



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

Welcome everyone to the ArchiCAD Best Practices Course lesson on Element Attributes. Today we will be focusing on Materials or, as they are now called in ArchiCAD 17, surfaces. So we started week 20 with our focus on Element Attributes, and we've gone through the basic concept here. We went through types and fill types last time. Now instead of going on directly to composites I'm going to skip down to Materials in ArchiCAD 16 here. The dialogs that we will see in ArchiCAD 17 will be very similar, just have the word 'Surfaces' in many cases. [0:00:46]

The reason why I'm skipping down here is because in ArchiCAD 17 - and let me just skip over to ArchiCAD 17 here - under the Element Attributes, we have building Materials that refer to surfaces, the Materials. So I wanted to define and show you how the surfaces - or the old word for it, Materials - work so that when we're working on building Materials you know what they're referring to a little bit more fully. And then composites actually refer to, in versions earlier than 17, they refer to fill types. Now they refer to building Materials. [0:01:27]

So I'm basically going to go through the Materials or surfaces and then in the next lesson we'll be looking at building Materials and then finally the composites. I figure this sequence might be the best way to understand how everything fits together. So in ArchiCAD 16 and earlier, so going back many versions, probably back to version 8 I would think. Version 9 is when the Materials and surfaces started to integrate Lightworks. So they took on a certain form and shape at that point. So going back many generations. [0:02:08]

I am in ArchiCAD 16. We are going to go to Options, Element Attributes, Materials. Remember, if you are in ArchiCAD 17 it will say surfaces. But the dialog box will be almost exactly the same. When we are looking at Materials or Surface settings, we're looking at potentially a long list. Graphisoft supplies many common material or surface descriptions. Each one of them has a name of course. They are displayed alphabetically. In the U.S. the system has some numbers at the beginning that are referring to CSI or Construction Specification Index categories. [0:02:51]

In international use they don't have a common numbering system so it's all alphabetical. But regardless, you'll see a list of these Materials or Surfaces. You'll see their name and then you'll see little icons next to them that indicate whether they have an associated fill or an associated texture. So if we look at the 'Default Walls Exterior', which is what we're in right now, we'll see that it has a surface color and some other attributes of how it responds to light. But there is no hatching pattern. So if you're using this simple material or surface, it's going to look plain in elevation or 3D view with no line work on there. And there's no texture. [0:03:42]



Now the preview here we are seeing represented using a tool or a method called the 'Internal Engine'. And this comes from way back probably back as far as ArchiCAD 4. I do recall I started with ArchiCAD 3.4. And in ArchiCAD 3.4 we had very simple shading that we were working with. In version 4, this was back in 1990, Graphisoft introduced the first texture mapping which is the ability to show some type of surface material like bricks or wood or carpet. And I think they may have also started to introduce the shadow casting at that point. [0:4:26]

So 'Internal Engine' is the code that Graphisoft created years ago to represent materials that way. Later on in version 9, they introduced Lightworks as a way to represent your 3D model in a more realistic way. And I think in version 8 they started to use Open GL. Now these are all closely related, but we need to understand them and we'll go to them one at a time. So in the Internal Engine, we have the ability for any material to have a surface color. And let me just duplicate this here and call this "*Test". I'm putting in a star or in asterisk here because when I do that, it's going to show up right at the top of the list. This is a tip that you may find in many of the alphabetical lists of ArchiCAD, if you put in an asterisk, it will alphabetize it at the beginning. [0:05:29]

I sometimes do that when I'm working on a project just to make all of the custom materials or surfaces stand out and just jump up to the top of the list. So here I duplicated the previous one and if I open up the surface color by double clicking on it I can just pick any other color that I want. And this is a color chart here. There are other ways that you can pick colors. You can pick a color, depending on whether you're on Mac or Windows, from many other different styles. They all will pick a certain red green and blue value here. If you are using the one that has RGB here it also has the ability to, if you drag this in, you'll see how it gets more pale, less saturation. [0:06:22]

Here it gets more intense. And this slider will take it darker and mix in black into the color. Regardless of what color you pick, when you say OK, you'll see that this preview updates because the surface color is the dominant look of this material or surface. When we look at these we'll quickly go through them and then we'll look at them in a little bit more detail as needed. Transparency allows you to simulate something that is more like glass. If I make this half way roughly, you can see we're starting to see through it but it does look like there's something there. If I make it 100% transparent, it totally disappears; 100% transmittance is how much light it transmits. [0:07:16]

There is also this choice here of attenuation. You'll notice how this looks even. You can't really tell whether it's a flat disk or a sphere. But if we increase the attenuation, then it will start to look a little bit more like it's solid around the edges, particularly if I make the transmittance higher. And you can see as we look through the center of it we can see through it, but on the edges the transmittance attenuates or weakens. This means that as we are looking edge on, it's not quite as transparent, it doesn't transmit as much light. If we make that more, you can see how it really looks different. So I can make this quite transparent in the center and still have it visually stand out on the edges. [0:08:10]



So these simulate to some extent how glass works. And you can just play around with it, there are no rules here in the sense that you can do whatever you like. But if we go to something like what Graphisoft has, the "Glass Clear", you can see it has a high transmittance, no color, a very neutral color, and no attenuation. So really you can't tell other than that there's sort of a little bit of a haze on it. But if we go to "Glass Blue Ice", you can see that it has attenuation, so it does look more solid around the edges. And the transmittance is lower. These are ones that are in the standard list of materials or surfaces. [0:08:56]

Now talking about standard, this is based on any particular file. So it's actually need to the file, which means that it is inherited from the template that you use to start out the project. So when you say "I want to create a new project", you generally will do it in one of several ways. You might create a new project based on a template, which is certainly a common thing. You might use the standard Graphisoft one or MasterTemplate one that you've customized. Whatever were the materials or surfaces in that particular file are going to be inherited and available in the new one. If you take a project that already exists and delete the building and save it under a new name, so now you have a new file with no building geometry, then it will have the same materials or surfaces were previously set up. [0:09:50]

If you make any changes, like I just created this test one, it only affects the current file and any descendants. This means that if I were to turn that file into a template or if I were to save a copy to start a new project, it will affect it. But it won't affect any other project file. This is true for all attributes in general. They get passed along to children, projects that are derived from one ancestor. There are ways to get materials or line types or fills from one project to another. We'll be looking at that in a section on Attribute Manager. [0:10:28]

So we've looked at the most basic thing in terms of color, transmittance, and attenuation. Let's look at Emission. If we go back to the glass, let's take the "Glass Tinted Dark". No, let's take the "Glass Clear" here. So this one I'm going to duplicate and we'll call it "Test 2". I'm now going to start looking at the emission color and attenuation. So emission is a simple way of simulating light coming from behind or emitting from this surface. It's black here, which means essentially that there's no emission or light coming from it. And if I double click on this chip and move this up even a little bit, you can see how it changes to just a bit of a gray tone. [0:11:24]

If I say OK you'll see how it looks glowing just subtly. So this adds just a certain amount of light that isn't in the environment; that makes it glow. If I take this higher, up to halfway, we'll see that it starts to look more like a glowing sphere, like there's light from the inside. If I give it a color instead of having it be the center, and maybe take it out towards the yellow here, then you'll see how it starts to tint like it's a yellow tinted surface. So what you can do here is actually make things, like a lamp or something that looks like it's a lamp. I'm trying to see where - here it is, "Lamp". It's #26, hard to remember. [0:12:18]



But if I go to "Lamp" here, you can see how it really looks like something that is glowing like a light bulb so to speak. And you can see the emission color is virtually fully lit up. There's no black in it. And it has a little color in that. So that's what they have here. It does have some transmittance. We just barely see some things through there. You can see the checkerboard background there. Now the attenuation here, you can see how it's less light around the outsides and more in the center. If I were to take this from 34 down to zero, we're not going to see much difference. [0:13:03]

Let's take it up to 100, and you can see how it's only glowing right in the center and the outside is not. If I bring this back you can see the outside has less but it's getting in there, its glowing more. So the attenuation again is the weakening or the lessening of the emission light as we are looking at it. Now with sources that have emission, the reflection of light on the surface will not be very visible. So let's go back to the test here and in fact let's go to the standard default wall color and then duplicate that. And we'll call this "Test 3". [0:13:54]

Now let's look at how the reflection of surfaces plays out. So ambient has to do with the overall light in the space and how it reflects off the surface. It's not directional light, its overall. At 100% here it's basically telling the internal engine to try to reflect more light, as much as seems naturally possible. So you can see this is sort of like a plastic surface with the way it looks. Or maybe a semi-gloss paint. If I take the ambient down to 50%, you can see it looks duller like a flat paint. If I take it down all the way you can see the looks even duller, a little bit more like a natural surface, like a stone or wood or things like that. [0:14:45]

It still doesn't look like a stone because it's not rough, it doesn't have a rough texture to it. But at least it does change. You can see how this makes it brighter and a little bit flatter. Let's take it about halfway up here and then play around with the diffuse reflection. So this is all under the category of reflection. So diffuse has to do with the reflection from a direction. So you can see that as I take this down it's actually not reflecting any light here. And as I take this up it reflects, but it's somewhat directional here. and you can see how this keeps going up as I move this up. and it starts to get more of a hotspot as I bring that up. [0:15:40]

So if I have less of a hotspot but I bring the ambient up - well, you know what? The difference between ambient and diffuse I've never gotten really clear on. I think you just have to play around with this to see the difference between what these sliders do. but I do know that shininess has to do with the focus of that hotspot. So if there is some reflection of light, how shiny is it? If you make it shinier, then that might will - now that's interesting. It's 100% here. I am not quite sure, I thought that when we... [0:16:26]

So depending upon what you have set up here, you can see that when I have this way up here that shiny spot is very narrow. You can simulate something that is a shiny surface that if there was a light shining on it you would see that point. As I back this off, that shiny surface becomes a little broader so it's not quite as much of a sheen. So if you think about waxing a floor and getting more of a shine on it, that's



what this has to do with. And if I take it down you can see at some points it's just going to render in sort of a weird way. But if we take it down to a moderate level it's more of an even shine rather than a pointed one. [0:17:15]

Let's just see if we can find one that's in the standard that would be shiny, like "Gold China". So here "Gold China", the shininess is up fairly high. There's also this glowing setting that we will look at. But let's duplicate this and we'll call it "Test Shiny". So here is a shiny surface. If I take the ambient down you can see it just gets darker. If I take the diffuse up it spreads it out so it doesn't look quite as shiny. If I take the shininess up more and it gets pinpointed almost like it's a polished glass. And if I take it down and it sort of glows more broadly, so you can play around with these things and see if you can get something that looks more realistic to your eye. [0:18:05]

Now all of the things that we're looking at here are being rendered with the internal engine, which in fact is a simpler or cruder method for representing surfaces. We're going to see that this is often the basis that we'll use for creating new materials. It's certainly one way that is relatively straightforward to understand these controls. The controls for the Lightworks are actually much more complex and we'll be spending a little time on them shortly. [0:18:36]

Now here is the glowing specular, so emission would be how much light is coming out from the inside, at least that's what it essentially tries to imitate. There's no emission here, and it doesn't look like it has a light inside of it, but it does have this specular highlight. So specular, I am not quite sure the technical meaning but it does have to do with the way that light bounces off a surface on a shine and if it has a color. So if I go to the specular color here and I change it to say more of a pinkish color, you'll see that it changed this shine. It is fighting with that. Let's take this and make it more of a white color here. [0:19:28]

You can see how it's more white. Originally this was more of this same yellow color. And you can see how what it does. So it colors that shiny spot with this. And this is the amount of color that's mixed in. If I turn this down, you can see how it's looking duller and here it's looking more shiny. So again you can play around with these. I haven't really become a super expert at it, but I'm comfortable enough that I can create something that sort of works. [0:20:02]

Now all of these things relate to the surface color. They are not using a texture, so in fact the more realistic surfaces or materials are going to be ones based on some type of a texture. So here we have a texture that is in U.S. version for river rock. These are picture maps that are being shown in the preview here and in your 3D view if you have textures shown in this. And here is a hatching that would show up when you have an elevation drawing where you are not showing any colors, you are just showing line work. It would use a particular hatch or fill pattern if you have that turned on. [0:20:51]



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So you'll notice that there is a surface color here. This surface color is essentially for the most part ignored. It's basically going to use the river rock -this picture - instead of the color. But this little color chip refers to it. So it's good if you're creating your own material to make sure that if you do have a texture file that you change the surface color to be somewhat reminiscent. So you don't have this one being red and this one blue, because then we'll see a red color here and it just won't correspond visually. [0:21:35]

Now you'll notice that this texture here looks smooth. In other words, it's repeating, or let's say it's a picture that we can look at repeated by changing the sample. If I change this to 3x3 you're going to start to see that there is thirds left to right and top to bottom. And there is some repetition. You can see some of the lines at the edge. but it's somewhat subtle. We don't see any hard edges here. and this is what is happening up on this surface is that it's repeating as its going around that surface. Now this gives you a preview of what you've got. If I go back to the 1x1, this is an important view that you need to be familiar with because the size of the texture file in terms of real world - this is 1'8", that's about ½ m roughly. That is the size of the stones. [0:22:43]

If I were to change this or if I were to cut this and type in 3' or something like that, that would be a larger. You can see how the stones became much bigger. if I make it 1', then they are going to be more like pebble size on here. This particular preview I calculated at one point based on how they had bricks or blocks, but it was I think maybe 8' high. it certainly was approximately one story high. Sort of a standard interior height. Obviously it's circular and not like what we would see on a wall, but you can just imagine that. So if you are just trying to get a sense of scale, a person standing next to it would be roughly 2.3 of the height of this. [0:23:35]

So the original size was this. Now you'll notice this 'Keep Original Proportion' is nice because if I have that unchecked and I make this a different proportion, you're going to see how it starts to get squished. And sometimes that's a good ability to change the way things look. But overall we would want to keep the original proportion to have it look like the original image here. In terms of the angle of this with the rock, if we were to make this a 30° angle we probably wouldn't see too much difference here. It does, you can just barely see that it's sort of looks like it's on a tilt. [0:24:23]

But certainly if we were to just put it back to zero and we were to go to a brick or block, like here is a brick pattern, if I were to change this to 30° we're going to have a pattern that is tilted. So while you can manually change the orientation of a pattern using controls under the Design menu for 3D texture, this is one way to say, for example - and let's just put it back to the zero - that we might have some materials like 'Cherry Wood' that is horizontal. Actually that one is not too clear there. What about 'Walnut Horizontal'. [0:25:06]

Okay, so you can see that this picture of the 'Wood grain Walnut' is going vertical in terms of the grain, but it's been turned 90° so it looks like the grain is going horizontally. This one here that says "V" for



vertical has a 0° so it looks a little bit vertical here. So you might use this in some cases when you are modeling to pay attention if you have some molding or something like that that is running horizontally across the baseboard or the crown. You might want to choose the horizontal version of this rather than the vertical one or create a texture material surface that was set up in that orientation. [0:25:56]

Now let's look at how we might create a new surface or material using a different texture file. So let's go and take a stone one here. You can see here is this stone, and I'm going to duplicate it. We'll call this "*Stone Test". So again I'm putting the asterisk so that all of these new ones that I am creating are floating up to the top here, just for convenience. Now this texture file here is one that is loaded in the standard library in the U.S. and I'm sure there are some similar ones in the international version of ArchiCAD. [0:26:45]

You can go ahead - and I've duplicated this so this is a different material - I can go ahead and search. And when I search, you'll see that it brings up a dialog box allowing me to load an image from the library. So we can load the image from the library or we can actually go to the File dialog box and find an image if you have a picture of a material that you'd like to use. And if you want to load something in, like perhaps a folder with a bunch of these images, you could go from here to the library manager and tell it to load a folder of images and then they would all be available within this. [0:27:27]

Now I'm in ArchiCAD library 16. Library 17 would be similar in the U.S. We have some special textures related to Lightworks. there aren't too many of those, in fact you can see just a handful. We have some standard textures here. This is C-Stone, the cultured stone we had. If I click on any one of them we will see there are some stone ones. They are also organized obviously into categories here. And you can see all sorts of different choices that we have under the standard textures. Now in the U.S. there are, in addition to the standard textures, there are the Arrowway textures here which are actually higher quality textures. [0:28:20]

Now what makes the texture higher quality is more resolution, meaning that the number of dots that define that image are higher. It's just more detailed and most likely more realistic in the effect. Now a little tip here: in version 18, which will be coming out relatively soon, Graphisoft has changed the rendering tools and they are going to be even higher quality rendering options than what we're looking at here. But the principals will still be generally similar. And certainly I will have an update after 18 comes out that I will be adding to the course website. [0:29:07]

But if we go under the Arrowway textures, and let's say I was talking about stone. so maybe it would be under masonry here. Here is stone here, and here is a dark sandstone and different types of sandstone granite. This is a nice granite here. so this looks quite realistic. And you can see that it says 1x1. If I go to 4x4, we'll see how it repeats. And it does have a bit of a repetition pattern here. Sometimes you can minimize that by using the option - let's just take this to a 2x2 - taking the option to mirror it. And you can see how it becomes a kaleidoscopic image. [0:29:53]



If I go up to the 3x3, and we'll see a slightly different effect between these. You can see how it's changing that appearance. There's another option here and another option here. so depending upon what that file is that you have, it's possible that one of these mirroring methods may help it to be more natural looking. But regardless of what you choose there, if we go to the 1x1, you want to make sure that the size relates. So it's hard to tell because of the grain pattern, but 5' across so 1.5 m roughly. That could be fine. And you can see here if we were to imagine this being from floor to ceiling, that's something quite possible. [0:30:40]

But maybe it should be a little smaller. So I could make it 4' here. And you'll see that it gets a little bit finer grained there. So I've created a new one and I've determined its size that it's going to render at. Now the only way to really see how these materials or surfaces look is to render them or to look at elements in 3D with this. This little preview is obviously pretty tiny. We're going to looking at some of the other effects here shortly, but I just want to show you what this looks like. So "Stone Test" that I just created, let me go ahead create a slab here. [0:31:22]

We'll put in a wall behind it with some context. And remember I'm in ArchiCAD 16, so we're talking about here the material on the top. So I'm going to make this the "Stone Test" on the top. And in ArchiCAD 17 it would be similar except there would be a surface override that we might choose there. So let me look in 3D and you can see what this looks like. Let's turn off this grid, because it's giving it a slight distortion to the look. We will go to the View menu, Editing Plane Display. Turn that off, and you can see what we have there. [0:32:09]

It's not a bad looking texture. Obviously it does look a little bit artificially repeating, but if we have furniture or other things we just wouldn't tend to see an issue with that. so that's the new material that I just created. Let's take this wall and say we had a surface here. Let's change it to the test, then we'll see how that test was sort of - I made it glass-like so you can see through that. We can go to "Test Shiny" and this was a gold color. And you can see it does look like it's coated in gold. And when we render this we're going to be seeing some differences, and I'm going to be explaining how we can make sure that they look similar between the 3D window and the rendering just shortly. [0:33:07]

Let's go back to the Element Attributes, Materials or Surfaces if we were in ArchiCAD 17, and let's look at some other effects here that affect the realism. So if we go to brick here, there is something called "Bump Mapping" And what the bump mapping does is it makes this look a little bit more like it has depth, it's a bumpy surface. I'm not going to go into all the details. In today's lesson I want to go into the basics of defining and controlling these things. I'll be doing a section later in the course on rendering and fine tuning your materials or surfaces to get better results, and I will spend more time there on some of these fine details. [0:34:01]

Basically there is a concept of an alpha channel. Now the alpha channel allows in some cases materials to be re-tinted. And that is the most common one, that one and transparency are the two that are used



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most frequently when I've been creating my own materials. Graphisoft will do some things with bump mapping which are a little bit trickier to do. So let's look at something like a carpet. And let's see - here is a carpet blue. So this carpet here, you can see the preview is showing a bluish-purple color matching this little color chip. The actual texture has the name "CarpetAlpha.png". [0:35:03]

I think we're all familiar with JPG files. PNG is another image format that you may or may not be familiar with. It's similar to JPEG but it allows what is called an 'alpha channel' or an additional set information. In this case, the alpha channel has to do with the surface color. So without getting into all the details of it, this "Carpet Blue", if I double click on the color chip and change it to green, we are going to see that the carpet becomes green. It didn't change the name. Of course, I could rename this to do that or duplicate it and create that. [0:35:44]

Only some of the materials or surfaces will actually change color based on the chip here. If we were to go to something like the stone and I change the color here to green, we're not going to see any change at all because the alpha channel is not set up with a surface. Now simply by checking this box doesn't actually make it do anything. It has to be set up for that. You'll notice that JPG - so that is the common image file format - does not actually support alpha channels, so it's not going to actually use that information. In fact, this probably is pretty much ignored as a JPEG file. [0:36:30]

But let's go back to the carpet one. Here's a "Carpet Gray". So if we were to change this color it would work. Here is that surface and here's the alpha. Let's see here, I know there were some other ones in here that are also...and I'm wondering what other ones have an alpha channel in there. It might be concrete. So the concrete can be tinted here. If I go in here and we make this concrete there, you can see actually that was rather dramatic. Let's just make this - oh, that's interesting. I just crashed ArchiCAD. So we'll just reopen ArchiCAD here and see if that works. Not that I've done much that I really need to retain. [0:37:31]

I will continue to open that project and go on to the concrete base here. It looks like we still have the little bit that I drew. Let's go back to the definition of the materials here. We'll go to the "Concrete Beige". And again, you can see the name of the texture has the alpha in there. So having the word 'Alpha' in here doesn't make it work, but it is a sign that Graphisoft puts on saying, "This type of texture file is setup to allow the Alpha channel to do something". And in general I've noticed it being a surface color. So obviously if I tint this a little bit, this blue and taupe color, it will have a slight bit of coloring here. [0:38:39]

I will go back in and maybe make it a little bit less saturated and we can get something just a little bit more subtle there. Now obviously the texture does create a certain roughness or a certain appearance. This is not a smooth plastic or paint, and that is the whole point of these surfaces. Now I think that if I were to remove the texture, we're going to see how it actually now looks totally smooth. And in fact it looks rather shiny. We might realize that it looked a little shiny with the picture, and if we had taken



down some of the reflections it could've been a little bit rougher there. But I guess it's a finished concrete as opposed to a rough concrete. [0:39:36]

Now let's look under this dialog box at some things about how internal engine relates to these other previews and what that means in terms of rendering. So as I mentioned, it's easiest to manipulate the materials in the internal engine. Here is "Stone test". We were able to manipulate the size of this. We were able to change things about whether something is transparent. It's fairly straightforward to create something that's at least somewhat representative of the real world material. When we go to Open GL, what you'll see is that looks pretty similar here. In fact, this is really what we're seeing down here. So it's close, but not quite the same. [0:40:39]

Now you can see that these controls just jump way up here. Let's go down to Internal Engine. And actually for some reason this is set to 100. Let's just take it down and go to the Open GL. It didn't change that there, but look at this preview. It got lost. This is a bug that I've noticed occasionally with recent versions of ArchiCAD is that the Open GL preview does not show up properly after you've made some changes. If I say OK and I go back in to the materials and we go back to that "Stone Test", it's still changing. Let's see if I were to change the scale. No. So this is not responding the way it should in terms of the Open GL preview. [0:41:45]

In fact, I generally don't look at the Open GL preview, because it matches the Internal Engine in the 3D view fairly closely. But if we were to look at the Lightworks Rendering Engine, we'll see something rather different. Notice that this looks totally different. You may recall that a few minutes ago I took one of the materials that was one of the stone materials and I duplicated it and I called it "Stone Test". Then I changed it to a different stone texture. Well, the Lightworks preview did not change. So let's just take a look at how Lightworks renders compared to the 3D view, and then we'll understand or be able to look at some of these things here. [0:42:35]

So if I'm looking in 3D I'm looking into Open GL format. Also in our 3D View Options, I can switch to the Internal 3D Engine which in fact does not show textures and all. So the Internal Engine - the only reason that I would generally bring this up is when I want to see how an elevation will look, because the Internal Engine will do a clean version of how lines or elements will touch each other. So if I go back to here and let's say that I take this wall back and duplicate a copy of it here. Now if I look in 3D, we're going to see that it still looks the same but it is two separate walls. If I go back to that 3D View Options, Open GL, we may see in some cases, depending on how it's done, we may see a seam. I'm sure you've seen that in some views of a model. [0:43:40]

In the Open GL, you'll see just a slight bit of a line of where things are joining. But the representation here is what we would see if we had an elevation. You can see here again this is two separate walls, but it's removing the line because they have the same material. And I will make this a different material, a



different surface. Let's just make it totally different here. now I can see the line in the elevation. and when we go to 3D, of course we are seeing the color change, but we're also seeing a line there. [0:44:19]

Now in general I don't particularly suggest that you work in the Internal 3D engine because it's slower to update. But occasionally you can see how crisp and clean this looks just for the line work. you can see what it would look like in an elevation. Let me get this back to the Open GL, and let's look at what happens when I render this. So I'm going to go to the Document menu, Creative Imaging, Photo Render This Projection. What's going to happen? It's going to render this in whatever was the default setting for renderings. And you'll see something very different than we had in the 3D window, because the new material or surface that I created on the floor was not actually updated for Lightworks purposes. [0:45:18]

it looked fine in the 3D window and in the Open GL, but the Lightworks was not coordinated. as a separate issue or limitation, the 3D window does not show actual reflections, but Lightworks can show this. and remember this was a shiny gold, so it's actually reflecting quite a bit of that material. so that we can't change in the sense that we can't make this reflective or really show a reflection in the preview, but we can make this match that if that's what we want. here is what you need to do. Go to the Options, Element Attributes, Materials or Surfaces, and we'll go to that "Stone Test". And in that "Stone Test", if I go back to the Internal Engine, we'll see here's what it looks like. [0:46:10]

And we can open these settings here to look at it. if I go to the Lightworks Rendering Engine, look at how different it is. There's a button here that says 'Disable Unrelated Controls'. That means that it's only going to allow me to look at how Lightworks controls things. if I uncheck that, then it will give me access to these controls that relate to the Internal Engine or Open GL. Regardless of whether you have this turned on or off, there is a button here that says 'Match with Internal Engine'. And you'll notice that there are all sorts of settings in here which we haven't even started to look at. And we'll go into them to some extent. The main one that I pay attention to is if I create a new material, I set it up in the Internal Engine the way we just in. And then, at some point when I am relatively happy with it, I go to the Lightworks Rendering Engine setting and say 'Match with Internal Engine'. [0:47:12]

And you can see how quickly it changes this. now it's done some settings in here to make it pretty close to the way the standard one works. if I say OK, and now we render this, we should see something closer to what we had in the 3D window. So you can see how now this Lightworks view matches our expectations or what we were playing with. So it's important in general to be able to see your design in the preview and in the 3D window relatively close to the way it would render, because otherwise you're working a little bit blind. So that's why I would generally use the Lightworks option that I showed you, which you would match with internal engine for that. [0:48:13]

Now sometimes you may want to go further than that. you may want to actually adjust some things beyond. And this gets pretty complex, and I don't think that it's worth spending lots of time explaining



everything here, but I'll explain a few of the highlights. So in Lightworks, each one of these buttons when I click on it will show different options here. This one has no transparency. we can choose various ways of simulating transparency. So if we were to go into something like leaves - let's see, we have probably landscape leaves shrub here. We are going to see is says 'Transparency Eroded'. So this is an option that obviously has a certain look that would allow something to look like it's not fully solid; things have been eroded away. [0:49:22]

And you can see some buttons here about scale or coverage of this. If I were to change the scale here from .01 to .02, we are going to see that the leaves look a little bigger. If I make them .05, we will see how the leaves look much bigger. You can actually scroll through this, but now you can see how it looks totally weird here because this just jumped way up there. Even if I take this way back down towards the beginning, you can see how it stays there. In general, these sliders in Lightworks can be a little problematic. That is why it's good to make a note of what they started with so you can always put it back in at .01 or .02 here. [0:50:10]

Now this one looks a little simpler, it's halfway up. if we take this up you can see it's more solid here. if I take it down, it jumps way down. It's somehow between 0.37 and 0.49. We'll see how this works. And I guess there's some fuzz factor, which we can play with. So these settings here can be tremendously complex. I have never really spent the time to master them, but it's important to know that for any particular one you're working with, you can go into the setting in the class and then perhaps change what this is. So if I make this 'Wood', what would that do? That looks different. if I make it 'Rough', what does that do? [0:51:05]

If I make it 'Cubed', that's rather strange here. Or 'Blue Marble'. I'm not even sure what this was. Probably 'Rough' or something like that. Texture space, this has to do with the picture image. And this is one of the few that I actually will sometimes play around with. if we go back to that 'Stone Test' here and look at this, you can see how the texture space says "Graphisoft Replicate". So that means that it's trying to replicate how the Graphisoft texture is represented. Now in stone or something like that, it probably will work just fine. what I have found is that occasionally you need to do some changes here if you're doing some signage. [0:52:01]

I have created some surfaces or materials that are basically to be used for a sign or picture. and occasionally I've seen that they get mirrored. So there is an option here to possibly mirror something. And you can see how when I click on 'Mirror' it flips in a way that's not too obvious to the eye here. But if we had a sign, it would flip it along a certain axis. it would be a certain size and things like that. So the main thing in terms of Lightworks is to know that if you are creating a new material like we did here, like this 'Test Shiny', we may want to go and 'Match with Internal Engine'. [0:52:51]

In this case, this was a duplicate of the gold one. and you can see how it's actually more realistic here; it really does look like a shiny gold ball because of the way that it's reflecting things. so I might not want to



mess around with it. but if it is something that I've created that was intended to be a new surface, I may want to say 'Match with Internal Engine' in order to get that to copy that more closely. I guess you will mainly see that when you're working with these ones which have a texture that you've loaded in in terms of the Internal Engine. So the settings that we've looked at here cover most of what I work with on a day to day usage. [0:53:48]

And what I mean by that is I suggest that when you're working on a model that you apply surfaces or materials to your building components that use the Graphisoft standard ones as a starting point. So if you want something like Limestone here, perhaps this is a starting point. it has a certain exposure to light. of course you can tweak it, but let's say that you wanted to use this Limestone and create something that was a different version. it was a different color or different grain pattern. So start with whatever would be closest, experiment a little bit with whatever you think might be closest to it, then go in and perhaps search for another material or surface. [0:54:47]

So here you can see limestone. And if I choose and I play around with looking at these you can see how there are lots of different choices for them. So that's actually not limestone but it's a very interesting material that I think could be very attractive for tiles. So I'm going to take that and I will say OK. it doesn't really matter that I am modifying this Limestone. In other words, I didn't duplicate it because this is just a test file. But in general I like duplicating first so that I'm not modifying. You'll see that the preview didn't change because it's showing Lightworks. I want to tweak this in the Internal Engine and get this looking roughly the way I want. [0:55:36]

Maybe I want to be a bit shinier and reflect the light a little bit more here. so now it's going to pick up the light more. and maybe I will give it a little bit of a highlight so it looks shiny. you can see the specular color starting to show. Adjust the shininess which will make it more poignant or less here. So I will make it a little bit more focused on that. And let's say that I like that. let's see now. this is what I would see then in the 3D window, roughly like that. But if I go to Lightworks it's going to look dull until I go into the Lightworks and say let me match this. And you can see how very quickly it's come up with something that is relatively close between the Internal Engine and the Lightworks. So that's the basics of how I work with these materials or surfaces. [0:56:35]

I take something that already exists, duplicate it, and then make some changes; tweaking it in the Internal Engine preview and then ultimately copying it into the Lightworks and possibly adjusting some things in here. I rarely do it, because it's frankly very tricky. Now the one other thing that I didn't show you that you certainly will need to look at has to do with the hatch patterns. So here is a CMU, concrete masonry unit. It's 16x8" here. And we'll see the vectorial hatching shows 'Block Running Bond'. So let's just see how this works if I apply it to a wall. [0:57:29]

So we're going to take this wall and I will tell it to make this CMU here. So you can see this texture file. If I zoom in on it you can see how it's a little bit fuzzy. That's the general quality of these images is a little



bit on the fuzzy side. Graphisoft is going to be improving that to make much higher quality, more detailed surfaces in ArchiCAD 18. But this is just a surface description. If I go to the elevation, this is showing some blocks as well. Now what controls that? If I right click in the elevation in empty space and choose Elevation Settings, there is the option to turn on or off in the model display what are called 'Vectorial 3D Hatching'. [0:58:29]

So if I turn that off then this disappears. if I turn it back on, then we see it. now how many courses are there here? 15. And if we go to 3D, we have 15, it matches. So this is perfect. one would expect that to be the case, at least I hope that would be the case with Graphisoft that what they created corresponds between the texture and the fill or hatch. But when you create your own, it's up to you to match that. So if we go back in here and let's say that let me go to 'Herringbone' pattern here. There's a herringbone and this has a herringbone there. But let me duplicate this and we'll call this 'New Brick'. We'll give it a master list to put at the top. And if we were to choose the texture and search under 'Bricks', here is a brick pattern that is probably not in the standard library and obviously it has a different feel. [1:00:13]

it looks like an older historic building. so let's just do that. Maybe I shouldn't call this new brick, maybe I should call it old brick here. Okay, now if I apply this to the surface here, it looks a certain style. But of course if I look at the elevation, it has the one that was set beforehand which was for the herringbone. so that obviously doesn't look right and it doesn't match. so what I need to do is go to that particular one and make sure that the hatching matches. so I'm not sure what would be the best, maybe we have to use a sort of small grid here and say OK. And you can see that at least represents the small ones. It's actually offset, so it wouldn't be. [1:01:22]

so we would have to go and pick whichever one makes sense. The other thing is that those blocks, this old brick, what size is this? This is the 1x1. It says 1'4" across. That's pretty small. Let's maybe make this 2' across, so these are going to be a little bit bigger blocks here. And let's see, do we have some type of brick grid here? Block masonry, we can say brick, fire brick, or something like that. So now you can see we have this here. And if I go to the south elevation that doesn't look very good. So we're going to go and of course make sure that this at least is indicative of that. [1:02:20]

so let's do of face brick here. now if this sizing of this is not right then I might need to duplicate this hatch pattern and make a copy of it with a different size. So you can see none of those are really intended for that purpose. here is a running bond. We will take that running bond there. so the running bond is rather large compared to this 3D view. so how would we coordinate it? remember how in the previous lesson I would go to the fill types, take that one that is the 'Brick Running Bond' - I think that's what I had - and say 'Create a new one'. And we'll call this 'Old Brick'. And we'll make this a larger size there. So let me say OK. [1:03:36]

and now if we go to the definition of the material and we go to that 'Old Brick' here and use the - where did I put it? Here is the 'Old Brick' here. So now here's what we have in 3D, and here's what we have on



the plan. So we might need to keep adjusting it until we get a result that is satisfactory. But you can see that it's a manual process that depends upon your eye as opposed to something that's automatically coordinated between the line work version and the texture file. So that's important to know about.

[1:04:26]

So we've got a little bit over an hour, I think I've pretty much covered the important things that you need to know when you're working with materials in ArchiCAD 16 or earlier. Let's just take a very quick look at ArchiCAD 17 where under the Options, Element Attributes, Surfaces, we have a dialog box that looks pretty much exactly the same. So you can see all the stuff up here looks exactly the same. If I go to one of the stones here, we'll see that it has the same texture down below. All of these controls are the same. Vectorial hatching is all the same. If I go to the Lightworks, we'll see the same type of controls. So really just changing it to the word 'Surface' in everything that I was teaching you in this lesson applies.

[1:05:25]

So let's see if there are any questions before we finish up or anything that I've left out that you've encountered that you would like me to explain under this general introduction to customizing your materials or surfaces for your building model.

I see a question from Steve Nichol, "How does one convert a material created in Internal Engine to a Lightworks material? Do you need to make a duplicate and then do the conversion and Match to Internal Engine? Glad to know the ArchiCAD 17 surface settings look pretty much the same."

Okay, so the answer is I've already demonstrated that. all of the ones that exist in the standard materials or surfaces have coordinated version in Lightworks. You don't have to worry about that. But how do I create a new one? You basically duplicate one that is at least somewhat like what you want. Is it stone or metal or paint? Pick one that is roughly like what you want and call it 'New Stone' here. And in the Internal Engine, generally what I recommend is that you go and if you want a texture go search for it, load it in here. Let's pick something. Here's a different type of river rock here. [1:07:04]

I have now a new stone that is this river rock. I make sure that it's set properly like at 1x1, is that supposed to be 5' across? Maybe that actually should be a little bit less. I'll make it 3' across so it's a little bit tinier in terms of each grain. Now I have something here to create the version in Lightworks. I simply switch my preview to the Lightworks Rendering Engine. And then after it updates in a few seconds, we go and say 'Match with Internal Engine'. That sort of worked almost automatically, that's interesting. I wonder if that has changed in version 17. let's go and put in a different texture. So let's pick something rather different. here's "Castle rock". I now have it in the Internal Engine. What if I go to Lightworks?

[1:08:05]

You can see Lightworks has not changed. So I go and say 'Match with Internal Engine', and now that is roughly the same. The Internal Engine here and the Lightworks there, they look quite similar simply by



going and matching. So that's how you do it. Generally you work with the Internal Engine first. There's one other thing that I forgot, and that is 'Load Settings from Archives'. And a really hardly use this, but I believe that it could be useful if you are going to be staying with ArchiCAD 17 or earlier and not using the new ArchiCAD 18 stuff whenever that comes out. [1:08:49]

There is an option to let's say create a new - I will duplicate this - another stone here. And I'm going to go in Lightworks and say 'Load Settings from Archives'. So it did not check this button before. This is available in ArchiCAD 9 and 10 and up through 17. Load Settings from Archives allows you to go look in some more sophisticated surface descriptions that Lightworks provides. I have not explored this very much, but you can see they are grouped into five different categories. 'Architectural' probably is a very good one to be checking out, but there are other ones for 'Basic' and 'Essential'. If we go to 'Materials' we'll see that it is divided in several different ways: construction, paving and flooring, concrete. Let's see, material components. No, that's probably not it. [1:09:55]

Let's go to 'Walls and Bricks'. So you can see some sort of strange preview up here. I have not spent much time with it, but if I pick a brick like this - the preview isn't very descriptive. I say OK, and you can see what it looks like here. it actually has a more realistic looking brick there. If I go in here and pick a different one, you can see what it's doing. Now I have not played around it much, but basically what happens is it just as a more realistic appearance based on some careful work that was done by the people who create Lightworks. So you could have a preview in Internal Engine that you do manually or that you use the texture here, and create something. [1:10:54]

And then decide, instead of matching that here, you actually will use a more realistic archive of material and play around with these. And there's just a whole lot of things in here that you can see. let's just try this 'Rose Roman' one here. you can see that it looks very crisp right now, but I'm sure it also actually probably looks like a clean bump. In other words, it simulates the surface appearance more accurately. So this is something that, again, I've hardly used but I think if you want to push Lightworks further this could be a useful way to do that. And we will spend some more time when I get into the rendering section looking at some of the differences with this. [1:11:52]

So let's see, Steve Nichol asked, "I should have asked about converting an existing internal engine material to Lightworks." Basically, if it's an existing internal engine material then it already has a Lightworks equivalent if it's existing in the sense of one of the ones from the standard Graphisoft template or MasterTemplate.

Bob George says, "How do you add a JPEG image of a material I found in my travels to the materials library so I can incorporate it into a project?"



Okay. This can be a little bit tricky. I will show you the basics of it but the issue is that the picture you take needs to be manipulated so that it will tile or repeat without showing the seam too prominently. So let's just go a web browser and we'll do something here. [1:12:58]

"Walls in Italy". I am just typing in something that obviously has a visual representation. I am going to go to 'Images' here. So here is a historic wall here. let me pick this image. and certainly if you take a picture of any type of surface, you're going to have something that has a specific size. And it's not designed to repeat. So let's right click on this and I will say 'Save Image As', and I will leave the name here. And let me go to ArchiCAD to the Element Attributes. We're in 17, so it's called Surfaces. And I will take the default exterior wall and duplicate it. And we'll call it "Battalion Wall". Then I'm going to go into the Internal Engine and I will go to the texture and say that I would like to search for texture file. I will load another picture from the file dialog box. [1:14:23]

So I'll go and manually find this. It's in my Downloads, maybe it's going to be in this folder here. I will say open that. And you can see the picture. Say OK. That looks good. Here's what it looks like, this is a 1x1 sample. If I go to 2x2 you can see the lines in between them. If I go to a 4x4 we're going to see how it looks a little bit funny because it's rather different on the left side than the right side there. let's just start out by saying how big is the surface? It guessed 1 m across or 3x2.5'. That's actually not too bad. I could live with that. And let's say OK. [1:15:16]

And let's draw a little building here and select these walls and tell them to have an override of the 'Italian Wall'. And let's look in 3D. You can see that when I zoom in on it, it looks like that wall, but you can see the tiling that's happening which makes it look rather funny; artificial. if I go to the definition here for that Italian new material, when I am repeating it I could try to minimize that by using one of these mirroring options here. And you can see it's like a kaleidoscope. Let me try that and say OK. And you can see now it looks a little bit more - we don't see the lines between them as much, but it still looks rather odd because of the way that blotches repeat to our eye. [1:16:19]

Our eye will see that. so what has to happen in order to create a material successfully is you need to go and in that texture or find a texture that is designed to repeat. or you need to go into something like Photoshop and treat this so that it can repeat. It's beyond the scope of today's lesson to show techniques that can make this work in Photoshop, but it will be something that I will cover in a later lesson in the course. At least some quick and somewhat effective ways to take something like this and make it look less obvious that it's repeating as it goes over the course of a surface. [1:17:12]

That's the basic idea there. And the main issue is just the repetitions when you have a simple photo. The other thing is that this is square on. Of course a lot of photos will be on some angle. if you do take it straight on or use your camera to make it fairly straight on it can work OK but you might need to skew it in Photoshop to try and make it as square on as it needs to be for rendering purposes. So let's see if



there are any other follow-up questions before we finish up here, any comments. Did you find it useful?
[1:18:12]

Bob says, "That's fine for today. I wanted to see the process for importing an image. I understand the tiling matter." Okay.

Tom Downer writes, "Very helpful."

I will just wait a minute for any final comments. Colin Healy writes, "Good review. Thanks." You're welcome. I do appreciate your feedback. I know I present for many minutes at a time and I hope it's clear. Just getting feedback during the session as well as at the end helps me to know whether I've hit the mark or not.

Magdalena says, "I find it very helpful, calling in from Australia." Joe Archibald says, "So much detail and information. Nice to figure it out a little better." Yes there's a lot of detail there, and I think you'll use it when you need it or let's say it will be available for you. When you have a question, you can go back and review that. [1:19:21]

Okay Jim Belisle says, "Thank you, very helpful training session." Paul Demars thanks me as well. Okay.

So thank you all for your time. We will continue on in the next lesson to go into Element Attributes. We'll be looking at Building Materials in ArchiCAD 17 which relate to Fills and Surfaces. We've already looked at how you set up fills and we've looked now at surfaces or old-style materials, and we'll be looking at the building materials and how they relate. We've already covered this to some extent in some of the lessons about new features in ArchiCAD 17, but I will give you a general description of how to work with these building materials. Then depending on how time allows, in the same session on Thursday, we may go on to composites. And composites are of course supremely important. They are the assemblies that you use for creating wall types, roofs and slabs. [1:20:42]

These refer to the building materials as well as the line types. And inherently from the building materials they refer to your surfaces and fills. And before version 17, the composite structures refer directly to the hatch patterns or fill patterns. So we'll be making sure that, regardless of what version of ArchiCAD you have, we cover that well enough for you to have full control over your composites which is so critical to getting good drawings and good clean plans and sections. So thank you all. I really appreciate the opportunity to work with you. We'll be meeting again a couple of days and continuing on through the spring and summer to round out the rest of the curriculum for the Best Practices Course. This has been Eric Bobrow. Please add your comments and questions to the page down below. Thanks for watching.

[END OF AUDIO 1:21:57]