FlgtPara menu appears. Right-click once to go back to the StairCon menu.

## Set Width of the Staircase

The width of the staircase and the individual steps depends on the opening you have left for the flight of stairs and on local building, safety, and fire codes.

➔ To set the width for the staircase:

1. Select Widths from the StairCon menu. The Parameters for fixed stair shape definition screen appears.

The screenshot shows a software window titled 'STAIRS' with a subtitle '(c) 1993 SOFT-TECH GmbH'. Inside the window is a dialog box titled 'Parameters for fixed stair shape'. The dialog box contains a table with the following data:

Stair shape	Width	Rad.Left	Rad.Right
Left string .....	-1 31/32" ft	0"	ft
Step .....	3'-3 3/8" ft	0"	ft 0" ft
Right string .....	-1 31/32" ft		0" ft
Stair width .....	=3'-3 3/8" ft		
Center string width :	7 7/8" ft	0"	ft 0" ft

At the bottom of the dialog box, there is a legend: F1=Mark | F0=Accept.

2. Use the arrow keys to highlight Stair width, type the value you want, and press **Enter**. ZAC recalculates the widths of the various stair components.

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If you enter positive values for the width of the left and right string, the step width is reduced by the sum of those values.

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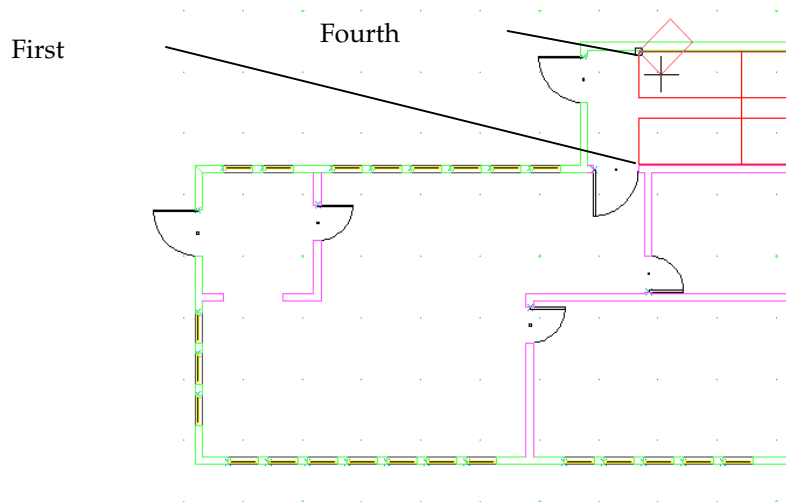
3. Press **F10** to accept all width settings and exit the screen. The StairCon menu appears.

## Insert Different Types of Stairs

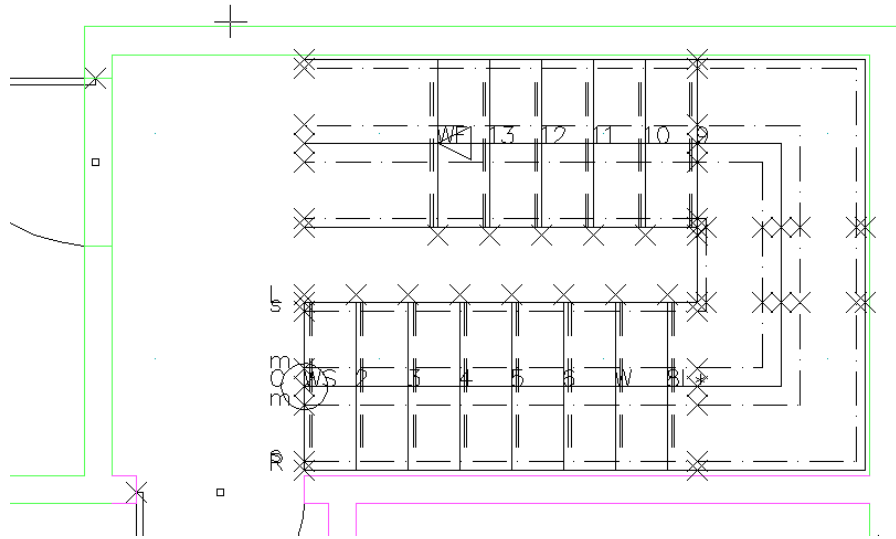
You can create staircases in almost any configuration with ZAC. For convenience, ZAC divides staircases into two mutually exclusive categories: Contour and FixShape. Contour staircases are curved and are based on arcs, circles, or tangents. FixShape stairs are based on rectangular shapes that can be arranged in different configurations. You can add landings wherever you need them in any type of staircase.

➔ To create a new switchback staircase:

1. Use FlgtPara in the StairCon menu to set the flight parameters for the staircase.
2. Use Widths in the StairCon menu to set the width of the staircase.
3. Activate FixShape in the StairCon menu.
4. Select Right or Left (depending on whether the bottom of your staircase is on the right or left side of the stairwell opening) and click on each of the corners of the stairwell. If you selected Right, click on the lower left and proceed counterclockwise. If you selected Left, click on the lower right and proceed clockwise.



5. Right-click after you have selected all four corners of the stairwell. ZAC calculates all the stairs and inserts a model in your drawing.



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ZAC assigns a number to each step. This makes it easy for you to determine the lowest step and the ascending direction. You also will be able to use these step numbers if you want to make changes affecting one or more particular steps.

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The principle for creating other types of stairs is the same; however, you can vary the shape of the staircase and the input method you use to insert it in your drawing. Depending on the type of staircase you design, ZAC offers different menus or options to help you. Several of the menu selections are mutually exclusive toggle switches; therefore, if you activate one, the others are unavailable.

- ➔ To create straight or L-shaped stairs:
1. Use FlgtPara in the StairCon menu to set the flight parameters.
  2. Use Widths in the StairCon menu to set the width of the stairs.
  3. Activate FixShape.
  4. Select the type of fixed-shape staircase you want to design from the mutually exclusive toggle switches:

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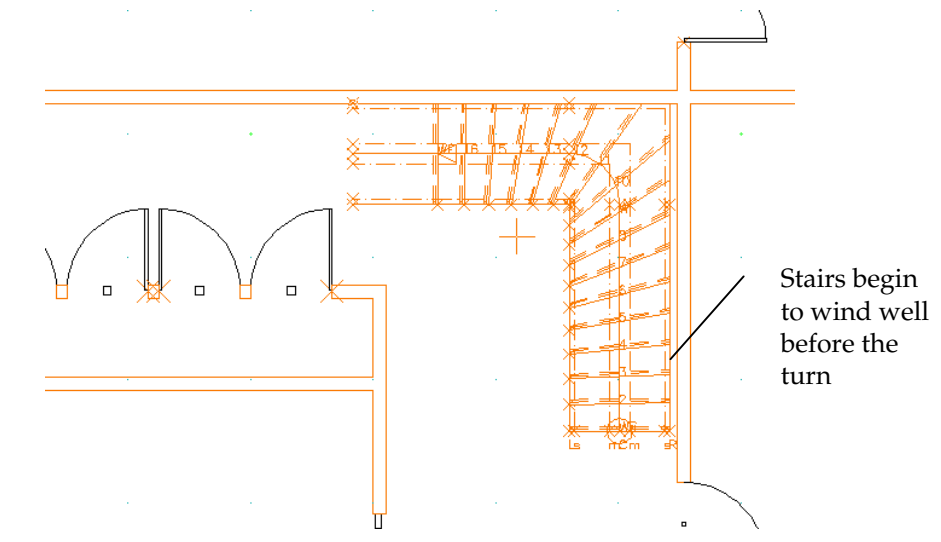
Many local building, safety, and fire codes prohibit the use of winders at a 90-degree turn in a staircase because it is too easy for people to fall when the triangular-shaped treads taper to a width of an inch. Such narrow portions of a tread pose extreme tripping hazards; therefore, we recommend avoiding the Winding option that helps you produce this type of staircase.

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Turnwind

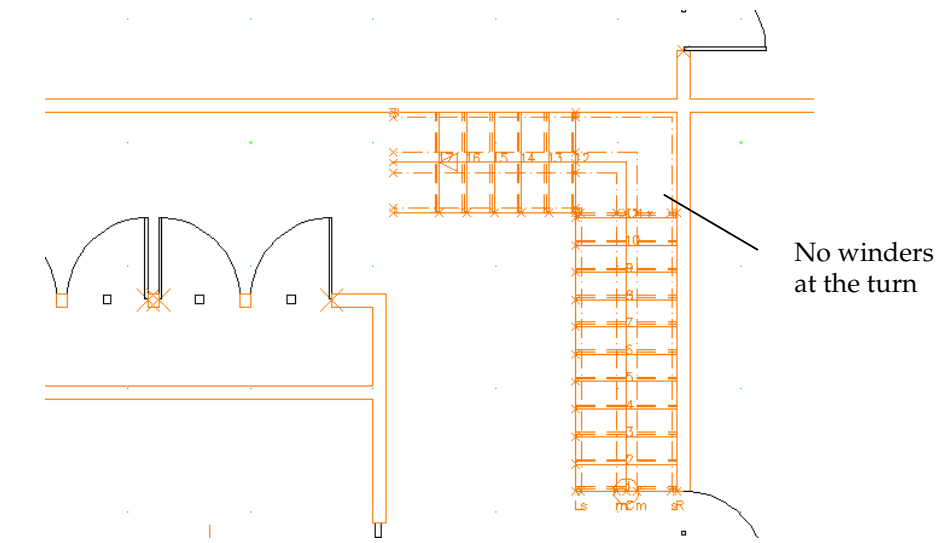
Use for L-shaped or other configurations if you want the steps to wind gradually from the beginning to the end of the flight.



Notice that the treads formed by this ZAC design tool are wide enough to accommodate people's feet, posing little danger of tripping accidents.

Straight

Use for straight flights or L-shaped configurations if you do not want winders at the turn.

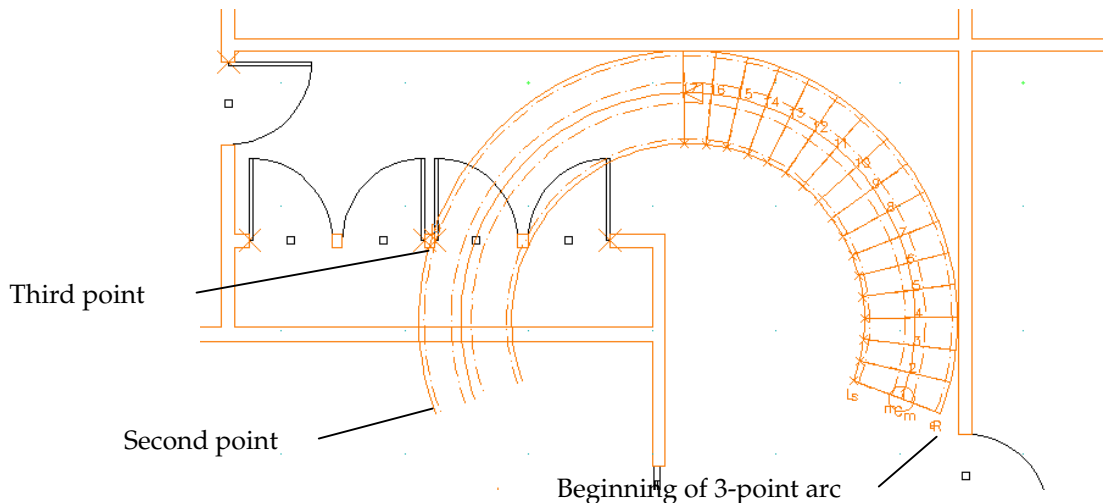


5. Select the input method you prefer (Left, Center, or Right) from the StairCon menu and click to create the staircase you want.
6. Right-click when you are finished with the staircase.

➔ To create curved stairs:

1. Use FlgtPara to set the flight parameters for the staircase.
2. Use Widths to set the width of the staircase.
3. Activate Contour.
4. Choose Newel from the StairCon menu.
5. Activate the input method you prefer.

2Pt_Arc	Arc with a center and two points.
3Pt_Arc	Arc with a center and three points.
Tangent	Arc with tangent and end points.
DogLeg	Dog leg arc.
Rad_Circ	Circle with center point and radius.
Dia_Circ	Circle with two opposite points.
3Pt_Circ	Circle with three points.
6. Click where you want the stairs and follow prompts to complete the arc, tangent, or circle, depending on your input method.
7. Indicate whether the stairs run clockwise or counterclockwise. ZAC generates the stairs.



## Modify Stairs

When ZAC produces the stair model, you may want to change the appearance of the treads and the landing area. For example, if you want the steps evenly distributed in a switchback staircase, you will have to make modifications, beginning at the bottom of the flight.

- ➔ To evenly distribute steps with an intermediate landing for a switchback staircase:
1. Select FlgtPara from the StairCon menu. The FlgtPara menu appears.

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What if you took a break and closed DataCAD Plus between generating the staircase model and making modifications? Just click on the Stair icon on the ZAC toolbar, select Yes from the Macro menu to work on the previously created model (which ZAC redraws on your screen), and choose StairCon from the Stairs menu.

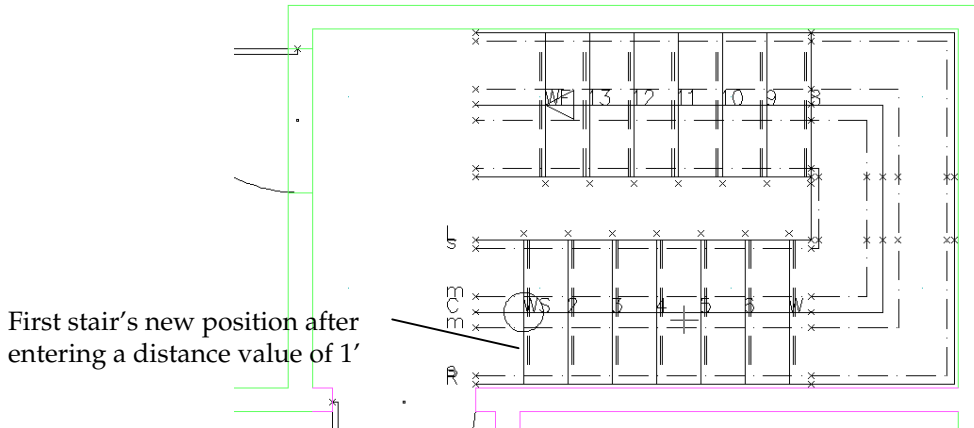
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2. Choose 1stStep from the FlgtPara menu.
3. Select DistStrt. Using this option, you enter the distance from the beginning of the first step's current position to the point where you want the staircase to start. You are prompted to supply the "Distance from start of line."
4. Input the distance value and press **[Enter]**. ZAC automatically recalculates the stairs and updates the model. If your staircase looks fine now and you don't want to make any changes to the landing, go to step 9.

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If you make a mistake when you input the distance from the start point of the model to the first step, simply repeat steps 2 through 4.

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5. Select Landing from the FlgtPara menu. The Landing menu appears.
6. Choose LandPara from the Landing menu. The Landing parameters definition box appears.

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In this text-based screen, your mouse has no effect. You must use the arrow keys to highlight the option you want to change and press the function keys to perform an action.

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The screenshot shows a text-based interface for a staircase design program. At the top, a blue header bar contains the text "STAIRS" on the left and "(c) 1993 SOFT-TECH GmbH" on the right. The main area is a light gray rectangle. In the center, a smaller rectangle titled "Landing parameters" contains the following text:

```
Landing default      0

Min. landing length : 0" ft
Landing first step  .: 0"   ft
Landing last step   .: 0"   ft
Landing thickness   .: 6 5/16" ft
```

At the bottom of the main gray area, a status bar displays function key shortcuts: "F1=1 Tread | F2=+ Tread | F3=- Tread | F4=Rise ratio | F0=Accept".

7. Input equal values for Landing first step and Landing last step, pressing **Enter** after you type each value. For example, if you use 0.6 for the first step, input the same value for the last step.

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If you want to increase or decrease the landing based on tread width, use the function keys. Pressing **F1** adds one tread's width; **F2** adds two treads' widths; and **F3** subtracts one tread's width.

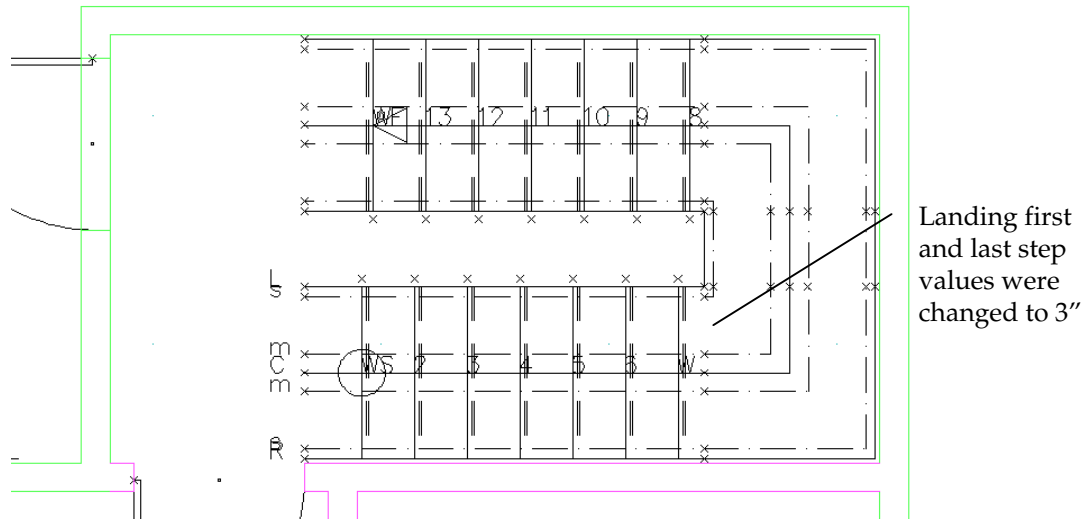
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8. Press **F10** for Accept to exit the Landing parameters screen. The Landing menu reappears. ZAC recalculates the stairs and produces a revised drawing.

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If you are dissatisfied with the results of the revised staircase, select LandPara again to display the Landing parameters screen and follow steps 7 and 8.

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9. Return to the Stairs menu by right-clicking three times. The staircase model is still on your screen. You can convert this model into a conventional two-dimensional drawing. Refer to the steps outlined in the following paragraphs.

➔ To add a new landing within an existing staircase:

1. Select FlgtPara from the StairCon menu. The FlgtPara menu appears with more options than when you created the staircase.
2. Choose Landing. The Landing menu appears.
3. Activate options you want:
 

N-Length	Landing extension is a multiple of the landing default.
AdjThk	Adjust uncovered landing thickness to tread thickness.
4. Activate NewLand. You are prompted to "Enter the number of the landing step."
5. Type the number of the step where you want the landing to begin and press . The Landing parameters definition box appears. Notice that the step where the landing will begin (in this example, we indicated that the landing would begin at step 10 of a 17-step staircase) is already indicated next to "Tread no."

The screenshot shows a software window titled 'STAIRS' with a copyright notice '(c) 1993 SOFT-TECH GmbH'. Inside the window is a 'Landing parameters' dialog box. The dialog box contains the following fields and values:

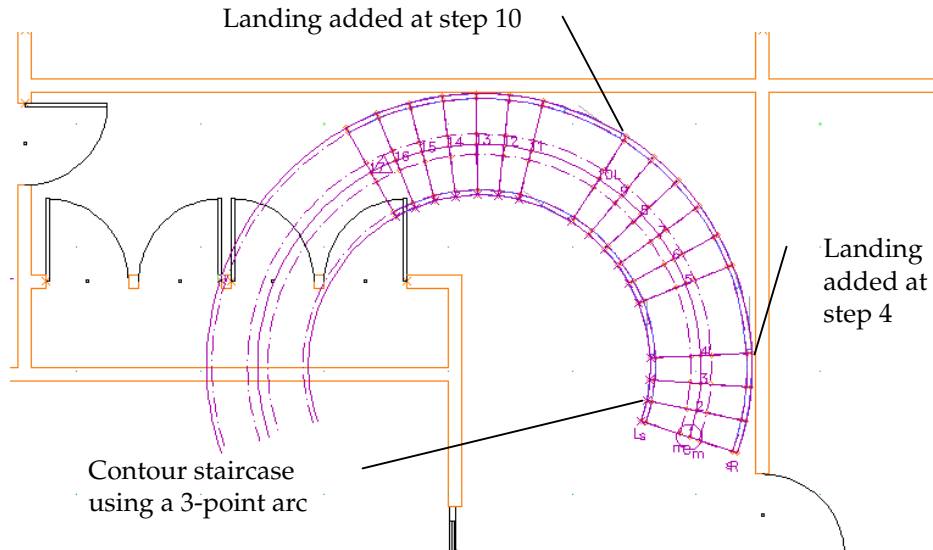
Parameter	Value	Unit
Tread No .....	10	
Landing .....	NO	...
Fixed landing length.	0"	ft
Landing length .....	0"	ft
Landing thickness ...	0"	ft

At the bottom of the window, there is a status bar with the following text: F1=1 Tread | F2=+ Tread | F3=- Tread | F4=Rise ratio | F0=Accept

6. Indicate the "Fixed landing length" and press **[Enter]**. Either supply a value or press a function key to use a multiple of the tread width as the basis for the landing length.  

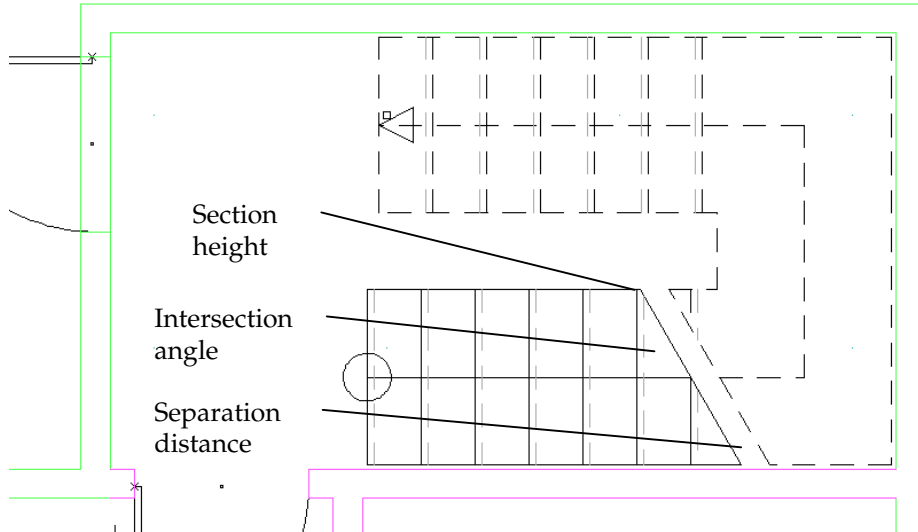
F1=1 Tread	Width of one tread
F2=+Tread	Add an additional tread width to the fixed landing length
F3=-Tread	Subtract the width of a tread
F4=Rise ratio	Adds the rise ratio
7. Insert a value for "Landing thickness" and press **[Enter]**.
8. Press **[F10]** for Accept. ZAC returns to the drawing screen and inserts the landing based on the measurements you supplied.
9. Make further changes if necessary. You can add another landing or select one of the other options from the Landing menu:  

MinRiser	Minimum amount of risers between landings is 3.
InCenter	Center the stair flight between the quarter landings.
10. Select START to calculate the new staircase with the landings you added. Right-click three times to return to the STAIRS menu.



## Generate a 2D Drawing of Stairs

- ➔ To convert the staircase model into a 2D drawing:
1. Select Gen\_2D from the Stairs menu. The Gen\_2D menu appears.
  2. Activate Riser and 2D-Para.
  3. Double-click on SectHgt. You are prompted to "Enter intersection height."
  4. Type a value and press **[Enter]**. (For example, select 4'-0" or type 4 in the input field.) You are prompted to "Enter intersection angle."
  5. Type an intersection angle and press **[Enter]**. (For example, choose 30-0' or type 30 in the input field.) You are prompted to "Enter the separation distance."
  6. Input a separation distance (for example, select 6" or type 0.6 in the input field) and press **[Enter]**. The main Gen\_2D menu reappears.
  7. Choose START. ZAC automatically creates the 2D drawing of the staircase and stores it on the Stair\_2D layer.



8. Exit the Stairs macro by right-clicking twice. You are prompted to “Store the construction before exiting the module.” You should store your staircase since this will make it easier for you to update or edit it later.
9. Select Yes. You are prompted to “Enter a prefix for storing the stair layer.”
10. Type a three-character prefix and press **[Enter]**. Right-click to move to the STAIRS macro menu. Right-click again to exit STAIRS and return to the EDIT menu.

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There is only enough room for the field to accept three characters (letters or numbers). For example, if the stairs are on the second floor level (going to the third), you may type 02S.

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## Generate a 3D Drawing of Stairs

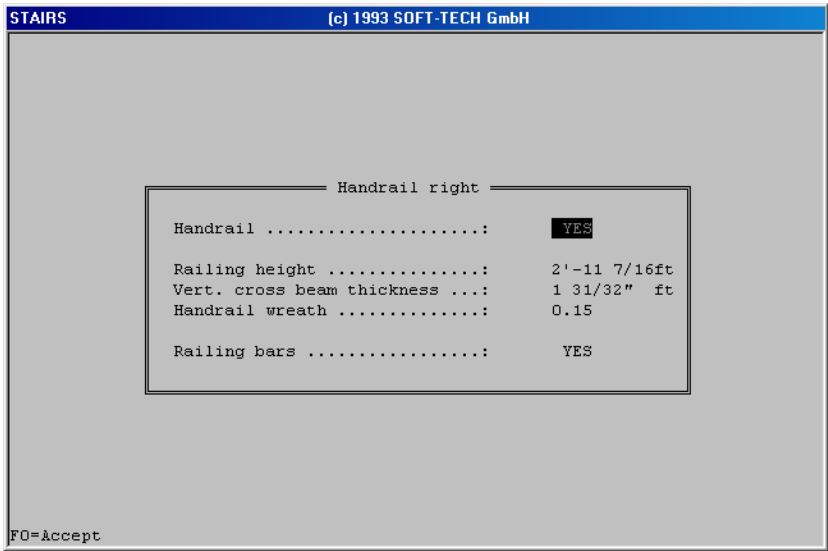
This will give you a good idea of how your staircase will look once it is constructed. The options in the 3D menu make it easy to experiment on the computer.

- ➔ To generate a 3D drawing based on the staircase model:
1. Select Gen\_3D from the Stairs menu. The Gen\_3D menu appears.
  2. Choose 3D-Para.



- 3. Select Colors. This allows you to set a different color for each of the 3D entities when you activate it.
- 4. Activate the options you want to appear in your 3D drawing.

Tread	Generates treads
Riser	Generates risers.
Concrete	Generates concrete stairs.
CenStrin	Generates the center stringer.
StrngLft	Generates the right stringer.
StrngRgt	Generates the left stringer.
HandLeft	Generates the left handrail.
HandRight	Generates the right handrail.



The Handrail right and/or Handrail left definition box appears when you activate these options. Press **[F10]** after you are finished making changes to the handrail parameters.

Newel	Generates the newel.
First	Considers connection of the first step.
Last	Considers connection of the last step.
LandWind	Generates winding 3D entities near the landing.

Headroom      Generates floor breakthrough for minimum headroom.

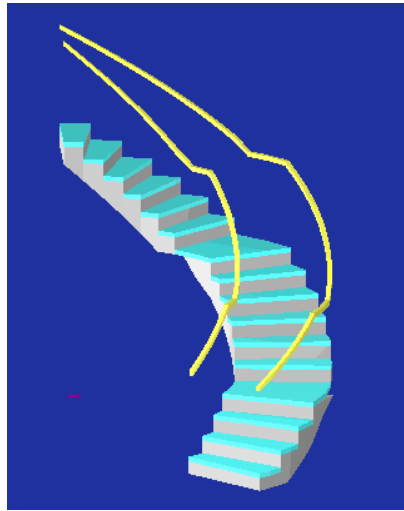
5. Select START when you are satisfied with the options you have activated.

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If a 3D drawing already exists, ZAC asks if you want to “Delete existing 3D stair?” Select Yes.

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6. Click on the Launch Object Viewer icon or select Object Viewer from the View pull-down menu. The 3D drawing appears. You can rotate the 3D image to see your staircase from different angles.



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You can display just the stairs by turning off other layers. To select the layers you want to see on your screen, press **[L]**.

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7. Keep a copy of the 3D staircase by selecting Save as... from the File pull-down menu on the Visualization screen, supplying a name, and pressing **[Enter]**.

➔ To display and change spindles:

1. Select Isometric from the View pull-down menu.

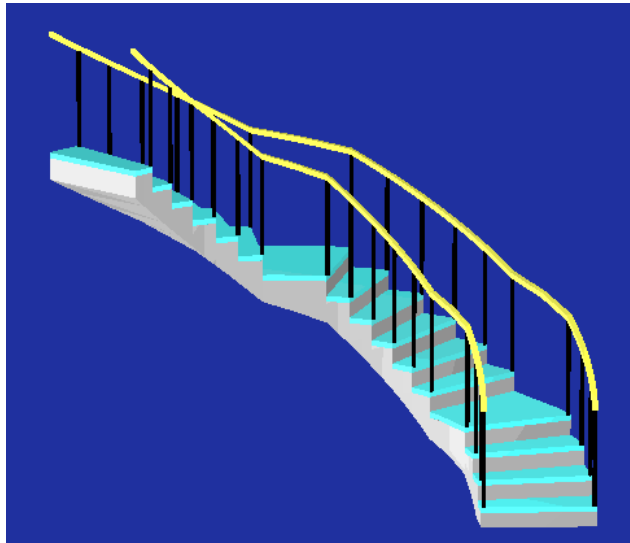
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If you want to see the stairs alone, turn off all but the Stair\_3D layers.

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2. Press **[Ctrl] + [Q]** for Quick Shader.

3. Press **[Shift] + [M]** to go to the >MACRO< menu and select MANAGER. The Manager menu appears.
4. Select Transfrm. The Transfrm menu appears.
5. Activate Area, Lin3>Cyl, and Settings.
6. Select Cyl\_Rad. You are prompted to "Enter cylinder radius."
7. Input the radius of the stair spindle, press **[Enter]**, and right-click once to return to the original Transfrm menu. You are prompted to "Select first corner of area to <Transform>."
8. Enclose the entire staircase in the Area box. The 3D lines that represented the spindles are transformed into cylinders.
9. Click on the Launch Object Viewer icon or select Object Viewer from the View pull-down menu. The spindles are now visible on the stairs.



10. Save this view of the stairs by selecting Save as... from the File pull-down menu, supplying a name, and pressing **[Enter]**. Your view is saved as a bitmap file with a .BMP extension.

## Adding a Roof

ZAC quickly generates a hip roof based on your building's contour. If you do not want a hip roof, you can easily modify it to suit your client's needs.

### Create the Basic Hip Roof

Creating a hip roof to use as the basis of your design involves three simple procedures:

1. Define the roof contour. This involves drawing a polyline around the building perimeter.
2. Define the roof parameters. This involves making decisions about the roof's pitch, the amount of overhang, and the height of the eave or outermost edge.
3. Generate the hip roof. ZAC automatically calculates the ridges and valleys to conform to your building's contour and roof parameters.

Once your building is covered by the basic hip roof, there are many ways that you can modify it. For example, you may add dormers, skylights, or gable ends. ZAC also helps you frame the roof.

➔ To define the roof contour automatically:

1. Click on the Create Roof Contour icon on the ZAC toolbar. The ROOFCONS macro menu appears.
2. Press **[K]** until you find the color you prefer for the roof polyline. Making the polyline a different color from the exterior wall is not strictly necessary, but it is helpful.
3. Select DefContr. The Polyline menu appears.
4. Choose ContSrch. You are prompted to "Select point inside/outside contour."
5. Click on the outside of an exterior wall of your building. ZAC automatically draws a polyline around your building's perimeter in the color you selected in step 2.
6. Right-click to return to the ROOFCONS menu.

➔ To define the roof contour by drawing an enclosed polyline of your own:

1. Click on the Create Roof Contour icon on the ZAC toolbar. The ROOFCONS macro menu appears.

2. Press **[K]** until you find the color you prefer for the roof polyline. Making the polyline a different color from the exterior wall is not strictly necessary, but it is helpful.
3. Select DefContr. The Polyline menu appears.
4. Activate Rect\_Ang to create a rectangular polyline. You are prompted to "Select first corner of rectangle."
5. Click on one corner of the rectangle. You are prompted to "Select second corner of rectangle."
6. Stretch the rubberband and click once when you have enclosed the rectangular space.
7. Right-click to return to the ROOFCONS menu.

➔ To define the roof parameters:

1. Define the roof polygon.
2. Select DefRoof from the ROOFCONS menu. The DefRoof menu appears.
3. Choose Pitch. You are prompted to "Enter the roof pitch."
4. Type a value (measured in degrees) and press **[Enter]**.
5. Activate Overhang. You are prompted to "Enter the roof overhang."

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The overhang is the distance from the outside wall to the outermost edge of the roof. If a roof abuts a side of the building, you can either decrease the overhang to 0 (zero) for the entire roof or edit just the abutting side to 0 and indicate a larger overhang for the remaining sides.

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6. Type a value and press **[Enter]**.
7. Activate EaveHgt. You are prompted to "Enter eave height."

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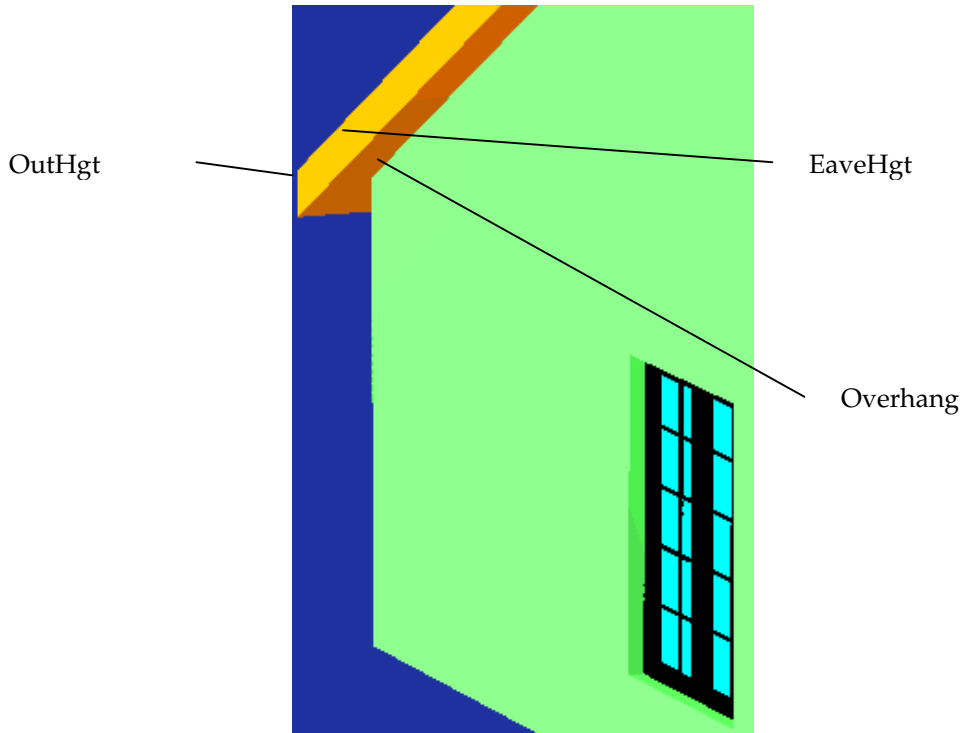
The eave height is the distance from the ground to the top of the outside wall of the roof structure. You can have several roofs on a building at different eave heights. For example, a garage attached to zone 1 could have one eave height; however, the roof of the building might be atop zone 2 or 3 if there were two or three floors. On a split-level, multi-zone building, each level could have its own roof with an individual eave height for each zone.

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8. Type a value and press **[Enter]**. ZAC automatically calculates the height of the outermost edge (OutHgt).

You may define the roof by using the height of the outermost edge. To do this, turn off EaveHgt and make sure OutHgt is activated. Then supply a value for the OutHgt and press **[Enter]**. EaveHgt and OutHgt are mutually exclusive toggles. If you supply a value for one of these options, ZAC will automatically calculate the other.

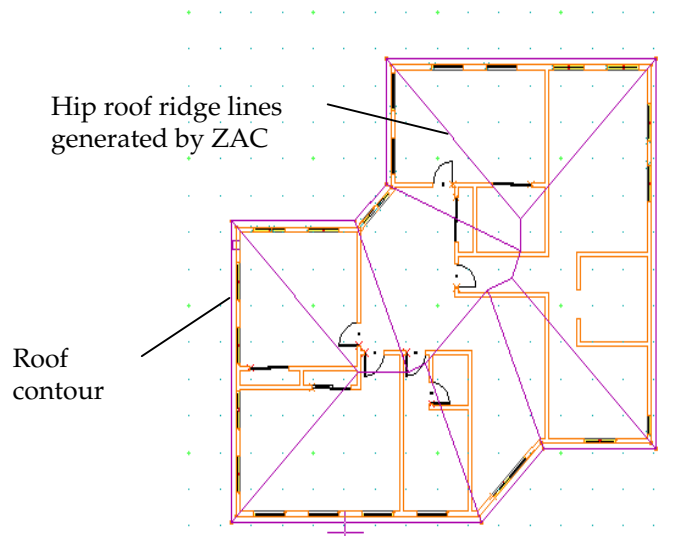
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9. Change the value for the roof's thickness by selecting Thkness twice, supplying a new value, and pressing **[Enter]**. Since Thkness is a default, it is automatically active when you open the DefRoof menu; however, you can change the thickness measurement at any time.

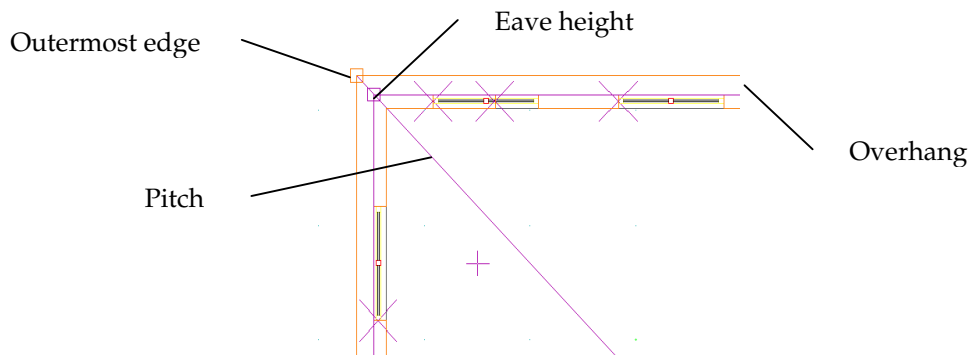
➔ To generate a hip roof:

1. Define the roof contour and the roof parameters.
2. Select GenRoof from the DefRoof menu. The GenRoof menu appears.
3. Make sure RoofExtn is deactivated. If it is active, nothing will generate. You are prompted to "Select polyline of roof contour."



4. Click on the polyline. ZAC automatically generates a hip roof.
5. Right-click to exit the GenRoof menu.

In this close-up view of the roof, you can clearly see the pitch, overhang, eave height, and outermost edge.

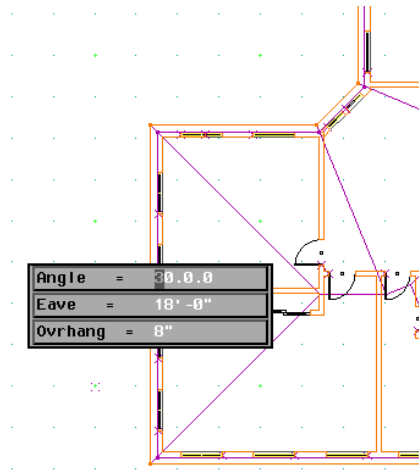


## Change the Hip Roof

Making changes to the shape or style of the roof is a fairly simple process. You can change the shape of the entire roof or selective portions. For example, you can change one or more eaves to form gables; you can change the ridge line or the pitch; or you can leave voids for an atrium or courtyard.

➔ To edit an existing roof:

1. Click on the Create Roof Contour icon on the ZAC toolbar. The ROOFCONS menu appears.
2. Select DefRoof. The DefRoof menu appears.
3. Choose EditRoof. The EditRoof menu appears and you are prompted to "Select a roof line (eave or ridge)."
4. Click on the center of the eave or ridge you want to modify. A definition box appears, containing information about the eave or ridge you selected.



5. Make changes to the variables. The changes you make will depend on the type of roof you want to produce.

➔ To reposition the center or main ridge:

1. Select EditRoof from the DefRoof menu. The EditRoof menu appears.
2. Make sure OutFix is activated.

---

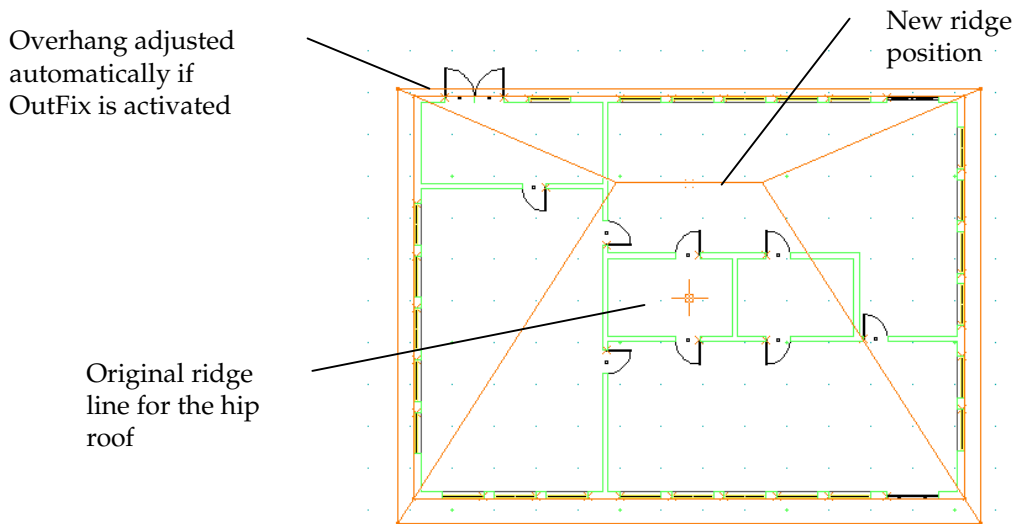
OutFix controls the outermost edge and the roof overhang. If OutFix is activated, ZAC automatically changes them. If OutFix is toggled off, the height of the outermost edge changes while the roof overhang remains the same. Unfortunately, this means that your roof planes may not meet at the corners and you will have to make adjustments by using EditRoof and CopyPline options until they do.

---

3. Click in the center of the main ridge of the hip roof. ZAC attaches the ridge line to your cursor and prompts you to "Move ridge line."



4. Move the ridge line with your mouse or the **[Spacebar]** until it is positioned where you want it. Then click. ZAC automatically adjusts the roof overhang; however, the height at the outermost edge remains constant.



➔ To change ridge height:

1. Select EditRoof from the DefRoof menu. The EditRoof menu appears.
2. Click on the end of the ridge line. A dialog box appears.
3. Type the new height and press **[Enter]**.

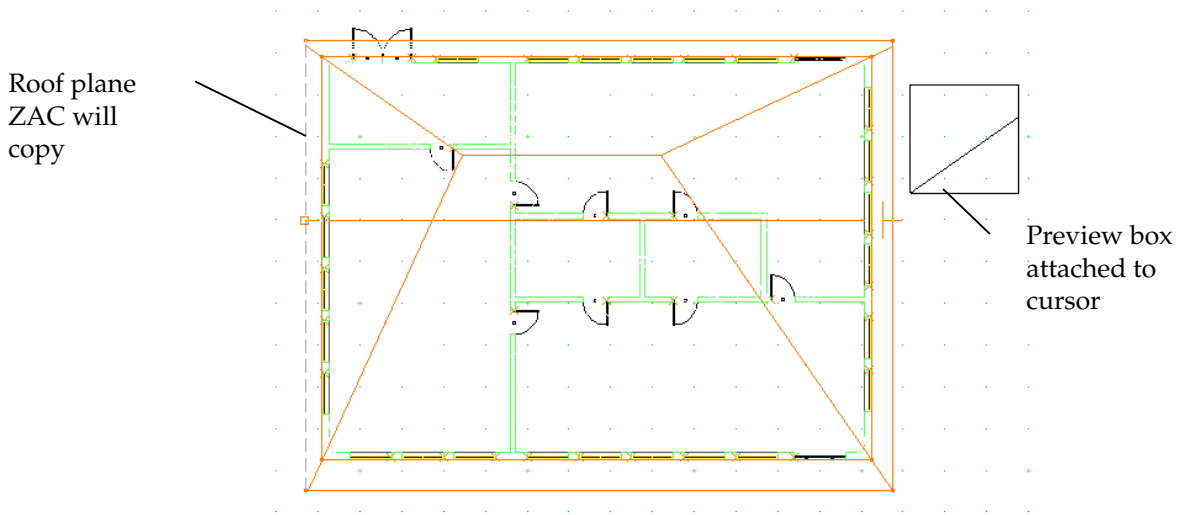
➔ To change the height of the outermost edge of the roof:

1. Select EditRoof from the DefRoof menu. The EditRoof menu appears.
2. Click on a corner of the roof. A dialog box appears.
3. Type the new height for the outermost edge of the roof and press **[Enter]**.

➔ To copy one roof plane:

1. Select EditRoof from the DefRoof menu. The EditRoof menu appears.
2. Click in the center of the outer edge of a roof plane you want to change and copy to affect another plane. A dialog box appears, requesting changes to the angle (pitch), eave height, or overhang.
3. Make changes, pressing **[Enter]** to accept each value. The dialog box disappears and your changes take effect for that particular plane of the roof.

4. Right-click to go to the DefRoof menu.
5. Select CopyPline from the DefRoof menu. You are prompted to "Select plane to be copied."
6. Click on the outermost edge of the roof plane you want to copy. The plane's edge becomes a dashed line and a preview box displaying the slope is attached to your cursor. You are prompted to "Select roof plane to be copied to."
7. Click on the outermost edge of each plane where you want the changes to appear. You can click on more than one plane.



8. Copy other planes if necessary.
9. Right-click until you return to the DefRoof menu. All your changes take effect on your drawing.

### **Gable Roof Edge**

➔ To produce a gable roof edge:

1. Make sure withVert is inactive. Then generate the traditional ZAC hip roof.

---

If you activate withVert and change the hip roof to another configuration (such as a gable or barrel), the roof line will extend from the peak to the top of the wall on which you are building the roof. Instead of bringing the roof line down to the top of the wall's original Z-height, you will want to extend the wall itself to the peak of the roof using the wall trim instructions that follow.

---

2. Select EditRoof from the DefRoof menu. You are prompted to "Select a roof line (eave or ridge)."

3. Click in the center of the eave that you want to change into a gable end. A definition box appears.
4. Type 90 as the Angle value and press **[Enter]**.
5. Change the values for the Eave and Overhang if necessary. Press **[Tab]** to bypass an option or **[Enter]** to accept a value. When you press **[Enter]** for the Overhang value, the definition box disappears and ZAC creates the gable end.
6. Use CopyPlane in the DefRoof menu if you want to turn other roof edges into gables.

---

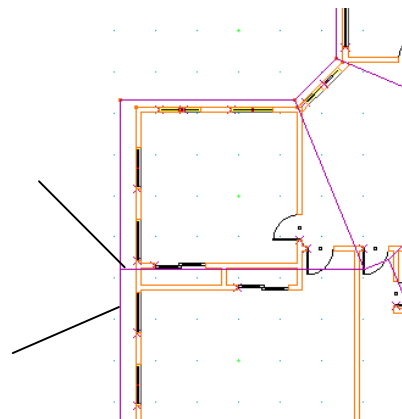
You can make a saltbox style roof by copying the gable end roof plane to three sides or a rectangular building or roof contour.

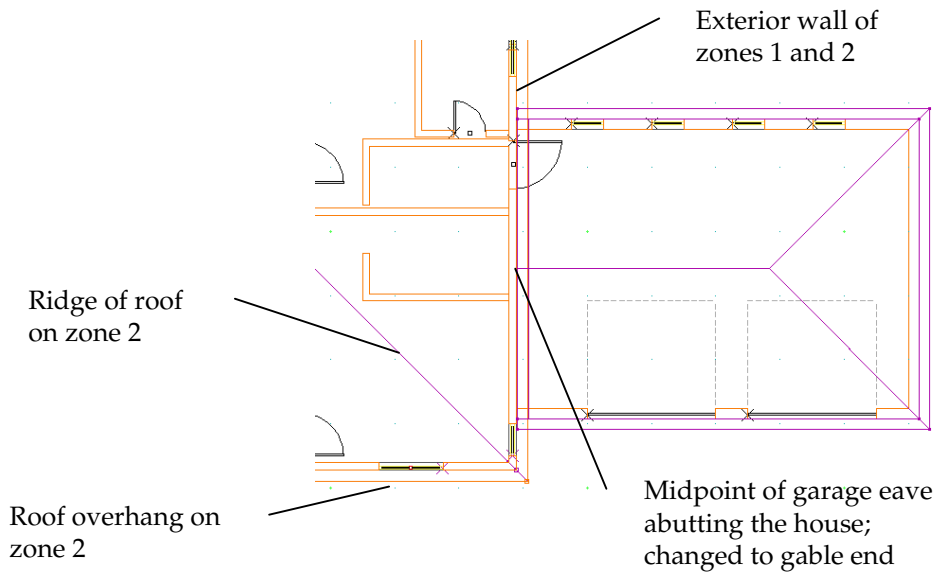
---

If a roof abuts the building, you should change the attached end to a gable with a 90-degree angle and 0 (zero) overhang. For example, a garage on zone 1 could abut the house wall of zone 2 for the second floor. You would change the roof to a gable where it joins the house.

New ridge line for the  
gable end

Gable end with  
increased overhang





If you look at your building with Object Viewer or DataCAD Plus vis, you will notice that the wall beneath the gable does not reach the peak. It stops at the zone height. To remedy this situation, you make the wall higher than the gable peak and have ZAC trim it back.


➔ To edit and trim the gable wall:

1. Click on the Entity Edit icon in the ZAC toolbar or select EditData from the ARCHTECT menu. The Identify menu appears and you are prompted to "Point to entity to identify."
2. Double-click on the wall that contains the gable. The wall now has dashed lines and the Wall dialog box appears.

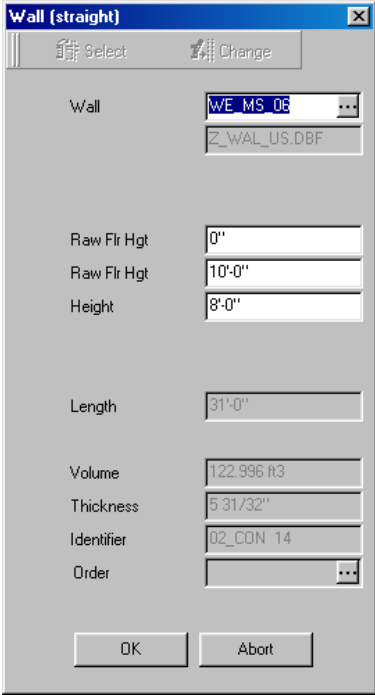
---

If you want to select more than one wall, wait until the Wall dialog box appears. Hold down **Ctrl** while you double-click on the other wall(s) you want to change. Another option is to do each wall separately, but this will take considerably longer.

---

If your building has more than one zone, press  and switch to the CON layer that contains the wall you want to extend to the gable's peak. For example, if the roof sits atop the 16th floor of a 16-zone office building, turn off the CON layers for zones 1 through 15.

3. Select Change. The fields you can change in the Wall dialog box are opened.

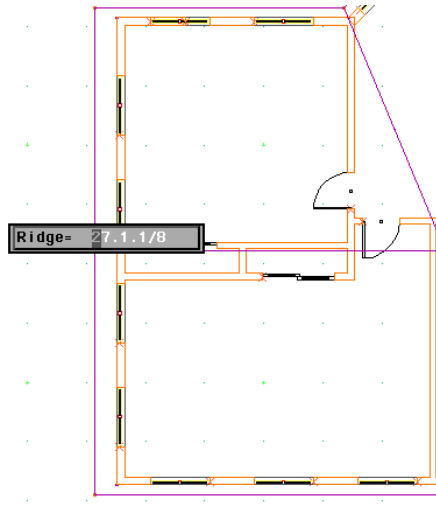


The image shows a software dialog box titled "Wall (straight)". It has two tabs at the top: "Select" and "Change". The "Change" tab is active. The dialog contains several input fields for wall properties:

Property	Value
Wall	WE_MS_06
Raw Flr Hgt	0"
Raw Flr Hgt	10'-0"
Height	8'-0"
Length	31'-0"
Volume	122.996 ft3
Thickness	5 31/32"
Identifier	02_CON_14
Order	

At the bottom of the dialog are "OK" and "Abort" buttons.

4. Change the Height to a number that you know is higher than the gable peak, select OK to exit the dialog box, and right-click to return to your drawing. If you use Object Viewer, you will see the wall extended through the gable roof.



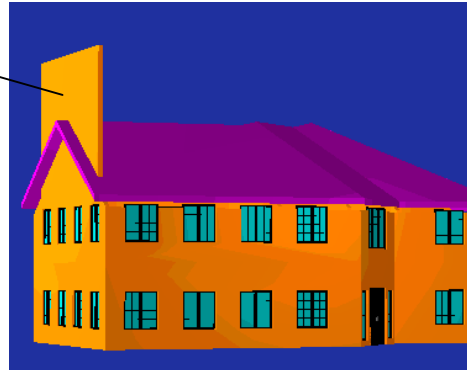
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Hint: To select a reasonable value for the height, you can use EditRoof from the DefRoof menu. Click on the ridge near the gable peak. ZAC displays the ridge height. Then add a few more feet to the ridge height as a safety margin and enter it in the Height field. ZAC will trim this wall.

When you use **[Shift] + I** to identify this wall after ZAC trims it to the gable peak, you will see whatever value you used in the Height field. ZAC reports the height of the untrimmed wall, not the zone's original Z-height or that of the gable peak.

---

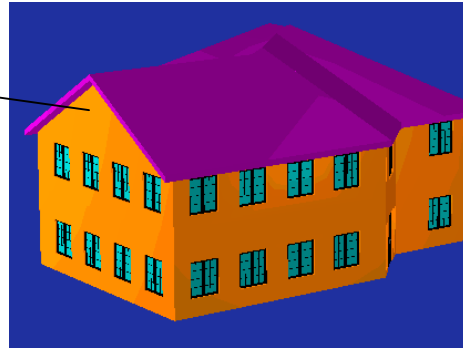
Wall extended  
through the gable  
peak



5. Click on the Wall Trim Edit icon in the ZAC toolbar. The CleanUp menu appears.

6. Select DefRoof. The DefRoof menu appears.
7. Choose Trims. ZAC automatically trims the wall to fit under the gable peak. You can use Object Viewer to look at the results.

Wall trimmed to  
gable peak



## Barrel Roof

→ To define a barrel roof:

1. Define the contour of the roof polyline by selecting DefContr from the ROOFCONS menu. Right-click to return to the ROOFCONS menu after drawing the polyline.

---

The barrel roof should be added to a rectangular building. If you want to add a barrel roof to a rectangular part of a building, use Rect\_Ang from the Polyline menu to define the contour.

---

2. Select DefRoof from the ROOFCONS menu. The DefRoof menu appears.
3. Activate Overhang, supply a value, and press .
4. Activate EaveHgt or OutHgt (mutually exclusive toggle switches), supply a value, and press .

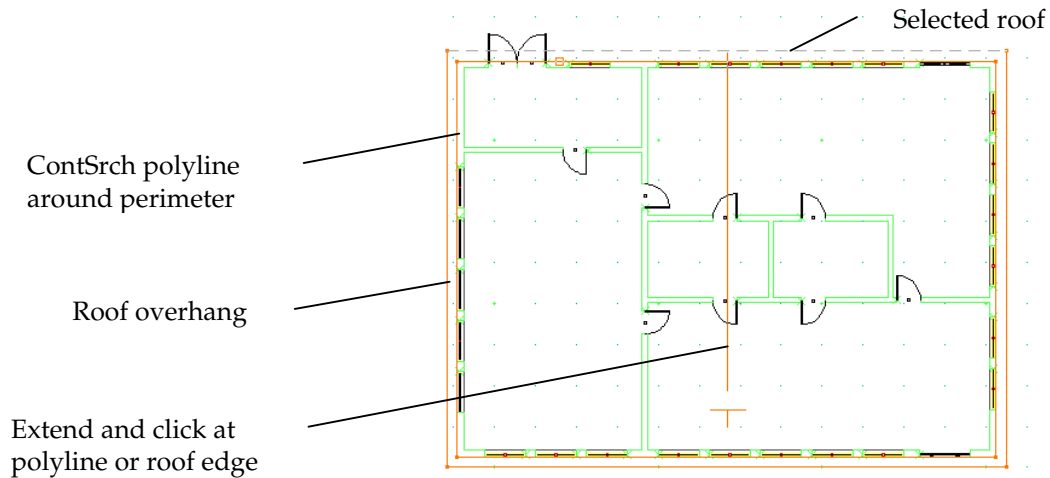
---

If you do not supply a value for EaveHgt or OutHgt, the edges of the barrel roof may extend to the base of the zone.

---

5. Select DefBarel from the DefRoof menu. The DefBarel menu appears.
6. Choose Segments, supply the number of segments, and press . The more segments your roof contains, the smoother the curve; the fewer segments, the more jagged the curve. You are prompted to "Select first side for creating compass roof."

- Click on one end of the rectangular polyline. The roof outline appears and the roof edge on the side you selected is a broken line. You are prompted to "Select second side for creating compass roof."



- Click on the opposite side of the rectangular roof edge. The roof edge on the opposite side appears as a broken line and ZAC offers a rise height value.
- Press **Enter** to accept the rise height ZAC offers for the barrel roof. ZAC automatically draws the segments of the barrel roof.
- Right-click to exit the DefBarel menu. You can use the Object Viewer to see the barrel roof.



- Extend the end walls and trim them to the roof. For instructions on this, review the gable roof wall information earlier in this section of the chapter.



## Multiplane Roof

- ➔ To define a multiplane roof (such as a Mansard roof):
1. Define the contour of the roof polyline by selecting DefContr from the ROOFCONS menu; select ContSrch; click on the exterior wall; and right-click to return to the ROOFCONS menu after ZAC draws the polyline.
  2. Select DefRoof from the ROOFCONS menu. The DefRoof menu appears.
  3. Activate Overhang, supply a value, and press **[Enter]**.
  4. Activate EaveHgt or OutHgt (mutually exclusive toggle switches), supply a value, and press **[Enter]**.
  5. Generate a hip roof by selecting GenRoof, clicking on the roof polyline, pressing **[Enter]**, and right-clicking to return to the DefRoof menu. ZAC automatically generated a hip roof.

---

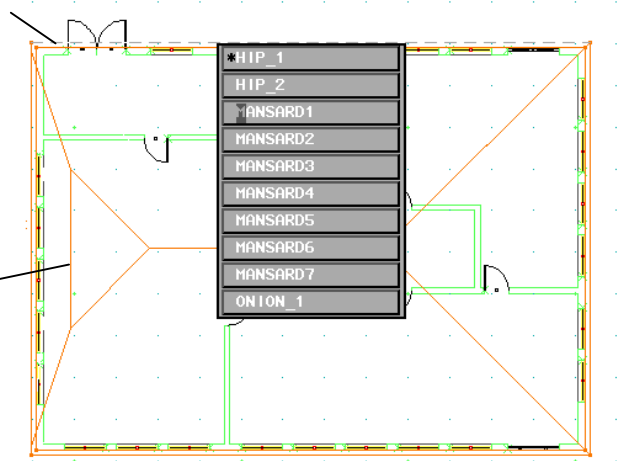
Make sure RoofExtn is not activated in the GenRoof menu. If you activate it, ZAC will not generate a roof.

---

6. Select DefMulti from the DefRoof menu. The DefMulti menu appears and you are prompted to "Select the roof plane for DefMulti."
7. Define each plane by clicking on one roof edge, activating Select in the DefMulti menu, using the arrow keys to move to an option in the dialog box, and pressing **[Enter]**. ZAC changes the plane of that segment of the roof.

Dashed lines indicate the current roof plane

First roof plane changed to Mansard1



8. Repeat this for each roof plane you want to change. Use the Object Viewer to see the resulting roof.

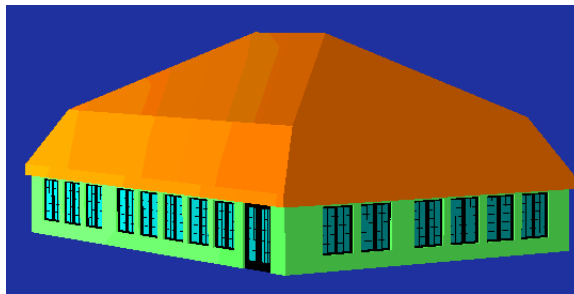
---

Experiment with options in the dialog box to create other Mansard styles or an onion dome.

---

➔ To create a multiplane roof with specific measurements and angles:

1. Follow steps 1 through 6 to begin the multiplane roof. You are prompted to "Select the roof plane for DefMulti."
2. Click on the roof plane you want to define.
3. Choose Input from the DefMulti menu. A dialog box appears, containing the current height (measured in meters only) and angle of the hip roof in the top line. These values indicate the current eave height (converted to meters if you originally entered feet and inches) and pitch.



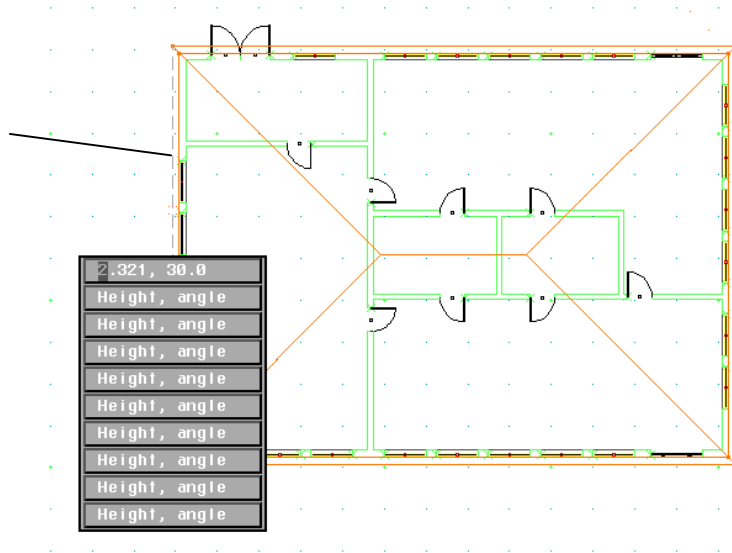
4. Type the height (in meters only), press  , and  , and type the angle you want to use in your multiplane roof, pressing  after each pair of values. Input a height (in meters) and angle for each roof plane you want to create.

---

If you use 0 (zero) for the angle, the roof segment will be flat.

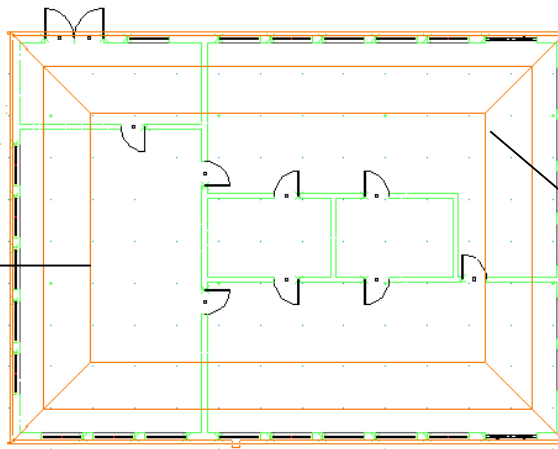
---

Roof plane selected



5. Right-click when you are finished indicating values for the roof planes. The roof plane you selected is changed, using your new height and angle values.
6. Copy the plane you just defined to other roof segments you want to change in the same way.

Three planes defined; the third has an angle of 0 for a flat top



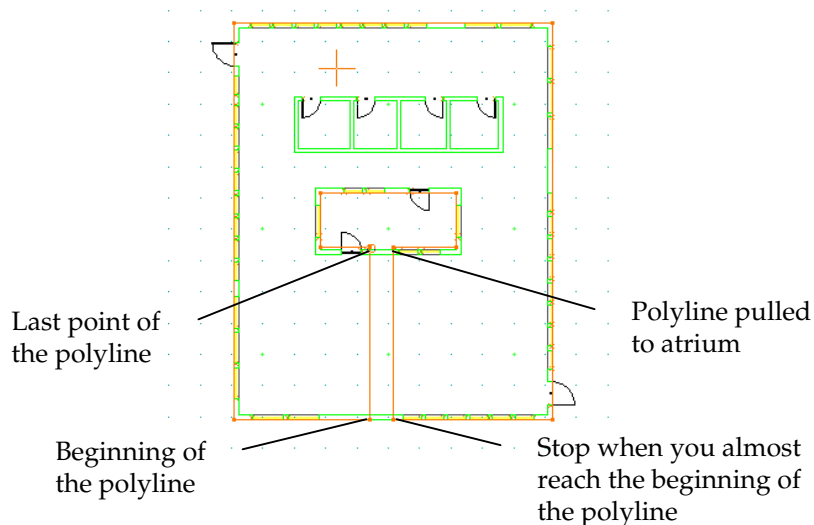
Multiplane portion copied to other roof planes

## Atrium Roof

When you put a roof on a building with an atrium, you cannot use ContSrch.

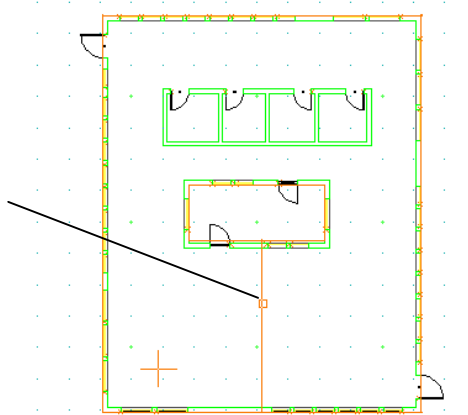
➔ To create a roof on a building with an atrium:

1. Select DefContr from the ROOFCONS menu. The Polyline menu appears and you are prompted to "Select the next point for the roof contour."
2. Click near the middle of one of the outside walls to begin your polyline. Continue around the outside perimeter until you almost reach the point where you began your polyline, and pull the polyline into the atrium.
3. Click on the outside wall of the atrium and continue clicking to draw the polyline around its perimeter until you are opposite the point where you began on the exterior wall. Right-click to end the polyline.

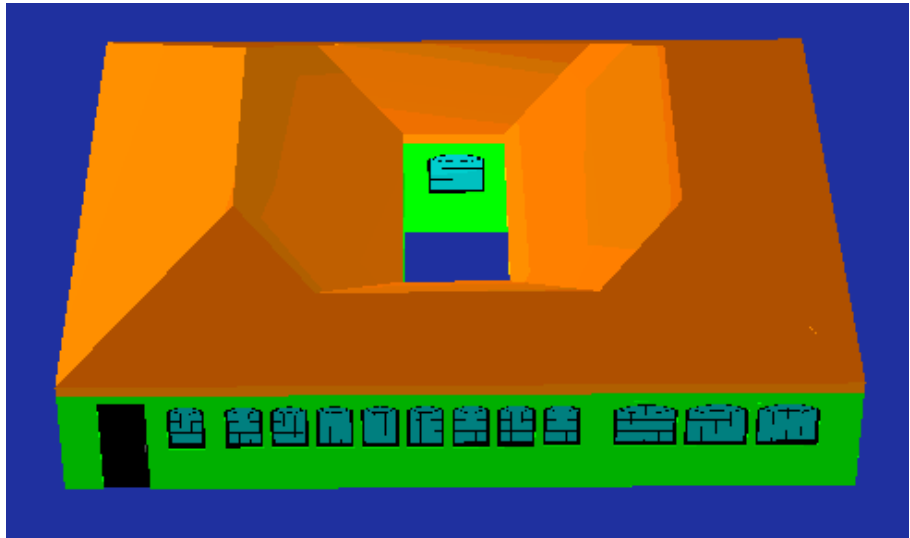


4. Select Amend from the Polyline menu. The Amend menu appears.
5. Choose DragEdge. You are prompted to "Select an edge to drag."
6. Click on one of the edges and drag it to meet the other edge.

One edge of the  
polyline dragged  
to meet the other



7. Select DefRoof. The DefRoof menu appears.
8. Set the roof parameters (Pitch, Overhang, EaveHgt, or OutHgt) and generate the roof (GenRoof). Make changes to the roof planes if necessary.



Depending on where your atrium is located inside the building and the roof shape you want, you can change the slope (angle or pitch) and/or the ridge height.

## Create Dormers

When you create a dormer, ZAC includes the walls along with the dormer's roof.

→ To create a dormer in a roof:

1. Make sure withVert is activated in the DefRoof menu.

---

If withVert is not toggled on and you change the hip dormer that ZAC automatically creates to another shape (such as a gable or barrel), the vertical walls will not extend to the dormer's front peak. Instead, there will be a gap between the dormer wall's original height (when it had an automatically generated hip roof) and the peak of the dormer's new roof shape.

---

2. Select DefDorm from the DefRoof menu. The DefDorm menu appears.
3. Choose DefEdge. The DormEdge menu appears.
4. Activate Height, type a value for the front side height, and press **[Enter]**. You are prompted to "Enter first point for edge definition."
5. Click where you want the front edge of the dormer to appear on the roof plane. You are prompted to "Select the second point for edge definition."
6. Click where you want the second edge to appear. Right-click to return to the DefDorm menu.

---

If you want to create several dormers in the roof, just repeat steps 5 and 6 for each one.

---

7. Select GenDorm. The GenGorm menu appears.
8. Choose DormPtch, type a value for the angle, and press **[Enter]**.
9. Select O-Hang, type a value, and press **[Enter]**.
10. Click on the dormer edge you defined in steps 5 and 6. ZAC draws the dormer.

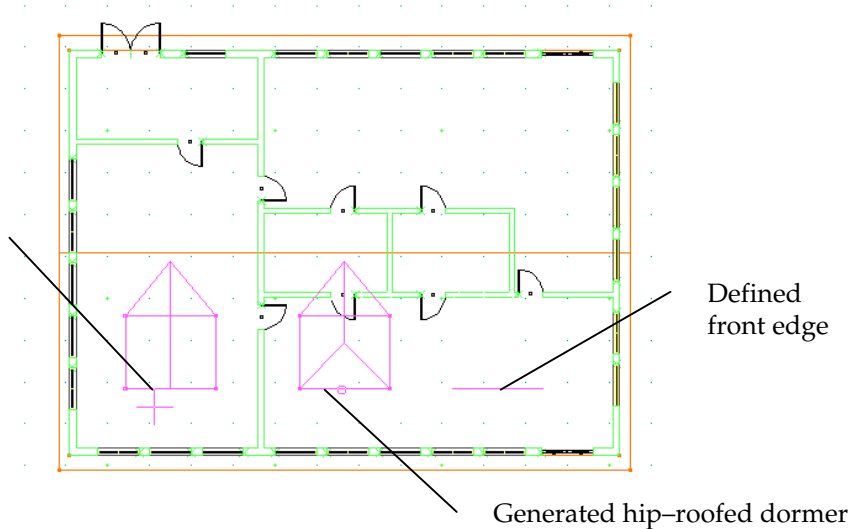
---

If you defined the front edge for several dormers in the roof, repeat step 10 for each one.

---

The dormer is actually a solid piece that is attached to the roof plane. Therefore, you have to cut out the part of the roof plane that is beneath the dormer. Make sure that your dormer is correct before you generate the void in the roof plane. If you make additional changes after that, generate the void again.

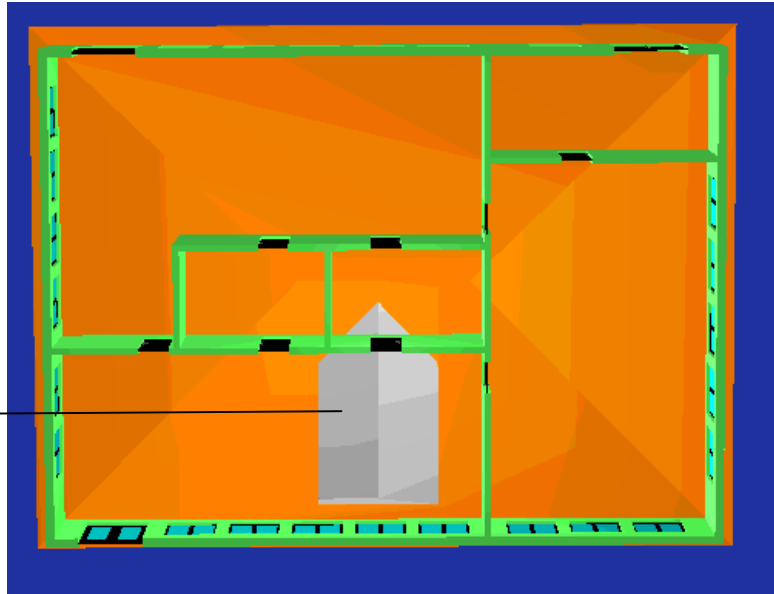
Original hip-roofed dormer changed to gable end (see following section)



➔ To cut the roof plane for access to the dormer:

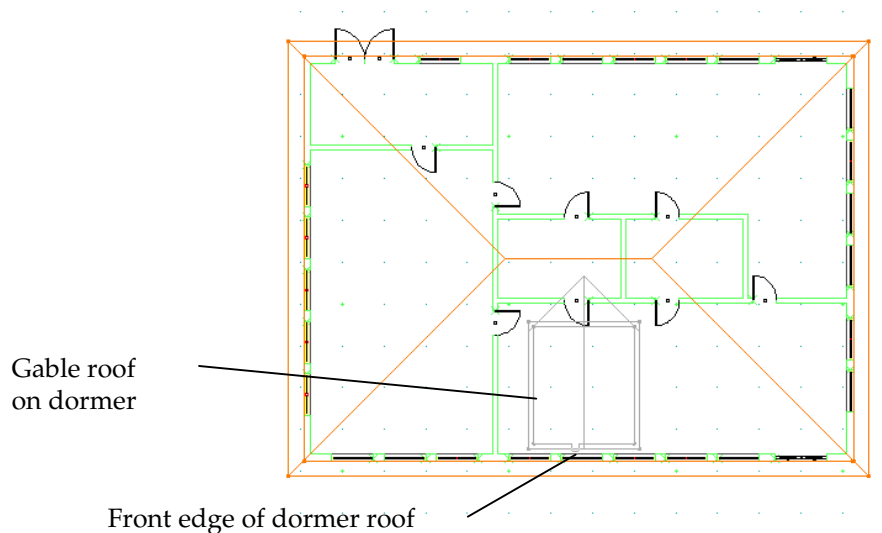
1. Select GenVoid from the DefDorm menu. The GenVoid menu appears.
2. Select Area. You are prompted to "Select first corner of area to cut out dormers."
3. Click on your drawing near one corner of the dormer and draw the rubberband around the entire dormer. Click again when you have enclosed the dormer.
4. Right-click to exit the GenVoid menu. ZAC cut the roof plane to allow for the dormer. To see it, use the Object Viewer and turn the building upside down.

Dormer visible  
through the void  
ZAC generated in  
the roof plane



- ➔ To change the hip-roof dormer to a gable end:
1. Make sure withVert is activated in the DefRoof menu. If withVert is not toggled on, there will be a gap between the original hip dormer's wall height and the gable's peak.
  2. Select EditRoof from the DefRoof menu. The EditRoof menu appears and you are prompted to "Select a roof line (eave or ridge)."
  3. Click on the front edge of the gable roof. A dialog box appears.
  4. Type 90 for the Angle and press **[Enter]**. Right-click to let ZAC create the gable end roof on the dormer.






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Similarly, you can change the shape of the dormer roof to a barrel or multiplane.

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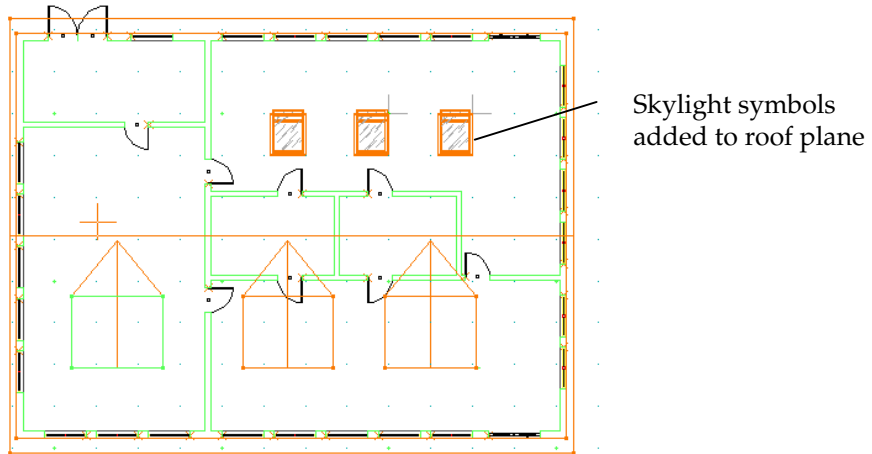
## Insert Roof Components

ZAC makes it easy to add a skylight, chimney, or smoke stack to the roof.

### Skylight

- ➔ To insert a skylight into a roof plane:
5. Right-click until you reach the EDIT menu.
  6. Change the Z-base by pressing **[Z]**, typing 0 as the new Z-base value, and pressing **[Enter]** twice to accept both the Z-base and Z-height values. You do not change the Z-height value; pressing **[Enter]** the second time accepts it as is.
  7. Return to the ROOFCONS macro menu by pressing **[A]** and clicking on the Roof icon on the ZAC toolbar. The ROOFCONS menu appears.
  8. Select RoofComp from the ROOFCONS menu. The Parts menu appears.
  9. Choose Windows.
  10. Select SKYLIGHT1. You are prompted to "Select the roof plane for inserting roof component."

11. Click on the edge of the roof plane where you want to insert the skylight(s). That roof plane now appears as a dashed line.
12. Activate Calc-Z.
13. Click on the roof plane to indicate where you want the skylight. If you want, you can use the snap feature to place a skylight in a specific location. Alternatively, you can draw help lines to guide you as you place the skylight.
14. Activate TakeOver. The skylight symbol appears on the roof plane.



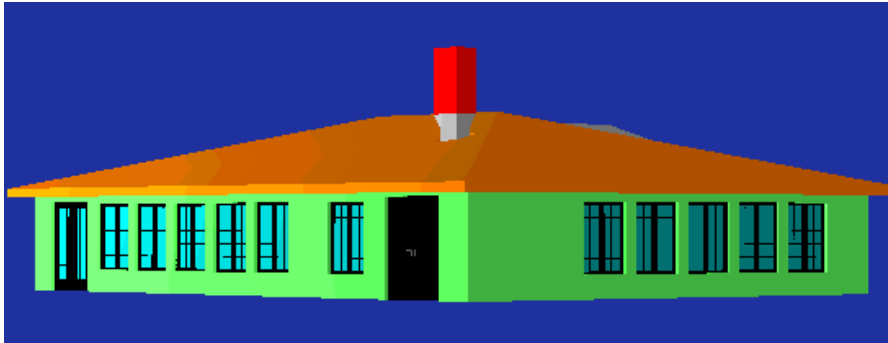
15. Reset the Z-base to its original value when you are finished inserting skylights into the roof.

### Chimney

➔ To insert a chimney in a roof plane:

1. Right-click until you reach the EDIT menu.
2. Change the Z-base by pressing **[Z]**, typing 0 as the new Z-base value, and pressing **[Enter]** twice to accept both the Z-base and Z-height values. You do not change the Z-height value; pressing **[Enter]** the second time accepts it as is.
3. Return to the ROOFCONS macro menu by pressing **[A]** and clicking on the Roof icon on the ZAC toolbar. The ROOFCONS menu appears.
4. Select RoofComp from the ROOFCONS menu. The Parts menu appears.
5. Activate Chimney.
6. Select ChimHgt, supply a value for the chimney's height, and press **[Enter]**.

7. Click on the roof plane where you want to place the chimney.
8. Activate CalcZ. You are prompted to “Select an operation or XY position.”
9. Click where you want the chimney to appear on the drawing and activate TakeOver. ZAC places the chimney on the roof.



## Put a Roof on a Building Addition

When you add a new section to an existing building, ZAC helps you to generate its roof.

➔ To put a roof on a building addition:

1. Create the new portion of the building.

---

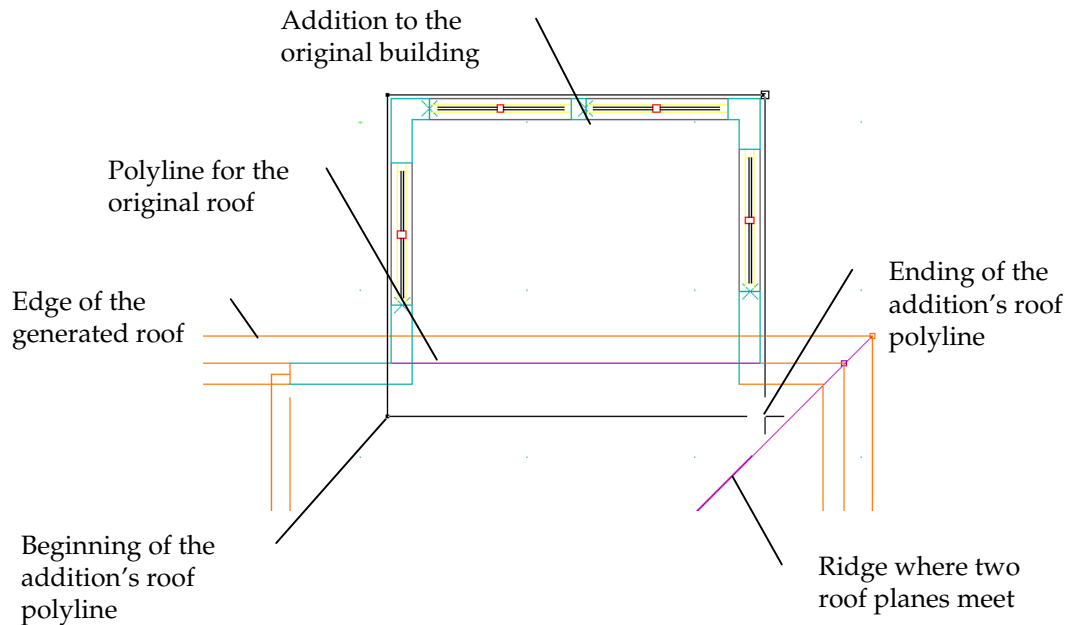
At least two of the corners of the addition must meet one plane of the original roof. If the addition meets the original roof at only one point or if it straddles two or more planes of the main roof, ZAC will not be able to generate the addition's roof.

---

2. Make sure you generated the roof over the original building with RoofExt off.
3. Click on the Create Roof Contour icon on the ZAC tool bar. The ROOFCONS menu appears.
4. Select DefContr. The Polyline menu appears and you are prompted to “Select the next point for the roof contour.”
5. Click on the inside of the building near where the addition begins. Continue clicking around the addition's exterior wall and right-click on the inside of the building near where the addition ends. Right-click again to return to the ROOFCONS menu.

The addition's roof polyline must overlap the original roof's polyline. If the addition's polyline is outside that of the original roof, you will not be able to generate the extended section.

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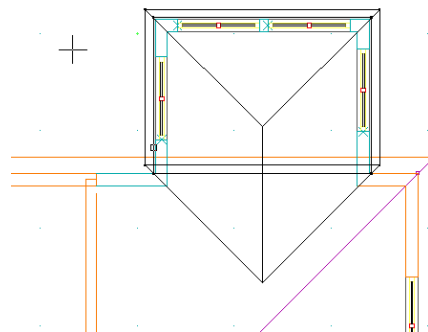


6. Select DefRoof. The DefRoof menu appears.

The eave height and pitch of the extension must not be greater than that of the original roof plane.

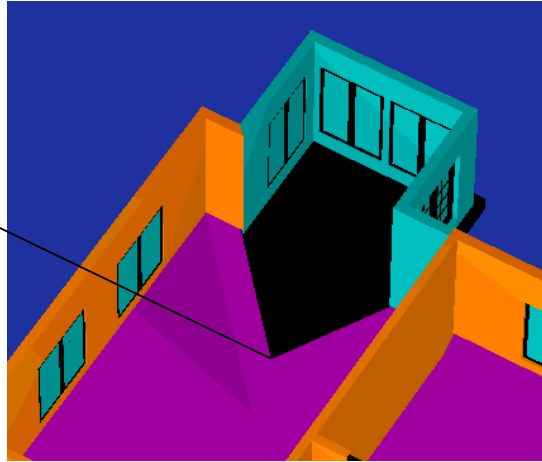
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7. Choose GenRoof. The GenRoof menu appears.
8. Activate RoofExtn and click on the polyline that surrounds the building addition. ZAC generates the roof over the extension.

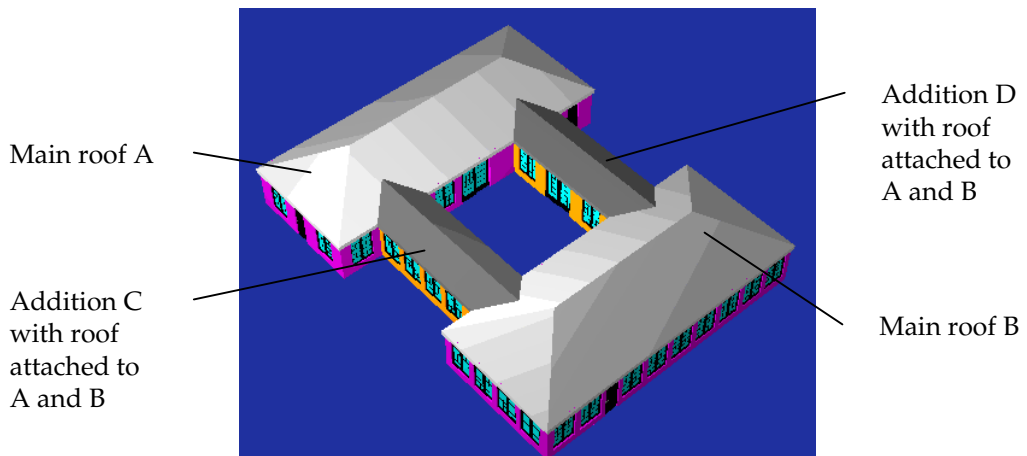


9. Select GenVoid from the RoofExtn menu. The GenVoid menu appears.
10. Activate Area. You are prompted to "Select first corner of area to crop roof extension."
11. Surround the roof of the addition with the area rubberband. ZAC automatically creates the void, connecting the addition's roof to the original roof plane.

Void generated to connect the addition's roof to the main one



You can connect an addition to more than one main roof as long as two corners of the addition are attached to the roof plane of each main building. However, only one side of an addition's roof can be linked with a main roof plane.



## Measure and Hatch the Roof

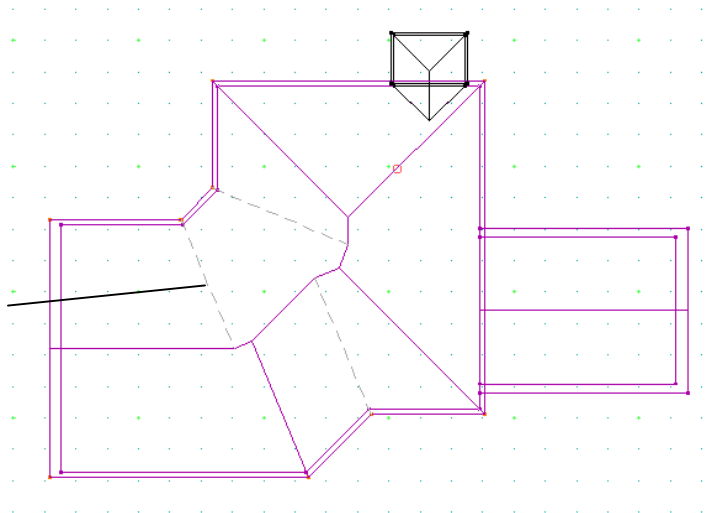
Once you have generated the roof, ZAC lets you measure various aspects of it.

➔ To measure the roof:

1. Select RoofLine from the ROOFCONS menu. The RoofLine menu appears.
2. Activate Measure. The Measure menu appears.
3. Use the toggle switch to Drwing to indicate whether you want to store the measurements in the drawing. If this toggle is not activated, your measurements will not be stored.
4. Select the item you want to measure. ZAC measures the total length of all the components that are highlighted as dashed lines.

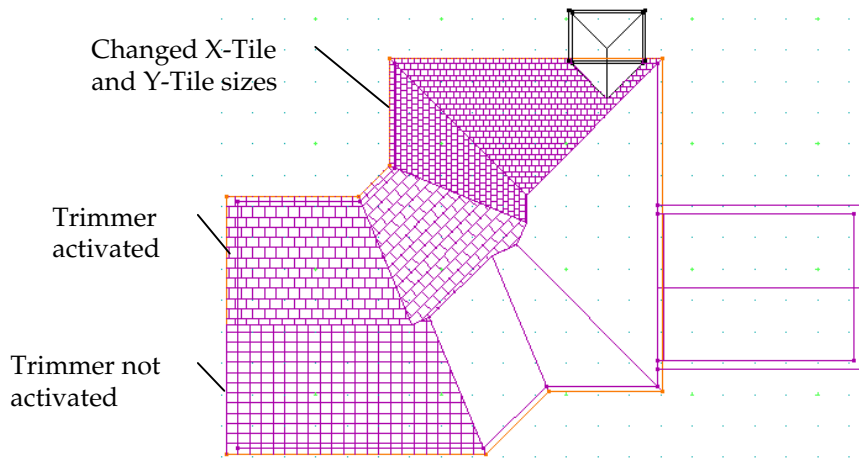
Eave	Measures all eaves.
Ridge	Measures all ridges.
Hip	Measures all hips.
Valley	Measures all valleys.
FlyHip	Measures all flying hips.
Verge	Measures all verges.
Vertical	Measures all vertical lines.
Curb	Measures all curb lines.

All roof valleys are measured



➔ To hatch the roof planes:

1. Select RoofCovr from the ROOFCONS menu. The RoofCovr menu appears.
2. Choose Hatch.
3. Activate Automat.
4. Supply values for the size of the individual roof tiles with Y-Tile and X-Tile, pressing  to confirm the measurement.
5. Activate Trimmer if you want to stagger the tiles on the roof.
6. Click on each roof plane you want to hatch.



➔ To supply the wood framing for the roof rafters or battens:

1. Select RoofWood from the ROOFCONS menu. The RoofWood menu appears.
2. Select Battens or Rafters, depending on which one you want to generate. These are mutually exclusive toggle switches. Each option produces another menu that allows you to supply values.

---

Battens allows you to set RaftDist, the distance between rafters. Rafters allows you to set RaftDistance (distance between rafters), RaftWdth (rafter width), RaftHgt (rafter height), and Thickness (downward thickness of the roof structure).

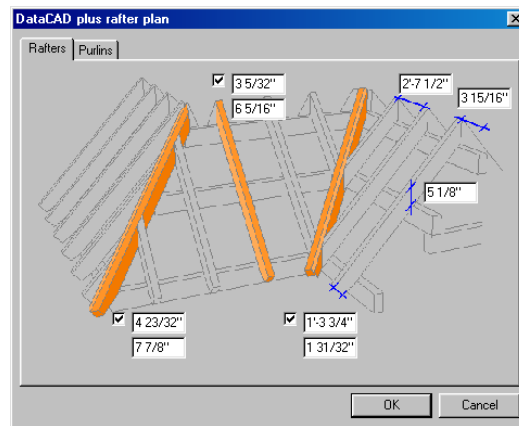
---

3. Click twice on the roof polygon where you want the framing to appear. Then select Yes if you are satisfied with the rafter system ZAC generated.
4. Repeat step 3 for each roof polygon.

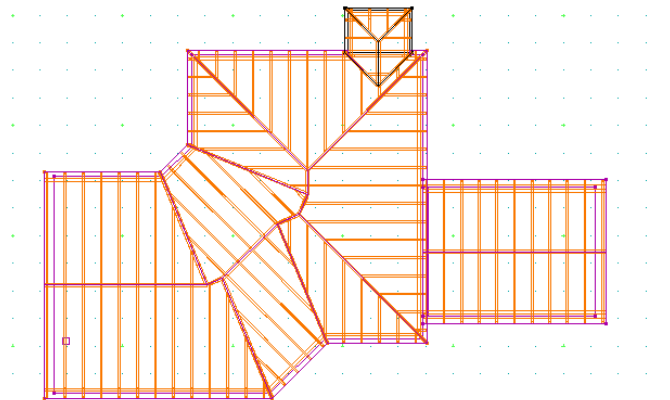
5. Select 3DTrans if you are using the Rafters option and want to convert the rafters to polygons. Use the Object Viewer to see the results. If you used a different color to identify the rafters, the view will be more dramatic.
6. Choose CalcWood if you are using the Battens option and want to calculate the total length of wood required for rafters and battens.

➔ To generate roof framing using the pull-down menu:

1. Select Generate roof framing from the Architect pull-down menu. The DataCAD plus rafter plan dialog box appears.



2. Change values in the input fields for the tabs of Rafters and Purlins to reflect the sizes of your framing members. Click OK when finished to generate the rafter plan.





## Working with Room Definitions

ZAC lets you add room statistics, such as the floor area, to a database. Here, you can also label each room in your project and give it a distinctive color.

➔ To use the room options on a particular zone:

1. Display the ZAC toolbar and the ARCHTECT menu. If you are starting from the EDIT or UTILITY menu, press **[A]** to get to the ZAC toolbar and ARCHTECT menu.

---

If your drawing has more than one zone, you will need to activate the one you want by following the steps below. If your drawing has only one zone, skip to step 4.

---

2. Select Zone from the menu. The menu displays a list of all the zones in your drawing. You are prompted to “Enter layer to be activated.”
3. Click on the zone you want to activate. You can only work on one zone at a time when you are using the room options. (For example, if your building has seven zones, you must select only one of them to work on at a time.) The zone you selected appears on the screen.
4. Click on the ZAC Room icon or select Rooms from the ARCHTECT menu. The Rooms menu appears.

➔ To define a room with its name and area:

1. Activate RoomLine, RoomName, Room Area, and Geometric in the Rooms menu. If you want ZAC to measure the room’s total perimeter, select Perimetr.

---

The RoomLine toggle switch determines whether ZAC displays contour lines around the room. If RoomLine is deactivated, only the room text is displayed.

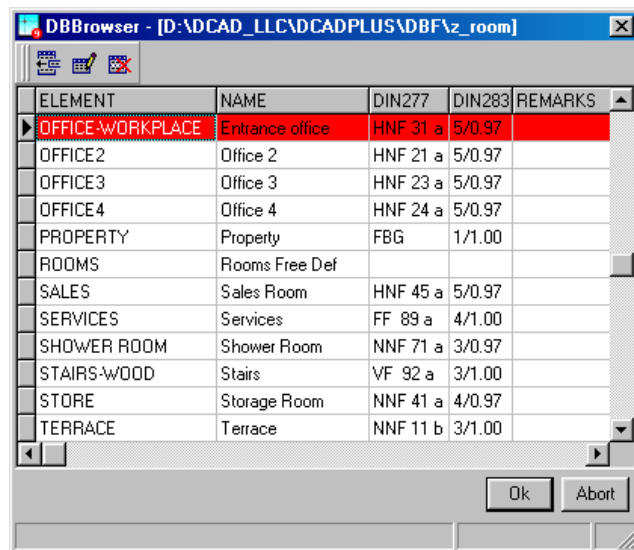
Text will appear when you activate any or all of these options: RoomName, RoomArea, or Perimetr. If you don’t activate any of these options, no text will appear. To avoid generating unnecessary text, make sure you deactivate the option(s) you don’t need. For example, if you want only the room’s name to appear, make sure RoomArea and Perimetr are deactivated while RoomName is toggled on.

Geometric and Topolog are mutually exclusive toggle switches. Geometric measures the contours of all entities in a room while Topolog considers just the walls. Each of these options bases its search on the construction layer of the current zone.

---

2. Change the color by pressing **[K]** until you find one you would like to use. Changing the color helps you easily identify the new entries.

3. Press **[Backspace]**. The Rooms database appears.

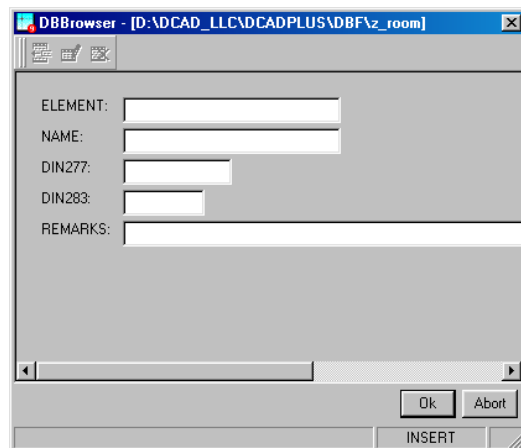


The screenshot shows a window titled "DBBrowser - [D:\DCAD\_LLC\DCADPLUS\DBF\z\_room]". It contains a table with the following data:

ELEMENT	NAME	DIN277	DIN283	REMARKS
OFFICE-WORKPLACE	Entrance office	HNF 31 a	5/0.97	
OFFICE2	Office 2	HNF 21 a	5/0.97	
OFFICE3	Office 3	HNF 23 a	5/0.97	
OFFICE4	Office 4	HNF 24 a	5/0.97	
PROPERTY	Property	FBG	1/1.00	
ROOMS	Rooms Free Def			
SALES	Sales Room	HNF 45 a	5/0.97	
SERVICES	Services	FF 89 a	4/1.00	
SHOWER ROOM	Shower Room	NNF 71 a	3/0.97	
STAIRS-WOOD	Stairs	VF 92 a	3/1.00	
STORE	Storage Room	NNF 41 a	4/0.97	
TERRACE	Terrace	NNF 11 b	3/1.00	

At the bottom of the window are "Ok" and "Abort" buttons.

4. Move your cursor to a blank line on the database and choose the Add icon. A dialog box appears.



The screenshot shows the same "DBBrowser" window, but with a dialog box open for adding a new entry. The dialog box contains the following fields:

ELEMENT:

NAME:

DIN277:

DIN283:

REMARKS:

At the bottom of the dialog box are "Ok", "Abort", and "INSERT" buttons.

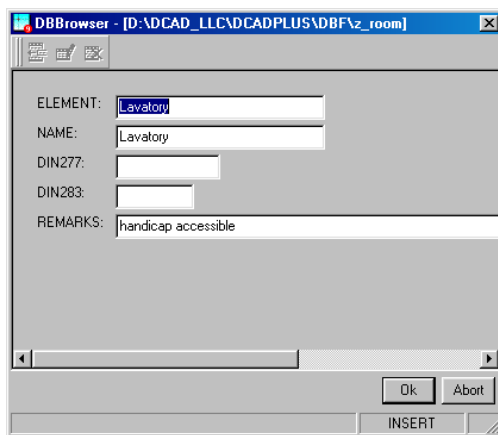
---

If you select a line in the database that already has an entry, you have to delete the items already in the fields before you input your information. Selecting a blank line saves time.

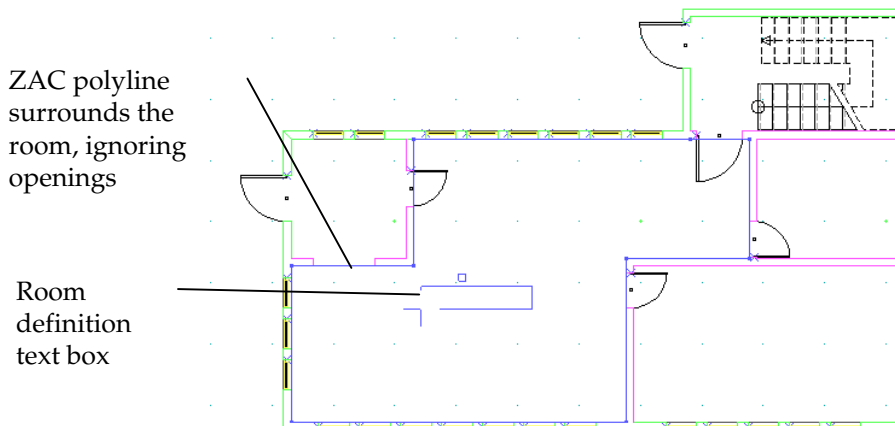
---

DIN is an international dimensioning standard set by the German Institute for Standardization. If your country does not use this standard, leave the DIN277 and DIN 283 fields blank.

5. Type information that will identify the room in the Element and Name fields. Use **Tab** to move from one field to another. You can add notes about the room in the Remarks field. For example, if one room is a handicap-accessible lavatory, you may want to include "handicap accessible" as a remark.



6. Select OK or press **Enter** to add the room name to the database. ZAC puts it in the database in alphabetical order.
7. Highlight the room name you want to use and click on OK to return to your drawing. The room name you selected appears on the status line.
8. Click inside the room you want to define. ZAC generates a polyline around the room. In addition, your cursor changes to a rectangular box that you can position where you want the room name to appear.

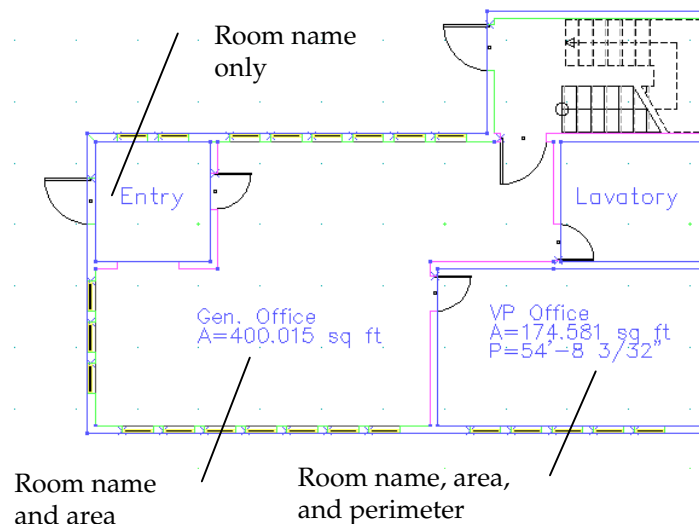


- Click Enlarge (or press **F8**) one or more times to increase the size of the text. If you want to decrease the text size, click Reduce (or press **F7**).
- Click when you are satisfied with the text size and the position of the definition box within the room. ZAC calculates the area within the polyline and inserts the name you selected from the database into your drawing.

---

The room definition text is actually part of the polyline. Since it is not actually text, you can only edit it through the room database. For example, if you notice a typographical error (such as “Dniing Room” instead of “Dining Room”), you must make the change in the database.

---



Many buildings do not have walls between functional areas. ZAC lets you define and name portions of a large space. For example, although a manufacturing company's building has few walls, they may want to designate certain parts of the space for shipping and receiving, some for manufacturing and assembly, and another portion for packaging.

- ➔ To define an unenclosed portion of a large space:
- Click on the ZAC Room icon in the ZAC toolbar. The Rooms menu appears.
  - Enter names of the unenclosed portions into the rooms database by pressing **Backspace**. The database appears.

3. Move your cursor to a blank line on the database and choose the Add icon. A dialog box appears.
4. Type information that will identify the function of the space in the Element and Name fields. Use **[Tab]** to move from one field to another. You can add notes in the Remarks field. For example, if a portion of the space in an open office is reserved for Accounting, you may want to note that a safe is included.
5. Select OK or press **[Enter]** to add the name to the database. ZAC puts it in the database in alphabetical order. Highlight that name and click on OK again to return to your drawing. The name you selected appears on the status line.
6. Activate the options you want to use in the Rooms menu (for example, RoomLine, RoomName, Room Area, and Perimetr), select Topolog or Geomtrc, and press **[K]** until you find the color you prefer for the definition.
7. Select FreeDef from the Rooms menu. You are prompted to "Select first point on polyline."

---

The Polyline menu gives you two options: Rect\_Ang and Closed. The Closed option lets you define any shape (including a rectangle). Rect\_Ang limits you to defining rectangular shapes.

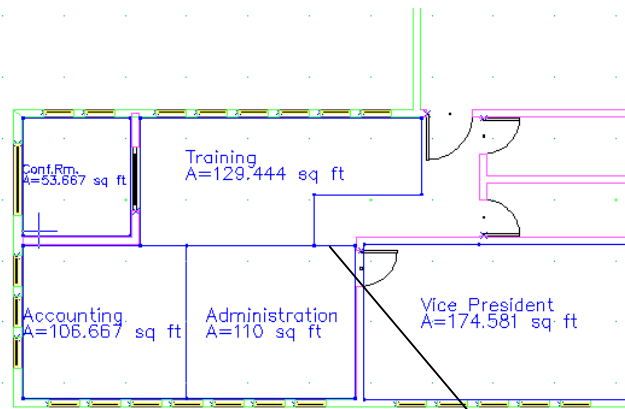
If you choose Rect\_Ang, you are prompted to "Select first corner of rectangle" by clicking within your drawing. Stretch the rectangular box until you have enclosed the area you want to define and click to respond to the prompt to "Select second corner of rectangle." When the cursor changes shape, you are prompted to "Position text using cursor . . ."

- 
8. Click on your drawing where you want the polyline to begin and continue selecting other points until you have enclosed the area you want to define. Right-click to end the polyline. The cursor changes shape and you are prompted to "Position text using cursor . . ."
  9. Move the cursor to the place where you want the description to appear and press **[Enter]**. The name appears, surrounded by the polyline you used to define that portion of the space.

---

To change the text size, select Reduce (or **[F7]**) or Enlarge (or **[F8]**) and click until the definition box is the size you want.

---

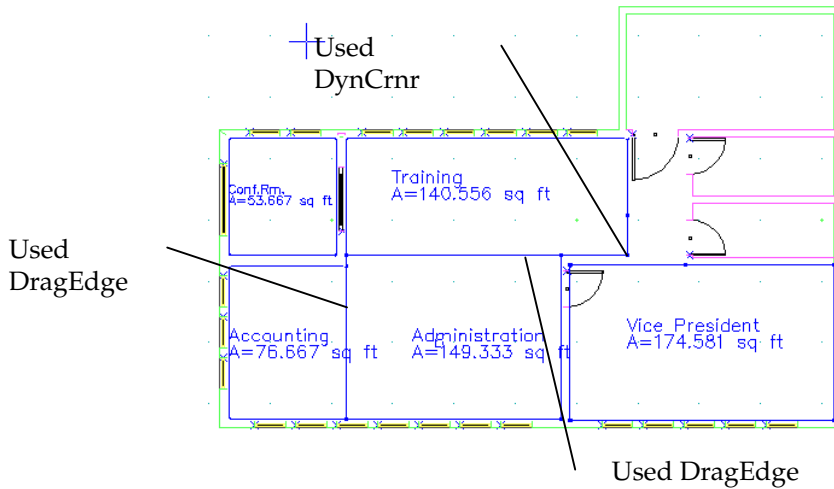


Rect\_Ang polyline  
surrounding part of  
the space

➔ To modify a room's (or part of a room's) polyline:

1. Press **[Alt]+[A]**. The Curves menu appears.
2. Select Polyline. The Polyline menu appears.
3. Choose Amend. The Amend menu appears.
4. Activate the option you want to use:

AddCmr	Adds a corner to the polyline.
DelCmr	Deletes a corner from the polyline.
Move Cmr	Moves a corner of the polyline.
DynCmr	Moves a corner dynamically.
DragEdge	Drags a line segment.
DelEdge	Deletes a line segment.
5. Click on the corner or edge of the polyline that you want to change and reposition it.
6. Click when the polyline is positioned where you want it. ZAC automatically recalculates the area and/or perimeter enclosed by the polyline and changes the text accordingly.



Since the room definition text, area, and perimeter are actually part of the polyline, the area and/or perimeter changes automatically when you reposition a polyline.

7. Press **[A]** to reactivate the ZAC toolbar and continue working with your drawing.

➔ To delete a room definition:

1. Press **[E]**. The Erase menu appears.
2. Select Group or Entity.
3. Click on the room's name in your drawing. The room's name, polyline, area, and/or perimeter disappear from your drawing.

The room's polyline and text are considered a single group or entity.

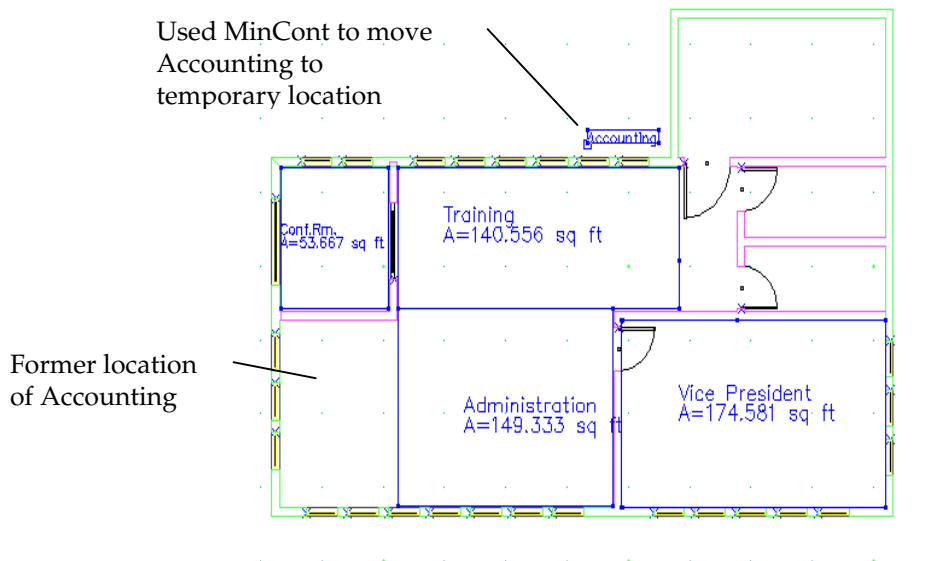
If you want to delete the last room you entered, you can press **[Shift] + [.]**. This is the shortcut for deleting the last group you entered.

➔ To move a room definition:

1. Select MoveRoom from the Rooms menu. Three menu options appear.
2. Activate one of the three options:

MinCont	Reduces the room's contour to the size of a box around the room's name. You can temporarily place the room at the margin of your drawing.
KeepCont	Moves the room's contour lines along with the text. You can move the room text even though the contour doesn't change.
AdjCont	Traces the room's contour lines and adjusts them automatically after you move the room definition to another place. ZAC traces the room's contour topologically or geometrically, depending whether you activated Topolog or Geometr.

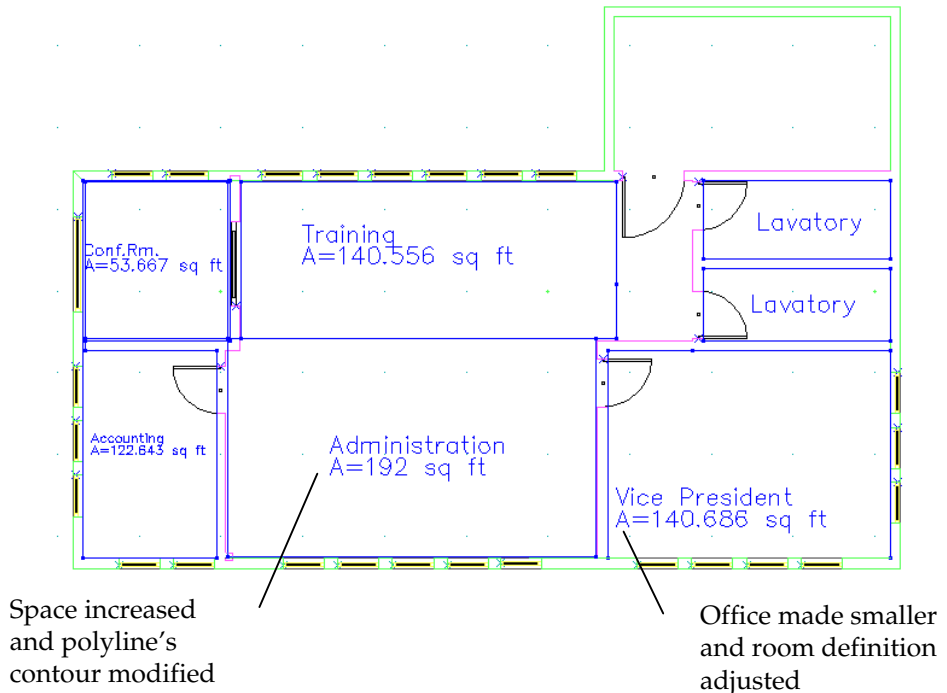
3. Click on the room's name and move it to the new location. If you activated MinCont, you can move the room's name anywhere on your drawing screen. You can move the room description to its new location later.



- ➔ To adjust room definitions after walls have been moved or corrected:
1. Select Adjust from the Rooms menu.
  2. Choose Group. You are prompted to "Select group to Adjust room."
  3. Click on the room's name. ZAC automatically adjusts the contour and recalculates the area and/or perimeter.



4. Make other changes to your drawing and the room definitions if necessary.



➔ To define a separate area within a larger room:

1. Press **[Backspace]** when you are in the Rooms menu to open the database, select an existing room name (or add a new one if necessary), and press **[Enter]**.
2. Select FreeDef from the Rooms menu and use either Rect\_Ang or Closed to draw the polyline and position the text within it. Refer to steps for using the FreeDef option if necessary.
3. Right-click to return to the Rooms menu.
4. Select DefDeduc from the Rooms menu. You are prompted to "Select main room."
5. Click on the text for the large room (not the smaller portion you just defined). The perimeter of the large room is now a dashed line.
6. Activate AddDeduc. You are prompted to "Select group to Deductible room."

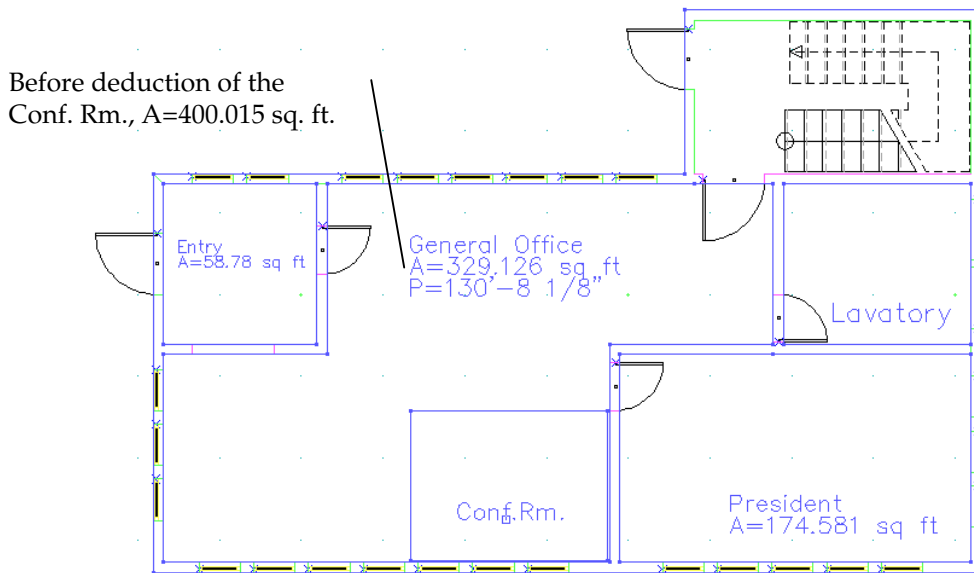
- Click on the text for the portion of the room you defined in step 2. The perimeter of the smaller portion of the large room is now a dashed line. ZAC automatically deducts the area of the smaller portion from the large room and measures the perimeter.

---

What if you click on the text repeatedly, but nothing happens? Probably a portion of the deductible part of the larger area is probably lies within a wall. The easiest way out of this mess is to erase the offending polyline, carefully draw a new polyline (step 2), and go on.

---

- Right-click to return to the Rooms menu.
- Press **[Esc]** to refresh the screen.



---

You can identify the room by pressing **[Shift] + [I]**. On the Infobar, you will see data about the main room and the deductible portion displayed as a single entity. The figures after A= and Perim= are the area and perimeter of the entire room; the figures after A.eff= and P.eff= are the effective area and perimeter after ZAC deducted the smaller portion of the space. The .eff suffix controls the information that appears as part of the ZAC polyline.

---

- ➔ To delete the connection to the room deduction:
- Select DefDeduc from the Rooms menu.

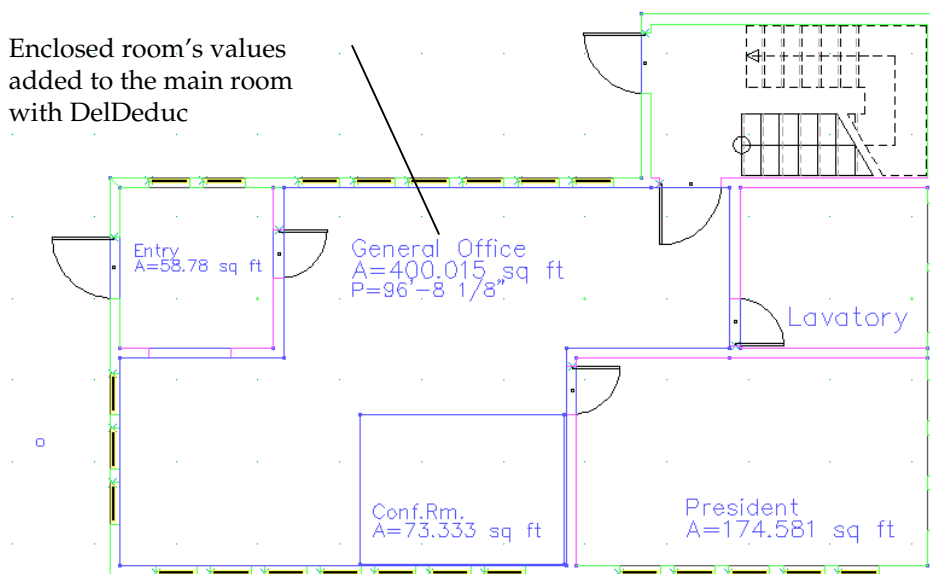
2. Click on the main room's definition (either the text or the polyline). Both the main room and the enclosed room are grayed.
3. Choose DelDuc. You are prompted to "Select deductible room to be unassigned."
4. Click on the polyline of the enclosed room. ZAC automatically recalculates the area and/or perimeter and adds the enclosed room's values to those of the main room.

---

If you click on the enclosed room's definition, nothing happens. You must select the polyline itself. You can use DelDeduc on other polylines (such as columns) that are not actually rooms.

---

5. Right-click to exit to the main Rooms menu.



- ➔ To add a formula into calculations for a room's area or perimeter:
1. Select EditText from the Rooms menu. The EditText menu appears and you are prompted to "Select a text editor function."
  2. Select a menu option and make the changes you want.

BLZRText

ZAC building component index number that calls up a database. This option is typically not used.

RoomText	Edits the text parameters (including Size, Slant, Aspect, Factor, and FontName) of the first line of the room text (the room's name).
AreaText	Edits the text parameters of the room's area (A=) and perimeter (P=).
Incrment	Affects the room text size when you use Enlarge and Reduce in the Rooms menu. This allows you to change the room's text size dynamically before you place it in your drawing.

---

For information about controlling text attributes, see the *DataCAD Plus Reference Manual*.

---

TxtForm2	Uses your formula to calculate the room's area.
TxtForm3	Uses your formula to calculate the room's perimeter.

---

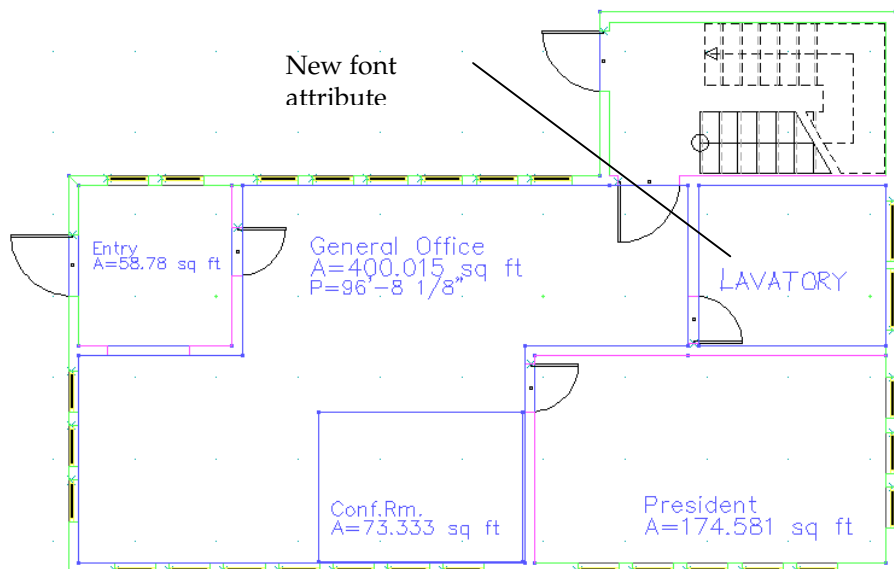
To create a formula in TxtForm2 and TxtForm3, you must use certain conventions. For example, "A=" signifies area; "P=" indicates perimeter; { and } brackets surround the formula; "area" refers to area; "perimeter" refers to perimeter; "dis" means distance; "\*" (asterix) means multiply; "/" means divide; "!" indicates the end of the formula.

P={dis:perimeter!} means interpret the value as the distance around a room, which ZAC calls the perimeter.

A={area:area\*0.97!} means subtract 3% from the room's total area to allow for plastering.

---

3. Right-click to return to the Rooms menu. The next time you identify a room, the new text attributes will take effect.



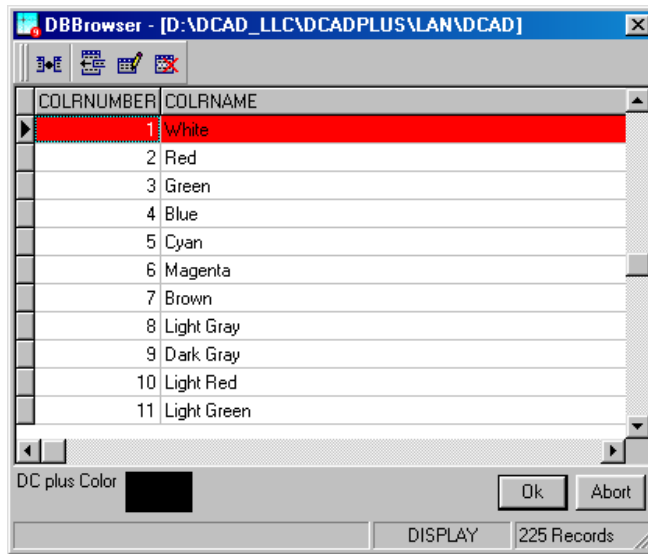
➔ To add color fills to rooms:

1. Define the rooms.
2. Press **[Shift] + [M]**. The MACRO menu appears.
3. Select COLRFILL. The COLRFILL menu appears.
4. Activate AddFill, Color, and NewMon. The database of colors appears.

---

If you do not activate NewMon, you must press **[Esc]** to refresh the screen and have the new colors take effect.

---

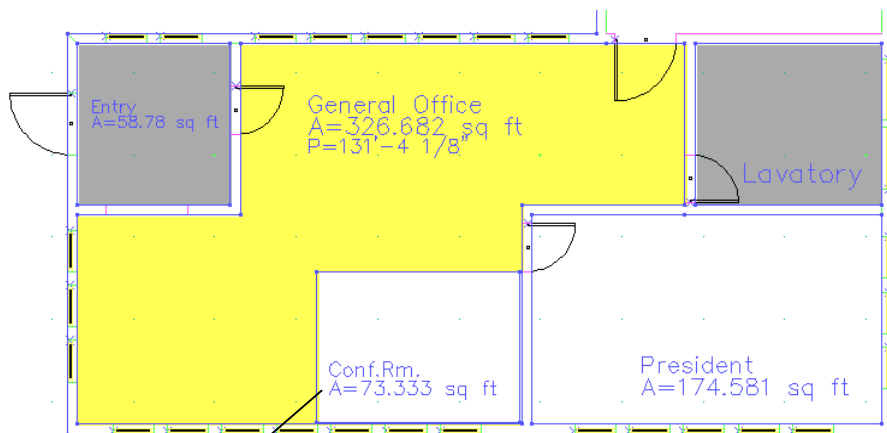


5. Double-click on the color you want to use.
6. Activate FI (Fills) on the Switchbar in the bottom portion of your screen. You are prompted to "Select entity to FILLOPERATION."
7. Click on the room definition text of each room you want to fill with the color you selected.

---

When you fill a large room that contains a deductible portion, only the main area is colored.

---



Deductible portion  
of room not colored

## Working with Floors

The ZAC floor appears on the drawing as a polyline with a thickness value. The floor is the entire thickness between the ceiling of one zone and the floor of the next one above it.

Each zone can have one floor associated with it. Since ZAC automatically sets the lower edge of the floor at the Z-height of the zone, you are actually creating a ceiling for that zone. This ceiling also serves as the floor for the zone above it. For example, if you have a two-story building with two zones (one for each story), the ZAC floor for Zone 1 is actually the ceiling of Zone 1 and the floor of Zone 2.

To create a floor at the bottom of Zone 1, you can generate a Zone 0 to hold it. Alternatively, you can change settings (specifically, for the floor base and thickness) to create a floor that is actually at the bottom of the zone to which it belongs.

In the Zone editor, the floor appears in the Ceiling column.

- ➔ To define a floor that is at the base of Zone 1 in a multistory building with several zones:
1. Select Create Floors from the ZAC icon toolbar. The Floors menu appears. Indicate the zone where you want to place the floor.
  2. Choose FloorBas, supply a value that is below the floor level of Zone 1 (for example, -0.4), and press Enter. This is a negative value.
  3. Set the value for FloorThk so that it is a positive value but the same number to negate that it step 2 (for example, 0.4) and press Enter. This is a positive value.
  4. Select DefDist, supply a value, and press Enter.

---

If you set DefDist at 0 (zero), the floor will directly meet the wall you select. If you select an interior wall, the floor will meet it exactly. However, if you click on an exterior wall, the floor will extend under the wall to reach the outside of the building.

If you set it to a negative value, the floor will not meet the wall of the room (for example, to leave room for insulation between a reinforced concrete floor and the outside wall). If you use a positive value, the floor will extend beyond the wall to produce a cantilever or ledge outside the building.

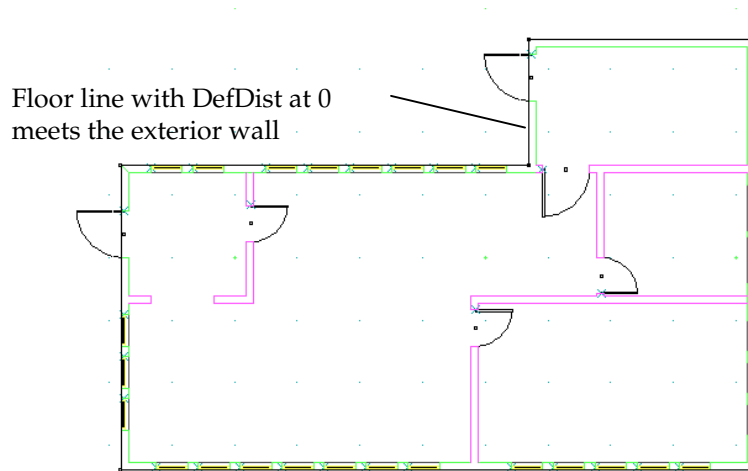
- 
5. Activate Topolog, Geometrc, or FreeDef. These are mutually exclusive toggles that control the way ZAC traces the floor's contour.

---

Topolog only searches for ZAC walls and ignores anything else. Geometrc looks for everything, including walls and other entities (such as polylines). FreeDef lets you use your mouse to define a polyline for the floor's contour.

---

- Click on the exterior wall of the building. ZAC automatically draws the floor line based on your criteria.



- ➔ To define a floor between two zones in a building where each story appears as a separate zone:
- Press **[L]** and activate the CON layer for the zone where you want the floor to appear. Activate other layers if necessary. For example, you may want to activate the stair layer(s). Right-click once you have activated the appropriate layer(s). The status bar shows which CON zone is currently active.

---

If you created a floor in zone 1 at the bottom of the zone, you would create one at the bottom of zone 2 (for example, 02\_CON should appear on the status bar).

If you created a zone 0 to hold the floor beneath zone 1, you would create the floor between the first and second stories in zone 1. In this way, you would effectively create a ceiling for zone 1 and a floor for zone 2 at the same time (for example, 01\_CON should appear on the status bar).

---

- Press **[A]** and select Create Floors from the ZAC icon toolbar. The Floors menu appears.
- Supply the values for the floor's base (FloorBas), thickness (FloorThk), and distance from the wall (DefDist).
- Activate the appropriate floor definition method (Topolog, Geomtrc, or FreeDef).



5. Click on the zone's ZAC wall (if you use Topolog or Geomtrc) or create your own polyline with the mouse (if you use FreeDef) to generate the floor's contour.

---

To create a floor on a room-by-room basis, click anywhere within the room; this will work whether you use Topolog or Geomtrc to draw the contour. To create a floor based on the building's or room's exterior wall, use either Topolog or FreeDef to draw the contour,

---

→ To create a ledge on the building's exterior:

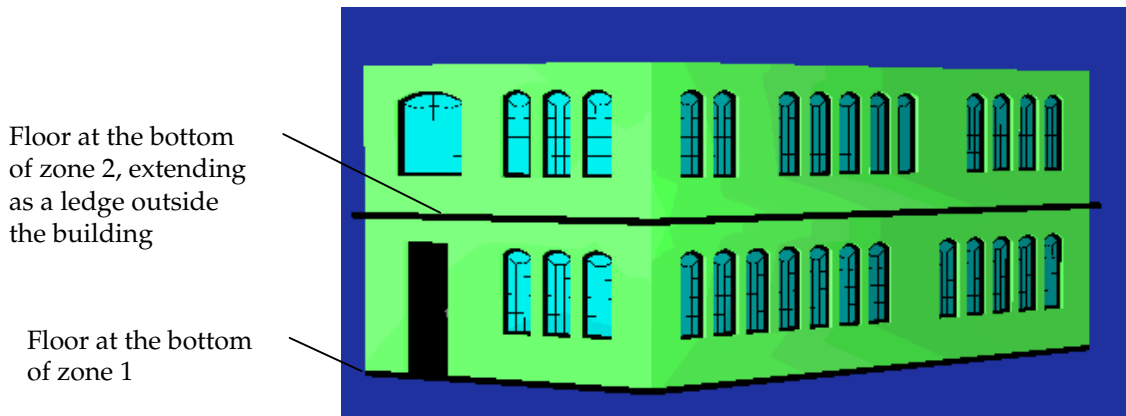
1. Press [L] and activate the CON layer for the zone where you want the floor to appear. Activate other layers if necessary.
2. Press [A] and select Create Floors from the ZAC icon toolbar. The Floors menu appears.
3. Supply values for the floor's base (FloorBas) and thickness (FloorThk).
4. Select DefDist, supply a positive value to indicate the width of the ledge you want to extend beyond the building's exterior wall.

---

You could even create a balcony by specifying a DefDist of 3 or more feet. A purely decorative ledge could be as narrow as 3 inches.

---

5. Activate Geomtrc.
6. Click on the outside of the building's exterior wall. ZAC creates the ledge along with the floor.



➔ To define a void in the floor:

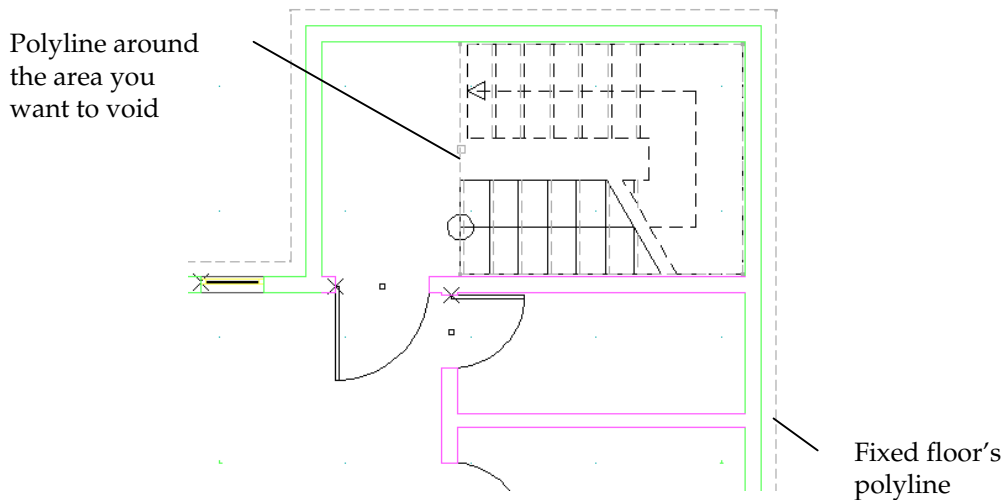
1. Use FreeDef from the Floors menu to create a closed polyline for the void you want to create.

---

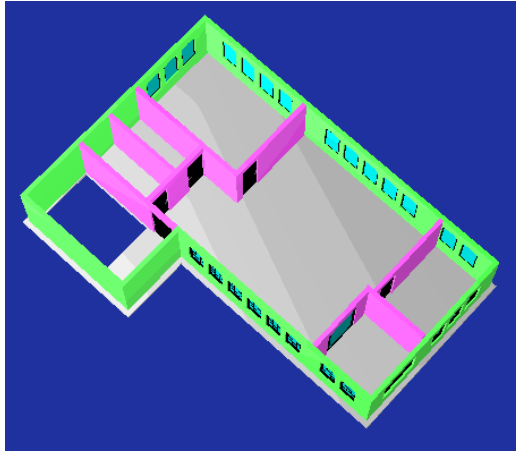
You can use any polyline generated with Polyline in the Curves menu to define the floor void. You can define the hole of a staircase that was defined with the ZAC stairs module as a void in the floor.

---

2. Select VoidDef. You are prompted to "Select fixed floor."
3. Click on the polyline surrounding the main floor for that room or portion of the building.
4. Activate Entity, deactivate LyrSrch, and select DefVoid. You are prompted to "Select entity to void."
5. Click on the void's polyline you created in step 1. ZAC inserts a void in the floor where you indicated.



6. Right-click to exit the menu.



➔ To delete a void in the floor:

1. Select VoidDef from the Floors menu. You are prompted to “Select fixed floor.”
2. Click on the floor that contains a void you want to delete.
3. Select DelVoid from the Floors menu. You are prompted to “Select a floor void to be unassigned.”
4. Click on the polyline of the void you want to delete. The void disappears. Right-click to exit the menu.

