

JIM O'FLAHERTY: Anyways, welcome. This is Beyond Basics, Advanced Assembly Modeling with an Inventor, not AutoCAD. Stress Inventor. I stress that because, last year, I had an Inventor class, had Inventor in the title, had 200 people in the class. As soon as they saw it was Inventor, half of them got up and left. They were upset that it was not AutoCAD. This is not AutoCAD.

My name is Jim O'Flaherty. I am the engineering manager at Versa-Gard. Again, for those who weren't here, we make sneeze-guards. Don't tell them I said that. They like calling them food-guards. So yes, we keep the germs off your Cici's pizza and Anything you go to-- Subway, sports venues. if you go to see the Dallas Cowboys, we've done their whole stadium. The Atlanta Falcons, the Braves, and so forth. You'll see the Versa-Gard logo somewhere on the unit, either on the post or on the glass itself.

And I'm going to apologize right from the get go. We are having some display issues. So when I have some videos to show, we're going to have to minimize this, bring up the video, show the video, and then go again. So for whatever reason, the videos are not working with this connection. Although they worked a matter of an hour ago up in the speaker lounge.

So again, who am I? I go by Jim. I always know who's on the phone when they call me? If they say, James, they're trying to sell me something. I guarantee you. If it's Jim, it's a colleague. If it's Jimmy-- family, no way around it. I have been on Inventor.

Let's see here. I want to go through this here. Again, I'm an engineering manager at Versa-Gard-- started my illustrious career back in 1980, using the drafting board and a slide rule. All right, old timers, who still has their slide rule? Have you bronzed it yet? I'm about to.

Started on Inventor back in release 3. So I've been on it for quite some time. I am a certified Inventor professional. I am also a certified instructor, believe it or not. I've taught quite a few classes. And I was awarded the Expert Elite back in 2014. I don't know who nominated me. But they did. And if you are here, thank you very, very much.

Any other CAD software I've worked on? Yeah, I'm not at liberty to tell you. But if you want to find out afterwards, hit me up. So I've worked on quite a few. So class summary-- you know the basics. You probably went through a basic intro class for Inventor that probably took up, what? 40 hours of your time. We're going to take that basic knowledge that you have and show you some extra features that you can do within the assembly environment. OK?

Again, this is a beginner to intermediate class. But some of these things you could probably consider them advanced. Obviously, Autodesk does. So we're going to go in there and see what we can do, what you can utilize to make your job a whole lot easier. No sense going five miles to go an inch.

As you learn-- I was kind of fired back to my classes. If you're doing part modeling, then you got to put in a filling. Don't get pigeonholed and think that there's only one way to do a filling. Typical Autodesk-- there's always five ways of doing something. If the first way fails, try a different way. You're always going to have options. People get stuck in habits. And it's a comfort thing. I understand that. But--

So at the end of this class, you're going to learn some more of the advanced features for assembly models. You're going to minimize the impact of file size for large assemblies. How many of you work on assemblies that are over 1,000 parts on average? Do you have an issue with them loading? Basically, do you load it and go get a cup of coffee, come back, go back out, compare Tom Brady to Peyton Manning. There is no comparison. Come on. Tom Brady is the goat.

And so, we're going to go through some things that'll show you how to bring those assemblies up very fast and start working on them. We're going to show you how to create weldments and other assembly features. We're also going to show you how to work more efficiently within the assembly environment. So let's see here. We've got some notes. I need my eyes for this one.

All right, so your hardware-- one of the things are, you're pretty much locked into the hardware you're offered or supplied by your employer. If you have the ability to get your own hardware, even better. But you got to understand, the hardware is the foundation. So we can make all the different settings you want in the world. They can only go as well as your hardware is going to take them. So we're going to work on as many deals as you can. So you might hit that ceiling.

So graphics cards-- again, graphics cards, you want as much memory as possible on them. The way Inventor works is-- and you probably know this-- it uses the memory on the graphics card first to do it's processes. Once it expands or once it hits the limit of the graphics card, then it goes to the system memory. If you have dual monitors, make sure you have a graphics card for each monitor as well.

And the reason for it as, let's say you have a 2-gig card. I know, 2-gig cards are pretty small nowadays. Well, you have a 2-gig card and you have two monitors. Windows will split the memory of that 2-gig card and make one gig for each monitor. Now, Windows Applications takes about a gig themselves, depending what you're using.

If you're finding issues or are having slowing down in the system, kill Outlook. Microsoft Outlook is a memory hog. Kill it. Get rid of it. Let the application come up or whatever's coming up. Then, bring Outlook open again if you need it. But yeah, Outlook is a killer.

Next is the RAM. Again, get as much RAM as you could possibly afford. RAM's fairly cheap today. So get as much of that as you can, especially if you're working with big assemblies, complicated parts. It doesn't matter. Get as much memory as you can on the system as well.

Processors-- right now, if you went to the keynote speeches, you know that this is changing. But currently, as of 2017 release, Inventor is still a single-thread application. It does access the multiple cores when you do more advanced features. So if you're doing FEA, it will utilize the multiple cores. But it uses single core for its more basic stuff.

Monitors-- yes, monitors will increase your productivity. Get multiple monitors if you can. I typically say, get a 16-by-9 ratio monitor. Use that as your CAD monitor. Why? Typically, you work on a drawing that's a B or D size, right? It's a 16-by-9 ratio. Fill that up with your CAD window.

And as you know with Inventor, all your menus can be totally undocked and put on the other screen as well. So you can have one screen, that one big monitor, nothing but graphics area. And it gives you all that room to work in if you want. And then, you can have your standard monitor be all your windows applications. So yes, monitors do improve things.

And my buddy here, Sheldon-- so we're going to refer to Sheldon every now and then here. So again, selecting these options-- excuse me-- changing some of your practices and whatnot will definitely increase your productivity. You're going to want to do whatever you can to get yourself more productive, instead of doing something the same way over and over and over again.

Again, why do something that takes five clicks if you could do it in one? If you've got to justify your job that way, sorry, but I like being a little bit more efficient. So again, if you can't afford or your company will not afford a supercomputer that would make Sheldon jealous, we'll set

some of these settings here to compete with that and compensate for it.

All right, so first section here-- the General tab. So on here, you've got different settings that you can set. And I'm going to start walking around here, see if I can use this guy. You can set some of these things up here. Again, you got physical properties. You can delete or take some of that off the Update Physical Properties, Unsave. You've got that option as well.

Some of these things here calculate your figures. When you're doing some changes on here, any of these settings that you have set like this, that you're asking for it to do something in the background, guess what? It's taking memory. It's got to run a process in the background.

If you guys remember the old Instaviews years ago, using CADS 5 or Pro-E or whatever and you had an old Instaview, the old green monochrome screens, you regenerated a drawing, you could pretty much go home for the night. And you were lucky if it came up by 7:30 the next morning doing a regen.

You got to remember, back then, CAD programs were history-based, just like Inventor is. But it had to do every command you did. So every zoom, every pan had to be replicated on the regen. We don't see that anymore. Everything is now being done in the background.

So your physical properties-- you can go in and set some of those again, whether it's calculating it or not. Let's see here, you got-- come on, come on, work for me-- certain display options you can do. So you've got the Parents tab. You can set the Settings button here. That brings up the pop-up dialog box that you see here on the side.

Here, you can go in and you can specify your visual style, whether it's shaded and whatnot. You've got ground shadows, object shadows, ambient shadows. Again, selecting any of these things-- what's that going to do?

AUDIENCE: Slow it down.

JIM O'FLAHERTY: Slow down. Takes memory. Right. So you've got all these different options you can do. Do you need them? Probably not.

So setting any of these will actually defeat what we're trying to accomplish here. So if you don't need to show a fancy shadow, if you're not doing a demo, get rid of the shadow. You don't need it on there, OK? Especially if you are seeing lag issues.

All right, how should you build your assembly? Swag time. Show of hands-- who can name the two different styles? This is a trick question. Be careful. Yes, sir?

AUDIENCE: [INAUDIBLE]

JIM O'FLAHERTY: Very good. What's the third?

AUDIENCE: [INAUDIBLE]

JIM O'FLAHERTY: What's the third? That's the trick.

AUDIENCE: Middle out.

AUDIENCE: Middle out

JIM O'FLAHERTY: Middle out. There you go. Would you like a pen or a shirt, young man?

AUDIENCE: [INAUDIBLE] a shirt.

JIM O'FLAHERTY: Shirt. All right, we got different shirts here. We got gray. We got black. We got red. And we got a tan.

[LAUGHTER]

[INAUDIBLE]

AUDIENCE: In, like, ladies' small?

AUDIENCE: Yeah, right.

JIM O'FLAHERTY: XL, how is that? That work?

AUDIENCE: [INAUDIBLE]

JIM O'FLAHERTY: Gray? Black? What color?

AUDIENCE: That's fine.

JIM O'FLAHERTY: All right.

AUDIENCE: Thank you.

JIM O'FLAHERTY: You bet. So correct, there are three. Most people do not think about the middle out. So you

get a top-down or bottom-up. This has been a major discussion between myself and a good friend who works for Autodesk as to why we should do it along with project files. But I won't get into project files.

So top-down or bottom-up, OK? And then, of course, you got the bonus one of middle out. Top-down-- basically what that is is you are building the parts within the environment of the assembly. Back when I was trained on release 2, that's what Autodesk drove home is that, very suddenly, you're going to make a one-off part. Your parts are typically going to be used with an assembly. So why not have the assembly environment open, build your part there, and then add the mating part, so on and so forth?

What that does is, because you're using a part that's already there, you're typically using a face that your next part is going to mate to, so using that profile. That makes the part adaptive. So as this profile changes, so does the mating part. That may not be what you want to have happen. And I'll show an example of that and why.

Bottom-up, I feel, is probably the most simple and most understandable way of building your assembly. And the reason for that is, bottom-up is typically the way you can associate that to an assembly line. Consider working for General Motors and you're building a car. What's the first thing that goes on the assembly line? Your frame rails. You have to have a foundation.

Consider a house, let's say. You build your foundation. You build off that foundation. That's what bottom-up is. You build your part outside the assembly environment, bring it into the assembly, and then bring in your other parts and build them and constrain them, thus building your assembly up.

Middle out is a combination of those two. So with middle out, you can work in the assembly environment and build some parts right there. And you can also bring external parts into that assembly. But you've got to remember, the parts that you build within the assembly, if you referenced anything else in that assembly, it makes it adaptive. So if you don't want something to change, you've got to break that adaptivity. And again, we'll show you.

And here's-- I swear, this video worked an hour ago. So bear with me here as I change out and show that. So here's an example of an adaptive part. You've got this gasket, let's say, on the front of this guy. It's an adaptive part. You can see by the-- "tsh-ch-ch-shoo"-- yin-yang sign right here telling me it's adaptive.

Now, in this video, I'm showing you what the size of that gasket is, what the width of that gasket is. So now, we go in. And I'm going to change that face on that casting. We got the dimension there. Modify it. Notice, the name of the gasket is based on the size of the gasket, which is a very common process.

So what happens if you go in and change that casting that that part is adaptive to? It's going to change your gasket. Now, in this case here, if your gasket is numbered or named, based on it's width-- let's say, 54 millimeters and now you just changed that casting to 60-- you don't want that gasket to update. You want to put a new gasket on. It's a whole new part.

Again, that type of process, you got to have a lot of planning set aside. You've got to plan out your whole assembly before you actually start doing it or know that, OK, I don't want that part to be adaptive. I had it adaptive during the design process at the very beginning of it all. That's fine and dandy.

But once it's done, go in and break the adaptively. Simply right-click on it and unclick the toggle that says Adaptive. Now, it's not adaptive anymore. So again, it's up to you what your process, what your workflow, how you want to do it. But things like this, you have to keep in mind.

AUDIENCE: So when you break a [INAUDIBLE], does it make a copy of the [INAUDIBLE]? Or how's it break [INAUDIBLE]?

JIM O'FLAHERTY: Well, yeah. When you break the adaptivity, basically, your sketch features or you sketch entities are now non-constrained. You're going to have to go back in and constrain them. Yeah, you've got to be careful of that.

AUDIENCE: If you open up that [INAUDIBLE] without the assembly, how do you know what it's adapting to?

JIM O'FLAHERTY: I believe it links to it. I believe it shows a link. Yeah, I can't do it here now. Let me see here. Yeah, I think what happens is that, if you open that part, there should be a link--

AUDIENCE: [INAUDIBLE]

JIM O'FLAHERTY: --that shows you to it. Yeah, I'm trying to remember myself. Good question. Good question.

AUDIENCE: [INAUDIBLE]

JIM O'FLAHERTY: You earned yourself a pen, young man.

AUDIENCE: [INAUDIBLE]

JIM O'FLAHERTY: Just don't tell anybody I didn't know the answer.

AUDIENCE: [INAUDIBLE]

AUDIENCE: You're safe.

JIM O'FLAHERTY: I'm safe. Thanks. What happens in Vegas, stays in Vegas, right? Pardon?

AUDIENCE: [INAUDIBLE]

JIM O'FLAHERTY: What are you talking about?

[LAUGHTER]

AUDIENCE: Exactly.

JIM O'FLAHERTY: I had no idea what you're talking about. So another way of doing top-down is layout design.

This one works pretty well. You go in. And basically, you're creating a sketch that is detailing the parts that are going to be in that. Get as highly-detailed as you want in this. Because what you're going to do here with the layout design-- you can actually go through this and study and see how things are going to interact with each other.

So you're going to see how your motion is in this case here. Let's say, you've got this piston. "Tsh-tsh-ch-choo." You got this piston here. You can actually move these entities and see how that's going to elongate. So you can check any kind of interference, any kind of deflection. Any of that sort you can do in the Sketch mode. And then, when you're done, when you got that squared away, you can take those sketches and create your parts right from those sketches, within the assembly environment, keeping everything adaptive.

And yet another approach is skeletal modeling. How many of you use skeletal modeling in some way or form? How does it work for you?

AUDIENCE: Pretty good.

JIM O'FLAHERTY: Pretty good. It does. It works. You got to be careful again. You can paint yourself into a corner really, really quick. The key to skeletal modeling is not to be too detailed. Typically, what I'll see with skeletal modeling, the way I'll use it, is I'll use it as an envelope for my assembly. So

I'll sketch the basic outline of the parts that are going to be in the assembly. And I have that act as an envelope, so the parts don't get any bigger than that. Or I can constrain them.

If you go in and get really highly detailed, like you would in this guy, you've got to remember, a skeletal model is your top-level model. If you've got to make a change to any of these features in here, you've got to activate the skeletal model. So everything will basically fall under that skeletal model. You start an assembly, insert a skeletal model as a part, and then build everything off of that.

So in order to modify any parts in that assembly, you have to have the skeletal model open. If you work in a vault environment, if you had that skeletal model open and it's saying "an upper-level assembly," guess what? You're the only one able to make any changes to that upper-level assembly. If you have other people in your department that need to modify that assembly or components in it, they're locked out of it.

And I've seen that happen where somebody did a skeletal model in a top-level assembly of a Stirling engine. And she was the only one who could modify that assembly.

AUDIENCE: [INAUDIBLE]

JIM O'FLAHERTY: So yeah, basically is what it was, until she painted herself into a corner so much that she could not modify anything and had to have Autodesk come in and help. And we had an Autodesk guy on site for three weeks to fix that issue. Yeah, it was not cheap.

So the bottom-up process-- again, this is where you build your individual parts outside of the assembly environment and then insert them into the assembly file. Again, it's probably the most easy to understand, probably the most common. How many use this more so than top-down? Yeah, see. It's just more realistic, especially if you work in a plant that does an assembly-line type process. It's just that much easier to wrap your head around and think about it.

AUDIENCE: Works good for construction as well.

JIM O'FLAHERTY: Pardon?

AUDIENCE: Works good for construction as well.

JIM O'FLAHERTY: Yeah, yeah. So--

AUDIENCE: [INAUDIBLE]

JIM O'FLAHERTY: I mean, granted, I understand that design intent, for the most part, is not propagated to the other parts in this. But there are ways around that. So yeah, it's one I usually find myself going to, if not middle-out.

AUDIENCE: That's why I don't even teach [INAUDIBLE].

JIM O'FLAHERTY: Yeah. Again, that's how I was originally taught in Inventor. But yeah, after a couple of releases, they realized that, yeah, that might not be the best way. And that's when this came along. But if I'm not doing this, again, I'm doing middle-out, one way or another.

All right, so simplifying an assembly-- so this is what's going to really pay off. Shrinkwrap-- who's familiar with Shrinkwrap? Come on. That's been around for a while. Shrinkwrap has been available for quite some time. The main use I had for Shrinkwrap back in the day, was doing just this, dumbing down anything I was sending out, mainly to protect IP.

I worked for a company that made solar-powered Stirling engines, OK? Cutting edge. They were the only ones that were able to reproduce a Stirling engine with the same power output on an assembly-line basis. To this day, they're still the only one that does it. Unfortunately, they're not in business anymore. So sh.

So anyways, this was typically what we'd use Shrinkwrap for, would be to send something out to a vendor. They just need to know the envelope of it, let's say, or what the thing looked like. We used Shrinkwrap. And it filled in all the internals. So it just it gets rid of all the internal IP for it. So it's more of a safety thing. But it also works for shrinking down the size of the file as well.

So besides Shrinkwrap, you've got a few different tools that you can go in here and specify the simplification of how you want to do this. So you find all these on your Simplify tab. So you've got three different options here. You've got the Include Components, the Define Envelopes, and the Create Simplified Part. So you've got them on numerous menus here, depending on what you're in.

And depending on which one you use, you'll see what they look like within your tree structure. So just based on your browser tree, you'll know if there's a part that's been done with an envelope or a simplified part and stuff like that. So you can very easily identify what's been done.

So the first one we'll go over here is Include Components. And there's the little icon for it. It's also available on your Heads Up display, your pop-up. Basically, what this does is you can decide what parts to include or what to exclude when you send this part out.

So it will take your assembly here that you have that you only want to send out a couple of parts to your client or your supplier, any vendor, anybody out there. Say you want to put this out on your website even. But you got some information here that you don't want to have go out to the public. So you can define what goes out and what doesn't, all right?

So when you do such, it'll create a view within your browser tree. So you'll have a separate view there as well. So you can just click on that, Save that, and send that out. You can also activate this as well. So again, if you have a very big assembly, you can create a simplified part like this and activate that upon activation of the assembly. Thus, it loads that much quicker. And then, you deactivate it.

AUDIENCE: This is not suppressing the items? It's just hiding their visibility?

JIM O'FLAHERTY: Well, yeah. You can decide whether or not--

AUDIENCE: [INAUDIBLE]

JIM O'FLAHERTY: --that does-- yeah. So it's just the view, yeah.

AUDIENCE: Oh, OK. So you could also have it suppress the items.

JIM O'FLAHERTY: Correct.

AUDIENCE: [INAUDIBLE]

JIM O'FLAHERTY: Yeah, yeah. We're definitely going to get into that. Yep. So next one is the Defining Envelopes.

This one really, basically, dumbs down things. This will take your assembly. And you can basically give either a square, rectangular-type box or a cylindrical box around it, around the outer edges of it. So that's basically creating your envelope.

So in this case here, you want to protect your IP here of this sheet metal. And you create the envelope. And it just gives the outer definition of that. So this way here, you can actually send this model out. And nobody knows how you built it. They just know, these are the outer proportions of that component.

And this is pretty much typical if you're building something around your components. You don't need to know the internals. You just need to know where to put that frame or that I-beam or whatever the case may be or duct work. You just want to make sure it works around it. This also will show up in your browser as the Envelope icon.

And lastly, your Create Simplified Part-- so this is probably, basically, what's going to help you the most on a very big assembly. So there's your icon. This is going to bring up this pop-up menu. So you can come in here and give it a different name. So you can specify whatever you want. You can even specify what template it's going to create it to OK, so if you have different-type templates. And then you even got your location here of where you're going to put it.

What this does is this will take the assembly that you have. And it'll create a whole new part, eliminating or combining all the stuff that you choose to put in there. It simplifies everything. So it shrinks that part file down extensively, depending on what your choices are

So I would say, if you have a very large assembly, and there's components that you don't need to see all the detail on, create a simplified part and put them into the assembly. And then, that way there, your assembly file has dropped drastically as far as size goes. It will activate that much quicker.

AUDIENCE: You still have [INAUDIBLE].

JIM O'FLAHERTY: Pardon?

AUDIENCE: You still have [INAUDIBLE].

JIM O'FLAHERTY: Yeah. Yep, you can link back to them. Guys standing up, we got seats up here.

AUDIENCE: [INAUDIBLE]

JIM O'FLAHERTY: You sure? OK. I know it's only an hour long, but-- level of detail-- I use this extensively. So level of detail-- you get three level of details out-of-the-box. And well, let's see here. Hang on a second. Who can name them?

[LAUGHS]

Who can name what those default level of details are?

AUDIENCE: [INAUDIBLE]

JIM O'FLAHERTY: I gave you the hint. You saw it there for a few minutes.

AUDIENCE: --three, four, and five? [INAUDIBLE]

JIM O'FLAHERTY: Close. What are the official names of the default level of details? Anybody know?

[INTERPOSING VOICES]

Yeah, Master.

AUDIENCE: All parts [INAUDIBLE].

[INTERPOSING VOICES]

JIM O'FLAHERTY: All parts suppresses one.

AUDIENCE: [INAUDIBLE]

JIM O'FLAHERTY: Pardon?

AUDIENCE: Component suppress?

JIM O'FLAHERTY: Yes. What's the last?

AUDIENCE: Content center.

JIM O'FLAHERTY: Content center, all right. Who wants a pen? Who wants a shirt?

AUDIENCE: I'll take a pen.

JIM O'FLAHERTY: You'll take a pen. All right, enjoy. Let's see, one more trivia question for a shirt here. I'll give a black one out. There's going to be a much harder trivia question that's going to get-- well-- whatever the last I have left. So prepare yourself for it. Let's see, let's see, let's see. Who was the original guitarist for Pink Floyd?

[INTERPOSING VOICES]

Hands up.

AUDIENCE: Syd Barret.

JIM O'FLAHERTY: All right, correct. Large or extra large? Black, red, tan?

AUDIENCE: Extra large.

JIM O'FLAHERTY: Extra large. Here you go. Now, a bonus question. What was the title of their first album.

AUDIENCE: *Piper at the Gates of Dawn.*

JIM O'FLAHERTY: Yes, ma'am.

AUDIENCE: [INAUDIBLE]

Yes.

[INTERPOSING VOICES]

Yes, ma'am. You're the man. No doubt. What was their second? What was their second?
Come on. You're the man.

AUDIENCE: Eh, [INAUDIBLE].

AUDIENCE: Yeah, no pressure.

JIM O'FLAHERTY: Think of a bowl of cereal.

AUDIENCE: Eh, [INAUDIBLE]. *Saucerful of Secrets.* All right--

AUDIENCE: [INAUDIBLE]

JIM O'FLAHERTY: Ask me anything Pink Floyd. I know it. All right, so you got your Master. That is your default out of there. But that doesn't really count as a level of detail, because it is all-encompassing. You have All Components Suppressed. You have All Parts Suppressed. Now, All Components and All Parts are kind of the same, but not quite. And then All Content Center Suppressed.

Content Center Suppressed I see used quite a bit. Consider a specific airline manufacturer in the Pacific Northwest.

AUDIENCE: [INAUDIBLE]

JIM O'FLAHERTY: And [LAUGHS] think of every rivet that is used on their airliners. They do have all of them in their models. So you've got a top-level assembly of one of their jets. Think of all the rivets in

that thing, not even counting all the parts in the entire jet itself. Think of just the rivets. They use that extensively and understandably why.

So again, you've got these. These are all default. You can select whichever ones you want. I would say, the All Parts Suppressed, what that does, it suppresses all parts at all levels. But your assemblies are still there. So if you have a feature of an assembly, it's still going to be shown. But the parts will not. All components suppressed is everything. It's all or nothing.

The reason why I suggest using the All Components-- if you have a very large assembly, save it as All Components Suppressed. That'll take that assembly file and shrink it down to almost nothing. It's the equivalent of, in a Part file, you got the End-of-Part marker. And you move that up to the very top.

Measure-- see what the size of your file is of that part before you do such. Then, move it up to the top. The size of your part's going to be 0. Save your parts that way as well, all right, if you have issues with disk space. There are, obviously, downfalls to that. But if you're mailing something out-- say you got to email a part out-- you can do that as well. Basically, it's almost like doing a pack-and-go or zipping a file, let's say.

Move the end-of-part marker up to the top of it. Send it out to a guy or whoever has got to get it. They open it up, take the end of part marker. Move it down. It rebuilds itself. This is basically the same thing. Select the All Components Suppressed. It will shrink that assembly down to nothing. Save it. Put on your disk.

The reason for this is, now, when you go to open up that assembly, it's going to open like that. It's going to take no time to regenerate and come across your network. It's going to come across, because there's basically nothing in it. So now, when you open it, you go in and change that Master level-of-detail. There's your assembly right there. So that would be the quickest way and easiest thing to do. So again, your Master-- no parts are suppressed-- all Components, All Parts, and then your Content Center.

Again, these are all-or-nothing for the most part. But you can make your own as well. So you can always create your own level-of-detail. You are not limited to the number of level details either. So let's say, it's almost like a design view or design rep. Let's say, again, you're working on this tail section. And you got this one little tiny motor that turns the rudder, let's say. Well, it's probably not a tiny motor. But still, you got to work on a motor or something on it, a component on that.

And at this Pacific Northwest manufacturer of jets, do you want to have to open up that assembly every time and wait for it to regenerate? Save a level of detail, just the components that you're working on. And activate that. And get right to it, boom, boom, boom. Save it. Get out of it-- done. You're not going to have to have it regenerate and bring in all those parts and reconstruct those parts in the background while you're waiting for it, unless you want to go get a cup of coffee. That's up to you. But that will do it.

So you can create your own level of details, based on how you want to bring that up. Level of details can also be used in your detailing side. So you can save a specific level of detail showing five components that you want to show in a specific view. You can specify, when you create that view, that you want to use that level of detail.

So you will see that in your browser. There it is! So by default, when you create your own level of detail, it's going to call it Level of Detail 1. Of course, you can double-click on that and rename it and give it some kind of descriptive name so you know exactly what it's showing.

And again, when you activate your assembly, during the Open File Dialog box, select the Options button. You select the Options button, it will list that you can select the Level of Detail. And let me show you such in a video. "Tsh-tsh-tsh-tsh-tsh."

You all know this assembly, right? I know you've seen this assembly somewhere, believe it or not. So basically, you had an assembly here. Again, you got your level of details. You get your Master. You got your default ones. So this one here, I'm kind of showing you what the difference is with the file size. So notice the file size of this assembly, before you do anything.

Then, we'll go in and we'll select one of the default ones. OK, we'll just activate that. Notice it goes away. Your preview-- there's no components being shown now. So it looks like a blank file. Notice, everything has been suppressed. Now, you go back to the I-Properties. Look at the file size. It takes up no space whatsoever.

So if you have issues on your disk or your server, as far as size goes, this is a way of avoiding that. But let everybody in your department know that this is going to be a process. Otherwise, they're going to sit there and say, there's nothing in this assembly.

AUDIENCE: I assume, though, if you're using [INAUDIBLE].

JIM O'FLAHERTY: Preview will be blank. So if you're used to using that thumbnail, that's one of the downfalls. So

yeah, I know a lot of people use that preview. And yeah, this pretty much eliminates that use, unfortunately. Again, you've got to figure out what your tradeoffs are going to be.

And, let's see. So here's one here where you want to open the view here or open the assembly. You got your Options button. It's asking for a level of detail. You can come in here and select whatever level of detail you want, on the open. So you don't have to open the file and then go and select a level of detail. You can go right to it. And it will bring it up.

Again, this one here, I selected one that's suppressed. Everything's suppressed. Now, I can go in and select Master. Come on, select Master. Ah, I'm going to show the size. So again, here's the size. It's got nothing to it. I can go in here and just activate the Master. Your assembly comes back. Everything is there. And the file size will be what it was.

Come on, Jim. You can do it faster. Yeah, you got to save it. There you go. So there's your assembly size. Again, this will speed up activation of a very large assembly. Granted, this is basically a small assembly. But yeah, if you have an assembly that's thousands of parts, this is a process you're probably going to want to look into.

So again, let me do the slide show. I went back one. There we go. So again, when you open up a file, if you go to the Options button, you're going to have your level of details here that you can select. Now, if you create your own personal level of details, they will also show up here in this dropdown list. So if you have 50 of them that you make, they're all going to be together. You scroll, select the one you want. Open it. You're done.

OK, that was the video it just showed. So again, some of your common issues-- the thumbnail preview has gone away. If you insert a subassembly into another assembly or assembly into assembly, and that subassembly you're inserting is set at a level of detail of parts being suppressed, it's not going to show those parts when you insert them, obviously.

So if you have something that is all components suppressed and showing nothing at all-- I've seen people sit there and-- why isn't the assembly coming in? And they're clicking, clicking, clicking and inserting this assembly in there. And then, when they finally stop clicking, I showed them what happens. They bring it up. And all a sudden "pfvvv," they got all the different times that they've clicked that assembly now into the upper-level assembly. Yeah, so be aware of such.

Benefits, do they outweigh the drawbacks? Again, how important is that preview? How

important is the level of detail? You got to know that you've got to bring it back on once you insert it into an assembly. So again, it all depends what you're trying to accomplish.

Weldments-- how many here do weldments? All right. Weldments are features of an assembly. Think about it. You can't weld one part to itself. Why would you, right? You weld two parts together. That weld bead is a feature of the assembly. So that weld bead will not show up in the part level.

It's sort of like putting a hole. If you have two plates, you've got to weld those two plates together. And then you drill a hole through both plates. That hole didn't exist when the parts were separate. That hole is a feature of the assembly. So you can actually put a hole as a feature in Inventor as part of the assembly.

Again, think of an assembly line. That's basically how Inventor is set up when you do your assemblies and your features. That hole comes at some point during the assembly process. That's why it's a feature of the assembly itself.

Welds, weld beads are basically the same way. So if you're going to do a weldment, again, start a weldment file. That will give you all the features of putting in weldments, such as your weld preps, your machining to welds, your weld beads, all that info. All the intelligence that you put into that model will now propagate over to your drawing as well.

So you got three main categories. What are they? Come on. This is for swag. Pen or shirt? Who wants the fancy stuff? (WHISPERING) Nobody. Nobody?

AUDIENCE: [INAUDIBLE]

JIM O'FLAHERTY: I'll keep a shirt for myself.

AUDIENCE: [INAUDIBLE]

JIM O'FLAHERTY: Bingo. What color shirt and what size? Or would you like a pen?

AUDIENCE: I'll take extra-large, but not [INAUDIBLE].

JIM O'FLAHERTY: Not who?

AUDIENCE: But not tan.

JIM O'FLAHERTY: Not tan. [WHISTLES] Well, that gives you red or red. Oh, and I found red. All right. So yes, you

got preps. You got the welds. And then you got the machining of such.

So again, your preparations-- that is where you machine off that wedge that the weld is going to fill, that weld bead. That preparation is a feature of the weldment assembly, just as the weld bead is. And then the machining, that is also a feature of the weldment, because it happens after it's been welded. So it doesn't happen on individual parts before they are put together.

Just like with sheet metal or creating an explicit part, you can convert it to sheet metal and vice versa. You can do the same thing with a weld. You can take an existing assembly and convert it into a weldment and then have access to all the weldment features and vice versa. So just because-- if you start an assembly and you're working it and then you realize, I could have had a V8-- you know? Yes, sir?

AUDIENCE: Isn't there a way to get the weld [INAUDIBLE]?

JIM O'FLAHERTY: Is there a way of putting the weld into an IPT file?

AUDIENCE: Let's say we [INAUDIBLE].

JIM O'FLAHERTY: Right.

AUDIENCE: [INAUDIBLE]. And then the [INAUDIBLE] doesn't need welded, [INAUDIBLE]. And I think it's one IPT. Do I have to create a weld [INAUDIBLE] to just introduce the weld? Or [INAUDIBLE]?

JIM O'FLAHERTY: Well, you'd have a weldment to put those parts together. You'd put the weld prep--

AUDIENCE: [INAUDIBLE]

JIM O'FLAHERTY: --and then a weld bead. And then you machine it.

AUDIENCE: [INAUDIBLE]

JIM O'FLAHERTY: Right. Oh, OK. I see you're saying. Yeah, you can convert it. You should be able to convert it to an explicit IPT. So I would say, do it as a derived part.

AUDIENCE: OK.

JIM O'FLAHERTY: Would be the best way to do it.

AUDIENCE: Thank you.

JIM O'FLAHERTY: Mm-hm. So to convert to weldment assembly, you're going to have this little icon here, Convert to Weldment. That's on your Convert panel within your assembly environment. So weld features, again, are features of the weldment assembly. Weld symbols can also be added or shown within the weldment assembly, as you see here.

So you're going to see this within your assembly environment. You can put out the welds there so you can see them. Same thing is starting happening with a GD&T, if anybody uses GD&T now. The GD&T symbols are now able to show up within your model-- not all of them, unfortunately. Don't know why. I put that in as an idea in Inventor's Idea Station.

If you don't use the communities, please sign up and use them. You will see me out there. I am known as-- don't laugh too hard-- the Angry Elf. It's a nickname that I got way back when. And it has stuck. So I'm out there as the Angry Elf. But yeah, use the community.

If you have a question, post it out there. There are people that camp out on the communities. And they will answer your questions like that. And some of them are extremely good at it. Quite a few of them are here, speaking at AU on a regular basis. So hopefully, we'll get all the GD&T symbols and not just half of them within our assemblies.

AUDIENCE: [INAUDIBLE]

JIM O'FLAHERTY: Pardon?

AUDIENCE: Total [INAUDIBLE].

JIM O'FLAHERTY: Yeah, there's a few. Well, the 2009 standard isn't fully offered yet. I don't know why. But anyways, your welds, any kind of features, again, they will show up on your browser because, again, they are features of the assembly. So your welds, they are fillet. What else? Come on, we got swag to give away.

AUDIENCE: [INAUDIBLE]

JIM O'FLAHERTY: Well--

AUDIENCE: Automatic.

JIM O'FLAHERTY: We got three actually. OK, so you got your fillet. That adds material to your model and your mass properties. So again, any welds you put in here, it's going to add weight and mass to your model. You've got a groove weld. Same thing-- this will add material to the model itself

and your mass properties. Anybody know the last one? I'll give you a hint. It does not add to the mass.

AUDIENCE: [INAUDIBLE]

JIM O'FLAHERTY: Quest-- with an asterisk on it.

AUDIENCE: [INAUDIBLE]

JIM O'FLAHERTY: Nope. I heard it. I heard it.

[INTERPOSING VOICES]

Cosmetic, yes. Cosmetic does not add any mass or any weight to your mass properties, unless you say to include it. This is basically a stripped down version of the weld symbol. Basically, it just shows the highlight of the cosmetic in there. So it doesn't actually build the weld bead in there.

All right, Frame Generator-- I'm hoping to do a class on this next year. The only thing is, Frame Generator can get really in depth. And I'm figuring it would have to be, like, an hour and a half class. But anyways, Frame Generator allows you to create just that, frames.

So you basically go in there. You sketch a skeletal model of what you will need that frame to look like. And based on the components that you select out of Content Center, such as an I-beam and an angle iron, any tube, square tubing, whatever you want to do, you specify all that. You use that skeletal model to put in those shapes-- to put it those shapes. There they are. It ends up looking like such.

Now, with this on top of that, it offers all kinds of options for your joints. So you got all different joints in there. If you want to put a miter join in there and you've got to specify a specific offset for that weld bead to fit through there, you can specify it in there as well. It goes in and cleans all that out. And you can detail all this you want. So Frame Generator works really, really well.

So your general steps-- again, create the skeletal model. That is going to be your controlling sketch for that assembly. So it's basically a top-down type assembly. As that skeletal model changes, your parts will then change as well with it. Everything's adaptive.

So insert that skeletal model into an assembly. Insert the frame members by selecting that icon on the Design tab in the Frame panel. Select the entities on the sketch to where you want

to place that frame member. And then select whatever end treatments you need for that frame.

Come on. It ain't gonna work. I think the battery is dead. There we go. All right. And I have a video for that. So here it is. I have already created a skeletal sketch for it. And it's already in the assembly, as you can see. So it's just a basic box. As you can see, I got the part in there, the skeletal model already in the browser. So save that as the assembly.

As you can see, it's a 3D sketch. It's got all the center lines or edges, however you want to do this. I picked them as center lines for that frame. Go up and select the Frame Generator. Again, you could specify whatever you want for your shapes. They're all based off of industry standards.

You got your sizes. You got your location. You can have offsets as well. So that's what all these little icons are here. You can specify how it locates on that sketch. In this case here, like I said, I got it going off the center. You could also specify what direction the offsets are. You can change your appearance. You can change your material. And you can specify the placement, whether you select the endpoints or the center of that sketch line.

And if it comes in the wrong way, you can always specify the toggle and no flip-back. Or actually, I'm sorry. That's the second one. Anyways, you'll see the preview of it. It'll ask you for a name, because it's a custom part, because it's going to be a custom length.

So you give it your specific name. It throws it in there. And you just keep going in there and keep doing this. And you specify-- you go around and click where it's going to go. And you'll see it. It'll build. And I think I'll fast forward this here in a bit, so you don't have to see the whole thing.

AUDIENCE: That's where you put your [INAUDIBLE] in?

JIM O'FLAHERTY: Yeah, you could do this after you have everything put in. So you put it all in first. And then go back and do the end-treatments. Here's the pause-- ba-boom! Look at that. It's finished, highly-polished. And I don't think we see the yellow Mini Cooper in there though. How many enjoy that Mini Cooper in the reflective?

So yeah, here you can go over there. You can change the visibility. You can see you even got some sketch entities in here, so you can actually activate the sketch and adjust it accordingly.

But here, I'm going to go in there. And I'm going to show you how to put in the end-features. Come on.

So you can see how everything is rough. There's no miters on here or anything of that sort. There's no welds. So you got to go in there and fix those. So here's your end-treatment. You can specify what the gap is between the miter. So you got your weld bead that goes in there. So you can specify that, however big you need it.

Select the two entities. And I know it's kind of hard to see. But you could see how to-- yeah, there we go. Zoomed in a little bit better. And you can see how it trims it right up to it.

So also, you got this part here where you'll see that it's actually inside here. Because it was on centers. You can actually trim that up, select the end-treatment for that. And that'll trim it to the top or whatever face you select to trim it to. In this case here, I've selected the top face. And it turns it back.

How we doing on time? We're getting there. All right? Due to time constraints, we're going to wrap this one up.

So some tips and tricks-- shutting down. How often do you shut down your workstation? Daily?

AUDIENCE: Never.

JIM O'FLAHERTY: Daily? Never?

[INTERPOSING VOICES]

AUDIENCE: Once a month.

JIM O'FLAHERTY: Once a month. Shame on you.

AUDIENCE: Once or twice a week.

JIM O'FLAHERTY: Shame on you. Shut it down on a regular basis actually, if you can. Let me go back to that. Here's why. Numerous applications you're going to use in Inventor grab memory and don't release it. You have memory leak here and there.

AUDIENCE: [INAUDIBLE]

JIM O'FLAHERTY: So yeah, exactly. So it retains that, I should say. So the longer you go, the more that's going to

grab every time you use it. The only way to clear that is to shut down your station. Let it clear all that memory. And then start it up again. I typically say, if I don't log off or shut down every night, I at least do it once a week.

AUDIENCE: [INAUDIBLE]

JIM O'FLAHERTY: Yeah. Yeah, yeah. Other options you can select here in the assembly environment-- you can deselect the Enable Relationship, Redundancy, Features are Initially Adaptive. You can change all that. That'll speed things up for you. So again, you can enable or disable that, enable the Relationship Failure analysis, so it's not doing that in the background and, again, whether it's adaptive or not.

A few things here you can change-- again, the adaptively. You can choose to disable this. In the application options, you can also right-click on the adaptive part and say, Undo the Toggle for the Adaptively. So you got different ways of doing it.

Content Center-- I assume everybody here uses Content Center.

AUDIENCE: [INAUDIBLE]

JIM O'FLAHERTY: How many think Content Center's only fasteners?

AUDIENCE: [INAUDIBLE]

JIM O'FLAHERTY: I can tell you, when I was a reseller, 90% of places I went into and put in Vault or installed Inventor, they deleted Content Center and never loaded it. Because they said, well, we have our own fasteners.

[INTERPOSING VOICES]

(CRINGING) Ugh, yeah. I understand that. But there are probably tens of thousands of parts in there that you could use, gaskets, springs. I mean, all kinds of stuff. If you do any piping, it's all in there. Building blocks-- they got building blocks in there now.

AUDIENCE: Quick question on the Content Center?

JIM O'FLAHERTY: Yeah?

AUDIENCE: If it was absolutely necessary, we could have our own parts in there.

JIM O'FLAHERTY: Oh yeah, you can create your own library. Yeah?

AUDIENCE: Is there a easy way to use the Content Center and put your part numbers to the existing Content Center parts?

JIM O'FLAHERTY: I would say, the easiest way is to open up the Content Center part, save it, and give it your own name, and then put it in your own custom library. That seems to be the most common way I've seen it done. There are different ways. But yeah, that's usually the way to do it. Or insert the cost the Content Center part as a custom part into your assembly. And then, it'll prompt you for the name and the location of it. And you just put it right to your library.

AUDIENCE: [INAUDIBLE]

JIM O'FLAHERTY: Yep, instead of reinventing the wheel. That's another thing I see people do. People that are not in the fastener business, create their own fasteners. And guess what? They get it wrong. Imagine that.

AUDIENCE: Yeah, but sometimes the newer Content Center doesn't include [INAUDIBLE] a different feature. And the older [INAUDIBLE]--

JIM O'FLAHERTY: Right

AUDIENCE: Sometimes, fasteners [INAUDIBLE] because I got rid of my [INAUDIBLE].

JIM O'FLAHERTY: Yep.

AUDIENCE: Is there a work-around [INAUDIBLE]? Or just--

JIM O'FLAHERTY: Something changed, yeah.

AUDIENCE: [INAUDIBLE] just keep every single one of them.

JIM O'FLAHERTY: You can. The other thing too, only load Content Center of what you're going to use. If you don't use DYN or JIIS parts, why download that library? Just download the library you're going to use. Because all your international standards are in there. I see a hand way back there.

AUDIENCE: With the Frame Generator, can you do the same thing as [INAUDIBLE] Content Center? Because we use a special framework from a special company instead of what's in the libr-- that I can access.

JIM O'FLAHERTY: Right. So you're looking to make a customized frame.

AUDIENCE: Yes.

JIM O'FLAHERTY: Yeah. Yeah, as you see, it'll prompt you for that name. So when you insert that component in the Frame Generator give it the name that you need it and give it whatever specifications you need to give it and save it. Because it comes in as a custom part automatically.

AUDIENCE: OK.

JIM O'FLAHERTY: Constraints-- make constraints your friends. Trust me. It pays off big time at the end. So learn how to do constraints. The Insert constraint is probably the most powerful constraint out there. It gets rid of all but one degree of freedom in one shot. So use the Insert constraint wherever you can.

Always consider constraining to the default origin and planes that come out with Inventor, your original X 0, Y 0, Z 0. Reason for that is they can never be deleted or modified. User ones can be. And I think we're almost getting the bums rush out of here.

Defrag your files-- who defrags their files? Did you even know you could defrag your file? You defrag your hard drive. Defrag your files too. You'll find that in the Task Manager. Hey, this one might actually work. Is it going to play? Is it going to play? Is it going to play? It's not going to play.

Well, let's see if we can move on. Oh, it is playing. There it goes. Come on.

[FINGERS SNAPPING]

Any time now. Any time now.

AUDIENCE: [INAUDIBLE]

AUDIENCE: Maybe you need to defrag.

[LAUGHTER]

JIM O'FLAHERTY: Yeah, I need to defrag it. Right, exactly.

[LAUGHTER]

All right, who said that? Who said that? Put your hand up. Put your hand up. All right, you get a shirt.

[LAUGHTER]