



# Quick Start Guide

## Excel Solver Upgrader Version

The screenshot displays the Frontline Solvers Excel Solver Upgrader interface. The main window shows a model titled "Simple Geometric Brownian Motion Based Price" with a formula  $=F12*(EXP((\$K\$18-\$K\$17)*...))$ . The interface includes a toolbar with various analysis tools like "AI Assist", "Distributions", "Correlations", "Results", "Decisions", "Constraints", "Objective", "Decision Tree", and "Decision Table".

Key components visible include:

- Model Window:** Shows the spreadsheet with the Frontline Solvers logo and the model title.
- Histogram:** A frequency distribution plot for the variable "\$FS13". The x-axis represents values around 20.5, and the y-axis represents Relative Probability. The plot includes a normal distribution curve fit and a data table:
 

\$FS13	Mean:	20.3338829
	StdDev:	0.192750563
	5th Perc:	20.017519
	95th Perc:	20.6503104
- Statistics Panel:** Provides detailed statistical data for the variable:
 

Mean	20.3338829
Standard Deviation	0.192750563
Variance	0.0371528
Skewness	0.000761766
Kurtosis	2.95166
Mode	20.32472354
Minimum	19.70568572
Maximum	20.93979432
Range	1.234108601
- Normal Distribution Plot:** Shows a bell curve for the variable "\$AS1" with a mean of 0 and a standard deviation of 1. The x-axis ranges from -4 to 4, and the y-axis ranges from 0 to 0.35. Vertical lines indicate the 5.00%, 90.00%, and 5.00% percentiles.
- Parameters Panel:** Lists various parameters for the model, including "Uncertain Variable" (Address: \$AS1), "Parameters" (mean: 0, stdev: 1), and "Control Parameters" (Name, Lock, Seed, Shift, Lower Cutoff, Upper Cutoff, Cutoff Measure, Lower Censor).
- Deploy Model Wizard:** A dialog box for deploying the model to various applications: Teams, Cloud Service, Power BI, Tableau, RASON Model, Fitted Model, Excel Model, and Probability Model.

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## Patent Pending

Systems and Methods for Automated Risk Analysis of Machine Learning Models.

# Upgrader Quick Start Guide

## Version 2025 Q1

Congratulations. As a user of the basic Excel Solver you already likely know the benefits of optimization. Since you're reading this, you probably have a problem that goes beyond what the basic Excel Solver was designed to handle:

1. You would like to solve larger optimization models, or solve them faster.
2. You would like to get better answers for more complex and challenging problems.
3. You would like to capture and manage uncertainty in your model.
4. You would like to solve optimization and simulation models or create data science and prediction models **in the Cloud**.

You can rest assured that you are in good company, since Frontline Systems not only built the basic Excel Solver but offers powerful upgrades that are the leading optimization and simulation tools in Excel, preferred by over 7,000 businesses and universities around the world.

This Upgrader Quick Start Guide covers key pieces of information to help you get started quickly and successfully with our Solver upgrade products. You'll be able to use Analytic Solver Comprehensive on a free trial basis. Everything discussed in this Quick Start Guide also applies to our most powerful product, Analytic Solver Comprehensive, and its subset products: Analytic Solver Optimization, Analytic Solver Simulation and Analytic Solver Upgrade.

For more information on any of these steps or topics, refer to the User Guide and Reference Guide, available in the Support section of Solver.com, or from within Excel by going to the **Help** menu on the **Analytic Solver** tab and selecting **User Guides**.

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## Key Enhancements from the Basic Excel Solver

Let's start with what **isn't** going to change when you upgrade:

1. *You can instantly solve your existing models and continue to use any existing VBA code.* Your existing optimization model built using the basic Excel Solver should work as-is without any changes.
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2. ***You can continue to use an interface similar to the Excel Solver dialog if you want.*** All our optimization Solver upgrades include an enhanced version of the basic Excel Solver dialog, so you can take advantage of the larger problem size limits and additional engines without even having to learn how to use the Ribbon and Task Pane interface (although after you do try it out, we think you'll never want to go back).

Now let's quickly summarize the features and benefits **you do get** when you upgrade:

1. ***The ability to solve much larger problems, much faster.*** Our upgraded products allow you to solve problems anywhere from 10x to 40x larger than the basic Excel Solver, and solve them much faster than before. With optional plug-in Solver Engines, you can solve problems of virtually unlimited size.
  2. ***The ability to solve a wider variety of problems.*** With the new constraint types and Solver Engines we include, you can solve more types of problems.
  3. ***Automatic guidance, giving you insight into your model and results.*** Analytic Solver will analyze your formulas, determine the type of model you've created, provide ideas to help you get a better answer more easily, automatically choose the best available Engine to solve it, and then help you understand the results.
  4. ***Instant connection to knowledgeable technical support.*** Connect to a live person from right inside Excel, and skip the explanations you'd have to give by email or phone – our software will send diagnosis and error information automatically to the tech support rep.
  5. ***A whole new way to model business situations with many dimensions.*** Besides building “regular” models that are compatible with the basic Solver, with Analytic Solver you can use Dimensional Modeling to replace thousands of copied formulas with just a few cells.
  6. ***The ability to capture and manage uncertainty.*** Very rarely do we have perfect information. Rather than putting in a single value to represent factors such as the weather, stock prices, and interest rates, using Monte Carlo simulation techniques in Analytic Solver, you can include uncertainty in your model, see the full range of potential outcomes, and make better decisions.
  7. ***Powerful Data Science and Time Series Analysis tools within Excel.*** Analytic Solver Comprehensive includes Analytic Solver Data Science (formerly Analytic Solver Data Mining) which is the only comprehensive data science add-in for Excel. Analytic Solver Data Science may also be purchased as a stand-alone product. Analytic Solver Data Science's capabilities include neural networks, classification and regression trees, logistic regression, linear regression, Bayes classifier, K-nearest neighbors, discriminant analysis, association rules, clustering, principal components and more.
  8. ***Access to Analytic Solver Cloud.*** The release of Analytic Solver V2025 Q1 includes our latest offering, Analytic Solver Cloud – a “modern JavaScript add-in” usable in both Excel for the Web (formerly Excel Online) and the latest versions of desktop Excel, for Windows and Macintosh. Analytic Solver Cloud handles optimization and simulation models, forecasting and data science models; fully compatible with models created in previous versions of Analytic Solver. Your license for Analytic Solver will allow you to use Analytic Solver Desktop in desktop Excel or Analytic Solver Cloud in either desktop Excel or Excel for the Web..
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9. **Capability to translate your Excel optimization, simulation or data science workflow into Frontline's new RASON modeling language** - radically simplifying the path to create an application that can run in a **web browser**, or a **mobile app** for phones or tablets. RASON<sup>®</sup> – Restful Analytic Solver<sup>®</sup> Object Notation – is a modeling language embedded in **JSON** and a REST API that makes it easy to create, test and deploy **decision services** powered by **analytic models** in **web** and **mobile** applications – using business rules and DMN decision tables, optimization, simulation, forecasting and machine learning. For more information, go to [www.RASON.com](http://www.RASON.com).
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## Installing the Software

You can use Analytic Solver Cloud in Excel for the Web through a Web browser (such as Edge, Chrome, Firefox or Safari), without installing anything else. This is the simplest and most flexible option, but it requires a constant Internet connection.

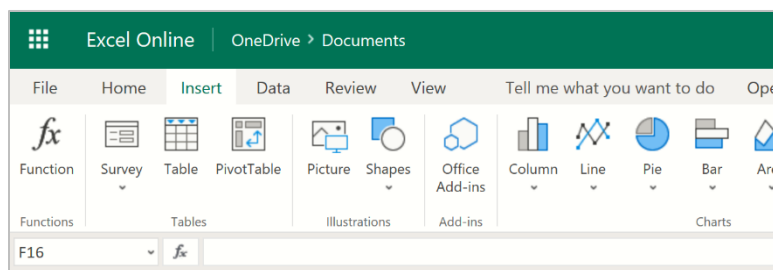
To use Analytic Solver Cloud in Excel Desktop on a PC or Mac, you must have a current version of Windows or iOS installed, and **you will need the latest Excel version installed via your Office 365 subscription** – older non-subscription versions, even Excel 2019, do not have all the features and APIs needed for modern JavaScript add-ins like Analytic Solver Cloud.

To use Analytic Solver Desktop (Windows PCs only), you must have first installed Microsoft Excel 2013, 2016, 2019, or the latest Office 365 version on Windows 10, Windows 8, Windows 7, or Windows Server 2019, 2016 or 2012. (Windows Vista or Windows Server 2008 may work but are no longer supported.). It's not essential to have the standard Excel Solver installed.

## Installing Analytic Solver Cloud

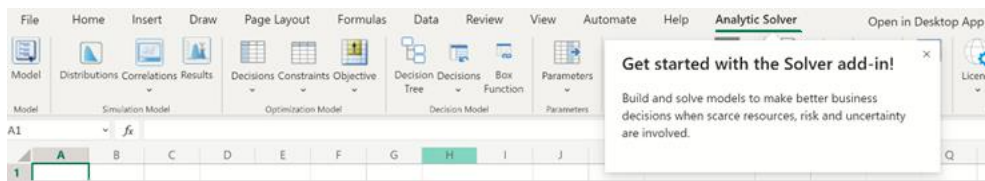
Analytic Solver Cloud is composed of two add-ins: Analytic Solver and Analytic Solver Data Science (formerly Analytic Solver Data Mining). To use the Analytic Solver and Data Science add-ins, you must first “insert” them for use in your licensed copy of desktop Excel or Excel for the Web, while you are logged into your Office 365 account. Once you do this, the Analytic Solver and Data Science tabs will appear on the Ribbon in each new workbook you use.

To insert the add-ins for the first time, open desktop Excel (latest version) or Excel for the Web, click the Insert tab on the Ribbon, then click the button Office Add-ins or (if you see it) the smaller button Get Add-ins.



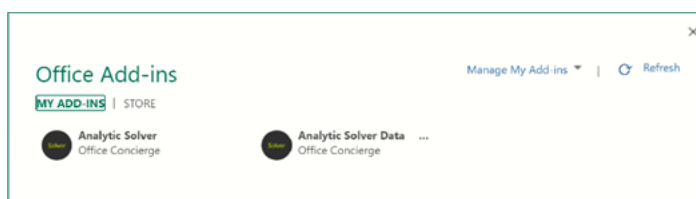
In the dialog box that appears, click the Store tab and type “Analytic Solver” into the Search box. Once you find the Analytic Solver add-in, click Add. After a moment, you should see the Analytic Solver tab appear on the Ribbon, with a note about how to “Get started with the Solver add-in”, as shown below.

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*Repeat these steps* to search for, locate and Add the Analytic Solver Data Science add-in. After a moment, you should see the Data Science tab appear on the Ribbon, with a similar “Get started” note.

After you perform these steps (one time) to insert the Analytic Solver and Analytic Solver Data Science add-ins, they will appear under "My Add-ins". If you ever need to remove the add-ins, click the “...” symbol to the right of the add-in name, then click the Remove choice on the dropdown menu that appears.



## Installing Analytic Solver Desktop

**Run the SolverSetup.exe** program to install the Analytic Solver Desktop – whether you are using Analytic Solver Comprehensive, or any of its subsets, with either 32- or 64-bit Excel. The User Guide chapter “Installation and Add-Ins” covers installation step-by-step, and explains how to activate and deactivate the Analytic Solver Excel add-in.

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## Logging in the First Time

The first time you run Analytic Solver (Desktop or Cloud) after installing the software on a new computer, when you next start Excel and visit the Analytic Solver tab on the Ribbon, **you will be prompted to login**. Enter the **email address** and **password** that you used to register on Solver.com. Once you’ve done this in Analytic Solver Desktop, your identity will be “remembered,” so you won’t have to login every time you start Excel and go to one of the Analytic Solver tabs. In Analytic Solver Cloud, you may be asked to login more frequently. To login or logout at any time, click License – Login/Logout.

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## Using Your Existing Models

All Analytic Solver versions are 100% compatible upgrades to the basic Excel Solver, from Analytic Solver Decision to Analytic Solver Comprehensive. This means you can solve your existing models immediately, taking advantage of Analytic Solver’s faster speed, additional solving methods, and larger problem size limits, without having to make any changes to your model or existing VBA code. Simply open the workbook containing the model and use the **Solver Parameters** dialog, or just click the **Optimize** button on the Ribbon (see below).

***Online Resource:** You can see an overview video of a model built using the Excel Solver and how to solve it in Analytic Solver as-is. In addition, you can also see how to quickly and easily build the same model from scratch using the Ribbon and Task Pane interface by clicking [here](#).*

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## Using the Ribbon and Task Pane

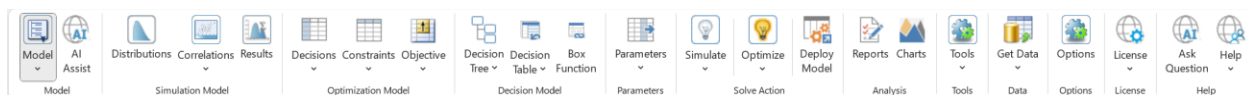
This section contains an overview of the Ribbon and Task Pane interface, as well as the alternative Solver Parameters dialog (similar to what you've used in the basic Excel Solver).

**Online Resource:** You can also see a short overview video of the Ribbon and Task Pane interface on our website by clicking [here](#).

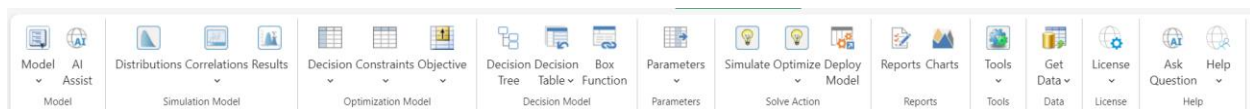
The Ribbon is your 'gateway' to Analytic Solver's graphical user interface. Most often, you simply click on the arrow at the bottom of a button on the Ribbon to open a dropdown gallery with more buttons, and then you click one of these choices.

The Analytic Solver Ribbon (in both the Desktop and Cloud apps) appears as a tab on the standard Ribbon at the top of the Excel application window, and it stays in this position:

*Analytic Solver Desktop*

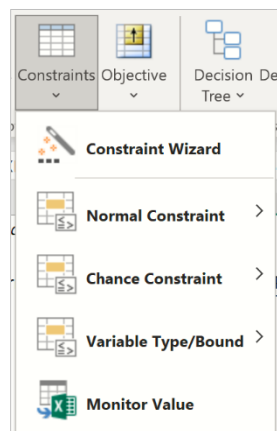


*Analytic Solver Cloud*

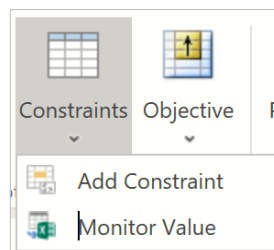


The small downward pointing arrow below each of the buttons indicates that you can open a **dropdown gallery** of options related to that button. For example, clicking the downward arrow for **Constraints** opens a gallery of further options for defining constraints:

*Analytic Solver Desktop*



*Analytic Solver Cloud*



Clicking **Normal Constraint** in Analytic Solver Desktop shows the traditional constraint relations, and clicking the remaining gallery choices will display new options that you haven't had in the basic Excel Solver.

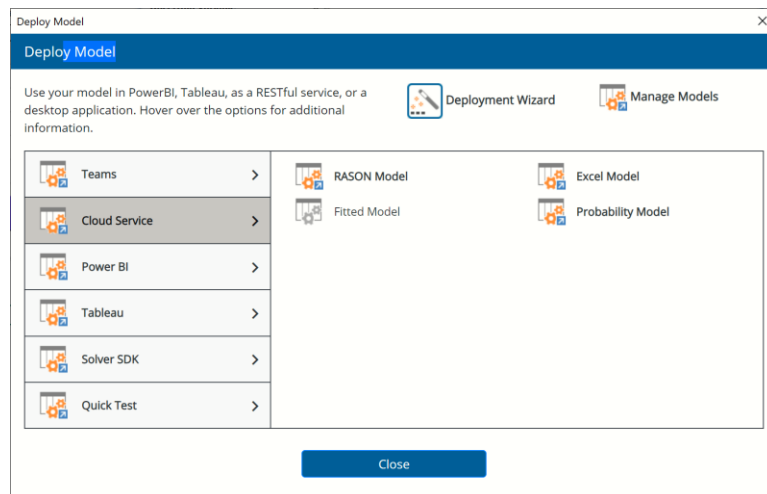
Clicking **Add Constraint** in Analytic Solver Cloud opens the Add Constraint dialog where you can enter a constraint with traditional relations or any new options not featured in the basic Excel Solver.

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The buttons on the Ribbon play the following roles:

- Clicking the **Model** button displays the Task Pane (see more on this below). Click the down arrow to add Dimensional Modeling capability to your model.
  - The *Simulation Model* group of buttons relate to setting up simulation models:
    - Clicking the **Distribution** button gives you a range of pre-defined probability distributions you may choose to represent uncertainty in your model and access to our new Distribution wizard.
    - Clicking the **Correlations** button brings up a dialog to allow you to easily create, edit or delete correlation matrices or fit a copula. The down-arrow allows you to turn the use of correlations on and off.
    - Clicking the **Results** button opens a gallery of options that allow you to designate a cell as an output cell for an uncertain function (to obtain statistics, charts or other simulation results), or insert calls to PSI Statistics functions to compute statistics, risk measures, or range values for uncertain functions.
  - The *Optimization Model* group of buttons relate to setting up optimization models:
    - Clicking the **Decisions** button creates a new “normal” decision variable using the currently selected cell. Clicking the down arrow allows you to designate a cell as a decision variable, and in stochastic optimization, choose normal or recourse decisions.
    - Clicking the **Constraints** button opens the Add Constraint dialog which lets you easily define constraints, including bounds and integer restrictions on decision variables, and chance constraints in stochastic optimization. Clicking the down arrow allows you to do all of the above plus gives you access to our new Constraints wizard.
    - Clicking the **Objective** button opens the Add Objective dialog which allows you to designate a cell as the objective function, and choose whether it should be maximized or minimized. Clicking the down arrow allows you to do all of the above plus “summarize” an objective containing uncertainty if solving a stochastic optimization model.
  - The *Decision Model* group of buttons relate to setting up decision trees or decision table models or models that use custom box functions.
    - Click **Decision Tree** to easily create decision nodes and branches, event nodes and branches, and terminal nodes. The tree is drawn in graphic form on the spreadsheet; standard Excel worksheet formulas compute ‘rollback’ values at each node, and the best-choice value at the root node, based on either expected value or utility function (certainty equivalent) criteria. With a Ribbon choice, you can graphically highlight the optimal path through the tree.
    - Click **Decisions** to add a decision table to the worksheet. Decision tables contain a set of rules which specify actions to perform based on specific conditions. Decision tables are a good tool to use when there is a consistent number of rules, or conditions, to be evaluated followed by a specific set of actions to be performed once a rule, or condition, is met.
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- Click **Box Function** to create and utilize a user-defined function within an Excel model.
- Clicking the **Parameters** button allows you to designate a cell as a parameter to be varied across multiple optimization or simulation runs, or designate a cell range as input data for runtime use. You can even find *candidate* cells for parameters *automatically*, displaying a tornado chart that shows which cells have the greatest impact on your model results.
- The *Solve Action* group of buttons relate to *solving* your optimization or simulation model:
  - Clicking the **Simulate** button turns on *Interactive Simulation*, and lights up the bulb; clicking it again turns off *Interactive Simulation* and the bulb. The down-arrow allows you to run a single simulation at a time.
  - Clicking the **Optimize** button runs an optimization, while clicking the down-arrow gives you a list of choices for how to solve the model. You can use the Analyze Without Solving option to find out what type of model (linear, nonlinear, etc.) you've defined, and what Solver Engine can be used to solve it.
  - Clicking the **Deploy Model** button opens a new dialog with a list of choices that automatically convert your existing optimization, simulation or simulation optimization model into a model written in the new RASON Modeling Language that can be solved in Rason Cloud Services, Power BI, Tableau, with the Solver SDK, from within a customized Web application or shared via Microsoft Teams. This feature reduces months of development work to a single button click!



See the chapter, *Deploying Your Model*, within the *Analytic Solver User Guide* for more information on this exciting new feature!

- The *Analysis* group of buttons relate to analyzing your results:
  - Clicking the **Reports** button gives you access to a full range of reports for optimization, simulation, sensitivity analysis, and discriminant analysis.
  - Clicking the **Charts** button lets you create and manipulate charts related to your optimization, simulation, or sensitivity analysis results – including charts that cover multiple optimization or simulation runs, with varying parameters.



- The *Tools* menu on the Ribbon or group of options on the Tools tab on the Task Pane are covered more fully in the User Guide: They allow you to create probability distributions that fit historical data, see the results of specific optimizations or simulations, load existing models or save new models to the worksheet, and new in V2025 Q1, identify constant input parameters.
- Compute summary measures (sum, average, standard deviation, minimum or maximum) for variables in a dataset with up to billions of rows, stored across many hard disks in an external compute cluster running Apache Spark (<https://spark.apache.org/>), by clicking the **Get Data** icon. This kind of summary data is often what you need as input parameters to an optimization or simulation model. See the Analytic Solver Data Science User Guide for more help on this new feature.
- Clicking the **Options** button displays a dialog of options for controlling the optimization and simulation processes, as well as for formatting charts and graphs.
- If optimization, simulation or stochastic programming are new for you, don't worry – you can learn a lot about them by consulting our **AI Agent**, Frontline's artificial intelligence technical support assistant. AI Agent is designed to provide assistance and support for users of Frontline Solvers' Analytic Solver and Analytic Solver Data Science software. The AI Agent is knowledgeable about the functionality and features of the software, as well as the concepts and processes involved in optimization, simulation and data science/forecasting. Just enter a topic or question such as “What is stochastic optimization?” and click Submit Query to get started.
- Use the **License** button to manage your account and licenses.
- Use the **Help** button to open example models, open the Help Center, where you can find pre-recorded webinars or access our Knowledge Base or explore our User Guides.

Each of these GUI functions is described more in depth in the Reference Guide chapter “Using the Ribbon and the Task Pane.”

Alternatively, if you've used the basic Excel Solver we developed for Microsoft, you'll find the **Add-Ins** tab in Analytic Solver Desktop contains a **Premium Solver** button which displays a **Solver Parameters** dialog very similar to the one you've used before. Changes you make to a model here are reflected in the Task Pane, and vice versa.

You can easily switch between the Solver Parameters dialog, and the Ribbon and Task Pane as often as you wish, without having to restart Excel or close and re-open any open workbooks.

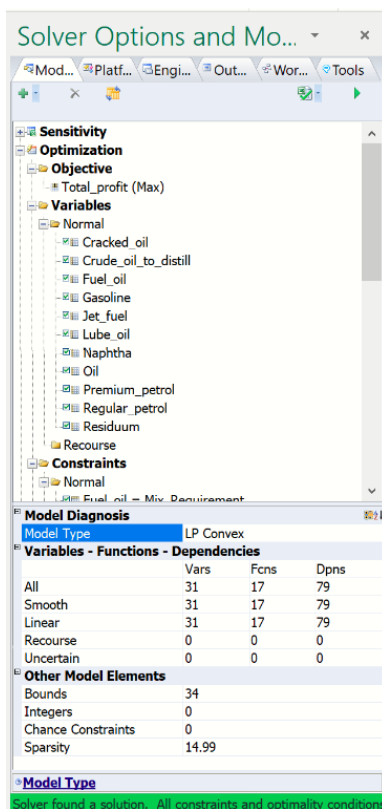
## The Task Pane

Clicking the **Model** button displays the Task Pane, normally docked at the right edge of the Excel window. On the Task Pane **Model** tab, you'll see an outlined list of all the elements of your model: (i) objective, decision variables, and constraints for optimization models, (ii) uncertain variables, uncertain functions, statistics, and correlations for simulation models, (iii) parameters for both kinds of models and (iv) datasets and results for data mining, text mining, and time series models. As explained below, other tabs on the Task Pane provide quick access to option settings, a log of events that happen during an optimization or simulation, and for long-

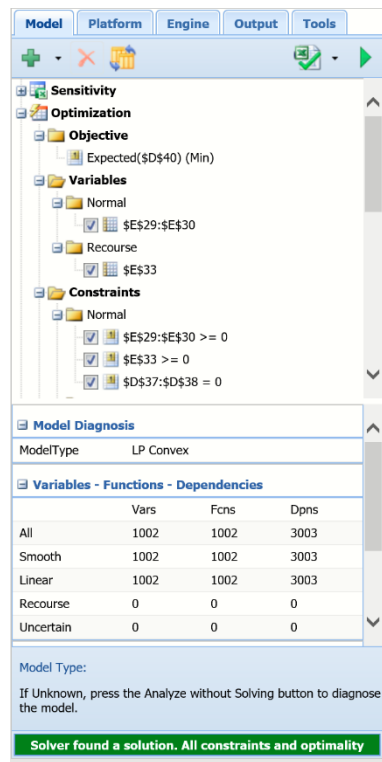
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running optimization models, a continually updated status report plus a dynamic chart of the objective.

*Analytic Solver Desktop*



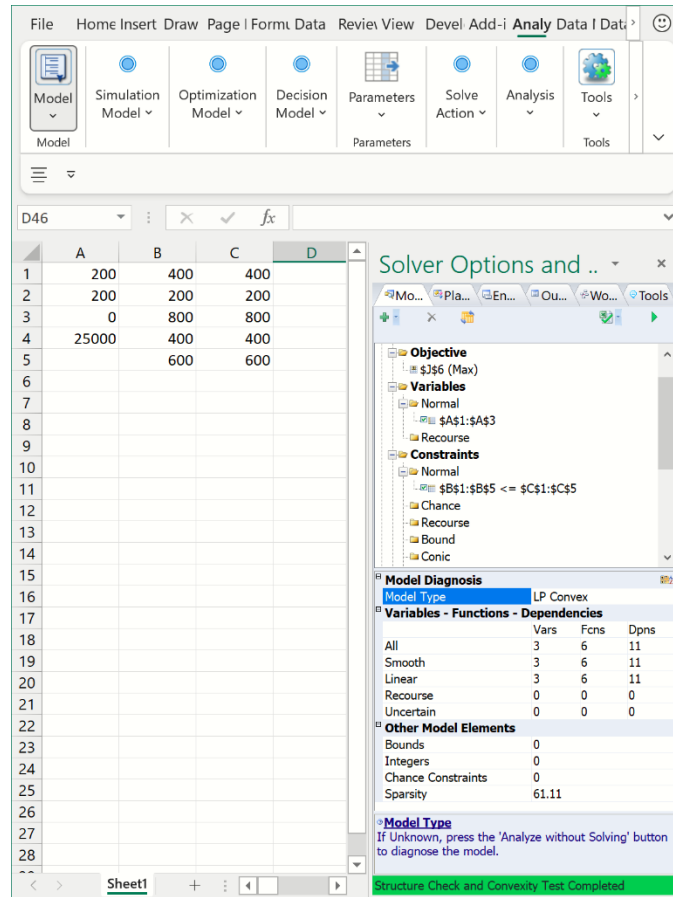
*Analytic Solver Cloud*



As you can see, the Task Pane Model tab and the Solver Parameters dialog contain the same information. But where the basic Excel Solver Parameters dialog is *modal* (moving the mouse outside the dialog displays a wait cursor – you must close the dialog to do anything else), the Task Pane is *modeless*: You can move the mouse outside the pane, edit formulas on the worksheet, or use other commands.

The Task Pane is initially docked to the right side of the Excel window, but you can select its title bar with your mouse, **drag** it to another position, and **resize** it, as shown on the next page. To “re-dock” the Task Pane, select its title bar with the mouse, drag to a position just beyond the right edge of the Excel window, then release the mouse.

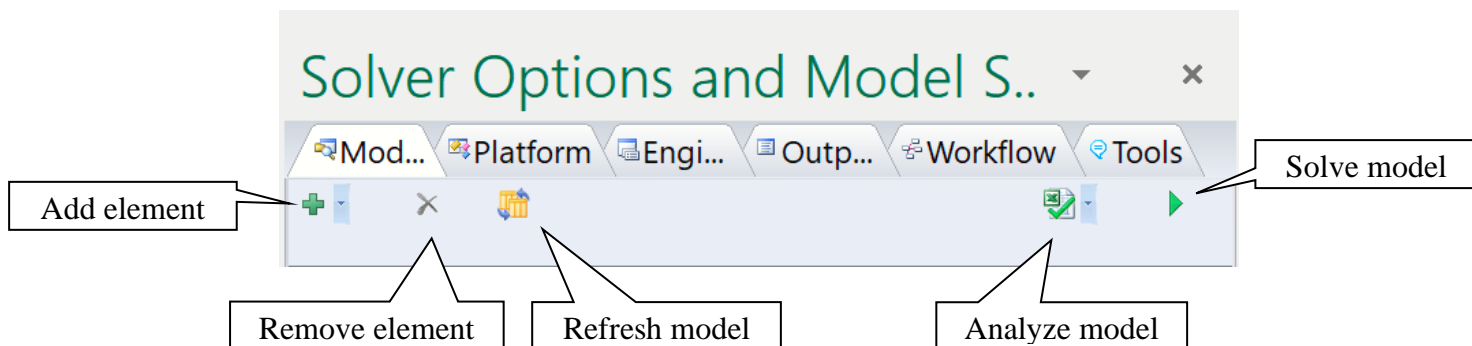
Use the **Model tab** to view your model in outline form, and optionally edit model elements in-place. Use the **Platform tab** to view or change Platform options, such as the number of optimizations or simulations to run, or default bounds on decision variables or uncertain variables. Use the **Engine tab** to select a Solver Engine and view or change its options. Use the **Output tab** to view a log of solution messages, or a chart of the objective values. Use the **Tools** tab to set the number of optimizations and simulations to be performed or view a specific simulation trial.

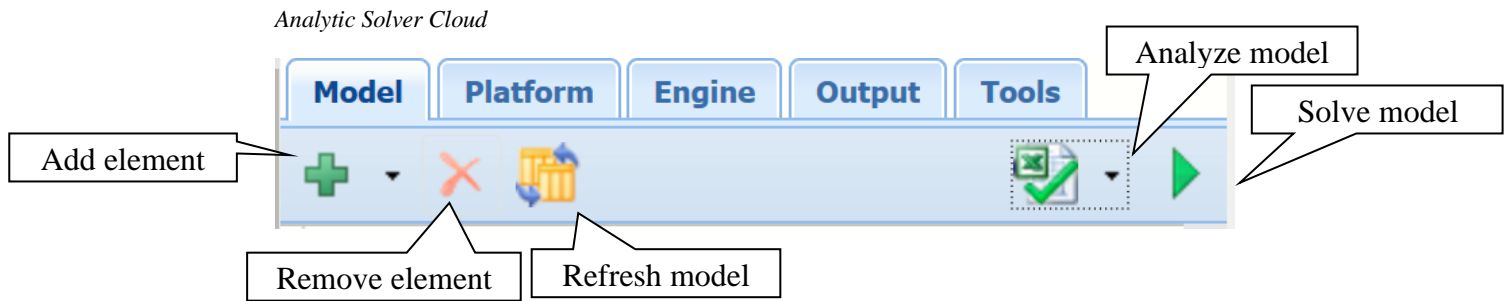


## Using Buttons on the Task Pane

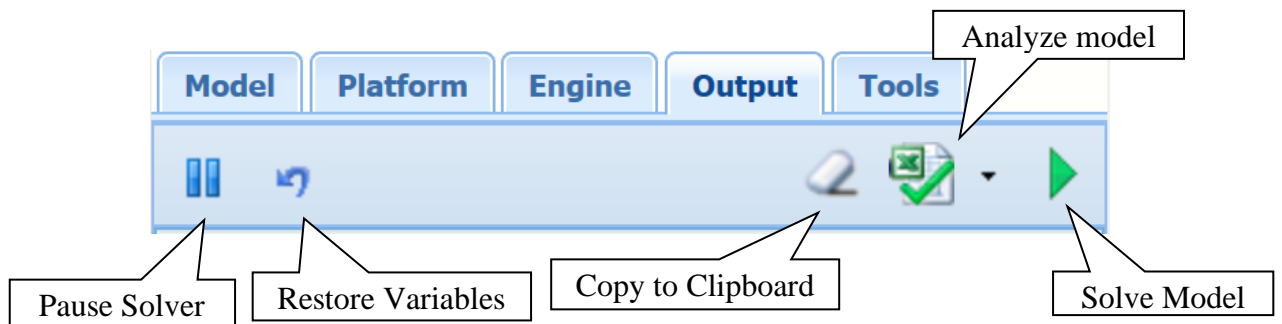
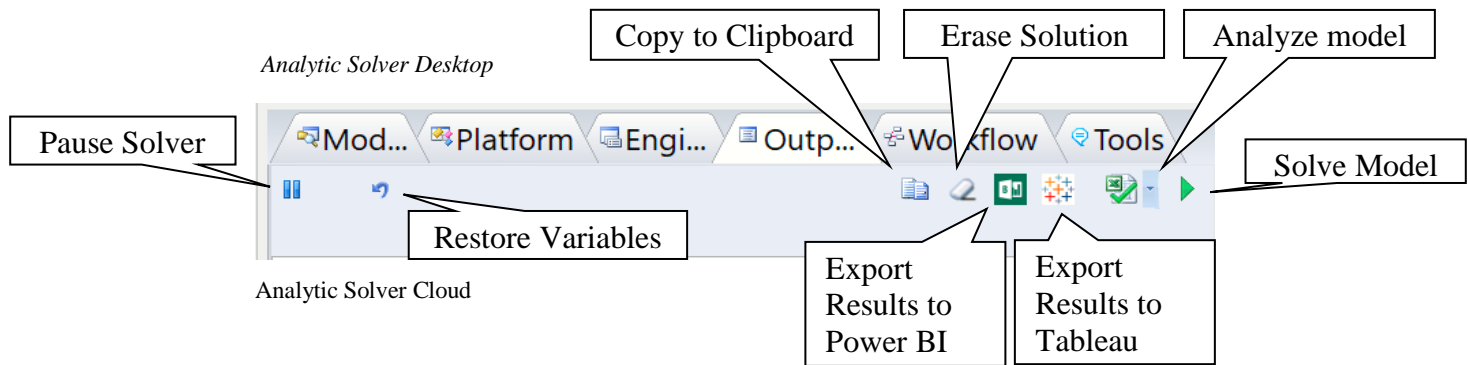
Use the **buttons** at the top of the **Model tab** to add or remove model elements (you can also use the Ribbon options to do this), refresh the model outline when you've made unusual changes to the worksheet, **analyze** the structure of your model, or **solve** (run) the optimization or simulation model:

*Analytic Solver Desktop*





Use the **buttons** at the top of the **Output tab** to pause or stop the Solver, **restore** the original values of the decision variables, **copy** the solution message log to the Windows Clipboard (so you can paste it into another application), **erase** the solution log, **export** the Solver results to **Microsoft's Power BI** or **Tableau**, **analyze** or **solve** the model.




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## Building an Optimization Model

While you likely already know how to build a basic optimization model, in the User Guide there is a chapter called “Examples: Conventional Optimization” which contains a section on building your first optimization model, as well as an overview of examples included with Analytic Solver. These examples will be useful for ideas as you look to build more ambitious models that better capture the business challenges you face.

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***Online Resource:** You can see an overview video on our website of how to build an optimization model from scratch by clicking [here](#).*

You can access the User Guide from within Excel by clicking on **Help** on the Analytic Solver Ribbon and choosing **User Guides**. In addition, see below for links to helpful introductory videos in addition to the one above.

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## Building Your First Simulation Model

Better *understanding* the range of potential outcomes in a situation, and *optimizing* your decision given that range, can be a very powerful way to make even better decisions. In the User Guide there is a chapter called “Examples: Simulation and Risk Analysis” which contains a section on building your first simulation models as well as an overview of examples included with Analytic Solver.

***Online Resource:** You can see an overview video on our website of how to build a simulation model from scratch by clicking [here](#).*

Again, you can access the User Guide from within Excel by clicking on **Help** on the Analytic Solver Ribbon and choosing **User Guide**. In addition, see below for links to helpful introductory videos in addition to the one above.

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## Exploring Example Models

### Finding the Examples

Use **Help – Example Models** on the Ribbon to open optimization, simulation, forecasting/data science, stochastic optimization, simulation optimization and decision tree example workbooks with a list of examples you can open by clicking hyperlinks.

### Using the Example Models and User Guide

The Analytic Solver and Data Science User Guides provide more detail on building your first optimization or simulation model, as well as step – by – step instructions for Analytic Solver Data Science. Example models used in these guides can be found by clicking **Help – Example Models** and relate to:

- Conventional Optimization
- Simulation and Risk Analysis
- Forecasting / Data Science
- Stochastic Optimization
- Sensitivity Analysis
- Decision Trees

### Mastering Optimization and Simulation Concepts

Go from beginner to expert, and learn how to fully exploit the software by reading the **Mastering Concepts** chapters in the Analytic Solver User Guide.

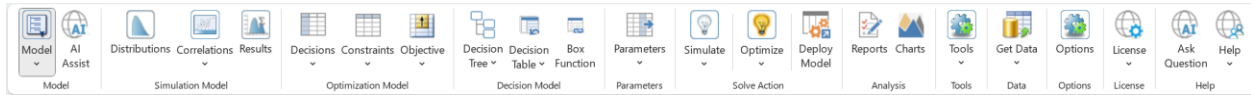
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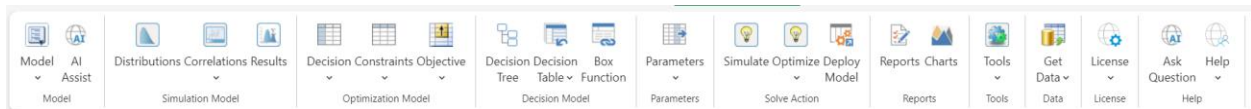
# New Features for Forecasting and Data Science

Analytic Solver Data Science software offers over 30 different methods for analyzing a dataset in order to forecast future events. The Data Science ribbon is broken up into five different segments as shown in the screenshot below.

*Analytic Solver Data Science Desktop*

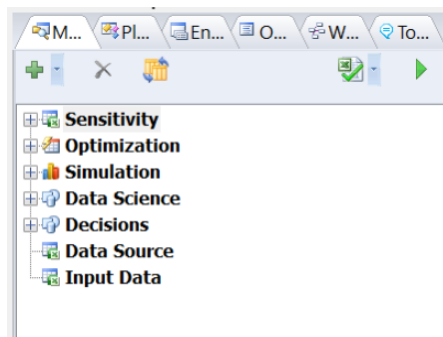


*Analytic Solver Data Science Cloud Ribbon*

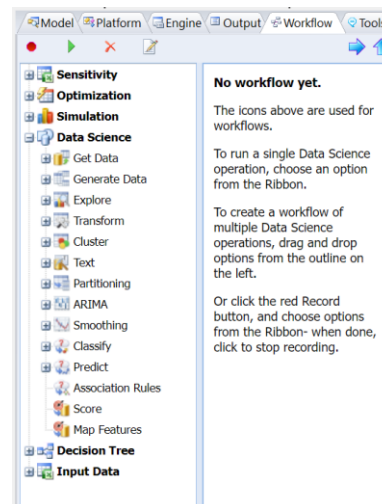


- **Model** – Click this icon to display the Analytic Solver Task Pane. Using the model tab, you can easily navigate between worksheets containing datasets and data science results.

*Data Science Desktop*

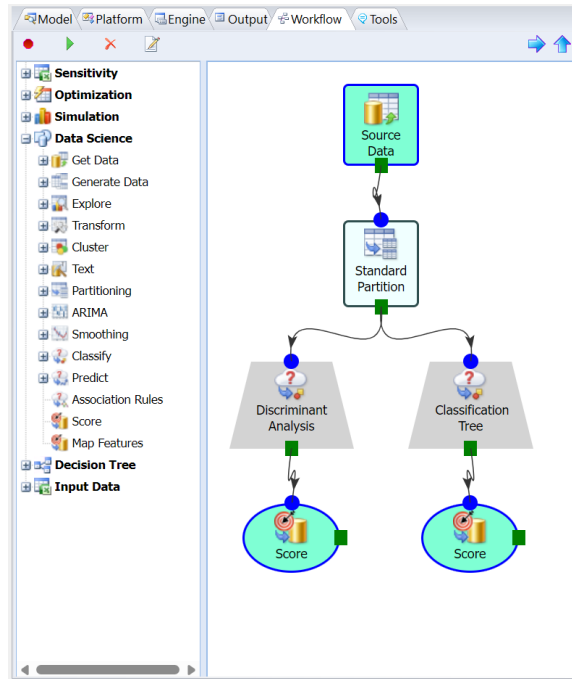


*Data Science Cloud*



The Workflow tab in Analytic Solver, allows the combination of all available data science techniques into an, all-inclusive workflow, or workflows. Once the workflow, or pipeline, is created, either manually or simply by recording your actions, each data science method included in the workflow will be executed sequentially. See the *Analytic Solver Data Science Overview* chapter within the *Analytic Solver Data Science User Guide* for more information on this new feature.

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- Data – This section includes the Big Data and the Generate Data icons. Click the down arrow on the Big Data icon to reveal the menu. Select *Worksheet* to draw a representative sample from an Excel worksheet. Select *Database* (Analytic Solver Desktop only) to retrieve all data or draw a representative sample from a SQL database table. Select *File Folder* (Analytic Solver Desktop only) to import all files or a representative sample from within a single file folder. Click *Big Data* to either sample or summarize from a very large dataset. Results can be obtained immediately or at a later time.

**RASON Decision Services**, Frontline’s REST API, features an innovative (and patent pending) new capability for **automated risk analysis** of **machine learning** models. A further benefit of this feature is a general-purpose, easy to use new tool for **synthetic data generation**, to augment the data you already have. **Synthetic data generation** has come into use in recent years to augment available datasets, when the available data is limited, or is restricted by law or regulation, such as with personal health information (PHI).

- Data Analysis – This section includes four icons: Explore, Transform, Cluster and Text. (In the Cloud app, the Text icon is included immediately to the right of the Data Analysis.) Click Explore to create and manage charts, run Feature Selection or Analyze the data. Click Transform to transform datasets with missing data, perform binning and to transform categorical data. Click the Cluster Icon to perform cluster analysis. Click Text to perform an analysis on a collection of text documents using the new Text Miner feature.
- Time Series – This section includes three icons: Partition, ARIMA and Smoothing and are used when analyzing a time series.
- Data Science – This section includes four icons: Partition, Classify, Predict and Associate and are used to perform data mining activities. (In the Cloud app, Partition is

included to the immediate left of the Data Science section.) Click Partition to partition a dataset using Standard Partitioning or Partitioning with Oversampling. Click the Classification icon to use a classification method such as Discriminant Analysis, Logistic Regression, k – Nearest Neighbors, Classification Tree, Naïve Bayes, Neural Networks or Ensemble Methods to build a classification model. Click Prediction to use Linear Regression, k-Nearest Neighbors, Regression Trees, Neural Networks or Ensemble Methods to generate a prediction model.

- Click the **Score** icon to score your test data. In the Desktop app, click the Options button to open the Web Subscription Manager, check for software updates and set your preference for Operating/Support modes. In the Cloud app, this button does not exist.
- Click the **License** icon to open the Analytic Solver Licensing Center where you can view/change/add licenses and view and pay outstanding invoices. Click the Help icon to open sample datasets, open the Help File and check for updates. See below for a complete discussion of the Help icon.
- If forecasting and data science are new for you, don't worry – you can learn a lot about them by consulting our **AI Agent**, Frontline's artificial intelligence technical support assistant. AI Agent is designed to provide assistance and support for users of Frontline Solvers' Analytic Solver and Analytic Solver Data Science software. The AI Agent is knowledgeable about the functionality and features of the software, as well as the concepts and processes involved in optimization, simulation and data science/forecasting. Just enter a topic or question such as “What classification algorithms are supported in Analytic Solver Data Science?” and click Submit Query to get started.
- Use the **Help** button to open example models, open the Help Center, where you can find pre-recorded webinars or access our Knowledge Base or explore our User Guides.

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## Cloud Version and Solver Home Tab

With your free trial or paid license, you can use Analytic Solver in desktop Excel, and its cloud-based counterpart, [Analytic Solver Cloud](#).

Analytic Solver Cloud is a “modern JavaScript add-in” that works in Excel for the Web, Excel for Windows and Excel for Mac (latest versions).

- All versions offer a Ribbon user interface featuring nearly-identical buttons and menus, and a Task Pane that summarizes models and provides access to Platform and Engine options.
  - All versions use the same modeling languages (Excel formulas and our RASON® modeling language, handled by our PSI Interpreter), and both use the same algorithmic "engines" for mathematical optimization, Monte Carlo simulation and risk analysis, forecasting, data science and text mining.
  - All versions can create or open existing optimization, simulation and data science models and datasets in Excel workbooks – and you can easily move such workbooks back and forth between desktop and cloud.
-



## Security and Privacy Considerations

When you use Analytic Solver Desktop in Excel for Windows, your model is solved on the same computer, in the same memory and running process where Excel for Windows runs. You can save your workbook on your own computer, on Microsoft OneDrive “in the cloud”, or elsewhere.

When you use Analytic Solver Cloud, your workbook is stored, at least temporarily, “in the cloud”, and your model is **solved “in the cloud”**, using Frontline’s RASON servers on Microsoft Azure. While many steps are taken to ensure your security and privacy, you should understand and be comfortable with how the technology works:

When the browser running on your computer communicates with Excel for the Web, all the information transmitted is encrypted using **Transport Layer Security (TLS) 1.2**, as is true for all “https” websites.

When you run or solve a data science, optimization or simulation model, a copy of your Excel workbook is transmitted to Frontline’s RASON servers, again using **TLS 1.2**. A copy of your workbook is stored temporarily on these Azure-based servers, but is always **encrypted** “at rest” and “in motion”. After the model is run or solved, all copies of your workbook are **deleted**; only a log of filename, model size and time taken to solve remains on the RASON servers.

### Analytic Solver Cloud

Analytic Solver Cloud can be used with Excel for the Web, Excel for Windows and Excel for Mac (latest versions). Excel for the Web functions very similarly to desktop Excel so there's no learning curve; you can immediately be up to speed with Excel for the Web.

It's easy to move files between Analytic Solver Desktop and Analytic Solver Cloud products by simply saving your existing files to your Microsoft OneDrive account. Files saved on OneDrive may be opened in Microsoft Online or desktop Office. For Analytic Solver Cloud, **you will need the latest version installed via your Office 365 subscription** – older non-subscription versions, even Excel 2019, do not have all the features and APIs needed for modern JavaScript add-ins like Analytic Solver Cloud.

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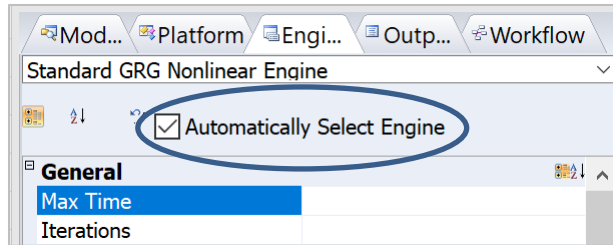
## Solver Engines for Optimization

### Using the Included Solver Engines

Your trial of Analytic Solver includes a comprehensive set of built-in Solver Engines which can be used to solve the entire range of problems you are likely to face including linear, non-linear, quadratic, non-smooth, and mixed integer problems, among others. Each Solver Engine has different strengths, making it better suited to solving a particular class or range of problems. You can choose which one you want to use by going to the **Engines tab** in the Task Pane, clicking on the drop down menu at the top, and selecting a Solver Engine.

Don't worry if you aren't sure what type of problem you have or which Engine would be best suited to solve it. If you wish, our “Automatic Mode” will analyze your model for you and automatically select the best choice from the available Engines to get you the best results. Simply go to the **Engines tab** in the Task Pane and make sure the “Automatically Select Engine” box is checked:

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In addition, the Solver Engine Option Reference chapter in the Reference Guide includes details for each Solver Engine bundled in Analytic Solver Comprehensive, Analytic Solver Optimization and Analytic Solver Decision. It also briefly describes how these options may be examined or set using VBA, or in another programming language using Frontline's Solver SDK Platform.

## Using Large-Scale Solver Engines

In addition to the included Solver Engines Analytic Solver Comprehensive and Analytic Solver Optimization and Solver SDK Platform allow you to install additional plug-in Solver Engines.

The installation program SolverSetup.exe installs the following optional plug-in Solver Engines: Gurobi, MOSEK, OptQuest, XPRESS, and KNITRO, as well as our own Large Scale SQP, Large Scale GRG, and Large Scale LP solvers for use with both Excel 32- and 64-bit. These Solver Engines allow you to solve virtually unlimited sized models at amazing speeds. Again, our Automatic Mode can automatically choose the best one for your particular problem. You can learn more about each Engine [here](#). The new Solver Engine(s) will appear in the dropdown engine list shown at the top of the Task Pane Engine tab.

## Using VBA Code in Analytic Solver Desktop

You don't have to know or use VBA to use Analytic Solver. But if you are familiar with the power of VBA, the User Guide includes two very useful chapters: "Automating Optimization in VBA" and "Automating Simulation in VBA." These chapters explain how to use the Object Oriented API in Analytic Solver Desktop to create, modify, and solve optimization and simulation models under the control of a custom application you've written in VBA.

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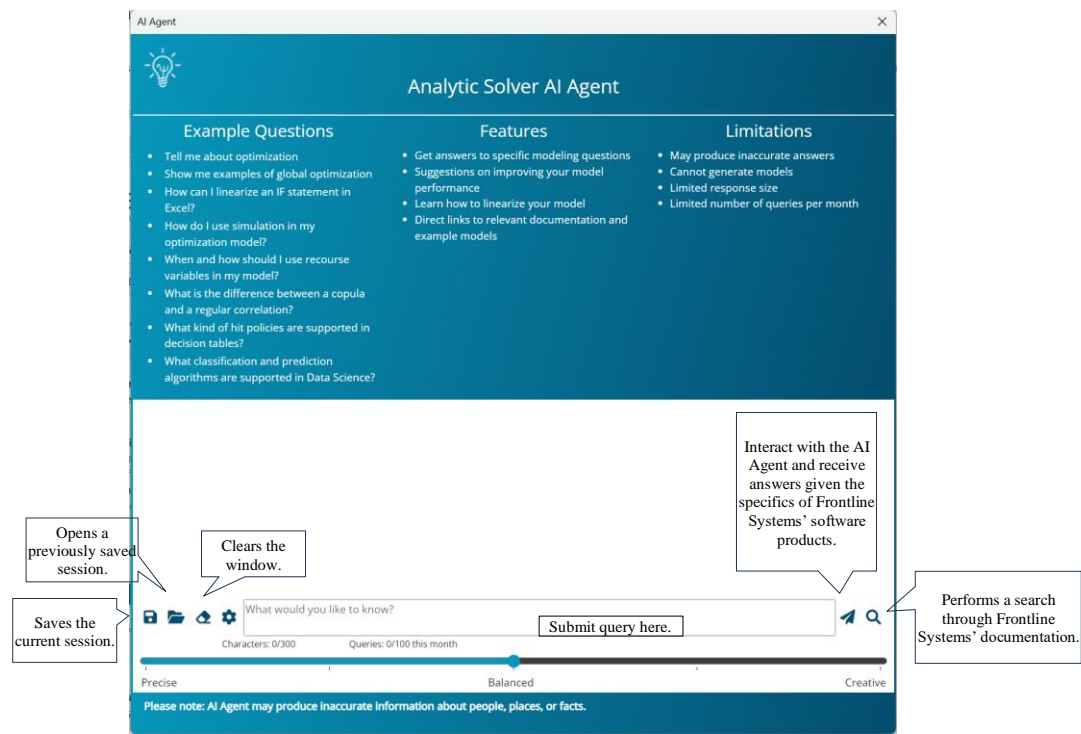
## Getting Help

The AI Help features in Analytic Solver are designed to help users of Frontline Systems' software, including Analytic Solver and Analytic Solver Data Science, by providing technical support and guidance.

- Click AI Assist (on the far left of the Analytic Solver ribbon) while your model is open to allow AI Assist to analyze your model and check the formulation for correctness.
  - Click Ask Question (on the far right of the Analytic Solver and Data Science ribbons) to open the AI Agent. AI Agent is knowledgeable about the functionalities and features of the software, as well as the underlying concepts and processes involved in optimization, simulation, forecasting, and data science.
-

## Ask Question

If you are new to Analytic Solver and/or optimization, simulation, forecasting and data science, don't worry – Frontline's AI technical support assistant, AI Agent, is here to help. AI Agent is designed to provide assistance and support for users of Frontline Solvers' Analytic Solver and Analytic Solver Data Science software. The AI Agent is knowledgeable about the functionality and features of the software, as well as the concepts and processes involved in optimization, simulation and data science/forecasting. Just enter a topic or question such as “What classification algorithms are supported in Analytic Solver Data Science?” and click Submit Query to get started.



Toggle between Precise, Balanced, and Creative to determine the type of answers returned. If Precise is selected, AI Agent will attempt to be as exact and deterministic as possible while Creative will usually result in more original, uncertain and non-repetitive answers. Use Balanced (the default) for the best of both worlds.

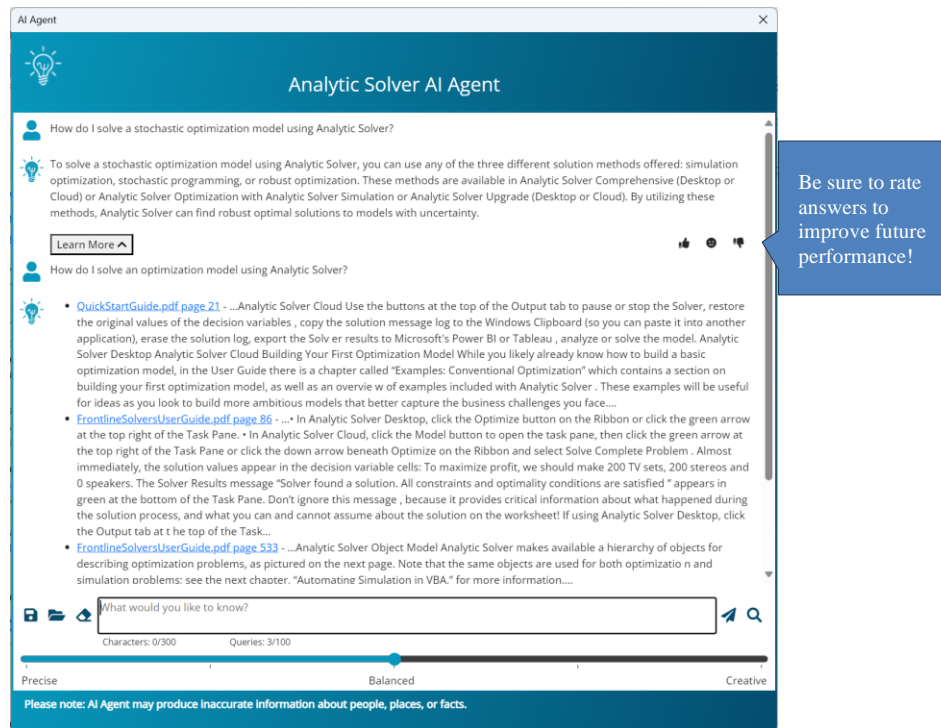
Click the **Save** file icon to save the current session. The file, transcript.json, will be downloaded. Click the **Open** file icon to open and restore a previously saved session. Click the **Erase** icon, to clear the current search window and start a new topic.

After typing a query,

- Click **Submit Query** to interact with the AI Agent and receive answers given the specifics of Frontline Systems' software products. On each new question, the AI Agent will take into account the chat history that is present in the current session. Click *Learn More* to view all extracts of source documents that are most relevant to the query. Each extract contains a link to the appropriate page in one of the official documents.

- Click **Search Documentation** (for faster search results) to perform a semantic/relevance search through all Analytic Solver and RASON documentation. The resulting response will be similar to the “Learn More” section as described above.

The screenshot below illustrates the difference between the two different types of queries. The first query used AI technology by using Submit Query. The 2<sup>nd</sup> query was performed using Search Documentation.



## AI Assist

Frontline Systems' new AI assist is a feature designed to enhance model formulation for optimization, simulation, and stochastic models. AI Assist helps users by:

1. **Analyzing Model Formulation:** AI Assist incorporates artificial intelligence to analyze your existing model and giving you tips on how to expand and improve your current model formulation.
2. **Providing Recommendations:** The AI can offer suggestions for improving model performance or adjusting parameters to achieve better results.
3. **Enhancing User Experience:** It aims to simplify the process for users by offering intuitive guidance and insights, making advanced analytics more accessible.

This feature is part of Frontline Systems' broader effort to integrate AI into their suite of decision support tools, making it easier for users to leverage powerful optimization and analytics capabilities.

## AI Assist Example

To demonstrate this exciting new feature, open the Product Mix example model by clicking Help – Examples – Optimization Models. While the model worksheet is open, click AI Assist. AI Assist opens and automatically enters the prompt, "Please describe the model and check for correctness."

AI Assist first translates your model to a RASON model, Frontline's modeling language, then diagnoses the model type and examines the model for correct formulation.

```
Please describe the model and check for correctness
### Description of the Model
```

Model diagnosis

The provided model is an optimization type, specifically focused on determining the optimal mix of products a company should manufacture in order to maximize gross profit. Here's a detailed breakdown:

Model name & description

```
#### General Information
- **Model Name**: ProductMix (Opt)
- **Model Description**: Not provided, likely a version of a Product Mix optimization problem.
- **Worksheets**: The model uses two worksheets named "Example 1" and "Example 2", but it is set to use "Example 1" as the active sheet.
```

Engine settings

```
#### Engine Settings
- **Engine**: LP/Quadratic (Linear Programming/Quadratic)
- **Scaling**: -1 (Automatic scaling is disabled)
```

Variables

```
#### Variables
- **Alias Name**: Number_to_build
- **Initial Value**: 0
- **Lower Bound**: 0
- **Final Value**: []
```

These variables represent the number of different products to be manufactured.

Description of data used in model.

```
#### Data
- **Production Coefficients**: `c18:e22` represents the production coefficients matrix, which is a 2D array of the resources consumed by each product. The values are:
- `[ [1, 1, 0], [1, 0, 0], [2, 2, 1], [1, 1, 0], [2, 1, 1] ]`
```

- **Inventory/Resources Available**: `h18:h22` represents the available quantity of each part/resource. The values are:
  - `[450, 250, 800, 450, 600]`, referred to as "Number\_available".
- **Profit per Unit**: `c24:e24` indicates the profit per unit of each product. The values are:
  - `[[75, 50, 35]]`

Description of constraints

- #### Constraints
- **Alias Name**: Number\_used
  - **Formula**: For each part/resource, the total used is computed via the SUMPRODUCT of production coefficients and the variables (Number\_to\_build).
  - **Upper Bound**: "Number\_available"

The constraints ensure that the total number of each part/resource used to produce the products does not exceed the available quantities.

Description of objective

- #### Objective
- **Alias Name**: Total\_profit
  - **Formula**: The objective function is to maximize the total profit calculated as the SUMPRODUCT of the profit per unit and the number of units to be built.
  - **Type**: Max (Maximize the total profit)
  - **Final Value**: []

Conclusions of model analysis.

### Checking for Correctness

The model appears to follow the structure of a standard linear programming problem for product mix optimization. However, to ensure correctness, here are some specific checks:

1. **Data Integrity**: The data values provided for parts, inventory, and profit are realistic and consistent with typical optimization models.
2. **Variable Definitions**: Variables for the number of products to build have correct initial values and bounds.
3. **Constraints**:
  - Formula for SUMPRODUCT (C18:E22[i,], \$C\$14:\$E\$14) is correctly defined for each part/resource.
  - Upper bounds are correctly specified using "Number\_available".

#### 4. **Objective Function**:

- Formula for SUMPRODUCT (C24:E24,\$C\$14:\$E\$14) correctly aggregates the profit over all products.
- The type of objective function is set to maximize, which aligns with the goal of maximizing total profit.

Given the provided structure and the components, no obvious mistakes are present, and the model appears to be correctly formulated for an optimization problem aiming to maximize total profit while respecting resource constraints.

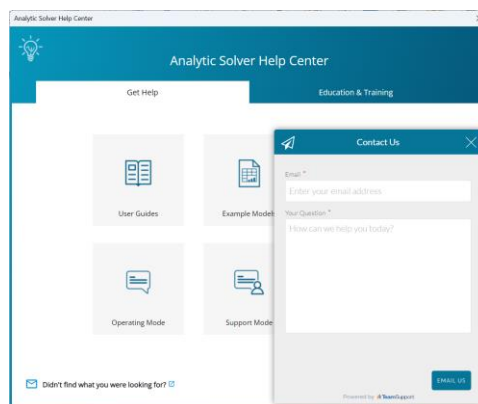
As with the AI Agent, toggle between Precise, Balanced, and Creative to determine the type of answers returned. If Precise is selected, AI Agent will attempt to be as exact and deterministic as possible while Creative will usually result in more original, uncertain and non-repetitive answers. Use Balanced (the default) for the best of both worlds.

For more information on AI assistance in Analytic Solver, see the Analytic Solver User Guide.

Note: Frontline's AI Agent uses artificial intelligence which could produce erroneous information about people, places or facts, including misinformation concerning Frontline Systems software products. Frontline Systems bears no responsibility for these inaccuracies.

## Help Center

Click Help – Help Center to open the Help Center. Click *Support Live Chat*, in the bottom right hand corner, to open a Live Chat window. If you run into any issues when using the software, the best way to get help is to start a Live Chat with our support specialists. This will start a Live Chat during our business hours (or send us a message at other hours), just as if you were to start a Live Chat on [www.solver.com](http://www.solver.com) – but it saves you *and* our tech support rep a lot of time – because the software reports your latest error message, model diagnosis, license issue or other problem, without you having to type anything or explain verbally what's happened. You'll see a dialog like this:



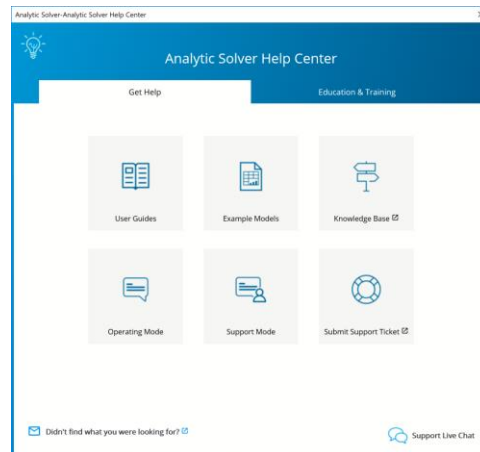
Since the software automatically sends diagnostic information to Tech Support, we can usually identify and resolve the problem faster. (Note: No contents from your actual spreadsheet model is sent, only information such as the number of variables and constraints, last error message, and Excel and Windows version.)

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Note: If Support Live Chat is disabled, click the down arrow beneath Help and select *Support Mode – Active Support*.

## Accessing Resources

The Help Center gives you easy access to video demos, User Guides, online Help, example models, and Website support pages to learn how to use our software tools, and build an effective model.



## User Guides

Click the User Guides menu choice to open PDF files of the Analytic Solver Optimization and Simulation User and Reference Guides, Analytic Solver Data Science User or Reference Guides, or our Quick Start Guides.

## Example Models

Clicking this menu item will open the Frontline Solvers Example Models Overview dialog with nearly 120 self-guided example models covering a range of model types and business situations.

## Knowledge Base

Click Knowledge Base to peruse a multitude of online articles related to support and installation issues or to locate articles that will help you to quickly build accurate, efficient optimization, simulation, and data science models.

## Operating Mode

Click Operating Mode to switch between three different levels of help. The Excel formulas and functions you use in your model have a huge impact on how fast it runs and how well it solves. If you learn more about this, you can get better results, but if you don't, your results will be limited. Guided Mode can help you learn.

- Guided Mode prompts you step-by-step when solving, with dialogs.
  - Auto-Help Mode shows dialogs or Help only when there's a problem or error condition.
  - Expert Mode provides only messages in the Task Pane Output tab. (This mode not supported when using a trial license.)
-



## Support Mode

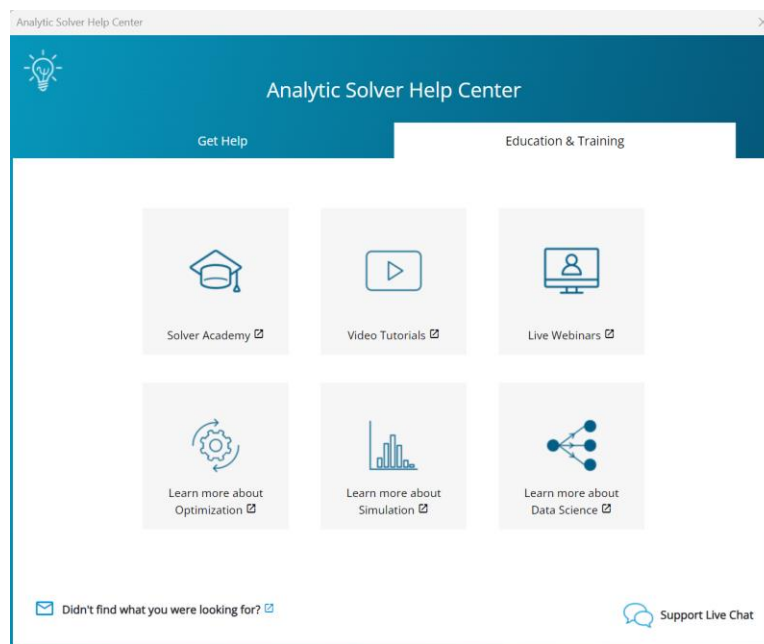
Click Support Mode to switch between three different levels of support. No information (cell contents etc.) from your Excel model is ever reported automatically to Frontline Systems, in any of these Support Modes. Only events in Frontline's software, such as menu selections, Solver Result messages, or error messages are reported.

- **Active Support** automatically reports events, errors and problems to Frontline Support, receives and displays messages to you from Support, and allows you to start a Live Chat with Support while working in Excel (**Recommended**). Auto-Help Mode shows dialogs or Help only when there's a problem or error condition.
- **Standard Support** automatically reports events, errors and problems anonymously (not associated with you) to Frontline Support, but does not provide a means to receive messages or start a Live Chat with Support.
- **Basic Support** provides no automatic connection to Frontline Support. You will have to contact Frontline Support manually via email, website or phone if you need help.

## Submit a Support Ticket

If you're having installation, technical, or modeling issues, submit a Support Ticket to open an online support request form. Submit your email address and a short, concise description of the issue that you are experiencing. You'll receive a reply from one of Frontline's highly trained Support Specialists within 24 hours, and generally much sooner.

Our technical support service is designed to supplement your own efforts: Getting you over stumbling blocks, pointing out relevant sections of our User Guides or example models, helping you fix a modeling error, or -- in rare cases -- working around an issue with our software (always at our expense).



## Solver Academy

[Solver Academy](#) is Frontline Systems' own learning platform. It's the place where business analysts can gain expertise in advanced analytics: forecasting, data science, text mining, mathematical optimization, simulation and risk analysis, and stochastic optimization.

## Video Tutorials/Live Webinars

Click Video Tutorials to be directed to Frontline's You Tube Channel. Browse videos on how to create an optimization or simulation model or construct a data mining or prediction model using Analytic Solver.

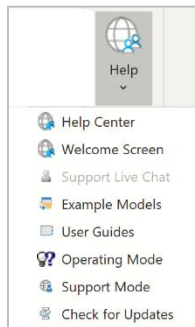
Click Live Webinars to be redirected to [www.solver.com](http://www.solver.com) to join a live or pre-recorded webinar. Topics include *Using Analytic Solver Data Science to Gain Insights from your Excel Data*, *Overview of Monte Carlo Simulation Applications*, *Applications of Optimization in Excel*, etc.

## Learn more!

Click any of the three Learn More buttons to learn more about how you can solve large-scale optimization, simulation, and data science models, reduce costs, quantify and mitigate risk, and create forecasting, data science and text mining models using Analytic Solver.

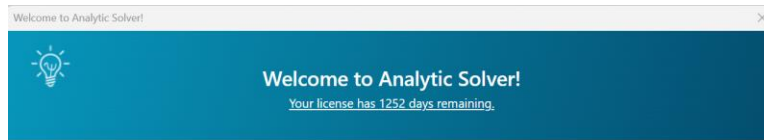
## Help Menu

Use the Help Menu to gain short cuts to live chat, example models, documentation, set your operating and support mode preferences, and also to open the Welcome Screen and check for software updates.

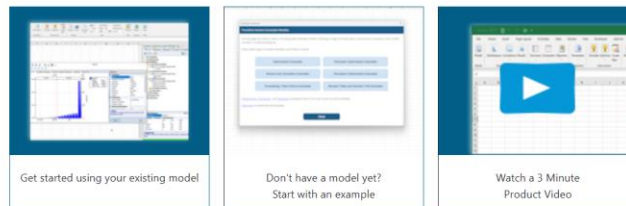


Use the Welcome Screen to get help with an existing model, open our example models or watch a quick video on how to get running quickly with Analytic Solver.

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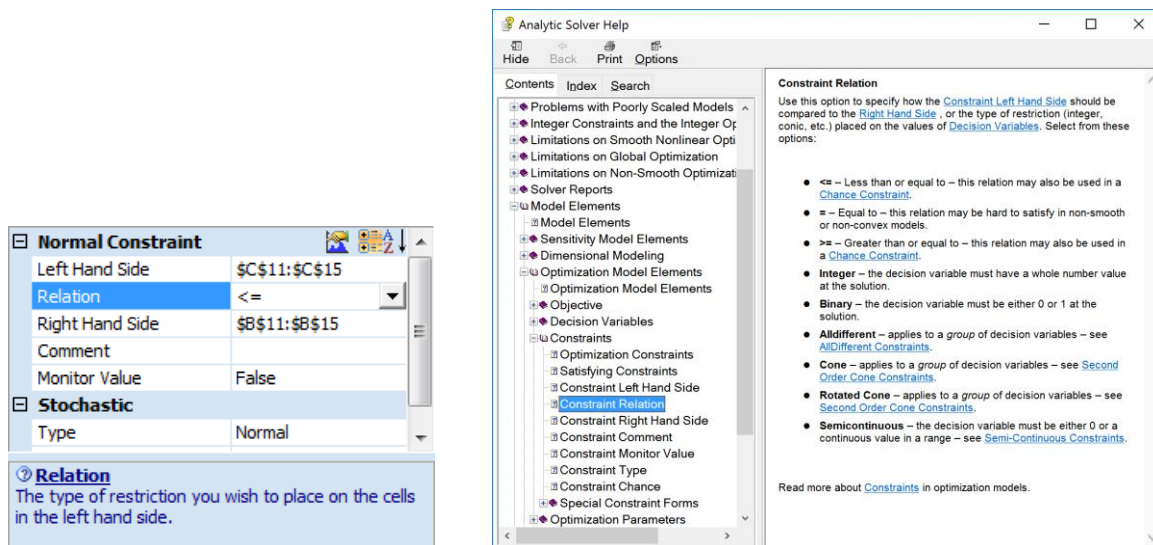


To get started, click a box below



## Using Online Help Available in Analytic Solver Desktop

Analytic Solver's online Help appears when you click the Help button in the Analytic Solver Desktop Ribbon. More Help options appear on the dropdown menu below the Help button. You can also get help on Solver Result messages, Platform options, or any element of your model, by clicking the hyperlink that appears at the bottom of the Task Pane. For example, clicking the **Relation** hyperlink displays the Help window shown below.

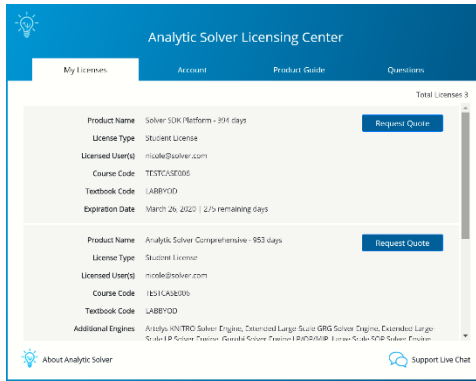


As with other buttons on the Ribbon, clicking the first menu choice has the same effect as clicking the main button: It opens the online Help viewer.

## Managing Your Licenses

Click the License button to open the License Manager where you can manage your current licenses and accounts, open our Product Selection Wizard, connect to Live Chat or peruse through a list of FAQs.

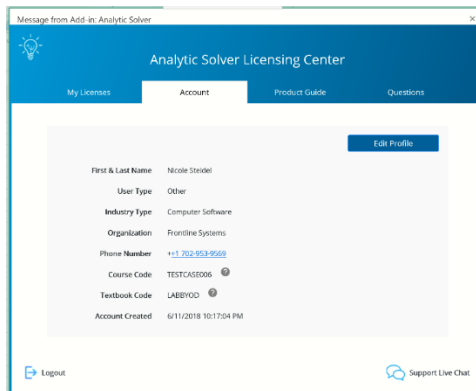
The "MyLicenses" tab displays your current license and license type, along with the expiration date. You can request a quote to renew your current license or, if your license has expired or is within 30 days of expiring, you can purchase a new license through our online store.



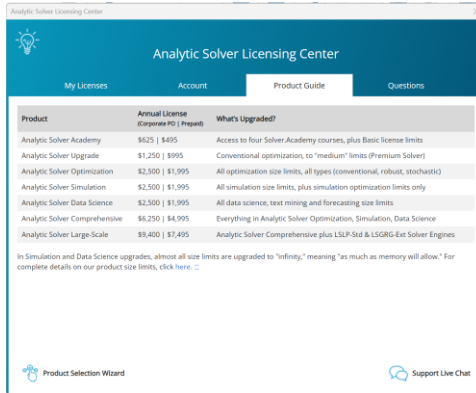
Click *About Analytic Solver* to open the following dialog containing information on this release.



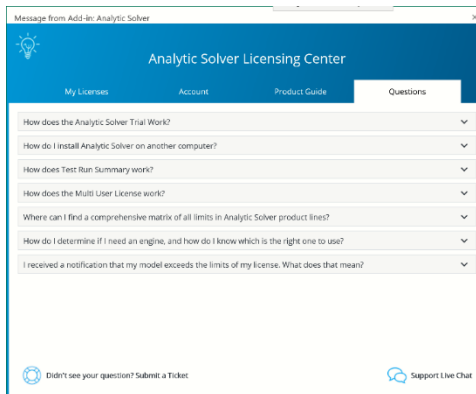
Click the Account tab to view your account on [www.solver.com](http://www.solver.com). Click Edit Profile to edit the information. Click Live Chat to open a Live Chat window or Log Out to log out of the product.



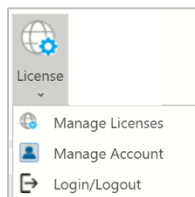
Click the Product Guide tab to view a list of products and pricing information. Click Product Selection Wizard to open the Product Selection Wizard. See the next section for information on this feature.



Click the Questions tab to review a list of FAQs, submit a support ticket or start a live chat.



Use the License menu to gain shortcuts to your account and to login or logout of Analytic Solver.



## Product Selection Wizard

Select **Product Selection Wizard** from the Product Guide in the Licensing Center to open a series of dialogs that will help you determine which product will best meet your needs based on your recent pattern of use.

Welcome to the **Product Selection Wizard!** Since you can use – and pay for – only what you need, this Wizard will help you choose from the available license options.

Analytic Solver's features cover three main problem solving areas – what do you want to do in each area?

Analytic Area	I want to gain modeling skills, or build a proposal/prototype	I have a current project to build a significant model of this type
Optimization	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Simulation/Risk Analysis	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Data Science	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

With any paid Analytic Solver license, you can always use **all** optimization, simulation, and data science features to build small models! But licenses have different **size limits** on models and data.

The Optimization upgrade you need depends on your model **type** (linear, nonlinear, integer), **size** and **complexity**. There are three basic levels of Optimization upgrades:

Optimization License Upgrade	Annual License + Support (Corporate PO   Prepaid)
<input type="checkbox"/> Analytic Solver Upgrade (formerly Premium Solver Pro)	\$1,250   \$995
<input type="checkbox"/> Analytic Solver Optimization (formerly Premium Solver Platform)	\$2,500   \$1,995
<input type="checkbox"/> Analytic Solver Optimization + plug-in Solver Engine (Analytic Solver Large-Scale offers special discount)	Contact us for details

For more details on specific size limits enabled by these upgrades, click [Optimization Choices](#).

Select the Product that you'd like to purchase and then click **Next**. Click the *Optimization Choices* link to learn more about Analytic Solver products that can solve optimization models and to find more information on speed, memory, and the use of plug-in Solver Engines.

**Analytic Solver Optimization Choices**

All Analytic Solver versions can solve at least small-size models of all problem types (linear, nonlinear, etc.). But the **size** of model you can solve, and the best Solver Engine (optimization algorithm) to use, depends on the problem type. **Why?** – Click [Optimization Advanced](#).

**Linear Optimization Problems**

Analytic Solver Version	Decision Variables	Integer Variables	General Constraints
Analytic Solver Academy	200	200	100
Analytic Solver Upgrade	2000	1000	8000
Analytic Solver Optimization	8000	2000	8000
LSLP-Std Solver Engine	32000	32000	32000
Adv. Plug-in Solver Engine	Unlimited	Unlimited	Unlimited

**Nonlinear and Non-Smooth Optimization Problems**

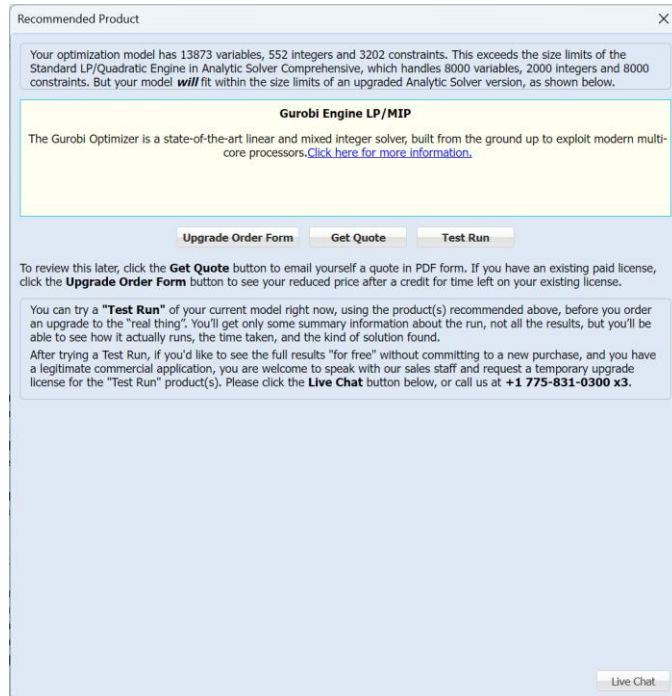
Analytic Solver Version	Decision Variables	Integer Variables	General Constraints
Analytic Solver Academy	200	200	100
Analytic Solver Upgrade	500	500	250
Analytic Solver Optimization	1000	1000	1000
LSGRG-Ext Solver Engine	12000	12000	12000
Adv. Plug-in Solver Engine	Unlimited	Unlimited	Unlimited

Your recent models had 161040 decision variables, 25404 general constraints, and the most complex model type was a Nonlinear Programming problem (NLP).

OK

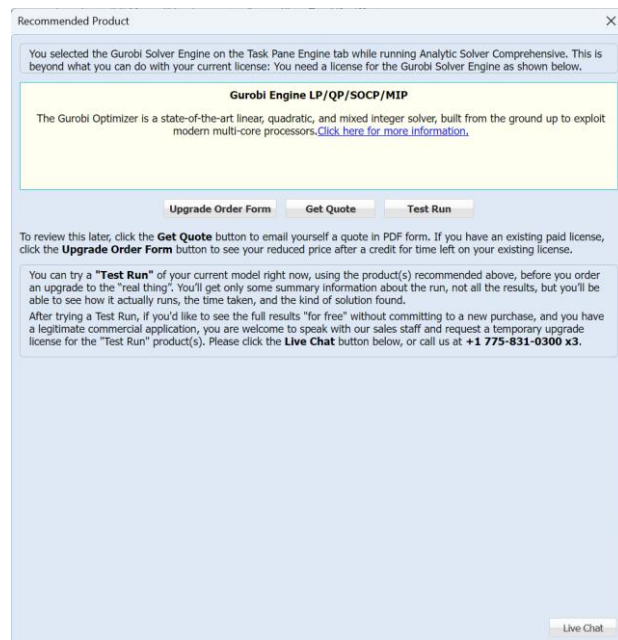
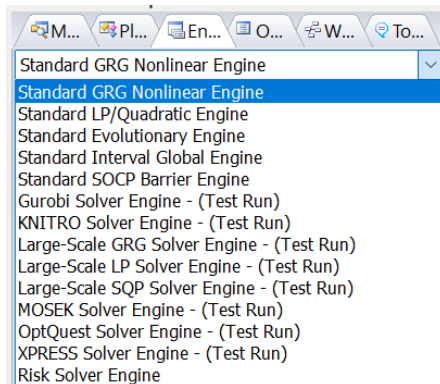
On this screen, the Product Selection Wizard will recommend a product or products based on your answers on the previous screens. Click Upgrade to purchase the recommended product. Click the *Optimization Choices* link to learn more about Analytic Solver products that can solve optimization models. If at any time you'd like to chat with a member of our Technical Support staff, click **Live Chat**. Or if you'd like to amend your answers on a previous dialog, click **Back**.

When you run a simulation or optimization model that contains too many decision variables/uncertain variables or constraints/uncertain functions for the selected engine, the Product Wizard will automatically appear and recommend a product that *can* solve your model.



When you click “Test Run”, the Product Wizard will immediately run the optimization or simulation model using the recommended product. (Only summary information will be available.) At this point, you can purchase the recommended product(s), or close the dialog.

This same behavior will also occur when solving smaller models, if you select a specific external engine, from the Engine drop down menu on the Engine tab of the Solver Task Pane, for which you do not have a license. The Product Wizard will recommend the selected engine, and allow you to solve your model using this engine. Once Solver has finished solving, you will have the option to purchase the product.



## Help Building Models

We also offer consulting assistance, from helping you define the problem, to building and solving the model, to interpreting and communicating results. You can learn more online on our [Consulting Assistance Page](#). You can also call us at 775-831-0300, or email us at [support@solver.com](mailto:support@solver.com).

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