2. Using the Wolfram SystemModeler simulation center

This video takes a step-by-step look at how to import pre-built models into the SystemModeler Simulation Center. It allows the user to add animation to models, save animation views for future reference and review and modify experiment settings. The video shows how to edit these models for use in an electronic record of achievement for school-based assessment.

Transcript

**Chris:** [00:00:18] So now once we've executed our command, that shows SystemModel with image size large. We now have an image that obviously can be posted into a folio. The next thing we want to do is generate some data. So with these pre-built models, they have, I think about
15 second window of simulation that we can do just as a standard thing to make sure the model is working correctly. So what we need to do, first of all, is assign a variable to this or call this sim. And again, on your sheet of paper, you can write down or jot down what you want sim to represent. And also, if you've got a multitude of variable names, you can assign them to different things. So do sim SystemModel, model simulate.

**Chris:** [00:01:09] And again, you'll see that it starts pre-filling. So we'll just do a quick click there. Autofill. Sometimes you might find a few autofill that you click on the wrong one. There's no problems with that. Just go back and delete it. So we'll open brackets, inverted commas, LossygearDemo1. And again, we'll see that auto fills one word of advice. I wouldn't recommend cutting and pasting from, say, PDF document because of the character codes that can be underneath that. It can cause problems. It's always best just to type it in fully. So again, control sorry shift enter to execute the command. Its saying that it doesn't need the square brackets. I did curly brackets, not square brackets. So make those square brackets Shift Enter.

**Chris:** [00:02:02] You should find that again, this bracket goes bold on the right hand side. And it says that simulation data has been generated from zero to zero point five seconds. How can we show that? We would just two SystemModel plot. Plot and then rather than putting on Model name in, we would actually put our variable name in sim.

**Chris:** [00:02:26] This will become clearer later on. So again, shift enter. We should finally get some nice plots coming through here that the students can use.

**Chris:** [00:02:39] So now that we've managed to get some plots, we can also enlarge those prior to our next stage of changing some variables. So again, if we take our command SystemModel plot and then the variable name, we can also add in that image size portion to it. So if we type in SystemModel, plot, model, plot and then our variable name sim.

[00:03:08] Okay. And then if we add a comma and just the usual image size and then the peculiar arrow of dash greater than sign, we'll do large and close our square brackets. If we shift Enter again, it should come up with some lovely large plots that our students can see.

**Chris:** [00:03:33] So here it go so we'll scroll down. Now, the next bit of software is an addition to our Mathematica. It's called Simulation Center. And what allows us to do is see what the variable names are called so that we can go back into Mathematica and actually change some of the parameters for them. So we've got to take our model from Mathematica into simulation center.

**Chris:** [00:03:59] So we do that by doing SystemModel or modeler and then obviously are lossy gear model. LossyGearDemo1 and again, close our square brackets, shift, enter to execute and you'll find that you'll see SystemModeler Simulation Center should pop up.

**Chris:** [00:04:24] So now that we've executed our command SystemModeler, the model name that we're using, it should have popped up and opened up automatically Simulation Center. Simulation Center allows us to see our graphs in slightly more detail. And also on this left hand pane has a breakdown of the variables, variable names. If we click on our parameter, we can also see if we look at DriveSine frequency. It shows us the current value. So what we want to do is on a little bit of paper, If we've got sim, we may call it DriveSine frequency, frequency. We now one to maybe place a different value on that. So we would then obviously use our notes to guide ourselves as we go through. So going back down the screen to Mathematica down here, click the open, reopen our notebook. If we type in our variable name again, which was sim and then equals and then SystemModel simulate open our square brackets tells us what we're going to try and do. And rather than do Shift enter at this point, just hit regular enter [00:05:34] and that'll [00:05:35] drop us down into the next line. The good thing about this is we can start breaking up what we want each individual bit to do. So now we want to call on our model. We want to tell which parameter value we're going to use. And we want to modify that value that it's currently got. So we would open with inverted commas. LossyGear.

**Chris:** [00:05:56] And again, you'll notice I missed camel case there, doesn't like it, so GearDemo1, we use the prefill option here and then you do comma and then opening the next set that sets up our parameters. So we would do brackets so less than sign and then Shift get the horizontal one and then inverted commas so you could hold shift down and just do that one sequence. So do parametar value. Values and then close our inverted commas. And that funny pointy arrow again. So minus greater than. And then we want to open some curly brackets and then open inverted commas again and do type in DriveSine, DriveSine. Again this is from our little notes that we've got dot f r e q h z was the value that we were using. Close our inverted commas, funny pointy arrow again and give it a value of say, 10. And then we want to close all those sequences of brackets after that. So it would go curly brackets first, then vertical line and then a greater than closes that. And then obviously the encapsulating square brackets round the whole lot.

**Chris:** [00:07:26] So we'll see that our commanders executed well. There's no problems there. It's come up with the data. So it's actually generated it and it just holds that. So now what you want to do is go in and do a SystemModel plot. So again, we just type in SystemModel plot. You'll notice pre-fills come up. So it's the first option. And then if we open square brackets, sim, that's our variable. Again, taken from our notes and shift enter and you should find that it now will plots a series of graphs using our variable data that we have changed. So we have got angular velocity and the inertia 1 and 2 power loss and the gear train in the mode of the gear, whether it's going forwards, backwards or stationary.