BEST PRACTICES COURSE – WEEK 16 – Roof Modeling & Documentation PART 8-B - Barrel-Vault Roofs in ArchiCAD 15 and Later

Hello, this is Eric Bobrow. In this lesson, we'll take a look at how you can create barrel-vaulted roofs in ArchiCAD 15 and later and how you can connect them to other roofs. I'm going to start out by drawing a box of walls here. And we'll go, instead of to the Roof tool where we no longer have any options for a vault shape; we'll go to the Shell tool which was introduced in ArchiCAD 15. Now the Shell tool has shapes such as extruded; then we also have shapes that are revolved or ruled. [0:00:41]

So we're going to be looking at the extruded shape here which can be simple curve or a more complex and detailed shape. For our purposes here today, all we need to do is click along the edge of this wall, that's a second click, and then click again, and we'll see that it has created something. And we'll see what it looks like in 3D. So this shape that we just created is a half cylinder that went along the edge of the wall. You can see there's a line here that was created, that is the extrusion vector. And then it had a half circle along there. [0:01:24]

Now, I'm going to go back and undo this and do it again, and then this time instead of clicking the third time on this point, I'm going to go over to the other end of the wall. We don't see anything here, but if I look in 3D we will see that it expanded it to the width of the building. Now it's still a half circle, and that might not be what we want in terms of a shape for a barrel-vault. So I can go to the axis line here that is the control contour, press down on it, and you can see the pet palette offers the standard options for dealing with curves or polygons. [0:02:08]

And I can actually just reshape it just like I'd like. So it's very quick to create the basic shape. It's a single element instead of a series of little roof pieces. And if we go in fact to something like the south elevation here that would look straight on at this, I can also take this shape and edit it directly in this window. So I can go and take it to whatever shape I want, drag it up in space perhaps so that it's resting on top of the walls. So it's much easier to create this shape than it was in previous versions. If I go back to 3D you can see how it's starting to take a pleasing geometry. [0:02:55]

I'm going to go to the Wall tool, select all the walls, and we'll use the pet palette to make them taller. And then select this barrel-vault, which is done with the Shell tool, and use the Connect, Trim Elements to Roof or Shell in the Context menu by right clicking. And use the default that says to use the roofs or shells from the current selection and trim. And you can see how quick and easy we can get this result. So this is so much easier than what we had in earlier versions. [0:03:32]

But there are some things that you need to be aware of that will give you more flexibility and control. So for example, if we wanted this to extend beyond the building on the sides, what we can do is select

this and go to the end of this curvature line here. When I go to the end of it, you'll see that there's an option just like what we would have if we were working with a curve on a plan to extend it to move it into a new position. So you can see how I've changed that. Now of course that sort of crude in the 3D window, let's go to the elevation and you'll see what it's done. And I can do the same thing. I can just reposition this point here. [0:04:13]

I can reposition it to the other side and perhaps even make it asymmetrical, like this. Then, go to the arc and change its curvature. So now we can get a very nice result just playing around with it as we wish. Now you may notice that the edges here are - let me just extend this a little bit further - the edges here are perpendicular. There's no control that we have that will allow us to make it vertical or horizontal directly. So what we need to do is use something to trim it. And I will show you. There are two ways that you can do this. [0:05:03]

So if I wanted to have a vertical fascia along this edge, one way that I could do it would be to actually create a cutting plane. So for example, if I use the Slab tool and draw a shape along here, go to 3D and take this slab and use the pet palette to make it much taller, like this, this slab could be used as a cutting tool. It can be used with Solid Element Operations. [0:05:33]

Now in order to make this work, I'm going to take this slab and put it on a different layer for this purpose. Say the one for Solid Element Operations that is often hidden. So this is in a layer that is in the standard U.S. template and there may be something similar in the international version. There is certainly a layer like this in MasterTemplate for Solid Element Operations elements. Now that temporarily made it disappear, but what I'm going to do is go and turn that layer on and put it in a wire frame mode by clicking on this little icon. [0:06:07]

And when that happens, you can see now that the element is visible but it's now in wire frame. And I will go open the Design menu, Solid Element Operations or if you were in ArchiCAD 15 it would be a sub item of the Connect menu; it would be over on the right here. Once I've opened that up, I can select this slab; make it an operator; so it's going to control the action. Take the shell; make it the target, and just a simple subtraction will allow me to carve off the end. I'm going to go back to that south elevation. We'll see that this element has been carved off, and this element here is showing, this is the slab. I can hide it by turning off the layer. And you can see we've got a nice clean result. [0:06:53]

So that's certainly very possible to do, however there is a simpler way that we can actually trim this off vertically. So that is by selecting that shell and right clicking on it and then saying that we like to define a shell contour. So shell contour allows me to create any arbitrary shape and cut out basically perpendicular to its editing plane; we can cut out an extrusion shape. And basically restrict the shell to be within it. Let me show you something that we can do arbitrarily. I will click on a series of points like this, and you can see the points that I drew have been intersected with this element. [0:07:45]

And when I go to 3D, we're going to see that the shell has this rather odd shape. And if I it, you can see it still has its original shape plus this extra contour line that I can adjust. I can make all sorts of complex changes to it just like any other polygon that we work with. If I go back to the floor plan you'll see that again, this is a polygon shape that cuts it, and the original element shape is intersected with that. Let me just undo, and let's do something more conventional here. [0:08:24]

Instead of manually clicking on a series of points, perhaps I might want to carefully put in something like a fill just to quickly define a shape. Let's say like that. Now this fill didn't do anything by itself, but I can select the shell, right click on it and say define shell contour and use the magic wand to create that. So you didn't see the magic wand onscreen, but basically I was able to with the space bar held down, define the shell contour. So now, we've got both the fill and the shell showing on plan. I could go to the Fill tool and delete it or the fill elements and delete it, but you see the actual shell now has a dashed line around it but extends out further. [0:09:19]

If I go to 3D, we will see how the shell now has vertical sides. And with it selected, we can see how it's been trimmed there. So this shell contour is an easy way to get vertical sides. So we don't need that Solid Element Operation option for this type of a trim. But we would need it if we wanted to trim to the underside. Let's see how that would work. Before I do that, I just want to point out that if you do want to extend this shell beyond the surface of the building on the ends, not on the sides, then you can go and go to the edge here and there is an option just to extend the shell. So I can go and extend it here. [0:10:06]

Now you notice that I extended it, but it didn't actually extend in 3D because guess what? That shell contour, which is the dashed line here, did not extend. So I need to extend it - if I have a contour line that controls it - I need to extend then the contour line. So the abstract extension is out to here and the cutout is going to this point. So if we go to 3D we will see now how it's extended. So there is this concept that there's an extrusion vector and it's going out in sort of general terms all the way out to the end, but then in this case is a contour that is cutting it out only as far as I wish, which can be a simple shape or a more complex one. [0:10:52]

Now let's take a look at how we connect a shell like this to another roof of shell. So I will go and we will just create a simple little building shape here. Then go to the Roof tool and we will put in a hip just by magic wanding there. And let's just make this have a dashed edge for the overhead line so we can see it better there. Now let's assume that we have something in front of the building and we want to connect with it. I will put in a column and then drag a copy over there. And we'll create now a shell, just a simple one again, going in this direction. And we'll extrude it all the way over to the end of the columns. [0:11:48]

So now when I go to 3D, we'll see this half circle. Now I don't really want it to be as tall as that, I want it to be a shallower one. So again I will go back to the south elevation. And now I can go and select this

and edit the shape down to whatever I like here. Perhaps I can drag this up to the top of the column so now it's at the shape that I want. Now when I go to 3D, we'll see that this shell is sort of buried inside the other one. So one question will be how do we connect these cleanly? [0:12:32]

Now in order to be able to see it better, I am going to go to the View menu, 3D View Options, 3D Window Settings and say that in the 3D window, I would like to turn off textures in the open GL. And that will make it a little bit easier to see. Now I might want to make these two roofs have the same texture rather than a different one, but for now this will make it easy to see what's going on. Now the simplest thing for me to do is to select these two elements, the main roof and the barrel-vault shell, right click, and say Connect, Trim Elements to Roof or Shell, which will then actually trim each one to the other. [0:13:14]

So you can see how this one has been trimmed back and the other one has also been trimmed. And if we go underneath, you can see how they relate. Now there is actually a little bit of a problem, or at least something that you may want to consider is that this element here is going to the surface of the wall. That may or may not be what you want. In fact, they are passing through each other in this relationship. So if we go to the floor plan, we will see some of what I am talking about. [0:13:51]

This shell here is trimmed and then goes across the face. The reason for this as I went through it in earlier training is that this main roof here, when I go into the settings, is set for trimming only out to the pivot lines, which is where the edge of the wall is. In this case, we might want to go to contours down. And then you will see how it interacts with the other roof all the way out because of the way that the other roof is sitting beyond the pivot line and out in this area. [0:14:28]

So when we go to 3D, we'll see now this roof actually its green line extends neatly there. So we've not got these two roofs cleaning up nicely, and if we were to change the curvature, for example, just change the curvature a little bit, you'll see how they just maintained that connection very naturally here. I will just undo that. Now the roof here has a perpendicular edge. And we know that we can get it vertical, but sometimes we might want to make it horizontal. We might want it to rest on top of this column and come straight back. [0:15:13]

So let's take a look at how we might do that. So I am going to go and take this in the elevation. And let me take this a little bit steeper, just to make it more obvious what I am doing. So I am going to take it up like that there. And let's say that we wanted to trim the underside here. Well, we can't use that contour method, but we can use the solid element operations. So first of all, let me pull this out. And I could do this precisely using drafted controls, but I'll just pull it out conceptually. And maybe drag this up. [0:15:54]

Actually, let me leave it back where it was. And I'm going to trim this off underneath here. So how would we do that? The same way I did earlier with the slab. This would be a convenient way to do it. I am just

going to draw an arbitrarily-shaped slab here, put it on that layer here for the solid element operations, and let's get that layer showing again. Remember I had used the Quick Layers palette to hide it. So I just undid the layer change here. So now if we go to 3D, we are going to see these cutting elements - the one that I no longer need over here, but the one that I am going to use definitely in this area. [0:16:40]

Now I am going to take this and stretch it up to the height of the column here. And I will make it the operator. And I will take this one and make it the target, the shell, and do subtraction and execute. And you can see how that got a nice, clean result there. I can get the same sort of thing by dragging this copy over, as long as it neatly overlaps, then making this copy the operator, and this shell again the target, and execute. And you can see how now we've got a nice, clean result in terms of the shell. [0:17:20]

Now we've got some issues here in terms of the way the two roofs are intersecting. So we might want to actually also do some type of a contour for this shell. This shell here right now is extending out further than the rest. So what I am going to do is with this shell selected, I will go and define a shell contour. So it just stays within the boundaries of the column here. And you can see this dashed line, what it's done. Now by having a contour, basically saying it will never go beyond that. [0:18:06]

Now when I go to 3D, you can see how it's cleaned up the way these two roofs are interacting. Now depending upon what you want to do, you can see that they've been connected. And so this one is now passing underneath that. There are different ways that you could approach it, but let's just try one last thing and that is to remove its trim by the other shell. So they no longer relate to it. And let's say for example that this one here is going to be trimmed out - first of all, let's take this one and we'll say connect to this shell and keep the upper part. [0:19:04]

So now, I didn't modify the main one, I just was acting on this one. And you can see how it's neatly trimmed out. Now having done that, if I select this one as the target and this one as the operator, and then do subtraction with downward extrusion and execute, we'll see that it's now neatly trimmed this underneath here. So we have some stuff that we would want to do with the walls to clean them up. Perhaps take this wall up higher, and then tell it to connect with or be trimmed. I don't know, you could try it different ways. [0:19:52]

But let me make it the target, and then we'll make this the operator. And we'll say subtraction with upward extrusion, which would be the traditional one. That trimmed that off. And we can take this as the target and take this roof as the operator, and again do this. And now we've got the wall coming up neatly here. Of course, we could have a doorway or whatever, but all of this is basically being trimmed nicely. [0:20:20]

So there are different things you can experiment with using the Connect. Either selecting two elements together just to have them automatically do what ArchiCAD thinks is best, or selecting one and telling it to connect to another or using the Solid Element Operations. There are all different variations that we

can do. And of course, these cutting elements here that I've got as slabs, if I hide them, you can see we've got now a nice, clean result. [0:20:49]

So these are some of the variations that are useful and make it easier to do in ArchiCAD 15 and later than ever before, but some of the little wrinkles or things that you need to understand to get full control over how a barrel-vault shell will interact with walls and with other roofs. This has been Eric Bobrow; I look forward to getting your comments and questions on the page down below. Thanks for watching.

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