PHIL SPREIER: So today, we're going to be talking about 3D PDF. Just quick class summary. We're going to talk a little bit about Inventor 2017 is 3D PDF support. We'll talk about how you view 3D PDF. We'll talk a lot about the Adobe Acrobat Reader and how 3D PDF behaves in it. We'll talk a little bit about how you can do forms and templates and other types of things so you can customize your 3D PDF. And then, I'll just, if we have time, I'll go through a couple of quick examples of some pretty complex 3D PDF so you can see what exactly what it does. So my learning objectives, like I say, you should be able to create 3D PDF models from Inventor when we're done with this. You should be able to interact with them. You should know a little bit about how to create forms and templates. And hopefully, everybody's going to learn a little bit something about PDF they didn't know today.

One of the things that I run across a lot is that people think 3D PDF is is CAD on a page. It's a viewer. And it is that, but it's significant amount more, too, and so we'll cover some of that today. So if this is not what you expected, now's your opportunity to leave. All right. So I do like talking a lot about myself so I'll do that for just a moment. I have a long history with Autodesk AutoCAD. I work at a company called Spatial Technology and they made a product called ACIS and that's a 3D solid modeler. And it was the 3D solid modeler they put inside of AutoCAD and Inventor and Mechanical Desktop and all those things.

I was a product manager of that for a number of years and I worked closely with Autodesk. Then Spacial got acquired by this French company called Dassault Systemes and they make CATIA and they make SolidWorks. That was the beginning of what I call the great schism. And Autodesk decided they were going go their own way and build their own, take their source code for ACIS and build their own modeler, that's ShapeManager today.

When the great schism happened, there was a lawsuit that was involved and I had to go, they deposed me, and did all those other things. So for a lot of years, I haven't done anything with Autodesk. But now, evidently, the great schism is all behind us and I'm working for a different company so I'm glad to be back in the Autodesk family and be able to talk here today. I am the Technical Director of the 3D PDF Consortium. I also serve on the ISO committee for all the PDF ISO documents, and I'm an Acrobat Certified Expert.

A little bit about the Consortium. We're a group of companies that are dedicated to 3D PDF usage in manufacturing or any kind of engineering workflow. There's a bunch of different

companies, we have Adobe, we have Boeing, we have General Electric, and we have a bunch of vendors. One of the vendors we have is Anark and you'll see that the 3D PDF in Inventor 2017 is powered by an Anark. So one of our members was the ones who actually did that development. We're nonprofit or member funded. There's only two us who work for the Consortium full time and I happen to be privileged to be one of them.

So let's talk a little bit about what exactly is 3D PDF. But before we can talk about what 3D PDF is, I think we need talk a little bit about data because engineering is really super data centric, right? I've worked in data translation for a lot of years. And the thing about data is that it just tends to be a bunch of raw unstructured numbers. Right? So you get a bunch of data and then you have to do something with that data. Most CAD formats are actually data specific. STEP is a data specific format, DWG is data specific, all those other things. When you actually want to communicate data to a person, the way that we do that, typically, is through a document. And I like to think of documents as data with purpose. Right?

So if you wanted to get a quality report or inspection report from your quality department, you would send them some data. Right? But you'd also send them a few other things. You'd send them some forms that need to be filled out, they send you back an annotated document. You get all those things and that's not just data, that's data with a purpose, because all those things that you put in that document are there to go ahead and focus your attention on something. A document tells the story.

There's really only two document formats that I know of today that work really well in CAD. One of those is PDF and another one of those is HTML. And Autodesk has done a lot with HTML in cloud, and that's great, and I think it's a really super-- you know, anybody who uses the cloud and the web, I mean, it's changed all of our lives. But the one thing that the HTML and the cloud don't have is persistence. They don't have this thing where they're durable. You can't save them. You can save them if you want a bunch of 404 errors, but it's typically not sometimes meant to be saved. And the people I work with there's a lot of records that you need for things, things like contracts, things like government things, regulatory documents, things like that. Those are documents, those are their records. And PDF is suited for doing records in the engineering space.

So as I mentioned, PDF is actually just PDF plus-- 3D PDF is PDF plus 3D. It has all the rich things that you do in a PDF file, they're all in there. You've got forms, security, presentation, all kinds of stuff. There's SDKs for working with Acrobat, there's an SDK for working actually with

JavaScript, there's all kinds of different programming languages you can do in there. But what they did is they added 3D to it so there's this whole 3D model. And inside that 3D model, it gives you a lot of data that you can put in there. You can put a whole BREP in there. Right? Not many people know that, but you can put a whole BREP inside of a PDF. You can put a visualization, you can put GDNT, PMI, you can put all kinds of things in that PDF file and that 3D data.

Now a little bit about the history of it. It's been around for quite a while, 3D PDF has. Actually, PDF in general had started back in 1992, Adobe released that. It came out, it was the idea was they wanted a portable type of a postscript type of file so they put PDF. They went and invented PDF at that time. Back in, I think it was about back in 2004, was when they actually put 3D into it. They decided they were going to go ahead and look at the engineering marketplace and create documents for that. So in Acrobat 7, Acrobat 8, and in Acrobat 9, they had a whole complex set of 3D tools that went in there. As a matter of fact, in Acrobat 9 Pro they had a whole bunch of translators so you could translate CAD documents directly into PDF.

And then 2009, the recession hit and Adobe decided they were going to divest out all these things. So they were not going to be a vertical market anymore, they were going to go horizontal. Adobe Reader is installed on something like 93% of the world computers today. Right? And that's a lot of computers. And they were looking at that engineering specific space and they thought, well, it's a good space, but it's not growing fast enough for us. But what they did was they couldn't kill the technology because it was being widely used. Companies like Boeing had adopted it. The entire 787, all their assembly instructions for the shop floor are all in 3D PDF is drawingless. Right?

So they thought, oh, we can't kill it, what will we do with it? So they diversified and they gave it to a number of companies to go ahead and develop that. One of those is Tech Soft 3D. They are a company that's here. They're Tetra 4D and Tech Soft 3D, they're the same company. They're a member of ours and they're showing here. They do all the core 3D development for the Adobe product and they license that back to Adobe. Adobe continues to support it and continues sales support forever. There's no plans with that-- there's no plans for them to do anything other than continue to adopt it or support it.

Lots of times I get people who ask me questions about that because there's rumors that PDF may not be around. PDF's here for the duration. It really is. It's used in every major banking,

government, legal system in the world today and the 3D parts of it are actually part of the standard now, too, so it's not going away and it really can't go away because it's part of the standard. Now that standard specifies a way you can put 3D in that file.

And there's two ways you can put 3D in a PDF file. The first one is that you can use this PRC and the second one is U3D. They're different file formats. Originally, the PDF used U3D and that was its file format. And then Adobe acquired a small company in France that had this PRC format. And PRC is a little bit different. It's a little bit more engineering specific. U3D was developed by Consortium, headed, I think, by Intel. Microsoft was involved, a number of different companies were involved in that U3D.

It's a really nice format, but it doesn't have a bunch of CAD specific data. You can't put a BREP in it, you can't put some of the data that you needed to in there. In order to overcome that, they use the PRC file. Now PRC gives you all the geometric data. It gives you views, it gives you PMI, it gives you a number of different things, and it really was designed to be an engineering specific 3D format. The one thing that PRC doesn't have is it doesn't have animation capabilities which U3D does.

They're roughly comparable in terms of the things they do. PRC is perhaps arguably a better engineering format. U3D is arguably a better presentation format because it has an animation in it. PRC is highly compressed, U3D is compressed, but not quite as much as PRC. The Inventor 2017 product creates only PRC files. That's kind of important because PRC's not supported by all the viewers and we'll talk about viewing in just a second. All right.

But before we do that, let's go ahead and let's talk about how we can go ahead and how you create a PDF file in Acrobat, I mean, in Inventor, excuse me. So let me go ahead and stop this quickly. And then let's have a quick look at our Inventor. So I'm going to go ahead and load up Inventor, and you'll see here I have the Ember 3D printer. It's an assembly that Autodesk makes freely available and I thought it was kind of a good one because it's reasonably complex to use. I've added a few representations you'll see here. I have a base assembly representation so all I did was I made them so they were specific to the sub-assemblies that are in there in this particular assembly and then we have our default.

To go ahead and create one from Inventor 2017, it's a file export and export is 3D PDF. You'll come up with the PDF Publish to 3D PDF menu and you'll see there's a number of different things. The first thing you can do is properties over here. And properties are any type of

metadata that's associated with a model. And if you leave it in its default settings, you're going to get a bunch of metadata and that metadata you'll see in the PDF file. One of the things you kind of want to do when you do this is that there is this little button here and it is Select All Fields with Values. And what that means is that when you export 3D PDFs, if the value's not there, if that field contains no data, it won't write it. By default, it writes all the metadata in the model. But this one makes for that you only write the metadata that is actually filled out.

Over here, you've got the Design View Representations. As I showed earlier, we have these representations I put up here so you can decide which ones of the representations you want to write into it and those become what we call a view in the 3D PDF file. You can set your visualization quality to low, medium, or high. My recommendation's that you typically leave it at high, unless you need to make a very small model or a small file. And the reason for that is, is that all your circular surfaces and edges will become tesselated, they'll become polylined type representations. So the coarser your visualization, the coarser all your curved surfaces and curved edges will be. Right?

So if you want the PDF to have-- because it's tessellated, what gets written into the PDF file is a tesselation or mesh. It doesn't carry all the geometry, it carries a visualization representation. It's important that you set this and you know what this one does. High will give you a larger file size, but you end up with smoother curved surfaces. Low will give you a smaller file size, but you end up with a lot of segment or polyline type edges or surfaces. In the notes that I have posted for the course, I wrote like 40 pages worth of stuff. And in there, there's a few images where I show exactly what it does so you can just refer to that or you can play with it, either one you want.

If you want to the export scope, what are you going to put in there? All your entities are only ones that are in the design view representation. So if there's any piece of the model that's not in one of my views, I can select it so that it won't get shown, it won't get exported to PDF. By default, it only exports those things that are used in my design view representations. There it allows you to select a template and the template is exactly what it sounds like. It is a blank document that the PDF, 3D data, gets written directly into and I'll show you those in the next slide. You can figure out where that file x output location is. You can set it wherever you want it to be. It doesn't prompt you for a file name and a directory, so if you want to change the directory or something, you have to do it here and before you actually hit the Publish. It's not going to ask you for that later on.

And then you've got View PDF When Finished. I like to keep that clicked because I know what my PDF looks like when it gets generated. One thing you should know is that if you don't have a PDF viewer registered on the system, I have heard people say that they may have a little bit of problem when it goes to launch that because it will typically launch something like Chrome or browser or something like that.

Now PDF can be viewed by tons of different systems. Every major operating system has a PDF browser in it or viewer. All of the browsers, internet browsers, Chrome, Firefox, all of them, they have their own PDF viewer. None of those support 3D, yet. There's two products that support 3D in terms of PDF viewing. The first is the Adobe Acrobat products and the second is the Bluebeam products and Bluebeam's showing here today at this conference, as well. If you don't have one of those two registered, you may have a little problem seeing that 3D PDF file when you go ahead and click View PDF When Finished.

Then finally, you can generate and attach a STEP file. Bluebeam. Yeah, Bluebeam. And at the very end of my presentation, I have their booth number and a few things on there so you can go ahead and visit them here, if you would like. Because there's no BREP in a PDF file, you can go ahead and attach a STEP file to it. STEP's great because almost everything reads and writes STEP today and use that full BREP. So if you wanted to machine a part, you typically wouldn't machine off a PDF file. You can machine off a tesselated model, but you're pretty much going to want the geometry. If I was going to send a PDF file to a machine shop or to manufacturing, I would always attach a STEP file to that because that way they can use that for the manufacturing. You can use the PDF file to do all your communication, to do your viewing, to do your collaboration, those types of things, but if they want to actually cut a part, you've got a STEP file in there.

Now a couple of things you should know about that STEP file they put in there, is it defaults to AP242. Now I spent a lot of time in interoperability with CAD format, so I know what that means, but I'm not sure everybody does. There's a bunch of different what they call application protocols for STEP and you need to make sure that the person you're sending your STEP file to can read that application protocol. Now AP242 is the newest one and it's going to be widely used. One of the great things about it is you can put GDNT in it, you can put PMI in it. It's got all those dimensions and everything else that you need for a manufacturing process.

The only problem is it's not widely supported, yet. So if you generate AP242 file and you send it to somebody and they want an NC off of it, there's a chance they may not be able to read

that file. So always make sure that the person you're sending this to can read this STEP file that you're generating. So you have the opportunity to do 203 or 214 here and those are common, they've been around for a lot of years, and almost every application reads and writes both of those so you can default to one of those two.

It also allows you to put in some information. I put some in for myself here, in terms of authorization or other types of things, and author and whatnot. And those actually get written into the STEP file. They don't get read in the PDF file, they get written into the STEP file. OK? And then you can add other attachments, and we'll talk about attachments here in a few minutes. But if you want to attach another file to your PDF, if you have a bill of materials or directions or anything you want, a form that you may have that they may need to fill out, you can stick that in here it will get added to that PDF file, too.

And then we'll just go ahead and we'll publish that. I already have one of those. Now let's talk about Inventor 2017 for just a moment. When Inventor 17 first released, if you're using the original version of Inventor 2017, I give you full permission to be really mad at Autodesk for their 3D PDF support because it didn't do such a great job. I wrote a blog about it. I used only test parts that I found on the Autodesk site. So I went and I grabbed the Inventor test parts, I thought this is great. I'm going to go ahead and test it. 60% of those failed out of the box. So it wasn't what I would call a huge success, but Autodesk did what they normally do, they fixed it rapidly.

So if you use the current Inventor SP3, you're going to see it's significantly better. What's gotten better about it? Well, the first thing is the file sizes are smaller. The original ones in original Inventor used a lot of fonts and those fonts got included in the PDF file and then it got really large. PDF has the ability to be self-contained so it puts fonts into it. So if you use standard fonts, like Times and Courier and other types of thing, those are always supported and they create very, very small PDF files. But if you want to create your own font or stick a font in there that is not one of their standard fonts that comes with PDF, it makes those file sizes large. It was super slow.

Now I wouldn't call this a speed demon now, because we're doing this in real time. It's reasonably complex, but it's not hugely complex. But it has gotten significantly better in terms of it and what I've noticed is that the larger the assembly, is a longer the time it takes to do it. It uses the Autodesk and the Inventor API and it pulls all the data out of the Inventor file, but right now that's not particularly a fast process. And the other thing they've done is they've

made it a lot more stable.

I was running just this last week all the files that I had that failed in the original Inventor now work, they all translate really well. I've been looking the different types of user groups and other types of communities they have out there in the internet, and where people were complaining about before, it seems to be quite a bit better now. It's not perfect, there are some things like color overrides, it doesn't get decals, a few other things that aren't quite there yet. But I think it's come a long way in the last six months and I think it's going to continue to be improving as we move forward. So I have to give them a lot of credit. They move very quickly and they made it much, much better.

AUDIENCE: Don't you need to redownload the templates because there's a [INAUDIBLE]. It came out in SP2.

PHIL SPREIER: Yes, sorry. So those are automatically installed when you do the SP2. I thought, no?

AUDIENCE: No, it's a separate download on the page.

PHIL SPREIER: OK. Sorry about that. So there is a separate set of templates and what those templates did was those templates changed the fonts. That's all that I know that they did. That made it smaller. The template, the font that you select in your template, is going to determine what fonts get stored in it and I think all they did was they just changed those to a standard files font. It makes them much smaller. Talk about that just for a minute. That introduces some problems, occasionally, though in that if you customize one of their templates and they release a new template, you have to go back and customize the new template, too. And that can be time consuming for you to do.

Now there are some products out here if you go see Tetra 4D, I think they have a product that will allow you to do templates and things without having to go back through and redo them when you want to change your template. So they have some really nice products and you should check those out. So now it's done and we go ahead and it launched Adobe Acrobat. First thing you notice when you come into here, is it has that yellow bar up on the top the screen. And the yellow bar says very simply-- my apologies, let me just change one more thing here that we're on-- if none of you have used this tool from Microsoft, it's called ZoomIt and it's pretty sweet, but if you do any type of presentations, it allows you to just put your cursor over some part of the screen and it will automatically zoom it. And then when you're done, you hit Control 1, it zooms whatever that is, and you hit Escape and it goes back. I only say that

because I think it makes it a lot easier for everybody to see. And if you ever want me-- if you can't see anything, just yell, ZoomIt and I'll make sure I do that.

So in the top left hand corner, you'll see they put this 3D Content Has Been Disabled. That is a standard default feature in Acrobat. The reason for that is 3D is complex and they worry that there's some security issues in the past with it so they turned it off by default. Now I've never had a security issue with PDF, 3D PDF, and I don't know anybody who has, but it's widely used. So there definitely is the opportunity for that, I think, but they've done a lot of things, they've responded quickly to any type of security issue they've ever had, they put other things in it to make it work quite well.

So here you get the chance to do a few things with it. You can trust the document one time only or you can trust the document always. So we'll go ahead we'll do it always for this.

AUDIENCE: Always never works.

PHIL SPREIER: Always will not work?

AUDIENCE: Always never works. [INAUDIBLE]. Yeah, you got to go in and send it to size.

PHIL SPREIER: Yeah, you can. I'll show that right now. Yeah. So we'll go ahead and trust the document always, but if you wanted to, you go to Edit Preferences and there is a 3D portion of it. And the very top thing here says Enable Playing of 3D Content. And if you click on that, now you will never see that yellow message again. Yeah. Yeah. So but it has to be said on each installation. Right? It doesn't carry with the 3D PDF file. You have to set it on your local machine. Yeah. OK? Now because it was like that, you'll see that there's no image that's being shown. So we'll click in there to activate that and whenever you get that yellow bar, it doesn't activate the image and you're always going to see that little red question mark in the left top hand side.

So now we've gone ahead and we've activated this and we have this one I used a particular template. I believe, this is the sample assembly template. There's four templates that come with it . And because I used a template, I get a lot of information in there. The first thing-- and let's go back to the presentation, then we'll go ahead and go through a few more things with this-- so I've gone through the export into a PDF, and as I mentioned, I used the sample template, sample assembly template. There are the four that you have here, there's a blank one and that gives you CAD on a page, just like the blank PDF. There's a blank DVR carousel

and that gives you this little ribbon on the bottom. And what that does is allows you to select your different representation views that gets stored into it. So you click on one of those it will set that representation view.

You got the sample assembly and it give you some more information there. And you get sample part, which is basically sample assembly with only a single part. Sorry, I went the wrong way. We talked about. Viewers already

AUDIENCE: Quick question.

PHIL SPREIER: Yeah?

AUDIENCE: Didn't the color come in in SP2 or SP3. That's green now, color of the material?

PHIL SPREIER: Material colors come through, but it just depends on your material colors and how they're defined. Right? So yes, the answer to that's yes. I believe it uses all color overrides or material overrides because that level. This particular one does not give me color and I know why that is. I have a bunch of other ones that do, so yes, it's color has gotten quite a bit better, but it's still not foolproof, yet. All right? All right.

So let's talk a little bit about what you see here. Typically, when you bring up a 3D PDF file, all you see is the PDF data there and the PDF itself. There's a number of different things that are useful. The first one of those is over here. You're going to see that we have a navigation pane. That navigation pane allows us to select pages, bookmarks, attachments, and that bottom one is a model tree structure. So if you click on that, you'll find that here you have your model tree. My One moment please, it's not duplicating my screen. Now I did something else wrong, but we'll get back to that. All right.

So we go back to this, if you've never attended one of my presentations, something always goes wrong. So there will be more of this, I promise. So here's our navigation pane. We've got Pages, Bookmarks, Attachments, and Model Tree. Click on this, you get your model tree. Model tree's the way you typically move around in the file. You can expand it or almost always comes collapsed. And then you can expand the different portions of it.

There's three parts to your model tree. The first part is the actual structure. The second is a list of the views that you're going to have. And a third is going to be those metadata properties. If you go ahead and you select one of these, piece parts, you'll see that my metadata actually

got populated here. So whenever you select a part that has metadata associated with it, it will give you those properties there. One of the things about it that you'll notice, though, about PDF is that, typically, you're going to get two different-- it treat everything like it's an assembly. Right? So if you have a-- treat's everything like it's an instance, not an assembly. So if you have a single part and you insert that in your model, you would expect to see just that part name in Inventor. All right? But in the PDF, it's going to have a nested structure. You're going to have two entries for that same part. Because it's an instance, this is the definition of the instance and this is where the instance is applied. So you get two entries for each part in your model. And that's kind of the way that the PDF structure works and I see that frequently with almost all the PDF writers.

When we look in here, there's a couple of things. There is a 3D tool bar that you'll see up there. That 3D tool bar can be turned on and off, you can hide it, or you can collapse it. You can do all those types of things with it. When you collapse it, you're going to see a reduced toolbar and you're going to have to use a pull down just like some of the things are typically just on that particular tool bar, the expanded toolbar.

You've got Rotate, you've got Ax Spin, which spins around axis. You've got pan, zoom, a fly through, camera properties, measurements, comments, home, your view portion of it. toggle your tree on and off. If you have any type animation in it, you can play it with that button. The skin change between perspective and orthographic projections on it. This allows you to change what your rendering mode is. This allows you to change what your lighting mode is. And this allows you to change your background color. Then finally, we have the sectioning there. In the handout in the presentation, I have all the rendering modes and the lighting modes so you can take a look at that, as well.

If you want to go ahead and do some-- let's go ahead and change our rendering mode. The rendering mode that I tend to really like is I like this solid outline because it gives you all your edges. If you just have it shaded, you don't get those edges in it. And then the lighting mode that I tend to use is either cube lights or CAD optimized lights. You'll see the CAD optimized lights. I think I like Hyper for a little bit depth. If you're using an architectural model, daylight tends to work really well, as well for that.

You can go ahead and turn visibility of things on and off by simply selecting the check in the model tree over there. Or you can turn them all on or off by simply going to part options and you can go ahead and hide them, you can isolate them, you can make them transparent, you

can do all those types of things directly from this. The view, the rendering mode, is attached to each of the individual parts. So you can have the rendering mode different for each one of your parts. So if we go ahead and set this one to a render mode of Illustration-- oh, I didn't have it selected over here, sorry. Let's Go ahead and do solid outline. That's where I want it. Solid wireframe shows you the whole tesselations. Solid outline is the mode that tells you-- solid outline gives you edges, solid with edges gives you the tesselation. I hope that makes sense.

So let's go ahead and change-- on this part, we'll go ahead and select that and then we'll change the part render mode over here, and then we'll make that just a shaded illustration. So you can do that on the entire model. You can change all those things any way you want to do that. If you wanted to, one of the things that happens quite frequently is that when you get a PDF file, not from Inventor because it does a very good job at this, but when you get PDF files from maybe other sources, you'll notice that your center of revolution is not correct when you do your rotations. If you want to change that, you can just simply go part option and you can go ahead and zoom to part and that resets your center of rotation to be the center of whatever part it is that you have selected.

So if I come back up here, I'll select my whole assembly and then I will go ahead and get visible there and then it will reset my center rotation to that entire assembly. So that's really something that happens frequently, but just hit Fit Visible or Zoom to Part and that will reset all that for you. All right?

I think that that does it for this portion. We'll talk a little bit about a few more things here. So we talked about the model tree, three toolbar, hiding, isolating, and changing appearance. Here are the rendering modes, as I mentioned, for the different things. Some of those I don't really know why they're there-- transparent, bounding box, things like that, the wireframe. I'm uncertain as to why they have those, but the ones I use mostly is a solid shaded illustration and illustration and solid outline.

The lighting schemes, again, here they all are. Some of them are strange-- red, blue, green, things like that. Talked a little bit about navigating. Let's talk now about the model views for PDF file. As I mentioned, we have for each one of our representations, we have a view. Let me change my render mode back to solid outline. So when we create the PDF file, it created a view for each one of the view representations in the Autodesk file. Those are very, very handy things because they help you to isolate what people want to look at at the model.

Views are super important in PDF because the way that PDF works is PDF is like a digital paper so you can't really modify a PDF file, you can mark it up, you can add things to it, but you don't really modify it at all. Views is really the only thing that you can modify because it is just a visualization representation. It doesn't actually modify the model, it modifies the camera, the visibility, the colors, transparencies, and things like that, all are in views, but it doesn't actually modify the model. The second thing about views is that the views are used quite a bit for the commenting and the measuring capabilities inside PDF. So whenever you add a comment or a measurement, it gets added to a view.

The best way to work with views that I find is use this Managed View capability here. And it allows you to do a bunch of different things. Right now, I'm using-- this is not available in Adobe Acrobat Reader, this is a Adobe Acrobat that allows you to do some of these editing capabilities. You can create a new view. So let's go ahead and change a couple of things, first. All right? So let's zoom in and let's change our render mode to illustration and then we will hide this one.

AUDIENCE: Is there a way to get the transparent to stay transparent? I noticed when you jump to a view, it will turn back to a normal [INAUDIBLE].

PHIL SPREIER: Yeah, I'll show you that right now exactly how you do that. So now we've create this view. Now we change our camera and what not, let's go ahead and create this view and we hit a new view. You'll see here that you've got all these different settings you can have when you save this view. I think it's the node visibility or the render mode, I forget which one it is, that controls your transparency. If you save a property, like the camera properties or the background color with a view, when you select the view, it will automatically use that property.

So you set the background color on this to be blue and I save that background color with my view, when I activate the view, the background will be blue. If I don't select that, if I say I don't want to save the background color, then it will use whatever my current background color is when I activate the view. So I can create it with the blue background, but later on I changed my background to orange-- I'm a Denver Broncos fan so blue and orange are great-- and what happens then is since I didn't save the background color, it would not go to the blue, it would go stay at orange.

So the way that these options work is if you set them, then it will use them as overrides when you select the view. If you do not set the value, then it will use whatever the current value is

when you go to the View and I think that's what's happening with your transparency. I think that one of these is not saved with the view and then when you change your view, it may default back. Some of them may have it, some of them may not. So it gets a little bit confusing sometimes. I tend to go ahead and set all these whenever I create a view because I want them to see exactly what it is that I was looking at when I put a comment or a measurement or something like that on. So I use them all.

So we'll go ahead and we'll hit OK and you'll see now we have a new view. We can change that. It creates it as new followed by some sort of number. We can change that to Fills View and then rename it. And then we can do things, we can move it up, and we move it down so that you'll see exactly where it falls in our tree. You can change the tree from there. You can also delete views from here, as well. So I save it and you'll see that Fills View is here. And now I select Fill View, it changes the model render mode, it changes the visibility of that, it changes my camera, it changes all those things.

The reason I find it so important is when you send a PDF file to somebody, if they put a comment or a measurement on the model, it will actually create a view, and then when you select that view, it will go to the exact camera spot where the person created that note or that measurement. So you see exactly what they see and we'll go ahead and we'll show that. So in order to do that, I will just go ahead and create a measurement. You'll see that I clicked Measurement Tool. The first thing that comes up with some navigation tips so that while you're measuring, you hold the ALT key down to rotate, Shift to a pan, and ALT Shift to zoom. You can go ahead and do that so it no longer does that. You can go ahead and click that so that it no longer shows that message. And then, we'll go ahead and ALT Shift here and then we'll create a measurement.

The first thing that happens is I get these things here, this menu Snap Enables and Measurement Types. Snap Enables tell me what part of the model I'm going to snap to so I have points, I have edges, I have radial edges, I have silhouette edges, and I have faces, and that's where it's going to automatically select whenever I moved my cursor around the model. Right now, I have it just set to Select Edges so you'll see I'm just getting those edges.

I do get sometimes some tesselation artifacts in here, so for example, I can select it in here, even though there is no edge, but typically, you'll see that the edges show up. And the other thing I have to do is select my measurement type. This is the distance, point to point, this is a perpendicular, this is a radial dimension, and this is an angular dimension. These two things

work together and they can be very confusing. So for example, I can say I want to snap to radiuses, but do a perpendicular dimension. As I move through the model, you'll see that none of my linear edges are being highlighted because I have my snap enable, it's all going to snap to my radial edges. So if I'm doing perpendicular, I typically want to snap to an edge and you'll see there's the edge. And I'll select that first edge, the second edge, and then where I want that measurement to be placed.

Now not only do I get the measurement here, but you'll notice it created this measurement view down here. If the default view is active when you do a measurement, it will create a new view. If you select a view, if a view is active when you create a measurement that's not the default, then it will add the measurement to that view. So in the first one, I have my default selected and when I did my measurement, it added the view. In the next measurement, I'll just do one here on the base assembly, I still have a perpendicular measurement. So let's just go ahead and just grab these two edges here and will sit it out there and it created another measurement view. It's typically not supposed to create another measurement view. I think I may have just found a bug. But it's supposed to add that to the view that you're in.

So right now, we're creating new measurement views for each one. Pardon me?

AUDIENCE: Obviously, you can save that?

PHIL SPREIER: Yes, you can save-- yes, all the measurements are saved, and the way they get saved, they get saved is you can convert them into comments and track them as comments or you can simply put them through here. So now when I save this model, all of views will be saved, the measurements are saved, the comments are saved. And when I send it to somebody, when he clicks on my measurement view five, they'll see the exact same thing that I saw when I created it. So that's a really great way-- communicating with 3D can be difficult, particularly when you're doing it not in real time. And explain where you want somebody to look can be difficult. The view mechanism allows you to capture all that information so that when you send the PDF to somebody, they get that. They can then go ahead and measure it or comment it and send it back to you and then you'll end up with those in there, too, so it's a great way to collaborate and send things back and forth.

AUDIENCE: [INAUDIBLE] Adobe Reader is doing that.

PHIL SPREIER: Adobe Reader will do all commenting and measurement. Yeah, Yeah, it will do all those things.

You can't create non-measurement views. So with Acrobat, you can create views for everything, but in Reader, the only views that get created are views for measurement and views for comments. I can't just arbitrarily create a view saying, I want to look at the model this way. I have to do that in Inventor as a view representation then save the model. Does that makes sense?

AUDIENCE: But this can be saved, the background, the color.

PHIL SPREIER: Yeah. Yeah, they can be.

AUDIENCE: It's just Reader that saves that?

PHIL SPREIER: No, Reader. Sorry, I'm not doing a good job of explaining this. So Reader, if you comment or measure in Reader, it will create views and they'll save automatically for you. The same behavior happens in Acrobat, but Acrobat also allows you to create views that don't have comments and don't have measurements associated with them, just visualization views. If you want a non-comment or a non-measurement view in your PDF file, the way to do that is, typically, to create a view representation in Inventor and then, as part of creating the PDF file, it will automatically create that view for you. OK? But you can't interactively add a new view in Reader.

AUDIENCE: If you do that in Adobe, and say somebody has Bluebean, will they see all that in Bluebean?

PHIL SPREIER: If it's a U3D model, I think the answer is yes. Yeah, for sure. All right. So because all of the things that I'm showing you today, most things I'm showing you today are not actually Reader type capabilities, they're PDF capabilities that Reader has enabled. So you put all the data in the PDF file and Reader reads it out of that PDF file or writes back to that PDF file. But most of the things I'm showing you today are PDF type things. All right?

AUDIENCE: Is there a way to hyperlink in the [INAUDIBLE]?

PHIL SPREIER: Can you explain that?

AUDIENCE: So say [INAUDIBLE] and I want to be able to make so that will open it if I added some attachment to it.

PHIL SPREIER: Yes. Yes, you can. You can do a couple of things with that. You can create a link, as I believe it was called, using Acrobat. You can do those things. Reader will not do that. Reader's just

basically a viewing system. If you want to do something more complex like create links or hyperlinks, you need Acrobat in order to do that. But Acrobat will allow you to do that. You can link to a website, you can link to a bookmark in your model, you can link to an attachment, you can link to a bookmark inside that attachment, you can do all those things. It's got pretty complex way of doing that, so the answer to that is absolutely yes, you can.

All right. So we went through model views and I think we went through measuring. And then commenting works very similar to the measurement capabilities so we'll go ahead we'll escape out of that and we'll select the comment tool. Well go ahead and we'll comment something about this hole here and we'll say, this is wrong. You can put any type of information in there. Now it will go ahead and it will attach that comment to it and now you get a comment view that gets added down here. So I go to that view, I'm going to go to the comment view. You'll see I got it exactly the way it was when I created that comment.

My first measurement view does not have the comment, my comment view has the comment and the measurement. OK? And then using comments, too, you can also save your comments from a PDF file, you can save your comments and measurements. So there is a system inside PDF that allows you to export those into an XML file format and then you can use that for a number of different things. So if you want to capture your comments and you want to go ahead and integrate those in your PDM system so you can reapply comments at some point in time or you can get all that information directly out of it using an XML file. All right.

And then the next thing we'll talk real briefly about is cross-sectioning. Cross-sectioning is a useful utility. When you first turn it on, all you see is this cross-section. You really need to turn on your properties. Properties will allow you to determine where you're going to do your cross section and what axis. You can align it to a face, you can align it to three points, or you change the color of the intersection, show you're cutting plane. You can change your offsets so it goes back and forth. You can change your tilt angles on it, as well. And then you can measure off those things, too. So it has a fairly nice cross-sectioning.

One of the things you should know so that when you're done with cross-section, it keeps the cross section active and you have to hide it if you want to get back the model itself. So cross-section remains active until you turn it back off. Cross-sections also can be saved in the views, as well. So views can be used for cross-sectioning. If I wanted to do a cross-section, create a view from that, it will save my cross-section properties with that. All right.

Now we'll talk a little bit about some of the things that are not just CAD on a page with 3D PDF. The first one of those is this what we call a notion of the technical data package. And a technical data package is not just CAD on a page, but it's CAD with all the information you may need for a specific manufacturing process. So if I'm going to send something to manufacturing, I'd want the STEP file in there, I'd want perhaps comments or notes that go with it, whatever your CAD standards or whatever you want to put in that, whatever you need to manufacture that model can go all into one file and we call that a technical data package.

Now the idea behind technical data package is that it becomes the foundation for this thing they call model based definition, that's kind of a hot thing now in the US. What model based definition means is that it's just drawingless manufacturing. So the whole idea behind model based definition is you create a 3D model with views and PMI for all the information you need, and then you can send that to any engineering process and they would not need a drawing for that. The idea is that drawings are eventually going to go away and that your 3D model will become the master source for all your GDNT and PMI and all your manufacturing information. Then you can put that in something like a 3D PDF and send all that data together.

It makes PDF really useful for this is you can put all data in PDF files where you can't in any other file. Like if you use a DWF file today, for communicating, you can't put a bunch of attachments in it and hyperlink them around and do all those other types of things. It's just not something you do with DWF. But you can definitely do that with PDF.

Here's one that I created that was a little bit that's an interesting one. So what I just create folders for all the other data that you can put in here. I created a 2D drawing folders so if you want to put 2D drawings in there, you can, metadata, all the other types of things. And then you'll see that when I select the 2D drawings, it's not the right 2D drawings, sorry, but I have another PDF file in there that shows me my 2D drawings.

The interesting about it is that it's structured now. So whenever I send this to somebody, they can understand what it is they're getting. Typically, if you send multiple files to somebody, you put them in a ZIP file and it comes unstructured and you may use directory names and other things to identify those things, but you generally have to send them something else that tells them that. You can put all that in a PDF file. You can put a cover page on it, you can put all the files in it. So all you have to do is send them one file.

Now the other advantage is this one files is it's all highly compressed. There's eight different

types of compression inside a PDF file and you can use on everything in it. Attachments get compressed, the 3D data gets compressed, everything you put, other in the header, in a PDF file has the opportunity to be compressed so it becomes very small. So you can create very small technical data packages using this type of a method where you put all your data inside folders inside of it. You can hyperlink to those. So like I say, I can create a button in here that would automatically open one of those files. It's a simple user interface in Adobe that allows you to do that. You can do all kinds of things with them because they're all there.

You can search them. That's another nice thing. Attachments are searchable so you can search just in the document you're in or you can search in your attached file. So where I'm trying clearly to get across is that PDF is a great format for simplifying your communication because it takes exactly, like we talked about at the beginning, it takes your data, it gives its structure, and it gives it purpose, and it makes it easily understandable by the person who gets that. And I think that that's missing in a lot of our communication today.

I would say that if you send a Microsoft Office file-- I think Excel is probably the most used engineering tool in the world today-- I would highly recommend that you take a look at replacing that with the PDF workflow simply because you can do so much more in it. You can put 3D in it, you can put all the other data in it. When you send some by an Excel file, they get data, and they get some presentation-- you can put graphs in it and you can put tables in it, you can sort it, and things like that-- but you don't get a lot of that rich interaction with the 3D. You don't get that rich interaction with other documents. You don't get the structure that tells you what other documents are.

Personally, I try really hard not to send any Microsoft Office documents around anymore just because of the nature of them is that they're easily edited, they can change really quickly, there's a whole bunch of things that I see as being potentially problems with all that.

AUDIENCE: [INAUDIBLE].

PHIL SPREIER: You could. You're absolutely right, but PDF has a very rich security thing so when I save my PDF, I can take that right away from you so that when you get it you cannot save it as an Excel file. I can change it so that I can password protect it, I can permission protect it, and then if I need to do anything even more, I can digital certificate protect it so that you have to have a digital certificate to look at it, and I can also encrypt it.

So you can really lock down all your data in PDF files so it becomes very, very, very secure.

But it's up to you when you author it to do that. If I just get a PDF that's been using default settings, you're absolutely right, I could save it as-- but I have to do that extra step to do that. I have to save as an Excel file, then I modify it, but the PDF itself you can edit it, you can set your security settings for it so that it's uneditable for sure.

AUDIENCE: I think PDF is a great tool, but [INAUDIBLE] better than DWF?

PHIL SPREIER: Right.

AUDIENCE: They keep [INAUDIBLE] in 2017.

PHIL SPREIER: Well, what I would say with DWF is that DWF-- I think it's one of the file formats to the basis for the cloud strategy because it's a streamable format. It's super, but it has much of the data that's already in a PDF so if you use DWF, I would use 3D PDF as an alternative to that for sending all my data, but you're right, but I'm very optimistic that Autodesk has put it in Inventor. It's in Inventor, and SOLIDWORK now, Solid Edge has it, PTC Creo has it. So a number of the different CAD systems are supporting it all today. All right.

So I think that's going to wrap it up. You have a question?

AUDIENCE: Yeah, real quick question. If you've got a revision in a PDF with a particular part in the assembly, and you want to call that out, visually, will [INAUDIBLE] rendering that [INAUDIBLE]. I haven't been able to save.

PHIL SPREIER: Yes. Yeah, and on your way out, if you have questions, I put some of my cards on the table right there or come see me I'll give you one. Feel free to contact me with anything like, if you want, just contact with that, we'll go over all of those. So. I really appreciate everybody's time today and I hope you have a really good rest of your Autodesk University.

[APPLAUSE]