BEN ROBERTS: These settings used to work in Revit, but no architect ever gives you a model with masses in. So they set it up so that you can use building elements as well, hurray. We're going to set our energy settings. We're going to define the materials in the model, generate an insight. And then we're going to have a play and see how it goes.

So oh, I totally didn't know I had that animation in. Look, it's all wrong and everything. I wonder if that's in all of them. OK, so here we go. I've got my model from my architect. We might want to put in some masses as well. So quite simple to do this-- just massing and mass in place.

You can pick a shape and draw whatever shape building you like and extrude it. It's SketchUp, basically. But we can do useful things with it. So I'm going to make block, south block and west block here, just to prove the point that there are massing elements and real building elements in the same model.

So I've made the form. I'd just adjust the height. And we can add in some flaws as well. So you can pick that mass. And based on the levels that are in your model, you can say, this is what I want to see. That one's a bit taller so I added in another level as well.

So it'll give you a rough area schedule. And it helps with the energy analysis too. So there's a few simple settings here. You can choose whether to use building elements, massing, or both.

You can give it a location. So this uses Google Maps so that you can actually put it in the right place. And then it will pull in the right weather data from the local weather station. So I've given it a location.

So at the moment, all we're telling it is very basic information. This is not a detailed thermal analysis. It's kind of used for comparisons. So we've got things like the HVAC system settings are quite basic. It's a bit of an overview and an indication.

It's important to set the export category either rooms or spaces, depending on what your model's got in it. And there are different ways of setting up the-- I'm going to go back slightly on this if I can. I can't. Don't worry. Unless I can do it like this.

So there are different ways of setting up the materials. There are either these schematic types. This is what applies to the masses. That's-- damn it, that's not it. Here we go. This is what applies to the masses. And again, it's just very generic-- just light-weight versus heavy-

weight, for example. Damn it. That's better.

So the conceptual masses is just very basic and an overview. The schematic types actually applies to the rooms or spaces depending on what you selected. And you can choose to overwrite what's in the model. The detailed elements is actually the elements that are in the building model.

OK, so having a look at those elements, if you click on a wall, go to Edit Type, you can see there's U value down here, heat transfer coefficient. And we can edit the structure. So this is based on the actual materials, so the individual materials.

You can bring in the thermal data. There's quite an extensive database of thermal information. And that's what calculates the U value, so pretty simple. You have to do that for each of the elements. So there's a little bit of time involved but worth doing.

So then we can generate an insight. I actually cheated slightly here. Whilst it's generating an insight, I've gone onto the website here. This is the one that it's generating now. So you can see that it's loading here.

And there's some previous examples that I've got here. So you can compare and contrast the different options that you've got. So you can upload a model. You can change your wall property, change your layout, upload another one and compare them.

So when you get in here, you get this benchmark figure. So mine is kilowatt hours per square meter per year. What's that? British thermal units, is that what you use, per square foot?

And you can adjust these sliders. Say, for each different option, you can choose which one you want. The triangle here, that's your current model. And then the dots are all the different options. So what you're doing is just defining ranges for the building load.

So at this stage, you're not specifying, it's going to be this wall type. It's going to be this window type. You're just giving some choices and some limits.

So that's it. That's kind of where Insight 360 at the moment stops. So it gives you an idea of the parameters that you're going to be working for going forward to the future. One of my feedback comments to Autodesk is they need to have some sort of output from this so that you can then have a report, right? But it's pretty much there. It kind of is a report. You can invite people to come and look at the insight and see what parameters you've set. So it's a

useful tool for the earlier stage stuff.

So once you've done that, we're going to put some spaces in. So I'm assuming that this is kind of familiar stuff to you guys. I've taken our template model, which has got view templates and families and whatever, a few settings predefined. I've linked in my architectural model, acquired the coordinates, switched it to room-bounding, and aligned the levels.

So that's how we start. We're going to put the spaces in. So I've used Dynamo to do this. There are a couple of seats here, man, if you want and sit down. I've used Dynamo to do this. So it just takes the rooms from the architecture model and generates the spaces. It's just a bit of a quicker way of putting spaces in.

We can add in this space later. So I'm going to show you a tool that we made which links Excel space types to your Revit model, and again, just makes that really quick. We can make treatment plans. So that's nice and easy. And we can produce individual room data sheets. Again, we've got a Revit-Excel datalink that exports those.

I'm going to try and do this live. Oh, look. It's going to do the little animations. Woohoo, cool. So there's a video here, but I'm going to try and do this live. And I'm going to see how I get on. And I'm going to see how I do for time.

So here's my model. And if I open up the spaces layout, just so you can see, at the moment, there aren't any spaces in here. I'm going to go to Dynamo and just run a script. So just to be clear, I'm not that good with Dynamo. I kind of know what it does. I can play with a few nodes. But generally, it confuses me and I've never made a successful Dynamo script.

So luckily, I have people in my team who are actually very good with Dynamo. I can highly recommend finding somebody. If you're not familiar with Dynamo, I highly recommend either learning or finding someone who can do it, because, well, hopefully you'll see it's a pretty powerful tool.

I suppose I should explain what Dynamo is. It's a visual scripting tool. So it allows you to do programming without learning a programming language. So it just builds up nodes. Here we go. So it just builds up nodes, and you can link them together. So it's just inputs and outputs-- get information from one place, put it into somewhere else. That's pretty much what it's doing.

So I'm not going to go into the detail here, but it's all in the handouts. I've gone through this

step by step so that you can see what's happening in each part of the script. So there we go.

I've run it. You can see in the background that it's generated my spaces. And I come back into my model, and I've got my spaces. If I look in section, they're filled up to the same height. So basically, they've taken on the properties of the rooms.

They have to work on an absolute height. So the upper limit is always offset from your level rather than to a level above just because architects will name their levels differently to us. So that's a little bit of a workaround. But hey, saved a bunch of time, right?

So I've got my spaces in. Where's my next--

Now I want to add some data. So again, in my template, I've got some predefined schedules. But all this is is I go to Analyze Schedule Quantities, list out some spaces, and put a bunch of parameters in.

So I've got a load of parameters along here-- space cooling temperature, space heating temperature, heating strategy, dot dot dot dot dot. All of these different parameters that I want to know about every space. So it's quite a lot of data. So what I do, we've made a data relations tool.

So basically, it's relational data. So it's going to read from-- where is it? Here we go-- this Excel document. So this is also because a lot of our engineers don't necessarily work in Revit, but they love Excel. Who doesn't love Excel?

So we've defined find our space types in Excel here. This is the space classification. And then there's a whole bunch of parameters that are defined as default types. So go back in Revit. That's just referencing that same table in that same workbook.

I've also created-- so in my space classification here, there's a dropdown. This is just the schedule key. So I've just made a schedule key for a space classifications. And it just means that I can pick the same parameters that are in my Excel sheet. So you can see that as I pick a space classification, it's putting in the values.

Right. I'm not going to go through this all in detail. I've got a-- OK. So here's one I made earlier. That's a British cultural reference. There's was a kids TV show called *Blue Peter*. Does anybody know about *Blue Peter?*

AUDIENCE: [INAUDIBLE].

BEN ROBERTS: But you're from England, right? Cool. OK. And so they showed you how to make stuff, like Tracy Island from *Thunderbirds*. Did you do that? Did you make Tracy Island? You didn't make Tracy Island? And they would always say, here's one I made earlier. So OK, there's a cultural reference.

And basically, all I've done is just go down that list and filled them all out, just so that you didn't have to watch me going down the list filling out all of those space classifications. So now I've got loads of data in my spaces, hooray. I can make a bunch of spaces, layouts with color schemes, right?

So the way I do this is just New Plan Views, completely blank. OK. They'll come in up here. And I'm going to select all three. And I've created view template. So all it is is just setting it up like a spaces view with a color scheme on. But I've just saved those as a view template, right?

So for example, if I want to do heating strategy, OK-- and then I've got a bunch of layouts. Drop a legend on the side. There we go-- so pretty quick. I know what's going on. So I've done one for heating strategy. Of course, you'd just keep going. You'd make another one for lighting types and air change rates and whatever else, any other parameters that you need.

So those are my layouts. I can also do individual room data sheets. So again, this is an add-in. There's quite a lot of add-ins available on the market for room data sheets-- no, that's the wrong word-- for Excel links, fairly common. I'll create a new one. I've got a standard one in there anyway.

So all it's saying is, where do you want to save it? I'm going to put it in, I don't know, a new photo. It doesn't really matter too much-- and synchronize it. So it's basically just taking the data of the spaces. It's telling me what it's going to export. I click Commit. Do I want to view the data? Yeah.

OK, it worked. So then for each individual space in the model, I've got a room data sheet. So there's a bunch of spaces, all with unique data, so hooray. So there we go. That's the spaces stuff sorted. So I've got individual room data sheets. I've got color-coded treatment plans. And I've got a model that's packed full of data very quickly. Cool.

So once you've done that, let's go back in here. So now the awkward bit-- this is getting heating loads into your Revit model, right? So I'm showing three different options because

everyone's got their own slightly different ways of doing things.

So one method is to use Insight 360 to get your heating and cooling loads. There's a little bit of a caveat in that for those who know what this means, it uses DOE-2 and it uses EnergyPlus as a calculation engine. It's a dynamic simulation. So it's not a steady-state load, which is a bit of a warning triangle. But otherwise, it's very slick and quick and efficient, so a useful tool.

The other options export a Revit model out to whatever software you want to use, run your analysis, bring it back in. Or start from scratch, set up your results, export your results to Excel, and bring them into Revit that way. So if you're doing that, creating a model from scratch, make sure you name or number your spaces exactly the same as they're in the Revit model. And then it just makes it really easy to just pull the data in.

So yeah, am I going to do a live demo? Yeah, why not? Yeah. So here we go. So it's the same interface that we saw before. So your energy settings are in here. Give it a location. Set up what your systems are, how you're going to do your fabrics, building elements.

Oh, yeah. And the other thing you need to do is put in a zone. So is anyone here from Autodesk? Oh, that's good. So I have to be honest. I think the zone feature is weird. Does anybody else find that?

AUDIENCE: Yes, it is weird.

BEN ROBERTS: Oh, good-- not just me. So yeah, I think it's a little odd that you have to go through this strange process of like adding things-- oh, I can't even do it. I'm not going to do it-- of adding everything to a zone and then specifying just information like heating setpoints and ventilation rates in the zone, and you can't apply a space to more than one zone. It's really strange. It should all just be in the spaces.

But anyway, this is what you have to do in order to do your-- so them you just click Generate Insight. It runs the analysis. And then you see this button here, Heating and Cooling. So what are the chances I've already done analysis on this model?

So all this does is open up a report. It's an XML report. And it just tells you what your overall heating and cooling loads are for the building and your peak heating and cooling loads. And there's no option at the moment to bring that back into your spaces unless you have a programmer sitting next to you who will just get in the API and make a little add-in that pulls it

in, which is what we did.

If you don't have that, then you're better off using just an Excel link tool so you can take your data out. Yeah, I kind of thought I might regret clicking that button. So yeah, you can use the Excel link, which is what I might show you if this just frees up. What did I do here? OK, I'm just going to leave it doing its thing.

So I hope that makes sense about bringing the data across from Excel. I look in a slightly different model-- this one. So what I've done is set up-- again, we've got predefined schedules in the template, so space heating values. So it brings the value back into the design heating load. That's what you would map in Excel.

And I've added in just an equation here, heat load per area. And I've put a conditional format so I can see ones that look a bit weird, very low heating loads. But these are just WCs, so pretty straightforward.

OK, so once you've got your heat loads in your spaces, it's time to actually put some terminals in and start doing some system modeling. What are you going to say? Great, OK. It was a random error. It's because it's a live demo. I've never seen that before.

So let's go. I've got some mechanical working views. And I've just trimmed it down just to the north because it would probably be dull for you guys to just watch me. And what's up with this, too? Let's get rid of all these. Here we go. OK, that's a little bit confusing because I've got no heating load in here now. I wonder if I do this.

So back to PowerPoint. Just a quick-- so this is what we're going to do. We're going to model just a really simple heating system with radiators, pipes back to a riser, and then a boiler upstairs. Some prerequisites for this-- it's amazing how many people don't do this in advance when they're doing a 3D model. I see so many models where the services are just randomly all over the place. And then people think, I'll coordinate it later. It's the worst idea that you can possibly have.

So always set out things like corridor details, connections to terminal units and everything. Do typical details in advance. And work out where the offset heights are so you know that when I'm drilling down a corridor, my offset height's always going to be, whatever, 8 feet. Is that a sensible number?

There we go. So this is my workflow. Put the terminals in and pipe them up, OK, which is-- and

this one block, there are 25 of these steps that I'm going through today-- that's the bit that everybody does in Revit at the moment. The other 24, most people don't do enough of, really.

So once we've got that A system modeled, I'm going to put formula into my families. This is what I talked about three years ago, right, basically this slide, putting formula into the family so that it can physically resize itself so that it can calculate flow rate from the heating load, pass that into the pipes.

And then I'm going to create some equipment schedules as well. Again, they're in our template. So they're ready to rock and roll. And then finally, I'm going to bring the space heating loads-- that's why I didn't have the space heating loads in there. I'm going to bring the space heating loads in and watch the magic happen.

So I hope that didn't work [INAUDIBLE]. Good. It didn't work. Great. Perfect. So I've still got a heating load of zero in my spaces. Yeah, no, that's not right. I'll put that in with Excel. Why don't I do that first? No, I'll do it afterwards.

So I'm putting in radiator, a couple of things we've done to make it easier. I've made like an offset from the insertion point so that you can click on the wall. It drops it in. It's just got a default heating value at the moment.

So here's a useful tip. When you're drawing a pipe, the offset is 150 mil. So this radiator, if I cut a section, is set at 150 mil off the floor. So if I try and draw a pipe out of here, it will want to draw it at that height, right, whereas what I want to do is drop it down a bit lower. So rather than 150, if you hit Spacebar, it just updates the offset. So you see that offset toggles. And it just drops it down low enough that you can draw underneath the radiator.

I'm going to go up into my ceiling void. So this is just the return pipe. And then I'm going to do the same thing for the flow pipe. So click on the symbol, hit Spacebar. I mean, obviously, you can draw these things in section and 3D, but I find generally, I'm just working in 2D anyway.

Let's put some pipes down the corridor. So I'm just going to put like a large-sized pipe, or the largest size that I think I'm going to need, down the corridor. So check that the reference level is the right level that you're on. There's my offset, system type, low temperature, hot water, flow-- great. So that's my main. And I'm going to go up the riser. I'm just going to change the offset to the level above and draw it back.

You can either do an offset or the parallel pipes feature-- pretty useful. So OK, I'm just going to offset that run, hover over it. Push Tab to select the whole thing. Click, and now I've got my return side. I just need to change the system to return, right? Cool.

Incidentally, at an early stage, if you don't want to do the piping up of the individual bits at the bottom, you can just put pipe caps on the end. So we've got hydronic supply and hydronic return caps. And they have water flow rate and pressure drop values in.

So you could just cap the ends of the pipe and still have your calculations in your system without having to do with all your final connections-- quite useful at an earlier stage. You have to make those as mechanical equipment. Maybe you could do it as plumbing fixtures, depending on what they are, because pipe fittings don't hold that data.

So I've done one. And then I'm just going to copy that across. That's the easiest way to do that. I'm just going to copy that across to my other rooms. Tick the little Multiple button-- also a really useful, time-saving feature. I'm not going to join them in just yet. I'm going to wait until I've got everything in my system.

If I'm going into a room with more than one radiator in single [INAUDIBLE] then it's an ever so slightly different workflow. I start with the furthest one. Same deal-- hit Spacebar. Go over to near the corner of the room, whatever, somewhere over here.

And then I use Connect Into. So this is a feature that, for this, is really good-- just straight in. OK, and then the same again-- Connect Into. This time, it doesn't ask me what system because there's already one connected.

So I know that it's highlighting the Flow tab because it's that lighter orange color. If you can-- I don't know if you can see the colors very well on that. But if you hit Tab, then it chooses the different pipes that are there. So there we go.

And then I copy that across. And what? I'm not quite sure what I did just then. And I might just bring these down here and put some in the corridor too. So I apologize if it's not very interesting to watch me pipe up the system, but maybe you're also learning a couple of little tips and tricks of the way we do things.

I know that that's going to be a [INAUDIBLE] later. I'm going to switch those to double panel. And I'm going to copy that across. OK, now I'm just going to join them all in. Best feature for this, Trim and Extend Multiple. So then I can just click the main ones and then just trim

everything in.

OK, that's going to go off the end, right? How do I mirror this? So if I mirror this, switch off the copy thing, then it will come around that way. OK. And just join that last one in. Cool.

Let's do the same for this. Sorry, same for flow. And then we've got a system that's all fully connected and ready to go. So I had some default heating values in my terminals. So yeah, yeah, yeah. So you can see that that's adding up along here. So it's picking up the flow rate and converting it.

You get this blank thing because of transitional flow, another little thing that, for some reason, Autodesk has never fixed. So if you have laminar or turbulent flow, yeah, you get a pressure drop. If you have a transitional flow, it doesn't tell you what the pressure drop is. It's a bit weird. It does count the pressure drop and it does add it up in your system loads, but there we go.

And yeah, I had those little warning triangles on, by the way, just to show me where I had holes in my system-- useful. Now I know I have no holes in my system. It's all connected up.

I'll go up to the plant room in a minute and connect it to the boiler. So there we go. I've got flow right along here. So I've drawn my system in. Now I'm going to put some formula into my families. I've actually already got the formula loaded in here. So I'll just show you what I did.

In terms of the actual sizing, I took some values from a product manufacturer. So they just gave me values in watts per meter based on the height. Worked out what that formula was in Excel, and then I've just copy and paste that formula into my family.

So again, sorry if that's a bit of a whistle-stop on that, but here we go. So that's what that is. It gives me a watts per meter value, and then my overall length is just a function of that. So as I update my heat output value, it's going to change the length based on the height, and the depth, actually.

And the other one I've included here is LTHW flow rate. So that's just-- in our terminology, it's mcp delta t. Is that the same thing? Does that mean something? Cool. Well actually, it's q over cp delta t. That's what that is, easy peasy.

So a couple of formulas in the family, load it back into the project and close it. OK, I didn't make any changes. So that's pretty straightforward.

Yeah, incidentally, I don't tag these. Annotate-- here we go. So mechanical equipment, I'm just going to tag all of those, just so that we can see the references and the heating values. Incidentally, another add-in that we made fairly straightforward was to remark things. So where are we? So I can just change the reference so that it's type level and then number, so a fairly straightforward add-in to make, actually. Cool.

Right, I've got my heat loads. Right, now I need to bring my heat loads into my spaces. I'm going to do this with Excel. And then I'm going to bring the values from the spaces into the terminals. So this is our own tool but it's very similar to-- [INAUDIBLE]. It's very similar to lots of other tools available, third party items and whatnot. Yeah.

So what I'm doing is creating the link, exporting all the data. This is the same as what we did with the room data sheets. And then I'm going to take my heat loads. So these are my heat loads that I've got from, let's say, an external analysis.

No, copy and paste isn't going to work. I need to do this. So I'm going to copy these, a little bit of Excel magic. I'm going to copy these in here. Cool. And then a VLOOKUP, right. So where did that come from? So I don't know how familiar you guys are with Excel but here we are, just a VLOOKUP. I'm going to do it based on the room number. OK, I've done it wrong. Nobody said. Come on.

So VLOOKUP based on the room number, this table. That is-- I think it's nine. False. Cool. So that's picked up my heat loads. Save it. Close it. Synchronize it. It's this one.

And then it will just pull those values back in. So it's going to tell me, these are all the ones that are changed. They're red because they're not up to date in the Revit model. I don't need to open the sheet.

And now when I come back is my model-- yeah, sure. So if I look at that schedule, it's just pulled in those heat load values. And when I look on my layouts, there we go. But my values and my spaces are different to what's in my heating terminals.

So again, Dynamo to the rescue-- manage. So all Dynamo does is take that value out of the space, divide it by the number of terminals, and push it into the radiator. So because I've got it all connected up, that's going to change the flow rates all the way back through my pipe. And it's also going to change the size of my radiator because of the formula that I put into the

family. As long as I've got enough time, I then-- yeah, I think so-- I then connect it up to the boiler on the top. Then we're on the home straight.

I never did the survey at the beginning. How many people are mechanical engineers here? Yeah, loads-- all right. How many people are architects? It's just you, man. How's it feel? Cool. Welcome. I hope it makes sense. I hope it makes sense to everybody. Does make sense? Yeah, good-- nodding heads. Ace.

So I've got some Dynamo scripts here. Heating loads, heating terminals-- so I've got one, air flow to air terminals, as well. It does the same thing but air flow into grills, obviously. There's my script. Run it. Cool, it's done. And you can kind of see in the background there there's been a few changes.

AUDIENCE: [INAUDIBLE].

BEN ROBERTS: Yeah, so the question is--

AUDIENCE: The radiators, the height is--

BEN ROBERTS: Yeah, so the height is fixed on all of these. Yeah, so these are all the default height of just 500 millimeters. It's about 1 and 1/2 feet or something. Or is it overall height here? So yeah, I mean, if I change-- let's move the tag out of the way.

So if I change the height-- I'm going blind. Here we go. So if I make that shorter, then it would become longer. And if I make it taller, then it will be really short. But yeah, the default height is just 500.

Equally as well, instead of single panel, if I change it to double panel, it's just thickness changes. But again, it makes it shorter as well. So it's based on those-- those are all in the equation. And all of that's in the class handout in detail as well. So you can make more sense of that from looking through the handouts.

Cool, OK. So that was straightforward. I'm going to go up to the level above. And I'm going to quite crudely just throw in a boiler and connect it up here. So here's a boiler. It has an access zone around the edge. That's what that big square is.

And I might just use Connect Into again. So flow here and return here. So it's kind of done something a little bit weird, but it doesn't matter. For the sake of connecting up systems, that's

fine. Incidentally, you can cap these open ends if you don't like seeing the little warning triangles all over the place. I find them-- they really bother me. So there we go.

So this is the old problem I'm sure you're familiar with, that with mechanical equipment that it just thinks it's-- the mark parameter is just a radiator. But again, I can run my remark here. And OK, it pulls in a better value.

So what I've got going on in my boiler has picked up the flow rate, hopefully. It has, yeah-- so the gas flow rate. So [INAUDIBLE] 0.146 liters a second, and it's converted it into a heating GT-- same equation but the other way around. And I can put that value into the tag as well so that-- so it's showing me my heating GT of my layout.

So just to prove a point, just to make it really satisfying, if I then change the heat output in my radiator-- so let's say that goes up to a kilowatt. That's going to be too big. Let's make it 800. Then that will update. Damn. So what happened was-- does anyone know what happened?

AUDIENCE: [INAUDIBLE].

BEN ROBERTS: Huh?

AUDIENCE: Did you blow the pipe?

BEN ROBERTS: I blew the pipe, yeah, yeah. Because of the equation in the family, I changed the heat output. And the radiator got so big that it went over the end here. Nothing like a slick demo. Cool. So there we go. I changed the heat output here and the value updates on the boiler. So it's all connected, hunky dory. That's also a British cultural reference.

I've got 10 minutes left. I can do this. So Revit doesn't make a schematic as such. But this is what we do, and maybe this is something that you guys do as well. You can change your layout to single line. So in pipe work, that's medium or coarse. In ventilation, that's just coarse. And then just add on these tags, right? So I've just made a tag that pulls out size, flow rate, velocity and pressure drop.

Again, I've made view templates. So I can just make a bunch of new views. I'll go and find them. And apply view templates-- here. So heating and cooling schematic. That's happened because of the view range or something. Cool.

So I keep the spaces switched on just so that you can see where you are. Space Tags, I

suppose you could put a tag in here that shows the heating load. OK.

Incidentally, I do you have a tag that's heating load per area. That's a calculated value in the schedule, and you can't put that value into a tag. But in newer versions of Revit-- I don't know when they bought in it-- but you can actually put in calculations into tags. So you can take the heat load, design the heat load value, and add the equation into the tag. I would show you, but it's thinking about it.

So oops, no. That's the wrong one-- Label. So here we go. So there's just same as in the schedule. You can add in a calculated value. I only found that out quite recently, and it's really useful.

Here we go. Oh, yeah. Here's another tip, right? So when you-- if I did tank all on these pipes, you'd get real mess because there's little pipes in here. And they're all over the place. There'd be loads of tags.

If you click on the pipe at the end and then hover over this one and push Tab, it selects all of the pipes just in between those two points. That also is something that I found out fairly recently and has changed my life for the better. Maybe people knew that already.

So then when you do Tag All, it's only selected objects and pipe schematics [INAUDIBLE]. There we go. It probably needs to have a little bit of a tidy-up, but at least it's there. So pretty quickly, we can make a layout that is a schematic. We do use this quite a bit. Particularly the senior engineers actually really like using these as a bit of a quality check.

I haven't even sized the pipes. I'm looking at these things, and they're too big still. Sizing the pipes is so easy. I've selected the whole system, all the flow and return. I go to Ducts and Pipes Sizing. Here's my criteria. You can do friction or velocity. In Ventilation, you can do static regain and equal pressure. So there we go, and that's it.

So this is also something I presented on three years ago. I helped to develop this feature. So if you look in the Settings, Mechanical Settings, under Calculations, this is the-- so in the UK, we use Haaland. In the States, it's mainly Colebrook, I guess. Yeah, you can pick your own things. That's the equation that it's doing.

Obviously, check the values. If you don't like the values that it's giving you, then there's something wrong. But yeah, we're using this all the time, and it's amazing. It saves loads of time.

Two more things, color-- oh, I never connected to the boiler. I did. I did do that-- system inspector and colors. So you want to know the total system pressure drop, right? That is, if I get back up to my boiler-- so you can find it just by going here. There's your-- what am I talking about? What am I talking about?

If I click on a pipe and go to System Inspector, you have to click Inspect even though that's the only button. But there you go. So it's telling you your total static pressure at this point. Also, it's showing you the direction of flow. So this is return system. So it's going back to the boiler.

The red route is your critical path or index run, depending on what country you come from. So for some reason, there's a huge load of resistance down here. It's just a bigger flow rate, I guess. OK, so that's the static pressure that it's basing it on, that index run. And then you can click Finish or Cancel, which both do the same thing.

Color-coded layouts-- I might just duplicate this view with the detailing. Detailing means annotations, so it just takes across all the tags and things. And same as I did before with the spaces, I can do a color scheme. But I'm going to do a pipe legend, in this case.

So I've got pressure drop. Yeah, sure. So it should all be less than 200 because I've already sized it. But it just shows you the blue ones are all good. And if anything is orange or red, then bad.

A couple of schedules that didn't show you. So again, this is part of the template. We've just got a radiator schedule ready to go. All those parameters are there-- reference, room name, room number. So you've seen me do this from scratch. So this is all just populated just from the calculations that we've done just now.

And one final thing, it's just kind of nice to have but people quite often ask about, like overall quantities and things. And it's a really meager, little schedule because there's hardly anything in here. But I've just set up a pipe schedule that's just based on the material and the size. What's the table length? Easy peasy, but quite valuable, quite useful.

Again, this is a feature that-- it's one of those things that's really obvious when you know it but it took me ages to find this. Itemize Every Instance-- so rather than showing a big list of every single bit of pipe, you untick this under Source in Grouping, Itemize Every Instance. And it just groups them based on whatever you're sorting by. So yeah, it makes schedules much easier

to read and work with. It's really cool. There we go.

I left my presentation behind a few slides ago. But rest assured-- hey, add insulation. There was one thing I didn't show you, then. Good job I checked.

So we made a tool, again, for insulation. Because at the moment, if you want to add the right type and size of insulation, you kind of have to click on every individual bit of pipe. So we've just taken specifications for pipe insulation.

Based on the size, the material of the pipe, the temperature of the water, whether it's inside or outside, it puts on the right thickness, and also the right type of insulation. So that is here-- [INAUDIBLE] 35 mil insulation thickness. So again, it's a little add-in that just saves a bunch of time and means that our model is actually accurate rather than having just like 30 millimeters or-- what would that be-- inch and a half of insulation on everything in your model.

Right, let's round it up. I've got two minutes. How good is that? So I had a few thoughts about a couple of things. This is just a bit of brain dump, really, just a couple of things that slightly annoy me about Revit at the moment and what I think it could do better.

So maybe I should put these-- what's that new thing, Revit Ideas or something, the web site, and you can put your ideas it and people vote for it? If you see any of these ideas, they're mine. Vote for them.

But otherwise, that's about it. This is the summary. This is where we started at. So I've just gone from a conceptual design-- nothing, blank page-- through to having a full model with all the spaces, all the systems, everything, size and all the calculations. And I've done almost all of it live. So I haven't bullshitted you, right?

How did I do? Good, great, amazing. Fill out the surveys. Thank you. Yes, please.

[APPLAUSE]

The surveys are really worthwhile. Sorry I didn't allow much time for questions-- much time. We're off now. But I would really like to talk to some of you guys because you're the best people in the world about this stuff, and it would be really nice to share ideas.

So I'll be happy to just hang around somewhere near here, grab a drink and have a chat. And I'll be around all week. The Answer Bar's pretty good, usually, as well. They have some useful

stuff. But I'm here to talk to people like you all week. So please do come and talk to me.

I don't have business cards because I'm so green. I'm paperless. I'm a bit lazy, but that's my email address. Please write it down and email me about-- not about anything. I was going to say, about anything. Don't remember anything. Email me about Revit and doing mechanical design.

[EXHALES] All right, that's it. That was an intense hour. So go and enjoy AU. And thank you very much for coming and for your time. Cheers.