

PHIL EICHMILLER: All right, welcome everybody. Good morning. Welcome to your third day of AU. Thank you for all showing up. We'll probably have a few stragglers wandering in, as there's probably traffic jams out there or something.

So our class, large model performance and productivity, Fusion 360. I'm Phil Eichmiller. This is Joel Palioca.

JOEL PALIOCA: Hello.

PHIL EICHMILLER: Little bit about ourselves. So both of us are QA for Fusion 360. That means we're quality assurance engineers. We work out of Lake Oswego, Oregon. There's me at last year's AU, having a good time. So that's the party tonight. So if you want to see me to sing "Like a Virgin," come on down. That's what's happening in that picture.

JOEL PALIOCA: And yeah, I am also a QA engineer for Fusion. Also based out of Lake Oswego. I help out on forums, connecting with customers like you, being able to help them solve any potential problems, and also take back feedback to the rest of our team. There is me at one of our recent laser tag events, doing what we do.

PHIL EICHMILLER: All right, so what are we going to learn today? So it's funny, people don't think that Fusion can handle very large models, and it's certainly not going to do like Inventor at 10,000 parts or anything like that. When I put this class together, my perspective was that of helping all the forum users. Anyone here ever talk to me on the forum at all? OK. Right on. There's at least one. But it's answering those questions every day about the struggles that people are having.

And so really, what we're going to be doing is just looking at tips and tricks as we go forward, some workflows, and there's going to be a whole lot of demo. We're not going to PowerPoint you to death here. And towards the end, we'll get into some of the more nitty gritty, the technical details.

JOEL PALIOCA: So in this class, as you've read already when you signed up for the class, we're definitely going to be talking about some of the tools and some of the existing capabilities we have within Fusion that we can leverage to increase our productivity. We also want to talk about distributed designs, which was recently implemented not but a couple months ago within Fusion. This allows us to work on larger designs and really be able to collaborate. We also

want to talk about some of the pitfalls, as well as some graphics and options that we feel like can help you get the most out of your Fusion experience.

So in the context of a Fusion assembly, what are we talking about here? What's a large assembly within Fusion? So right now, within Fusion 360, we seem to have a cap around about 2,000 different objects on the screen at a time. Objects being a body, a component. This seems to be Fusion's current cap. Obviously, Fusion's continually changing. We update every six to eight weeks. This will change over time, and that's to be expected.

But in the context of this class, what are we talking about? So really what we're focusing on is we're focusing on assemblies that, one, have a timeline that is larger than the screen, or a browser that is larger than the screen, as well as assemblies that potentially have multiple sub-components. And so our goal here is to really talk about some of these tools and methods for organizing and creating an efficient design within Fusion.

So three different ways we can start with an assembly inside of Fusion. One, we can upload existing data sets, whether that be from Inventor, SolidWorks, whatever your CAD program may be. We can actually upload that into Fusion. We could also insert existing designs into another design. Or if we so choose, we can actually use native Fusion files and contain them all within a single design.

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EICHMILLER:**

All right, so let me switch over here. There we go. So whether or not you've uploaded or modeled your own parts, whatever's on the screen that's now making you deal with the interface and deal with being efficient and getting through your modeling tasks without being lost in minutia, I think the first thing I want to cover is basically the immediate steps I think that you should take, especially if you've uploaded something. Or even just think of it as your modeling. I've modeled this thing, and what do I need to do before I move on to my next modeling steps? You don't want to leave behind certain things that really make a huge difference as you're going down.

So let's get started with this model here. I'm going to do lots of demo here. So this is a SAT file that I uploaded. It came from Inventor. It's got a whole bunch of bodies. So it's only got 53 bodies, but still you can see it's already a lot of stuff on the screen. It's a SAT file, so all the components from Inventor showed up as bodies in a flattened folder view.

So I've got a few challenges here. First of all, the browser. Right Working with this as bodies isn't going to work, because this isn't an assembly. So I need to do some things like convert

this to components, and start working on getting this thing organized. So the first thing I would do in this case is create-- well, first of all, let's make this thing parametric. Capture design history. That's a good place to start. Now I've got a timeline. The SAT file's going to show up as a direct model. There we go.

The next thing that I would do would be to create components from bodies so that I can work with it as an assembly. There we go. Just took a second. And so now you see I've got a nice long list of components here. Something else you might want to do is maybe go through and rename things. So if you just click slowly on just like any other naming type of convention, you just click a couple times and you can start naming things.

So right away, I'm already looking at how do I get this thing organized? I've got it parametric. I've turned the bodies into components. Let's look at some of these sub-assemblies, for instance. So right here this is a speaker in case you can't tell. It's kind of hard to see the front part of it right now. But this is the tweeter that's in the middle of this nice D'Appolito set up here.

The way to start finding your way around while you've got all this information on the screen is to take advantage of the cross highlighting. So if I just click on one of the tweeter components and start looking through the browser, I find that I can find the tweeter. And luckily, there's a bunch of other components nearby that are all related to the tweeter.

So I'm interested in making that into a sub-assembly. That's a little bit more logical. So I'm going to create a new component, and I'm going to drag those things into there. I don't want to accidentally start dragging the tweeter components into one of the other tweeter components, so I need to first make a new component and just call that "tweeter," and then go back to looking for my cross highlighting.

And by hovering over the objects on the screen, I can actually see what it is I'm working with. So I'm just using the graphics to help me out here and finding all the tweeter components. So there they are, and just drag them into your leaf component right there. And so now we have tweeter down here at the bottom. It's nice and organized. So just working my way through the model. Remember, I'm talking about getting these things out of the way so as I'm going forward, this isn't going to be confusing later. And it's going to reduce the amount of hunting and pecking around I'm doing to try to find this information.

Another thing you might want to do would be to create rigid groups, for instance, is a great tool

at this point because in this assembly, not everything moves and certainly the tweeter, I don't need the tweeter components to move relative to each other. So rigid group is kind of like for anything, if it was welded for instance, like a welded assembly. We don't have welds showing in Fusion yet, but you would probably make a rigid group of that so that you could deal with it as one unit.

So that's what I want to do with the tweeter. So I'm going to go ahead and just to emphasize this here, if I drag on one of the tweeter components in that assembly, I'm not dragging the assembly around. I'm actually moving the component, and also creating a historical modeling position. So I don't want to capture this snapshot right now. I'm going to go ahead and revert it. But if I go ahead and make this into a rigid group by just right clicking on it, and so now the tweeter moves as one unit. Of course I don't want to capture that position either, so I'll put it right back.

All right, so another way, as you're getting started if you've inserted something or brought something in, now this doesn't look like a large assembly, but this is just a quick demo on creating as-built joints too, because you may have some motion in your-- let's ground this thing. You may have some motion in your assembly.

Obviously, right now this isn't really how a hinge works, so I'm going to go ahead and do an as-built joint, which takes advantage of the positions of the components. So if you've modeled something in place, again if this is as you're working through, let's say you're just working on your own assembly and you create some things in place together. Before you move on to your further modeling steps, this is something you would do also. It's not just for uploaded components. But let's go ahead and make a revolute joint. Position right there. I need another one of those.

OK, well, I misapplied my joint, but you get the idea. Anyway.

JOEL PALIOCA: I was just going to say, and just emphasize with that hinge, this was a model that we brought in from McMaster-Carr. And it came in as Phil brought it in. That's the way the model comes in as components. And so we were able to quickly create an as-built joint with the model itself. This took just a few clicks that we can quickly leverage, especially when we're bringing in other data sets or, in the case of the hinge, other components that we can readily purchase from McMaster-Carr, other sellers of that nature.

So let's quickly shift a little bit. We're going to talk a little bit about materials and appearances. This question comes up, how is this related at all to large assembly productivity improvements? It's a pretty solid question. When we're working with our models, one of the important things to remember is that as we're modeling, it's also important to make sure that we're capturing physical information as well as the visual information. Some of this is going to be leveraged potentially in bonds or in simulations down the line, but also we need to be able to make sure that we're creating images that we can leverage to communicate to our customers, to our vendors, to upper management as well.

And this is why we have the capability to handle both physical and appearances. Physical materials is going to be the physical aspects. This is going to include density. This is going to include tensile strength. Some of these materials, this is going to be your aluminum. Whereas your appearance is going to be the visual representation. A great example of this is going to be anodized aluminum. I want anodized red. I want anodized blue. This is where we can change this in the appearance without actually altering the physical makeup of the material itself.

**PHIL
EICHMILLER:**

So again, the reason why I'm mentioning this up front is that whether you've uploaded it or you're modeling it yourself, before you move on to the next component, you want to define the thing that you're working on right there. You don't want to have 50 things on the screen and wonder why at some point, you look at the mass of it and it weighs 50 pounds because everything is still steel. Now you're plunking through all the work you just did to go back and actually find something. These are listed as immediate steps because as you're making these components, if you know the definition of what the material is, go ahead and take care of that up front.

So just to show you a couple little workflows here for working with appearances, this isn't always obvious to everybody. Hopefully this is some information for you here. So just quickly, the basic workflow for applying appearances is just to go ahead and just drag them onto objects. So whether you're coloring faces or bodies or components, just go ahead and drag it over there.

I've already got these loaded in the document. You can always go through and actually add the material. These are appearances, or physical materials works the same way. Add it to your document by just dragging it up to this design portion. And let's say our circuit board needs to be green. I just drag it over to there. So appearances get dragged around.

There's another cool trick that is actually great for performance. Let me get a good view of this thing. In terms of not wasting a bunch of time, you see all the cyan, blue-colored objects there, they're supposed to be Fusion orange. So how do I change the color of all of them? Do I want to drag to each and every component that's on there and face? Or do I just want to replace the entire color?

In this case, I want to replace this color with Fusion orange which is right here. So I'm going to go ahead and just drag this swatch on top of the other swatch. And when I let go, everything that was that color is replaced with Fusion orange. So just a little productivity tip there. If you're doing versions of things where you're swapping out the colors or something like that, just use the drag and drop option there.

This is great if you're like me, you want to be able to render this thing at any moment. When I'm doing product design, I always like to look at exactly what I think I'm working on, no matter what color it is. When I was making audio gear, it was what color black is this box, usually. So I had about four different colors of black that I had defined in an Inventor.

But if you're not at that point yet, and you've just got a whole bunch of information on the screen like this thing, and you just need to start working with it and you're not worried about colors and appearances, there's another way to actually make this more distinct. So you're not just looking at a bunch of gray blobs. And that's using under the Inspect menu, we find the component color cycling toggle. And basically what this does is it makes it look like you're at the circus, but the other thing it does is gives each component its own color.

So the other thing that you'll notice is that these colors correspond to the components in the browser and the actions in the timeline. And that's also independent. You can actually have one without the other. So if you notice that the hot key for this is n, so I'll just hit the letter n right there.

The other thing you can do is actually turn on component color swatch from the timeline settings, which are over here, this little gear here in the corner here, and get just the browser and timeline view of that color swatch. So that could be independent, but you can't turn this on without getting both.

JOEL PALIOCA: So just to review, reiterate, arrange bodies and components into assemblies when necessary, as well as leverage rigid groups for our sub-assemblies. Very quick, powerful tools. Lastly,

apply materials and leverage appearances. This helps you downstream, but also it allows you to visually see the differences. If you're not concerned with the current materials or appearances, you can also leverage the component color cycling tool as well.

So now that we've set up our assembly, we've kind of got things started. Let's take a look at some existing tools that we have to help us understand what is occurring in our assembly.

So in the Fusion we've got two areas. We've got the browser right here, which kind of acts more like a filing cabinet that contains all of our objects or bodies. Whereas we've got the browser down here. That's going to be more like our log of events, what has occurred in time and how things have progressed.

PHIL EICHMILLER: All right so let's start off by looking at the timeline. So we're just going to go through the UI here and kind of march around on the screen and talk about each little area, what it pertains to the subject here.

Couple of tips for the timeline would be creating timeline groups. So you can see right here that some groups are created automatically for you. I could turn these bodies into components. I probably don't need to see all of that stuff at once, and I don't need to do it manually myself. So this group was actually created for me. This is just all of the timeline actions of turning each one of these things into a component. So if you wanted to do that yourself and form some sort of logical grouping or just get stuff out of the way.

Select that. Select a range. Create a group. Creating groups, it's just the easiest, most efficient way to keep the timeline smaller so it's not 50 yards running off the screen and you're trying to scroll around and you can't see where errors are and things like that.

JOEL PALIOCA: And I'm not sure if it shows up very easily on this screen because it looks like it's being cut off the bottom here, but there's a plus or minus sign here for those that weren't sure how the groups work. There's actually a plus or minus if you want to hit that, Phil.

So when he hits that, you see that it expands. There's going to be a minus sign here now that it's expanded. It's quick and easy to be able to just collapse and collapse those groups, but it doesn't exactly show up on this monitor, unfortunately.

PHIL EICHMILLER: It doesn't show up very well? Oh my goodness. I'm clicking on things that you guys can't even see. Anyway, so there's a few things you can do with groups. In a way, we can also select things. So right now the group that I have that I made for those tweeter actions at the end of

the timeline actually becomes a nice little container of these timeline objects and allows me to do some things. Like for instance, I can create a selection set off of this group. That's one thing you can do.

And then now I can select the objects in the selection set just from my group there. So it's like as you're going through the process, it's like well, I've made a group. I can also use that. I can extend that group.

Right now, before we move away from the timeline, just one thing else I want to show you is just in case you don't know-- I want to back up a little bit here-- is pruning the timeline. So when you move the timeline marker back before some actions.

A lot of times when I'm doing design, I'm working out a problem, and so I'll try a path and if I don't like that, I'll back up a little bit and try something. And I wind up with things at the end of the timeline I don't really want, that I need to prune off from time to time. So just pointing this out in case you don't know, you can delete things after the timeline marker, and you can also delete all features after the timeline marker. It's just what I would say pruning the timeline.

All right, so let's move on to the browser. As Joel was saying, the browser acts a bit like a filing cabinet. In Fusion, it's little bit different than Inventor in the way that the browser was actually distinct from the actual parametric history. This truly is just the collection of the objects on the screen right now.

So what are some browser objects that are going to help us? Named views are awesome. So there's a bunch of pre-canned named views. There's actually four of them, so that's a bunch, I guess. But you can also create named views whenever you want to. One of the things I'm always interested in is if I'm zoomed way into something, and I know I'm going to return to some area of interest, I'll just go ahead and grab the camera or create a named view that I can return to, and of course name it myself.

Selection sets folder. Again, when you click on it, once you've created a selection set, so if you have some number of things selected and you know you're going to want that selection, that selection's interesting to you for further modeling, go ahead and quickly make a selection set out of it. And we'll talk a little bit. We'll show a little bit here in a minute, things you can do with it, but that's how you actually select it, and there's also an update button on the end of it.

Another thing that shows up in your browser, we're just describing the browser here, would be

is if you had some analysis. So if I've got a section analysis, for instance, and I want to turn it on and off and refer to it, there's the analysis folder as well. So different analysis objects show up and that's where they get stored in the browser.

And just took to reaffirm, components are parametric containers. And in this case you know this thing was uploaded. So there isn't much parametric history to them other than the body that's in it. But we'll talk about the activate component workflow here in a second that I want to emphasize. I emphasized it yesterday, and I'm going to emphasize it today relentlessly. I think activate component is the way to go. If someone asked me what's your number one best practice in Fusion, activate component. I can't think of a downside to it at all. So those are the browser objects that are interesting

So let's talk about components as parametric containers for a second. Here we are. The component coloring toggle is actually session-wide. So everything that you have open will participate in that. It's like turning the lights on. You get to see everything.

So in the case of considering components as parametric containers, for instance, where it matters a lot would be for instance if you're going to save out a copy. So if I'm going to right click on something and say Save Copy As, I want that thing when it gets to its destination. I can reuse it, reconfigure it, make a new version, whatever. It needs to have the sketch in it. It needs to have the body, and it needs to be complete. So that's kind of what we're going for here.

So what that looks like, when you don't manage to save out the part with both the body and the sketch, is it shows up and you can see over here, this is a base feature. We just converted into a base feature for you. We don't even complain. Fusion's not going to complain. It's because you did that on purpose. It's not an error. There's no reason to put an error in the timeline. Just give you a base body. That's what you asked for because you saved out this thing with just the body and not the sketch. And of course there's the parameters don't come along if they're tied to the sketch.

So let's just go through the activate component workflow. I'm just going to show it here starting from a blank screen, just so you get the steps and you're quite clear about it. Right now I'm looking at this is just a single part. But if I create a component, it instantly becomes an assembly. So now I'm interested in this component I don't want to have things stored at the root that I think belong in the component. So I'm going to go ahead and activate it. And once

the component is activated, you'll see that the sketch and everything I put in there is going to show up.

Go ahead and I know this is really motivating here, but I'm just going to make a couple of shapes real quick. So I'll get a few features on there. And let's create another. Let's activate this and create another new component so you can see the difference.

When the top level is active, you see the entire timeline. When your component is active, your sub-component is active, you see just a portion of the timeline that pertains to just that component. And this'll make it a little bit more clear. This component has nothing in it, so now there's nothing in the timeline. So this matter of staying organized and working with a large model, using active components is probably the best way to go. And it helps you focus on just the features that you're working on.

JOEL PALIOCA: So as Phil flips to the slides, we'll quickly just reiterate the importance of the activate component command, because as Phil mentioned, this is probably one of the number one things that we like to recommend. And we alluded to it in the first class. I alluded to it in my previous class. And again, we're bringing up here because it is important to understand that this really helps us to preserve that parametric history.

So, activate component. This is really important to make sure that we are creating components that when we move them around, when we save them out, they will keep that parametric history. We do this by quickly creating a new component. We then activate that component. All the sketches and bodies, as well as any joints or any other operations will be contained within that component. And the last thing to remember is before you edit, quickly just reactivate that component.

AUDIENCE: If you create a sketch in the top level accidentally, something else that you can do later [INAUDIBLE]?

PHIL EICHMILLER: So the question was, if you forgot to activate component and your sketch is at the root level, yeah, you can drag that sketch just down into the component that it belongs in. So that would be how you would do that. There are some rare instances where that's going to be blocked. And that would be if you had used that sketch probably in a number of components, I'm pretty sure it's blocked at that point. It needs to belong to the root because the root owns those other components that it's referring to.

AUDIENCE: Except if you're in direct modelling [INAUDIBLE]?

PHIL
EICHMILLER: Yeah, except if you're in direct modeling, of course. We're mostly 100% talking about parametric stuff here. We're completely ignoring the direct modeling side of Fusion.

JOEL PALIOCA: Correct. So as Phil alluded to earlier, we have a couple things in the browser that are important to quickly discuss. Those are going to be the named views and the selection sets. Our named views, as mentioned, allow us to quickly get to specific locations that we're looking to see.

In the example here, we'll see that we get to quickly go inside our box here and focus on a very specific region. Now, yes, we can spend some time moving to this quickly every single time that we need to access this specific location. Or we can make a single click and quickly have this accessible at any point in time. And this is how we're going to approach our named views.

PHIL
EICHMILLER: So I like to think of it as just capturing things. Like I mentioned, if you've zoomed in somewhere, capture the camera. If you've got a selection set, if you've got things selected, capture that as a selection set. If you're zooming to an area of interest and you're probably going to return there, capture that as a named view. It's great for design reviews. You could just quickly click. If you've got a great big model that's beyond the screen, you can click and go from area of interest to area of interest.

So right now I'm going to go ahead and create a new named view, and call this Output Connects. There we go. So now I've got a nice, logical name for me that says, OK, every time I want to return to this thing, I'll just go ahead and go right back to it. So that's a great way to keep from having to tumble the model around.

I always look at it as sort of a Pavlovian experience. If you find yourself doing something that's a pain in the butt twice, just realize that you could probably be your own best friend at that point and give yourself a handle to be able to not do that same workflow over and over again, zooming in.

But what about extending named views? This is a big model. There's a lot of stuff inside. Maybe I'm interested in working on the inside of this thing. So how about I create an analysis that lets me look inside. Create another named view in this case. Output Interior. And now that I've got this analysis, I'm actually going to rename it too, so that they both make sense. So

now I can be anywhere working on the model and quickly return to an area of interest like that.

So this keeps me from doing a couple things that might be, I think, a bit more cumbersome, which would be turning on and off the visibility of things. If you've got a browser that goes all the way to the floor, do you want to go scrolling around there looking for light bulbs, and turning on six or seven different things, or turning off six or seven different things when you could really just capture that information?

JOEL PALIOCA: So the other important thing that we have in browser that Phil alluded to is going to be our selection sets. And these are really going to be similar in the way that we're leveraging named views. We'll be able to quickly jump in and select multiple objects, bodies, components, faces, whatever we have defined in our selection set, and we can select that again.

So if you do you find yourself taking that painstaking time to select very specific bodies, components, objects, this is how we can quickly reselect those with accuracy and making sure that we don't actually lose that selection. It's happened to me before. If I need to select 20 or so different objects, I might miss one. And I have to go back and reselect that object. This is a quick way to make sure that we do select those pieces.

PHIL EICHMILLER: All right, so in this case, hopefully you guys know that Fusion has a pretty deep selection filter. And using it is key in some workflows. I try to run without using it as much as possible, but in certain cases it's good to use. So I want to go ahead and turn off Select All and just go to just components for this right now to make it a little bit easier. So I'm going to go ahead and demo creating a selection set.

So that's most of the sheet metal on the outside of the thing. I'll go ahead and get the screen off the front as well. Create a new selection set. I'll go ahead and name this thing. And this would be case. Something like that. There we are. We've got it selected. Let's extend the selection set here. So what can I do with the stuff while it's selected? There's your good old right click menu has a lot of options for things. So what do you want to do?

Something that might help right here would be opacity control. So let's say I don't want to necessarily turn them on and off. I just need to make them see-through for a time period. Or I could make them invisible entirely. Again, do I want to now go back and hunt around for all the components? No, I don't. I've got a selection set. So to make them for rendering or whatnot, to make it all completely opaque again, use the selection set and go back to opacity control and roll that thing back up again.

So just take advantage of where you are at in the tools and the interface to keep you going. So what other tools are there? Selectable and unselectable. That's a great one. One of the things that selectable and unselectable does is, obviously if you're using it, you see that the mouse doesn't see the case metal at all. It's looking all the interior stuff. So it's going to reduce the amount of highlighting that's going on. So if you don't want all that blue flashy highlighting happening, it's a great thing. But there's another thing.

Right now currently Fusion is looking at all the objects in the scene whenever you move the mouse. And so if you want to reduce the load on your CPU because you've got so much information on the screen, selectable and unselectable, it works just like visibility. And actually, right now you'll be reducing the CPU load. That's going to change fairly soon by Fusion standards, probably within the next six months. It's one of the productivity areas we're looking at, and being able to have larger models on the screen, and have it perform a little bit better.

There's more than just performance, selectable and unselectable. Show all is another one. Just different options when you have things selected. There's a show and hide, show all components if you've turned off components. We'll get to this later. I'm going to show you a pitfall that happens when people-- this came up on the forum just the other day. Somebody had managed to hide everything, and so we'll talk about that. We talked about opacity.

Isolate is a good one. You can just isolate something very quickly. So again, extending the selection set using the right click tools. One thing about the isolate is when you're done, you want to un-isolate right away. If you start turning things on and off, you'll break the isolate workflow. It's sort of like an undo. You don't want to break your undo chain either.

And then remove and delete. Just want to explain the difference here. I'm just going to click on an object to do this, or use my selection set, actually. There we go. Remove versus delete. In this case, I just remove because of some of the relationships that are going on here. It's not actually in any of the other menus. This is found just as a right click option for bodies or components. And the difference between the two, delete will destroy the parametric history and completely remove all references for it.

So people, if you've got a great big timeline and you delete something and you ignore the warning-- which happens all the time, I help users with this all the time-- then you'll wind up with yellow and red things in the timeline that might not be on the screen. And so people can get into trouble that way. And they try to tend to ignore it or whatever.

So remove, on the other hand, will actually put something at the end of the timeline. Collapse this down, and right click and use remove. And what that does is actually creates a parametric event of removing that object from the scene. So you can see if I just roll the timeline back, I get my stuff back. So key distinction, remove versus delete. Just thought we'd mention it right now. And oddly enough, I have to delete the remove.

JOEL PALIOCA: So let's talk about a couple quick tools that we have in the UI that Phil's been actually leveraging throughout this entire presentation. And we just want to kind of quickly bring awareness to those. The first is going to be the selection filter. So as Phil mentioned earlier, we've got an access to the selection filter that helps us define what we're looking to select. As our models grow in complexity, Fusion is trying to be intelligent and give you the capability to select components, bodies, sketches. What you're looking for, Fusion wants to be able to give you that option to select it.

When we're working with large models, sometimes we don't mean to be able to select that sketch that's contained within that component. We're interested in the components. We're only interested in the joints. We're only interested in certain objects. This is how we can actually prune down what we're trying to select.

We also at the top have the option to select through, which is the ability to select through other components and bodies. So if you're trying to access something behind another component or body, if this isn't turned on, you won't be able to do it. You'll have to rotate your model around. You have to track it down.

The other thing that doesn't show up in the UI, but if you're familiar with Inventor, it's pretty common to leverage this functionality. When you're rotating around your model, whether you're using the shift middle mouse button, or whatever your default setup is for Fusion, if you hold down the shift and middle mouse button and you click it, you're actually going to reset the pivot point that you're rotating around.

By default, Fusion is trying to rotate around the center, but when we need to focus on a very specific location, if we reset that pivot point, we can actually rotate only around where we've reset it. And this is a quick way for us to be able to see right what we're looking at instead of trying to focus on the entire model as a whole.

PHIL So right here I'll just demonstrate it, holding down shift, pressing the middle mouse button. If

EICHMILLER: you have a Magic Mouse, more power to you.

JOEL PALIOCA: And you'll notice this little red dot right there.

PHIL And that red dot is where I'm pivoting around right now. So let me zoom out a little bit and
EICHMILLER: maybe make it a little more apparent. Set the pivot whenever you need to. Just quick shift, right click.

Just curious, how many of you would like to see hotkeys for this stuff? Let's just see a show of hands here. I would love to see hotkeys for the selection filter because it's a little cumbersome going to a second level menu to make my selections.

AUDIENCE: Selection filter sets.

PHIL Yeah, selection filter sets, absolutely. I think it would be terrific to be able to add them. So you
EICHMILLER: guys all know you can add commands up to the top, right? Add to toolbar. How about we can't add these to the toolbar. So anyway, just thought I'd ask. That's something I'll be pushing for. All right, let's switch over.

JOEL PALIOCA: All right, let's go ahead and dive into distributed designs within assemblies. So what is a distributed design? This is what we're calling our associative update capability within Fusion. If you're familiar with other CAD products, it's very common to be leveraging multiple designs, multiple assemblies together to create a much larger design. This quickly allows us to leverage multiple users, multiple machines, multiple people to work together.

So here's a couple quick benefits that we have for distributed designs. We talked about how it can actually speed your workflow because you've got multiple people working together. But what does this do from a performance standpoint?

With distributed designs, these designs come in as read-only right now. And what this means is that because they're read-only, those files, those designs stay intact, and we're not able to touch them. So it doesn't make sense for us to be computing all the changes that are occurring within those files unless we specifically ask the program to. So by leveraging distributed designs, we can quickly use existing designs and not have to compute them every single time. This allows us to make our changes to the models that we're concerned with without worrying about making any changes or trying to recompute all the rest of our information.

What it also does is it allows us to reduce the timeline clutter. When we have a linked design like this, we use only a single node to contain that information of that design in the timeline. If you're talking hundreds of potential timeline nodes, this really helps to shrink down how much we're looking at within our timeline, and how much time we have to waste looking through that timeline to find what we want. And as mentioned earlier, multiple designers can collaborate.

**PHIL
EICHMILLER:**

So it's highly unlikely that you're going to have two people working on the same part, but if you've got inserted parts, someone could be editing one of them and someone could be editing the other. And on teams I've been on, it would be somebody would be working on the circuit board, somebody would be working on maybe the sheet metal or whatnot, which will eventually be in Fusion. I'm going to be honest here, this was uploaded from Inventor if I didn't mention it earlier. So if you're looking at all this gorgeous sheet metal, yes, eventually.

And just to reiterate, the read-only nature of the [AUDIO OUT] Fusion's going to do is it's going to calculate the entire model. When we say the compute cycle, that's what we're talking about. What's the worst possible time for performance to suffer is when your design is almost finished. And then suddenly everything you're doing, Fusion is doing the entire parametric history when you make a change. And that's true for all parametric modelers. They're always computing. So that's when that becomes a problem.

All right, so let's just show you the workflow real quick in case you don't know. It's fairly simple. You just find the data you're interested in. It has to be in the same project. If you insert data from a different project, it comes in as a non-linked file. But right now I'll insert this into the current design. Let it think for a second. Go ahead and close my data panel.

So something that's notable is that right now there is zero parametric history for this thing because I haven't accepted this. So I could always cancel this and change my mind. So I get a free move. Fusion gives you a free move without a snapshot. Go ahead and click OK, and there's our object. Looking at the interface, you see the linked node there in the timeline, as well as down here you can see the chain link in our component.

All right, so a little bit more about this workflow, just to point things out for you. Right now, the sketch is visible. And that's going to look ugly in my model. And so I need to fix that. So typically, you would probably try to have this prepared ahead of time, because certain things are not-- this being read-only, certain things are not able to be controlled. For instance, you'll see these light bulbs are all grayed out. So I can't turn the sketch off. There's a few things that

you can turn on and off like joints.

So how do I fix this? This is a simple problem. You might find in your workflow you're going to go, well, you might go back and forth and edit things anyway, so how do you get there? Right click and open. And it was already open, but it would've opened anyway. And then go ahead and just turn off the sketch that's interesting or that's not interesting, that's bugging you actually. Go ahead and hit Save. Let the thing save. Go back to your other design.

And you see the component's out of date. So the little yellow warning says it's out of date. And you can just go ahead and get all latest. That will do the entire model. Or you can just get latest for this one particular object, and it'll go find the correct version. There we are. And now it looks great without the sketch showing.

JOEL PALIOCA: So these are pretty powerful things that we have within Fusion that allow you to quickly bring in different types of data from different users that we're able to leverage. And it really makes it so that we can optimize the work that we're doing without putting too much strain on the system itself.

So let's dive into common pitfalls that are affecting our models. This could be from a performance standpoint, but also a usability standpoint. So these are a couple things that we've accumulated from customer feedbacks, forum support, different reports that we're getting from people like you that have come to us with questions. But also with feedback around the product as a whole that we want to bring awareness to, as well as a couple things that we feel can help reduce some of these issues themselves.

PHIL EICHMILLER: All right, so back to our great big amp here. The selection filter's wide open. So I need to explain something about how selections work when you're in this state right now. There's a hotkey for visibility. This one right here.

So I just turned off the visibility of that body, not the component, and here's why. With the selection filter wide open like this, Fusion has to make decisions for you. And one of the things that's going on is you click on the face here, you can't make a single face not visible. So for commands that would not work on a single face, Fusion's promoting that selection to the next level up. What's the next level up from a face? It's a body. It's not the component.

So I'm sitting here, I love my new hotkeys, all right. Let's turn this off. Let's turn this off. And you go over to the browser and you realize all the light bulbs are on. This is what confused a

user this week. They said their entire model had disappeared. They had turned off all the bodies in their model, or a significant portion of them, but all the lightbulbs for the components were on. They didn't realize what they were doing.

It's great to have the hotkey, but you can very quickly get into trouble with the thing, because now you have to do what? Go plunking around looking at things like part numbers to figure out, and hovering over and getting your highlighting to figure out where something is. And it just becomes very cumbersome and it's no fun. So try to avoid that.

And the way to avoid that is quite simply to go ahead and use your selection filter again. Go to components. And now you can do the same thing, except that you notice I'm making a full component selection, not a face selection. So it's not being promoted to body. It's actually doing the full component.

JOEL PALIOCA: And this is helpful because within Fusion, we actually have the capability to show all components within the product. Right now there's no ability to show all bodies, but it is something we are aware of. So again, as Phil showed, the body visibility is something to take into account. It's something that can really confuse our customers, and we want to make sure that you're aware of these facts because these are things that will add additional time while you're modeling. So make sure to turn off body. When you do use visibility, use the component, not the body itself. There is no automatic way yet to actually show that information.

A couple more performance pieces that we have is going to be around snapshots and body moves. It's quite common to see a timeline that is filled with different move commands as well as different snapshots. And what this boils down to is most people like to be able to look at the movement of their models. They want to move their components around. They want to understand how things are interacting. And Fusion is trying to track all that information. And when it's tracking that information, it's trying to compute every single one of those changes.

So we're not telling you don't go and do that. It's simply that when you need to make an explicit move, that's the perfect time to leverage mover snapshot. When you're really trying to understand motion, you're trying to just look at how it's interacting, do that. Leverage the revert functionality that we have within the snapshot to return it to its original place. That way you're not consuming and populating your timeline with additional snapshots and body moves.

PHIL Here, I'm going to actually show something real quick before we go to the next slide. Just to

EICHMILLER: kind of show you what that looks like, I've actually helped users who did things like move this away, do some work on it, and they're forced to accept the snapshot by some other parametric action that wants to capture that. And then they move back, and they'll joint it back again. So there's this nonsense of this thing moving around in space, and it's like either just turn it off, or isolate it, do something else and use the revert to get back. It's fine to move things around, but just remember to revert them.

Here's another little trick. Let's say you found that you've done this yourself. It's all right. Go ahead and just accept a few snapshots. Move this thing around. I'm not sure where it belongs in my design. That's where it belongs, I suppose.

You'll see at the bottom I've got three snapshots. If you have a string of snapshots where something's moving around the screen, and you really only care about the first position and the last position-- and just a word about snapshots, you're capturing a model position relative to the history of your model. So if you think of like a sliding mechanism where you need to do modeling when it's in one position or another position, that's the purpose of snapshot right there, just to be clear about that.

But the trick I want to show you is that you can actually delete the intermediate snapshots. And it only needs the last one. So it has its beginning position is prior to the snapshot and the ending position is after the final snapshot. So again, I've seen models. I've helped users that had several hundred timeline entries, and 2/3 of it is snapshots and body moves. And all that stuff's being computed every time you do something parametrically. So make sure you model stuff in place and avoid unnecessary snapshots.

JOEL PALIOCA: Perfect. Last piece, we've harped on it multiple times, activate component. This allows us to keep that parametric copy of our components because it allows us to quickly move and access those components.

PHIL And it makes it easy to do your editing.

EICHMILLER:

JOEL PALIOCA: Exactly. So let's talk about performance real quick. Performance within Fusion is where we're talking about the CPU. We're talking about the GPU and how this affects Fusion. So we've talked about leveraging linked distributed designs to reduce the CPU load because they do not participate in the compute. This is really fast, really helpful when we need to reduce the amount of time that Fusion is computing.

Also, the larger number of objects on our screen, it's going to increase our CPU load right now. Quick way to resolve this is make them unselectable. If you have something coming in from a vendor that you know you don't need to change, and you've already created any geometry that you need based off of that, you can make it unselectable, so that any highlights, any interactions with it won't exist. But you still understand its position relative to the rest of your components.

Lastly for the GPU, we have effects in Fusion like ambient occlusion, anti-aliasing, things like this that allow you to have a great visual experience within Fusion even modeling, even while modeling. We have a separate environment for rendering, but even during modeling we give you that capability to be able to view that information. This really can tax your model as things get larger because we're trying to compute all this information for all the edges, all the faces, and that's going to affect your GPU as we try to display that.

So when you are working with a large model and you are noticing a potential performance degradation, turn off the effects, or in extreme cases as it says, let's just turn off the bodies themselves. If we really need to work and we need to focus on what we need to get done, the visuals themselves aren't as important while modeling unless we need them for modeling purposes, for references. If we need to make a nice picture, if we need to make great images for capturing or to share with vendors, we have an environment that handles that, that actually is much more performant, as well it gives us much greater options when we create these videos.

PHIL Too fast.

EICHMILLER:

JOEL PALIOCA: So we also have a couple settings within Fusion that we like to show that allow you to understand where some of these things can be changed. We've got two different locations primarily within Fusion where we can affect our graphics. One is going to be our effects down in the navigation toolbar. And this is something we can do where we get to actually make changes to different environment settings. These can be ambient occlusion, these can be the shadows, these could be the grid. We can quickly turn on and off these per session basis.

We also have the capability to dive into our preferences within the product and make changes from there as well. From within the preferences within the product, what we're able to do is

we're actually able to define some of these settings even further. We're able to control some of what Fusion is trying to calculate from a graphics standpoint a little in greater detail.

**PHIL
EICHMILLER:**

All right, so basically those are the two limiting things right now as far as how much stuff you can get on the screen. So if you're finding that your CPU is running wild because you've got a couple thousand things on the screen, make some of them unselectable. Use your selection sets and use those tools to prune away some of that excess cycle.

The other thing is, as far as the graphics are concerned, for me as a modeler this is beautiful. I'm a pretty traditional guy though, and I really don't need all of that stuff. There's one more place. It's in the graphics diagnostic. So oftentimes you'll get a hold of one of us, and you'll say I'm crashing, and we'll say we maybe don't get your CER reports, but we'll need this information. So we'll ask you for copy the graphics diagnostic to clipboard, send that to us.

But there's this great little tool here. Limit all effects to provide optimum performance. Just turns them all off at once. And now you what I would call a nice clean view of the model. So it looks pretty, but do you need to have it running full time? And maybe turn that stuff on if you're in the middle of a design interview, you're trying to show off to some customers, or something like that. In the meantime, just turn it all off at once. If you're interested in sort of a hierarchy, the stuff at the bottom of the list is the heaviest graphics effects.

You notice I don't even run with anti-aliasing on. I just don't bother. Again, if I want to look at it super, super pretty, I'll go render it. But ambient occlusion, object shadow, and reflection, those bottom four are really the heaviest load on the graphics. And other things that affect graphics too would be if you have a lot of textures. Obviously the more edges and faces and everything that's in the scene is also going to affect graphics, just like any traditional CAD product.

JOEL PALIOCA:

Perfect. So the other thing to understand with Fusion is, as we mentioned before, Fusion is changing every six to eight weeks. We're making constant improvements to the product, and very specifically in the performance region. This is an area that we are targeting, trying to make it so that we can handle larger and larger models. But some of these tips are going to be great while you're increasing your own model size. As Fusion is growing, your model sizes are probably going to start growing as well. And we want to be able to provide you with some of these effects and different settings that you can leverage or turn off while you're modeling so that you have a good performant experience within Fusion.

PHIL EICHMILLER: So if you reference the handout, at the tail end of the class PDF or whatever, you'll notice that there's a section that's specific for different hardware. What's your operating system? Are you running a laptop? And there's some performance tips listed there to help actually with your own hardware and your own operating system. So I would refer you to that too. It doesn't demo very well. I've only got one computer here, and it is a laptop, so I could only show you a very tiny slice of that. But do refer to that.

We're actually finished quite early here, so we're ready to take any questions you guys have.

JOEL PALIOCA: Thank you guys for your time, by the way.

AUDIENCE: When it comes to screen resolution, [INAUDIBLE] how will that be addressed? [INAUDIBLE]

JOEL PALIOCA: Yeah. So are you talking while modeling performance?

AUDIENCE: Modeling [INAUDIBLE].

PHIL EICHMILLER: The question is about 4K monitors, just to be clear for everybody.

JOEL PALIOCA: Yeah. So when working with a 4K resolution monitor, obviously we're talking a lot of pixels here. Most commonly with the 4K resolution monitor, it's going to be our GPU that's going to be the problem. Having to push that many pixels around at the fidelity that Fusion is trying to work with is going to be tough. So the primary thing that I look for when working with 4K resolution monitors is making sure first and foremost my graphics card can handle it.

It's pretty common to be able to hook up a 4K monitor to a card that handles 256, 512 megs. You're going to run into some problems. Just with the way Fusion was designed, we're leveraging newer graphics technology to be able to provide these things for you. But at the same time, there are those downsides when you get to those larger resolutions.

So when you're working, what we've seen in the past is simply shrinking the size of Fusion to not take up all 4,000 pixels, but rather a corner of that, or making adjustments to that resolution can provide you with a current solution. And we also have within the 4K-- can you show the Retina or the high option? That going to show up for you?

PHIL EICHMILLER: Yeah, it's in preferences.

JOEL PALIOCA: Yeah, exactly, under graphics. Yeah. So we also have a option for use high resolution graphics. And this is also something that we're able to use when we're working with higher resolution monitors to really make it so that we have better performance and better work with those resolution monitors. This is something that we're actually actively working on. I work on a 4K monitor myself. And most the time, I'll be honest, I don't use the full 4,000. I probably use 2/3 of the monitor while I've got other work going on.

But while I'm modeling, I know I've got to keep performance in mind as soon as my model starts to get larger. But when I'm doing a rendering, that's a perfect way that I love to use that 4K resolution, that size, that fidelity. And that's the great thing about the rendering environment is I don't have to really worry about performance of interacting with different components, but rather that fidelity, that visual look is what that rendering environment will provide for me.

PHIL EICHMILLER: I can show you on a Mac here how to go and actually tell the OS to not use Retina with this thing. So from a right click on the dock icon Show in Finder and Get Info, if you've got a Retina Display, open in low resolution. So you can just set that. That's probably going to reset every time you get a Fusion update, but that's one way to do it.

And the other thing is if you're dealing with graphics performance, how many apps do you have open? Are you on two monitors? All the common sense stuff. We don't want to limit you, but if you're trying to get your job done, do you need to be watching a soccer game while you're working?

JOEL PALIOCA: I'm guilty of that one.

PHIL EICHMILLER: I know. Yeah, World Cup time, we managed to shut the network down because literally every developer was streaming high-def. So just a little side story there.

JOEL PALIOCA: So I hope that answers your question. I know it would be great to have an answer where we fully support it, everything works great. We're not there yet. It's a constant improvement for us, and it's something we are actively working with and looking at. Yes?

AUDIENCE: [INAUDIBLE] So at this moment in Fusion, it would be difficult to handle that area where the parts are over 1,000, 2,000, very, very big. [INAUDIBLE]

PHIL I can be very specific. OK, so the question is when I've got over a couple thousand objects on

EICHMILLER: the screen, the main thing that's going to happen to you at that point is the CPU is just going to be maxed out, and you're not going to get anything done. That's why I was mentioning using selectable and unselectable to get around that. Here's what's going on.

The mouse is always interested in everything that's in the scene. And so this was an architecting thing that happened early on, and we haven't addressed it yet. So right now if I'm moving the mouse, it's thinking about every single thing in the scene. And so that's why you'll notice if you're in that situation and you just let it go, and the CPU will back down again. And then the second you move the mouse, even when you're not selecting anything, I'm just up here in the corner wiggling it around.

It's thinking about everything in the scene. So the what's the problem? We know exactly what it is. We need to make the mouse just like Inventor, only be interested in the stuff that's immediately around it, or it hasn't bumped into any bounding boxes of these objects. So that's specifically how we're going to fix that. And like I said, that's probably in the next six months or so. We're already working on it. I just don't know exactly when it's going to be released.

And of course, I'm the QA that's going to test it. So I'm not letting it out there until I'm confident that it's going to work. That's a fairly safe solution, because I can't imagine if the mouse isn't thinking about everything in the scene, it's probably not going to cause a crash. So I'm just going to need to make sure that all the normal selections and workflows and stuff like that work.

AUDIENCE: Yeah. When you have a lot of components that are relatively fixed, [INAUDIBLE] work that I'm dealing with, when you need to be moving those around, and they're going to be ultimately driving other parts of the design, is there a suggestion you could make for a workflow within the parametric environment that would kind of wall off all those moves in a separate kind of bubble? Is there any way to isolate that stuff so you could do that without searching the direct model or capturing the thousand snapshots that you don't want to capture, and tweaking that stuff all over the place. You don't know how it's all going to go together.

PHIL
EICHMILLER: So the question, for those of you in the back, is that Ron here, he actually needs to move things around a lot while he's designing. And so he's asking is there a way to isolate that out so that you have a more exploratory mode that is not necessarily parametric.

One of the things that Ron does now is he'll go back and forth between parametric and non-parametric in the same model. So he's not always capturing the entire parametric history. I

know him real well, so that's why I'm speaking for him. He's not always capturing the entire parametric history.

For me, I kind of don't mind that workflow. We've talked about it before, and it doesn't hurt you too much. But obviously at some point, you really do want to have the entire parametric history of your objects. So how do you isolate that stuff? And the answer is I don't know.

AUDIENCE: You were deleting [INAUDIBLE] in the timeline, and I was looking at that and thinking, is that a possibility we could capture those moves? And then somehow get rid of them when you don't need them.

JOEL PALIOCA: So what I can tell you is this. I don't know if this is going to solve things right away for you, but we actively have some we're targeting move and those interactions, specifically with snapshots and how the move command works. We do have some focus on that right now. I am not sure when it will be fleshed out again. But it is something actively being discussed, and it is something important to us that we are aware of that we need to get to.

I believe right now they still are researching some of that. That being said, I can definitely make sure that when the team is trying to understand requirements in gathering that, we can definitely add you so that they can have that conversation with you and understand your requirements to make sure that that actually gets captured and looked into as well.

PHIL EICHMILLER: So another sideline, Eric back there asked what about base feature? The problem with base feature, which is opening up a non-parametric-- right now I'm in base feature right now. I can't move these things around. So in base feature, you--

AUDIENCE: You sealed it?

PHIL EICHMILLER: Yeah, because this is parametric stuff and I'm specifically asking Fusion to work non-parametrically. The other thing is branching and merging. I think what you want is branching and merging.

AUDIENCE: It is, yes.

PHIL EICHMILLER: So right now there isn't a way to deal with it. But once we get branching and merging going, and I think I heard Kevin Schneider said the other night, what did he think, six months on that too. Or maybe by this time next year, hopefully. It's something we're deeply interested in.

For those of you who don't know, branching and merging would be basically going down parallel but distinct design paths. And so that's pretty much what you would want. You would go down that separate path and move things around and do the modeling you want, and if you want to capture that or not, I think that would be the way to do it. So hopefully what you want what would be contained within that branching and merging workflow.

AUDIENCE: What I would like to have is a little direct modeling bubble just inside of the parametric environment.

PHIL EICHMILLER: Yeah, and still affect the parametric objects. Like right now, we're limited by how we calculate the timeline, because yeah, it would make sense to have a base feature, move some stuff around. And for me, it would just be, well, prior to the base feature here's where stuff is, and after the base feature here's where stuff is. It just doesn't do that right now. Anything else? Yeah.

AUDIENCE: What strategies are everybody else using as far as subordinate coordinate systems? [INAUDIBLE] You're doing top-down. You're modeling that in position, and then you end up with a coordinate system that's [INAUDIBLE] moving free component, move component, [INAUDIBLE].

PHIL EICHMILLER: Yeah, you could do that. So the question is, the coordinate system, the origin of your model is distinct from the origin of the components. So how do you manage that? So you can see here that there's some origins for those that I think are for the fans. So they're right there smack in the middle of the fan way back there. So if you're doing forward creation, and you want that to be there so you're creating in place, where does that origin go?

So let's create a new component. And let's find its origin. And it's probably right smack on top of the actual origin of the entire design. So at that point, I would suppose you could move it while it's empty. You could totally do that and move it into place. I right clicked on it. So just to explain here, when you're moving objects, you're either moving components or bodies. And so components are containers for bodies and sketches. Bodies are just containers for 3D information within a component.

A lot of times people find that they move the body far away from its own origin because they're just saying move, and they're not paying attention to the two icons here. When you start the move, it's defaulting to the little marshmallow shape, which is body. And what you want is the little sugar cube shape, which is component. So I keep that straight just by using the browser.

This is just an old Inventor habit I have, but I think pays is when you're dealing with that stuff. Right click on the component and talk to it that way.

So I don't know. You could model it right where it's at and then move that into place, because if you're going to have a joint or something like that, you need some geometry to do that. Or if you just know where the origin really ought to go, you can just move it there too. It's going to create a snapshot.

AUDIENCE: What does everybody else do? [INAUDIBLE]

PHIL Does anybody pay much attention to where the origin is for their components?

EICHMILLER:

AUDIENCE: Now where that can screw you up is if you're creating a body, say, on another component and it's at a funny angle or whatever. You create that as a body, and then make a component out of it. Then you've got an origin that's at some oddball angle to the rest of the coordinate system. And down the road you try to move that, or you try to something with it. It can get kind of confusing.

PHIL Yeah, and so that's--

EICHMILLER:

AUDIENCE: It's a good reason for activating--

JOEL PALIOCA: Exactly.

AUDIENCE: --first, then doing. It's another reason why you want to do it that way.

PHIL OK, did everybody hear that? I guess so. Thanks, Ron. Yeah, so it's a CAD system. Everything

EICHMILLER: you're putting in there is on purpose. And so you have to decide what you want to do. I advise to model things in place, but Ron comes up with a great example of why modeling something in place might not be the best thing to do, because it could be at some bizarre angle relative to the origin of the assembly.

AUDIENCE: That's great if you know what the place is. [INAUDIBLE] be when you're doing the modeling. But at least in my case, I rarely do.

PHIL Yeah, and so everybody has different workflows.

EICHMILLER:

AUDIENCE: [INAUDIBLE]

PHIL EICHMILLER: Yeah, exactly. You're using instances of something that's rotated compared to its origin. For me, this is the kind of work I do. So I always know where everything's going. The hardest thing is keeping up with the electrical engineer who's moving stuff around on the circuit board every time they pull a new revision. Every design's different. That's why a lot of the advice we're giving here today and in the classes, I try to give general advice. It's like how to ride the bike, not where to go. I'm not telling you where the trails. I'm telling you where the handlebars are. And that's what I prefer to do. Any other questions? Yeah.

AUDIENCE: Is there a keyboard shortcut to switch between [INAUDIBLE]?

[INTERPOSING VOICES]

PHIL EICHMILLER: That'd be cool. We'll see.

JOEL PALIOCA: We don't have one yet. It's something we are looking into. Obviously with the way the tabs are designed, something more similar to the way Chrome interacts with Control-One, Control-Two, but also dragging, being able to change the order. Sometimes that's important as well. I know we've kind of chatted about it. I don't think it's been thrown as a high priority. But something as easy as a hotkey though, on the other hand, shouldn't be too big. I know Phil's taking a note right now around this.

AUDIENCE: Really what I'd love to see is the ability [INAUDIBLE] second display, but to be able to pull a part from [INAUDIBLE] back and put it on the second quadrant so I have two things up at the same time.

PHIL EICHMILLER: Wow, that's another great suggestion. Yeah. I suppose you could open Fusion twice. Is that even allowed? Yeah.

AUDIENCE: That's what I do.

[INTERPOSING VOICES]

PHIL EICHMILLER: What's that? Not on a Mac, OK. I'm one of those traditional guys. I only want to run Fusion once at a time. But that's the one way. So that would be cool. Because you can move toolbars and junk outside of the window, so why not move an entire model window out? That would be

kind of cool. Then you just click between the two. That's a good idea.

JOEL PALIOCA: Yeah, sure thing.

AUDIENCE: Is that at the very bottom in the middle, you can manually suppress sketches [INAUDIBLE]. Does that drag down into the component level? Like you did an example earlier where you had a sketch [INAUDIBLE] inside of a subcomponent. If you use those, does it turn off the sketches [INAUDIBLE]?

JOEL PALIOCA: Let's take a peek. Initially, my mindset is I do not believe that it will.

PHIL So what was the question again Joel? I was taking a note there.

EICHMILLER:

AUDIENCE: You had a [INAUDIBLE] inside of an entire assembly, with the sketch [INAUDIBLE]. If you used the filters at the bottom [INAUDIBLE] to turn off sketches? Yeah. Yeah. There you go. Will that turn off the sub-components [INAUDIBLE]? It just gives a clean render.

JOEL PALIOCA: Yeah. We can take a quick look, because there's a part of me that wonders if that's truly-- I think we're looking at two different things. So from my understanding, obviously we can pull it up to verify, my understanding is that when we leverage that, we're actually turning off the visuals from the graphics standpoint, but not always going back to the model and going visibility off, visibility off, so on and so forth.

PHIL That is really interesting. That's pretty cool.

EICHMILLER:

AUDIENCE: They're breeding.

PHIL They are. Wow.

EICHMILLER:

JOEL PALIOCA: So let's verify that real quick.

PHIL Yeah. Let's verify that in a different way.

EICHMILLER:

AUDIENCE: [INAUDIBLE]

PHIL Well, you said a sketch and a sub-component, right?

EICHMILLER:

AUDIENCE: Yeah. Yeah. [INAUDIBLE]

PHIL Yeah. Let's see. So go back up to the top level. So yeah, so if it's inserted, I'm going to need to

EICHMILLER: insert something else.

JOEL PALIOCA: Go back to that component real quick.

PHIL Where?

EICHMILLER:

JOEL PALIOCA: The one that had the sketch in it.

PHIL Oh, shoot. I don't remember which one it was. It's a little washer doodad.

EICHMILLER:

JOEL PALIOCA: So yeah. As I was saying, yeah, that option down there is a graphics option. Just kind of being able to quickly turn that off, but also for visual standpoints, being able to reduce that load. Because as you could see there, the sketch is still visually on the light bulbs. Everything else is on for those sketches. We can't see it because that option is currently turned off as a whole.

AUDIENCE: And then I'm having a little trouble figuring out how to control the ground plane, particularly in multi-tiered assemblies. How does it determine--

JOEL PALIOCA: The ground plane. Yeah.

PHIL So, right now the ground plane is set at the bottom of the model. So he's asking how do you

EICHMILLER: control the ground plane and the stuff at the bottom there. So there's a thing called layout grid lock. If you're using layout grid lock, the layout grid is fixed to the origin. If you're not using layout grid lock, it just moves to the bottom of the model, as defined by whatever your dominant axis is for up. Whatever up is, it's at the bottom of that, in that direction. That's where it goes to find it.

JOEL PALIOCA: And if Phil moves this model, it'll move with it.

PHIL Yeah. You'll see it, like if you have something rotating, you'll see the ground bouncing around

EICHMILLER: underneath it. That's because it's always calculating that. The other thing is, OK, what is up?

What's up? Sorry guys, I had to make a joke there. Let's say this is the top view, and right now it's the front view. The view cube also controls the ground plane stuff. So I'm going to right click on the view cube. This view cube is the same through all Autodesk products. Set current view as top. And so then now I have a new ground plane.

AUDIENCE: I think you just nailed it.

AUDIENCE: Yeah, because I [INAUDIBLE].

JOEL PALIOCA: Oh, yeah. With those two options, I would definitely check that. One other thing to quickly note. Randomly sometimes the model will enable the grid lock for you. And sometimes you just have to go verify that that just needs to be disabled real quick.

PHIL EICHMILLER: Yeah, that's something I can never quite put my finger on. Because I go through so many models, and I'm like, I know I had-- because I always put the grid at the bottom. I don't like it going through the middle of my part. That was a decision that I disagreed with when they made that happen. I always wanted it at the bottom, but people were asking for it, right. And I swear I'm like, wait a minute, didn't I turn that off? So that's something I've got to look into. So you might wind up doing that more than once. But it's not a big deal.

AUDIENCE: Can you reset all of these then?

PHIL EICHMILLER: Excuse me?

AUDIENCE: Can you change? Because in SolidWorks, you can go view and actually say, no, that's not the bottom, that's the top. And it flips all [INAUDIBLE]. Oh no, that's left versus right. And sometimes an object will come in and you're looking at the back versus the front. When you hit the home, that'll take you to the back of the thing. No, I want that to be the front. If you hit home by your cube right now.

PHIL EICHMILLER: Yep. It's going to tip it on its side.

AUDIENCE: And you're like, no, that's not the home. The home that I want is the one--

PHIL EICHMILLER: OK, well it's--

EICHMILLER:

AUDIENCE: Can you reset it to where it changes based on where you're at? Kind of pick a view as your home view?

PHIL EICHMILLER: You can set a new view as home. So I can set current view as home. So I can go to new home view. Is that what you're talking about?

AUDIENCE: No. The thing was let's say a cone. And it came in like a street cone, but you wanted it to be like a megaphone or [INAUDIBLE]. When I looked at it in normal home view, I wanted it to be spun in iso over the circle facing me versus going down. And in SolidWorks, you just go to [INAUDIBLE] view and say reset all views, and then you click the iso again, [INAUDIBLE].

JOEL PALIOCA: Let me just reiterate so I can see if I understand. So it sounds like what you're looking for is when you have the model up, you want to be able to reorient not just what's top and bottom, but also left, right, front, back as well.

AUDIENCE: [INAUDIBLE]

JOEL PALIOCA: Correct.

PHIL EICHMILLER: Well, that's true. If the object's not pointed in the right direction, then to me, that's a valid move. So just make sure that you're moving the component and not the body within the component, unless you don't care if the body changes relative to its own origin. These are general guidelines. So if I say don't make a lot of moves, I'm just pointing out that you're adding a lot of stuff to your timeline that's going to be clutter in compute cycles. So if you feel like you need to move it, move it. That's perfectly valid at that point.

AUDIENCE: We've got that option of defining that when you first bring it in.

PHIL EICHMILLER: Oh yeah, and when you insert a component into the design--

AUDIENCE: You can set it however you want it.

PHIL EICHMILLER: Yeah, that's the other thing, is when I insert this component, go ahead and turn it right then too. That's a free one. So if it shows up in your assembly pointing the wrong direction, just move it right off the bat. And then that's not part of the parametric history either.

AUDIENCE: [INAUDIBLE] something else? But its orientation is backwards.

PHIL So yeah, when you pull it in, flip it around right then. That's probably your best opportunity.

EICHMILLER: That's the best answer I can give you right now. Again, we love our idea station, so if you wanted to post it up on the idea station, see what other people that are used to your workflow think about it, by all means, because that would help us understand what you're looking for. Videos and lots of explanation help in those things to really sell them.

JOEL PALIOCA: So it looks like we're about at the end of our time. Again, thank you everyone, we'll be up here still if you have additional questions.