

Click the OK button. The Select Project dialog will be updated. Click the Select button on the Select Project dialog. Click the OK button on the Save ReferenceRun, Save ApplicationModel, Save Task and Save DesignSpace dialogs. The save will take a short interval (30-60 seconds) as DOES invokes ANSYS while it validates the ExpertDesign. When complete, the DOES Design window updates ExpertDesign Id and Name.

Virtual Engines Example

This example shows how to prepare a Virtual Engines model, a YZ426 engine, to run under DOES. We will attempt to maximize BMEP over a sweep of RPMs by varying the length and diameter of a section of the exhaust pipe. Example files for this example may be found in the common application data folder (usually C:\ProgramData) at subfolder OPTIMUM Power Technology\DOES\Samples\VirtualEngines.

You should follow the instructions in this tutorial to re-create these files as the files contain information that may be specific to your particular Automated Design or Virtual Engines setup.

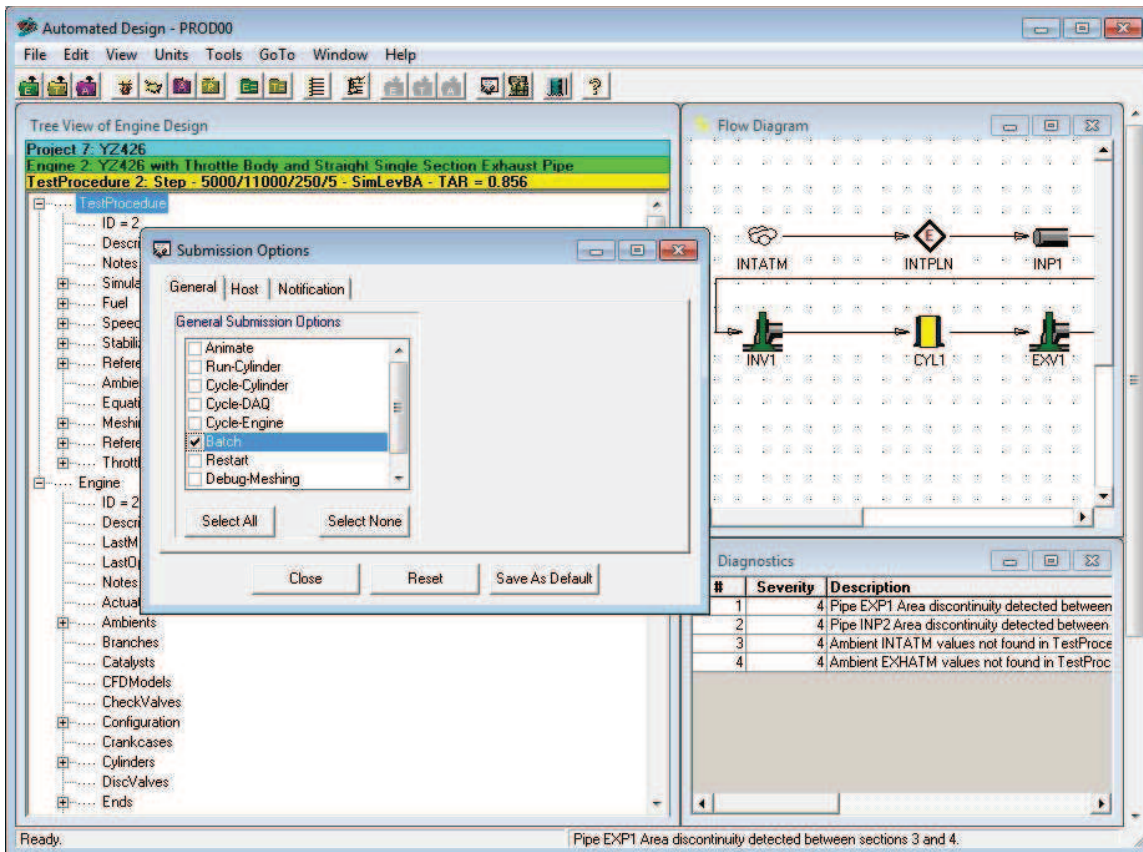
Preparing a Virtual Engines model to run under DOES consists of the following steps:

- Prepare Virtual Engines Batch Run
- Submit Virtual Engines Batch Run
- Prepare DOES ReferenceRun
- Prepare DOES ApplicationModel
- Prepare DOES Task
- Prepare DOES DesignSpace
- Save DOES ExpertDesign

Prepare Virtual Engines Batch Run

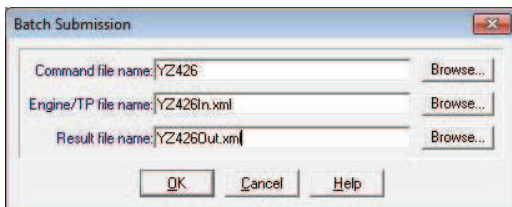
You must first prepare a Virtual Engines batch run. This example assumes that you have imported the Virtual Engines YZ426 sample. Load this sample and its TestProcedure into Virtual Engines or Automated Design.

Click Tools then Submission options from the menu to display the Submission Options dialog.

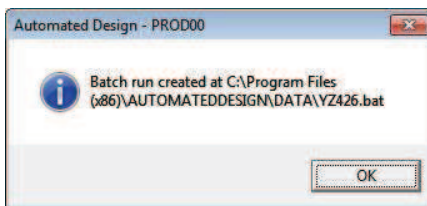


Click the Batch checkbox in the General Submission Options list so it is checked and click the Close button to close the Submission Options dialog.

Click File then Submit from the menu. The Batch Submission dialog is displayed because you had checked the Batch checkbox in the Submission Options dialog.

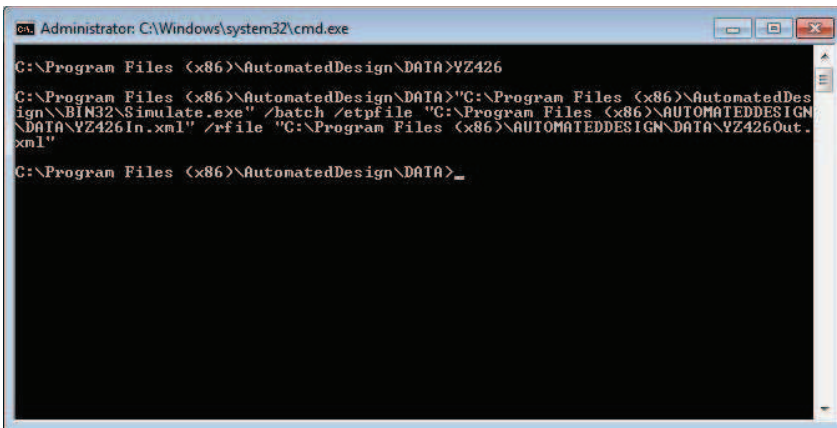


Type YZ426 as the Command file name, YZ426In as the Engine/TP file name and YZ426Out as the Result file name and click the OK button. Virtual Engines creates the command and Engine/TP files and displays a confirmation dialog:



Submit Virtual Engines Batch Run

You now need to run the YZ426.bat command file that was created. Open a DOS command prompt and orient to the Virtual Engines DATA folder. Type YZ426 and press Enter. This runs a batch Virtual Engines simulation and creates results at YZ426Out.csv.



```

Administrator: C:\Windows\system32\cmd.exe
C:\Program Files (x86)\AutomatedDesign\DATA\YZ426
C:\Program Files (x86)\AutomatedDesign\DATA>"C:\Program Files (x86)\AutomatedDesign\BIN32\Simulate.exe" /batch /etpfile "C:\Program Files (x86)\AUTOMATEDDESIGN\DATA\YZ426In.xml" /rfile "C:\Program Files (x86)\AUTOMATEDDESIGN\DATA\YZ426Out.xml"
C:\Program Files (x86)\AutomatedDesign\DATA>_

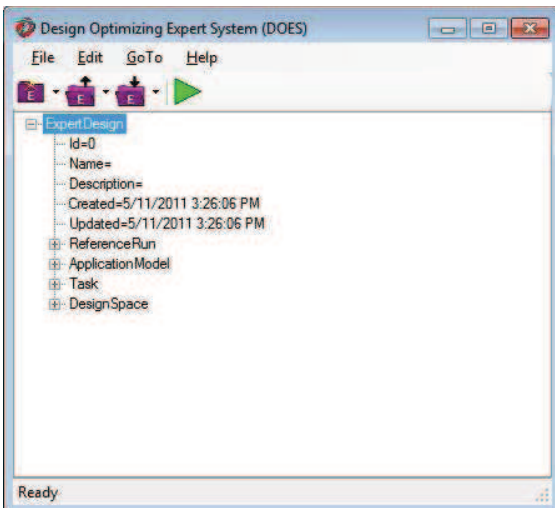
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You now have a set of files from which to create a DOES model.

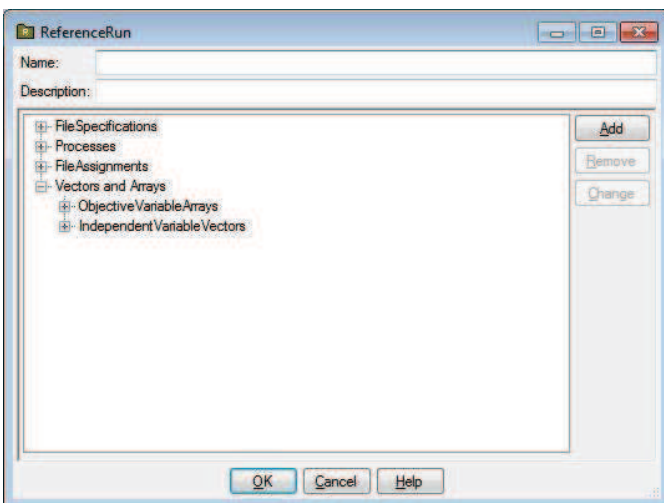
Prepare DOES ReferenceRun

In this example, DOES will vary the length and diameter of exhaust pipe section 4 in order to maximize BMEP.

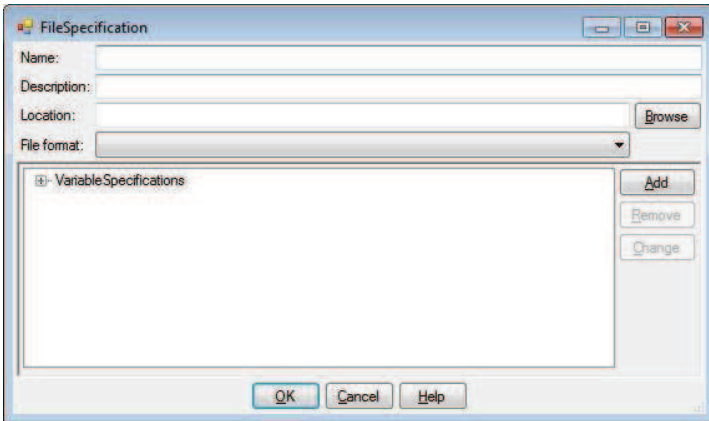
Start Design.



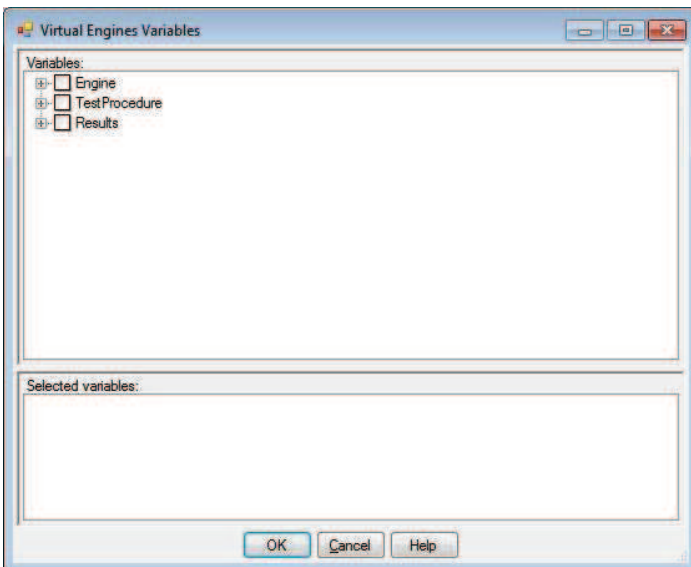
The first step in creating a DOES model is to create a ReferenceRun. The ReferenceRun is a definition of all the files, variables within each file, and processes that make up your model. Creation of a ReferenceRun is a Knowledge Engineer task and requires knowledge of the file layouts and processes that make up your model. Right-click on the ReferenceRun node and select Change from the menu. The ReferenceRun dialog is displayed.



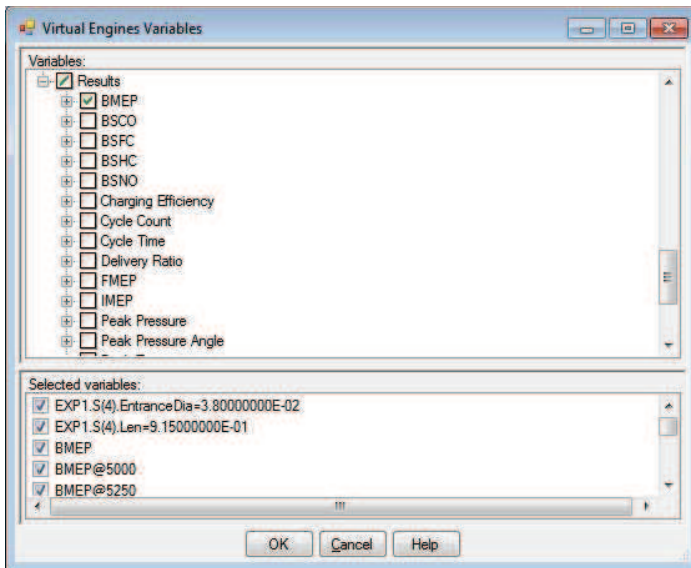
Right-click on the FileSpecifications node in the ReferenceRun dialog and select Add from the menu. The FileSpecification dialog is displayed.



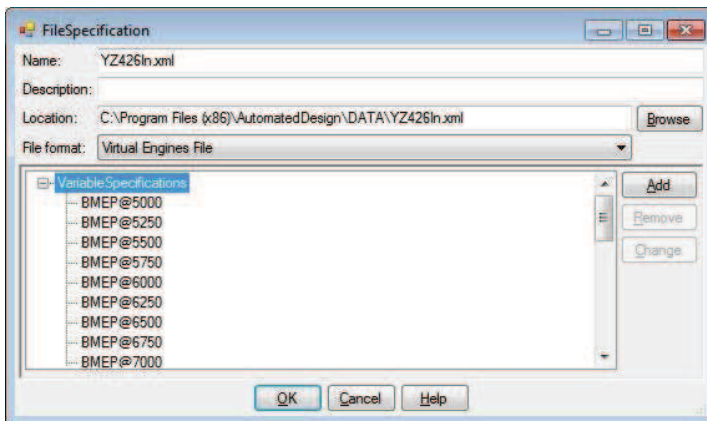
Click the "Browse" button and select YZ426In.xml from the Virtual Engines or Automated Design DATA folder as the location. The FileSpecification dialog will fill in the FileSpecification name, location and format for you. Right click on the VariableSpecifications node in the FileSpecification dialog and select Add from the menu. The Virtual Engines Variables dialog is displayed.



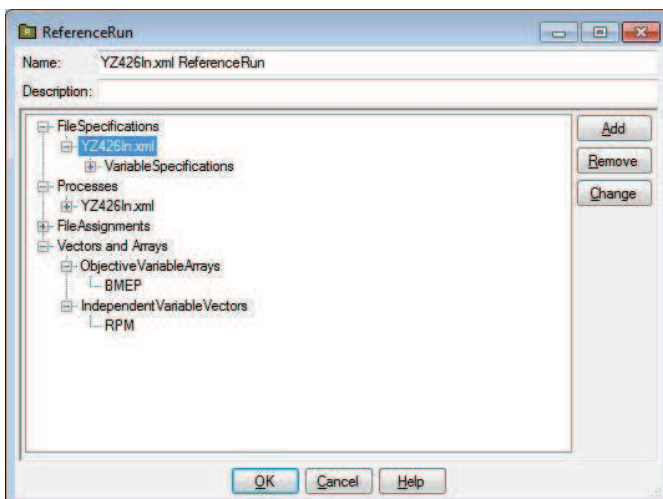
The Virtual Engines Variables dialog displays a tree view of the Engine, TestProcedure and Results and is similar to the tree view that the Virtual Engines Design application or the Automated Design Knowledge Engineering Interface application. Expand the Engine, Pipes, EXP1, Sections and Section(4) nodes. Click the checkboxes on the EntranceDiameter and Length nodes. Expand the Results node and click the checkbox on the BMEP node. Your Virtual Engines Variables dialog should look like this:



Click the OK button to return to the FileSpecification dialog which should look like this:



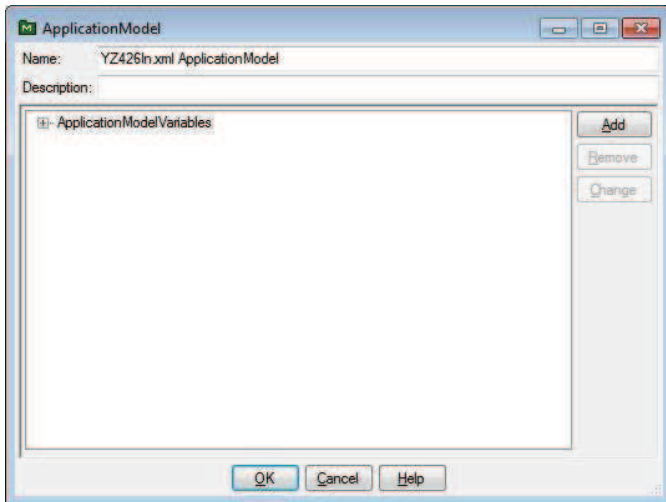
Click the OK button to return to the ReferenceRun dialog which should look like this:



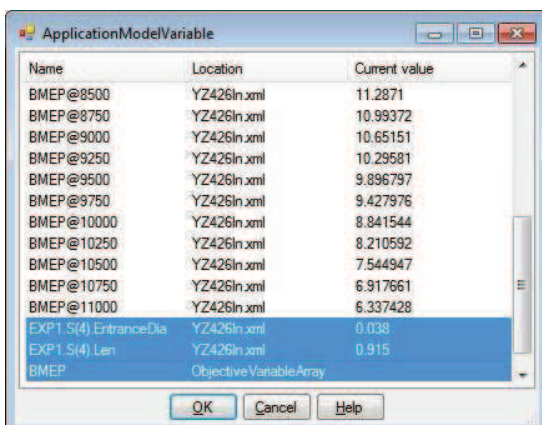
The Virtual Engines interface to DOES has filled in all the ReferenceRun specifications with a few mouse clicks! Note that, in addition to the FileSpecification, the Virtual Engines interface has filled in the Name and Process, created an ObjectiveVariableArray and created an IndependentVariableVector for you. The IndependentVariableVector RPM is required for the definition of the ObjectiveVariableArray. The ObjectiveVariableArray BMEP will be used as your Objective later. The Process defines how to run a simulation and will be used by the DesignEngine when you submit Iterations. Feel free to explore these nodes by double clicking them. When you are ready to continue, dismiss all ReferenceRun dialogs to return to the main Design Window.

Prepare DOES ApplicationModel

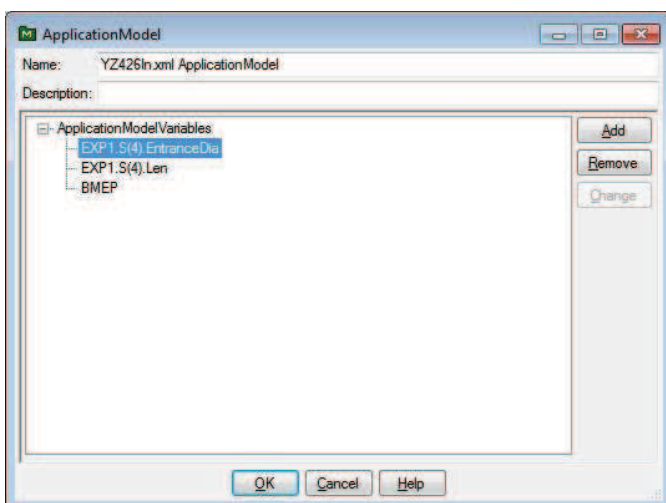
The next step is to create the ApplicationModel. An ApplicationModel is a set of Variables used for a specific application of DOES. Creation of an ApplicationModel is a Knowledge Engineer task. Right-click on the ApplicationModel node and select Change from the menu to display the ApplicationModel dialog.



Note that the Virtual Engines interface has supplied a name for the ApplicationModel. Right-click the ApplicationModelVariables node on the ApplicationModel dialog and select Add from the menu to display the ApplicationModelVariable dialog. Scroll to the bottom of the list of VariableSpecifications. Click Exp1.S(4).EntranceDia. Shift-click Exp1.S(4).Len and BMEP. The dialog will look like this:



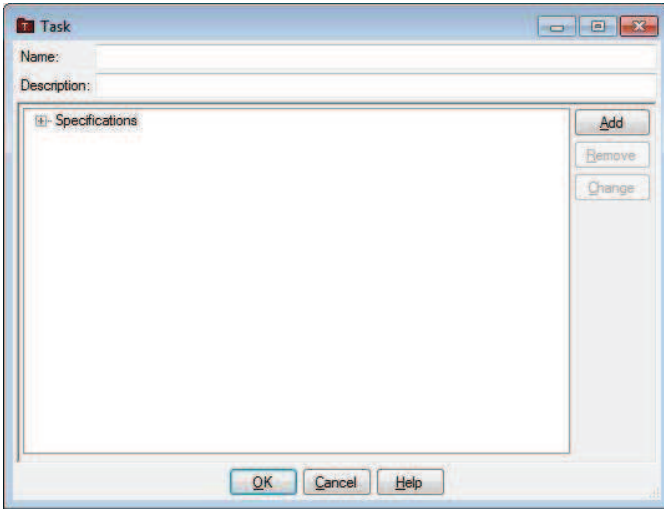
Click OK to return to the ApplicationModel dialog.



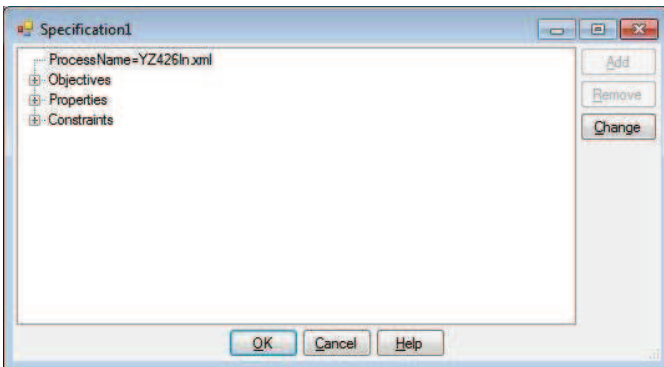
Click OK to close the ApplicationModel dialog.

Prepare DOES Task

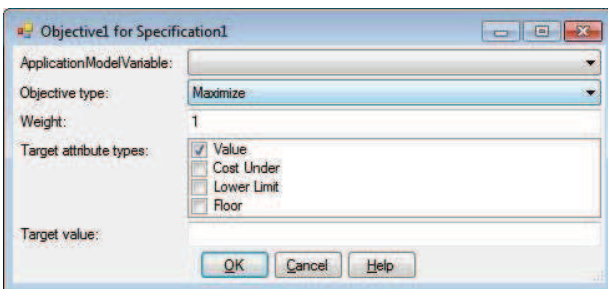
Now it is time to create the Task for this ExpertDesign. Creation of a Task is an Application Engineer task. The Task is where you define the Objectives of an ExpertDesign. Right-click on the Task node and select Change from the menu to display the Task dialog.



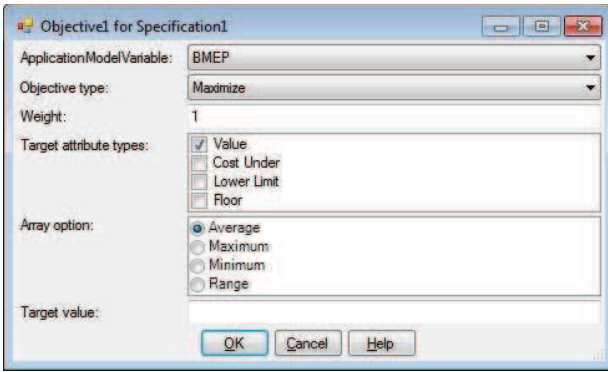
Type Maximize BMEP as the Task name and Virtual Engines Task as the description. Click the Specifications node and click the Add button to display the Specification dialog.



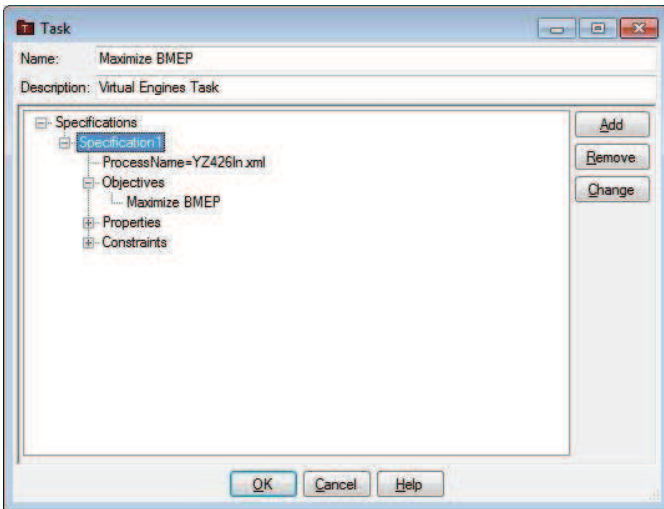
Note that the Process has been filled in already because the ReferenceRun contains only one Process. If the ReferenceRun had contained multiple Processes, you would have been required to select the Process node, click the Change button and select the Process for this Specification. Click the Objectives node and click the Add button. The Objective Dialog is displayed.



Select BMEP as the ApplicationModel variable and select Maximize as the Objective type. Your dialog will look like this:



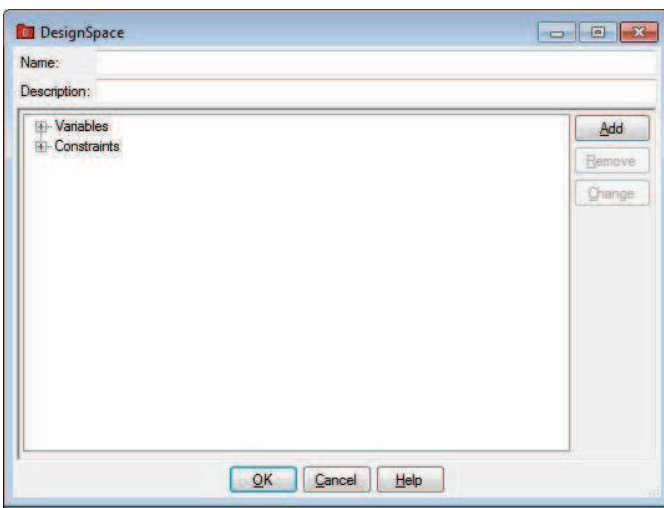
Click OK to return to the Specification dialog, then click the OK to return to the Task dialog. Your Task dialog will look like the following:



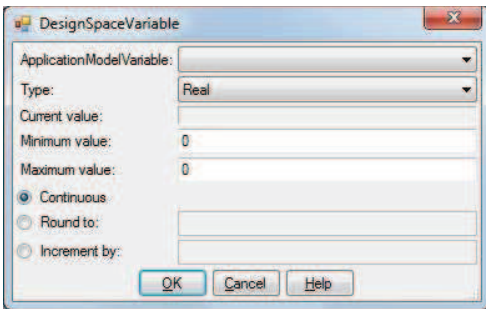
Click OK to close the Task dialog.

Prepare DOES DesignSpace

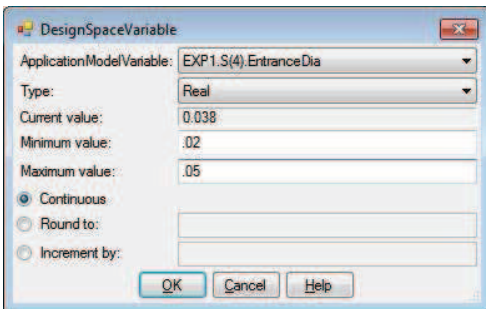
Now it is time to create the DesignSpace for this ExpertDesign. Creation of a DesignSpace is an Application Engineer task. The DesignSpace is where you define the variables to vary to achieve the Objectives that you defined in the Task. Right-click on the DesignSpace node and select Change from the menu to display the DesignSpace dialog.



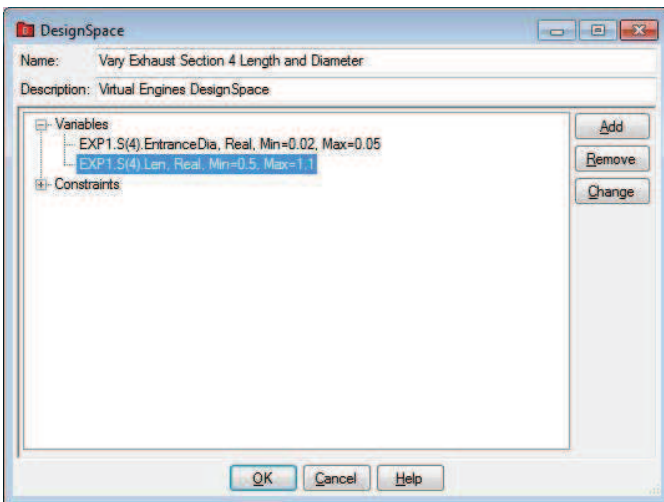
Type Vary Exhaust Section 4 Length and Diameter as the DesignSpace name and Virtual Engines DesignSpace as the description. Click the Variables node and click the Add button to display the DesignSpaceVariable dialog.



Select EXP1.S(4).EntranceDia as the ApplicationModel variable and type .02 as the Minimum value and .05 as the Maximum value. Note that all values are expressed in meters because the Virtual Engines files store all length values in meters.



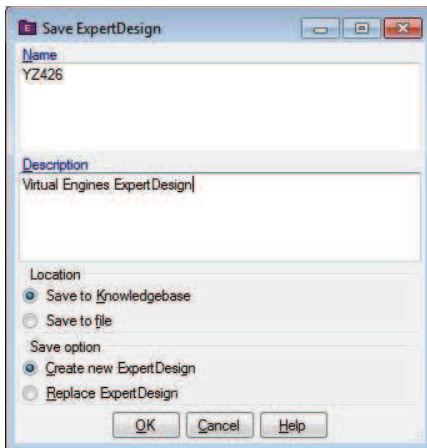
Click OK to return to the DesignSpace dialog and repeat selecting EXP1.S(4).Len as the ApplicationModel variable, .5 as the Minimum value and 1.1 as the Maximum value. The DesignSpace dialog will look like this:



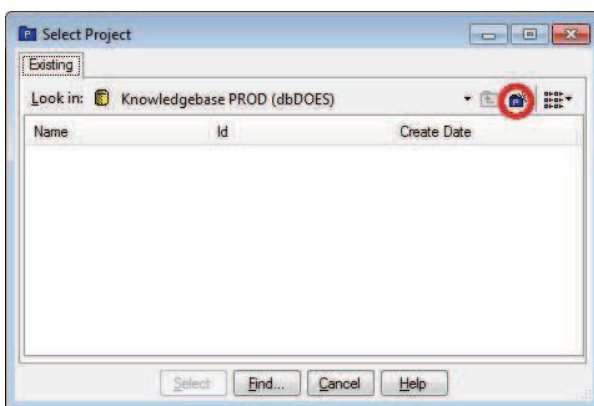
Click OK to close the DesignSpace dialog.

Save DOES ExpertDesign

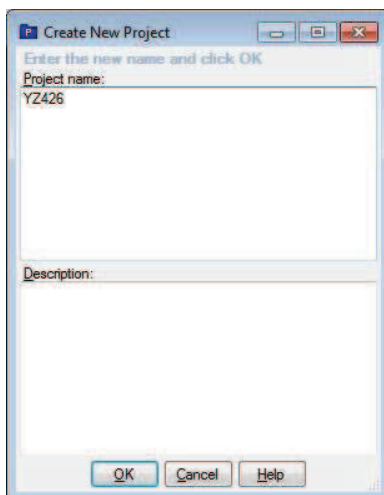
The ExpertDesign must be saved to the Knowledgebase before it can be run. Right-click the ExpertDesign node and click Save from the menu. The Save ExpertDesign dialog will be displayed. Type YZ426 as the Name and Virtual Engines ExpertDesign as the Description.



Click the OK button. The Select Project dialog will be displayed.



Click the New Project button (circled). The Create New Project dialog will be displayed. Type YZ426 as the Project name.



Click the OK button. The Select Project dialog will be updated. Click the Select button on the Select Project dialog. Click the OK button on the Save ReferenceRun, Save ApplicationModel, Save Task and Save DesignSpace dialogs.