Roof-maker

GENERAL SETTINGS

Working Units ? 🔀 Set the project units (centimeters -**OPTIONS**» **PROJECT** Di Model Unit: centimeter • **PREFERENCES »WORKING** Decimals: 0 -UNITS). Layout Unit: centimeter -Decimals: 0 -∠5^{0⊄} Angle Unit: decimal degrees • Decimals: 2 -In this tutorial you will study Angle & Font Size Decimals in Dialog Boxes: 2 how to: Note: Working Units set here are effective throughout the project, except for Dimensions and Calculation Units, which are defined separately on their own create composite materials Preferences pages. automatically create multiplane roofs OK Cancel using a contour line. Use RoofMaker ? 🔀 Project Preferences o automatically generate a hip Dimensions << Previous Next >> • roof structure draw individual structural Custom Store as... elements for the roof DIN place and edit roof windows Rename... Plain Meter Ξ Plain Millimeter Delete US Architect US Builder **US** Detailing ¹² ∠ C →¹² ♦¹² ↓² ℤ¹ ℤ² ℤ² ℤ² ℤ² ℤ² ℤ² Sample: 12 In the OPTIONS»PROJECT Linear Dimensions PREFERENCES»DIMENSIONS Unit: meter • menu, set the dimension units to Decimals: 2 meters with 2 decimals and check Extra Accuracy: Off the HIDE ZERO WHOLES in order ✓ Hide Zero Wholes Hide Zero Decimals to show sub unitary dimensions in

centimeters.

Witness Line Scalability:

Scaled
 Fixed

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Using Polyline, create on the first floor the next closed contour:

| ayer Combination Name | Structural - Bearing | | Layer name A Extension | Show all I |
|---|---|---|--|------------------------------------|
| 11 Site 12 Drafting 13 Plans - Preliminary 14 Plans - Approval 16 Plans - Detsiled 16 Plans - Mechanical 17 Plans - Structural 18 Rendering 19 Layouting 10 Show 3D Zones as Solid | b C | | Marker - Detail Marker - Elevation Marker - Elevation Marker - Section Marker - Vorsheet MEP - Electrical MEP - Plumbing Model Unit - Module Model Unit - Zone Morph - General ROOF Shell - General Shell - Roof | New Delete Select All Deselect All |
| | | ∩₀ ③ ⋳₀ 1 ∩₀ ③ ⋳₀ 1 ∩₀ ④ ⋳₀ 1 ∩₀ ④ ⋳₀ 1 ∩₀ ④ ⋳₀ 1 | Site & Lan General Site & Lan Terrain Structural - Bearing Structural - Combined Structural - Grid | ⊕ ⊕ ⊕ ↓ ₽rint |

Open the layer manager (CTRL+L) and create a new layer, naming it ROOF.

CREATING A COMPOSITE STRUCTURE FOR THE ROOF

Create a new composite material for the roof **OPTIONS » ELEMENT ATRIBUTES » COMPOSITES**.

Select **ROOF TILED** from the composite material list, and press **DUPLICATE** to make a copy of the material and edit it. Name the new material **ROOF TILED 2.**

Keep the first four layers (TILE ROOF, AIR SPACE-FRAME, MEMBRANE-RAINPROOF &

AIR SPACE-FRAME). The first air space layer will represent the battens and the second the decking.

| 🔊 roofmaker 19 - Graphisoft ArchiCAI | -64 19 | |
|--|---|---|
| 陆 File Edit View Design Document | Options Teamwork Window Help | |
| 🗋 🗅 🚅 🖶 🛃 🐇 🖻 🛍 🗠 | Element Attributes | 📴 Layer Settings (Model Views) Ctrl+L 😽 |
| Toolbox × Select Image: select mark Arrow Image: select mark | Element Snap Alt+E | Line Types ☑ Eill Types ☑ Building Materials |
| Ell Marquee ▼ Design Ell Marquee | H Auto Intersection Magic Wand Settings Import Standard Steel Profile | Composites Pens & Colors (Model Views) Surfaces |
| Door Door | 🔊 Add-On Manager | B Zone Categories ∰ Mark-Up Styles |
| Uindow Column | Project Preferences | C Profile Manager |
| Beam Slab | | Check Surfaces |
| Stair | | |

| Composite Structures | | <u>? × </u> | s and Categories |
|---|--|--|---|
| Roof Tiled 2 | | ► F | |
| New Duplicat | Rename | Delete | |
| Edit Skin and Line Structure | | | |
| Skin and Separator | I√I Line Pen Type Ξ 152 I | | |
| Tile - Roof Solid Line Air Space - Frame | IN-01 Insulation - Fiber Soft | ♦ 410 | |
| Solid Line Solid Line Membrane - Rainproof Solid Line | C-00 GENERIRNAL CLADDING C-01 Fire Proofing C-02 Plaster - Lime Sand | EN-02 Sand EN-03 Gravel EN-04 Soil | IN-05 Insulation - Plastic Soft IN-06 Insulation - Plastic Hard IN-07 Membrane - Rainproof |
| Air Space - Frame Air Space - Frame Insulation - Fiber Soft | C-03 Stone - Finish | IC-00 GENERIRNAL CLADDING IC-01 Plaster - Gypsum IC-02 Timber - Floor | IN-08 Membrane - Vapor Barrier PR-00 GENERIPREFABRICATED PR-01 Timber - Structural PR-02 Reinforceorcete - Prefab |
| IV Solid Line | EF-02 Masonry Block - Filler EF-03 Concrete Block - Filler EF-04 Brick | IC-04 Plastic - Solid IC-05 Tile - Wall IF-00 GENERICTERNAL FILLER | PR-03 Iron PR-04 Aluminium PR-05 Steel |
| Total thickness: [cm] | EF-05 Glass EF-06 Air Space EM-00 GENERINAL MEMBRANE EM-01 Timber - Roof | IF-01 Air Space - Frame IF-02 Gypsum Plasterboard IF-03 Gypsum Prd - Waterproof IF-04 Fiberboard | PR-06 Steel - Structural PR-07 Steel - Stainless ST-00 GENERIC - STRUCTURAL ST-01 Stone - Structural |
| | EM-02 Insulation - Thermal Break EM-03 Membrane - Waterproof EM-04 Tile - Roof EM-05 Titanium Zinc EN-00 GENERIC - ENVIRONMENT | IF-05 Plywood IN-00 GENERIC - INSULATION IN-01 Insulation - Fiber Soft IN-02 Insulation - Fiber Hard IN-03 Insulation - Mineral Soft | ST-02 Brick - Structural ST-03 Masonry Block - Structural ST-04 Concrete - Structural ST-05 Concrete Block - Structural ST-06 Reinforceete - Structural |

The **CORE** type of this layers will prevent the intersection with the finishing layers of other elements using composite structure materials.

| 🗲 Ski | n and Separator | 140 | Line P | en | Туре | Ŧ | | | <u></u> |
|------------|---------------------------------------|------|--------|-------|-------|---------|----------------|---------------|----------|
| <u> </u> | Contour / Solid Line | | 152 | | | | <u>^</u> | | |
| | Tile - Roof | ~ | 152 | | 00 | 4 | | | |
| ▼ – | Solid Line | | 152 | | | | | | |
| | Air Space - Frame | ~ | 159 | | | 3 | | | |
| - | Solid Line | | 141 | | | | | | |
| | Membrane - Rainproof | Г | 142 | | | 0 | | | |
| <u>-</u> | Solid Line | | 141 | | | | | | |
| | Air Space - Frame | ~ | 159 | | | 5 | | | |
| ▼ | – – – Hidden Line | | 142 | | | | | → | |
| | Insulation - Fiber Soft | ▶ 🗸 | 154 | | | 20 | | | |
| <u>-</u> | Solid Line | | 154 | | | Core, F | inish or Other | | |
| | Plaster - Gypsum | ~ | 156 | | 00 | 1 | | | |
| - | Contour / Solid Line | | 156 | | | | - | | |
| tal thickr | ness: [cm] | | | | | 32 | | Use With: | |
| In | nsert Skin Remove Skin | (| | | | | | | |
| | | | | | | | | Cancel | ОК |
| nge | the 5 th layer material to | Insi | ulati | ion - | - Fib | er So | oft and se | t its thickne | ss to 20 |

cm. Check **Other** for the Type of material.

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CREATING A MULTI-PLANE ROOF USING A PREDEFINED CONTOUR

The roof will be generated on the first floor level, using the **MULTI-PLANE** geometric method of the **ROOF** command.

| × | Default Settings | | | Floor Plan | and Section | |
|--------|--------------------|---------|------|----------------------|-------------------|-----|
| lo Box | 🖉 👁 Shell - Roof 🔸 | æ | , ₽, | ون المراجع (p: h: | 30,00° ° 🕨 400 | |
| Ξ | ∢ 1 | | | | | - F |

Enter the settings area of the ROOF command and make the following changes:

| Roof Default Settings | | | | ?× |
|--------------------------------------|-------------|-------------|--------|----------|
| Favorites | | | | Default |
| T The Competence and Positioning | | | | _ |
| | , | | | |
| Home Story: | | <i>]</i> ** | 25 | <u> </u> |
| 1. Story (Current) | TILED ROOF | | | • |
| to Project Zero 🕨 | | (/x | 30.00° | •• |
| 400 | | U.e. | 90.00° | |
| Multi-plane Geometry | | | | |
| ▼ | | | | |
| | | | | |
| | Solid Line | | | _ |
| | 0.13 mm | 92 | | |
| Overhead Lines | Hidden Line | | | |
| Overhead Line Pen | 0.13 mm | 92 | | |
| COVER FILLS | | | | ÷ |
| · | | 3 | | |
| Model | | | | |
| ● ⊕ _□ Tags and Categories | | | | |
| | | | | |
| TROOF | • | Cancel | 0 | |

In the GEOMETRY AND POSITIONING section set Pivot Line height to 90 cm relative to the first floor level. In the FLOOR PLAN AND SECTION» STRUCTURE section choose the composite material created before (TILED ROOF). In the FLOOR PLAN AND SECTION, deactivate the roof texture. (Uncheck COVER FILLS)

Place the roof on the **ROOF** Layer.

| Roof levels: | | * <u>D</u> |
|-----------------|-------------------|------------|
| | Level Pitch | Elevation |
| | 1. 30.00° | 600 |
| | | |
| | | |
| 1 | 1 | |
| | Add | Delete |
| Eaves overhang: | Curve resolution: | |
| i Offset 60 | 🐛 🖲 By arc | 10 |
| C Manual | 🚫 🔿 By circle | |

In the **MULTI-PLANE GEOMETRY** section, set the angle to 30 degrees, elevation to 600, and the offset to 60 cm.

Generate the roof using the Magic Wand (**SPACE & CLICK** on the polyline contour).

On the first floor plan will be placed the skylights. Draw a polyline like in the figure below (2,50m on the X coordinate to the left, and 1,07m on the Y coordinate upwards).





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Double click the Skylight tool in Toolbox to access its settings and select from ArchiCAD library **SUNLIGHT PIVOT HUNG 19**.



In the **PREVIEW AND POSITIONING** section, change the skylights dimension to 90 x160cm, and in the preview window set the insertion point in the right upper corner.

| Place the skylight at the end of the polyline drawn previously. | |
|--|--------|
| Multiply Choose an action: © Drag © Rotate © Elevate © Matrix Number of copies: 6 Vertical displacement: 0 | |
| ● Increment ● Distribute ● 当当当 ● 当当当 | ♦ 2.50 |

Select the skylight and press CTRL+U (Multiply) –Drag Action, Increment Method, number of copies – 6.

To enter the reference point (Drag Reference Point), click anywhere in the plan. By holding the SHIFT key in order to snap to the orthogonal directions, press R to access the incremental distance and set it to 100cm.

Using the editing options (DRAG A COPY, MIRROR and MULTIPLY), place 4 identical skylights starting from the upper end of the main ridge of the roof.



GENERATING THE ROOF STRUCTURE

To enter the Roof Maker menu, access **DESIGN**»ROOF EXTRAS»ROOFMAKER»SHOW ROOFMAKER TOOLBOX.

Select the roof and press the Roof Wizard button in order to automatically generate the roof structure.



| Roof Wizard Settings | <u>? ×</u> |
|--|-----------------------------|
| Rafters 🗛 Beams 🏠 Purlins 🚺 Trimmers 🔽 Ridges | |
| Create Rafters Axis linetype: | |
| Width: Eaves angle: | ····· |
| Height: C Vertical Soffit | |
| I6 O _ A Rectangular cut | |
| Image: | |
| | Double rafters on window |
| | |
| between rafters corners bigger on slant edges | |
| | |
| | |
| B Wood - Pine Graine B ► | ОК |
| Shell - Roof | Cancel |

In the **RAFTERS** section : Rafter section dimensions – 10x16 cm Distance between normal rafters – 100 cm Minimal distance between rafters – 100 cm

Check the **JOINT ON SLANT EDGES** option to have a simmetrical positioning of the rafters on the adjacent planes of the roof

In the **BEAMS** section : Beam section dimensions – 5x20 cm Height to project 0 – 655 cm. Computer Aided Design - ArchiCAD



In the **PURLINS** section set the section dimensions of the ridge and eaves purlins to 15x20 cm.



In the TRIMMERS section, uncheck the CREATE TRIMMERS option.



Set the **RIDGES** dimensions to 10x16, and press ok to generate the roof structure



In the 3D view the roof structure will be hidden in the roof layers. In order to inspect it, check the CORE ONLY option from
 DOCUMENT>PARTIAL STRUCTURE DISPLAY menu. This will show in the 3D window only the CORE elements of the COMPOSITE STRUCTURE MATERIAL (check the Creating a Composite Structure for the Roof section of this tutorial).

MANUAL ADJUSTMENTS

Using Roof Wizard for complex roofs may require manual adjusments to correct errors and omissions of the module.



The missing rafters can be placed with the usual editing tools MIRROR A COPY and DRAG A COPY or by individually defining them using the specific tools of the ROOFMAKER Toolbox.

With the last method, the **CREATE RAFTER** button will enquire the selection of the roof and the dimensions of the

element section. Clicking on the insertion point of the ridgr will finally place the rafter.

There may be errors in the Beams, which will not be generated if the adjacent rafters are not symmetric relative to the ridge.

After adjusting them to be symmetric, select them and press **CREATE COLLAR BEAMS** in the ROOFMAKER Toolbox. Like in the case of the rafters, there will be an enquiery for the dimensions before generating them.

Open the CONTROL BOX from WINDOW»PALETTES menu. In the ground floor select the polyline, press **OFFSET POLYLINE** in the **CONTROL BOX** and holding SPACE key, generate a similar poligon 200cm towards the interior.





Copy the new polyline on the first floor plan. This will be the contour line for creating PURLINS for the roof. Press the CREATE A PURLIN button in the ROOFMAKER Toolbox. You will be prompted to select the roof plane which will be affected. After setting the dimensions (section dimensions - 15x15 cm. elevation - 5cm), click on the segment of the polyline created above on that roof. In order to place the purlins you have to perform this action for each roof plane.

On the purlin contour place studs using the COLUMN tool, with the following dimensions: section -15x15cm Height – 190cm. Set **NOT LINKED** optiom for the **Column Top** type.





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