1. Getting started with Wolfram SystemModeler

This video explains why the SystemModeler software is a useful tool for teaching and learning in VCE Systems Engineering. It explores the pre-built models that come within the SystemModeler software, and how these models can be used to gain an understanding of engineering design. The video also shows how to set out a notebook, import a model and make a basic simulation of the model, all of which can be included in a record of achievement for school-based assessment.

Transcript

**Chris:** [00:00:19] Welcome, everyone, to the first video in the series for Wolfram Mathematica SystemModeler and modelling software. Today, we're going to run through the initial prebuilt models that Wolfram comes with, how we can use those to get students to simulate various systems that they're going to use hopefully in their folios. So today I'll show you how to set out a notebook, how to import a model and how to do a basic simulation of that model just from a prebuilt model. So once we've opened up Mathematica, using the little icon usually on your taskbar looks like sort of splash star type object. It will come up with a notebook, notebooks, basically is exactly what it says it is. It's somewhere where you can jot down your ideas and then obviously get the commands or put the commands into it to implement so that it follows in a logical sequence. First thing I'd always advise would be to go in and hit file, save as and give your notebook a known name.

**Chris:** [00:01:22] So we'll plop this on the desktop and we'll just call it video demo. So just tape a video demo demo.

**Chris:** [00:01:34] So we're going to try and format our document. If you've got any previous web design experience, you'll know that you've got things such as heading one, heading two. With this we have a similar thing. So if we go into format style and click title, we can then enter a name for what we want to call our documents so we'll call it prebuilt document or prebuilt demo and to get it back to command line, and you'll notice as we move our cursor down it changes so that it goes horizontal when it's at that stage that will allow you to do a left click and it brings you back down to a [00:02:11] command line. A command line is basically [00:02:14] where we're going to input everything we want things to do or we want the software to do. So we'll try and look at what various models are there at the moment. So if we type in the command system models.

**Chris:** [00:02:28] And then examples. And then we'll have an open square brackets, closed square brackets.

**Chris:** [00:02:36] What you'll notice is that, little quirk with the software, he uses camel case so traditional camel case you'd say, for example, have first name surname. The first letter of your first name would be a lowercase, but the first letter of your surname would be a capital with Wolfram what you've got to do as camel case everything. So your first name would have a capital and your surname would have a capital as well. So that's a peculiar thing that they do with their camel case. Another thing is, if you think, OK, you press enter to execute the command. It won't actually do that. You've got to do shift and then enter to get the command to execute. So control C we'll copy that I'll just go back down to new command line. Looking for my cars are going horizontal. I'll do control V to paste my command in. I'll just double check. So I did miss another S there as well.

**Chris:** [00:03:33] So a SystemModel. Examples.

**Chris:** [00:03:39] That's the one. And if we do control enter again, that's better. Looks like it's doing something now.

**Chris:** [00:03:47] So now we have our models up that we can see. There are a raft of pre-built models that we can use, the ones that we are really interested in are in Modelica. So we double click Modelica. Depending on the speed of your internet connection, you'll find that it can take quite a while to load. So we'll go mechanics. Go Rotational, go Examples.

**Chris:** [00:04:16] And here we have all their prebuilt examples they come with. The one that we're interested in is LossyGearDemo1. So if you double click that, it will come up with a small or an image of what the system is.

**Chris:** [00:04:32] So basically, we've gone through and we found our model that we want to go to, so LossyGearDemo1, we want to actually import that.

**Chris:** [00:04:41] So we would go SystemModel, model, remembering our camel case again and then open brackets and then inverted commas. LossyGear and you'll see that it starts to prefill things as we're typing it as well, which means that we are on the right track. Demo number one. Close our inverted commas. Close our square brackets. Again peculiar quirk shift enter that should execute the command.

**Chris:** [00:05:11] So we've now effectively imported our model entire notebook. As you can see, it's not particularly large in size the model image. So as we can see here, we've imported the model quite effectively. It's a small diagram. So obviously when we want to put that into fully or represent it electronically, it's not going to be very clear. So how can we then get our model to show up with a larger image?

**Chris:** [00:05:39] So with that, we just do, Show, again, remembering our camel case. And you'll notice that the commands sometimes autofill. So we'll type in SystemModel. And then open our square brackets again. What was our model called? It was called LossyGearDemo1 demo one. It's also worthwhile if you're importing pre-built models just to write them down on a scrap of paper at the side so you get the correct name for them. So close that with inverted commas. We'll do another comma and an inverted commas again. Diagram. Again, in parentheses or close that with one square bracket for our first bracket here and then a second square bracket after that for one at the beginning, again, that peculiar thing of shift enter. But generally trips a few people up. You'll notice that this bracket on the corner here on the right hand side goes dark while it's executing that command. So it's bold.

**Chris:** [00:06:48] And we'll see that yes, our image is now slightly bigger, obviously slightly clearer when we print it out or represent in a folio electronically. But it's still not quite the size that we would need. So that we can see things clearly. So we can also modify this image as well to get it in to either tiny, small, medium or large. So we might do a medium sized image for this so normal Windows commands take place here so we can just go up and highlight our line we want. Control X. Control C, control V. Standard commands, we'll just do control C. If we hover back down to where our cursor goes horizontal. Remembering that. And do control V. We've now got our line back in. But we want to add a couple of little bits to it. So we've got a diagram. We've shown our SystemModel. We've imported it in. We've said that we want it to be a diagram. After this last square bracket, if we go put our cursor there and do a comma and then image size camel case again, capital I capital S you'll notice that it comes out with image size and other peculiar quirk. To get a right hand or left hand arrow, you just do a minus, and then I think it's mathematics greater than. And then we can type in the size we want it.

**Chris:** [00:08:12] So we'll type in large again, camel case. OK. And control enter to execute. And we'll see that now, we've obviously got the largest image that we can display. So that's our model imported and represented in a diagram.