## About DOES

Welcome to DOES. DOES (Design Optimizing Expert System) is a software suite that allows one or more engineers within an organization to optimize model-based designs utilizing OPTIMUM Power Technology's proprietary optimization technology (US Patent 7,260,516).

### *Table of Contents*

# Installing DOES

Before installing DOES, please make sure your system meets the minimum hardware and software requirements.

## DOES Hardware Requirements

- **CPU:** 500 MHz processor or faster
- **RAM:** 256MB or more
- **Hard Disk Space:** 100 MB free space required for install
- **Monitor:** 1024 X 768 or higher
- **Internet connectivity** is required for installing on Microsoft Windows XP if the .NET Framework 3.5 and .NET Framework 4.0 are not already installed

## DOES Software Requirements

- **Operating System:**
  - Microsoft Windows 7 and 8 - User Account Control Settings (UAC) must be set to "Never notify" and Local Administrator authority is required to run DOES applications.
  - Microsoft Windows Vista - User Account Control Settings (UAC) must be OFF and Local Administrator authority is required to run DOES applications.
  - Microsoft Windows XP with Service Pack 2.
- **Microsoft Office:** 2003, 2007, or 2010
- **Additional Software** included and automatically installed by setup if necessary:
  - Microsoft Windows Installer 3.1
  - Microsoft Windows Imaging Components (installed as a component of the Microsoft .NET Framework 3.5 if necessary)
  - Microsoft .NET Framework 4.0
  - Microsoft Office and Excel Primary Interop Assemblies
  - Update KB908002 for .NET Framework and Office
  - Microsoft SQL Server is required for a DOES install on a 64 bit Windows. Microsoft SQL Server Express is included on the DOES Setup CD.
- **Additional optional software:**
  - Virtual Engines 12.0 if you plan to run Virtual Engines models
  - Microsoft Office Excel 2003, 2007 or 2010 if you plan to run Excel models**
  - Ansys 14.0 if you plan to run Ansys Workbench models

    **If you plan to run Microsoft Office Excel models, then the following Microsoft Office Features must also be installed:
    .NET Programmability Support under Excel Features,
    Microsoft Forms 2.0 Programmability Support under Office Tools Features,
    and Smart Tag Programmability Support Feature under Office Tools Features.

## DOES Serial

DOES options and expiration date are controlled by a Serial. A Serial is a string of upper case letters and numbers similar to the following:

   ABCDEFGH-01234567-IJKLMNOP-98765432

When the first DOES application starts, it will request a Serial. If you do not specify a Serial, the application will terminate.

## Planning The Install

Choose the installation method below that is most appropriate for you:

- **DOES Using SQL Express.** Choose this method to install SQL Express on your PC and to create a new SQL Server database.

  - **Follow the instructions at Install DOES And SQL Express.**

  - **Follow the instructions at Allocate And Create An SQL Server Database.**

- **DOES Using a Pre-allocated SQL Server Database.** Choose this method if you will use an SQL Server database that has been pre-allocated by your database administrator. You will need to know the name of the SQL Server and the name of the database.

- **Follow the instructions at Install DOES.**

- **Follow the instructions at Create An SQL Server Database.**

- **DOES Using an Access database.** You may choose this method if you are running a 32 bit version of Windows. If you are running a 64 bit version of Windows, you must choose one of the SQL Server methods.

    - **Follow the instructions at Install DOES.**

    - **Follow the instructions at Create An Access Database.**

## Install DOES

Follow this procedure to install DOES on your PC.

Checking Components
SQL Server Express
Confirm Install
Welcome
License Agreement
Destination Folder
Summary
Progress
Complete
Create An Access Database

## Setup: Checking Components

After Setup starts, it verifies that each required software component is installed, if a required software component is not installed, Setup automatically installs it. This process could take from several seconds to 20 minutes or more depending on which software components need to be installed and the speed of your computer. While verifying and installing required software components, Setup displays a dialog similar to the following:



## Setup: SQL Server Express

After verifying and installing the prerequisite software components, Setup determines whether an instance of SQL Express is installed at this PC. If no instance of SQL Express is found at this PC, Setup displays the following dialog:

Click the "No, do not install Microsoft SQL Express" radio button. Click the "Next" button.

## Setup: Confirm Install

Setup displays the following dialog:



Click the "Yes" radio button and click the "Next" button to continue. Setup will invoke the Microsoft Windows Installer to complete the installation.

## Setup: Welcome

The Microsoft Windows Installer launches the DOES Setup Wizard. The DOES Setup Wizard will display the following opening dialog:

Click the "Next" button to continue.

## Setup: License Agreement

The DOES Setup Wizard will display the following dialog:



Click the "Yes" radio button to indicate that you have read, understood and agree to the terms of the license agreement. Note that the license agreement also appears in files License.doc and License.rtf in the same directory as Setup.exe, in case you would like to print it. Click the "Next" button to continue.

## Setup: Destination Folder

The DOES Setup Wizard will display the following dialog:



The default install folder for DOES is C:\Program Files\OPTIMUM Power Technology\DOES. If you wish to install to another folder, click the "Change" button and specify that folder. Note DOES must be installed to a local hard drive; it may not be installed to a mapped drive or a network drive. Click the "Next" button to continue.

## Setup: Summary

The DOES Setup Wizard will display the following dialog:

Click the "Install" button to start the installation.

## Setup: Progress

The Does Setup Wizard displays the following dialog while DOES is installing:



## Setup: Complete

When the DOES Setup installation is complete, the DOES Setup Wizard displays the following dialog.

Click the "Finish" button. Before terminating, the DOES Setup Wizard launches the Database Wizard then the Design Engine Tray application. Follow the instructions at Create An Access Database.

## Install DOES And SQL Express

Follow this procedure to install Install DOES And SQL Express on your PC.

Checking Components
SQL Server Express
Confirm Install
Welcome
License Agreement
Destination Folder
Summary
Progress
Complete
Allocate And Create An SQL Server Database

## Setup: Checking Components

After Setup starts, it verifies that each required software component is installed, if a required software component is not installed, Setup automatically installs it. This process could take from several seconds to 20 minutes or more depending on which software components need to be installed and the speed of your computer. While verifying and installing required software components, Setup displays a dialog similar to the following:



## Setup: SQL Server Express

After verifying and installing the prerequisite software components, Setup determines whether an instance of SQL Express is installed at this PC. If no instance of SQL Express is found at this PC, Setup displays the following dialog:



Click the "Yes, install Microsoft SQL Express" radio button. If your PC has more than one hard drive installed, the dialog presents a drop down list of candidate drives for the target install directory for the SQL Express installation. If you wish to install to a drive other than the C: drive, select the desired drive. SQL Express will be installed to the Program Files/Microsoft SQL Server folder on that drive. Click the Next button to install SQL Express.

While SQL Express installs, its Setup program may display progress dialogs. No response is necessary from you while SQL Express installs. SQL Express installs an SQL Server instance named DOES on your PC.

## Setup: Confirm Install

Setup displays the following dialog:



Click the "Yes" radio button and click the "Next" button to continue. Setup will invoke the Microsoft Windows Installer to complete the installation.

## Setup: Welcome

The Microsoft Windows Installer launches the DOES Setup Wizard. The DOES Setup Wizard will display the following opening dialog:



Click the "Next" button to continue.

## Setup: License Agreement

The DOES Setup Wizard will display the following dialog:

Click the "Yes" radio button to indicate that you have read, understood and agree to the terms of the license agreement. Note that the license agreement also appears in files License.doc and License.rtf in the same directory as Setup.exe, in case you would like to print it. Click the "Next" button to continue.

## Setup: Destination Folder

The DOES Setup Wizard will display the following dialog:



The default install folder for DOES is C:\Program Files\OPTIMUM Power Technology\DOES. If you wish to install to another folder, click the "Change" button and specify that folder. Note DOES must be installed to a local hard drive; it may not be installed to a mapped drive or a network drive. Click the "Next" button to continue.

## Setup: Summary

The DOES Setup Wizard will display the following dialog:

Click the "Install" button to start the installation.

## Setup: Progress

The Does Setup Wizard displays the following dialog while DOES is installing:

## Setup: Complete

When the DOES Setup installation is complete, the DOES Setup Wizard displays the following dialog.

Click the "Finish" button. Before terminating, the DOES Setup Wizard launches the Database Wizard then the Design Engine Tray application. Follow the instructions at Allocate And Create An SQL Server Database to create a new SQL Express database.

## Allocate And Create An SQL Server Database

Follow this procedure to create a new SQL Server database to use as a DOES Knowledgebase after you have completed Install DOES And SQL Express or Install DOES.

## Enter Serial

The DOES Setup Wizard has launched the Database Wizard. Since the Database Wizard is the first application to start after Setup, it will prompt for a Serial:



Click the "Serial" button. The Serial dialog will be presented:



Type or paste your serial in the "New Serial" box and click the "OK" button.

## Database Wizard Introduction

The Database Wizard introductory dialog will be displayed:



Click the "Next" button to continue.

## Database Wizard Main Menu

On a PC running a 32 bit version of Windows, the following dialog may be displayed:

Click the "Create SQL Server Database" radio button, then click the "Next" button.

*Note that since an Access database is not applicable to a 64 bit version of Windows, this step is skipped; proceed at Database Wizard Identifier.*

## Database Wizard Identifier

An identifier differentiates one Knowledgebase from another. The identifier is also a subdirectory name where the Knowledgebase and associated files are stored. The subdirectory is created under Program Data\OPTIMUM Power Technology\DOES. Type an identifier and click the "Next" button to continue.

## Database Wizard SQL Server Name

If SQL Express has been installed at this PC, then the default value of ".\DOES" is adequate (Note that the dot signifies the local machine). Otherwise you must enter an SQL Server name.

Click the "Next" button to continue. The Database Wizard attempts to logon to the specified SQL Server. If unsuccessful, an error message is displayed and you are prompted for

the SQL Server name again.

## Database Wizard New/Existing SQL Database

Click the "I want to create a new SQL Server database" radio button, then click the "Next" button.

## Database Wizard New SQL Database Name
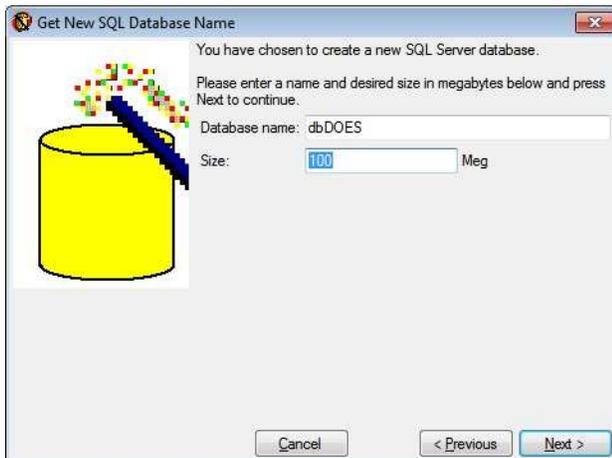
The recommended database name is "dbDOES" and the recommended size is <u>at least</u> 100 megabytes. Click the "Next" button to continue.

## Database Wizard New SQL Database Location
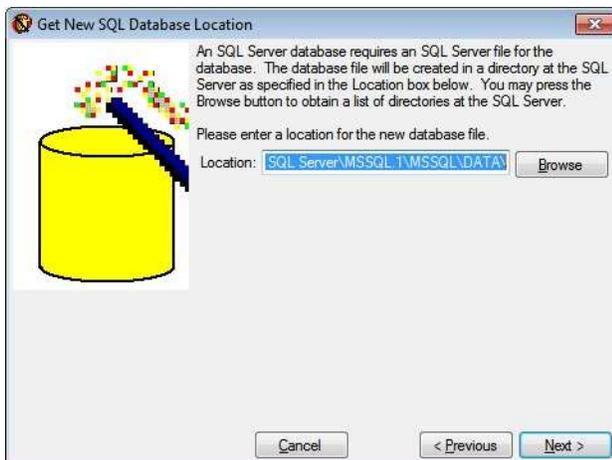
The database location must be a directory that is located on a hard drive that is local to the SQL Server. You may click the "Browse" button to browse for a location. Click the "Next" button to continue.
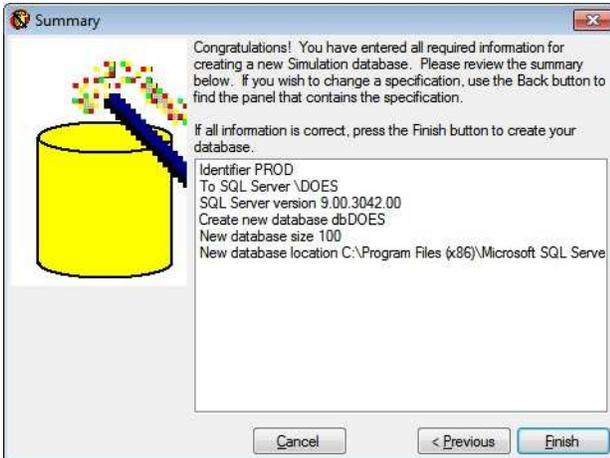
## Database Wizard Summary



Click the "Finish" button to create your database.

## Database Wizard Finished
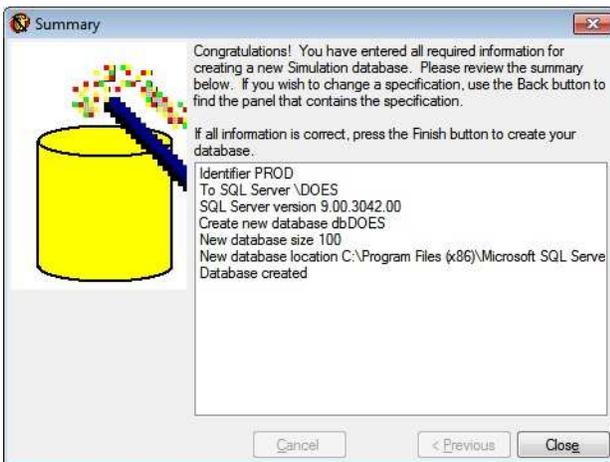


Click the "Close" button to terminate the Database Wizard.

## Create An SQL Server Database

Follow this procedure to create a new SQL Server database to use as a DOES Knowledgebase after you have completed Install DOES.

Enter Serial
Database Wizard Introduction
Database Wizard Main Menu
Database Wizard Identifier
Database Wizard SQL Server Name
Database Wizard New/Existing SQL Database
Database Wizard SQL Database Name
Database Wizard Summary
Database Wizard Finished

## Enter Serial

The DOES Setup Wizard has launched the Database Wizard. Since the Database Wizard is the first application to start after Setup, it will prompt for a Serial:



Click the "Serial" button. The Serial dialog will be presented:

New Serial

Current Serial:

New Serial: |

OK    Cancel    Help

Type or paste your serial in the "New Serial" box and click the "OK" button.

## Database Wizard Introduction

The Database Wizard introductory dialog will be displayed:

Introduction

Welcome to the Database Wizard. The Database Wizard will guide you through the process of creating a Simulation Database.

Press the Next button to continue.

Cancel    < Previous    Next >

Click the "Next" button to continue.

## Database Wizard Main Menu

On a PC running a 32 bit version of Windows, the following dialog may be displayed:

Main Menu

Select one of the following options and press Next:
- Create Access database
- Create SQL Server database

Cancel    < Previous    Next >

Click the "Create SQL Server Database" radio button, then click the "Next" button.

*Note that since an Access database is not applicable to a 64 bit version of Windows, this step is skipped; proceed at Database Wizard Identifier.*

## Database Wizard Identifier

An identifier differentiates one Knowledgebase from another. The identifier is also a subdirectory name where the Knowledgebase and associated files are stored. The subdirectory is created under Program Data\OPTIMUM Power Technology\DOES. Type an identifier and click the "Next" button to continue.

## Database Wizard SQL Server Name



If SQL Express has been installed at this PC, then the default value of ".\DOES" is adequate (Note that the dot signifies the local machine). Otherwise you must enter an SQL Server name.

Click the "Next" button to continue. The Database Wizard attempts to logon to the specified SQL Server. If unsuccessful, an error message is displayed and you are prompted for the SQL Server name again.

## Database Wizard New/Existing SQL Database



Click the "My SQL Server database was created already" radio button, then click the "Next" button.

## Database Wizard SQL Database Name
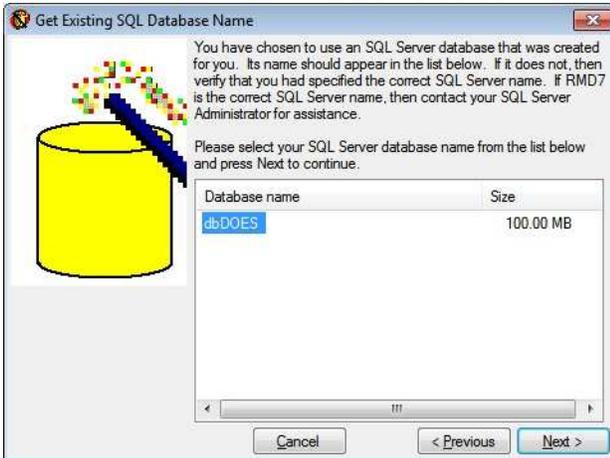


You are presented with a list of database names that exist at the SQL Server. Locate and click the database to be used as the DOES Knowledgebase and click the "Next" button.
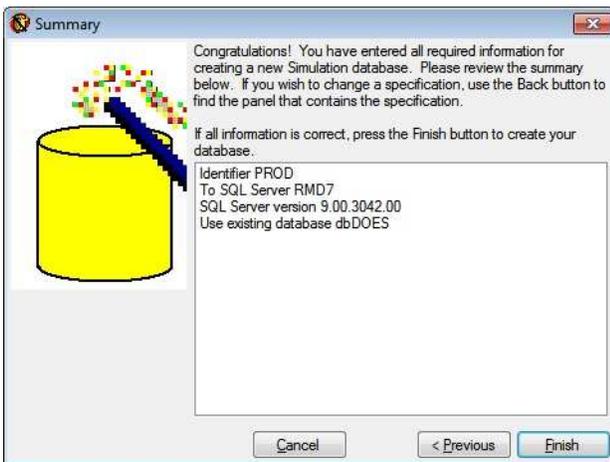
## Database Wizard Summary



Click the "Finish" button to create your database.

## Database Wizard Finished
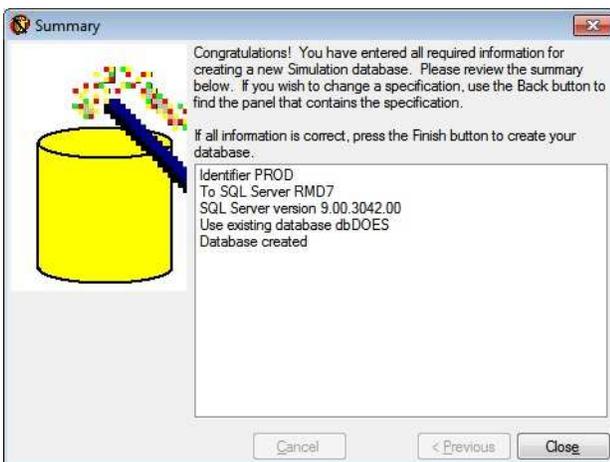


Click the "Close" button to terminate the Database Wizard.

## Create An Access Database

Follow this procedure to create a new Access database to use as the DOES Knowledgebase.

Enter Serial
Database Wizard Introduction
Database Wizard Main Menu
Database Wizard Identifier
Database Wizard Access Database Name
Database Wizard Summary
Database Wizard Finished

## Enter Serial

The DOES Setup Wizard has launched the Database Wizard. Since the Database Wizard is the first application to start after Setup, it will prompt for a Serial:



Click the "Serial" button. The Serial dialog will be presented:



Type or paste your serial in the "New Serial" box and click the "OK" button.

## Database Wizard Introduction

The Database Wizard introductory dialog will be displayed:
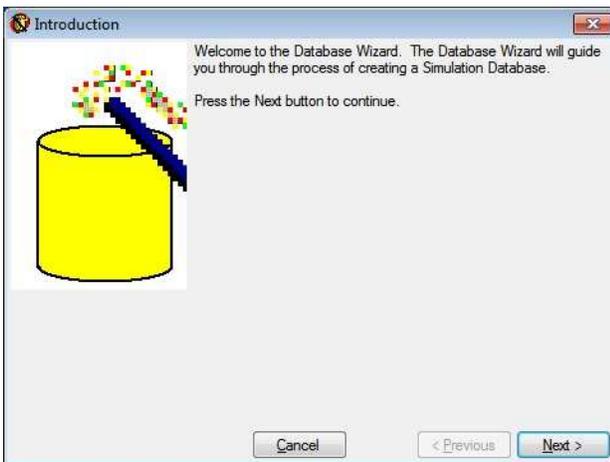


Click the "Next" button to continue.

## Database Wizard Main Menu
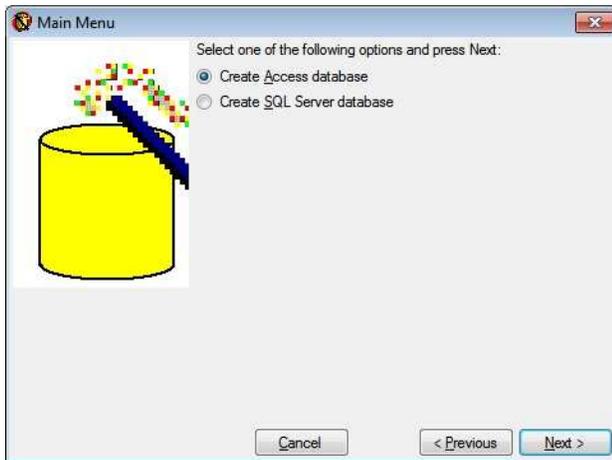
Select "Create Access database" and click the "Next" button to continue.

*Note that since an Access database is not applicable to a 64 bit version of Windows, this step is skipped; proceed at Database Wizard Identifier.*

## Database Wizard Access Database Name
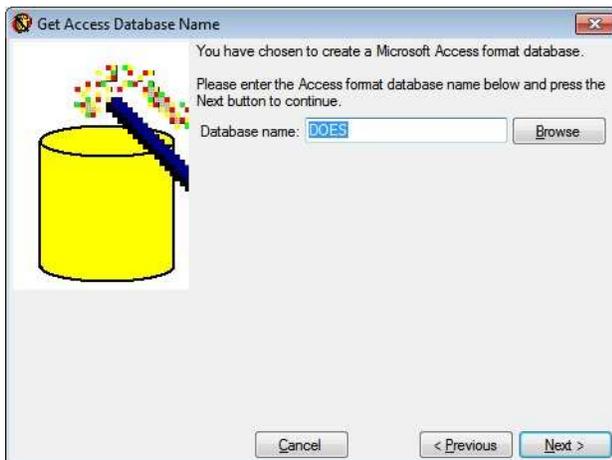
Type a file name for your Knowledgebase, for example "DOES" and click the "Next" button to continue. The Database Wizard appends a ".mdb" extension.

## Database Wizard Summary
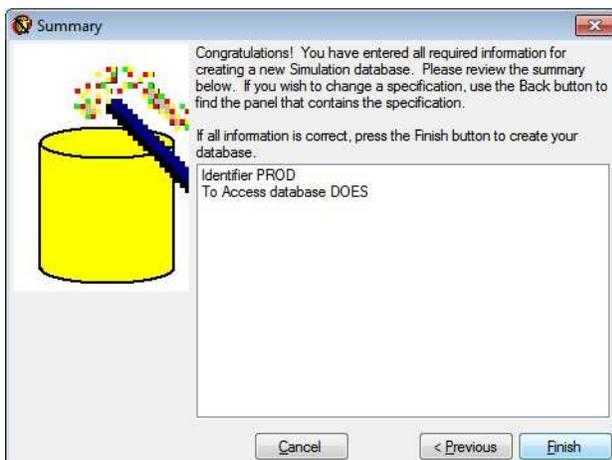
Click the "Finish" button to create your database.

## Database Wizard Finished
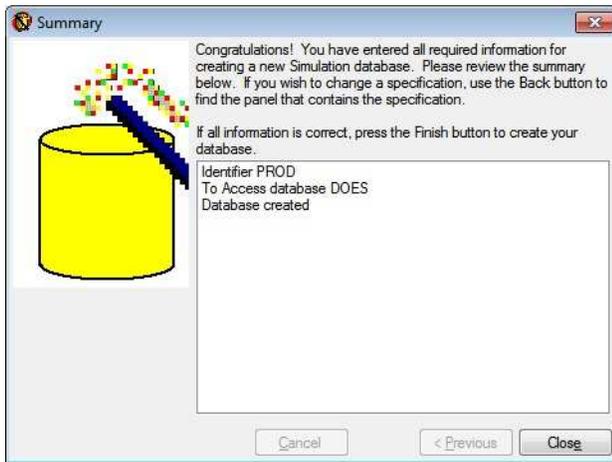
Click the "Close" button to terminate the Database Wizard.

## Design Engine Tray Application

The DesignEngine Tray application may be used to manually start and stop the DesignEngine service. The DesignEngine service runs all DOES Models in a background environment. In addition, the Design Engine Tray application displays progress messages as the Models run. The DesignEngine Tray application is launched automatically from Setup, then from the Windows Startup program group on every logon. When minimized, the Design Engine Tray application appears as an icon in the Windows Taskbar Tray usually at the lower right corner of the Windows Desktop:



Double-click the Design Engine Tray icon to open the DesignEngine Tray Application.
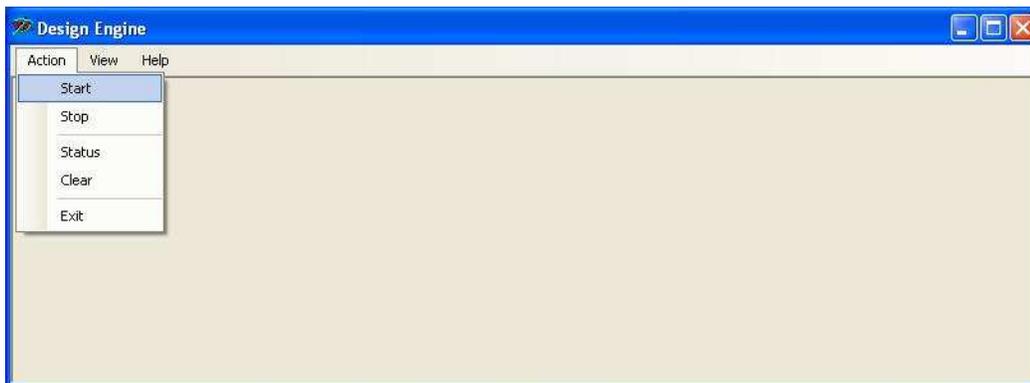


## Concepts

DOES is a software suite that allows one or more engineers within an organization to optimize model-based designs utilizing OPTIMUM Power Technology's proprietary optimization technology (US Patent 7,260,516).

Knowledgebase
Project
ExpertDesign
ReferenceRun
ApplicationModel
Task
Specification
Objective
DesignSpace
Iteration
Multi User Access
   User
   Group
   Role
      Security Manager
      IT Manager
      Engineering Manager
      Knowledge Engineer
      Application Engineer
   Preference
   Permissions

## Knowledgebase

The Knowledgebase is a repository that contains design optimization Projects.

## Project

A Project is a logical folder in the Knowledgebase. A Project may contain sub-Projects, ExpertDesigns, ReferenceRuns, ApplicationModels, Tasks, and DesignSpaces.

## ExpertDesign

An ExpertDesign is an entity that defines the model you wish to optimize, the optimization you wish to perform and the variables you wish to manipulate. ExpertDesigns are stored in Projects.

An ExpertDesign consists of a ReferenceRun, an ApplicationModel, a Task, and a DesignSpace.

## ReferenceRun

A ReferenceRun is an reusable entity that is part of one or more ExpertDesigns. The ReferenceRun contains specifications for all input, process and output files that are required to run the model. Each file specification contains specifications for the the variables that may be manipulated by ExpertDesigns. The ReferenceRun also contains specifications for the processes that must be run in order to obtain a solution for the model.

A ReferenceRun may be created and altered by a KnowledgeEngineer.

## ApplicationModel

An ApplicationModel is a reusable entity that is part of one or more ExpertDesigns. The ApplicationModel contains specifications of ReferenceRun variables that are required for a particular application of DOES.

An ApplicationModel may be created and altered by a KnowledgeEngineer.

## Task

A Task is a reusable entity that defines all of the Objectives of an optimization to be performed on an ApplicationModel. A Task consists of one or more Specifications.

## Specification

A Specification consists of a Weight, one or more Objectives and zero or more Constraints. When a Task has multiple Specifications, the Weight permits one group of Objectives to have a greater impact on the optimization than another group of Objectives.

## Objective

An Objective specifies the desired optimum value of an ApplicationModel variable. The desired optimum value may be an explicit value (match), or you may request that DOES find the minimum or maximum value of the ApplicationModel variable. In addition, an Objective has a Weight.

## DesignSpace

A DesignSpace is a reusable entity that defines which ApplicationModel variables to manipulate and how to manipulate them to achieve the Objectives defined in the Specifications that make up the Task.

## Iteration

An Iteration is the Results for one or more locally optimized Solutions that were created by performing an Exploration and Refinement on an ExpertDesign.

## Multi User Access

Multi User Access is an optional feature of DOES that facilitates and manages access to a common Knowledgebase by multiple Users. The Multi User Access feature includes Users, Groups, Roles, Preferences, and Permissions.

## User

A User is a Microsoft Windows LoginId. A User is assigned Roles and Preferences. A User may be added to multiple Groups. A User may be Granted or Denied Permission to access a Folder or Project in the Knowledgebase.

## Group

A Group is a set of Users. A Group may be Granted or Denied Permission to access a Folder or Project in the Knowledgebase.

## Role

Roles are assigned to a User and include:

    SecurityManager
    IT Manager
    Engineering Manager
    KnowledgeEngineer

Application Engineer

# Security Manager

A Security Manager is omnipotent. A Security Manager has full access to all elements of DOES. The User that installs DOES automatically becomes the first Security Manager.

# IT Manager

The IT Manager role includes:

- Running the Database Wizard to create a Knowledgebase.
- Assignment of the IT Manager Role to other Users, but an IT Manager may not create or delete Users.
- Management of the Knowledgebase, but an IT Manager may not view the contents of Knowledgebase Folders or Projects.

# Engineering Manager

The Engineering Manager role includes:

- Creation/deletion of Groups and Users.
- Assignment of Project Permissions.
- Assignment of Engineering Manager, Knowledge Engineer, and Application Engineer Roles to Users
- Engineering Manager also includes the Knowledge Engineer and Application Engineer Roles

# Knowledge Engineer

The Knowledge Engineer role includes:

- Creation/deletion of Projects, ExpertDesigns, ReferenceRuns, ApplicationModels, Tasks, and DesignSpaces.
- Access to the Knowledge Engineering Interface, and the Application Engineering Interface.
- Knowledge Engineer also includes the Application Engineer Role

# Application Engineer

The Application Engineer role includes:

- Creation/deletion of Projects, ExpertDesigns, Tasks, and DesignSpaces.

# Preference

Preference is one of the following if a User's Roles include both Knowledge Engineer and Application Engineer:

**Knowledge Engineer Preference:** the Design application will start in the Knowledge Engineering Interface if no interface is specified.

**Application Engineer Preference:** the Design application will start in the Application Engineering Interface if no interface is specified.

# Permissions

Permissions by User or Group are granted or denied to Folders, Projects and the Knowledgebase. Folders and Projects may inherit Permissions from their parents. Permissions include:

**View Permission:** The User or Group may see the element and any sub-Folders or sub-Projects of the element but no other contents unless Access Permission is also granted.

**Access Permission:** The User or Group may see and edit the contents of the element.

**Full Control Permission:** includes both View and Access Permissions.

# Design

Design is launched from the Windows Start Menu or from the DOES Knowledgebase Explorer application.

Design Window
ReferenceRun Dialog
FileSpecification Dialog
VariableSpecification Dialog
VariableSelection Dialog
Process Dialog
ProcessStep Dialog
FileReference Dialog
FileAssignment Dialog
ObjectiveVariableArray Dialog
ObjectiveVariableArray Variable Dialog
IndependentVariableVector Dialog
IndependentVariableVector Variable Dialog
ApplicationModel Dialog
ApplicationModelVariable Dialog
Task Dialog

Specification Dialog
ProcessName Dialog
Objective Dialog
DesignSpace Dialog
DesignSpaceVariable Dialog
Constraint Dialog
Constraint Side Dialog
Constraint Variable Dialog
Save ExpertDesign Dialog
Save ReferenceRun Dialog
Save ApplicationModel Dialog
Save Task Dialog
Save DesignSpace Dialog
Optimize Dialog
Optimize Validation Errors Dialog

## Design Window
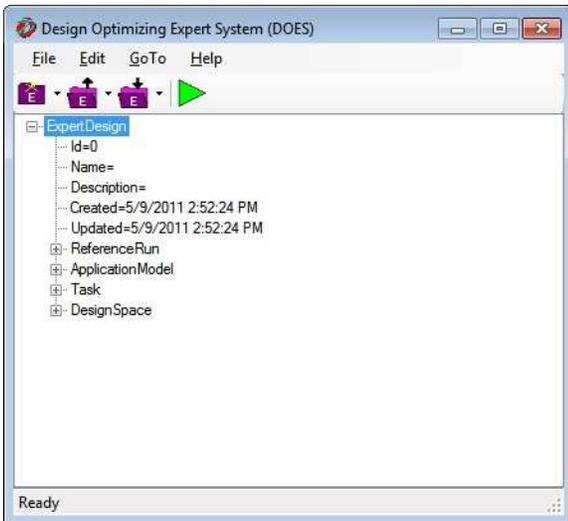


The Design window displays a tree view of an ExpertDesign that you are editting. The tree consists of nodes that you may click. Left-clicking a node selects and highlights it. The Edit Menu may be used to operate on the selected node. You may also right-click a node to display a Menu with actions that are appropriate for the selected node.

The menu of the Design window consists of File, Edit, GoTo and Help submenus. The File menu contains actions that permit you to Load, Save, and Clear the ExpertDesign. The Edit menu has actions that operate on the selected node. The GoTo menu permits you to navigate to other DOES applications. The Help menu has standard help actions.

The toolbar of the Design window consists of Clear, Load, Save and Optimize actions.

## ReferenceRun Dialog

The ReferenceRun contains specifications for all input, process and output files that are required to run the model. Each FileSpecification contains specifications for the the variables that may be manipulated by ExpertDesigns. The ReferenceRun also contains specifications for the Processes that must be run in order to obtain a solution for the model. The ReferenceRun dialog is displayed when you right-click the ReferenceRun Node and select Change from the menu.
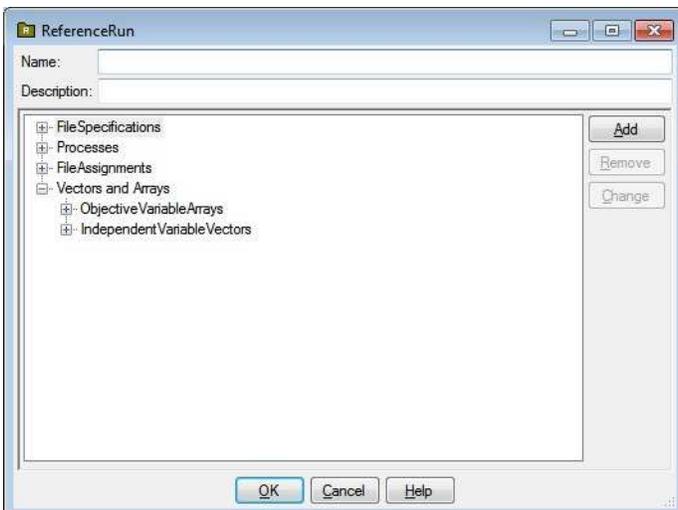
The ReferenceRun dialog has textboxes for entering the Name and Description of the ReferenceRun, a tree with FileSpecifications, Processes, FileAssignments, Vectors and Arrays, ObjectiveVariableArrays, and IndependentVariableVectors nodes and buttons that allow you to Add, Remove and Change subnodes of these nodes, as well as OK, Cancel and Help buttons.

### Name

This is the name associated with this ReferenceRun. Once saved to the Knowlegebase, this is the name that will appear under the ReferenceRuns node in the Knowledgebase Explorer application.

### Description

This is an optional description associated with the ReferenceRun.

### FileSpecifications Node

Each FileSpecification Node that appears under the FileSpecifications node displays the FileSpecification name.

To add a FileSpecification node, click the FileSpecifications node if it is not highlighted, then click the Add button. The FileSpecification dialog is displayed.

To remove a FileSpecification node, click the FileSpecification node you wish to remove, then click the Remove button.

To change a FileSpecification node, click the FileSpecification node you wish to change, then click the Change button. The FileSpecification dialog is displayed.

### Processes Node

Each Process Node that appears under the Processes node displays the Process name.

To add a Process node, click the Processes node if it is not highlighted, then click the Add button. The Process dialog is displayed.

To remove a Process node, click the Process node you wish to remove, then click the Remove button.

To change a Process node, click the Process node you wish to change, then click the Change button. The Process dialog is displayed.

### FileAssignments Node

Each FileAssignment Node that appears under the FileAssignments node displays the FileAssignment name.

To add a FileAssignment node, click the FileAssignments node if it is not highlighted, then click the Add button. The FileAssignment dialog is displayed.

To remove a FileAssignment node, click the FileAssignment node you wish to remove, then click the Remove button.

To change a FileAssignment node, click the FileAssignment node you wish to change, then click the Change button. The FileAssignment dialog is displayed.

### ObjectiveVariableArrays Node

Each ObjectiveVariableArray Node that appears under the ObjectiveVariableArrays node displays the ObjectiveVariableArray name.

To add a ObjectiveVariableArray node, click the ObjectiveVariableArrays node if it is not highlighted, then click the Add button. The ObjectiveVariableArray dialog is displayed.

To remove a ObjectiveVariableArray node, click the ObjectiveVariableArray node you wish to remove, then click the Remove button.

To change a ObjectiveVariableArray node, click the ObjectiveVariableArray node you wish to change, then click the Change button. The ObjectiveVariableArray dialog is displayed.

### IndependentVariableVectors Node

Each IndependentVariable Vector Node that appears under the IndependentVariableVectors node displays the IndependentVariableVector name.

To add an IndependentVariableVector node, click the IndependentVariableVectors node if it is not highlighted, then click the Add button. The IndependentVariableVector dialog is displayed.

To remove a IndependentVariableVector node, click the IndependentVariableVector node you wish to remove, then click the Remove button.

To change an IndependentVariableVector node, click the IndependentVariableVector node you wish to change, then click the Change button. The IndependentVariableVector dialog is displayed.

### OK Button

Clicking OK will validate the information you entered. If valid, the ReferenceRun dialog will be dismissed and the calling dialog or window will be updated with the information you entered. If invalid, you will be presented with an error dialog and the ReferenceRun dialog will remain.

### Cancel Button

Clicking Cancel will dismiss the ReferenceRun dialog and the calling dialog or window will not be altered.

### Help Button

Help will display this information.

# FileSpecification Dialog

A FileSpecification contains information about a file that is required to run the ExpertDesign. The FileSpecification dialog is displayed in response to the following actions:

- Right-click the FileSpecifications Node and select Add from the menu
- Right-click a FileSpecification Node and select Change from the menu
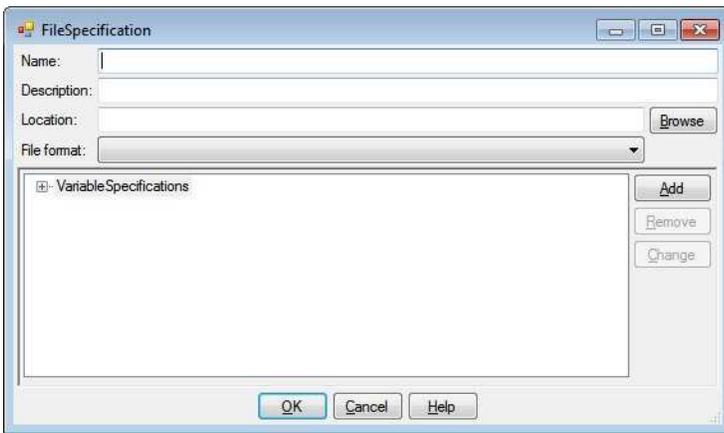


The FileSpecification dialog has textboxes for entering the Name and Description of the FileSpecification, a textbox and Browse button for entering the location of the file that this FileSpecification represents, listboxes for selected the type and format associated with this FileSpecification, a tree with a VariableSpecifications node and buttons that allow you to Add, Remove and Change VariableSpecifications, as well as OK, Cancel and Help buttons.

### Name

This is the name associated with the FileSpecification. FileReferences and FileAssignments refer to this name.

### Description

This is an optional description associated with the FileSpecification.

### Location

This is the fully qualified file name that this FileSpecification represents.

### Browse Button

You may click the Browse button to display a standard file dialog that you may use to navigate to and select the file name of this FileSpecification.

### File Format

This is a list of file formats that DOES recognizes. DOES can recognize variables from any file format except "Binary".

### VariableSpecifications Node

Each VariableSpecification Node that appears under the VariableSpecifications node displays the VariableSpecification name.

To add a VariableSpecification node, click the VariableSpecifications node if it is not highlighted, then click the Add button. The VariableSpecification Dialog is displayed.

To remove a VariableSpecification node, click the VariableSpecification node you wish to remove, then click the Remove button.

To change a VariableSpecification node, click the VariableSpecification node you wish to change, then click the Change button. The VariableSpecification Dialog is displayed.

### OK Button

Clicking OK will validate the information you entered. If valid, the FileSpecification dialog will be dismissed and the calling dialog or window will be updated with the information you entered. If invalid, you will be presented with an error dialog and the FileSpecification dialog will remain.

### Cancel Button

Clicking Cancel will dismiss the VariableSpecification dialog and the calling dialog or window will not be altered.

### Help Button

Help will display this information.

# VariableSpecification Dialog

A VariableSpecification contains information about a variable in a FileSpecification. The VariableSpecification dialog is in response to the following actions:

- Right-click the VariableSpecifications Node and select Add from the menu
- Right-click a VariableSpecification Node and select Change from the menu
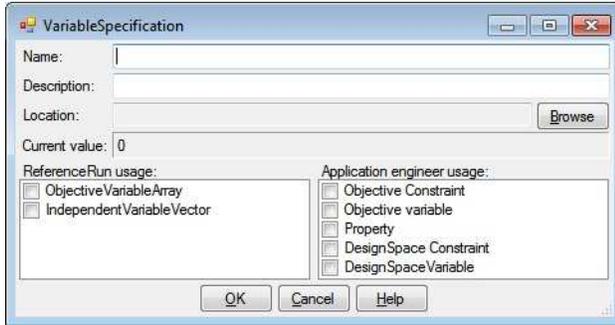
The VariableSpecification dialog has textboxes for entering the Name and Description of the VariableSpecification, a textbox and Browse button for selecting the variable that this VariableSpecification represents, the unit class of this variable, the current value of this variable, and checkboxes for selecting the allowable use(s) for this variable, as well as OK, Cancel and Help buttons.

## Name

This is the name associated with this VariableSpecification. ModelVariables, ObjectiveVariableArrays, and IndependentVariableVectors refer to this name.

## Description

This is an optional description associated with the VariableSpecification.

## Location

This is the location of the variable associated with this VariableSpecification and my be set or changed by clicking the Browse button.

## Browse Button

Clicking the Browse button presents a Variable Selection dialog where you may select the location of the variable associated with this VariableSpecification. The format of the Variable Selection dialog depends on the type of the FileSpecification that contains this VariableSpecification.

## Unit Class

This is a list where you select the unit class of the variable associated with this VariableSpecification. It is one of the following values:

- File name
- Float
- Integer
- Object
- Text

Most of the times, the default value of Float will be adequate.

## ReferenceRun Usage

This is a list of checkboxes where the Knowledge Engineer designates the type of ReferenceRun entities for which this VariableSpecification is eligible. You may check any combination of the following:

- ObjectiveVariableArray
- IndependentVariableVectory

## Application Engineer Usage

This is a list of checkboxes where the KnowledgeEngineer designates the Application Engineer entities for which this VariableSpecification is eligible. You may check any combination of the following:

- Objective constraint
- Objective variable
- Property
- DesignSpace constraint
- DesignSpaceVariable

## OK Button

Clicking OK will validate the information you entered. If valid, the VariableSpecification dialog will be dismissed and the calling dialog or window will be updated with the information you entered. If invalid, you will be presented with an error dialog and the VariableSpecification dialog will remain.

## Cancel Button

Clicking Cancel will dismiss the VariableSpecification dialog and the calling dialog or window will not be altered.

### Help Button

Help will display this information.

## VariableSelection Dialog

A Variable Selection dialog is presented when you click the Browse button on the VariableSpecification dialog. A variable selection dialog is specific to the FileSpecification format that contains the VariableSpecification and is usually a tree view of the variables in the file represented by the FileSpecification. Here is an example of a variable selection dialog for a Virtual Engines output file:
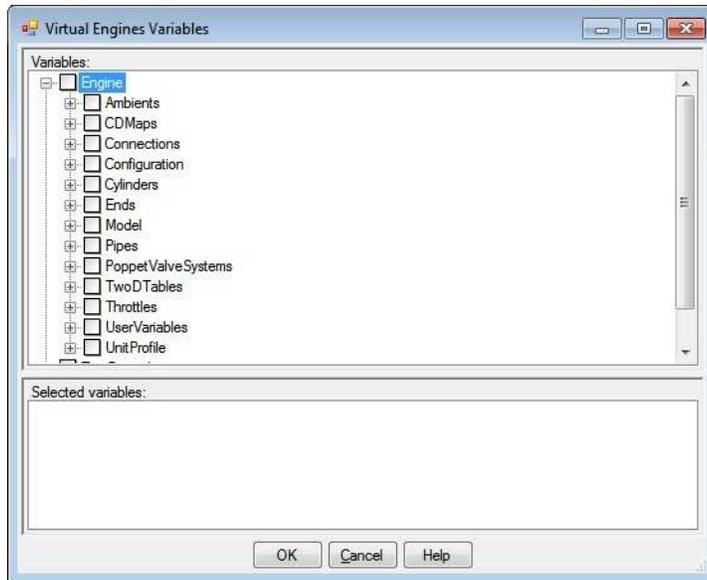


A variable selection dialog usually contains a tree view as well as OK, Cancel and Help buttons.

### Tree View

This is a tree view of all the variables in the file represented by the FileSpecification. Click a node and then click the OK button to select a variable.

### OK Button

Clicking OK will select the variable represented by the highlighted node in the tree view and return to the VariableSpecification dialog.

### Cancel Button

Clicking Cancel will dismiss the variable selection dialog and return to the VariableSpecification dialog without selecting a variable.

### Help Button

Help will display this information.

## Process Dialog

A Process is a stage of the ExpertDesign model execution that consists of one or more ProcessSteps that must execute consecutively. The Process dialog is displayed in response to the following actions:

- Right-click the Processes Node and select Add from the menu
- Right-click a Process Node and select Change from the menu
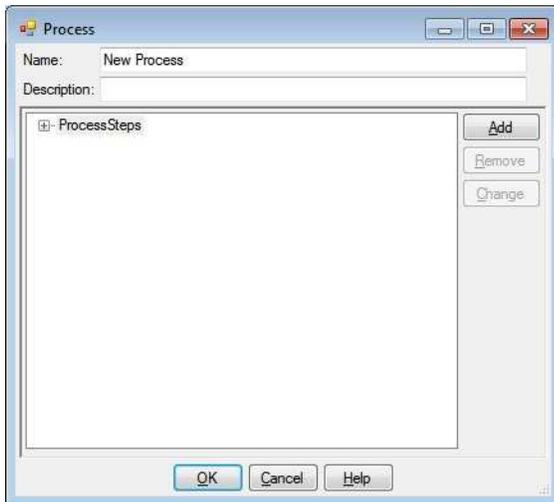
The Process dialog has textboxes for entering the Name and Description of the Process, a tree with a ProcessSteps node and buttons that allow you to Add, Remove and Change ProcessSteps of these nodes, as well as OK, Cancel and Help buttons.

### Name

This is the name associated with this Process.

### Description

This is an optional description associated with the Process.

### ProcessSteps Node

Each ProcessStep Node that appears under the ProcessSteps node displays the ProcessStep name.

To add a ProcessStep node, click the ProcessSteps node if it is not highlighted, then click the Add button. The ProcessStep dialog is displayed.

To remove a ProcessStep node, click the ProcessStep node you wish to remove, then click the Remove button.

To change a ProcessStep node, click the ProcessStep node you wish to change, then click the Change button. The ProcessStep dialog is displayed

### OK Button

Clicking OK will validate the information you entered. If valid, the Process dialog will be dismissed and the calling dialog or window will be updated with the information you entered. If invalid, you will be presented with an error dialog and the Process dialog will remain.

### Cancel Button

Clicking Cancel will dismiss the Process dialog and the calling dialog or window will not be altered.

### Help Button

Help will display this information.

## ProcessStep Dialog

A ProcessStep is a stage of a Process that consists of the execution of a single File that is defined by a FileSpecification as well as all input and output files that are also defined by FileSpecifications. The ProcessStep dialog is displayed in response to the following actions:

- Right-click the ProcessSteps Node and select Add from the menu
- Right-click a ProcessStep Node and select Change from the menu
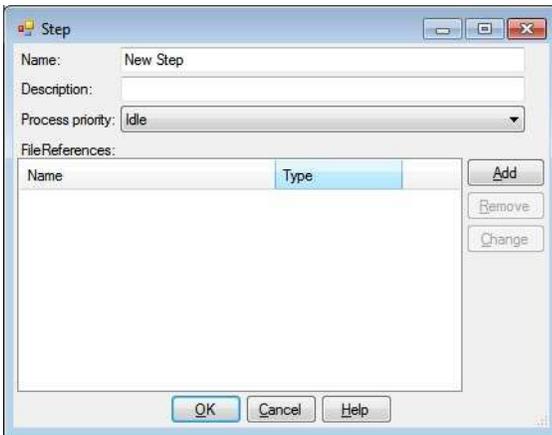
The ProcessStep dialog has textboxes for entering the Name and Description of the ProcessStep, a list for selecting the Windows priority at which the ProcessStep will run, a list of FileReferences to the FileSpecifications that make up this ProcessStep as well as OK, Cancel and Help buttons.

### Name

This is the name associated with this ProcessStep.

### Description

This is an optional description associated with the ProcessStep.

### Process Priority

This is a list of Windows priorities at which this ProcessStep may run. Select one of the following:

- Realtime
- High
- AboveNormal
- Normal
- BelowNormal
- Idle

The default of Idle means that the ProcessStep will execute in the background when no other work is running.

### FileReferences List

Each row of the FileReferences list displays the FileSpecification that is referenced and the type of reference (Input, Process, Output).

To add a FileReference, click the Add button. The FileReference Dialog is displayed.

To remove a FileReference, click the FileReference row you wish to remove, then click the Remove button.

To change a FileReference, click the FileReference row you wish to change, then click the Change button. The FileReference Dialog is displayed.

### OK Button

Clicking OK will validate the information you entered. If valid, the ProcessStep dialog will be dismissed and the calling dialog or window will be updated with the information you entered. If invalid, you will be presented with an error dialog and the ProcessStep dialog will remain.

### Cancel Button

Clicking Cancel will dismiss the ProcessStep dialog and the calling dialog or window will not be altered.

### Help Button

Help will display this information.

## FileReference Dialog

A FileReference associates a FileSpecification with a ProcessStep. The FileReference dialog is displayed in response to the following actions:

- Click the Add button on the ProcessStep dialog
- Click a FileReference row and click the Change button on the ProcessStep dialog
- Right-click a FileReferences Node and select Add from the menu
- Right-click a FileReference node and select Change from the menu
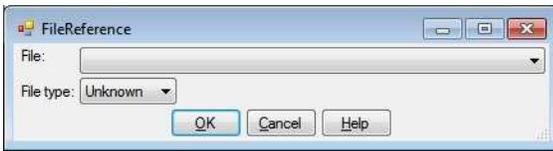
The FileReference dialog has a list for selecting a FileSpecification, a list for specifying the FileReference type (Input, Process, Output) as well as OK, Cancel and Help buttons.

### File

Select a FileSpecification that represents a file that this ProcessStep requires.

### File Type

Select the the type of reference this FileReference represents.

### OK Button

Clicking OK will validate the information you entered. If valid, the FileReference dialog will be dismissed and the calling dialog or window will be updated with the information you entered. If invalid, you will be presented with an error dialog and the FileReference dialog will remain.

### Cancel Button

Clicking Cancel will dismiss the FileReference dialog and the calling dialog or window will not be altered.

### Help Button

Help will display this information.

## FileAssignment Dialog

A FileAssignment associates a FileSpecification with a VariableSpecification in a Process file. When DOES runs a model, it assigns generated file names to each FileSpecification. Usually, a Process file needs to know the names of the Input and Output files it references. The FileAssignment allows DOES to adjust the generated Process file so it specifies the generated Input and Output file names. You need to generate a FileSpecification for the Process File and a VariableSpecification for each command parameter in the Process file that specifies an Input or Output file name. You then create a FileAssignment for each of these variables. The FileAssignment dialog is presented in response to the following actions:

- Right-click the FileAssignments Node and select Add from the menu
- Right-click a FileAssignment node and select Change from the menu
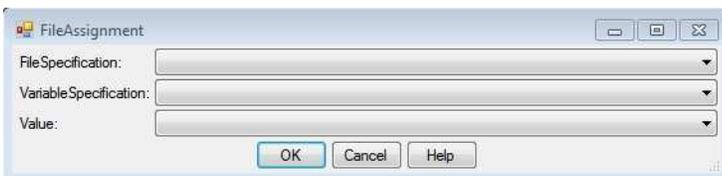


The FileAssignment dialog as lists that allow you to select the Process FileSpecification, the VariableSpecification that specifies a command parameter in the Process FileSpecification, and the Input or Output FileSpecification to assign to the VariableSpecification, as well as OK, Cancel, and Help buttons.

### FileSpecification

This is a list of all FileSpecifications defined in the ReferenceRun. Select the Process FileSpecification that has the command parameter that you wish to assign.

### VariableSpecification

This is a list of all VariableSpecifications that are defined for the selected FileSpecification. Select the VariableSpecification that represents the command parameter you wish to assign.

### Value

This is a list of all FileSpecifications. Each is of the form FileName(filespecification_name). Select the FileSpecification that you wish to assign to the VariableSpecification that you selected above.

### OK Button

Clicking OK will validate the information you entered. If valid, the FileAssignment dialog will be dismissed and the calling dialog or window will be updated with the information you entered. If invalid, you will be presented with an error dialog and the FileAssignment dialog will remain.

### Cancel Button

Clicking Cancel will dismiss the FileAssignment dialog and the calling dialog or window will not be altered.

### Help Button

Help will display this information.

# ObjectiveVariableArray Dialog

An ObjectiveVariableArray allows the KnowledgeEngineer to designate multiple VariableSpecifications as a single array variable that the ApplicationEngineer may use as an Objective. An ObjectiveVariableArray requires that one or two IndependentVariableVectors also be specified. With one IndependentVariableVector, the ObjectiveVariableArray is also a Vector; with two IndependentVariableVectors, the ObjectiveVariable Array is a Table. The ObjectiveVariableArray dialog is presented in response to the following actions:

- Right-click the ObjectiveVariableArrays Node and select Add from the menu
- Right-click an ObjectiveVariableArray node and select Change from the menu
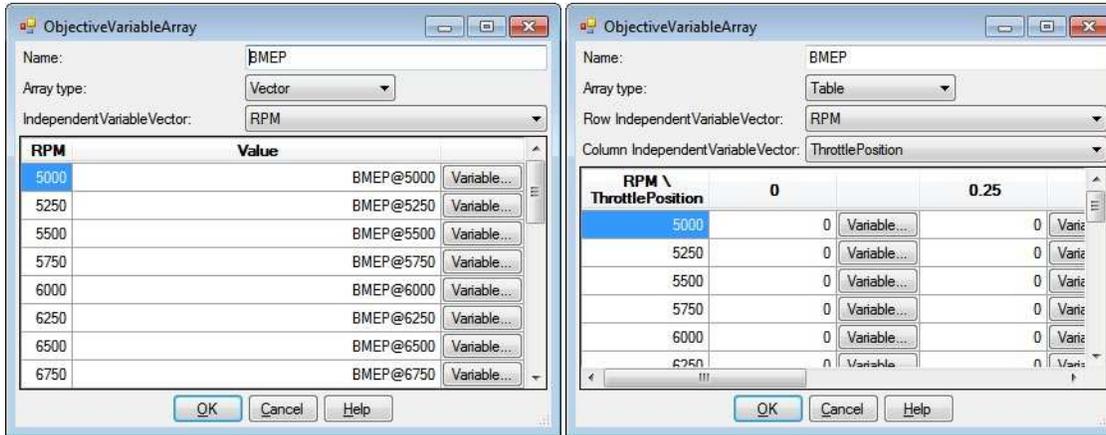
The ObjectiveVariableArray dialog has a textbox for entering the name of the ObjectiveVariableArray, a list for selecting whether the ObjectiveVariableArray is a Vector or Table, one or two lists for selecting the IndependentVariableVector(s), and a grid for specifying the content of the ObjectiveVariableArray, as well as OK, Cancel, and Help buttons.

## Name

Type a name to be associated with the ObjectiveVariableArray. This name must be unique among all VariableSpecifications, ObjectiveVariableArray names, and IndependentVariableVector names.

## Array Type

Select whether this is a Vector or Table type ObjectiveVariableArray.

## IndependentVariableVector
## Row IndependentVariableVector
## Column IndependentVariableVector

These are lists of all IndependentVariableVectors. See the IndependentVariableVector dialog for creating an IndependentVariableVector.

## Vector Grid

The Vector grid has a column for the IndependentVariableVector, a column for displaying the associated VariableSpecification and a column of Variable buttons for selecting the associated VariableSpecifications.

### IndependentVariableVector Column

This column displays the IndependentVariableVector associated with this ObjectiveVariableArray.

### Value Column

This column displays the VariableSpecification associated with each IndependentVariableVector value.

### Variable Button Column

Clicking one of the Variable buttons presents the ObjectiveVariableArray Variable dialog where you can select one or more VariableSpecifications to fill the Value Column.

## Table Grid

The Table grid has a row for each value of the Row IndependentVariableVector and two columns for each value of the Column IndependentVariableVector: the first column displays the VariableSpecification associated with the point defined by the Row and Column IndependentVariableVector values; the second column displays Variable buttons that present the ObjectiveVariableArray Variable dialog where you can select one or more VariableSpecifications.

## OK Button

Clicking OK will validate the information you entered. If valid, the ObjectiveVariableArray dialog will be dismissed and the calling dialog or window will be updated with the information you entered. If invalid, you will be presented with an error dialog and the ObjectiveVariableArray dialog will remain.

### Cancel Button

Clicking Cancel will dismiss the ObjectiveVariableArray dialog and the calling dialog or window will not be altered.

### Help Button

Help will display this information.

# ObjectiveVariableArray Variable Dialog

The ObjectiveVariableArray Variable dialog is presented when you click a Variable button in the grid of the ObjectiveVariableArray dialog.
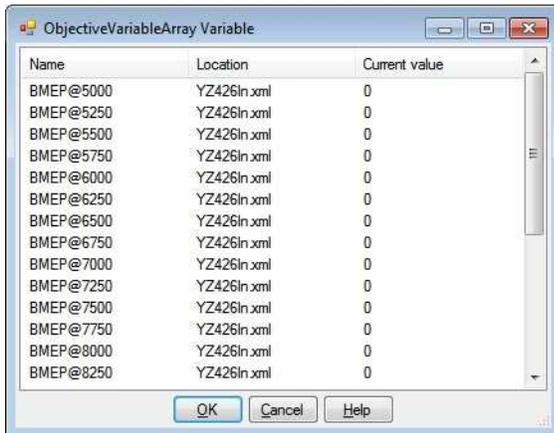


The ObjectiveVariableArray Variable dialog has a list of all VariableSpecifications that are elligible for a ObjectiveVariableArray as well as OK, Cancel and Help buttons.

## VariableSpecification List

The VariableSpecification list has Name, Location and Current Value columns. You may click to column heading to sort the list by that column's value. You may select a single VariableSpecification by clicking a row of the list. You may select multiple contiguous VariableSpecifications by clicking on the first row, then shift-clicking on the last row. You may select multiple discrete VariableSpecifications by ctrl-clicking on each VariableSpecification. When your selection is complete, click the OK button.

### Name Column

Each row of the Name column contains the VariableSpecification name.

### Location Column

Each row of the Location column contains the name of the FileSpecification that contains the VariableSpecification.

### Current Value Column

Each row of the Current Value column contains the current value of the variable associated with the VariableSpecification.

## OK Button

Clicking OK will validate the information you entered. If valid, the ObjectiveVariableArray Variable dialog will be dismissed and the calling dialog or window will be updated with the information you entered. If invalid, you will be presented with an error dialog and the ObjectiveVariableArray Variable dialog will remain.

## Cancel Button

Clicking Cancel will dismiss the ObjectiveVariableArray Variable dialog and the calling dialog or window will not be altered.

## Help Button

Help will display this information.

# IndependentVariableVector Dialog

An IndependentVariableVector is a group of VariableSpecification or constants that are treated as a single variable. The IndependentVariableVector dialog is presented in response to the following actions:

- Right-click the IndependentVariableVectors Node and select Add from the menu
- Right-click a IndependentVariableVector node and select Change from the menu
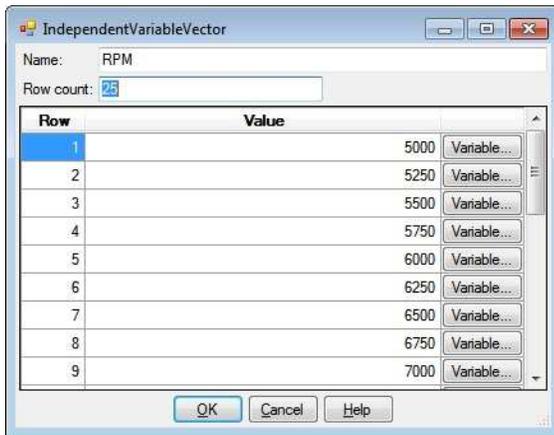
The IndependentVariableVector dialog has a textboxes for entering the name and size of the IndependentVariableVector and a grid for specifying the content of the IndependentVariableVector, as well as OK, Cancel, and Help buttons.

### Name

Type a name to be associated with the IndependentVariableVector. This name must be unique among all VariableSpecifications, ObjectiveVariableArray names, and IndependentVariableVector names.

### Row Count

Specify the size of the IndependentVariableVector.

### Grid

The grid has a row for each element of the IndependentVariableVector. When a new IndependentVariableVector is created, its row count is 0, so the grid will empty. Once a non zero value is specified, the grid will be populated with the number of rows specified by the row count. Each row consists of a row number column, a value column and a column of Variable buttons for selecting the associated VariableSpecifications.

#### Row Number Column

The row number column contains the row number of each row of the grid.

#### Value Column

This column displays the constant or VariableSpecification associated with each IndependentVariableVector value. It is initialized to the constant 0 and when it contains a constant, it may editted. If you change a row to a VariableSpecification by clicking the associated Variable button, the value may not be edited. If a VariableSpecification is chosen, its initial value is used; if running the model changes the value, the changed value is ignored.

#### Variable Button Column

Clicking one of the Variable buttons presents the IndependentVariableVector Variable dialog where you can select one or more VariableSpecifications to fill the value column. After selecting a VariableSpecification, the button for the row changes to a Constant button and the value column for the row may not be edited. Clicking a Constant button, changes the value back to the constant 0 and the value column for the row may again be editted.

### OK Button

Clicking OK will validate the information you entered. If valid, the IndependentVariableVector dialog will be dismissed and the calling dialog or window will be updated with the information you entered. If invalid, you will be presented with an error dialog and the IndependentVariableVector dialog will remain.

### Cancel Button

Clicking Cancel will dismiss the IndependentVariableVector dialog and the calling dialog or window will not be altered.

### Help Button

Help will display this information.

## IndependentVariableVector Variable Dialog

The IndependentVariableVector Variable dialog is presented when you click a Variable button in the grid of the ObjectiveVariableArray dialog.
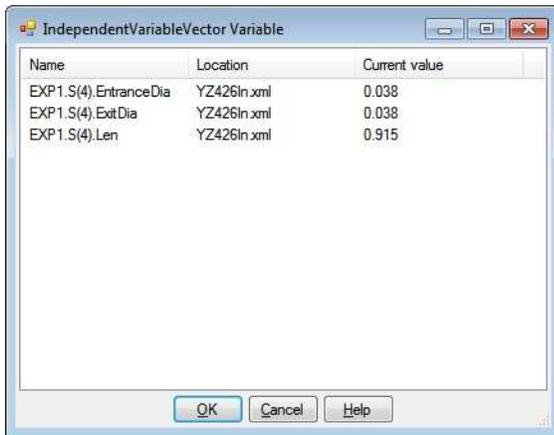
The IndependentVariableVector Variable dialog has a list of all VariableSpecifications that are elligible for a IndependentVariableVector as well as OK, Cancel and Help buttons.

## VariableSpecification List

The VariableSpecification list has Name, Location and Current Value columns. You may click to column heading to sort the list by that column's value. You may select a single VariableSpecification by clicking a row of the list. You may select multiple contiguous VariableSpecifications by clicking on the first row, then shift-clicking on the last row. You may select multiple discrete VariableSpecifications by ctrl-clicking on each VariableSpecification. When your selection is complete, click the OK button.

### Name Column

Each row of the Name column contains the VariableSpecification name.

### Location Column

Each row of the Location column contains the name of the FileSpecification that contains the VariableSpecification.

### Current Value Column

Each row of the Current Value column contains the current value of the variable associated with the VariableSpecification.

## OK Button

Clicking OK will validate the information you entered. If valid, the IndependentVariableVector Variable dialog will be dismissed and the calling dialog or window will be updated with the information you entered. If invalid, you will be presented with an error dialog and the IndependentVariableVector Variable dialog will remain.

## Cancel Button

Clicking Cancel will dismiss the IndependentVariableVector Variable dialog and the calling dialog or window will not be altered.

## Help Button

Help will display this information.

# ApplicationModel Dialog

The ApplicationModel contains ModelVariables that may be used by the ApplicationEngineer in the Task and DesignSpace of this ExpertDesign. Each ModelVariable references a VariableSpecification or ObjectiveVariableArray. The ApplicationModel dialog is displayed when you right-click the ApplicationModel node and select Change from the menu.
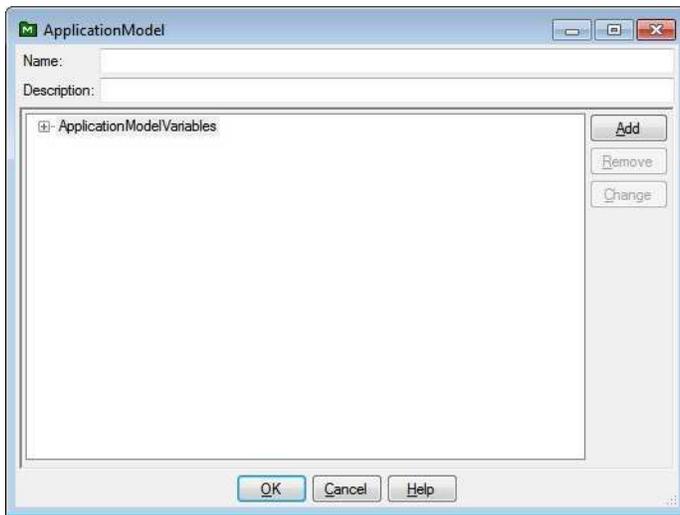
The ApplicationModel dialog has textboxes for entering the Name and Description of the ApplicationModel, a tree with an ApplicationModelVariables node and buttons that allow you to Add, Remove and Change ApplicationModelVariable nodes, as well as OK, Cancel and Help buttons.

## Name

This is the name associated with this ApplicationModel. Once saved to the Knowlegebase, this is the name that will appear under the ApplicationModels node in the Knowledgebase Explorer application.

## Description

This is an optional description associated with the ApplicationModel.

## ApplicationModelVariables Node

Each ApplicationModelVariable Node that appears under the ApplicationModelVariables node displays the ApplicationModelVariable name.

To add an ApplicationModelVariable node, click the ApplicationModelVariables node if it is not highlighted, then click the Add button. The ApplicationModelVariable dialog is displayed.

To remove a ApplicationModelVariable node, click the ApplicationModelVariable node you wish to remove, then click the Remove button.

To change an ApplicationModelVariable node, click the ApplicationModelVariable node you wish to change, then click the Change button. The ApplicationModelVariable dialog is displayed.

## OK Button

Clicking OK will validate the information you entered. If valid, the ApplicationModel dialog will be dismissed and the calling dialog or window will be updated with the information you entered. If invalid, you will be presented with an error dialog and the ApplicationModel dialog will remain.

## Cancel Button

Clicking Cancel will dismiss the ApplicationModel dialog and the calling dialog or window will not be altered.

## Help Button

Help will display this information.

# ApplicationModelVariable Dialog

The ApplicationModelVariable dialog is presented in response to the following actions:

- Right-click the ApplicationModelVariables Node and select Add from the menu
- Right-click a ApplicationModelVariable Node and select Change from the menu
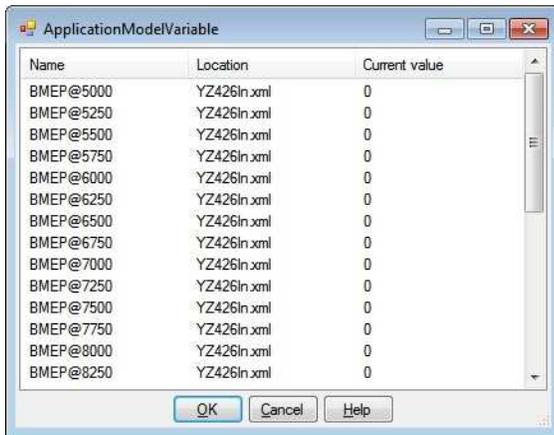
The ApplicationModelVariable dialog has a list of all VariableSpecifications and ObjectiveVariableArrays that are elligible for the Task and DesignSpace as well as OK, Cancel and Help buttons.

## VariableSpecification List

The VariableSpecification list has Name, Location and Current Value columns. You may click to column heading to sort the list by that column's value. You may select a single VariableSpecification by clicking a row of the list. You may select multiple contiguous VariableSpecifications by clicking on the first row, then shift-clicking on the last row. You may select multiple discrete VariableSpecifications by ctrl-clicking on each VariableSpecification. When your selection is complete, click the OK button.

### Name Column

Each row of the Name column contains the VariableSpecification name.

### Location Column

Each row of the Location column contains the name of the FileSpecification that contains the VariableSpecification.

### Current Value Column

Each row of the Current Value column contains the current value of the variable associated with the VariableSpecification.

## OK Button

Clicking OK will validate the information you entered. If valid, the ApplicationModelVariable dialog will be dismissed and the calling dialog or window will be updated with the information you entered. If invalid, you will be presented with an error dialog and the ApplicationModelVariable dialog will remain.

## Cancel Button

Clicking Cancel will dismiss the ApplicationModelVariable dialog and the calling dialog or window will not be altered.

## Help Button

Help will display this information.

# Task Dialog

A Task defines the optimization to be performed on the model. The Task dialog is displayed when you right-click the Task node and select Change from the menu.
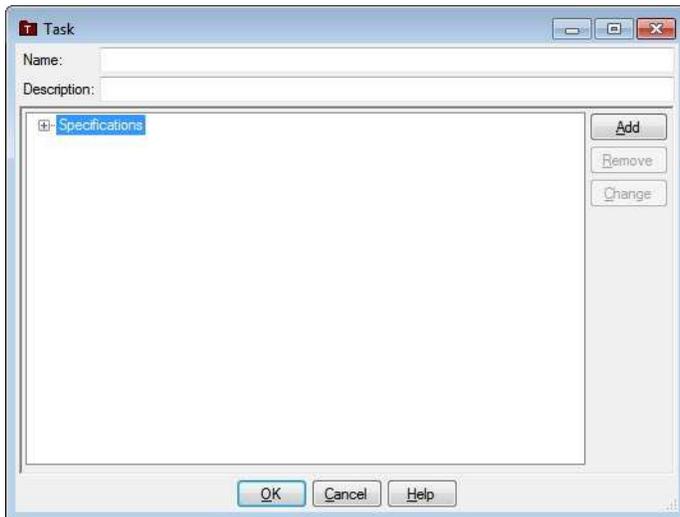
The Task dialog has textboxes for entering the Name and Description of the Task, a tree with a Specifications node and buttons that allow you to Add, Remove and Change Specification nodes, as well as OK, Cancel and Help buttons.

## Name

This is the name associated with this Task. Once saved to the Knowlegebase, this is the name that will appear under the Tasks node in the Knowledgebase Explorer application.

## Description

This is an optional description associated with the Task.

## Specifications Node

Each Specification Node that appears under the Specifications node displays the Specification name.

To add a Specification node, click the Specifications node if it is not highlighted, then click the Add button. The Specification dialog is displayed.

To remove a Specification node, click the Specification node you wish to remove, then click the Remove button.

To change a Specification node, click the Specification node you wish to change, then click the Change button. The Specification dialog is displayed.

## OK Button

Clicking OK will validate the information you entered. If valid, the Task dialog will be dismissed and the calling dialog or window will be updated with the information you entered. If invalid, you will be presented with an error dialog and the Task dialog will remain.

## Cancel Button

Clicking Cancel will dismiss the Task dialog and the calling dialog or window will not be altered.

## Help Button

Help will display this information.

# Specification Dialog

The Specification dialog is presented in response to the following actions:

- Right-click the Specifications Node and select Add from the menu
- Right-click a Specification node and select Change from the menu

The Specification dialog has a tree with ProcessName, Objectives and Constraints nodes and buttons that allow you to Add, Remove and Change subnodes of these nodes, as well as OK, Cancel and Help buttons.

## ProcessName Node

The ProcessName node displays the name of the Process that must run before this Specification is evaluated. When the ReferenceModel contains only one Process, the ProcessName is automatically set. To change the ProcessName, right-click the ProcessName node and select change from the menu to display the ProcessName dialog.

## Objectives Node

To add an Objective node, click the Objectives node if it is not highlighted, then click the Add button. The Objective dialog is displayed.

To remove an Objective node, click the Objective node you wish to remove, then click the Remove button.

To change an Objective node, click the Objective node you wish to change, then click the Change button. The Objective dialog is displayed.

## Constraints Node

To add a Constraint node, click the Constraints node if it is not highlighted, then click the Add button. The Constraint dialog is displayed.

To remove a Constraint node, click the Constraint node you wish to remove, then click the Remove button.

To change a Constraint node, click the Constraint node you wish to change, then click the Change button. The Constraint dialog is displayed.

## OK Button

Clicking OK will validate the information you entered. If valid, the Specification dialog will be dismissed and the calling dialog or window will be updated with the information you entered. If invalid, you will be presented with an error dialog and the Specification dialog will remain.

## Cancel Button

Clicking Cancel will dismiss the Specification dialog and the calling dialog or window will not be altered.

## Help Button

Help will display this information.

# ProcessName Dialog

The ProcessName dialog is presented when you Right-click a ProcessName node and select change from the menu.
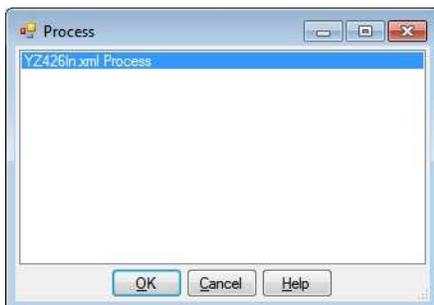


The ProcessName dialog has a list of all Process names defined in the ReferenceRun as well as OK, Cancel and Help buttons.

## Process Name List

The Process Name list is a list of Process names defined in the ReferenceRun. Click the Process name to associate with the Specification from which the ProcessName dialog

was invoked.

## OK Button

Clicking OK will validate the information you entered. If valid, the ProcessName dialog will be dismissed and the calling dialog or window will be updated with the information you entered. If invalid, you will be presented with an error dialog and the ProcessName dialog will remain.

## Cancel Button

Clicking Cancel will dismiss the ProcessName dialog and the calling dialog or window will not be altered.

## Help Button

Help will display this information.

# Objective Dialog

The Objective dialog is displayed in response to the following actions:

- Right-click an Objectives Node and select Add from the menu
- Right-click an Objective Node and select Change from the menu
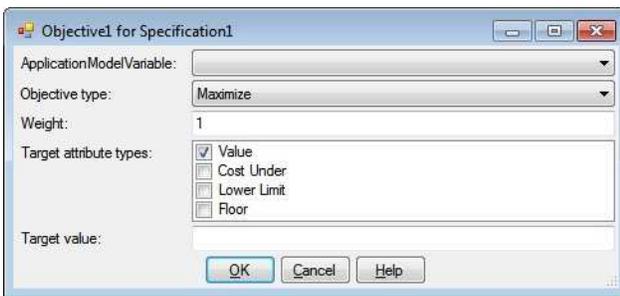


The Objective dialog has an ApplicationModelVariable list, an Objective type dropdown, a Weight textbox, a Target attribute types list, a Target value textbox or a Target attributes grid, as well as OK, Cancel and Help buttons.

## Variable List

This is a list of all ApplicationModelVariable names that represent VariableSpecifications that are eligible for Objectives and all ObjectiveVariableArrays. Select the name of the ApplicationModelVariable you wish to optimize.

## Type

This is a dropdown list that specifies the criteria for finding the global optimum: maximize, minimize or match a value.

## Weight

Weighting can be applied to each Objective of a multi-Objective design Task. The default Weight value is 1. The Weight can be assigned any real value, and all Objective Weights are relative to each other. For example, in a two Objective Task assigning Objective one a Weight of 1 and Objective two a Weight of .5 is the equivalent of assigning Objective one a Weight of 2 and Objective two a Weight of 1.

## Target Attribute Types

The Target attribute types is a list of checkboxes that represent additional restrictions on allowable Objective values. You may place any combination of Ceiling, Upper Limit, Cost Over, Value, Cost Under, Lower Limit, and Floor restrictions on the allowable Objective values.

### Ceiling

Checking the Ceiling Target attribute type causes the Target attributes grid to be displayed. An additional row (for an ApplicationModelVariable that represents a VariableSpecification) or an additional column (for an ApplicationModelVariable that represents a ObjectiveVariableArray) is displayed for the Ceiling value. A Ceiling is a "hard" limit in that a Objective value that is greater than the Ceiling will not be considered for a possible solution.

### Upper Limit

Checking the Upper Limit Target attribute type causes the Target attributes grid to be displayed. Two rows (for an ApplicationModelVariable that represents a VariableSpecification) or two columns (for an ApplicationModelVariable that represents a ObjectiveVariableArray) are displayed; one for the Upper Limit value and another for the Upper Limit Cost Over value {UL Cost Over). An upper limit is a "soft" limit in that a Objective value that is greater than the upper limit value will still be considered for a possible solution except at a reduced weighting as specified by the UL Cost Over value.

### Cost Over

Cost Over is a weighting factor that is applied when a Objective value exceeds a target Value. Its default value is 1.

### Value

The Value target attribute type is always selected. You must specify a match value in the Value textbox, Value column of the Target attributes grid, or the Value row of the Target attributes grid for a Match type Objective. For a Minimize or Maximize Objective, you may specify a match value, which is usually the approximate value you expect for the Objective.

When Target Values are specified for Maximize and/or Minimize Objectives in a Multi-Objective scenario, the Objective Value could be less than 100% even though all the targets have been met. This would be caused if a given Objective's target had been exceeded within the evaluated designs, but was not the best solution because of other Objectives.

### Cost Under

Cost Under is a weighting factor that is applied when an Objective value is less than a target Value. Its default value is 1.

### Lower Limit

Checking the Lower Limit Target attribute type causes the Target attributes grid to be displayed. Two rows (for an ApplicationModelVariable that represents a VariableSpecification) or two columns (for an ApplicationModelVariable that represents a ObjectiveVariableArray) are displayed; one for the Lower Limit value and another for the Lower LimitCost Under value (LL Cost Under). A lower limit is a "soft" limit in that an Objective value that is less than the lower limit value will still be considered for a possible solution except at a reduced weighting as specified by the LL Cost Under value.

### Floor

Checking the Floor Target attribute type causes the Target attributes grid to be displayed. An additional row (for an ApplicationModelVariable that represents a VariableSpecification) or an additional column (for an ApplicationModelVariable that represents a ObjectiveVariableArray) is displayed for the Floor value. A Floor is a "hard" limit in that an Objective value that is less than the Floor will not be considered for a possible solution.

### Target Value

The Target Value textbox is displayed if an ApplicationModelVariable that represents a VariableSpecification is selected and only the Value Target Attribute is checked. Otherwise, the Target Attributes grid is displayed.

A Match Objective type requires a Target Value to define the value that is to be matched. The Target Value can be assigned any real value.

Target Values are optional for Maximize and Minimize Objectives. Multi-Objective Tasks will be better met when realistic Target Values are assigned to Maximize and Minimize Objectives.

### Target Attributes Grid

Target attributes:

| | |
|---|---|
| Ceiling | 0 |
| Upper Limit | 0 |
| UL Cost Over | 1 |
| Cost Over | 1 |
| Value | 0 |
| Cost Under | 1 |
| Lower Limit | 0 |
| LL Cost Under | 1 |
| Floor | 0 |

Target attributes:

| RPM | Ceiling | Upper Limit | UL Cost Over | Cost |
|---|---|---|---|---|
| 5000 | 0 | 0 | 1 | |
| 5250 | 0 | 0 | 1 | |
| 5500 | 0 | 0 | 1 | |
| 5750 | 0 | 0 | 1 | |
| 6000 | 0 | 0 | 1 | |
| 6250 | 0 | 0 | 1 | |

The Target Attributes grid is displayed if an ApplicationModelVariable that represents a ObjectiveVariableArray is selected or if multiple Target Attribute Types are selected. If an ApplicationModelVariable that represents a VariableSpecification is selected, the Target Attributes grid has one or more rows for each Target Attribute Type. Otherwise the Target Attributes grid has one or more columns for each Target Attribute Type.

### OK Button

Clicking OK will validate the information you entered. If valid, the Objective dialog will be dismissed and the calling dialog or window will be updated with the information you entered. If invalid, you will be presented with an error dialog and the Objective dialog will remain.

### Cancel Button

Clicking Cancel will dismiss the Objective dialog and the calling dialog or window will not be altered.

### Help Button

Help will display this information.

# DesignSpace Dialog

A DesignSpace defines which ApplicationModelVariables to manipulate and how to manipulate them to achieve the Objectives defined in the Specifications that make up the Task. The DesignSpace dialog is displayed when you right-click the DesignSpace node and select Change from the menu.
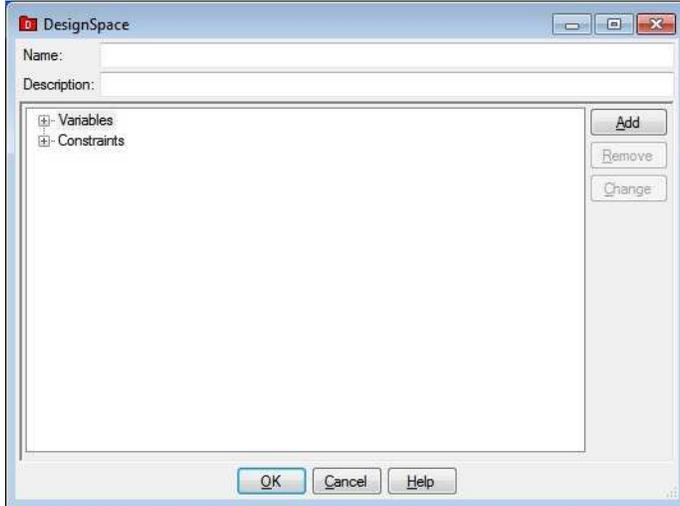


The DesignSpace dialog has textboxes for entering the Name and Description of the DesignSpace, a tree with Variables and Constraints nodes and buttons that allow you to Add, Remove and Change subnodes of these nodes, as well as OK, Cancel and Help buttons.

### Name

This is the name associated with this DesignSpace. Once saved to the Knowlegebase, this is the name that will appear under the DesignSpaces node in the Knowledgebase Explorer application.

### Description

This is an optional description associated with the DesignSpace.

### DesignSpaceVariables Node

Each DesignSpaceVariable Node that appears under the DesignSpaceVariables node displays the DesignSpaceVariable name.

To add a DesignSpaceVariable node, click the DesignSpaceVariables node if it is not highlighted, then click the Add button. The DesignSpaceVariable dialog is displayed

To remove a DesignSpaceVariable node, click the Variable node you wish to remove, then click the Remove button.

To change a DesignSpaceVariable node, click the DesignSpaceVariable node you wish to change, then click the Change button. The DesignSpaceVariable dialog is displayed.

### Constraints Node

To add a Constraint node, click the Constraints node if it is not highlighted, then click the Add button. The Constraint dialog is displayed.

To remove a Constraint node, click the Constraint node you wish to remove, then click the Remove button.

To change a Constraint node, click the Constraint node you wish to change, then click the Change button. The Constraint dialog is displayed.

### OK Button

Clicking OK will validate the information you entered. If valid, the DesignSpace dialog will be dismissed and the calling dialog or window will be updated with the information you entered. If invalid, you will be presented with an error dialog and the DesignSpace dialog will remain.

### Cancel Button

Clicking Cancel will dismiss the DesignSpace dialog and the calling dialog or window will not be altered.

### Help Button

Help will display this information.

# DesignSpaceVariable Dialog

A DesignSpaceVariable defines how to manipulate an ApplicationModelVariable to achieve the Objectives defined in the Specifications that make up the Task. The DesignSpaceVariable is presented in response to the following actions:

- Right-click a Variables Node and select Add from the menu

- Right-click a Variable Node and select Change from the menu
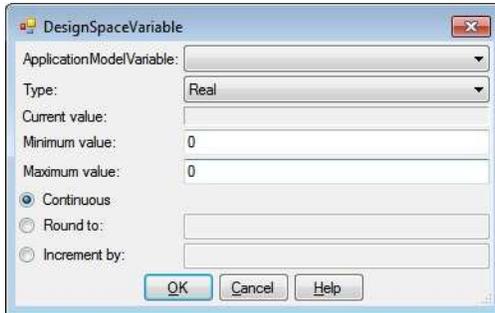


The DesignSpaceVariable dialog has an ApplicationModelVariable list, a Type dropdown, a Current Value box, Minimum and Maximum value textboxes, Continuous, Round to, and Increment by radio buttons, Round to and Increment by textboxes, and OK, Cancel and Help buttons.

### Variable List

This is a list of all ApplicationModelVariable names that represent VariableSpecifications that are eligible for DesignSpaceVariables. Select the name of the ApplicationModelVariable you wish to manipulate.

### Type Dropdown

The Type dropdown specifies the value type of the DesignSpaceVariable. Supported types include Real, Integer and Binary. Real is any real numeric value. Integer is any integer numeric value. Binary variables have the value of 0 or 1.

### Current Value Box

This displays the current value of the selected ApplicationModelVariable.

### Minimum Value Textbox

This is the minimum value for the selected ApplicationModelVariable which limits the size of the Design space

### Maximum Value Textbox

This is the maximum value for the selected ApplicationModelVariable which limits the size of the Design space

### Continuous Radio Button

Checking this option means that the DesignSpaceVariable may assume any value from the Minimum to the Maximum value.

### Round to Radio Button and Textbox

Checking this option means that DesignSpaceVariable values will be rounded to the value specified in the Round to textbox.

### Increment by Radio Button and Textbox

Checking this option means that an increment specified in the Increment textbox will be applied. For example, if a Minimum value of -3 and a Maximum Value of 3 and an Increment of 2, DesignSpaceVariable values of -3, -1, 1, and 3 will be considered.

### OK Button

Clicking OK will validate the information you entered. If valid, the DesignSpaceVariable dialog will be dismissed and the calling dialog or window will be updated with the information you entered. If invalid, you will be presented with an error dialog and the DesignSpaceVariable dialog will remain.

### Cancel Button

Clicking Cancel will dismiss the DesignSpaceVariable dialog and the calling dialog or window will not be altered.

### Help Button

Help will display this information.

Help will display this information.

## Constraint Dialog

The Constraint dialog is presented in response to the following actions:

- Right-click a Constraints Node and select Add from the menu
- Right-click a Constraint Node and select Change from the menu
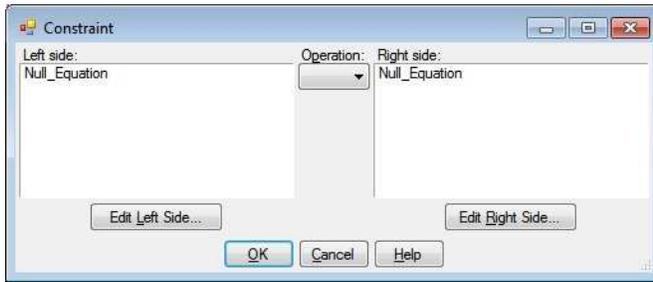
The Constraint dialog displays the left and right side of the Constraint and has Edit Left Side and Edit Right Side buttons, an Operation dropdown as well as OK, Cancel and Help buttons.

### Edit Left Side Button

After the Edit Left Side button is clicked, the Constraint Side dialog is displayed for the Left Side of the Constraint.

### Operation Dropdown

Use the Operation Dropdown to specify the comparison operation to perform between the Left Side and Right Side when evaluating the Constraint. The Operation dropdown contains symbols for Not Equal, Greater Than, Greater Than Or Equal, Less Than, and Less Than Or Equal.

### Edit Right Side Button

After the Edit Right Side button is clicked, the Constraint Side dialog is displayed for the Right Side of the Constraint.

### OK Button

Clicking OK will validate the information you entered. If valid, the Constraint dialog will be dismissed and the calling dialog or window will be updated with the information you entered. If invalid, you will be presented with an error dialog and the Constraint dialog will remain.

### Cancel Button

Clicking Cancel will dismiss the Constraint dialog and the calling dialog or window will not be altered.

### Help Button

Help will display this information.

## Constraint Side Dialog

The Constraint Side dialog is presented in response to clicking the Edit Left Side or Edit Right Side button of the Constraint dialog. The Constraint Side dialog permits you to enter a mathematical expression consisting of constants, variables and operators.



The Constraint Side dialog has an Expression edit box, a Numeric button group, an Operator button group, an Editting button group, and OK, Cancel and Help buttons.

### Expression Edit Box

The Expression edit box displays the expression that you are editting for the Left Side or Right Side of a Constraint. You may enter information into the expression using the buttons or the keyboard. The edit box contains a vertical bar cursor (|). Any information you enter appears to the right of the vertical bar. You may also select information by dragging the mouse over a portion of the edit box. Selected information appears highlighted. If text is selected, a keystroke or button click will replace the selected text.

### Numeric Button Group

The numeric button group contains buttons for the digits 0 to 9, decimal point and PI. Use these buttons to enter a constant.

### Operator Button Group

The operator button group contains buttons for addition, subtraction, multiplication, division, exponentiation, and parentheses.

### Editing Button Group

The editing button group contains a Clear button, a Backspace button, a Delete Button and a Variable button.

#### Clear Button

Clicking the Clear button erases all information from the expression edit box.

#### Backspace Button

Clicking the Backspace button (or the Backspace key) erases one character to the left of the cursor.

#### Delete Button

Clicking the Delete button (or the Delete key) erases one character to the right of the cursor.

#### Variable Button

After the Variable selection button is clicked, the Constraint Variable Selection dialog is displayed.

### OK Button

Clicking OK will validate the information you entered. If valid, the Constraint Side dialog will be dismissed and the Constraint will be updated with the information you entered. If invalid, you will be presented with an error dialog and the Constraint Side dialog will remain.

### Cancel Button

Clicking Cancel will dismiss the Constraint Side dialog and the Constraint will not be altered.

### Help Button

Help will display this information.

## Constraint Variable Dialog

The Constraint Variable dialog is presented in response to clicking the Variable button on the Constraint Side dialog. The Variable Selection dialog has a Cell box and OK and Cancel buttons. After the Variable Selection dialog is displayed, the Excel worksheet is enabled so you may click the cell that contains the Variable that you wish to enter into the constraint. Clicking a cell causes the cell address to be placed in the Select DesignSpaceVariable Cell box.
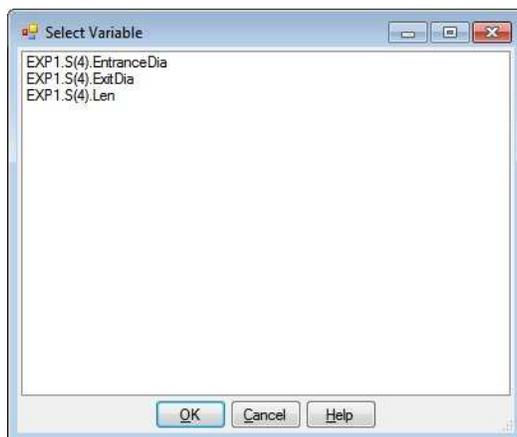


The Constraint Variable dialog has an ApplicationModelVariable list as well as OK, Help and Cancel buttons.

### ApplicationModelVariable List

This is a list of all ApplicationModelVariable names that represent VariableSpecifications that are eligible for the Constraint that you are editting.

### OK Button

Clicking OK will dismiss the Constraint Variable dialog and place the selected ApplicationModelVariable name into the Constraint that you are editting.

### Cancel Button

Clicking Cancel will dismiss the Constraint Variable dialog and the calling dialog will not be altered.

### Help Button

Help will display this information.

# Save ExpertDesign Dialog

An ExpertDesign must be saved to the Knowledgebase before an Iteration for it may be submitted. The Save ExpertDesign dialog is presented in response to the following actions:

- Click File then Save from the main menu
- Click the ExpertDesign node, then click Edit then save from the main menu
- Click the Save ExpertDesign toolbar button
- Right-click the ExpertDesign node then select Save from the menu
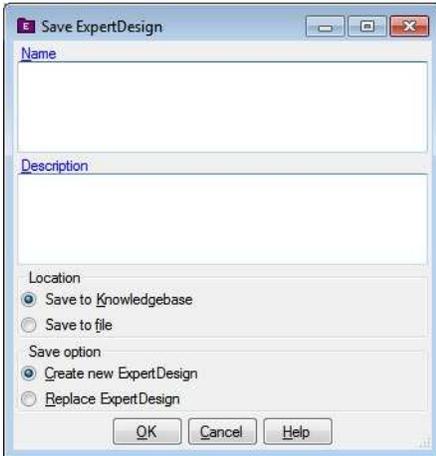


The Save ExpertDesign dialog has textboxes for the name and description of the ExpertDesign, a Location radio button group, a save option radio button group as well as OK, Cancel and Help buttons.

## Name

This is the name associated with this ExpertDesign. Once saved to the Knowlegebase, this is the name that will appear under the ExpertDesigns node in the Knowledgebase Explorer application.

## Description

This is an optional description associated with the ExpertDesign.

## Location

The location group has a Save to knowledgebase radio button and a Save to file radio button.

### Save To Knowledgebase

If this button is checked, the ExpertDesign will be saved to the Knowledgbase. If this is the first time that this ExpertDesign is being saved, you may be prompted for a Project and for names for the ReferenceRun, ApplicationModel, Task and DesignSpace in separate dialogs.

### Save To File

If this button is checked, the ExpertDesign will be saved to a file. You will be prompted for a file name.

## Save Option

The save option group has a Create new ExpertDesign radio button and a Replace ExpertDesign radio button.

### Create New ExpertDesign

If this button is checked, a new ExpertDesign will be created in the Knowledgebase.

### Replace ExpertDesign

If this button is checked, the ExpertDesign will be replaced in the Knowledgebase. This option is only available until the first Iteration is submitted for the ExpertDesign.

## OK Button

Clicking OK will dismiss the Save ExpertDesign dialog, and may present more dialogs before saving the ExpertDesign.

## Cancel Button

Clicking Cancel will dismiss the Save ExpertDesign dialog without saving the ExpertDesign.

### Help Button

Help will display this information.

# Save ReferenceRun Dialog

An ReferenceRun must be saved to the Knowledgebase before an Iteration for it may be submitted. The Save ReferenceRun dialog is presented in response to the following actions:

- Click File then Save from the main menu
- Click the ReferenceRun node, then click Edit then save from the main menu
- Click the Save ReferenceRun toolbar button
- Right-click the ReferenceRun node then select Save from the menu
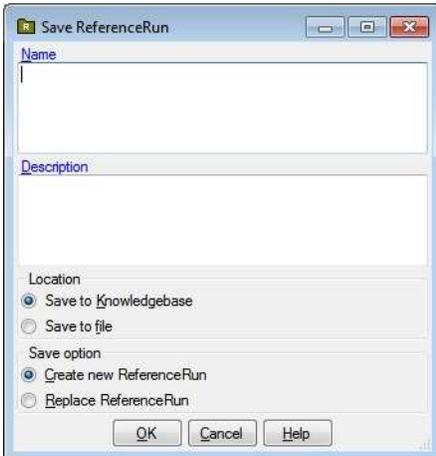
The Save ReferenceRun dialog has textboxes for the name and description of the ReferenceRun, a Location radio button group, a save option radio button group as well as OK, Cancel and Help buttons.

### Name

This is the name associated with this ReferenceRun. Once saved to the Knowlegebase, this is the name that will appear under the ReferenceRuns node in the Knowledgebase Explorer application.

### Description

This is an optional description associated with the ReferenceRun.

### Location

The location group has a Save to knowledgebase radio button and a Save to file radio button.

#### Save To Knowledgebase

If this button is checked, the ReferenceRun will be saved to the Knowleddgbase.

#### Save To File

If this button is checked, the ReferenceRun will be saved to a file. You will be prompted for a file name.

### Save Option

The save option group has a Create new ReferenceRun radio button and a Replace ReferenceRun radio button.

#### Create New ReferenceRun

If this button is checked, a new ReferenceRun will be created in the Knowledgebase.

#### Replace ReferenceRun

If this button is checked, the ReferenceRun will be replaced in the Knowledgebase.

### OK Button

Clicking OK will dismiss the Save ReferenceRun dialog, and may present more dialogs before saving the ReferenceRun.

### Cancel Button

Clicking Cancel will dismiss the Save ReferenceRun dialog without saving the ReferenceRun.

### Help Button

## Save ApplicationModel Dialog

An ApplicationModel must be saved to the Knowledgebase before an Iteration for it may be submitted. The Save ApplicationModel dialog is presented in response to the following actions:

- Click File then Save from the main menu
- Click the ApplicationModel node, then click Edit then save from the main menu
- Click the Save ApplicationModel toolbar button
- Right-click the ApplicationModel node then select Save from the menu
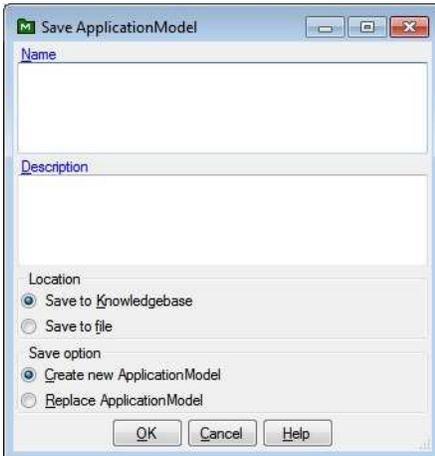
The Save ApplicationModel dialog has textboxes for the name and description of the ApplicationModel, a Location radio button group, a save option radio button group as well as OK, Cancel and Help buttons.

### Name

This is the name associated with this ApplicationModel. Once saved to the Knowlegebase, this is the name that will appear under the ApplicationModels node in the Knowledgebase Explorer application.

### Description

This is an optional description associated with the ApplicationModel.

### Location

The location group has a Save to knowledgebase radio button and a Save to file radio button.

#### Save To Knowledgebase

If this button is checked, the ApplicationModel will be saved to the Knowledgbase.

#### Save To File

If this button is checked, the ApplicationModel will be saved to a file. You will be prompted for a file name.

### Save Option

The save option group has a Create new ApplicationModel radio button and a Replace ApplicationModel radio button.

#### Create New ApplicationModel

If this button is checked, a new ApplicationModel will be created in the Knowledgebase.

#### Replace ApplicationModel

If this button is checked, the ApplicationModel will be replaced in the Knowledgebase.

### OK Button

Clicking OK will dismiss the Save ApplicationModel dialog, and may present more dialogs before saving the ApplicationModel.

### Cancel Button

Clicking Cancel will dismiss the Save ApplicationModel dialog without saving the ApplicationModel.

### Help Button

Help will display this information.

## Save Task Dialog

A Task must be saved to the Knowledgebase before an Iteration for it may be submitted. The Save Task dialog is presented in response to the following actions:

- Click File then Save from the main menu
- Click the Task node, then click Edit then save from the main menu
- Click the Save Task toolbar button
- Right-click the Task node then select Save from the menu



The Save Task dialog has textboxes for the name and description of the Task, a Location radio button group, a save option radio button group as well as OK, Cancel and Help buttons.

### Name

This is the name associated with this Task. Once saved to the Knowlegebase, this is the name that will appear under the Tasks node in the Knowledgebase Explorer application.

### Description

This is an optional description associated with the Task.

### Location

The location group has a Save to knowledgebase radio button and a Save to file radio button.

#### Save To Knowledgebase

If this button is checked, the Task will be saved to the Knowledgbase.

#### Save To File

If this button is checked, the Task will be saved to a file. You will be prompted for a file name.

### Save Option

The save option group has a Create new Task radio button and a Replace Task radio button.

#### Create New Task

If this button is checked, a new Task will be created in the Knowledgebase.

#### Replace Task

If this button is checked, the Task will be replaced in the Knowledgebase.

### OK Button

Clicking OK will dismiss the Save Task dialog, and may present more dialogs before saving the Task.

### Cancel Button

Clicking Cancel will dismiss the Save Task dialog without saving the Task.

### Help Button

Help will display this information.

## Save DesignSpace Dialog

A DesignSpace must be saved to the Knowledgebase before an Iteration for it may be submitted. The Save DesignSpace dialog is presented in response to the following actions:

- Click File then Save from the main menu
- Click the DesignSpace node, then click Edit then save from the main menu
- Click the Save DesignSpace toolbar button
- Right-click the DesignSpace node then select Save from the menu
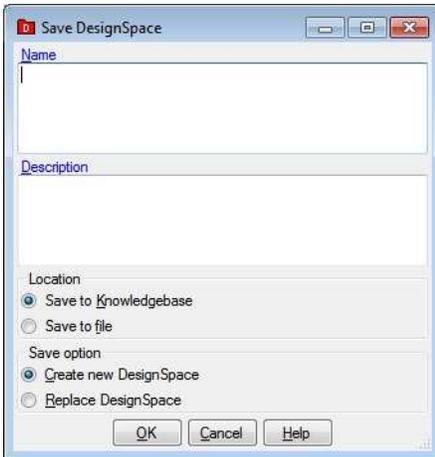


The Save DesignSpace dialog has textboxes for the name and description of the DesignSpace, a Location radio button group, a save option radio button group as well as OK, Cancel and Help buttons.

### Name

This is the name associated with this DesignSpace. Once saved to the Knowlegebase, this is the name that will appear under the DesignSpaces node in the Knowledgebase Explorer application.

### Description

This is an optional description associated with the DesignSpace.

### Location

The location group has a Save to knowledgebase radio button and a Save to file radio button.

#### Save To Knowledgebase

If this button is checked, the DesignSpace will be saved to the Knowledgbase.

#### Save To File

If this button is checked, the DesignSpace will be saved to a file. You will be prompted for a file name.

### Save Option

The save option group has a Create new DesignSpace radio button and a Replace DesignSpace radio button.

#### Create New DesignSpace

If this button is checked, a new DesignSpace will be created in the Knowledgebase.

#### Replace DesignSpace

If this button is checked, the DesignSpace will be replaced in the Knowledgebase.

### OK Button

Clicking OK will dismiss the Save DesignSpace dialog, and may present more dialogs before saving the DesignSpace.

## Cancel Button

Clicking Cancel will dismiss the Save DesignSpace dialog without saving the DesignSpace.

## Help Button

Help will display this information.

# Optimize Dialog

Optimize submits an Iteration for the ExpertDesign for optimization. If the ExpertDesign is valid, the Iterate dialog is presented in response to the following actions:

- Right-click the ExpertDesign node and select Optimize from the menu
- Click Edit then Optimize from the main menu
- Click the Optimize toolbar button
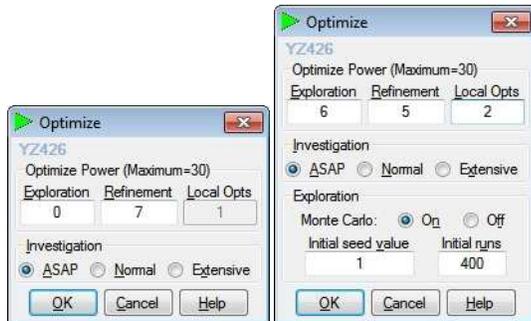


The Iterate dialog has an Optimize Power panel, an Investigation panel and optionally an Exploration panel as well as OK, Cancel and Help buttons.

## Optimize Power Panel

The Optimize Power panel is where the details of the process used to solve in this problem are specified. There are three main values to be specified: Exploration, Refinement and Local Opts. The power level of an iteration is determined by the Design Level which is the sum of the Exploration and Refinement values. The Design Level cannot exceed 30. The higher the Design Level the longer the Iteration will take. Also the more Local Opts requested the longer the iteration will require.

### Exploration Textbox

Exploration is the level from (0 to 29) for the Design of Experiments (DOE) process. The higher the Exploration level the more likely more local optimums will be evaluated by the DOE process, and therefore, the more likely the global optimum will be found. Increasing the Exploration number can sometimes increase the iteration time significantly.

### Refinement Textbox

Refinement is the level from (1 to (30 – Exploration)) is the refinement of the value of any local optimums (including the assumed Global optimum). The higher the Refinement number the more refined the result. Increasing the Refinement number normally does not increase the iteration time significantly.

### Local Opts Textbox

Local Opts is the desired number of solutions. When explorations is 0, only one solution can usually be found. The higher the Exploration number usually the more Local Opts can be found. More Local Opts will increase the iteration time, sometimes significantly.

## Investigation Panel

Investigation specifies the relative amount of time to spend on the solution to the problem. The Investigation panel has ASAP, Normal and Extensive radio buttons.

### ASAP Radio Button

ASAP specifies that the quickest possible solution to the problem is desired.

### Normal Radio Button

Normal specifies that a good solution which may require more time to solve is desired.

### Extensive Radio Button

Extensive specifies that the best solution regardless of the time required to solve the problem is desired.

## Exploration Panel

When the Exploration number is sufficiently large the DOE process may require a Monte Carlo solution to reduce the overall time required for the iteration. There are two parameters than can be used to specify the amount of Monte Carlo process: Initial Seed Value and Initial Runs.

### Initial Seed Value Textbox

The initial seed value allows you to generate another iteration with a Monte Carlo solution without changing any other input parameter. This will just start the process from a different point in the generation of pseudo random numbers used in most computing situations.

### Initial Runs Textbox

The Initial runs value allows you to generate a larger DOE process using a Monte Carlo solution. More initial runs will increase the amount of time required to solve the problem.

## OK Button

Clicking OK will submit an Iteration for the ExpertDesign for optimization and dismiss the Optimize dialog.

## Cancel Button

Clicking Cancel will dismiss the Optimize dialog without submitting an Iteration for the ExpertDesign.

## Help Button

Help will display this information.

# Optimize Validation Errors Dialog

The Optimize Validation Errors dialog is presented when you have attempted to submit an Iteration but validation errors have been discovered in the ExpertDesign. The Optimize Validation Errors dialog may be presented in response to the following actions:

- Right-click the ExpertDesign node and select Optimize from the menu
- Click Edit then Optimize from the main menu
- Click the Optimize toolbar button
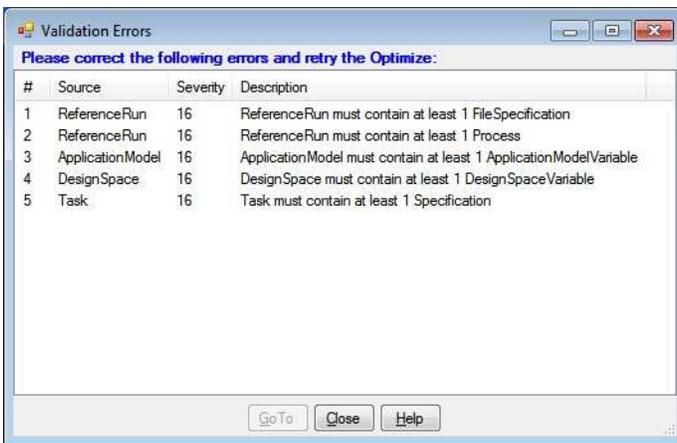


The Optimize Validation Errors dialog has Validation Error list and GoTo, Close, and Help buttons.

## Validation Error List

The validation error list has a row for each error discovered. Each row has a number column, a source column, a severity column, and a description column.

### Number Column

This is simply a sequence number of the error.

### Source Column

The source column displays the component name of the ExpertDesign that appears to be in error.

### Severity Column

The severity is a numeric value. The higher the value, the more severe the error. Values of 4 or less are considered warnings and do not prevent the Iteration from being submitted. Values greater than 4 prevent the submission of the Iteration.

### Description Column

This is a description of the error.

## GoTo

If you select an error by clicking on a row and click the GoTo button, the edit dialog for the ExpertDesign component in error is displayed. If you update that component and dismiss the dialog, the row is deleted from the validation error list.

## *Close*

Clicking the Close button dismisses the Optimize Validation Errors dialog and returns to the Design window.

## *Help Button*

Help will display this information.

# Knowledgebase Explorer

The Knowledgebase Explorer is launched from the Windows Start Menu. The first time you start the Knowledgebase Explorer after running Setup, it will look like this:
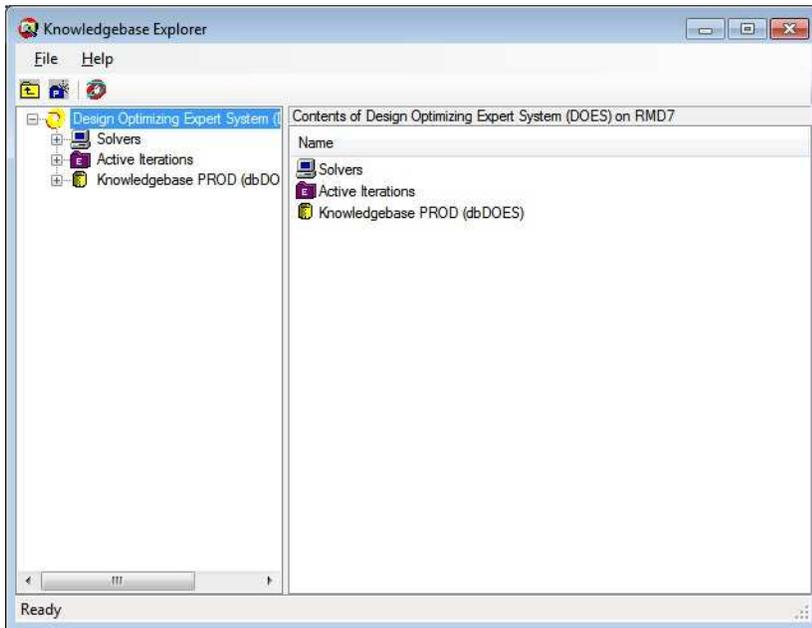


The Knowledgebase Explorer window or Explorer window consists of a tree view of your DOES installation and a list view of the tree view selection. The tree and the list consist of nodes that you may click. Left-clicking a node selects and highlights it. Right-clicking a node displays a Menu with actions that are appropriate for the selected node.

> Knowledgebase Nodes
>> System Node
>> Multi User Access Node
>> Groups Node
>> Users Node
>> Group Node
>> User Node
>> Host Node
>> Schedulers Node
>> Solvers Node
>> Scheduler Node
>> Solver Node
>> Active Iterations Node
>> Knowledgebase Node
>> Project Node
>> ExpertDesigns Node
>> ReferenceRuns Node
>> ApplicationModels Node
>> Tasks Node
>> DesignSpaces Node
>> ExpertDesign Node
>> ReferenceRun Node
>> ApplicationModel Node
>> Task Node
>> DesignSpace Node
>> Iteration Node
> Menu Actions
>> Clear (ExpertDesign)
>> Create Group
>> Create Knowledgebase
>> Create Scheduler
>> Create Solver

## System Node

The System node is the root node of Explorer. It represents the whole DOES. In a single host installation of DOES without the Multi User Access option, the subnodes of the System node are the Solvers node, the Active Iterations node, and Knowledgebase nodes. In a Network Supercomputer installation of DOES, the subnodes of the System node are the Host node, the Active Iterations node, and Knowledgebase node.

In a single host installation of DOES with the Multi User Access option, the System node also includes a Multi User Access node.

The menu associated with the System node contains one action: Create Knowledgebase.

## Multi User Access Node

If the DOES installation includes the Multi User Access option, the System node includes a Multi User Access subnode. The subnodes of the Multi User Access node are the Groups node and the Users node.

## Groups Node

The Groups node contains a Group node for each Group defined.

The menu associated with the Groups node contains the one action: Create Group.

## Users Node

The Users node contains a User node for each User defined.

The menu associated with the Users node contains one action: Create User.

## Group Node

A Group node represents a Multi User Access Group. A Group is a set of Users.

The menu associated with a Group node contains the following actions:

- Properties
- Delete

## User Node

A User node represents a Multi User Access User. A User is a Microsoft Windows LoginId.

The menu associated with a User node contains the following actions:

- Properties
- Delete

## Host Node

A Host node represents a host or computer where DOES is installed. The subnodes of a Host node are the Schedulers node and the Solvers node.

The menu associated with a Host node contains the following actions:

- Create Scheduler
- Create Solver

## Schedulers Node

The Schedulers node contains a Scheduler node for each Scheduler defined for a host. A Scheduler submits the individual runs of an Iteration.

The menu associated with the Schedulers node contains one action: Create Scheduler.

## Solvers Node

The Solvers node contains a Solver node for each Solver defined for a host. A Solver executes the individual runs of an Iteration.

The menu associated with the Solvers node contains one action: Create Solver.

## Scheduler Node

A Scheduler node represents a Scheduler that is defined for a host. A Scheduler submits the individual runs of an Iteration. If multiple Schedulers are defined and active, multiple Iterations may be submitting runs concurrently. However, only on Iteration per ExpertDesign may be active at a time.

The menu associated with a Scheduler node contains the following actions:

- Shutdown
- Start
- Delete

## Solver Node

A Solver node represents a Solver that is defined for a host. A Solver executes the individual runs of an Iteration. If multiple Solvers are defined and active, multiple Iterations may be executing runs concurrently. However, only on Iteration per ExpertDesign may be active at a time.

The menu associated with a Solver node contains the following actions:

- Shutdown
- Start
- Delete

## Active Iterations Node

The Active Iterations node contains an ExpertDesign node for each Iteration that is running.

The Active Iterations node has no menu actions.

## Knowledgebase Node

A Knowledgebase node represents a DOES Knowledgebase. A Knowledgebase is a repository that contains Projects, ExpertDesigns, and Iterations. The Knowledgebase node contains the root Project nodes, the Projects that have no parent Project.

The menu associated with a Knowledgebase node contains the following actions:

- New Project
- Delete
- Permissions

## Project Node

A Project node represents a Project in the Knowledgebase. A Project node may appear under the Knowledgebase node or under another Project node. A Project node contains an ExpertDesigns node, an ApplicationModels node, an Tasks node, a ReferenceRuns node, and a DesignSpaces node.

The menu associated with a Project node contains the following actions:

- New Project
- New ExpertDesign
- Rename
- Delete
- Permissions

## ExpertDesigns Node

The ExpertDesigns node appears under a Project node and contains an ExpertDesign node for each ExpertDesign that the Project contains.

The ExpertDesigns node has no menu actions.

## ReferenceRuns Node

The ReferenceRuns node appears under a Project node and contains a ReferenceRun node for each ReferenceRun that the Project contains.

The ReferenceRuns node has no menu actions.

## ApplicationModels Node

The ApplicationModels node appears under a Project node and contains an ApplicationModel node for each ApplicationModel that the Project contains.

The ApplicationModels node has no menu actions.

## Tasks Node

The Tasks node appears under a Project node and contains an Task node for each Task that the Project contains.

The Tasks node has no menu actions.

## DesignSpaces Node

The DesignSpaces node appears under a Project node and contains a DesignSpace node for each DesignSpace that the Project contains.

The DesignSpaces node has no menu actions.

## ExpertDesign Node

An ExpertDesign node represents an ExpertDesign and may appear under an ExpertDesigns node or under the Active Iterations node. An ExpertDesign node contains an Iteration node for each Iteration that has been submitted for it.

The menu associated with an ExpertDesign node contains the following actions:

- Optimize
- Status
- Progress
- Clear
- Design

## ReferenceRun Node

A ReferenceRun node represents a ReferenceRun and appears under a ReferenceRuns node.

The ReferenceRun node has no menu actions.

## ApplicationModel Node

An ApplicationModel node represents an ApplicationModel and appears under an ApplicationModels node.

The ApplicationModel node has no menu actions.

## Task Node

A Task node represents a Task and appears under a Tasks node.

The Task node has no menu actions.

## DesignSpace Node

A DesignSpace node represents a DesignSpace and appears under a DesignSpaces node.

The DesignSpace node has no menu actions.

## Iteration Node

An Iteration node represents an Iteration that has been submitted for an ExpertDesign. An Iteration node appears under the ExpertDesign node that represents the ExpertDesign from which it was submitted.

The menu associated with an Iteration node contains the following actions:

- Status
- Progress

## Menu Actions

## Clear (ExpertDesign)

The Clear menu action is available at an ExpertDesign node. The Clear menu action deletes all Iterations from the selected ExpertDesign.

## Create Group

The Create Group menu action is available at the Groups node. The Create Group action displays the Create Group dialog.

## Create Knowledgebase

The Create Knowledgebase menu action is available at the System node. The Create Knowledgebase action invokes the Database Wizard where you may create a new Knowledgebase.

## Create Scheduler

The Create Scheduler menu action is available at a Host node or at a Schedulers node and creates a new Scheduler.

## Create Solver

The Create Solver menu action is available at a Host node or at a Solvers node and creates a new Solver.

## Create User

The Create User menu action is available at the Users node. The Create User action displays the Create User Dialog.

## Delete Group

The Delete Group menu action is available at a Group node and deletes the selected Group.

## Delete Knowledgebase

The Delete Knowledgebase menu action is available at a Knowledgebase node and deletes the selected Knowledgebase.

## Delete Project

The Delete Project menu action is available at a Project node and deletes the selected Project.

## Delete Scheduler

The Delete Scheduler menu action is available at a Scheduler node and deletes the selected Scheduler.

## Delete Solver

The Delete Solver menu action is available at a Solver node and deletes the selected Solver.

## Delete User

The Delete User menu action is available at a User node and deletes the selected User.

## Design

The Design menu action is available at an ExpertDesign node and invokes Design for the selected ExpertDesign.

## Group Properties

The Group Properties menu action is available at a Group node. The Group Properties action displays the Change Group dialog.

## New ExpertDesign

The New ExpertDesign menu action is available at a Project node and invokes Design to create a new ExpertDesign.

## New Project

The New Project menu action is available at a Knowledgebase node and at a Project node. Clicking New Project presents the Create Project dialog to create a new Project under the selected node.

## Optimize

The Optimize menu action is available at an ExpertDesign node. Clicking Optimize displays the Optimize dialog.

## Permissions

The Permissions menu action is available at a Knowledgebase node and at a Project node. Clicking Permissions presents the Permissions dialog to update the Permissions associated with the selected node.

## Progress

The Progress menu action is available at an ExpertDesign node and at an Iteration node. When invoked from an ExpertDesign node, the Progress action displays the ExpertDesign Progress window. When invoked from an Iteration node, the Progress action displays the Iteration Progress window.

## Rename (Project)

The Rename menu action is available at a Project node. Clicking Rename presents the Rename Project dialog to rename the selected Project.

## Shutdown

The Shutdown menu action is available at a Scheduler node and at a Solver node. It shuts down the selected Scheduler or Solver.

## Start

The Start menu action is available at a Scheduler node and at a Solver node. It starts the selected Scheduler or Solver provided that the DesignEngine Tray Application is running at the associated Host.

## Status

The Status menu action is available at an ExpertDesign node and at an Iteration node. When invoked from an ExpertDesign node, the Status action displays the ExpertDesign Status window. When invoked from an Iteration node, the Status action displays the Iteration Status window.

## User Properties

The User Properties menu action is available at a User node. The User Properties action displays the Change User Dialog.

## Knowledgebase Explorer Windows And Dialogs

Create/Change Group Dialog
Create Project Dialog
Create/Change User Dialog
Iteration Progress Window
Iteration Status Window
   Iteration Status Summary Tab
   Iteration Status Results Tab
   Iteration Status Pareto Tab
   Pareto Options Dialog
Optimize Dialog
Owner Dialog
Permissions Dialog
Rename Project Dialog
Select Group Dialog
Select User Dialog
User Permissions Dialog

## Create/Change Group Dialog

The Create/Change Group dialog is presented in response to the following actions:

- Right-click the Groups node and select Create Group from the menu
- Right-click a User node and select Create User from the menu



The Create/Change Group dialog has a Group tab as well as OK, Cancel and Help buttons.

## Group Tab

The Group tab has Group and Users panels.

### Group Panel

The Group panel has a name combobox and a description textbox.

#### Name

You may type the name of a group into the name combobox. If the Group name does not currently exist, it will be added when you click the OK button. If the Group name does exist, it will be updated when you click the OK button. If you click the dropdown button, a list of all defined Groups is presented and you may select one to update.

#### Description

You may type a description for the Group. The description is optional.

### Users Panel
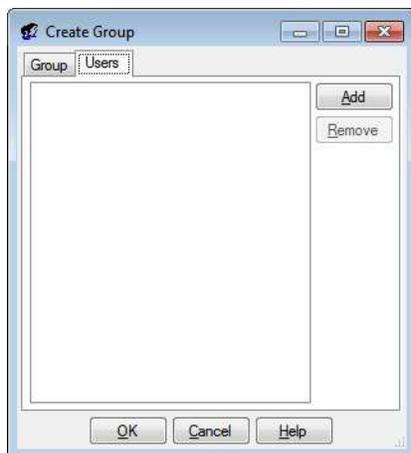


The Users panel has a Users list, an Add button and a Remove button.

#### Users List

The Users list contains the name of each User that is included in the Group.

#### Add Button

Clicking the Add button presents the Select User dialog where you may add one or more Users to the Group.

#### Remove Button

The Remove button is enabled if a name in the User list has been clicked. Clicking the Remove button removes the selected User name from the Users list and from the Group.

### OK Button

Clicking OK will dismiss the Create/Update Group dialog, and create or update the Group.

### Cancel Button

Clicking Cancel will dismiss the Create/Update Group dialog without updating a Group.

### Help Button

Help will display this information.

## Create Project Dialog

The Create Project dialog is presented in response to the following actions:

- Right-click a Knowledgebase node and select Create Project from the menu
- Right-click a Project node and select Create Project from the menu
- Saving an ExpertDesign



The Create Project dialog has textboxes for entering the name and description of the new Project as well as OK, Cancel, and Help buttons.

### Name

Type the name of the new Project. A name is required. The Project name must be unique among all Projects at the same level.

### Description

Type a description for the new Project. The description is optional.

### OK Button

Clicking OK will dismiss the Save Project dialog, and create the new Project.

### Cancel Button

Clicking Cancel will dismiss the Save Project dialog without creating a new Project.

### Help Button

Help will display this information.

## Create/Change User Dialog

The Create/Change User dialog is presented in response to the following actions:

- Right-click the Users node and select Create User from the menu
- Right-click a Group node and select Create Group from the menu
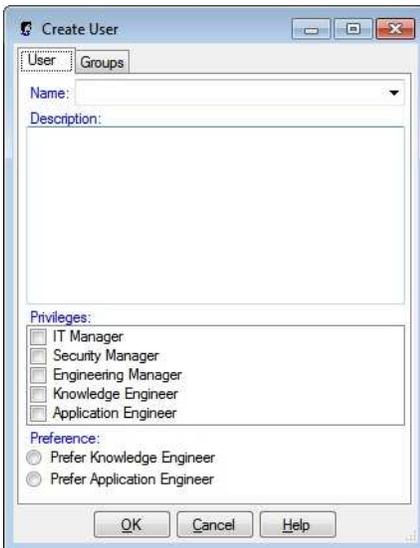
The Create/Change User dialog has a User tab as well as OK, Cancel and Help buttons.

## *User Tab*

The User tab has User and Groups panels.

### *User Panel*

The User panel has a name combobox, a description textbox, a Roles listbox and a preference radio button group.

#### *Name*

You may type the name of a User into the name combobox. If the User name does not currently exist, it will be added when you click the OK button. If the User name does exist, it will be updated when you click the OK button. If you click the dropdown button, a list of all defined Users is presented and you may select one to update.

#### *Description*

You may type a description for the User. The description is optional.

#### *Roles ListBox*

The Roles listbox contains checkboxes for each possible Role.

#### *Preference Radio Button Group*

The Preference radio button group has a radio button for each possible Preference.

## *Groups Panel*
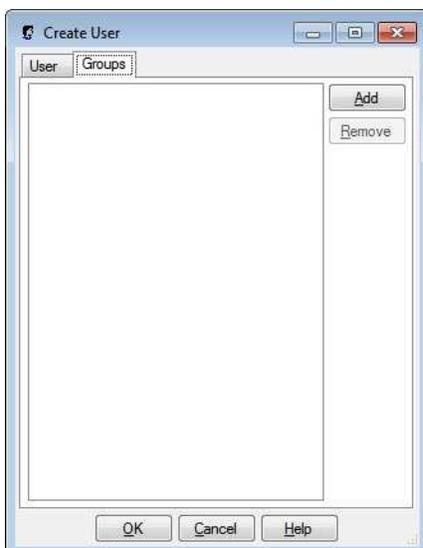
The Groups panel has a Groups list, an Add button and a Remove button.

### Groups List

The Groups list contains the name of each Group that is included in the User.

### Add Button

Clicking the Add button presents the Select Group dialog where you may add one or more Groups to the User.

### Remove Button

The Remove button is enabled if a name in the Group list has been clicked. Clicking the Remove button removes the selected Group name from the Groups list and from the User.

## OK Button

Clicking OK will dismiss the Create/Update User, and create/update the User.

## Cancel Button

Clicking Cancel will dismiss the Create/Update User dialog without updating a User.

## Help Button

Help will display this information.

# Iteration Progress Window

The Iteration Progress Window is presented in response to the following action:

- Right-click an Iteration node and select Progress from the menu
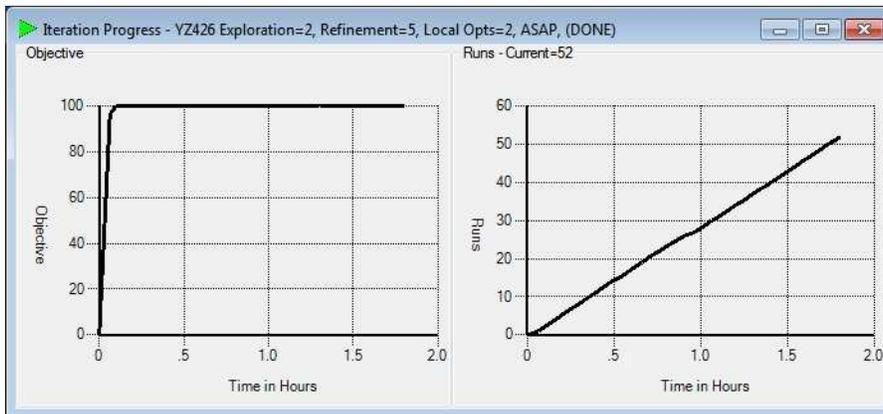


The Iteration Progress window displays an Objective graph and a Runs graph.

## Objective Graph

The Objective graph plots the global optimum objective value against time.

## Runs Graph

The Runs graph plots the number of runs submitted against time.

# Iteration Status Window

The Iteration Status Window is presented in response to the following action:

- Right-click an Iteration node and select Status from the menu

The Iteration Status screen displays the results of a single Iteration. It has a Title Bar, Menu, a Summary Tab, zero or more Result Tabs and zero or more Pareto Analysis Tabs.

### Title Bar

The title bar describes which Iteration is being displayed. It shows the name of the ExpertDesign, Exploration Value, Refinement Value, Local Opts Value, Speed value, Initial Seed value (if Monte Carlo was used), Initial Runs (if Monte Carlo was used) and the status of the Iteration.

### Menu



The Iteration Status Menu consists of 6 menu items: Pareto Analysis, Export to Excel, Export to File, Copy, Show and Exit. The Iteration Status Menu is also available as a right click from the Iteration Status grid or from a Pareto Analysis grid.

### Pareto Analysis Menu Item

The Pareto Analysis menu item is visible if the current optimization has more than one Objective *and* the current Iteration has more than 5 Solutions. Clicking on the Pareto Analysis item of the Iteration Status menu presents the Pareto Options dialog where you may select the X and Y Objectives for Pareto Analysis. When you click OK on the Pareto Options dialog, a Pareto Analysis tab is added to the Iteration Status Window.

### Export to Excel Menu Item

Clicking on the Export to Excel item of the Iteration Status starts an instance of Microsoft Excel, creates an Excel Workbook with on Sheet and pastes the contents of the current Iteration Status Window into the Sheet.

### Copy Menu Item

Clicking on the Copy item of the Iteration Status menu copies the current Iteration Status window contents to the Windows Clipboard as a set of tab delimited values. You may then paste into another application such as Notepad, Word or an instance of Excel.

### Show Menu Item

Clicking in a Column that represents the Base Run or a Solution, then clicking on the Show menu item of the ExpertDesign Status presents the Run dialog which can run the Base Run or Solution.

### Exit Menu Item

Clicking on the Exit item of the Iteration Status menu closes the Iteration Status Window.

Iteration Status Summary Tab
Iteration Status Results Tab
Iteration Status Pareto Tab
Pareto Options Dialog

## Iteration Status Summary Tab

The Summary Tab displays the results of an Iteration in a hierarchical tabular format. It has a grid consisting of rows and columns that are described below. If no other tab is applicable to the Iteration, the Summary Tab is not displayed; only the grid is displayed.

## Rows

The Iteration Status window has a number of collapsible rows.

### Task Row

The Task row displays the weighted average of each Objective of the run. All Objective values range from 0% (worst case) to 100% (best case). The better the solution, the higher the Objective.

### Objective Rows

Each Objective row displays the value of the Objective component of the Objective.

### Objective Value Rows

Each Objective Value row contains the cell value after evaluating with the DesignSpaceVariable values from the DesignSpace rows.

### Variable Rows

Each Variable row contains the cell value associated with the DesignSpaceVariable that was used to obtain the value in the associated Objective Value rows.

### Objective Characteristic Rows



There are Minimum and Maximum Objective value rows as well as a Solution Gradient row for each DesignSpaceVariable. A Solution Gradient is the partial derivative of an Objective value with respect to a DesignSpaceVariable value.

## Columns

The first column contains the Row Titles. The first data column is the Base Run, and the subsequent columns are the various solutions found, in descending order by Objective value. Only the solutions that were found will be displayed not the number requested.

### Base Run Column

The Base run is the run produced by the starting values.

### Solution N Column

Each solution is listed in descending order by Objective value. Only the solutions that were found will be displayed which may be less the number requested.

# Iteration Status Results Tab

A Result Tab is produced for each Match Objective that is an Array. A Result Tab has a Graph and a Legend that consists of one line for the Base Run and lines for each Solution.

# Iteration Status Pareto Tab

A Pareto Analysis Tab is displayed after you click the OK button on the Pareto Options dialog. A Pareto Analysis tab is a grid of rows and columns and a graph that may be

exported to an Excel sheet.



| | Match GearRatio. arnetvalue=6.93 | Minimize GearTrainWidth. Targetvalue=20 | GearRatio Percentile | GearTrainWidth Percentile | GearRatio Error | Frontier |
|---|---|---|---|---|---|---|
| Minimum | 1.5625 | 20.0535 | 0% | 0% | -18.0690 | |
| Maximum | 25.0000 | 40.1070 | 100% | 100% | 5.3685 | |
| Base Run | 6.2500 | 20.0535 | 32% | 100% | 0.6810 | true |
| Solution 4 | 6.8889 | 20.6901 | 59% | 97% | 0.0421 | true |
| Solution 3 | 6.9231 | 23.2366 | 75% | 84% | 0.0079 | true |
| Solution 1 | 6.9271 | 23.5549 | 82% | 82% | 0.0039 | true |
| Solution 2 | 6.9304 | 28.1704 | 100% | 59% | 0.0006 | true |
| Solution 5 | 6.9744 | 21.4859 | 58% | 93% | -0.0434 | false |
| Solution 9 | 6.9796 | 24.1916 | 57% | 79% | -0.0486 | false |
| Solution 6 | 6.9375 | 25.9423 | 77% | 70% | -0.0065 | false |
| Solution 10 | 6.9176 | 27.5338 | 70% | 63% | 0.0134 | false |
| Solution 8 | 6.9263 | 28.6479 | 80% | 57% | 0.0047 | false |
| Solution 14 | 6.9758 | 29.1254 | 58% | 55% | -0.0448 | false |
| Solution 7 | 6.9333 | 29.7620 | 87% | 51% | -0.0023 | false |
| Solution 12 | 6.9259 | 30.7169 | 79% | 47% | 0.0051 | false |
| Solution 11 | 6.9333 | 31.3535 | 87% | 44% | -0.0023 | false |
| Solution 15 | 6.9479 | 32.7859 | 68% | 36% | -0.0169 | false |

## Grid

### Rows

The first row of the Pareto Analysis Tab consists of Column Headings.

The next two rows of the Pareto Anaysis Tab contain the Minimum and Maximum value for each column.

After the Maximum row, the Pareto Analysis Tab displays rows for Solutions that are on the Pareto Frontier in order from best Y value to the worst Y value as determined by the Y percentile value.

After the Pareto Frontier rows, the Pareto Analysis Tab displays rows for Solutions that are not on the Pareto Frontier in order from best Y value to the worst Y value as determined by the Y percentile value.

### Columns

The first two columns of the Pareto Anaysis Tab contain X and Y Objective values.

The next two columns of the Pareto Anaysis Tab contain X and Y Objective percentile rankings.

After the percentile ranking columns, the Pareto Analysis Tab displays error column(s) for Match Objectives.

Finally, the Pareto Analysis Tab displays a column that indicates whether a particular row represents a Solution that is on the Pareto Frontier.

## Graph
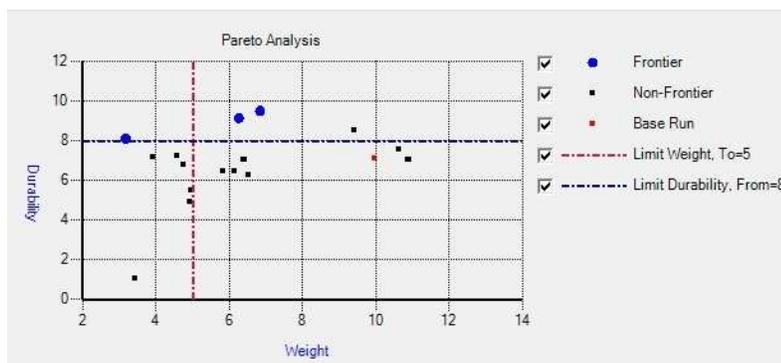


The Pareto Graph plots Frontier, Non-Frontier and Base Run points for the selected Objectives. In addition, it plots reference lines for any limits, bands or match values specified by the Objectives. The graph includes a legend entry for each set of points that includes a checkbox that toggles the visibility of the associated set of points.

# Pareto Options Dialog

The Pareto Options dialog is presented in response to clicking the Pareto Analysis menu item from the Iteration Status Window. The Pareto Options dialog has an X Objective listbox and a Y Objective listbox as well as OK, Cancel and Help buttons.
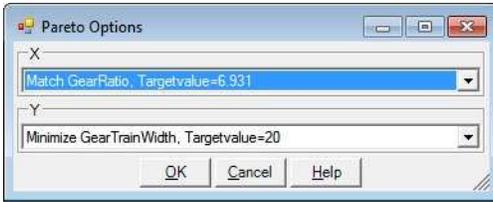


## X and Y Objective Listboxes

The X and Y Objective listboxes include all Objectives that are in the current Iteration. Select the Objective for the X and Y axes of the Pareto Analysis and click the OK button. The dialog will not permit you to select the same Objective for both the X and Y axis.

## OK Button

Clicking the OK button dismisses the Pareto Options dialog and displays a Pareto Analysis tab.

## Cancel Button

Clicking the Cancel button dismisses the Pareto Options dialog and does not create a Pareto Tab.

## Help Button

Help will bring up this information.
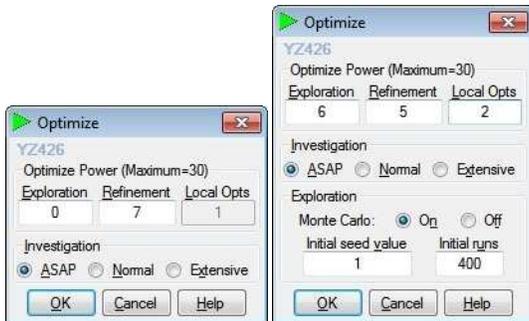
# Optimize Dialog



After clicking the Optimize button on the Multi-Objective-OPT dialog, the Optimize dialog is presented. The Optimize dialog has an Optimize Power panel, an Investigation panel and optionally an Exploration panel as well as OK, Cancel and Help buttons.

## Optimize Power Panel

The Optimize Power panel is where the details of the process used to solve in this problem are specified. There are three main values to be specified: Exploration, Refinement and Local Opts. The power level of an Iteration is determined by the Design Level which is the sum of the Exploration and Refinement values. The Design Level cannot exceed 30. The higher the Design Level the longer the Iteration will take. Also the more Local Opts requested the longer the Iteration will require.

### Exploration Textbox

Exploration is the level from (0 to 29) for the Design of Experiments (DOE) process. The higher the Exploration level the more likely more local optimums will be evaluated by the DOE process, and therefore, the more likely the Global Optimum will be found. Increasing the Exploration number can sometimes increase the Iteration time significantly.

### Refinement Textbox

Refinement is the level from (1 to (30 – Exploration)) is the refinement of the value of any local optimums (including the assumed Global Optimum). The higher the Refinement number the more refined the result. Increasing the Refinement number normally does not increase the Iteration time significantly.

### Local Opts Textbox

Local Opts is the desired number of solutions. When explorations is 0, only one solution can usually be found. The higher the Exploration number usually the more Local Opts can be found. More Local Opts will increase the Iteration time, sometimes significantly.

## Investigation Panel

Investigation specifies the relative amount of time to spend on the solution to the problem. The Investigation panel has ASAP, Normal and Extensive radio buttons.

### ASAP Radio Button

ASAP specifies that the quickest possible solution to the problem is desired.

### Normal Radio Button

Normal specifies that a good solution which may require more time to solve is desired.

### Extensive Radio Button

Extensive specifies that the best solution regardless of the time required to solve the problem is desired.

## Exploration Panel

When the Exploration number is sufficiently large the DOE process may require a Monte Carlo solution to reduce the overall time required for the Iteration. There are two parameters than can be used to specify the amount of Monte Carlo process: Initial Seed Value and Initial Runs.

### Initial Seed Value Textbox

The initial seed value allows you to generate another Iteration with a Monte Carlo solution without changing any other input parameter. This will just start the process from a different point in the generation of pseudo random numbers used in most computing situations.

### Initial Runs Textbox

The Initial runs value allows you to generate a larger DOE process using a Monte Carlo solution. More initial runs will increase the amount of time required to solve the problem.

## OK Button

Clicking OK will submit an Iteration for the ExpertDesign for optimization and dismiss the Optimize dialog.

## Cancel Button

Clicking Cancel will dismiss the Optimize dialog without submitting an Iteration for the ExpertDesign.

## Help Button

Help will bring up this information.

# Owner Dialog

The Owner dialog is presented in response to the following actions:

- Click the Change button on the Permissions dialog.



The Owner dialog has an Owner list as well as OK, Cancel, and Help buttons.

## Owner List

The owner list contains one row for each Group and User name. Clicking a row selects it. A selected row appears highlighted.

## OK Button

Clicking OK will dismiss the Owner dialog, and update the pending Owner of the node. The Owner of the node will be updated when you click the OK button on the Permissions dialog.

## Cancel Button

Clicking Cancel will dismiss the Owner dialog without updating.

## Help Button

Help will display this information.

## Permissions Dialog

The Permissions dialog is presented in response to the following actions:

- Right-click a Knowledgebase node and select Permissions from the menu
- Right-click a Project node and select Permissions from the menu
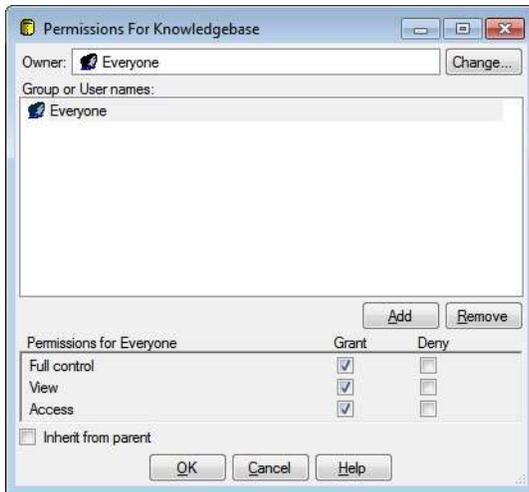


The Permissions dialog has an Owner box with a Change button, a Group or User names list with Add and Remove buttons, a Permissions panel, an Inherit from parent checkbox as well as OK, Cancel, and Help buttons.

### *Owner*

The Owner box displays the current owner of the Knowledgebase or Project. The owner is a User or Group and always has full control of the node. When the Knowledgebase is create, its owner is automatically assigned to the special built-in Group named Everyone. When a Project is created, its owner is automatically assigned to the current Windows LoginId.

### *Change Button*

Click the Change button presents the Owner dialog where you may change the node's owner.

### *Group Or User Names List*

The Group or User names list contains a row for each Group and User name that has Permissions defined for this node. Clicking a row selects it and updates the Permissions panel. A selected row appears highlighted.

### *Add Button*

The Add button is enabled if the Inherit from parent checkbox is unchecked. Clicking the Add button presents the User Permissions dialog where you may add Permissions for a Group or User that is not listed in the Group or User names list.

### *Remove Button*

The Remove button is enabled if the Inherit from parent checkbox is unchecked. Clicking the Remove button removes the selected Group or User Permissions from this node.

### *Permissions Panel*

The Permissions panel has Grant and Deny checkboxes for Full Control, View, and Access. The checkboxes are enabled if the Inherit from parent checkbox is unchecked. The Permissions panel displays the Permissions associated with the selected Group or User. Deny Permissions always take precedence over Grant Permissions.

### *Full Control Checkboxes*

The Full control checkboxes are enabled if the Inherit from parent checkbox is unchecked. Full control implies both View and Access Permissions. Checking or unchecking a Full control checkbox also causes the associated View and Access checkboxes to be checked or unchecked. Conversely, unchecking a View or Access checkbox will also uncheck the associated Full control checkbox if it was checked.

### *View Checkboxes*

View Permission means that the User or Group may see the node and any sub-Folders or sub-Projects of the node, but no other contents unless Access Permission is also granted.

### *Access Checkboxes*

Access Permission means that the User or Group may see and edit the contents of the node.

### Inherit From Parent Checkbox

When Inherit from parent is checked, Permissions are inherited from parent node of this node and this dialog displays the inherited Permissions. You may not modify the Permissions unless you uncheck Inherit from parent. The Add button, Remove button, Grant and Deny checkboxes are disabled. Whenever you uncheck Inherit from parent, you are given the option to copy the inherited Permissions. If you do not copy the inherited Permissions, you start with no User or Group Permissions.

### OK Button

Clicking OK will dismiss the Permissions dialog, and update the Permissions associated with the node.

### Cancel Button

Clicking Cancel will dismiss the Permissions dialog without updating any Permissions.

### Help Button

Help will display this information.

## Rename Project Dialog

The Rename Project dialog is presented in response to the following action:

- Right-click a Project node and select Rename from the menu



The Rename Project dialog has textboxes for entering the name and description of the new Project as well as OK, Cancel, and Help buttons.

### Name

When the Rename Project dialog is first presented, this is the current name of the Project. Type a new name for the Project. A name is required. The Project name must be unique among all Projects at the same level.

### Description

When the Rename Project dialog is first presented, this is the current description of the Project. Type a new description for the Project. The description is optional.

### OK Button

Clicking OK will dismiss the Rename Project dialog, and update the Project.

### Cancel Button

Clicking Cancel will dismiss the Rename Project dialog without updating the Project.

### Help Button

Help will display this information.

## Select Group Dialog

The Select Group dialog is presented in response to the following action:

- Click the Add button on the Groups panel of the Create/Add User dialog.

The Select Group dialog has a Group list as well as OK, Cancel, and Help buttons.

### *Group List*

The Group list has a row for each Group of which the User is not a member. You select a group by clicking on it. Once selected, a Group row is highlighted. You may select multiple groups by ctrl- or shift-clicking them.

### *OK Button*

Clicking OK will dismiss the Select Group dialog, and update the User.

### *Cancel Button*

Clicking Cancel will dismiss the Select Group dialog without updating the User.

### *Help Button*

Help will display this information.

## Select User Dialog

The Select User dialog is presented in response to the following action:

- Click the Add button on the Users panel of the Create/Add Group dialog.

The Select User dialog has a User list as well as OK, Cancel, and Help buttons.

### *User List*

The User list has a row for each User of which the Group is not a member. You select a User by clicking on it. Once selected, a User row is highlighted. You may select multiple Users by ctrl- or shift-clicking them.

### *OK Button*

Clicking OK will dismiss the Select User dialog, and update the Group.

### *Cancel Button*

Clicking Cancel will dismiss the Select User dialog without updating the Group.

### *Help Button*

Help will display this information.

## User Permissions Dialog

The User Permissions dialog is presented in response to the following action:

- Click the Add button on the Permissions dialog.



The User Permissions dialog has a Group and User names list, a Selected Group or User box, a Permissions panel as well as OK, Cancel, and Help buttons.

### Group And User Names List

The Group or User names list contains a row for each Group and User name that has Permissions defined for this node. Clicking a row selects it and updates the Selected Group or User box. A selected row appears highlighted.

### Selected Group Or User Box

The selected Group or User box displays the name of the selected Group or User as a visual aid to identify the Permissions that you are adding.

### Permissions Panel

The Permissions panel has Grant and Deny checkboxes for Full Control, View, and Access. The checkboxes are enabled if the Inherit from parent checkbox is unchecked. The Permissions panel displays the Permissions associated with the selected Group or User. Deny Permissions always take precedence over Grant Permissions.

#### Full Control Checkboxes

The Full control checkboxes are enabled if the Inherit from parent checkbox is unchecked. Full control implies both View and Access Permissions. Checking or unchecking a Full control checkbox also causes the associated View and Access checkboxes to be checked or unchecked. Conversely, unchecking a View or Access checkbox will also uncheck the associated Full control checkbox if it was checked.

#### View Checkboxes

View Permission means that the User or Group may see the node and any sub-Folders or sub-Projects of the node, but no other contents unless Access Permission is also granted.

#### Access Checkboxes

Access Permission means that the User or Group may see and edit the contents of the node.

### OK Button

Clicking OK will dismiss the User Permissions dialog, and add the selected Group or User and the associated Permissions to the pending Permissions of the node. The Permissions of the node will be updated when you click OK on the Permissions dialog.

### Cancel Button

Clicking Cancel will dismiss the User Permissions dialog without updating.

### Help Button

Help will display this information.

## Examples

DOES provides a number of samples that demonstrate DOES interoperability with other applications (ANSYS, Virtual Engines). Files for these samples are loaded into the common application data folder (usually C:\ProgramData) at subfolder OPTIMUM Power Technology\DOES\Samples.

ANSYS Example

# ANSYS Example

This example shows how to optimize an ANSYS Workbench project with DOES. DOES interfaces with the ANSYS Parameter Manager to change and observe values. The example finds the dimensions Example files for this example may be found in the common application data folder (usually C:\ProgramData) at subfolder OPTIMUM Power Technology\DOES\Samples\ANSYS14.
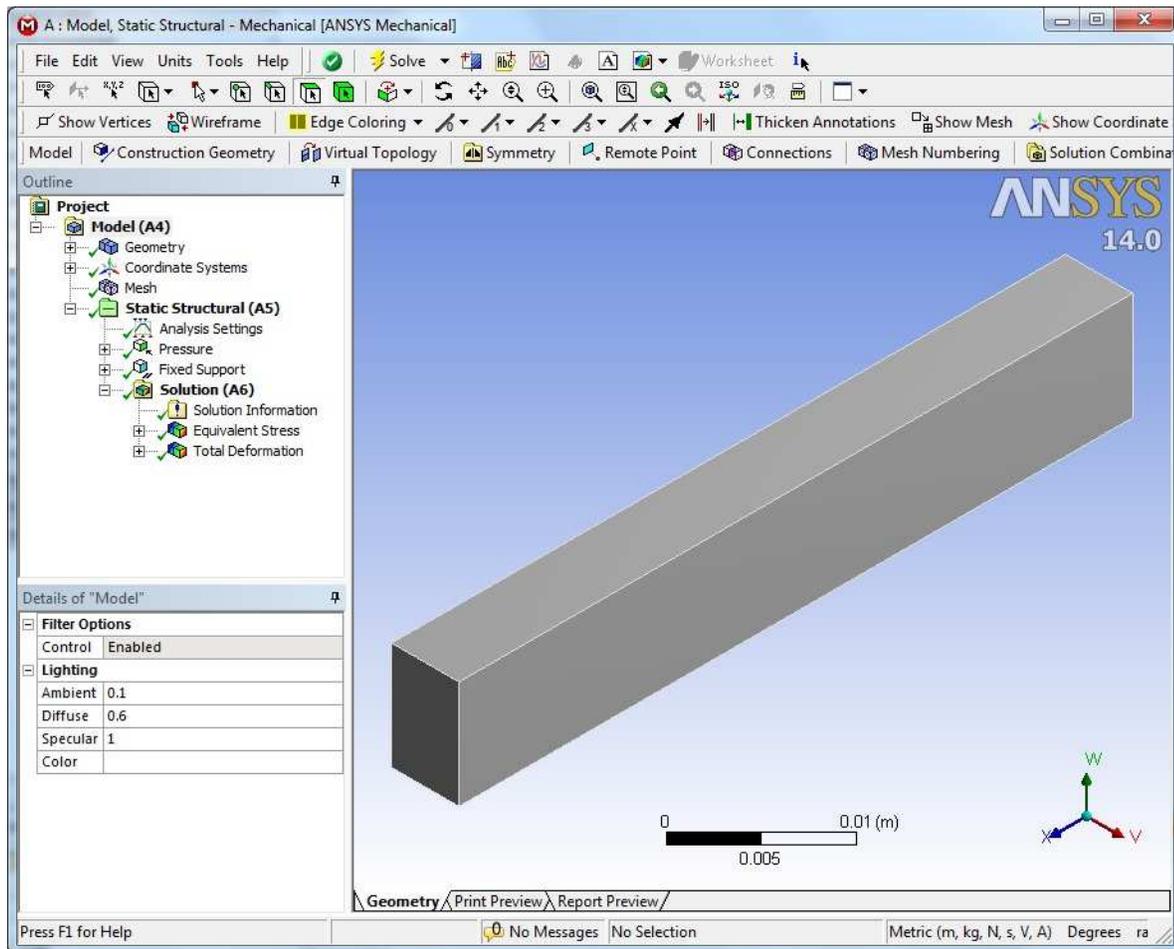


Optimizing the sample ANSYS Workbench project with DOES consists of the following steps:

    Restore Workbench Project From Sample Archive
    Prepare DOES ReferenceRun
    Prepare DOES ApplicationModel
    Prepare DOES Task
    Prepare DOES DesignSpace
    Save DOES ExpertDesign

## Restore Workbench Project From Sample Archive

The first step is to restore the Block Workbench project from the DOES Samples. Start ANSYS Workbench and select File then Restore Archive... from the Workbench menu.
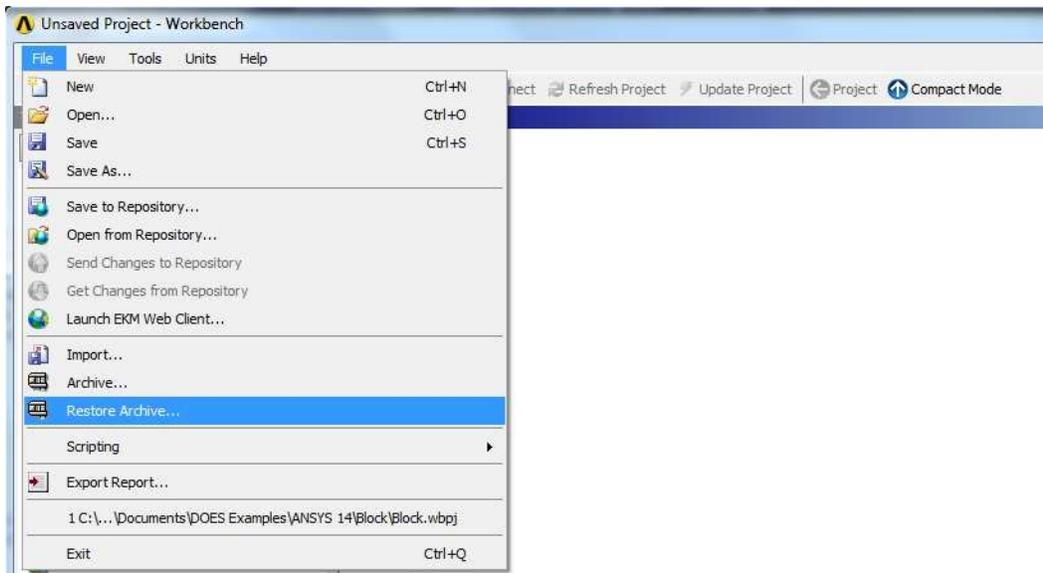
ANSYS Workbench responds with the Select Archive To Restore dialog. Navigate to the DOES sample folder at
C:\ProgramData\OPTIMUM Power Technology\DOES\Samples\ANSYS14 and click Block.wbpz. Click the "Open" button.
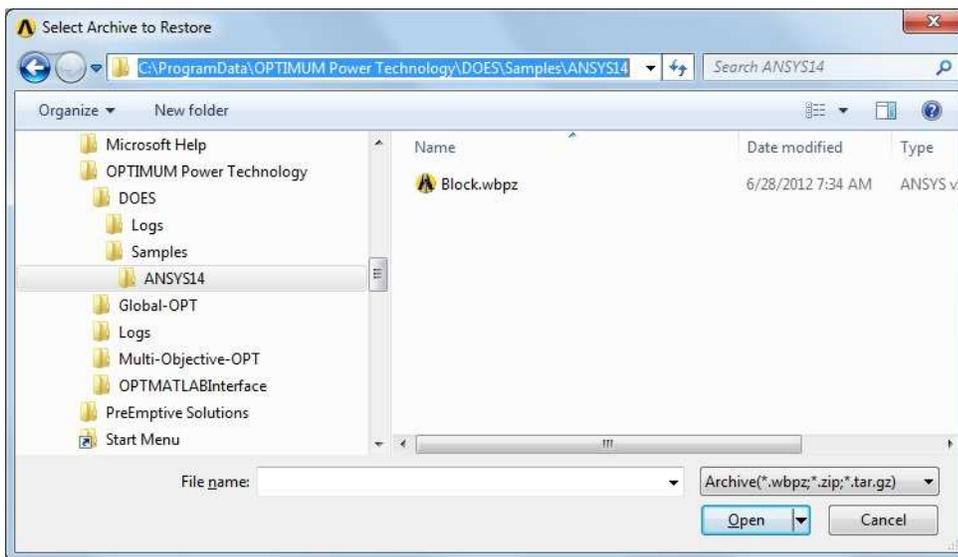


ANSYS Workbench responds with a Save As dialog. Navigate back to the DOES sample folder C:\ProgramData\OPTIMUM Power Technology\DOES\Samples\ANSYS14 if
necessary and click the Save button.
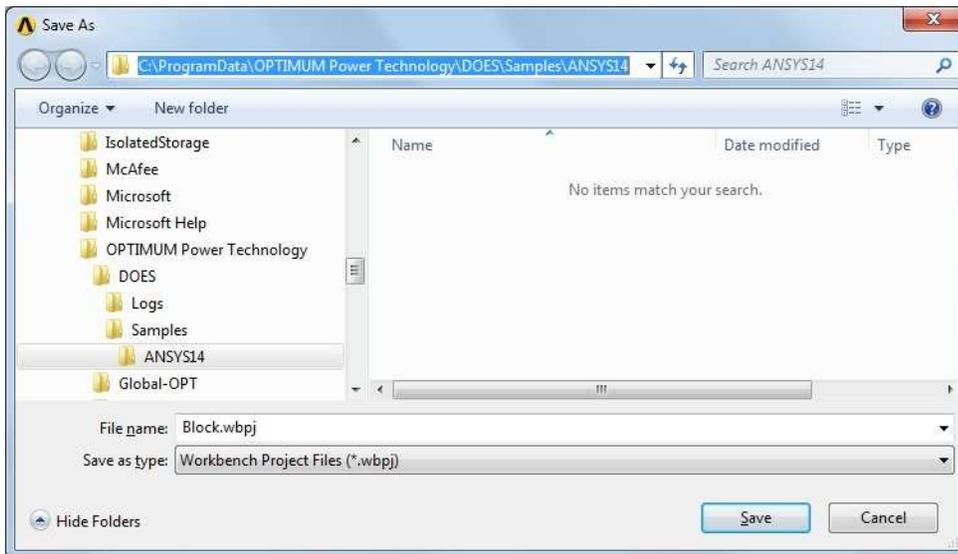
ANSYS Workbench restores the Archive to Block.wpbj and displays the Project Schematic when complete.
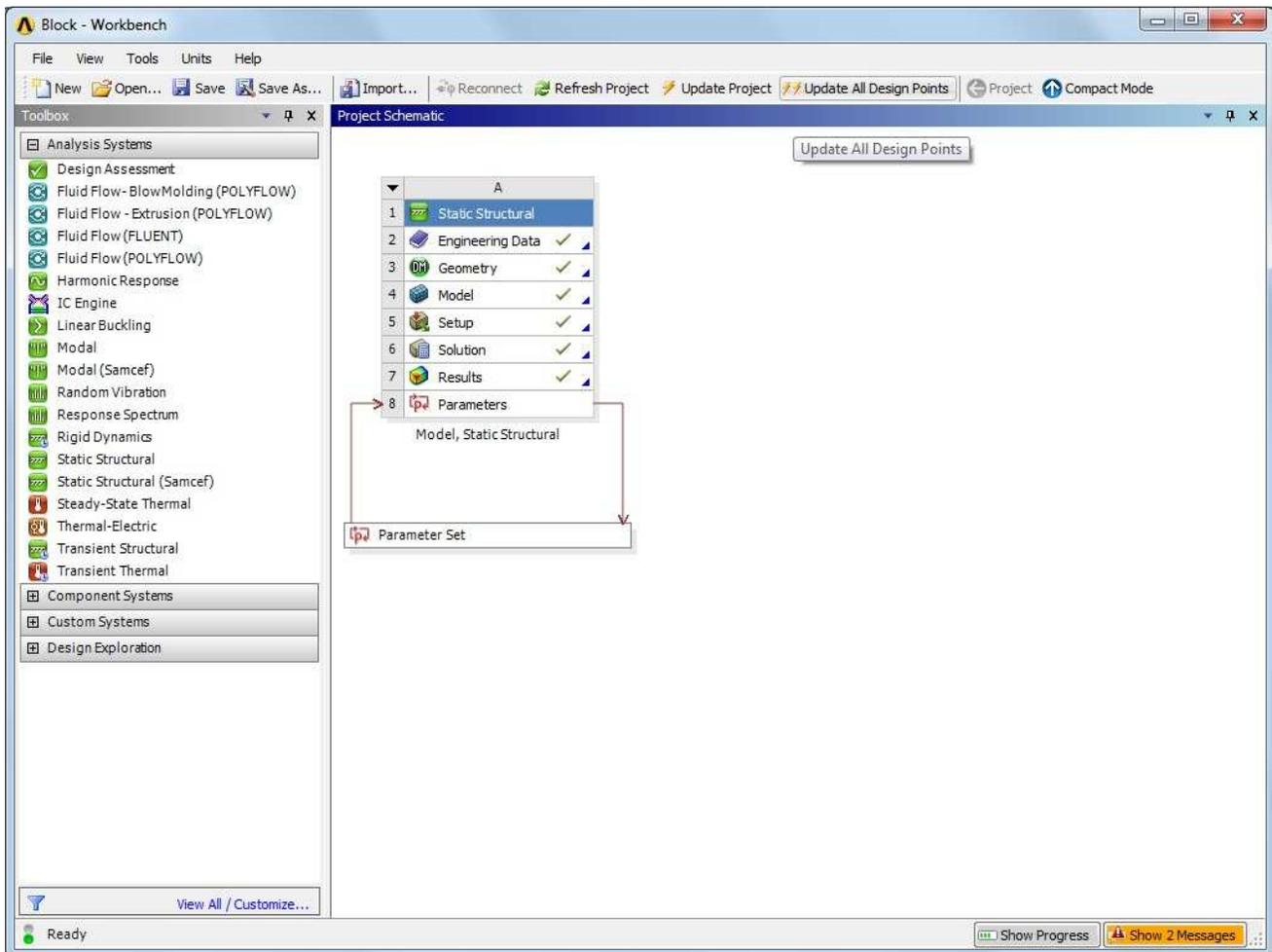


Close the ANSYS Workbench.

## Prepare DOES ReferenceRun

Start Expert Design.
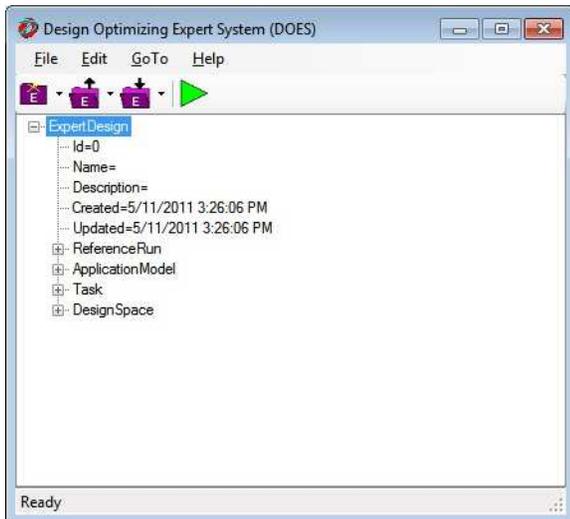
The first step in creating an Expert Design model is to create a ReferenceRun. The ReferenceRun is a definition of all the files, variables within each file, and processes that make up your model. Creation of a ReferenceRun is a Knowledge Engineer task and requires knowledge of the file layouts and processes 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.
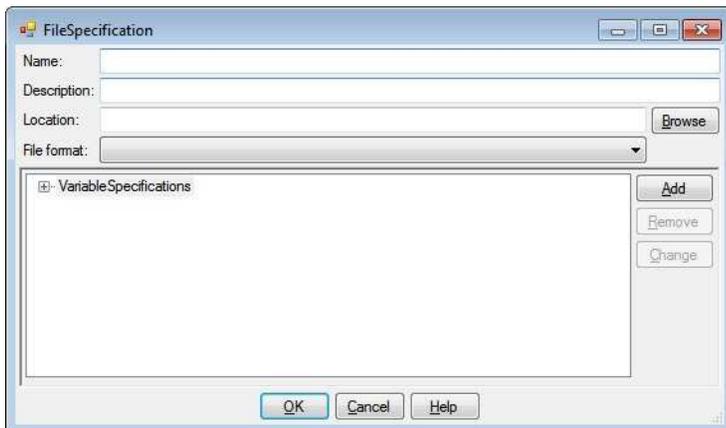
Click the Browse button, navigate to the DOES sample folder C:\ProgramData\OPTIMUM Power Technology\DOES\Samples\ANSYS14 and select Block.wbpj as the location. The FileSpecification dialog will fill in the FileSpecification name, location and format for you. Right click on the VariableSpecifications node in the FileSpecification dialog and select Add from the menu. The ANSYS Parameters dialog is displayed after a short interval 30-60 seconds. This wait occurs on the first DOES access to an ANSYS Workbench project because DOES needs to run ANSYS to extract and cache the ANSYS Parameter definitions from the project. Subsequent accesses to the ANSYS parameters are from the DOES cache and occur instantaneously.
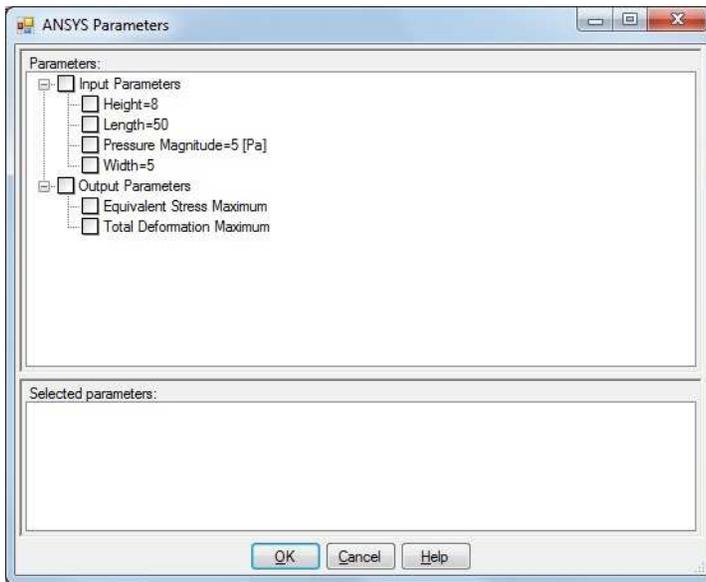
The ANSYS Parameters dialog displays a tree view of Input and Output parameters. Click the checkboxes on the Height, Length and Width Input Parameter nodes. Click the checkbox on the Output Parameters node to select all the Output Parameters. Your Variable Selection dialog should look like this:
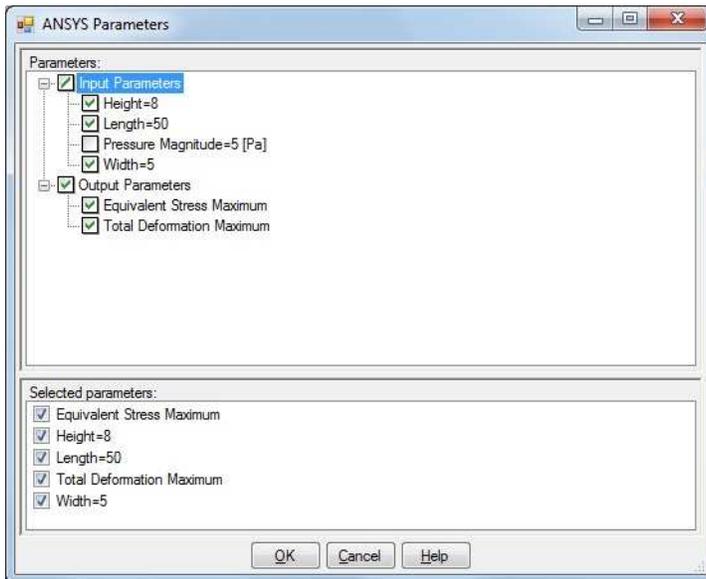
Click the OK button to return to the FileSpecification dialog which should look like this:
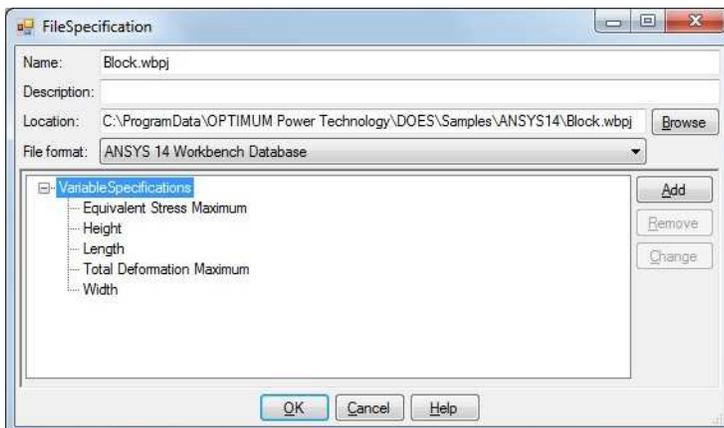
Click the OK button to return to the ReferenceRun dialog which should look like this:
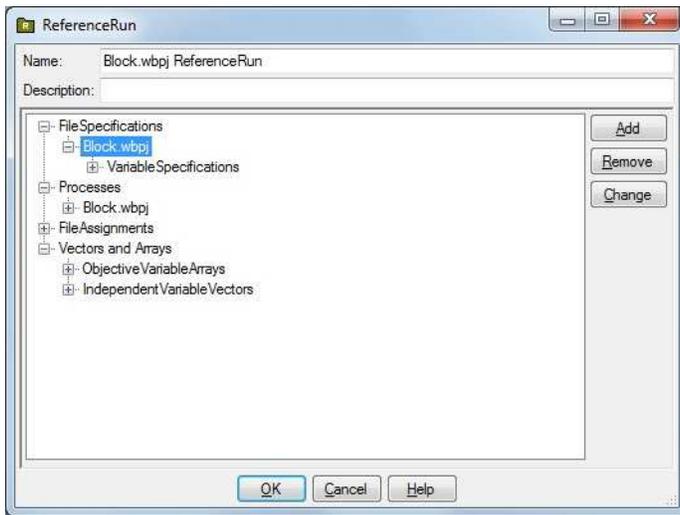
The DOES ANSYS Parameter Manager interface has filled in all the ReferenceRun specifications with a few mouse clicks! Note that, in addition to the FileSpecification, the DOES ANSYS Parameter Manager interface has filled in the Name and Process. Feel free to explore the ReferenceModel nodes by double 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.
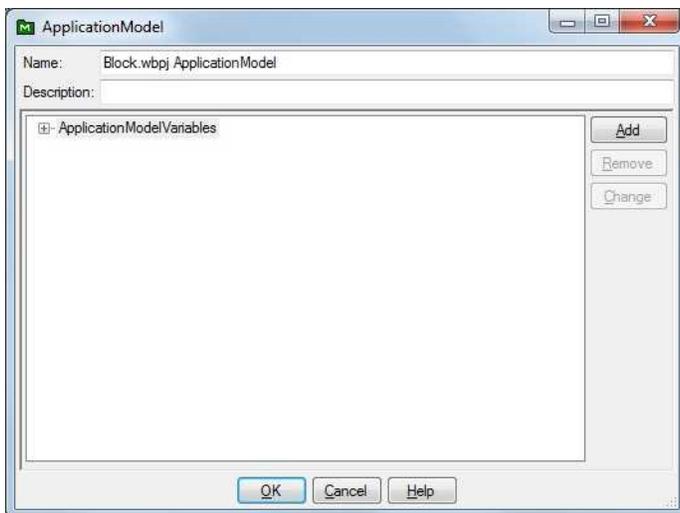
Note that the DOES ANSYS Parameter Interface interface has supplied a name for the ApplicationModel. Right-click the ApplicationModelVariables node on the ApplicationModel dialog and select Add from the menu to display the ApplicationModelVariable dialog. Scroll to the bottom of the list of VariableSpecifications. Click Exp1.S(4).EntranceDia. Shift-click Exp1.S(4).Len and BMEP. The dialog will look like this:
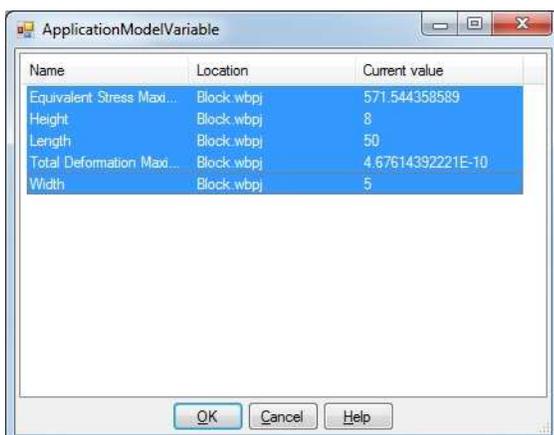
Click OK to return to the ApplicationModel dialog.



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 Minimize Deformation and Stress as the Task name. Click the Specifications node and click the Add button to display the Specification dialog.
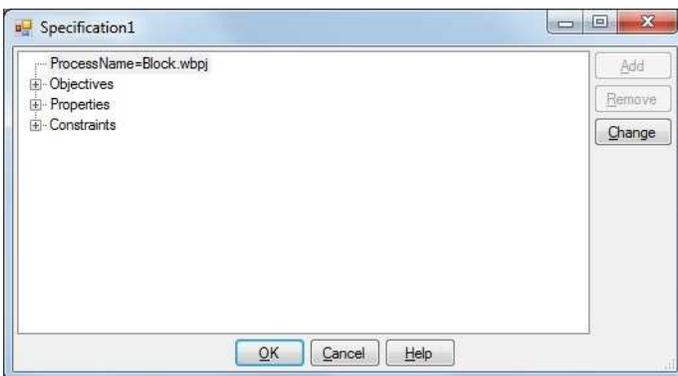


Note that the Process has been filled in already because the ReferenceRun contains only one Process. If the ReferenceRun had contained multiple Processes, you would have been required to select the Process node, click the Change button and select the Process for this Specification. Click the Objectives node and click the Add button. The Objective Dialog is displayed.
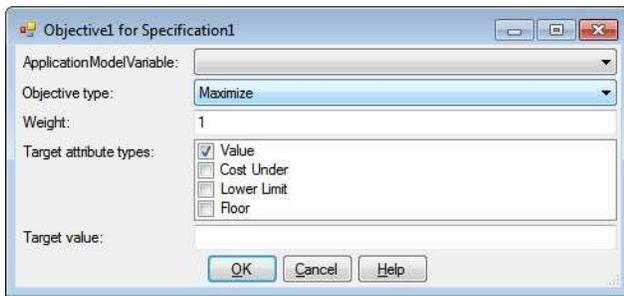
Select Equivalent Stress Maximum as the ApplicationModel variable and select Minimize as the Objective type. Your dialog will look like this:
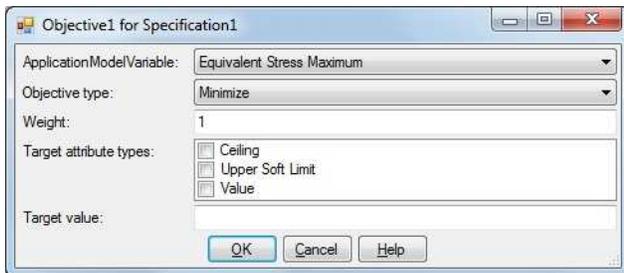
Click OK to return to the Specification dialog, then create another Objective to Minimize Total Deformation Maximum. Your Specification dialog will look like the following:
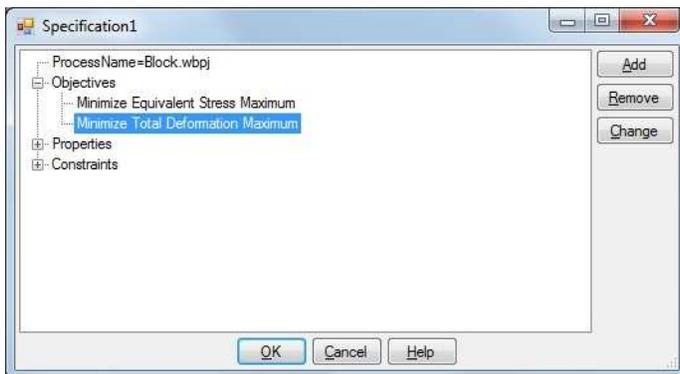
Click OK to return to the Task dialog. Your Task dialog will look like the following:
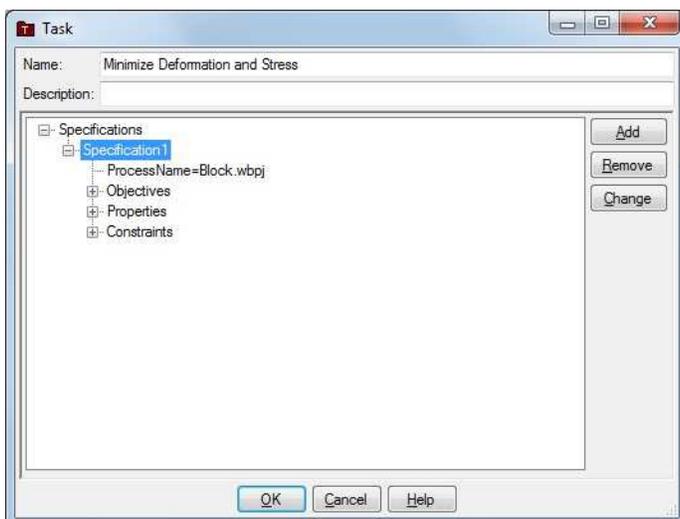
Click OK to close the Task dialog.

## 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.
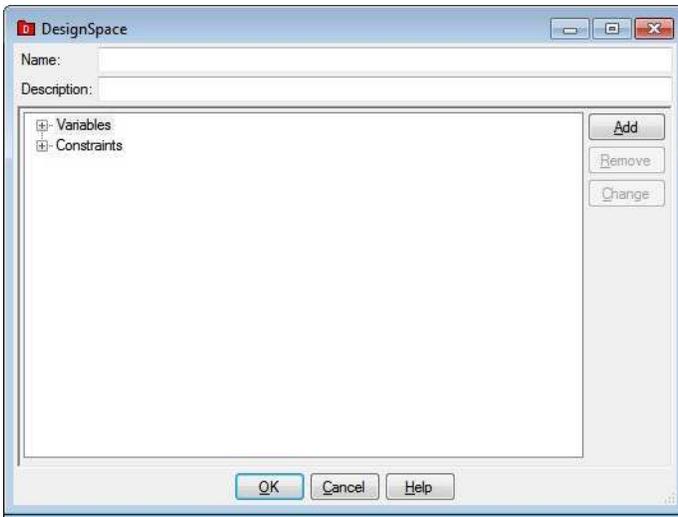
Type Vary Width Height and Length as the DesignSpace name. Click the Variables node and click the Add button to display the DesignSpaceVariable dialog.
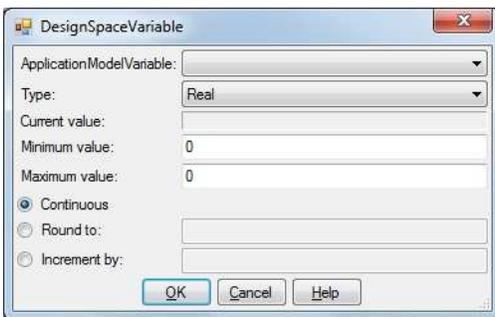
Select Width as the ApplicationModel variable and type 4 as the Minimum value and 10 as the Maximum value.
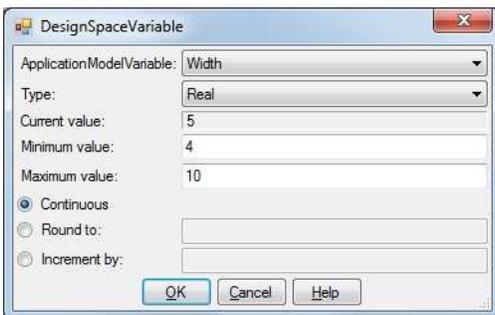
Click OK to return to the DesignSpace dialog and repeat selecting Height as the ApplicationModel variable, 6 as the Minimum value and 10 as the Maximum value, then finally with Length as the ApplicationModel variable, 30 as the Minimum value and 70 as the Maximum value. The DesignSpace dialog will look like this:
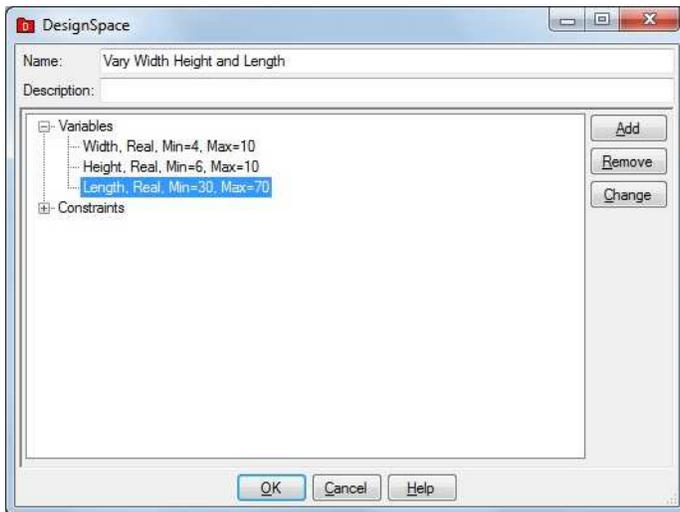
Click OK to close the DesignSpace dialog.

## 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 ANSYS Block as the Name.
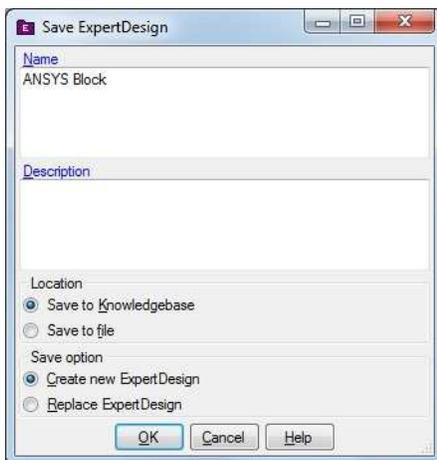
Click the OK button. The Select Project dialog will be displayed.
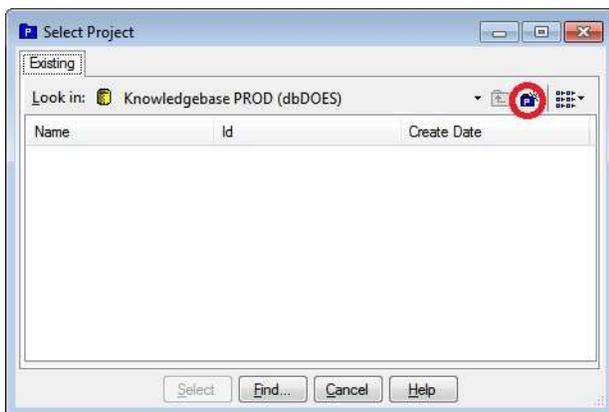
Click the New Project button (circled). The Create New Project dialog will be displayed. Type ANSYS as the Project name.

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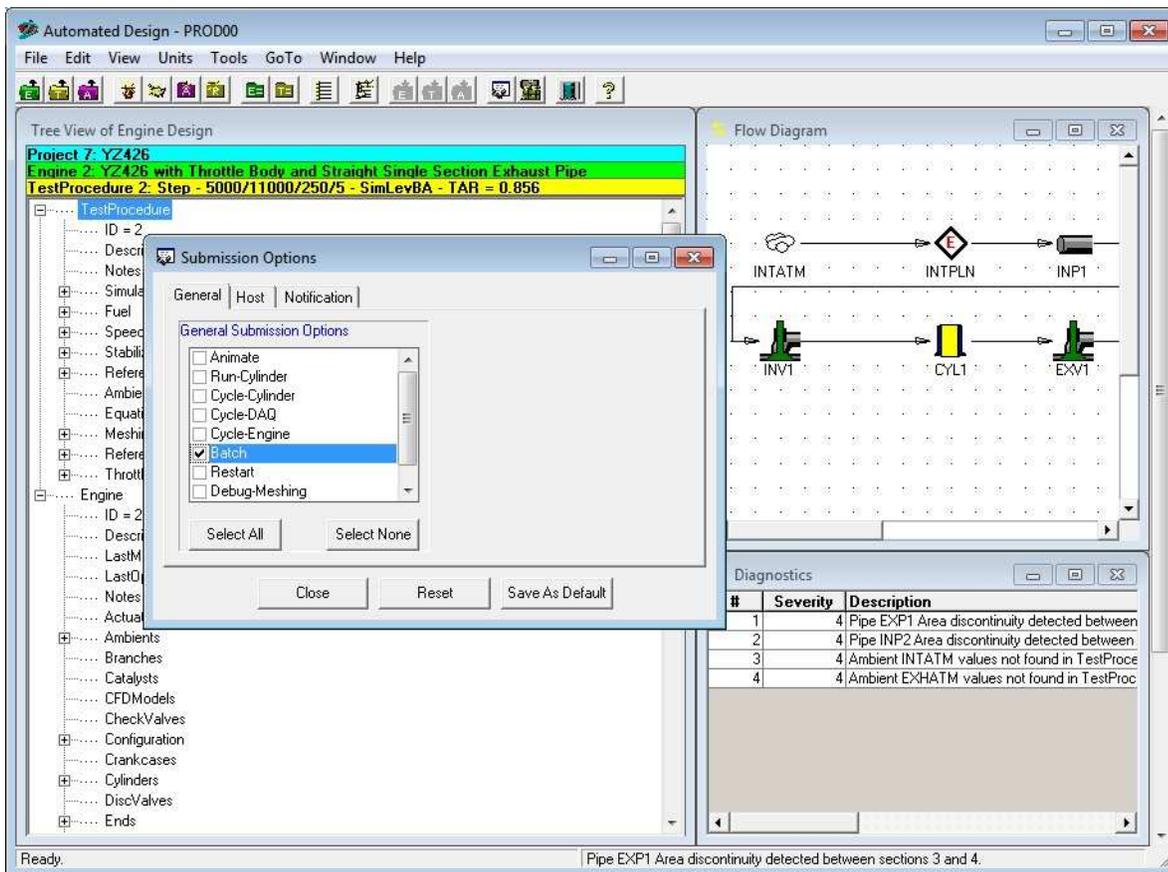
Click the Batch checkbox in the General Submission Options list so it is checked and click the Close button to close the Submission Options dialog.

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.
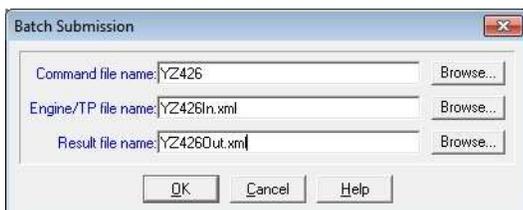


Type YZ426 as the Command file name, YZ426In as the Engine/TP file name and YZ426Out as the Result file name and click the OK button. Virtual Engines creates the command and Engine/TP files and displays a confirmation dialog:
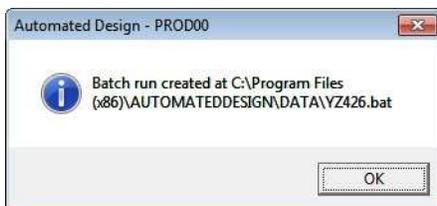


## Submit Virtual Engines Batch Run

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.

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.
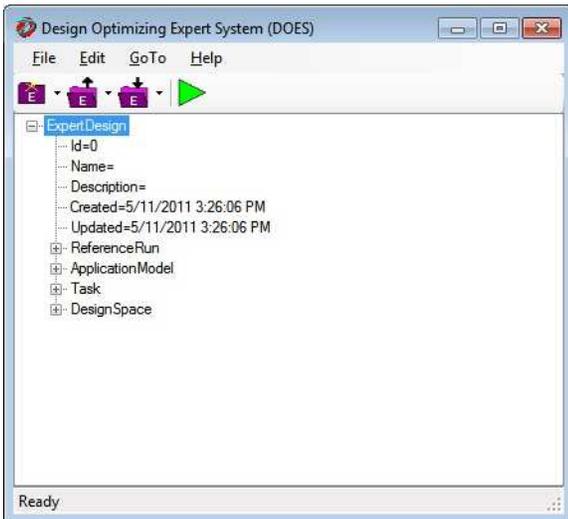


The first step in creating a DOES model is to create a ReferenceRun. The ReferenceRun is a definition of all the files, variables within each file, and processes that make up your model. Creation of a ReferenceRun is a Knowledge Engineer task and requires knowledge of the file layouts and processes that 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.
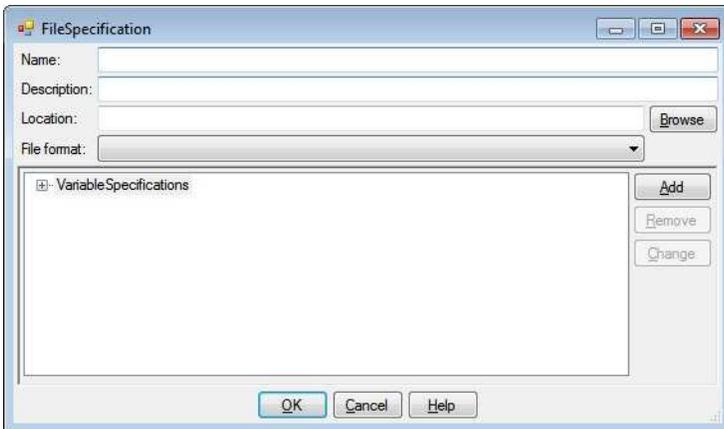
Click the "Browse" button and select YZ426In.xml from the Virtual Engines or Automated Design DATA folder as the location. The FileSpecification dialog will fill in the FileSpecification name, location and format for you. Right click on the VariableSpecifications node in the FileSpecification dialog and select Add from the menu. The Virtual Engines Variables dialog is displayed.
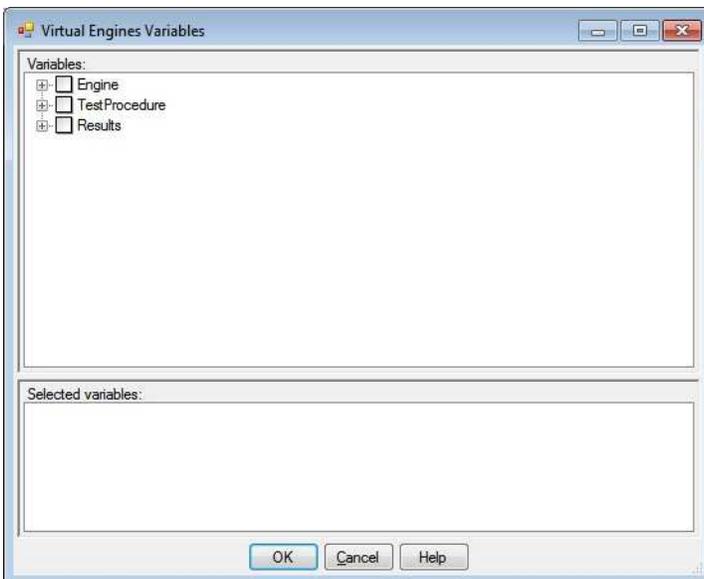
The Virtual Engines Variables dialog displays a tree view of the Engine, TestProcedure and Results and is similar to the tree view that the Virtual Engines Design application or the Automated Design Knowledge Engineering Interface application. Expand the Engine, Pipes, EXP1, Sections and Section(4) nodes. 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:
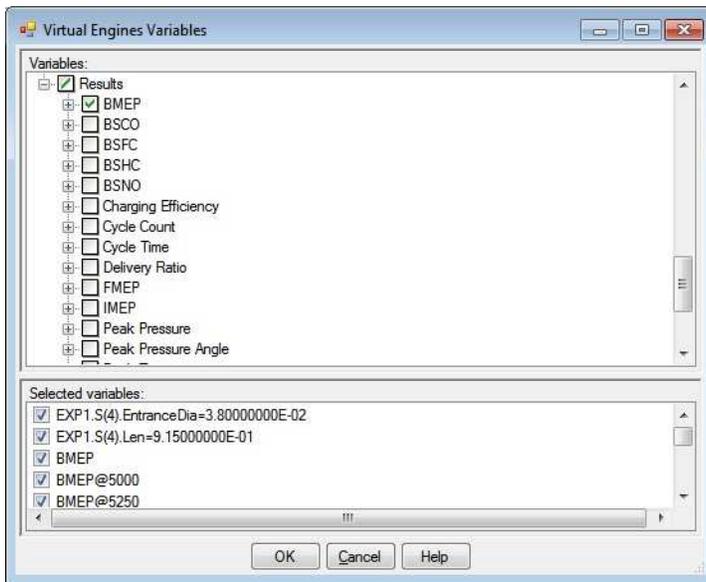
Click the OK button to return to the FileSpecification dialog which should look like this:
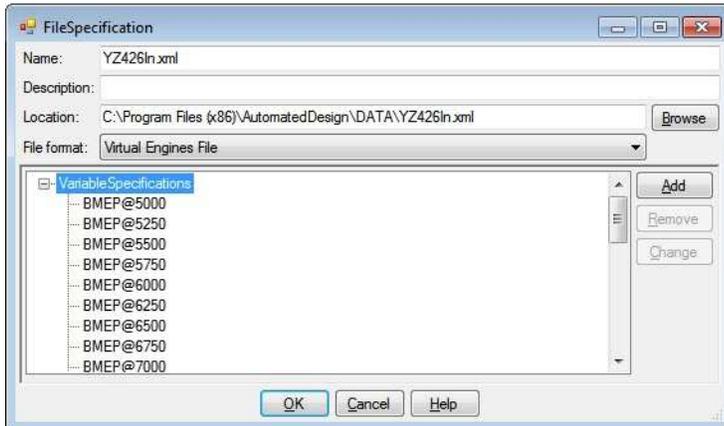
Click the OK button to return to the ReferenceRun dialog which should look like this:
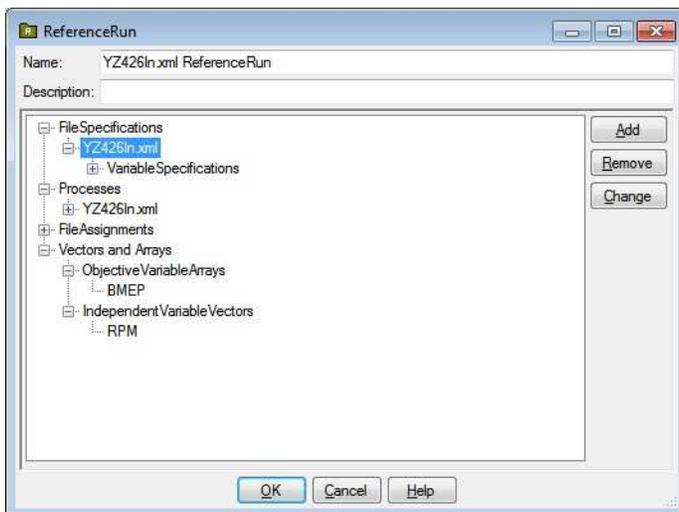
The Virtual Engines interface to DOES has filled in all the ReferenceRun specifications with a few mouse clicks! Note that, in addition to the FileSpecification, the Virtual Engines interface has filled in the Name and Process, created an ObjectiveVariableArray and created an IndependentVariableVector 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.
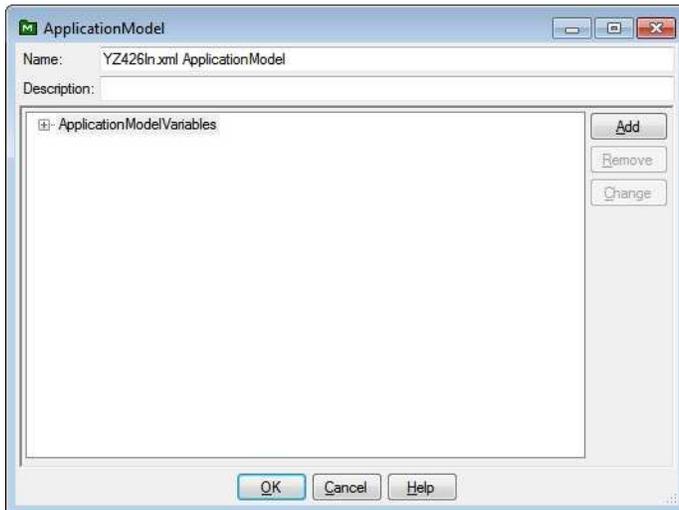


Note that the Virtual Engines interface has supplied a name for the ApplicationModel. Right-click the ApplicationModelVariables node on the ApplicationModel dialog and select Add from the menu to display the ApplicationModelVariable dialog. Scroll to the bottom of the list of VariableSpecifications.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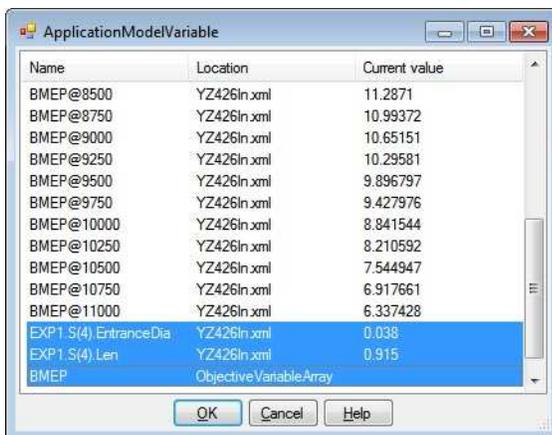


Click OK to return to the ApplicationModel dialog.



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.
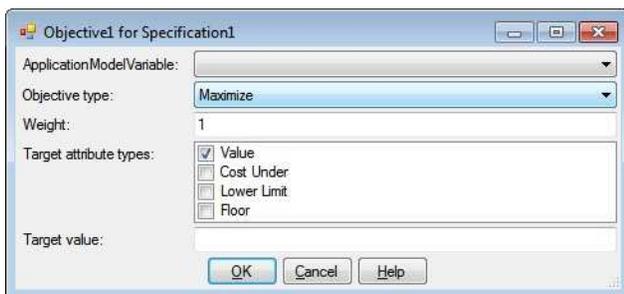


Select BMEP as the ApplicationModel variable and select Maximize as the Objective type. Your dialog will look like this:
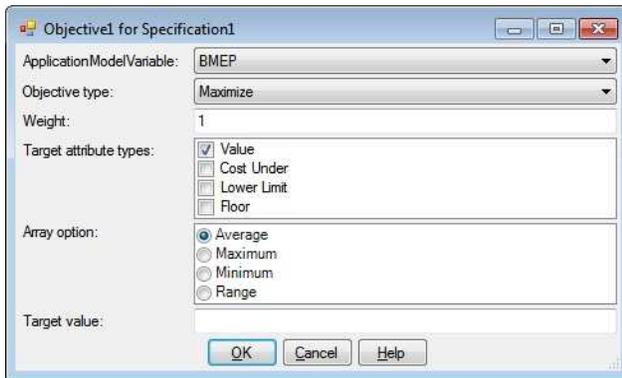
Click OK to return to the Specification dialog, then click the OK to return to the Task dialog. Your Task dialog will look like the following:
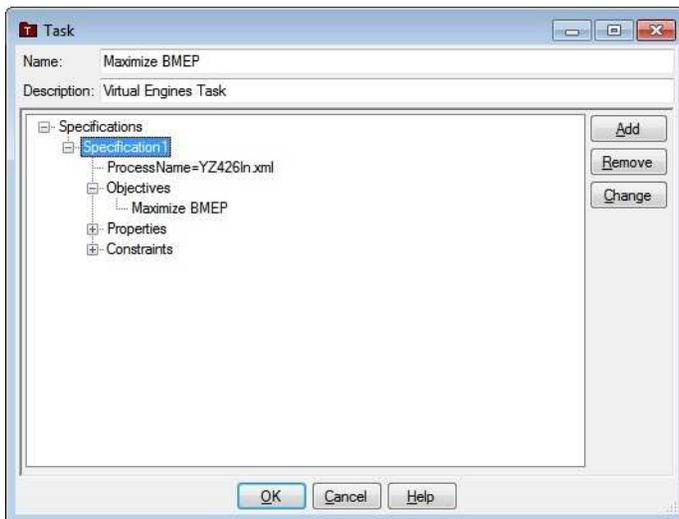


Click OK to close the Task dialog.

## 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.
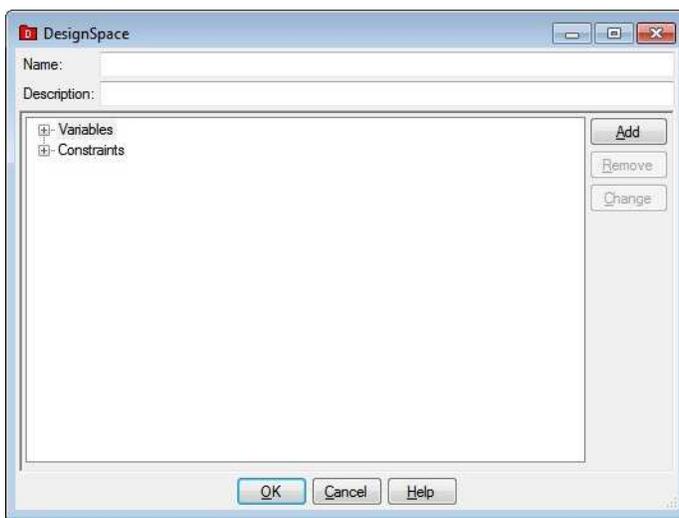


Type Vary Exhaust Section 4 Length and Diameter as the DesignSpace name and Virtual Engines DesignSpace as the description. Click the Variables node and click the Add button to display the DesignSpaceVariable dialog.
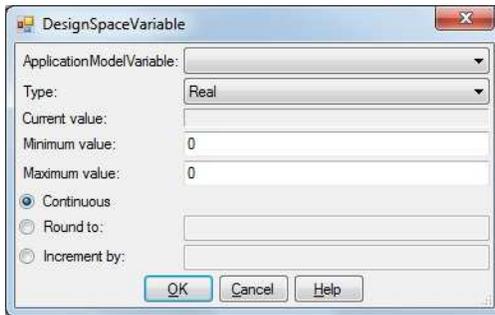
Select EXP1.S(4).EntranceDia as the ApplicationModel variable and type .02 as the Minimum value and .05 as the Maximum value. Note that all values are expressed in meters because the Virtual Engines files store all length values in meters.
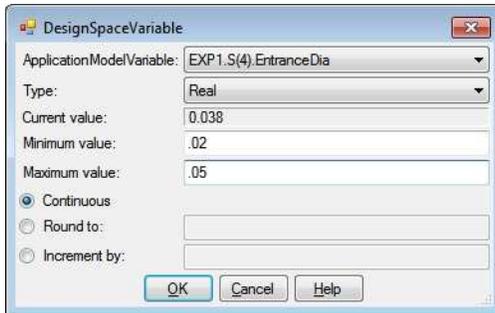


Click OK to return to the DesignSpace dialog and repeat selecting EXP1.S(4).Len as the ApplicationModel variable, .5 as the Minimum value and 1.1 as the Maximum value. The DesignSpace dialog will look like this:
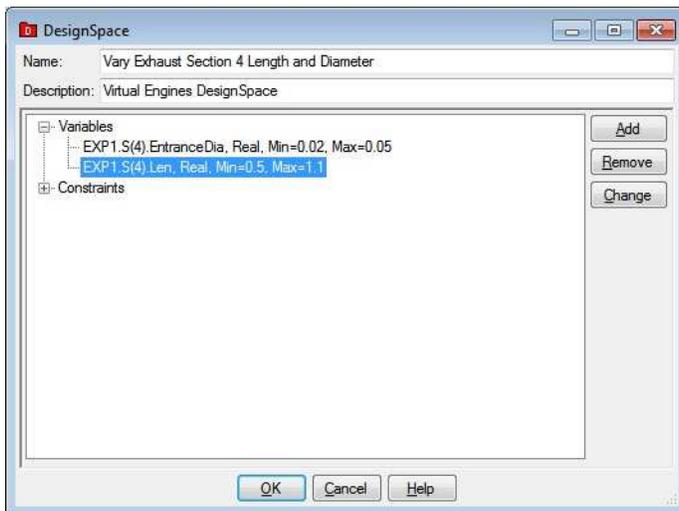


Click OK to close the DesignSpace dialog.

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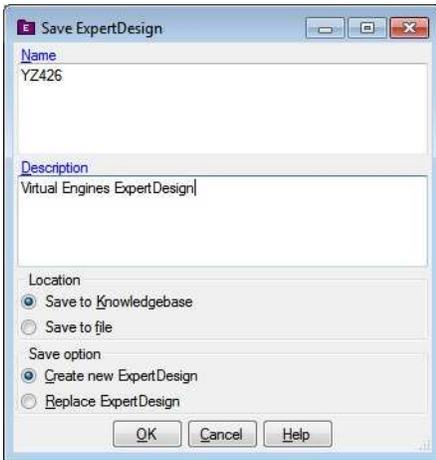
Click the OK button. The Select Project dialog will be displayed.
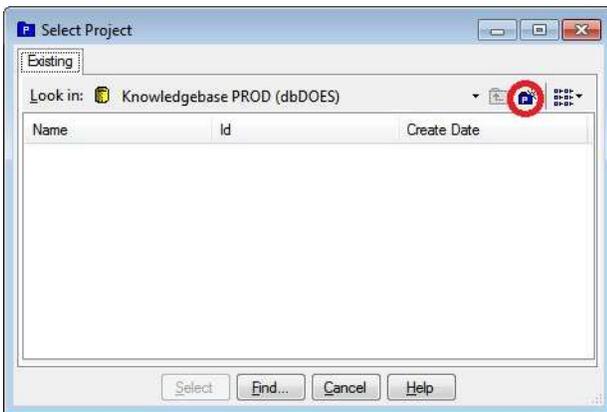
Click the New Project button (circled). The Create New Project dialog will be displayed. Type YZ426 as the Project name.

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.