

MATT DILLON: They closed the door, so I'm going to go ahead and start. I'm probably 30 seconds early. So don't tell anybody, OK? Again, for those of you who walked in, I'm doing a little bit of an experiment. So I usually show the software live. And because of a lot of what I'm going to be doing is going to require a lot of rendering, you don't want to sit there waiting through a rendering process to see the result. So instead I've got a bunch of embedded videos that I'll be talking through, and I've clipped out the rendering part. Some of them might have taken 20 minutes to render. So hopefully they'll go OK. I've gone through it several times, and it's not messed up on me yet.

For those who don't know me, my name is Matt Dillon. I am with Applied Software. Formerly I was with Inceptia, which before that was DC CAD. So if you know me from then, we actually merged with Applied Software back in September of last year. So it's been a little over a year. I'm a certified instructor for Autodesk. I've got a few years of experience with this stuff. I'm not a hardcore Max user. So I'm assuming that most of you guys are coming from kind of the same place I am, which is, your main focus is maybe Revit. But you'd like to be able to do some rendering in Max, but you don't live in Max. You don't have time to hire, or the money to hire a staff of people to do things in Max that live in it, breathe it, sleep it, that kind of thing. Is that pretty close? That's who this class is geared for.

I have done a lot of renderings through the years. I actually started-- does anybody remember an old program called Autoshade? See all the gray haired people remember that. I think the first rendering I did was with Autoshade, and it was around 1987. Somewhere around there. We've come a little bit since then, OK? But I've seen a lot of iterations of stuff. I've gone down a lot of rabbit holes, and I'm hoping to prevent you from going down some of those rabbit holes that I went down, trying to figure out how to make this stuff work.

So with that, this is not an advanced class. Hopefully that's already been made clear. So if you're a hardcore Max user looking for some really cool advanced tips, you're probably not going to get anything like that in this class. But again, if you're just somebody that wants to be able to take what you do normally, day to day in Revit, bring it into Max, and get some decent renderings, do an animation, that's what this class is for. Has anybody in here never used Max before? OK. So OK, that's fine. I do assume though, that you have a basic understanding of the interface. And if you don't, don't get up walk. You should get something out of this. But I'm

not going to really cover a whole lot of stuff about basic interface things.

So what would I'm going to talk about in this class is first, just talk about the various options and strategies for bringing a Revit model into Max. There's a lot of ways you can do it. I'll show you some little tricks on how to better manage the geometry when you bring it in. We're going to talk about the new art render, versus the mental ray render. So the mental ray render has been around for several years. The art render is brand new. So it's just been added to Max in 2017. It's now the default render in Revit 2017. We'll talk about that, when you might use one, versus the other. Did anybody go to the class this morning on the art render? I was relieved when I sat through that class that he didn't contradict anything that I've already figured out, because sometimes you don't know what you don't know, right? So it was good news for me.

We're going to spend a lot of time talking about photometric lighting, especially. This is a really big deal with Max. Revit as well, but it's even a bigger deal with Max. Little bit about materials. And then the last part of the class I'm going to show you how to create a keyframe animation the simple way. And then, how to use a component of Max that a lot of people don't know about called Video Post, to put several sequences together, to make a longer sequence. Rendering shorter sequences, and then put them together in a variety of ways. Sort of like the way they do on television, and the movies, where they cut from one scene to the next. That kind of thing.

But first off, how many people have rendered in Revit. You can get pretty good renderings in Revit, right? So why even bother with Max? Well, it depends. I mean sometimes what you can get in Revit is perfectly satisfactory. So I'm not telling you to stop rendering in Revit. It just depends on the effect you're trying to get. So in this example, I've got a daylight scene. I'm indoors, and I've got a large expanse of light, and I want to pull a lot of light into the scene. You can't do that real effectively with Revit. You can do it a little bit, to an extent. But you can do it a lot better with Max. You have a lot more control over that in Max.

Here's a dusk scene. Again, you can get a decent image in Revit. You've got a little bit more control over Max. But quite frankly, these are fairly similar. I could argue either way on this one. Here's a big one, though, nighttime scenes. And you really don't see it much in this image, but I'm going to show you something a little bit later on, where you really see the difference.

But I want to point out a couple of things. In the Revit image. Notice that everything's black out

here. Even though there's lights here, everything's black out here. And if you look at the Max scene you're actually seeing some of this exterior lighting filtering out into this area beyond, which is a little bit more realistic. And the reason for that is Max gives you a lot of control over global illumination, indirect lighting, which Revit doesn't give you as much control over. OK so there's an example of where you might want to do it in Max, versus Revit. Also if you want to do animations. Has anybody here done an animation in Revit? Don't do it in Revit. Use Max. If you're going to do an animation, just use Max.

So we're going to go through this workflow real fast, and we're going to focus on each aspect of this as we go through the class. So I'll get into all these things in more detail. But here's the basic workflow. First thing is, just link, or import your Revit geometry. 90% of your geometry is going to be done in Revit. You may do some modeling in Max to embellish the scene a little bit, but most of it is going to be in Revit. So that's the first thing you want to do, is get your Revit geometry in. And then you need to choose your rendering engine. Everything you do from this point forward, to a large extent, depends on which rendering engine you're going to use. You're going to use art, or mental ray, or something else. We'll talk about some of the others. But you want to do that first off.

I don't like to use Revit cameras in Max. You can import Revit cameras into Max when you link, or import the file, but I choose not to. And I'll explain why when we get to exposure. I'll explain why now. In Max, I like to use physical cameras. And you don't have that in Revit. We'll talk more about that when we start talking about lighting and exposure.

You're probably going to need to work a little bit with materials. Again, I'm assuming that your materials have already been assigned in Revit. but you're going to find some cases where you might want to tweak them a little bit in Max. Or in some cases, you may even need to swap them out for something else. Especially if you're using, again, the art render. We'll talk about that when we get to that particular rendering engine.

Lighting is a big deal. You can bring in your lights from Revit. There's nothing wrong with that. They're perfectly valid. They're photometric lights. But you may want to add more lights, or tweak the lighting that's coming in from Revit, to give it more effect. So there's tons of controls in Max for lighting. And this is usually where people get tripped up. Especially if you're using the mental ray engine, there's all kinds of settings here for global illumination. And this is where you can go down a lot of rabbit holes. I'm going to try to keep you from doing that. If you choose to use mental ray, I'll show you kind of the settings that I like to use that seem to

work best for me.

You need to work with exposure. And if you've rendered in Revit you know how exposure affects the scene. It's the same concept in Max. So it's not that hard to pick up on. Again, I recommend the physical camera. It gives you a little bit more flexibility with different exposure options. Different cameras can have different exposures, and you can play with different things.

And then you're going to do a lot of iterative rendering. So you're going to be fine tuning your lighting, fine tuning your materials. You're going to want to be doing some test renderings. You don't want to spend a lot of time on these. So there's little tricks you can do to adjust the render quality to kind of get a preview, without doing your final rendering, and get through them fairly quickly, until you're ready to do that final rendering. We'll cover some of the little tips and tricks for that.

And then finally, do your final render. And in case I forget to mention this when we get to this step, when you save your render, don't do this. Let's see if I've got it on this slide. Nah, of course not. We'll probably get to it later, but there's an option in your render settings. There's an output option where you can render directly to a file. And a lot of people will go through all their test renders. And then they'll render their final render to make sure it looks like what they want, and then they'll go and render it again to output to a JPEG or something. Don't do that. You can save right from the render frame window right there. So when you render that final image, yeah, that's the one I want, just hit the little Save button right there. And you don't have to render it again.

So let's dive in a little deeper here, and talk about importing and linking. So which would you do, import or link? It's pretty straightforward. Obviously, if you're importing, there's no link-- there that's why it's not called a link-- back to the original file. So if you've updated the model, you have to re-import. You can't just update the link. If it's a large file that could take a while. With links, of course, you can update the file. And what's cool, I'm going to show you some little tricks to manage that file. So if you've made changes to the Revit model, you don't necessarily have to re-link the whole model, or upload, or update the whole model. Just parts of it.

This may seem like a big deal here, that if you import the geometry, the objects become editable meshes. So you can actually edit them. You have full control over editing those, but

as soon as you start editing that mesh, you've pretty much destroyed the geometry. Has anybody ever done that, right? I'm going to play with this a little bit. Boom. It's no longer a window, or a wall, it's a blob. So even though the Revit objects are largely un-editable, they're still editable to some extent, even when you link them in. Primarily, if you need to, say, swap out materials or something. You can still do that.

I personally prefer the file linking. I don't do much importing at all. I prefer file linking, myself. And if we talk more about file linking, some strategies for that, we'll get to that in a minute. I want to talk about this as well. There's two places you can go to link the file in. You can go to the application menu here, and you'll see several options for linking or importing the file. But you can also go over here to the utilities panel in Revit. You'll notice there's no file link button here. If I click on More, then I'll get a whole list of additional utilities, and you'll see file length there. But if you're doing this a lot, and you will, wouldn't it be nice just to have the button right there, right? So we can do that. You can actually customize this interface fairly easily. So I'm going to go ahead and run this video. I'm going to show you how to do that.

So you'll notice this button here. I got the shakes today. Too much coffee. So that button there actually allows you to configure those buttons. So right now there's eight buttons. You can see in the list there, there's file link manager. I'm just going to add a button. Just add one more button, or I could take something off of one of those buttons, and replace it, but I'm going to add a button. And just drag that file link manager tool over to it, click OK, and it's there. And it'll stay there until you take it off. OK. So that's real quick, easy way of making file link manager a little bit more accessible.

So if you're going to link, there's two ways you can do it essentially. You can link in an FBX file. Does everybody know what an FBX file is? OK. So that's kind of like the 3D translation file for Autodesk. FDX is a good way to transfer three dimensional data from say, Revit to Navisworks, to Max. I can go from Showcase to Max, using FBX. Max to Showcase using FBX. Sort of like DXF for 3D geometry that includes materials.

But we can also link Revit files directly. You don't have to go FBX. So if we look at the differences, if you go FBX, you have to open up the Revit model, and export the FBX from Revit. So you go to the application menu, export FBX. You've got to be in a 3D view to do that. And when you export that FBX, all of the texture maps that define your materials in the Revit model, get saved in an FBM folder, in the same location that you export the Revit file to, the FBX file to. So you've got both of those you have to manage. You've got the FBX file, and all

those texture maps that go with it. Otherwise in the Max Scene you won't see the textures.

If you link it, you can link the file directly into 3DS Max. You don't have to open it up in Revit. You can just go grab the file. And as long as there's a 3D view in that Revit model, you can choose the 3D view to link, and it'll bring it in. You don't even have to Revit on the machine. And more importantly, there is no FBM folder. Well we'll see this more later on, when I get some materials. But the texture maps stay right where they're at. They're referenced in their original location. So you don't have to manage that. So I prefer linking, and I prefer linking directly from the RVT file. And there is one case where I will link an FBX file. We'll get into that a little bit later.

So again, here's an illustration of that. Linking in an FBX, if I look at a texture map, this is just a piece of the material editor in Max. And this is a texture map that's partly defining the material that I'm dealing with. And you can see where it's referencing. And it's in my folder that I stored the FBX file at. And if that moves, then I've lost all references to those maps, and I've got to rebuild those materials, and re-point them to all those maps. The maps are there, I just have to rebuild it, and point to those locations. And that can be a pain.

And if I go RVT notice right here, it's looking at the material in the original place that it came from. This is just one of the default AutoCAD materials, and the materials stored in the default AutoCAD material library. But let's say I created my own custom material, with my own custom map file, and stored it in a folder called, My Maps. Somewhere up on the server, wherever, doesn't matter. Wherever it found it when it originally linked the file in, that's where it's going to reference it at in Max. I don't have to make sure it follows my file around. And again, that's linking a Revit file.

So if you ever noticed in Revit, when you go to the application menu, and you've got the Sweet's Workflows. You ever seen that? Don't use it. It's kind of a placebo. It makes it look like it's making it easier for you. First off, it's always going to export an FBX file. And if you look at the different settings for all of these different ways of exporting an FBX file, the differences between them are practically nonexistent. And it's not a big deal. But more importantly, when you export it, that FBX file, and the associated FBM folder, get exported to your temp folder. How many of y'all clean your temp folder out on a regular basis? I do. Guess what? You just lost your FBX, and the material definitions.

And even if you've already got Max sitting there, waiting for the file, ready to take it. Doesn't

matter. The Sweet Workflow is going to launch another session anyway, right? So it's going to take longer.

AUDIENCE: So you can't define [INAUDIBLE]?

PRESENTER: Not to my knowledge. The question is, can you define it to go make that temp folder go somewhere else, make the FBM file go somewhere other than temp? I don't think so. Yeah. I mean once I realized what was really happening I said I'm not going to do that. I can do it manually, and do it better that way. OK. So, whether you're linking FBX, or RVT files, there's a couple of strategies you might want to take advantage of, and sometimes these Revit models get kind of large. And every time you make a change in the Revit model, you don't want to have to upload the entire model. So a few things to be aware of.

First off, when you link the file in, you've got these presets, how do you want to derive the Max geometry. And the one I usually use is this one here, buy Revit material. So instead of a wall being an object in Max, no. Everything that is jip board, has a jip board material assigned to it, that's one object in Max called jip board. And then everything that might have a limestone veneer assigned to it, that's an object called limestone. So it gives me fewer objects to manage. Makes it really easier to swap out. Like if I want to say, you know what? Instead of limestone, I want to make it brick. Well, I can easily make everything that was limestone, brick. Just by swapping out the material on that one object.

Let's say I have a few walls where I want a little bit more granular control up. I might want to say, that wall there, I want to make an accent wall. So I want to be able to get to the jip board on that wall, and make it separate from the jip board on these walls, and assign a material separately to that. That's when I would link that geometry in, using the do not combine entities, to where, yeah it's a wall. That wall is an object. That wall is an object. So you can mix, and match, depending on what you want to do with the objects, how much control do you want over them, as to how you bring them in.

Regardless of which one of these presets you use, I would suggest you split your Revit model up. And the way you do it is in Revit set up 3D views, with just the geometry that you want visible for that piece of the model, in that view. So when you export an FBX, or you link a Revit file, again, you're doing it based on a 3-D view in the Revit model. And the only objects that will come over, are those objects that are visible in that view. So I've got all these Max views set up with different parts of the model visible in them, and that allows me to link those in

separately. So that if I made a change only on the first floor, then I can just reload that part of the model. Instead of having to reload the whole thing. I can ignore these other views. Does that make sense? So a little bit of pre-work in the Revit model, will go a long way when you go to bring it into Max.

And then once you bring it into Max, to get a little bit more control over selecting those objects, or maybe just turning them off and on, to get them out of the way. Put them on layers. How many of y'all use layers in Max? For a long time I kind of ignored layers in Max, because once I went from AutoCAD to Revit, it was like, thank god, no more layers, right? But I've kind of come back around. And one of the things I like to do now is when I link these various pieces in, each view gets assigned to a corresponding layer in Max. So again, it gives me a little bit more control over selecting them, as well as turning them off and on.

So I've got a little video to show that. Now, you'll notice in the video, the layer manager isn't even available right here. So I'll show you how to access that, if you don't know. So first thing we're going to go up to the utilities panel, click on the file link manager button. Go ahead. Click on it. There you go. OK. And go grab the file. And it's going to take a few seconds here. And what it's actually doing is this reading that Revit model, to look at what 3D views are available. And once it's got a list of 3D views, then it will display them for me. And I can choose the actual view that I want to bring in. I'm going to bring in the first floor first. And before I actually link it, I'm going to go check this preset. And you'll notice that on my preset, I'm not bringing in anything other than geometry. So no lights, no daylight systems, no cameras. On this preset, I'm not doing any of that. That doesn't mean I don't bring in lights, but not with this geometry.

So this is where I kind of fast forward a little bit. You'll see it here. Boom. It's automagically in there, right? It takes it a few seconds to do that. It might take it up to a minute or two, actually to link that in, and read the model. So I just kind of fast forward it. Now we're going to put it on a layer right. So it came in on this layer that is basically named the same as the file. So all that geometry is on that one layer. But you're going to rename that layer to, in this case, first floor interior's. So now I've got all that geometry on a layer.

Go back. Go select the exact same file again. Let it read the list. And this time, once that list comes up I'll choose, in this case, the first floor furniture. And we'll link that in. I don't need to look at the preset. I know what it's doing. I always check the preset the first time, and then after that I know what it's doing. And again, it's got the same name again, the file name again. But again I just rename that layer now to furniture, and just wash, rinse, repeat, keep going.

Don't worry you're not going not going to sit here, and watch me load the whole thing. So I'm going to cut ahead here in a second.

So I want to point out one more thing here. Come on, move ahead. Move ahead. There you go. All right. So everything's been loaded. I want to point out, there's one here that says lights. And in that one, I modified the preset to bring the lights in. And you'll notice, I don't know if you can read that, but that one I actually did as an FBX. So what I did for the lights is, I went to a view where only the lights were visible in Revit, export the FBX file. And the reason I did that is when you bring in lights, as part of an FBX file, by default, they're turned off. I don't like them on automatically. I'll turn them on when I'm ready to turn them on. If you bring it in as part of the Revit file, they're automatically on. And I usually wind up going and turning them off especially. If I'm going to do a daylight scene or something.

So it's just a little thing I do. OK so that's linking. Any questions on that? Does that make sense? OK.

So let's talk about the renderers. Art versus NVIDIA and there are some others as well. So the art renderer is brand new for Max. One of the nice things about it is, it's really simple. And I was, again, I sat in a class this morning. And the guy had a really good way of explaining it. It's based on real world, physical properties. It's already configured to simulate reality. So there's not a whole lot of controls here. You're not trying to fake things. It's meant to be realistic, out of the box. You do have some controls over image quality, noise filtering, and things. We'll talk about that in a little bit. There's the noise filtering. One thing to remember in Max, in general, the further over to the right the sliders go, the better the image quality, the longer it takes to render. So the trick is finding that balance between image quality, and time.

Then the NVIDIA MentalRay renderer is a lot more complex, especially when we start talking about global illumination. So Final Gather is part of that. There's a lot of settings there. And again, a lot of rabbit holes you can go down. I'll hopefully show you some things to keep you from doing that. The Ray renderer is really good for faking it, right? You need to, maybe, embellish reality. And the MentalRay render allows you to do that. So you're going to have some scenes where you're going to need to embellish reality a little bit, because reality doesn't look the way you want it to look. That's when you might need to use the MentalRay renderer.

So if you look at a list, and this is a little bit deceiving, art is easier. There's no question. Art it's faster. It's definitely faster than the MentalRay render. And it is now the default renderer in

Max 2017. You can switch to the others, but it is the default. And it is also the only render in Revit 2017. OK? But in red there, it doesn't support attenuation. How many of y'all know what attenuation is? OK. Though for those of you that don't know, it's not that important anymore. And I'll explain why in a minute when we get to lighting. So you know, that's really not a big deal. Limited lighting controls. Again, the global illumination. You don't have all those settings. So less flexibility, but much less complexity, right?

This one's kind of important. If you're going to do a night scene you might like to use the lens effects, which I'll be showing you. Doesn't support lens effects. So if I need lens effects, 'm going to have to go with metal ray. It doesn't support sky portals. That's a big deal if you're doing certain types of interior scenes. This is not a huge deal. You may have to do a little tweaking with some of the Revit materials, but not a lot. So MentalRay is kind of the opposite of that. It's slower, et cetera, et cetera. But don't let the amount of red over here, versus the amount of red, lull you into thinking you should just use metal ray, right? It depends on the situation. And a lot of these are not that big of a deal.

So I'm going to show you an example of what they both look like. Here's the art renderer. Real simple little rendering here. We're going to just do an exterior scene. And you'll see how they actually look different when they render. But you can see it's very simple controls here. So 50%. This is actually a fairly decent rendering quality setting here. You might bump that up to high, but this will actually give you a decent rendering. Watch what happens though. You see how it kind of pixelates? So the art renderer, what's cool about this one is you can set it for a certain quality, but you can actually watch the image as it gets better, and better, and better, and you might get to a certain point, maybe halfway along, where you go, you know what? That's a good enough. Stop, and save it, right? So there's the finished art render.

Now let me show you the MentalRay render, and what that looks like. So there's the MentalRay render. Same scene. Look at all these settings here. I'm just going with default settings here. We'll talk more about these in a little bit. And I've got quite a bit-- hopefully everybody downloaded the handout. If you didn't, make sure you download it. I've got tons of information on different options for the settings here, and when you might want to use them one way or another way. This is called a bucket render. So you'll see as it's rendering, it's first just making a pass to do the final gather, the indirect lighting calculations. And then it's going to start doing the render. And you have to wait for it to finish. Sorry, that was my screen doing that, not the render. But you have to wait for it to finish, because it starts rendering in these

buckets. And you see these squares appearing. They usually go from left to right. You can't just say, good enough. Stop. Doesn't matter. If it's good enough, great. We've still got to wait for it to finish. And it does take longer. But the final quality is comparable, for an exterior rendering.

So which one do you use? These are my recommendations. And if you want to take a picture of this, I'll hold this up. I'll leave this up here for a little bit. I've done a lot of experimenting since 3ds Max 2017 came out. Kind of played with it. A lot of different ways, and here's kind of what I've come up with. If you're going to do a simple exterior scene with daylight, so sunlight, you can use either one. They both give you good quality rendering. Nighttime scene, exterior, use MentalRay. We'll dive into this a little more later.

Interior, daylight only. In other words, inside scene. If you have a large expanse of glass, and you're trying to bring in daylight, and light up the interior of the room, use the MentalRay render, because you're going to need to tweak reality a little bit. Interior daylight plus artificial. So any time there is daylight on the inside of the building, and you're trying to really leverage that daylight on the inside of the building, you're really talking MentalRay. OK. Now if it's just a little bit of daylight, like some small windows up there, but mostly artificial light, I'd go the other way. But if it's a lot of daylight you're trying to bring in, use MentalRay. Artificial only, you can use art or MentalRay. In general, either of these here that say art or MentalRay, I'm going to make it real simple on you. Go with the art render. OK, if it says art or MentalRay, just go with art. It's simpler. It's faster. It just makes more sense.

Now we'll look at some specific examples. By the way, this PowerPoint is also available on the AU website. You can download the whole thing. OK so there are other renderers, not just MentalRay or art. There is the Scanline renderer. This has been around forever. I mean when 3D Studio first came, out back in the 90s some time, getting old, memory fades, that was the original renderer with 3D Studio. It's going away. Don't use it. It does not support photometric lighting. And it doesn't support the materials that come with Revit. Don't use the Scanline Renderer. Pretend it's not there.

NVIDIA iRay is another option. It's a good renderer and it supports the same materials that the MentalRay supports, and it supports photometric lighting. The reason I don't use it is I have a notebook here that is really not beefy enough for iRay. iRay has some fairly stringent hardware requirements. So if you've got a really powerful GPU, you know, multi-core machine, then you might want to consider the iRay renderer, play with it, see what you think. It's a good

renderer. But if you don't, don't go there. It requires too many resources. V-Ray, a lot of people like to use V-Ray. I'm not that familiar with it. And the reason I'm not that familiar with it is I'm a cheapskate, and V-Ray costs money. It's extra. It's a third party renderer. So I do know a lot of people that love it. I don't use it. Don't know anything about it.

And then you have cloud rendering. So you can render from the cloud, from either Revit or Max. It's quick and easy. There's some cool things you can do, along these lines here. Fewer options. Again, easy usually means fewer option. It pretty much always works out that way. Depending on the quality, and what you're trying to do with the rendering, it may cost you some Cloud Credits. But the Cloud Credits aren't much. I mean, what is it, \$1 a credit or something like that? It's not that big of a deal.

Let me show you an example of a panorama, if you haven't ever done one of these. So this is a cloud rendering here, right? Just a static image. But this is a panorama that I actually downloaded. Really simple to do. So you've been hearing a lot of stuff got VR out here, right? Well this is your first kind of step toward VR. You can also do a stereo panorama in the cloud. So you upload your file to a stereo panorama, download it, put on the goggles, and you're doing VR. And it's not hard. It's real simple. This is brain dead simple. So I encourage you to try it. I think that particular rendering cost me maybe six credits. So give it a shot. It's worth it.

OK. My favorite topic. Photometric lighting, and materials. Almost my favorite topic. So when you're working with photometric lighting and materials, you're going to be doing a lot of tweaking, and adjusting, and you want to see how it's going to affect your final rendering. And this is where you need to come up with some ways of doing multiple iterative renderings quickly, right? You don't want to have to be waiting 20, 30 minutes, or an hour each rendering just to see what some minor adjustment might do so. So some things you can do is in the render setup dialog box-- whoops, get back there. Render render set up dialog box, in the art render, you can just set your quality way down low, like this. I'm turning off noise filtering here. Noise filtering basically just kind of smooths out some of the granularity there. Kind of blurs the image as well. But you know, it's something you can play with. But again, it takes a little bit more time. So I'm going to turn that off. And in the comment settings here, I'm rendering to a lot smaller size. So I might render normally to a like 1920 by 1080, but for this test, I'm going to render to 320 by 180. It takes it less time. Now, the results here is a pretty grainy image.

But if all I'm trying to do is get a sense of the overall lighting, this is all I really need. And it doesn't take any time at all. If I need more detail, less graininess, well then I can do something

like this. I bump my quality up, which is going to increase rendering time, but then I say, instead of rendering the entire view, I just want to render a blow up area, to the same image size, and that will speed it up again. So here's an example of how that's going to work.

So we'll do the art renderer first. We'll go to render set up. So here, again, I'm setting my render size to a small size. And then I'm going to drop my render quality all the way down to minimum, and I'm turning off noise filtering. Also fastpath tracing. That's usually fine for almost every rendering you do with the art render, the fastpath tracing. The other option, the advanced ray tracing, is really if you've got a lot of reflective materials. That might be a little bit more helpful. But frankly, I haven't noticed much difference, and it takes longer. So there you go. It's, again, grainy, but you get a good sense of what the lighting's going to do.

OK, now if I want to get a little bit more detail on that table, I'll up the quality here to draft. And I'll change it to a blow, up instead of a view. When you go to a blow up, you've got this box here that you can drag around, position it where you want, and then you can play with those little corners to kind of get the size the way you want. You've got a similar thing in Revit. Want to go ahead and render that. It'll take a little bit longer, but not much. And again, you get a little better quality image, so you can see more detail on it. So again, pretty simple with art. There's not a whole lot of settings to manage.

So the next one is MentalRay. Same process. So on MentalRay, again, on the common settings, I'm going to render a view. I'm going to render to a small size. But then when we get to global Illumination, right here, I want to take final gather, which is the calculation for indirect lighting, set it all the way down to draft, so it's the lowest quality possible, because that can really take some time, and then go ahead and let it render. And also I pulled up the render frame window. This button here pulls up the render frame window, so that I can drop the image quality all the way down. There's probably another place to do that, but that's just how I do it with MentalRay. And again, you notice, it does take longer than the art render, even with those settings dropped all the way down, because it's calculating final gather. I need that because I'm trying to bring an exterior light, and that's what final gather helps you do. So I get a decent quality rendering. That's fairly quick. Fairly easy. But again, the key is, lower the quality, until you're ready to bump it up for that final rendering.

Another tool that's really valuable in Max for comparing renderings, among other things, we're going to see us again when we get to animation, is the RAM player, what this allows you to do is to compare renderings. So you know, I do a rendering, I think I'll change the setting here. I

can then do another rendering, and compare that to the RAM player, to see what some of the subtle changes might have been. Because sometimes it's not real obvious. Gee, it looks like it didn't do much of anything. And then you load it in the RAM player. You go, oh yeah it did. This is a lot better, right? So it's really helpful. I'll show you how that works. It's pretty straightforward.

So first I'm going to do a render. And again, I'm in the mental ray rendering. Again, we're dealing with an exterior scene, light coming in. This is just with the default final gather settings. Default global illumination settings. So I've done that rendering. And I'm now going to capture in the RAM player. So it's at the bottom of this rendering pull down menu. So right here, I've got two channels, and I'm going to load it into channel A, the last rendering, and just store it. So I'm just going to minimize that window. Don't close it. You'll lose the rendering. And then I'm going to make an adjustment. I'm going to go to my final gather settings, and I'm going to bump up the number of light bounces. So how many times is light bouncing off the objects in the scene? That's way too many, by the way. Six is ridiculous. It really increases render time, and it doesn't give you that much. But let's pretend I don't know that. OK.

So I'm going to load that now in channel B, and I can see the difference. Now, I don't know how well you can see it on the projector. But you can see there is a difference. Now, if I'm gullible, I might think, that's pretty good. I'm going to go with that. But let's see if I can improve the render quality now. A little tip, don't go above two bounces on final gather. You reach a point of diminishing returns. And here I see, OK, I bumped up the image quality, and it really increased my render time, and it didn't do anything to the scene. So I know I can bump that down before I do my final render, and not waste too much time on it. So use that RAM player. It's a really handy tool for comparing images when you're tweaking lights, tweaking materials. It's invaluable.

So let's talk about lighting settings. Talk about exterior light first. And again, the art render, and the mental ray render, in this respect, are fairly similar. But they do use different tools. So if you're using the art renderer, you want to use the art sun positioner. And it's on the lighting tab of the create command panel. If you're using the mental ray renderer you're going to use the MR. It's not Mr., OK? It's mental ray MR daylight's system. And that's actually found on the systems panel, and not the create panel. But once you get to them, they both work pretty much the same way. They both include, both a light source, and an artificial sky environment, which also casts light as well.

So I'll show you both of them. Here's the art sun positioner. So again, I brought in my Revit scene. I've got my lights in there. But they're all turned off. I did not bring in the daylight system from Revit. I didn't bring in any cameras. I created my camera right here in Max. But there's the sun positioner on the light tab. So you'll notice, you place it, and then you have to size up this composite. The size of that doesn't matter. That's just a glyph that allows you to then rotate it, to indicate which direction north is. And then you position the actual sun system, or the sunlight. And then over here, you configure, usually based on date, time, and location, where that sunlight actually is. So I'm going to click on the location tab here. This is a desert scene. So we're going to put it in, where my good friend Stephen Shell lives, Tucson, Arizona. And we'll set the time, and render.

Now one thing I'm skipping in this sequence here is exposure. Somewhere in here you need to go ahead and set your exposure. Not showing that in this. I've already done it. But I'll show that part to you in a little bit. And so there you go. There's your rendering. And I didn't cut anything out there. That render didn't take very long at all. A little bit low quality, but it's there.

So this is the MentalRay side of it. So now I'm going to the systems tab for the systems panel. Clicking on daylight. But from here on out it's very similar. I create the compass rose, drag out the sunlight. The only thing different is you don't rotate the compass here. If you want north to be a different direction, you have to come back, and rotate it separately. But then here we have the same time, and date controls, location controls, et cetera. Go ahead. Find Tucson. It's down at the bottom stupid. Go. Anyway, you get the idea. It's going to look pretty much the same.

So let's all about artificial light. Sunlight's pretty simple. If you're doing an exterior daylight scene, that's about as complicated as it gets. But if you're doing an interior scene, then you're probably going to need to use some artificial lighting. And there's two main types of photometric lights in Max. You have target lights, and you have free lights. Target lights have a light source, and a target where the lights pointing at, right? And casting light. Free lights typically just have a light source, and it can cast light in almost any direction.

You also have distribution settings. So these two kind of go hand in hand. You've kind of got to work with those two together. Whether it's a free light, or a target light, and then what kind of distribution is it? And if we look at different combinations, here's a free light with uniform spherical distribution. So basically, it's a free light. Uniform spherical distribution means the light is going in all directions. And this is why I said attenuation is not a big deal. If you're using

the old Scanline renderer from the old days, then you could actually place a light, and if you didn't do anything to it, that light would just go to infinity, which is not really what happens, right? So we had attenuation, where he could select the light, and tell it, OK. I want you to start fading from about here. And then when you get here, it's full black.

Well, both the art and mental ray renderers, with the photometric lighting, the photometric lights understand attenuation automatically, and it's already built in. The only time you need to use attenuation is if you need to fake it, if you need to augment reality, tweak reality. And again, that's the MentalRay renderer, not the art render. So the fact that the art renderer doesn't support attenuation is probably not a big deal. You usually don't need to adjust it.

So here is a free light with a photometric web file, so an IES file. This is usually something you might get, like, from a manufacturer. So you might download a light for Revit, for example, from Lithonia. And you also download an associated IES file. Well, that actually has all of the data in it that tells that light what its distribution pattern, its intensity, its color, everything. According to manufacturer's spec.

And then you have-- this is a target light. Uniformed diffuse. Basically, uniform diffused is what we used to use to simulate sunlight, where you have a light source here, and it's casting light, a constant direction, but the light rays are parallel. In other words, it's not like a spotlight, or something. I don't use those too much. I do use these a lot, spotlights. Spotlights are kind of cool for highlighting certain things. And again, you're usually going to do it with a target light, because you need the light, and you need where it's casting light to. And you've got these settings here. Hot spot, beam, and fall off field. Basically, that's controlling the size of the light, the beam for the spotlight, and the distance between these two numbers, controls how sharp that is. So if you want a really crisp spotlight, that distance should be really small. If you want to kind of fade to black gradually, then make that distance larger. And it's about the spinners. You can adjust how many. You can actually see what's happening there as you adjust.

What I like to do is, when I place a light, find a template that's close to what I want. This makes it a lot simpler. And instead of going, and tweaking all those little settings, find something close to what you want. Do you want an incandescent light bulb? Then maybe go here to this one 100 watt light bulb preset, place the light, go to the modify panel, grab this preset, and it'll basically set it up with the intensity, and the distribution pattern for a 100 watt light bulb. This is the same light, I just assigned a different template to it. There is a 100 watt light bulb. Same light, now with a four foot pendant fluorescent. And then you can adjust it from there. If you

want it to be more intense, change colors, whatever you want to do.

So exposure control, this is huge. And usually I will do this before I start tweaking lights. So I'm kind of doing this a little out of order. Usually the first thing I do before I start actually working with my lights is I go ahead and set my exposure control. It's done on the Environment dialog box. So you go to the render down, pull down. You don't go to render set up. I don't know why they don't put this in a render set up, but they don't. There's actually a specific setting for exposure control. And actually, what it's going to pull up is this environment dialog box, which is also where you can get to your special effects. Again, I use physical cameras. So that's why I don't bring in cameras from Revit.

When you go to the command panel, and you go to the camera tab, you'll see three types of cameras. Target free, or physical. Use physical, if you use the physical camera, it's just like a target camera. You tell it where you want the camera to be, where you want the camera to look. But in addition to that, it simulates real world camera properties. Now, I'm not a photographer, but if you are, and you like working with things like the shutter speed, frames. There's one in particular, I'm looking for, the ISO, the film, like 150 ASA, or ISO, whatever. It's been a long time so I even used a 35 millimeter camera but you can actually do that in this modify command panel for a physical camera.

And the exposure is saved with the camera. So you can have multiple cameras in the same scene, with different exposure settings. Here's one on the inside of the building, for an interior scene. Totally different exposure setting from this one on the outside of the building, for an exterior scene. Just switch from one camera to the other, and you've already got your exposure set. Always do this preview. Get your exposure set up here. Hit this render preview. It doesn't take very long. And it gives you a real quick idea of what your exposure is, and if you need to adjust these settings, this will update automatically as you adjust. So you can get it close. You can play with the settings, and you'll see that kind of adjust as you go.

So here's some recommendations I have, in general. If you're doing an exterior daylight scene, and generally you want high EV value, so this value here, anywhere between, say 12 and 14. Like when I do renderings that are like from where I'm from, San Antonio, I usually have them like around 12 or 12.5, because the sun's a little bit more intense than maybe up north, where I might have it at 13.5. OK. Also, if you're doing an exterior scene, you're going to want to go ahead and process your background and daylight's settings. So again, if you're

using a sunlight system, or a daylight system, you've got the sun, and you've got that simulated sky. Well you want that to actually be part of your light, right? So you want to make sure you process that. But then again, everything else is set to physical camera exposure control.

For interior scenes I typically don't process the background. I don't use the map, and I don't process the background. I'll talk more about that in a little bit. And I put asterisks on there. I do know people that do. And you can play with it back and forth. But I prefer not to. But notice here, the EV values are a lot less. So for an interior scene, you typically drop that exposure to a lot smaller number.

And then you may want to play with the white point. So especially on an interior scene, just changing that number. The lower the number, the cooler the scene. So here I'm dropping from-- and this is a preset. You can type in a number, as well. I'm dropping from 6,500 Kelvin, to 4,000 Kelvin. So 1500 Kelvin. And it really doesn't change it that much, but you can change from a warmer scene, to a cooler scene, just by changing that value.

OK so global illumination. This is, again, MentalRay. So if you need to tweak global illumination, this is when you need to use mental ray. And what that basically is simulating is more ambient light, or what happens when that light hits this surface, whatever it might be. It bounces off that surface, and has an effect on the things around it, right? And so that's what this is giving us control over, is how we want that to work. Now, again, the art renderer does that. It just doesn't give you any control over it, because it is meant to simulate reality. The MentalRay engine allows you to fake reality. And in some cases, that's what you need to do. And this is a perfect example. With the MentalRay engine, without final gathering enabled, this is what I get. With final gather enabled, just with the default settings, I get this. Now, this still isn't as good as I want it, but it's a heck of a lot better than that. I still have more tweaking to do, but just final gather being on, with the default two bounces, gets me from there to there. OK?

So again, on your global illumination setting, and I've said this once already. I don't ever go more than two bounces. I taught this class a year or so ago, and I was showing you can go to four, etc. I've changed my mind. Especially with the art renderer, a lot of what I used to have to do, to get the effect, is now done with the art renderer, this kind of scene here, two bounces is enough. There's another way to get more light in here.

So here's some challenging scenes, along those same lines. And by the way, in the handout, I've got tons of different scenarios. And I've got the settings that I used to get the best rendering for those. So make sure you download the handout. I go into a little more depth in that. Interior scene, exterior daylight. So you've got a lot of exterior light, and you need to bring that light to the inside of the scene. That's not easy to do. And part of it is because our eyes perceive things different than a camera. I mean how many of you all are photographers? And even if you're not a photographer. You've done this. What happens when you're in a room, and you've got a big window here, looking outside, and you take a picture looking at that window? It's washed out, right? Because your camera wants to adjust to what makes the room look good. Well, if you adjust the exposure so that the outside isn't washed out now the room is real dark. Your eyes don't perceive it that way, right? So this is why MentalRay, we have to tweak it, we have to fake it, to make it look like the way our eyes perceive it, because the art renderer is going to do it based on the way a camera sees it.

OK. So we're going to use MentalRay. I'm going to set final gather to the default settings. So just low quality, two bounces. I'm not going any more than that, because it's going to make my scene take much longer to render for very little gain. Instead, I'm going to use a mental ray skylight portal to magnify the amount of light coming in. You'll see some people say what you can do here is just adjust your exposure to brighten this up. Well that's going to do exactly what a camera does. It's going to brighten this up, and brighten that up too, and it's going to be washed out. So use this MentalRay skylight portal. Here's an example.

OK. So we're going to go to the render set up here. And again we're going to take the final gather settings. We're just going with default settings. So it's enabled, low quality, two bounces, that's it. I'm not going to mess with anything else on that panel. Those are radicals. I mean, there's a ton of stuff we can do with those, but frankly for what we do, you don't need to. My exposure is set to 13.5 here. And if we do the rendering, again with final gather enabled, again it's kind of dark, but at least I'm getting some light in. Well, now I want to drop the exposure, like a lot of people would recommend. I'll go ahead, and save this image. We'll drop the exposure. Come on. Come on, Matt. Over here. Over here. There you go. So I'll drop it down. I'm just going to drop it down to 11, right? See what happens. Do another rendering.

And exactly what I said. It brings in more light, but look at that, right? You can't see anything outside, so that's no good. So we're going to take this back to 13.5 over here. Come on. Back over here. I'm confused. One of these videos, my mother-in-law was talking to me while I was

doing. You know, I was telling her, I'm kind of busy, can we talk later? Yeah, we can talk later. By the way, was I-- she just kept on going. So I was kind of distracted.

OK. Yeah I think it was this one. it's like, what am I doing? OK, so here I'm going to the MentalRay sky portal on the light tab, right? So it's a light source. You go to light tab, go to MentalRay sky portal. And then I draw it in elevation, in front of this glass here. So I'm actually looking at that glass in elevation. I draw the light portal to cover that up. You don't have to be real accurate. Then I move it up here, so it's sitting right to the outside of that glass. OK. And that's actually an object that I can adjust. The arrow is the direction of light. So you can flip that if you need to. And then over here on the modify panel, right here, this multiplier. In this example, I'm really exaggerating it. I usually only go to two, but just to show you the effect, I'm going to four. And you can see a drastic effect. I don't need to pull this up in the RAM player to show you but there it is. And my mother-in-law was still talking to me. So we're just going to move ahead. You can see the difference, right? It's a lot brighter. So that's the MentalRay sky portal. And again, that's why we use the MentalRay engine for those types of renderings, because the art renderer doesn't support the sky portal.

So another challenging scene, exterior daylight, with artificial light. So this is a scene that's kind of dusk. And I want to see, kind of the effect of these artificial lights. In this example, I'm using indirect diffused lighting. That's actually not quite correct. You'll see in the dialogue, indirect illumination is the actual correct term. It's a new feature in Max, for the mental ray engine. I am using a MentalRay sky portal with a normal 2.0 multiplier. And real important here, you have to exaggerate the artificial lights like crazy. If you leave them at their normal default settings you won't see any effect from them at all. Just a little bit of effect here. I have to really exaggerate those exterior lights. You have to do the same thing in Revit, by the way.

So this is a new feature in Max. With the MentalRay engine they had this other setting here called Indirect Diffuse. Now, I try to avoid using this. I have been, anyway, because it tends to take a lot longer. But I just noticed today, I was going through this presentation, I was like, why have I not noticed this before. I wonder what would happen if I unchecked us GPU, because I'm running on this laptop that doesn't have a really high end graphics card, and that's probably why it's taking so long, because it's using the graphics card that isn't really tweaked for rendering. I wonder if I uncheck that, it'd probably use the CPU. It may go a lot faster. So something you can play with anyway, if you choose to use this. But notice here on the lights, 10,000% of normal intensity. That's what you have to do. You just got to fake it, to get that

effect.

So here's another one. And this is something just recently started happen a lot in 2017. It used to happen a little bit prior, but you could adjust it with the final gather settings, start sliding those sliders over to the right a little bit more. Of course, that increases render time. But even if I adjust, if I set final gather to the max properties on everything, I can't get rid of this kind of disco light effect for some reason, in 2017, on a lot of these interior scenes. So I don't use final gather. Instead, I can use indirect illumination, the one I just showed you. And that takes care of it. Takes longer. The art render actually does a pretty good job. I could probably up the exposure here a little bit, but other than that it actually does a pretty good job on it.

AUDIENCE: Excuse me.

PRESENTER: Mm-hmm?

AUDIENCE: [INAUDIBLE]

PRESENTER: Yeah. You can adjust it. But that it really increases render time. I mean, so all those settings, you can adjust them. And it does improve it. You can also set the number, not just the sample size, but also the number of iterations, and so forth. And that makes it get a little bit better each time, but then the render time just skyrockets, right? And see, it gets to be even worse than this one. So that's why I choose not to. I'm impatient.

So here's the exterior night scene. Again, I used MentalRay on these, mainly because, again, with the indirect illumination, or the final gather, I can get the light effects out here. The art renderer probably isn't going to give you that. The light just doesn't look realistic out here. The other thing is, in Max you can add these lens effects. So like a glow, or a streak, or something. You can't do that with the art render.

[AUDIO OUT]

So right here, I've got the render finished. Got the lens affects in there. And I'm saving it to a file, and I just want to point out--

AUDIENCE: Sorry.

MATT DILLON: It's OK. I'm saving it to a PNG format. If you save it to a PNG format, your background becomes an alpha channel, OK?

AUDIENCE: [INAUDIBLE]

MATT DILLON: I got it. So I'm saving it to, making sure alpha channel there's checked on. And then I use Snagit, as an editor. So if you have any kind of image editor, you can probably do this. Snagit's really good. It's cheap. Does a lot of cool stuff. So I just downloaded an image off the internet. And I'm making sure the image size is the exact same size as my render image size. And then I'll go open up the rendered image right there. And so you can see that little checkerboards stuff there, that's that alpha channel. It's transparent. I'll just drop that on top of the other image, and position it, and we've got our background. That's one way to do it. And you can also add a background in your environment settings, in Max. The reason I don't is it tends to affect your lighting, even when you tell it not to process the background for lighting, it tends to affect it. And the whole thing would have kind of a blue tint. So I just find this to be a better way to do it, for me. OK? So that's a night scene. And again, all this stuff is in the handout.

Let's talk about materials. I want to make sure we have time to cover animation. So let's move to materials. Real quick, I just want to talk about the legacy material editor, versus the Scanline material editors. Everybody know the difference between these? So this legacy material editor is still there. It's not the default. I don't like to use it because you can get lost in your material real fast. And with the Scanline material editor you can see everything that's going on. I'll show you what I mean by that. So in this video, we're going to start off using the legacy material editor. By the way, the Scanline is the default. So unless you tell it to use the other one, it's going to use Scanline.

So this is it. Now to go find the material to work on it, I have to click on this button here, to go to the material map browser. So it's another box. It's very disjointed. So I'll go to this other box, and I'll go find another material that I might want to work with. Come on, go find the material. So there's one of the materials. I'm going to grab that one there. Come on, hurry up, grab it. I'll drag that over. Now I've got it in here, and I can work with it, but this thing has a lot of texture maps that are controlling it. So if I want to edit the texture map, I click on that button there. Come on click it. Now I'm editing the texture map. At this point, I've started to get lost in the material already. Where am I, right? I'm no longer editing the parent material. I'm editing this texture map. What if I want to edit the bump map? Well, now I got to go back up to the parent, and then go to the bump map, and edit that. You got a lot of this back and forth, up and down. You get lost. Where the heck am I in this material? And yeah, there's a little window you can pop up here that will show you where you are? But why? Why use a map when you can use a

GPS, right?

So here's your GPS. This is the slate material editor. Same process. So for one thing, I can have multiple views, with different materials on them. Or if you're like me, I'm just real sloppy. So when I fill up one view, I just create another view, and ignore the others. I'll go ahead and make this a little larger. Come on, over here. There you go. OK. So over here is the material map browser. It's right there. I don't have to pick a button to go to it. Everything is right there, where I need it. I'll go grab that same material we were looking at before, and everything that's making up that material is immediately visible to me, and if I want to edit something, all I have to do is just double click on what I want to edit. When I got that dash line, that's what I'm editing, right? When I edit that map, I just double click on that map. That's what I'm editing. It's very easy to see where you're at in the material, and a lot easier to work with, OK?

So let's talk about which materials to use with MentalRay, and art. It's pretty simple, really. These are raw materials. The new physical material, for MentalRay or for art. That just came out in 2017. I'll talk a little bit more about that in a minute. These have been around for a while. These are MentalRay compatible materials. They've been around for a while. Either of these will work. Whether you use a Mentalray, or art. Either of these materials will work. Don't use standard. Standard is for the Scanline renderer. Don't use it. Pretend it's just not there, OK? That's it you have to-- I'm not talking about if you have to create a new material.

But again, you may not need to create one from scratch. There's a lot of MentalRay material templates. So if you want to make water, water is kind of hard to create. It's not the easiest thing in the world to do. Here's one right here. This one here you can say, OK, I'm going to use this. This is a reflecting pond. I'll do another one, and it's a swimming pool. And it's just got these little parameters that you adjust for wave height, and so forth. It's real simple. So you can use these to kind of get started with a material, instead of starting with the raw materials. And don't forget there's a ton of materials already in that Autodesk material library. All of them are MentalRay materials, perfectly compatible with art. You can start with those. Use those out of the box. Or take one, duplicate it, and make a new material out of it, OK? And that's what I like to do. I don't like to have to work too hard. I'm pretty lazy.

But this new material here, physical material, this came about with the art renderer. It is compatible with the NVIDIA MentalRay renderer as well. Again, if you're going to use this, I would recommend using a preset to start with. So go ahead, and use the physical material. Set it up with a preset. There's tons of them. There's glass presets. I don't think there's a

water preset. But there's masonry, concrete, wood, all kinds of presets, that get you started. And then you adjust the basic parameters from there. And actually, I was able to create a water material with a physical material in about five minutes, just by playing around. I never could get a water material to look decent using the other types of materials. But this one, it wasn't that hard to do. In the handout I give you a link to a fairly short tutorial on physical materials on YouTube. It's pretty well done. Kind of walks you through it. He's got links to files that you can download to kind of go along with it. But you can use these. Either or.

So here's some of the things that can happen. If you're using the art renderer, and you're bringing in a Revit model, if you've got glass, it's going to come in, a lot of times, just looking like a mirror. It's just way too reflective. And I don't know why. It just happens. So what I did, I did a couple of different experiments. This is where I actually use the physical material to create my own clear glass material, and swapped it out in the Max model. It was real simple. I just picked that glass object. Remember you combined by material. Take all the glass. Swap it out for this one. And I was able to better control the reflectivity. I also did this reflecting pond out here. That's my water. It's a little wavy, but it actually looks pretty good if you see it in the editor.

Then this is the same scene, where I just used the clear material. That's the clear glass material that's in the Autodesk material library. MentalRay glass. The Revit material is a MentalRay glass, but for some reason this one isn't showing up like a mirror like the other one was. So that's another option. Just take the existing glass, and swap it out for what's coming in with the Revit model. Again, you typically only have to worry about that with really reflective, like glazing that should be clear, and it's coming in like a mirror.

So does that help anybody with just still frame animation, lighting, et cetera? Let's talk about animation. There's various ways of doing animation. You can do what's called path animation, where you animate a camera along a path. How many of y'all drink? So have you ever been in a bar, at about 2 o'clock in the morning, and you're walking out of the bar, and it's like this? That's a walk through, right? I don't like walkthrough in Max, because that's basically what it feels like, right? So that's why I don't use path animation, because you make this camera follow a path, and you're doing this. And it's real hard to simulate how your body moves, and your eyes move, and how you perceive things. It just doesn't look right. You get a lot of whiplash.

So I like keyframe animation. And I also like to animate in pieces. Some I'm going to pull these

tips up here at the end. So if you don't get all these now, don't worry about it. I'm going to have the same slide up here at the end. But I'm going to use keyframe animation. I'm going to use a tool called Autokey to simplify that. I'm also not going to render directly to an AVI file, when I do my output, I'm not going-- I have commitment issues. OK. So I don't want to commit to that AVI file, unless I'm really ready to do it. So that's going to be the very last thing I do, is render to an AVI. I'm actually going to render every frame, out to an individual image file instead.

And then I'm also going to render smaller sequences. I might want a fairly long animation. But I'm going to render it in smaller sequences, and put them together in video posts with cuts and fades, just like they do on TV. Watch next time you're watching TV, notice how long a single shot lasts. They usually don't last more than a few seconds, and then they cut to someone else, or they fade to somewhere else. Do the same thing with your renders, with your animations. And if you're using the MentalRay, render you don't want to have to sit there, and wait for it to calculate final gather, for every single frame. There's a setting to reuse final gather. Calculate it once, and reapply it for every frame. And I'll show you that.

OK. So the first part of rendering is just doing time configuration. The very first step is, how long do you want the rendering to be? Right? So if you're doing it based on how fast people walk, the average person, I've been told walks about 11 feet per second. That's average. So if you use that as a baseline you can figure out, OK, I've got to walk this far. I want to go at the normal speed. How many seconds would that be? How many frames per second? You do the math. I'm an architect. I don't like to do math.

But in this example, I want to do a 10 second animation at 30 frames per second. And this is in the time configuration dialog box, you get to right here. It's going to be in the lower-- well, you'll see it in a minute. So I'm 30 frames per second. I want a 10 second animation. So my total frame count is 300. And that will then adjust this slider that's at the bottom of your Max window to however many frames your animation is going to be. K.

And then you're going to use the Autokey tool to do keyframe animation. So every object in your animation will have keys. Whatever you're animating, in this case, I'm moving a camera, so I'll have positioned keys at various critical points on that time slider. So at that time the camera is there. At this time the camera is there. It's moved a little bit. And Max will interpolate in between. So you don't have to animate every single frame. The key here with Autokey, no pun intended, is only turn it on when you're animating, because when that thing is turned on, anything you do is being recorded in the animation. So you want to be careful.

So here's an example. We're going to animate, basically this 30 second or 10 second animation for this camera. The first thing I'm going to do actually is I'm going to configure my view ports. You know, so I went to configure view ports, right here on the display performance, turn off never degrade geometry, because you're going to be previewing the animation. You don't want your scene like disappearing, or going to boxes, or something. So turn that off. I also like to turn safe frames on. That just shows me exactly what I'm going to see in the final render, or based on what my current render settings are on. And yeah, I turn on the environment background. That's not a big deal.

OK. So to do the animation, first thing I'm going to do is I'm going to come down here to the time configuration button. And I want to do 10 seconds at 30 frames per second. So I'm just going to set the final frame count there to 300. And when I click OK, you'll see this. Actually, before you even click OK. As soon as I went out of that box, that adjusted to 300 frames. So now I'm going to take the time slider. I'm going to grab the camera. And then I'm going to take, and turn on Autokey. Notice this thing turns red when I do that. That's my warning. Anything I touch is being recorded now, as part of the animation. So I want to take this time slider. I want to move it up to about frame, in this case, I think 65 or so. And then I'm just going to move the camera to where I want it to be at that location, or at that time, I should say. So I'll move it up a little bit. And then move it down.

OK. So once that's done, I'm then going to-- come on. Why am I doing that? I can't leave it alone. OK. Now, I'm going to turn off Autokey. So again, I don't want to do any more animation right now. But notice what happened. There is a key here, and there's a key there. So that's where it started from. That's where it ended. And it just interpolates in between. Now, a little trick you want to do here. You don't want to start the motion, as soon as the animation starts. The eye need just a split second to adjust things. So I'm going to hold the shift key down, and drag that key over. I'm copying that position key to there, so actually the camera doesn't start moving till just a little-- it's less than a second into the scene, but it just gives your eye a chance to adjust before things start happening.

OK. Now I'm going to move ahead to, I don't know, around frame 140 or so, I think. Yeah, 140. And again, I'm going to turn on Autokey. I'm going to grab the camera. Slide it a little bit forward along the path. Drop it down. At this point, I'm going to drop it down to eye height. So I'm going to use the transform type in here to set it to about five foot six. And I'm also going to grab the camera target. So here I'm going to take the target, and I'm going to move it to, well

move it to there, and then move it up to three feet. So I'm looking, not quite at ground level, but up a little bit. And just like with the camera, turn off Autokey, with the target selected, I'm going to grab that key right there, and copy it forward, to the point where I really want that target to start animating. Otherwise, it would start at the very beginning, and start to move.

OK. So the hard part is done. Now it's just a couple more positions on the camera. We'll slide this thing forward to up here somewhere. But again, this is why you turn off, never degrade geometry, so you can see that smoother animation as you're moving through it. So I'll move this up to here. Turn on Autokey. And again, just move the camera to where I want it to be at that time, add the target. I think the target I'm going to adjust a little bit here. And maybe look up a little bit. Up, up, up, Simba. There we go. Turn it off. And that's it. Never animate all the way to the end, right? Just like you want something at the beginning, have something at the end where your eye, again, has a chance to process.

And then just play it back. Now it's only going to play back in the active viewport, right? So you got to make sure you're in the viewport you actually want to see the animation in. But there's your playback. And it'll loop. And there you go. So there's a 10 second animation. It's not that hard to do, to keyframe. You've just got to be thinking about it while you're doing it. And be careful with that Autokey. And if I needed to animate something else, then I'd go to that object, and start setting up its keys.

So once you get all those set-- well, actually, before we get to that, I want to talk about this. Pretty stark scene right now. It's just a building, right? You don't want to just have a building, and nothing else. So you want some shrubs, and cars, and people, that kind of thing. Entourage, they call it. Whoops, sorry. I didn't mean to do that.

AUDIENCE: Your posse.

MATT DILLON: My what?

AUDIENCE: Your posse.

MATT DILLON: Your posse. Exactly. And I'm going to do a posse right here. So there's lots of ways to-- in the hand out I give you some links to different places. So there is the SketchUp 3D warehouse. I know Autodesk doesn't like me to use that word, but I'm sorry. There's a ton of stuff up there. And it will work in Max. You can download trees. You can look up specific buildings. Actually, this model, I did it for a little fake project at the school my son was going at Texas State

University. And I actually wound up downloading some actual buildings from the TSU site, right? It's up there. You can just look for them. You can download people. There's also Arc vision. Arc vision is good for very good quality photo realistic type people, and plants, and cars. But they don't move. There's no animation to them.

This is actually built into Macs. It's called Populate. How many of y'all like The Walking Dead? Right? And I only get it on Netflix. I'm still waiting for season 7. Don't tell me who got-- don't tell me. I think I know, but don't tell me. So this is kind of like The Walking Dead, inside of Max. I call it the zombie people, but for an animation where you just want something happening-- I wouldn't do this for a still image, because then you'd really notice that they look like zombies. But for an animation, it just kind of adds a little bit more motion to it, just kind of as a backdrop. So I'll show you how that works. Sorry, about that. Try that again.

OK. So this is built in. The First thing I'm going to do is I'm going to set up a flow. So you've got basically two things. You have flows, and you have idle areas. And I'm going to set up a flow which is just basically a path, with people walking along. So I go to the plan view here, and turn off the grid. Just make a leisure to see what's going on. Click on create flow, and then just tell it where I want to start, and where I want to end. And then, come on, hit Escape. I think my mother-in-law is talking to me again on this one. There was couple of them where she was like, shut up. K. And then over here-- it's fairly random, but you can control some of the randomness with, what's the balance between male, and female, and running, and slow, and density, and that kind of thing. So you can kind of play with those settings. I'm playing with them way too much here. OK. OK. Yeah, move. Hurry up. You've only got 10 more minutes.

OK. And so there's the path. Now you also want to make sure it's in the right place in 3D. It's kind of low here. The people will be down under the ground. So I'll just kind of raise it up to like six inches below floor level. Also back here, you'll notice how it kind of just goes up, and floats in the air, because my ground isn't level. There's actually a way to put a break in it, and build a ramp. I didn't do that here, because I was lazy. But you can play with that.

OK so that's the flow. Now over, here I'm going to do an idle area. I want some people kind of standing around in the front entry here. So I'm going to do an idle area. And those are right up. There are a variety of different types of idle areas. But I'm just going to do a simple rectangular one. I'm just going to do a little rectangle right in this area here. And again, the size of the rectangle in these settings here are going to determine how many you get. Right now, you've just got one. It's a fairly small rectangle. Here in a minute I'll figure out I need to

make it a little bit bigger. Sometimes you watch these videos of what you were doing, and it's like, god, why were you taking so long to figure this out?

Anyways, this thing, you know, yeah, come on. Pull it over. Pull it. There we go. So you'll start to see some more people appear here. These little symbols here are going to be people when we're done. And then again, you can adjust density, et cetera. Mix, there. So once you get all that done, make sure that your frame count here matches your animation sequence. And then I'm going to click on this simulate button, once I get through screwing around. I've got to I got to raise that up a little bit. We'll do that. I'm going to type it in. Six inches. There you go. OK. So then we'll pop back over here. I'll hit the simulate button right there. And it'll create all my little zombies. I think I'm just testing to make sure they were in the right place there. OK.

Simulate. So we'll fast forward through that, and you'll see my people magically appear here. I know I cut through most of this, because it does take it a couple of minutes to do. But there's my people. And by the way, when you do the rendering, you don't actually see the path there. But there you can see them actually they're walking. It's kind of cool. Just don't look at them too close. And remember to always go for the head. So there you go. That's populate. So that's actually something that's built into Max.

When you go to output the sequence, again, don't go to AVI. Again, I'm going to a JPEG, right? And you're going to animate the entire sequence. In the handout I give you explicit instructions on how to reuse global illumination, final gather. I've got seven. But we won't argue. OK. So again, there's very explicit instructions in the handout on how to set this up. It's not very difficult. But you definitely want to do that, if you're using the MentalRay engine. So go to a JPEG. Make sure you're rendering your active time segment. Once you've rendered out all those images, I usually put each sequence in its own folder. You'll have however many frames, in this case 300 images, all separate JPEG files. Sort of like if you printed them out, and did this, you'd have your animation, right? If you just flipped them. But then we use Video Post to combine those animations into one animation, and we can use these cross stage transitions to start to use more cinematic type effects.

So I'm not going to spend any time on the slide. Let's just kind go right into the demonstration, because we're running out of time here. So I've rendered out three sequences. So the approach, a lobby scene, and then a classroom wings scene. I'm going to go to Video Post on the rendering pallet, from the rendering pull down. And the first thing I want to do is, I want to load an input event. And create an image input event here. And again, this is all in the doc, in

the handout. So I'm going to go grab my files. And there's my approach sequence. Again, all those images-- all you got to do is just pick the first one, and then make sure you check on sequence. And it'll grab the rest of them. OK.

There's my frame count. It always starts at zero. So we've got 300 frames. And I usually name these. So I'll call that approach. And it throws that one in there. I want to go right back, and grab another one. So I'll go back up, go to the lobby sequence next. We'll grab the first one. Sequence is already checked on now. Again, 300 frames on that one I'll name it. And one more. We'll go get the classroom wing. Oh, yeah. Right here, you've got this zoom extense button. That just makes sure that you're looking at the entire sequence in your-- it's like a zoom extense in AutoCAD, or Revit. OK. There's the classroom wing. We'll grab that one. So we basically want to go from the approach, into the lobby, and then we want to transition back to the classroom wing.

Now if I was to run all these right now, they'd all run simultaneously, right? You don't want that. I mean, you can overlay animation. Sometimes that's a neat effect. That's not what I want here. So I'm picking the first two, and I use that button there called abut select. I'll do it again here. That one, and that one. This button here pushes that one beyond. So that's a real quick way of putting them in the correct sequence. The next step is to put in the transitions, because I'm changing location over time. The best way is to kind of simulate that is with a fade transition. So I'm going to grab these two sequences, and then put a fade transition in between. So this image layer event. There's other effects you can try here, but I'm going to do a fade transition. OK. And then I'm just going to use these little sliders here to actually adjust where it starts. So that the transitional start at the end of the approach, and go for maybe 15 frames.

And then I need to, again, move this one, right? So again I'll use that abut selected to adjust this, so it happens at the end of the fade. And then this is a little tricky part. I want to fade from this one to that one, but if I pick those two, I can't get to the fade transition, because that's now nested inside of that. You have to actually link from the transition to the input event there. It took me like half a day to figure that out.

And then again, I'll use the buttons, the little glyphs there, to adjust the position of it. Start at the end of that sequence. Go about 15 frames, and then again, I'll use the abut tool to position this one after the fade. This is not hard at all. It only takes-- well, you can see how long it takes. There's no tricks here. And once you've got all that set up, then you're going to add an

image output event. Right? So this is your output, right here. So add that, and all you're going to specify is where it's going to go. Again, I'll put it in its own folder.

So what's nice here, at any point in this, I can come back in, and edit some of these. I can take out one whole sequence, and redo it, and then recompile it in Video Post. I haven't committed to a final animation yet. There's lots of flexibility here if I need to make changes. Now, what you have to watch out for here, when I execute the output event-- so I'm going to execute sequence right there-- there's one little gotcha. Make sure you check your resolution. It's not the same as what I originally rendered to. I have to manually set it to the same resolution as the original images. Otherwise, it's just going to do whatever it wants, and it's not going to be right. So there you go. And now I'm not going to let it go through the whole thing. Basically, all it's doing is taking old images, and putting in the correct order, and putting them in the next folder.

So we're going to jump ahead here. I said we're going to jump ahead. I said jump ahead. Trust me. We're going to jump ahead. So the next step is pull it up in the RAM player. So I said the RAM player has a couple of uses. We're going to pull all these images up in the RAM player. Do a final preview. If we like what we see, we're going to output the animation. So go through that real quick. I'm almost out of time. I think I'm just going to barely make it. So we're just going to open a file on the alpha channel, or the A channel. I'm going to go to final sequence. Again, pick the first one, make sure sequence is checked on, it will open them all up. 922 frames. And again, fast forward. Now, you play it back. So you've got playback controls in the RAM player. And there's is your animation. Again, we haven't saved it to AVI yet. So right here, if I see something, oh crap, I don't like that. I can go back and re-render, that section, and just recompile, right?

But once I'm happy with it, now I'm going to commit. Take a deep breath. It's OK. So I'll give it a file name and save to AVI. When you save to AVI, I like to use the or M-JPEG compressor. That one seems to work the best, as far as quality, resolution, et cetera, and file size. OK. So here's the resulting animation. I've enlarged it a little bit, so it's a little bit grainy. But that's the final animation from that video post. And here's my zombie's. So, there's that approach sequence. And then we fade to the lobby. And then again, we're going to fade to back there, in that classroom wing. So now we're standing where we were looking before. See, they do look like zombies. OK. So there you go.

So, real quick. Those tips I had for you. Use Autokey, but be careful. Don't commit until you

have to. I'm all about not committing until I have to. Combine your stuff into smaller sequences. Use the final gather. Reuse final gather if you're using the MentalRay renderer. And, yeah. I don't have time to go through all this. So there's my review, OK? We are having a contest. If you want, we do a live lab. This is online learning, it's instructor based using [? Gota ?] training. We're giving away a free class, so you can register to win that, if you like. Just go to that website, and you can register to win. I'm out of time. I'll have to pack up, because I'm sure there's another instructor coming in. But I'll stick around for questions if anybody has any. And I want to thank you all for coming. Thank you.