



## BEST PRACTICES COURSE – WEEK 16 – Roof Modeling & Documentation PART 2 - Roof Modeling with Ornate Rafter Tails

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Hello, this is Eric Bobrow with Bobrow Consulting Group, creator of the ArchiCAD MasterTemplate with an ArchiCAD video tip.

Today we are going to look at a technique that makes it very simple to create rafter tails and delineate the roof edging rather than using the simple volumes that you get when you draw basic roofs and beams for the rafters.

In this example project, which is supplied with MasterTemplate, we are seeing a small residential project here on the inside view. Let's take a view from 3D. This project is used in MasterTemplate to demonstrate many of the features in context. Here we have some saved views. Here's a perspective. [01:07]

Now as we zoom in on this, I would like to point out one thing that has some extra detail here, and that is the rafter tails. If I rotate this around, you'll notice that each of these elements here are carved. And when I open it up in the Object Settings, it is actually just a very simple shape. In other words, there's just a horizontal or rectangular cut here. But in 3D, you can see that it has a complex shape. That's because it's been trimmed by a Solid Element Operator, a complex form that has trimmed it off to make it have this sculptural look. [01:50]

Now notice also the roof piece here which is thick in the main part of the roof, but is thin over the rafters. And you'll notice that every roof piece is like that. When I select it, they all have that notch cutting out. So let's take a look at how that is done.

I am going to go back to the floor plan here, and I will pick up the settings of the roof and of the floor of the wall and we'll just go off to the side and draw a little piece. So I will draw a piece of wall say 6 feet long, and go create a simple roof here that rests on the wall. I will make it 9 feet here. And I'll go and draw this piece just an arbitrary distance. But I will extend the roof edge out a foot. And we'll take a look at this in 3D. [02:58]

So you can see just a very simple roof and wall connection. Now I'm going to go back and select this roof and drag a copy of it on top of itself, basically, making a second roof right on top. So now there are two roofs. One of them I'm going to go and extend out another foot and shorten it back to the face of the wall. So now I have two roofs, one is the original one, and one is just outside the wall and extending further. If I go to 3D, we will see the two roofs. [03:40]

Now this extra piece of roof, I'm going to drop down. And I will drop it down 3 inches in this case so you can see now it's underneath and it's going to create that knot. So I'm going to go select it here and use the Solid Element Operations. And in Solid Element Operations I will make this the operator. And then I



will select the real roof, the main roof as the target, and use subtraction has the option here. So I'll execute this. [04:10]

And you can see now how this main roof has been cut into. Now in order to be able to see it better I am going to select this roof and change some of its attributes. I will go into its settings and make glass so we will be able to see through it in 3D window. I will also change it for section purposes to be just a simple empty fill rather than the composite that the other roof was. Now you can see the shape a little more clearly. [04:44]

Now let's look at how we do a rafter tail. I will go to the Beam tool which has been set up right now with just a simple rectangular beam, 3 1/2 x 7 1/4 or 4 x 8 or something similar, just a wood. And I'm going to pop that in. So I will go and say draw this straight across, and if we look in 3D, we will see that I've got a horizontal beam. I'm going to take that beam and actually tell it to tilt, and I know that the angle here for the roof is 18.43°, which is a 4 and 12 slope. If I want to actually check that, I can select the roof and you can see here the slope. So now that beam is in the right angle but it's not quite the right height. And it's much easier to set the height in a section view than it is in a 3D view. So I'm going to go to the section tool and put a section right in line with the beam. [05:55]

So I will select the section and open it and we'll see here is the beam or rafter, and I will just select it. I'll go to this intersection point and drag from here up to where it snaps there. So that is precisely in the same area as the cutout, and is supporting the underside of the roof there. Now the volumes here, the actual construction is certainly something that one could spend more time refining, but I'm showing a very quick way to model these rafter tails. And you can of course take it further when you are done. So if I go back to the floor plan, let me go now and take one more 3D view and see its repositioned itself. [06:48]

But I would like to make it a sculptural end. So I will go to the Wall tool in this case. And we are going to use a sculptural wall. So instead of using a straight wall I will pick a profile. And in MasterTemplate we have quite a few profiles that are already setup for use. Here is one for the eave. And it is an example of a type of shape that in this case is the cutting shape. So in other words, if you look up above in the preview, you will see a solid shape that you can imagine would be the part cut off of a rafter leaving the sculptural piece behind. That I'm going to be placing. [07:28]

I'm not exactly sure where to place it in 3D, so I will just place it on the floor plan. And then in the section again, I will just position it precisely. So I open that section, and here it is down low; I will just grab this and move it sort of the general area. And then zoom in and drag from this snap point, get a snap point there, and take it over here. So now you can see I've got it precisely fit into position. I can go even in this view and tell it to be the operator, and go select this beam or rafter to be the target and execute. And now if I go back to 3D, we're going to see that that shape has been cut. [08:20]

Now this beam here, I've made it as glass, but I forgot to put the edge color as glass so that it would make it easy to see through it. So now we can see that. So that's how easy it is to create the roof shape and a single rafter tail. Let's go and duplicate the rafter tail and see what happens. If I select this then multiply it, perhaps do it with a spread. It could be every 2 feet, it could be 16 inches or whatever it



needs to be, but I will just make a couple of copies here and we'll take a 3D view. And you can see that they've been trimmed by this operator as well. [09:04]

Now when I'm done working on the operator I will select this shape, select that and change its layer from say a wall to the layer we had in MasterTemplate for the Solid Element Operations. That makes it disappear from our view, and I will do the same thing with this roof. So now you can see - ah, that surprised me. I thought we had that trimmed. So I will go back and put the layer back, I will use our Quick Options here, this button here, and I will change it to the layer we have in MasterTemplate layer combination where the Solid Element Operations are visible. [09:54]

And I will go and just make sure that this trim element is the operator, and that these two elements here are targets, and we execute. And now if I go back to show the building only without the Solid Element Operators, we have a nice clean result. So let me show you how you can do this for a lot of roofs and walls all in a very quick succession. So I will go back and pick up the settings for the Wall tool and just create a series of walls. [10:40]

Here is a simple building shape. I will go to the Roof tool and I will go tell it to create a series of hip roofs on this to 9 foot or 4 and 12 and let's say with a 1 foot overhang. Now these are the original roofs. We'll just take a quick look to see what we've got. And you can see here is the basic building shape. And I will close up the Solid Element Operations so we have more of the screen to look at. And I'll go back to the Roof tool. Perhaps in this simple case, instead of copying the roofs one at a time, I will just recreate the roof structure, but this time with a 2 foot overhang. And I might as well just drop it down to the 8 foot 9 that I know I need. [11:43]

So now we've got these outer pieces. Now these outer pieces extend all the way into the ridge line, which is not what I want. I want them to only be outside the building. So I'm going to use a very simple technique of splitting them along the outside face of the building. And I'll use the eyeball cursor to say this is the part that I split that I'd like to delete. So now is part here is just the outer part. So I'm going to repeat that for each of these roofs. So I split along the outer edge of the wall, tell it to leave selected the inside part, and delete it. And then just go very quickly splitting each one of these. And you can see how even with a number of roofs this is a quick process. [12:52]

So here's my last one. So at this point, these outer roofs, I will go in and just very quickly set them to be glass, to be a simple shape for a section here. And I will also make them be the operators and then select all of these roofs here as the target and subtract. So we can see in 3D the results of that operation. We are going to select the outer roofs here and put them on the layer that is for special operators. This will make them disappear when I switch my layer combination to show the building only. Then when I go to 3D we will have very clean representation of the shape. [14:14]

At this point I'm ready to create the rafter tails. And of course I could use the Beam tool, but I'm going to actually take advantage of the Roof Maker Wizard by selecting all of the roofs, and going to the Design menu, Roof Maker, Roof Wizard; telling it that I would like to create rafters of the appropriate size. And it will create all of the other ones as well. We will tell them to go ahead and create them on the layer that it wants. And we now have some rafter tails very quickly. [15:13]



Now they're not sculptural, so let's see how we can do that very expeditiously. Now I'm ready to draw a cutting tool. The wall element here, which I will set up instead of being a straight wall, I will set it up as a profiled wall here with the eve cutting tool. So I will go draw this across. If I had recorded the height previously, I could use that, but if I'm not sure then I'll just go and repeat the process of creating a section and opening the section and dragging the shape into position. [16:18]

And then I'll look at it in 3D, and you can see that it's nicely positioned, but instead of doing the cutting right now, I'm going to repeat it around the shape, around the building before I do the cut so I can save time. So I will simply mirror a copy across the axis line. So I've mirrored the copy, and I'm going to stretch this to there. Mirror a copy along, mirror a copy, and last one. Okay, so now if I go to 3D, I will see all of them there. And I'm going to use Find and Select, which is a great way to work with these things as a whole. I can select this element here and say that I'd like to use its settings and select all of them. [18:03]

So you can see it selected all six of them very easily. And then go back to the Solid Element Operations where I will make these the operator. And then I will need to select one of the rafters as an object. But I don't necessarily want to get objects just at 9 feet. I can go in and change the criteria perhaps to the name and find out all of the rafters that have that name. It's not getting all of them, because some of them might have different names; so I might want to actually say the name contains the word "rafter". And then it selects all of the rafters and makes them the target. Then I do the subtraction, execute. [18:47]

And you can see they've all been carved in terms of the shape. And then as a final step I will just select these walls, the six of them, and put them on that layer that has the Solid Element Operation operators hidden. And at this point, I've now got all of those beautiful rafter tails trimmed and the building is looking pretty nice for only a few minutes of work. Now sometimes one might want to experiment and change the shape of the rafter tails, and it's very easy to do that using these tools and this approach. I can go to the Complex Profile, Profile Manager and open up that shape and edit it. [19:59]

So here's the shape that was being used. And I can go and select it and let's just do simple edit to see the effects. I will just straighten this segment out. And you can see the shape here. As soon as I store the profile and go and tell it to rebuild, all of the rafter tails change like magic throughout the building. Now I can have a set of materials and in MasterTemplate we have this set up with instructions for how you can work with all of these things. There is a set of profiles and a guide for setting things up at a 1 and 12, 2 and 12, etc. All of the different roof slopes here. And what I'm going to do is simply take another shape with the Fill tool, and let's say I might want to try this one. So I'm going to copy that and magic wand it. [21:17]

Cut its from this one where I've got all of my resources and go to the one that is actually in use. I don't need to save any changes for what I just did but I'm going to paste this in. And this shape here I will go and drag the alignment point. And now this is critical, this X here is the project origin or the origin point for this window, and that is where we have control of the profile when we are drawing it. I'm going to go and rotate this to be the angle that I need here. And because I know that it needs to go from this



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point at the edge of the roof to the wall a certain distance, I will just adjust this profile perhaps little bit to make it more compatible with that shape. [22:24]

So at this point, I will get rid of the other profile and make sure that this one has a material that we are using, the glass. And again as we look behind here, as soon as I store this and update the 3D window, we get the new shape.

So there you have it, a great way to use Solid Element Operations and Complex Profiles to create rafter tails with sculptural form; and how to also prepare the roof with a solid volume in the main area, but a shape - here you can see notched out to allow the rafter tails. So this is Eric Bobrow of Bobrow Consulting Group, creator of the ArchiCAD MasterTemplate. This was November 2009 ArchiCAD Video Tip. Hope you enjoyed it.