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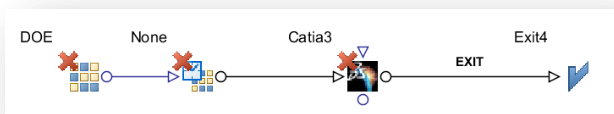
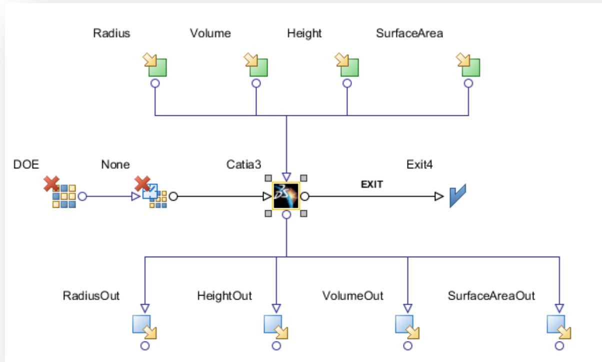
5/4/11

How to do basic setup and optimization in modeFRONTIER.

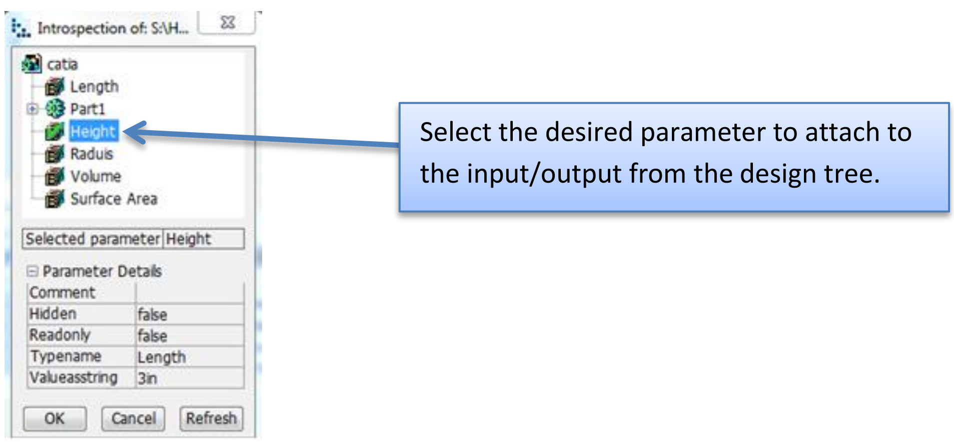
1. Open modeFRONTIER.
2. Every modeFRONTIER program must begin with a "Scheduler" node, so select the scheduler node  and drag it into the workflow space. This node, when put into the workflow space, will appear as two nodes: a DOE node and Scheduler.
3. Next drag in the CATIA V5 node  .
4. Every modeFRONTIER program must also end with a "Logic End" node  , so drag that into the workflow (it is located in the drop down under the scheduler).
5. At this point the nodes can all be connected and it should look like this:




6. Next the CATIA file needs to be selected. Double click the CATIA node and CATIA Document Properties dialogue box will open. Under the Document option, browse for, and then select the part that you wish to optimize, and then click ok.
7. Now it is time to select the inputs and outputs to your system. Drag an input node  in for each of the inputs you would like to use, and connect them to your CATIA node. For every input node you need to also make an output node  . You can name these accordingly and it should look like this:

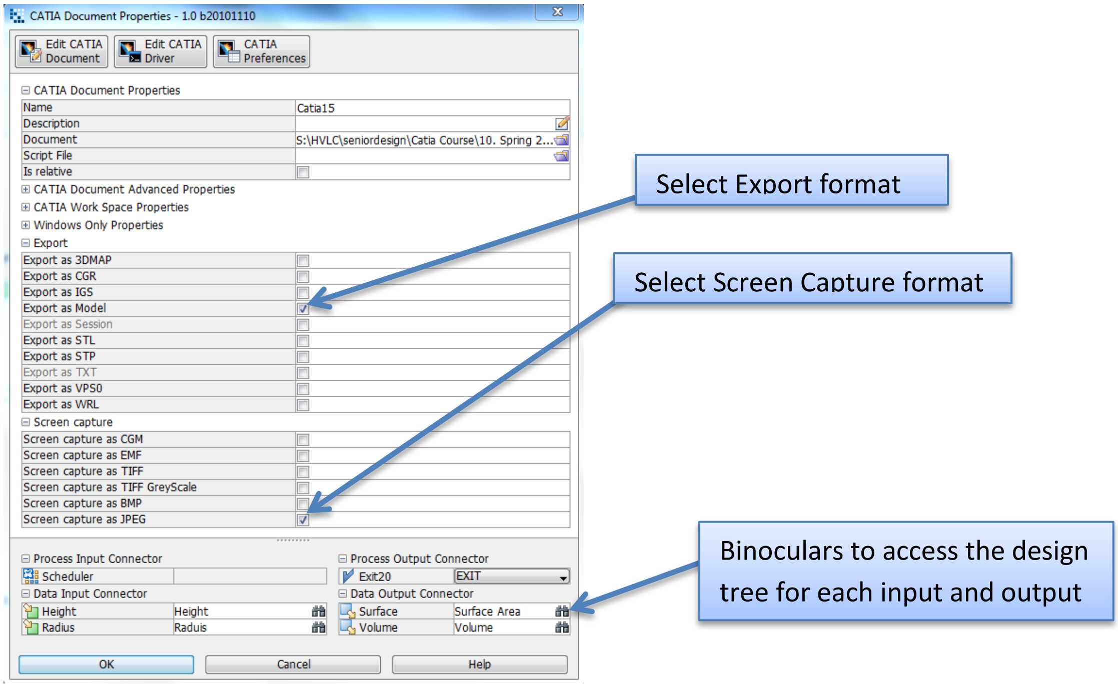



8. Next go into the CATIA node again to connect each input and output node to a parameter in your part. To do this, double click on the CATIA node to open the CAITA Document Properties. At the bottom of this dialogue box should be the inputs on the left, and outputs on the right. Click the binoculars symbol in the blank field next to the input or output name. This will begin an introspection. Once the introspection is complete click close, and the design tree of your part will appear.

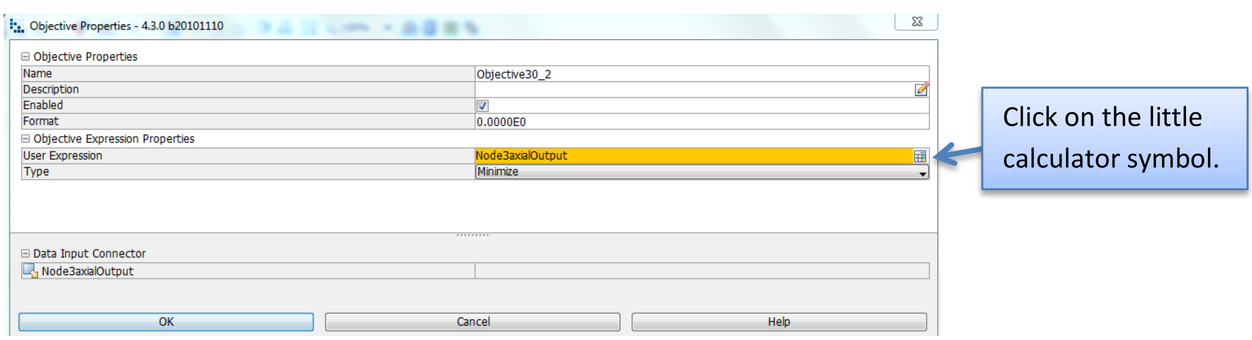


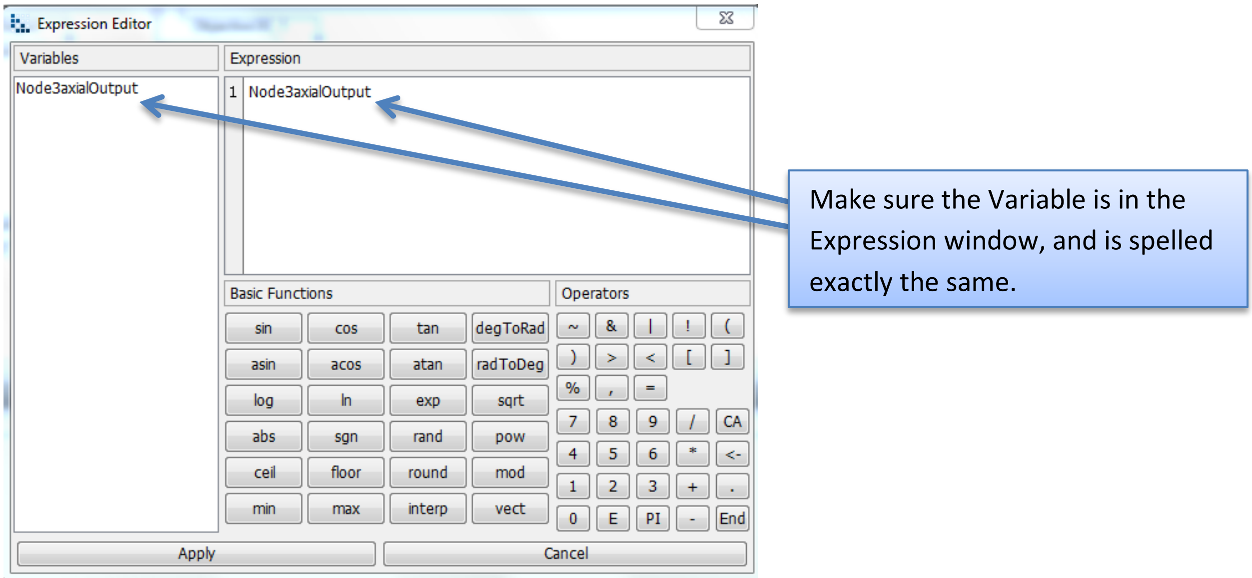

Double click the parameter in your design tree that you wish to link to each input and output. Do this for each input and output.

9. At this point you can also select the export and screen capture setting you want. In the CATIA Document Properties window you can expand Export option, and I suggest selecting "Model". This will export a CATIA model for each iteration of your optimization. Also, you can expand Screen Capture option and select to export an image with each iteration as well. Once the inputs, outputs, and export options are all set click ok.

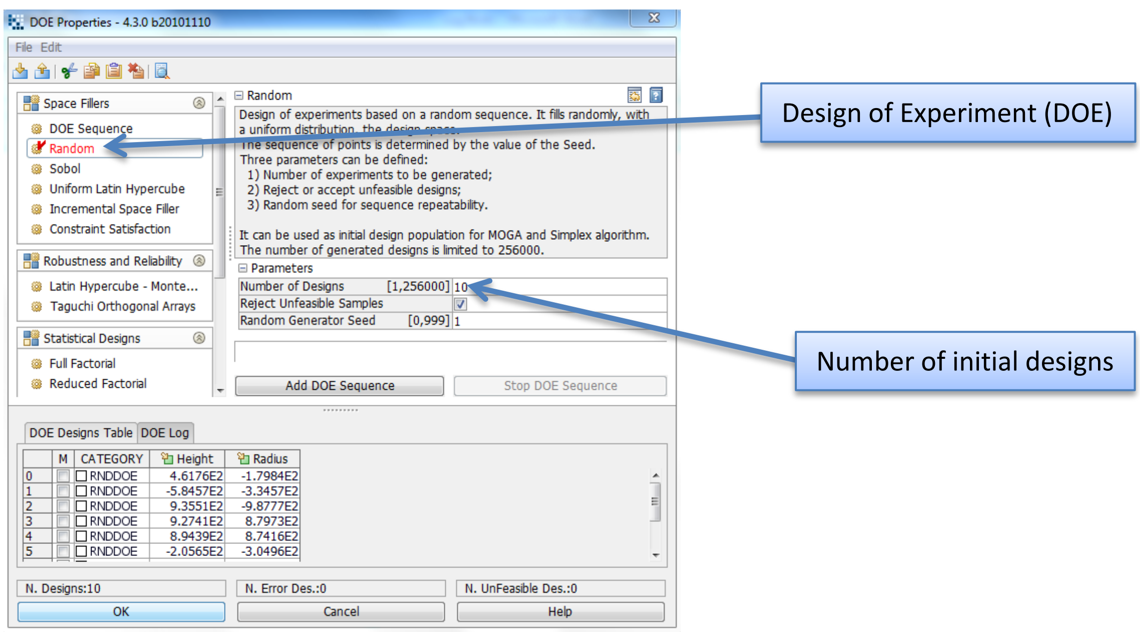



10. Now you need to set the boundary conditions for your inputs. Double click each input node and change the upper and lower bounds to narrow down the scope of your experiment and minimize infeasible results.
11. Similarly, set up an objective for each output. To do this, select the objective node and drag one under each output. Depending on your goal the objective can either be to minimize or maximize the output. Also, you may want to constrain an output, in which case you can drag a constraint node under the output (the constraint node is in the drop down of the objective node). Within the objective or constraint nodes you must select the "User Expression". To do this double click on an objective or constraint node and click on the little calculator symbol in the User Expression field. Select the variable you want, then click apply.



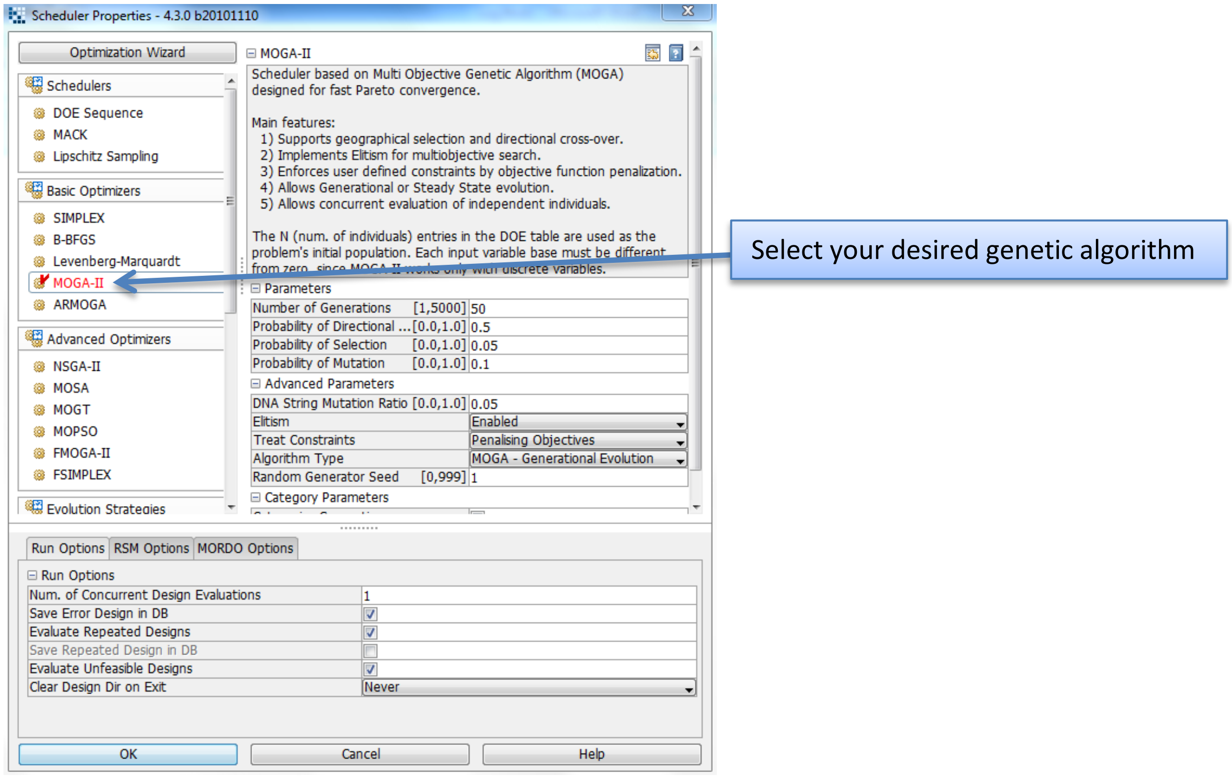



12. Next you need to set your scheduler settings. Double click the DOE node. Under Space Fillers select Random. This is a good place to start with simple optimizations. Under parameters you can select the number of designs to start with. I picked 10.




Once these two options are set, click Add DOE Sequence, and this will tabulate the initial designs for your experiment, then click ok.

13. Double click on the scheduler node that is connected to the DOE node and pick which algorithm you would like to use for your optimization. I picked MOGA-II.




14. At this point you should be able to run your program!

15. The experiment may take a while to run, but after it is complete you can use the information collected to choose an optimum iteration. To do this click on the Designs Space tab. In the Design Charts section of Tables and Charts click on Parallel Coordinate. Select the objectives that you would like to base this optimization on, and then it will bring up a graph consisting of a bunch of lines with a few vertical axes. Each vertical axis has objectives on it. Sliding the green arrow up and down the axes will eliminate or include different iterations. After narrowing down which iteration best fits your desired results you can select it and view the exported model, screen shot, and also run the exported CATScript to have CATIA automatically change your part to that iteration.