BEST PRACTICES COURSE – WEEK 20 Managing Attributes, Project Preferences, Work Environment – Part 1-D – Element Attributes: Working with Custom Materials

Welcome everyone to the ArchiCAD Best Practices training lesson. Today we'll be focusing on building materials. This is continuing on in our series on element attributes. Recent lessons have been on working with custom line types and fill types. Last time we worked on surfaces, or before ArchiCAD 17 they were called materials. Today we are going to be focusing on building materials which were introduced in ArchiCAD 17. So if you're in ArchiCAD 17 this applies you. if you're in an earlier version then this is something that you can look forward to. [0:00:42]

If you are in ArchiCAD 18, if it's later on when you're watching this lesson, of course this should be pretty relevant for the next few versions. So building materials, what is this about? Well in ArchiCAD 17 Graphisoft introduced this concept of a super-attribute. These are all attributes, line types, fill types and surfaces. And building materials refers to the fill and the surface appearance of an element. So let's say that I have gravel, and gravel has a certain fill in a section or possibly in the plan drawing if you have a mound of it that is being cut through. And it does have a certain appearance in terms of when you're in the 3D window or possibly doing a rendering. [0:01:41]

So you'll see a list of building materials on the left hand side. they can be organized by priority or by name by clicking on the top here. now if you are used to seeing them by name you'll see it based on the first few characters. In the U.S., Graphisoft organized their standard template - which is what I'm using right now - numerically to match the Construction Specifications Index or CSI standard descriptions of these materials. In international versions I believe it's all alphabetical. there is no number at the beginning of it. but basically this is something that if you understand the CSI numbers or if you're in the international version and you just I want to look for wood, it's going to be down in the W's, and you can go find it easily. [0:02:33]

Priorities are something we're going to be looking at and I'll explain in case you haven't spent much time with it. you can sort by priority and see how visually we get an indication here as well as we see a priority number showing up. When I click on any particular building material we'll see the intersection priority number and we'll see the bar chart here. Now what makes a building material? A building material has a name, so let's pick some tiles. Here is "22-0930 Tiles". That is its name. you could at any point change its name and everything in that particular file will still reference that building material. [0:03:19]

If you've created a flooring material with tiles on top or wall with tiles applied to it, they will understand even if you change the name because internally there is an index number. So in other words, this is

number "85" or whatever it is. If you change the name, then it will display that in all the dialog boxes but internally all reference to it will be talking about number 85. [0:03:45]

Now the structure and appearance are the things that we focus on most commonly in everyday use. So tiles right now have no fill. It's actually technically called 'background fill' but has no line work. and obviously the fills, the ones down in the vectorial fills or symbol fills will have line work and the ones in the solid fills may have a percentage. if we go down to something like Limestone here, we're going to see that in a section it's going to be shown with this particular brick face fill. And so that's what it's going to appear when you cut a section through it or in a wall that is being cut through because of the standard representation for the floor plan cut plane. [0:04:34]

Now in previous versions of ArchiCAD, we simply would create walls or other structural elements with fills knowing that the fill referred to something like brick or stone or concrete or something else. Now we're actually going to be making the walls and the elements with a building material or a series of building materials in a composite. And we're going to explore composites in a following lesson that references either building materials, like in ArchiCAD 17, or in previous versions it would reference directly the fill. [0:05:18]

So the building material for the limestone here has a fill and then it has an appearance. This is our surface appearance; formally called materials but now called surfaces. And that means that it will have a certain look when we draw something with it or if we have a composite that includes it and it's exposed. In other words, the surface is being seen as opposed to an internal one. Now the intersection priority, if you've been working with 17 you are already familiar with this. if you haven't been or are just getting started with ArchiCAD, this basically turns how strong that building material is relative to other materials and when things intersect. when you make a wall and a floor pass through each other, then certain materials will have priority. [0:06:10]

They will pass through other materials and have a lower priority. So basically by either moving this bar, changing the number or sliding the material up or down in the system, the intersection priority can change. We've looked at this in some of the lessons on the new features of ArchiCAD 17, so if you want to see some of the mechanics of how this works in a section drawing I suggest you look there. We'll take a little bit of a look here today but I mainly want to talk about how you manipulate these and create them and some of the other things that we haven't talked about in those lessons. [0:06:57]

To round out the overview here, the physical properties of something like limestone relate to thermal properties. So thermal conductivity, I'm not really an expert on this, but I believe this has to do with how much the heat passes through it or how little. And heat capacity, this has to do with how much heat is stored in it. So obviously if you wanted a more efficient building in terms of requiring less heating, then you'll want to have a lower conductivity. So let's say that if we look at insulation here, you can see

it's connectivity is very low relative to something like wood, which is somewhat higher; or relative to something like steel. [0:07:54]

Concrete passes the heat through much more than insulation of course. But on the other hand, concrete can hold a lot of heat. so if you're interested in passive house types of strategies where you have some thermal mass that is accumulating warmth during the day and radiating it back at night or possibly getting cool at night and therefore sucking out a lot of the excess heat during the day, then you'll want elements with more heat capacity. And something like precast concrete is going to be having a lot more benefit in that way than something - I guess I am not quite sure what we would build things with. CMU, a concrete masonry unit - actually, that has a high heat capacity in here. [0:08:54]

As I said, this is something that I really am not that familiar with. I know the basics of this. Density also would be a factor that I'm sure if you're working with physical analysis of your buildings this would have some relevance. Now one of the things that I do know is that if we were creating a new material, let's say that we have some structural concrete but it's a different type of concrete and therefore has some different properties, we can go ahead and let's say create a new one that is a duplicate. I will leave it with the default name that is a copy of this. And we might change the attributes here. we can of course adjust any of these things in this copy and I can give it a different name if I wanted. [0:09:49]

But sometimes if you're creating a material that is not a building material that is not in this list, you might want to check the material catalog. by clicking the material catalog button, Graphisoft has provided a reference list. so here's concrete, and we can pull this down and expand it, and you can see OK there some concrete with steel in it that has certain thermal connectivity and density here. Maybe you're using that because the steel gives it more strength versus reinforced. So structural concrete that's extra reinforced with a fair amount of steel. Say OK, and you can see how it's taken this information. And let's see if we - material catalog, concrete - I thought if I double click on this, there is the 1000. And that didn't change it. [0:10:47]

Let's take the material catalog and open this up. I know its supposed to be able to do this. If I say "Core Concrete", double click on that, there. We see this change radically. So by choosing something in the material catalog, it will automatically allow you to pull information from that reference. Now where does that reference come from, I'm not exactly sure. And certainly Graphisoft has pulled that information from manufacturers or standard industry reference lists. The main thing is that if you have the data from a manufacturer, you can put it in directly. If you don't, you can use the material catalog to quickly get something reasonably close. [0:11:33]

Now when would you use this? You would use this in energy analysis for the building using Eco Designer. Eco Designer used to be an add-on for ArchiCAD that was sold separately. It was rolled into ArchiCAD I believe in ArchiCAD 16 and later versions. There is a higher level version called Eco Designer Star, which I have not worked with but I believe it takes the same basic principles but adds more sophistication and

better reports so that Eco Designer Star allows you to get certification. You can literally take your building and as a professional who is skilled in this area, run a report that you can submit for approval. [0:12:18]

The earlier version would be for eco design feedback and study, but the Eco Designer Star, which I believe does have a charge in terms of an add-on for ArchiCAD does allow you to create reports that are good for submission. So if you don't care about this, if you are not really focused on energy efficiency professionally and you are not going to be referencing or studying the energy usage of the building, you can ignore these things. But if you do want to look at it either for design feedback or for submission, then of course you will want to make sure that what you build the project from uses the appropriate building materials. [0:13:00]

And you can create as many new ones as you like. Give them names that will be very clear. If it's a manufacturer specific part or assembly, then you may want to actually put in some manufacturer information in the name. so in terms of the building materials, say I need to change the priority of something. let's say that I find that the granite here, I would like this stone to be a higher priority than something like the framing, so that the framing stops when it bumps into this stone. What I can do is select this and change the number here. let me just type in a new number. [0:13:52]

You will see after a second it will just move into position. Of course, I can type in any number here. it goes up to 1000 I believe. You can see how it's now getting up towards the top here. I can also literally drag this around and say, "Well, it should be under plywood, but above the other one." So now you can see as I moved it into position, it found a number in between. So these numbers, if I drag it, this goes down to zero. It says that this particular material will give way to everything. And gravel makes sense, and earth makes sense that they would give way to everything if they are piled up against it. [0:14:29]

And then of course if we move it up to the top, which is 999, it will be stronger than any other material so we can adjust it in any of these variety of ways. I think it was like 435 or something like that here. So somewhere in that region. Now in terms of the fill orientation, what does that mean? If we are looking at a wall, so let's just go here and I will just draw a wall, and let's select these walls and choose them as an insulated wall. now these walls have a particular type of insulation fill. In ArchiCAD 17, you can adjust a composite by right-clicking on the composite and say 'Edit Selected Composite'. [0:15:33]

In previous versions, you had to go find the composite in the list of the Options, Element Attributes, Composites but now this immediately goes and finds it. Now you can see here this is insulation, and it's choosing 'Insulation Foam Board'. If we were to choose 'Insulation Blanket', you can see it has a somewhat different appearance. It changed subtly. This will redefine all walls that use that particular composite. When I select that, you can see how this insulation area looks funny. It's showing the insulation symbol, but it's not really rotating around properly, and it just doesn't look like blown insulation like we would expect. [0:16:20]

In order to make this work - and by the way, this is the standard Graphisoft template, so this has not been set up properly - what we would want to do is go into the building materials. By the way, if we have one or more elements selected that use building materials, then it will highlight in the building materials dialog elements or building materials that are in use. So gypsum board would be the interior face here. I will scroll down, and we have the wood frame plus insulation blanket, etc. [0:16:56]

Now this is the 'Insulation Blanket'. That's the one that I just substituted here and it's not showing the way I would like because the fill orientation for this 'Insulation Blanket' is not oriented properly. It's making it all face the same way based on the project origin, so it's all going upright. If we do Element Origin, it will rotate as the wall rotates. And if we Fit to Skin, it will rotate and stretch or shrink. Let me show you how Element Origin works. I will say OK and you see how it rotated this 90˚ for each of these. [0:17:38]

But it still doesn't look right, because what I really want to do under the Building Materials for this one here, the 'Insulation Blanket', is I want to make it Fit to Skin. So I select that, say OK, and now you can see how it has this conventional description for the 'Insulation Blanket', the soft insulation. If I were to go to again right click on that composite and say Edit Selected Composite, if this particular insulation here was going to be a bit thicker, let's make it 3.5", so 2x4 instead of 2x2 in there, you can see how the wall first go thicker, and the insulation is filling the cavity, it's filling the available space. [0:18:41]

So in terms of those building materials, when one or more items are selected, you can see them highlighted here. this makes it easy to make some adjustments saying, "Oh, I need to fix that insulation." By the way, this will affect all uses of it. So in other words, other walls or possibly slabs or roofs that use this 'Insulation Blanket' will now all properly have the fill orientation. So it's nice that you can fix it once and it will fix it in any composite that references it there. You see fill orientation is only available for composites and complex profiles, so this soft insulation, fit to skin or element origin here will only be of use when we are working with composites like this or a complex profile that has multiple skins like this. [0:19:39]

Okay, so we've covered the basics in terms of naming, being able to choose a particular fill. We do have some additional options. Sometimes you may want to make this a different line weight or color. Let's make it a red here to see what happens. So now this stands out. And again, every time this is referenced in any wall at any thickness, it will be red. Now let's look at the line weights here. so View menu, Onscreen View Options, and we will go to true line weight. And that's what that did there. Let's go back to the building materials. [0:20:30]

We'll take that 'Insulation Blanket' and let's make it a hairline or faint color like that. you can see how it disappears almost. You can choose that and it will affect all uses of that particular building material. Let's go back into the building materials now. We've looked at the fill, the choice of fill, and the different pens, and we've looked at the surface. Now when we are working with these elements, if I go to 3D

here, we are going to see that - I have a different mouse going right now because I am having problems with my - there we go. Maybe this will…I was having a problem with this wireless mouse. I was using a secondary mouse, and it's now having problems here. okay. so I am going to have to work around that and figure it out. [0:21:44]

I rotate with the Orbit tool here and zoom in like this. So in terms of the building material if I select this composite, we will see that it has brick on the outside, that's the building material, and that brick has a certain appearance. If I go to the Options, Element Attributes, Building Materials, we will see this brick here has an appearance of "B-Common Bond". If I were to change this to "Stack Bond" or something like that, then we are going to see this instantly change there. If I go to the building materials and change anything that is exposed here - so where was it? I don't have it selected, so it's not highlighting it. [0:22:46]

That's why it's nice to select things before you go in so you can quickly find things. But this surface is the default for the 'Exposed Brick'. Let's say that we wanted this to be a different appearance. Even though it's made out of brick, it should show up structurally like this and have the same physical properties, but it's going to be painted differently. Or some other attribute about it. So what we can do - and this is a standard part of 17 - is we can select one or more elements like this and go in and override the surface instead of having it automatically be whatever the building material was in terms of that brick. [0:22:31]

We can say we would like to override this, that made it all default wall color. I could say it's going to be a different brick pattern. Let's give it the herringbone pattern or something like that. We can override this - even though the wall is made of this same type of brick and shows the same on the floor plan and in a section, we can override the surface. Similarly, if we go and put in some walls that are - let's go choose an interior wall here. I know this is a rather small little shape of the building, but let's work with this. [0:24:37]

If I go to 3D - boy, I am used to having my mouse do things and right now it's not cooperating so I have to manually do it, I'm not used to that. In any event, I can select any of the elements here and again override it. I can say it's made from the wall with gypsum board. I am going to make perhaps all of these surfaces here, I am going to lock them together and paint them a certain color. So you can see what that does there. [0:25:21]

Now the edge appearance here that we are seeing in terms of the building materials is something that is new in ArchiCAD 17. Previously any cut through areas or exposed areas of the wall would have just a simple single color appearance. Now it's showing the actual building materials. If you were migrating a project from earlier than 17 into 17, then under the Options, Project Preferences, Construction Elements, if you say 'Use Legacy Intersection Methods', which would be the default when you migrate a project in, then you are going to see just the simple edge appearance. And you will also get less

sophisticated intersections in sections than if the project preferences are set up as I would recommend where it's not using legacy methods; it's using the new methods here. [0:26:23]

Then you are going to get the more sophisticated visual representation. Now I see a comment from five minutes ago from Tim Ball, "Try using a white fill on a colored background to color code materials." Okay, interesting, so let's see here. If I go to this and we go to Element Attributes, Building Materials with this selected, we will do a white fill on a colored background. Let's pick that insulation here and a white fill on a colored background. So let's say that we make this - I assume you mean a white line work on a colored background. Let's just give it something like that. [0:27:22]

We will say OK. Now that didn't do anything in the 3D, let's go to the floor plan. If we zoom in on this, we'll see that there we have that colored background and the white fill there. Let's go back in here and that insulation here, that Pen 91 is fairly wide. Let's use one of these other ones. This is .25 in width; this one is .1 which is much thinner here. Let's say OK. Now you can see that particular fill there. So Tim, I am wondering if that is actually what you were referring to in terms of the color coding that you can actually show similar materials with the same background color to color code it. [0:28:32]

So let's see if Tim has any response there. So meanwhile, I am going to go and see if there's anything else about building materials that is important to cover in terms of this section of the course. This section of the course has to do with creating or manipulating element attributes. Other sections talk about how you optimize your sections or work with ArchiCAD 17 features for priority intersections using different options including the Merge Elements command. But here, I have pretty much gone through the fact that we can create these building materials by saying "New" and creating a duplicate of something or a brand new building material. [0:29:26]

When we create a new building material and give it a name, you can choose all of the attributes of how it's going to appear in general including its thermal properties if you wish. So you can start from scratch here and the move this building material up or down in the list for whatever purpose if you are not duplicating one already.

Let's see Tim says, "Yes, you can play with it to make sections easier to read." Okay. So Tim that would be a nice thing for you to send in in terms of a coaching call so that we could take a look at how you are using the color coding in your sections. For now I will pass along your suggestion of an idea. [0:30:13]

Tom Downer asks, "With a new building material, can you use the asterisk to group the materials?" Yes, you should be able to. Right now, this new building material is floating up to the top because all of the materials are named in the U.S. with a number. So the letters show up here. What you are referring to in the surfaces, I would often put an asterisk at the beginning to make the new items show ahead of the other ones alphabetically. So the asterisk alphabetizes before the letter A. You certainly could do that but if you were to create a bunch of new materials, then you could - [0:30:58]

Now let's see - if we sort by name here, here is the name. If I take this without the asterisk it jumps down to the bottom. So in fact, that is a good point. If you are grouping it by name as opposed to priority, then to be able to find building materials that are new that are custom to your needs, then by putting in an asterisk, they will float up to the top when you sort by name. [0:31:26]

When you sort by priority, and let me give it a reasonable priority so you can see it, of course it will just sort this way. So that is a good point. Now I've shown in other sections of the course migration of previous projects into ArchiCAD 17 and how the building materials get created based on the fills that are used in composites. So basically we have a composite wall made of framing, brick and drywall, whatever you had in ArchiCAD 16 or earlier, when it's opened in 17 will create a building material based on that fill or each of the fills in the composites that are defined in the project. [0:32:19]

So you can end up with a rather lengthy list of these building materials that are based on previous fills. They will not have any physical properties. Generally that doesn't matter too much if you're not going to be doing energy analysis, but also the intersection priorities will not really have a sensible setting. So you will need to adjust those and you will find in many cases that it will create duplicates of the building materials. As you migrate the old project forward it's trying to create, each time it sees somewhat different context with the linework, materials, or appearance and some of the old style intersection settings it will create a new building material. [0:33:06]

So you will end up with perhaps many building materials that are virtually the same but with slight differences. Generally in my other lessons I have shown how you can collapse these. And the basic idea here is that you can sort them in a variety of ways, but once you see something that is unnecessary you can delete it. And when you delete a particular material or possibly several that are selected, you can replace it anywhere in your project that is referenced, you can replace it with any material. [0:33:40]

Do we have the generic materials here? We will say 'Replace' that. If I said 'Delete', than anything that referenced it would have a "missing", it would indicate that it was missing. If you say 'Delete and Replace', then anything that references this one in the future would reference that one there. You may notice here this 'Generic Exterior' material. There is a similar one for 'Generic Interior' material. So Graphisoft in the U.S. version has those two. We have a few additional ones in MasterTemplate. I think we have a generic building material which is not specific to interior or exterior. [0:34:20]

We also have I think a few additional ones that we've added to make the system work better. In the international version there are some similar generic ones as well as the ones that are specific here. Now one issue that we have with the Graphisoft one is that the interior material is lower on the list than the exterior material because the intersection priority '530' here versus this '590' makes the interior have a higher priority. So just as a quick review of a change that I would make - if you are using the standard template and you are having some issues with some of the walls cleaning up. This is what causes it. [0:35:14]

Let me just show you that context and that will at least give you a sense of what to do. I am going to go to the Wall tool and create a box of walls here with just a simple material here. We will take the generic exterior, and let's zoom out. I will draw some interior walls with the generic interior material. You will notice that as I zoom in on this that the interior walls are sticking through the exterior. The reason is that the interior material has a higher priority than the exterior. So in order to fix this, and by the way if I select any number of these walls - remember I can go to the Options, Element Attributes, Building Materials and then see them highlighted, and you can see the exterior material is highlighted in this green. And here is the interior. I can grab this exterior and drag it down and put it above the interior. I will take it down far enough that it goes up above or manually change its number here and then say OK. And you can see how it cleans that up. [0:36:45]

The reason why there are solid lines here rather than open spaces is because they are made from different materials, so ArchiCAD is creating a line where the material changes. When you do have something like wood framing that is both in the exterior and the interior, then that particular skin might match and it will open up that line. In this case, if we were just doing a conceptual model, we might just work with, instead of generic exterior and interior, just make everything generic from the same material. In this case, I will choose exterior. [0:37:19]

Then it will give us a very simple diagram like that. So that's some of the basics of how these things work without getting into the details. So let's see, a question or comment from Bob George: "Can a building material be renamed?" Yes, I mentioned that right at the beginning. When you rename it, it will be seen in dialog boxes with your new name. But it will not cause any problem in terms of elements that are using it; they will see the new name. And composites that reference that building material will also see the new name. [0:37:57]

That is because these element attributes here, like building materials, have an index number. If I go to Attribute Manager - and we are going to have a training on that coming up next week - if we look at say the Building Materials here, you will see that every building material not only has the name but it has this number associated with it. So if I did decide to rename wood framing to "wood frame" or something like that, it still has this number here. Everything that refers to the wood framing would see that update. So you can rename it at any time. [0:38:42]

Now if you are copying things from one file to another - you might take part of an old building like an old kitchen into a new one so that you can create your kitchen more quickly - be aware that if the names of those attributes, like the names of the building materials or the names of the composites are different, then ArchiCAD will add them as new building materials or composites to your environment when you paste it in. if the names are the same, then it will assume that when you are pasting in a wall with the name 'Exterior Material' that it should use the settings for 'Exterior Material' in this project. [0:39:27]

So that is something I will be going over in the lesson on Attribute Manager so that you understand the rules that it uses for that.

There is another comment Tim Ball made about "I also find it useful to create materials for existing building elements such as walls, floors, roofs and site." Okay. I am not quite sure what you are saying. You are creating materials for existing versus new? Is that what you mean? I am going to guess that, but can you clarify that Tim. So that way you can color code in 3D perhaps, or maybe even on plan the difference between existing and new. Is that what you mean? [0:40:16]

So please clarify that. Okay, let's see here. I think that pretty much covered all the things that are specific to manipulating element attributes with regards to building materials. Tim's comment says, "It helps with priorities." Okay. So I am going to make an exception here, since Tim is such a long time user and good friend. Let's put him on the line. I am not doing that in general for these lessons. I do that in the coaching calls, but let's give Tim a chance to talk. Tim, I've unmuted your line. [0:41:05]

Tim: Hi Eric. That's very kind of you. I've used this whole thing really quite extensively. I've actually completely recreated it from scratch to suit the way we work in the U.K. because we use a different classification system than the one you use in the U.S. So I've edited these materials completely different than the way Graphisoft does it. And really, it's quite powerful, but it is quite hard sometimes to think it through, because if you are creating a composite wall, which maybe has several different materials in it, that composite wall is interacting with another composite wall that has also several different materials. [0:42:03]

It can really be quite tricky to work through which priority each material actually needs to take so that you actually get clean junctions. I've got to the point where I have about three different types of insulation at least, depending on where the insulation goes in the building. So insulation in drywall is completely different than insulation that might be in a cavity of a mason wall and different again to an installation that might be in a floor. So it's immensely powerful, but it's actually quite - it does your brain in some days trying to work out where the priorities have to lie. [0:42:52]

Eric: I know you are pushing the limits in ArchiCAD - not in a bad way, in a good way to get the most detailed section views in drawings as well as 3D cutaways or 3D details. I saw your recent posting on ArchiCAD LinkedIn group about detail drawings saying, "Do we really need 2D unlinked drawings that represent details. When we do it properly, we can make the natural generation from the model have all that information that we need." So I know you have some interesting discussion rolling there. [0:43:47]

Tim: Yeah. If you are interested, in one of the coaching calls, I could actually send you in advance a file with a series of views that you could show what all that actually looks like. And that comment that we covered about inverting the color arrangement from the cavity insulation for instance, I actually got that idea from Jared Banks. He's used it quite a lot. And I wouldn't use it for every material, but if you want

to highlight a material, insulation is obviously really important to buildings these days. If you have - and I generally use pink background color with white linework for insulation - and I use that for all insulation so when you are looking at section it's really easy to see what the insulation is and what the continuity is between the different elements like a roof or junction. And I think that's really powerful stuff to do. [0:45:03]

Eric: I think that would be an excellent idea for a coaching call. Let's talk about this offline and talk about when would be a convenient time for you to join with me…

Tim: Yeah, sure Eric.

Eric: … where I can spend some time with you and with everyone going through some of the ways that you have pushed the building materials and the assemblies, composites, to generate the most useful information with the most legibility where it's just easier to see the important structural relationships and thermal relationships and things like that. We can perhaps even focus that entire call on the whole question of 3D detailing. That you brought up of how detailed can you make it? [0:45:55]

We're not talking about just for fun or wasting time doing it but in fact by doing it in such a smart way that it saves time and reduces errors and gives better, clearer communication in terms of the drawings and 3D model.

Tim: I agree. I think where I started with that was thinking, "Well, if I am going to draw something in a traditional 2D detail, which we usually create using a whole load of extra lines, fills, and all the rest, you can use exactly the same fills to create a complex profile and you then apply that to whatever element you are working with. You don't need to detail it anymore then, because it's there. So that's the principle behind it. [0:46:50]

Eric: Well, I definitely am interested in seeing more of the specifics of it, because I understand the concept, but there's a difference between knowing that it could be useful and seeing it and going, "Ah. Now I know how I can use it."

Tim: [*laughs*] Okay.

Eric: Yeah, so thank you Tim. I am going to move on if that's okay with you.

Tim: Yes, that's good, thank you.

Eric: So I think this is a good point to finish today's session. I know that often I have been going well over an hour with these lessons. In this case, I have gone over as much as we need to for doing building materials, just the basics of how to create and manipulate the definitions of building materials. [0:47:42]

We will be looking at the topic of composites, which reference building materials, in the next lessons. We'll be looking at composites as they existed before 17, and the ones that as they extend in 17 in separate sections. They are closely related but obviously some important differences. So let me see if there are any final comments or questions. [0:48:13]

Let's see, Ken Brooks writes, "I think Tim has a grasp of the concept of priorities in section and plan in order to simplify details and utilizing BimX." Yes, I do agree with you there. Now if there are any other comments or questions, please type them in now, and then we can finish up the session. Did you find this useful? Were there any new things that you discovered that you weren't aware of?

Steve Nichol writes, "Okay from here. Another good one, looking forward to all the links between building materials, surfaces, and composites." Absolutely. [0:48:54]

Waiting for any final comments that will be shared before we close up. Ken Brooks: "very useful Eric. Attributes is quite an arcane topic for me." Yes, definitely it's one of those things that a lot of people are confused about, but it's such an essential foundational element for creating your drawings as well as the complete model. Alright. Thanks everyone. I see "Good Night" from Tim. Yes, it must be 10PM in the U.K. Please add your comments and questions to the page down below this recording. This has been Eric Bobrow, Thanks for Watching.

[END OF AUDIO 0:49:47]