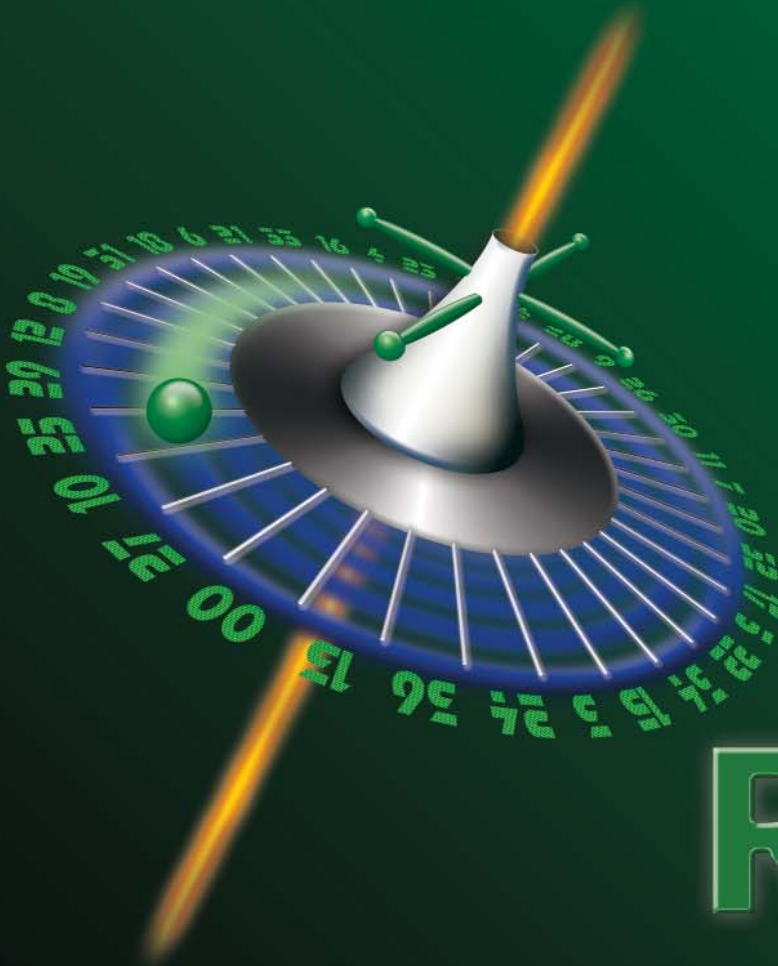


# ReliaSoft®

## Presents...



# RENO

ReliaSoft



Reliability Office

# RENO

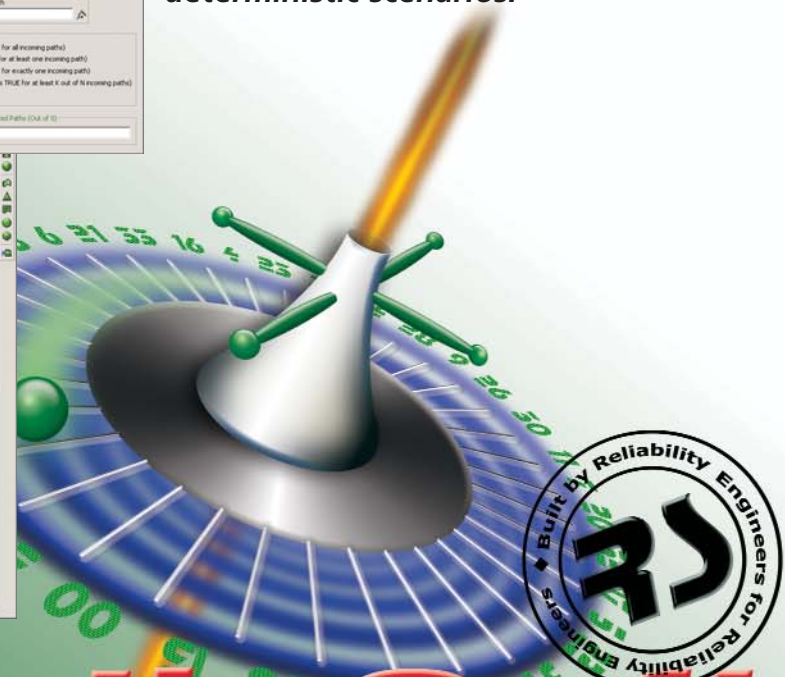
If you can flowchart it...  
You can simulate it!™

If you thought building complex simulation and/or discrete analysis models required buying ridiculously expensive software, and then writing code on top of that, then do we have news for you...

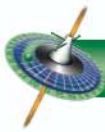
**RENO** is the most intuitive, user friendly and, might we say, fun and addictive platform for building and running complex analyses for any probabilistic or deterministic scenario. Build models for complex reliability analysis, risk and safety analysis, decision making, maintenance planning or, if you prefer, optimize your stock portfolio or test your blackjack strategy!

Utilizing a visual and intuitive flowcharting approach, **RENO** allows you to model and analyze even the most complex probabilistic or deterministic scenarios.

The image displays several screenshots of the RENO software interface. The top-left screenshot shows a graph with a bell-shaped curve. The middle-left screenshot shows a complex flowchart with decision nodes and numerical values, including a 'BEGINNER' button. The bottom-left screenshot shows a more advanced flowchart with a 'BLACKJACK' model, including a 'SUBTOTALS' window. The bottom-right screenshot shows a 'Random Variable' dialog box with fields for 'Distribution' (Weibull), 'Beta', 'Eta', and 'Gamma'. The interface includes various toolbars, a file explorer, and a status bar.



# ReliaSoft®



# IF YOU CAN FLOWCHART IT... YOU CAN SIMULATE IT!<sup>SM</sup>

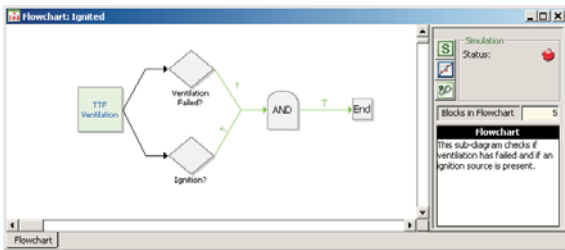
You can think of **RENO** as a graphical analysis tool. It is a powerful and flexible platform for visualizing and dynamically analyzing and/or simulating nearly any kind of physical, financial or organizational system. **RENO** is unique in the fact that it gives you the flexibility of a computer language, but instead of writing computer code, you use the familiar flowcharting concept to build your analysis (write your "program"). You can build systems and/or scenarios and then have the software execute or simulate them. You may also think of **RENO** as a "visual spreadsheet" that allows you to graphically create and manipulate data and equations, but with greater flexibility due to its ability to depict and evaluate systems and scenarios that evolve over time.

**Flexible and intuitive interface to build flowchart models**

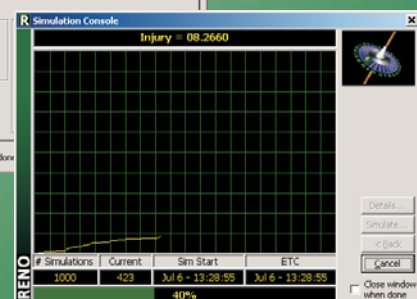
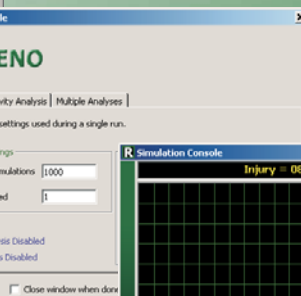
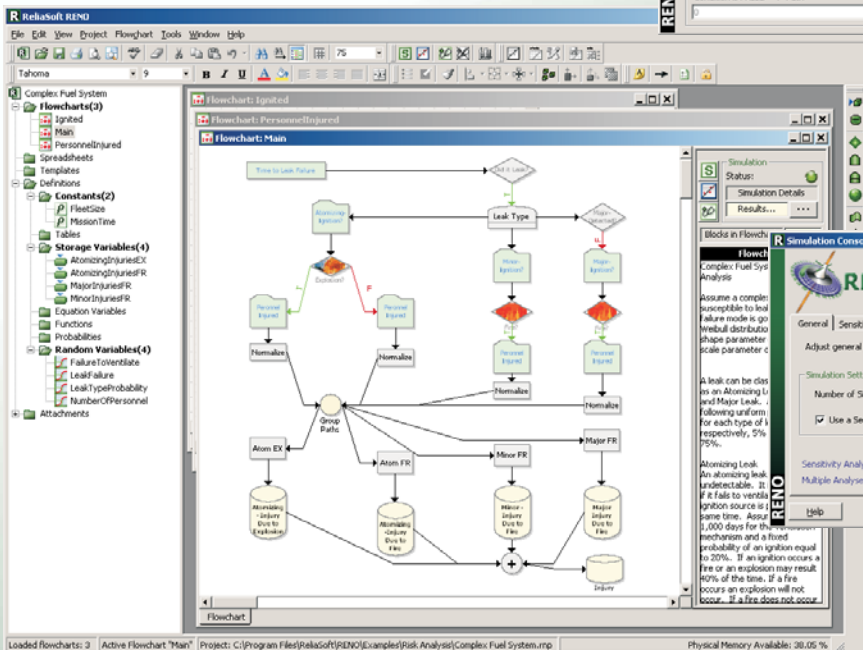
The applications for **RENO** are limited only by your imagination and ability to create a flowchart model. If you can flowchart it, you can simulate it! Some application examples include:

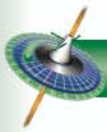
- Systems/Product Engineering and Modeling
  - Reliability and Failure Analysis
  - Risk and Hazard Analysis
  - Vulnerability Analysis
  - Conceptual Design
  - Probabilistic Design
  - Systems Engineering
  - Manufacturing
  - Materials Handling
  - Quality Control / Quality Assurance
- Business, Financial and Economic Modeling
  - Strategic Planning
  - Business Process Modeling
  - Financial Analysis
  - Risk Analysis and Management
  - Cost Modeling
  - Portfolio Management
  - Six Sigma
  - Yield Analysis
  - Supply Chain Modeling
  - Financial Engineering
- Environmental Systems Modeling
- Hazardous Waste Sites, Safety Analysis
- Natural Resource Planning and Management
- Ecosystem Modeling
- And much more...

**Powerful simulation engine to generate results of interest**



**Potential applications for Risk Analysis, Complex Reliability Modeling, Maintenance Planning, Optimization, Operational Research, and much more...**





## Easy to Build Flowchart Models

With **RENO**, you will use the familiar and intuitive flowcharting concept to build models for the scenarios that you are trying to understand, quantify and/or simulate. The software provides a full array of building blocks for these flowcharts (called "constructs") to serve different functions within the model. For example, Conditional Blocks allow you to define "If/Then" statements that trigger one response if the condition is met (TRUE) and another if it is not (FALSE). You can also define various types of global variables (called "definitions") that are available throughout the project. For example, Random Variables provide values based on a specified statistical distribution. You will employ easy point-and-click and drag-and-drop techniques to use these components to build simple or complex flowchart models.

## Flexible Interface to Organize the Analysis

**RENO's** flexible user interface makes it easy to enter and manage the information required to perform analyses. Using the intuitive, hierarchical "Project Explorer" approach that was first introduced in ReliaSoft's BlockSim software, **RENO** makes it easy for you to manage one or many flowchart models together with the definitions and constructs used to build them. The optional Template feature allows you to pre-define constructs that can be used in multiple flowcharts to save time and ensure consistency.

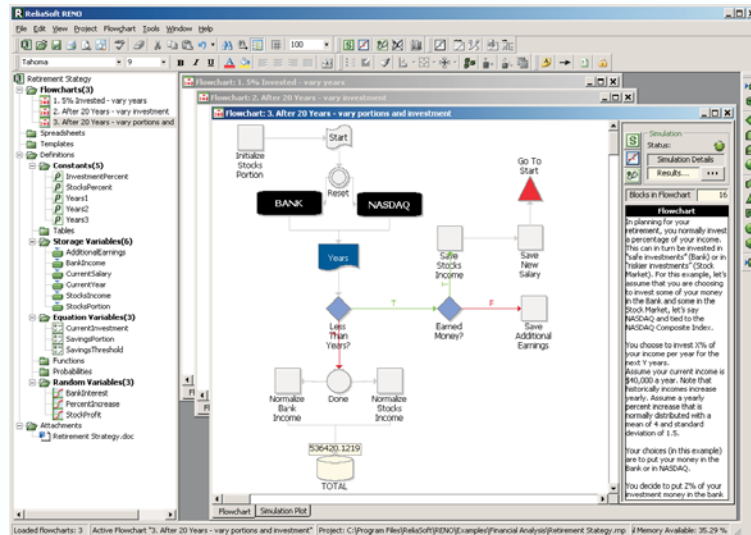
Your projects can also include Excel®-compatible spreadsheets for your own custom analyses. These spreadsheets provide complete in-cell formula support, over 140 built-in functions and a wizard to help you build your own custom graphical charts. In addition, the Attachments feature makes it easy to keep supporting documentation and other related files together with the analysis.

## Definitions (defined variables available throughout the project) may include:

- Constants
- Tables
- Storage Variables
- Equation Variables
- Functions
- Probabilities
- Random Variables

## Constructs (objects used to build flowchart models) may include:

- Standard Blocks
- Result Storage Blocks
- Conditional Blocks
- Logic Gates (AND, OR, XOR, K-out-of-N)
  - Branch Gates
  - Summing Gates
- Flag Markers and Go To Flags (to define loops)
  - Counter Blocks
  - Reset Blocks
  - Stop Flags
  - Subcharts



## Item Properties Table to View/Edit Project Information in a Spreadsheet

The Item Properties Table allows you to view and edit the data in your project in an Excel®-compatible spreadsheet format. This makes it easy to quickly update analysis properties without having to open and save each record individually. It also allows you to export or copy/paste this information to use in reports or your own custom analyses.

## Definitions Report to Manage Analysis Components

The Definitions Report provides a summary of the global variables that have been defined in your project. This report identifies the flowcharts and other definitions that reference each defined variable. The utility can also automatically remove unused definitions from your project with the click of a button.

**Definitions Report**

Additional Earnings

Additional Earnings - 1. 5% Invested - vary years

Additional Earnings - 2. After 20 Years - vary investment

Additional Earnings - 3. After 20 Years - vary portions and investment

Additional Earnings - 3. After 20 Years - vary portions and investment

Bank Income

BANK - 1. 5% Invested - vary years

Normalized Bank Income - 1. 5% Invested - vary years

BANK - 2. After 20 Years - vary investment

Normalized Bank Income - 2. After 20 Years - vary investment

BANK - 3. After 20 Years - vary portions and investment

Normalized Bank Income - 3. After 20 Years - vary portions and investment

Bank Interest

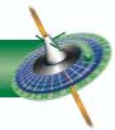
BANK - 1. 5% Invested - vary years

BANK - 2. After 20 Years - vary investment

BANK - 3. After 20 Years - vary portions and investment

**Item Properties**

Block Name	Block Type	Evaluates to
Summing Gate	Summing Gate	N/A
Atom EX	Regular	AtomInjnrEX
Atom FR	Regular	AtomInjnrFR
Atomizing - Injury Due to Explosion	Regular	AtomizingInjnrEXP
Atomizing - Injury Due to Fire	Result Storage	N/A
Atomizing - Ignition?	Subchart	N/A
Def of Leak?	Conditional	N/A
Explosion?	Conditional	N/A
Fire?	Conditional	N/A
Free?	Conditional	N/A
Group Paths	Summing Gate	N/A
Injury	Result Storage	N/A
Leak Type	Branch Gate	N/A
Major FR	Regular	MajorInjnrFR
Major Injury Due to Fire	Result Storage	N/A
Major - Detected?	Conditional	N/A
Major - Ignition?	Subchart	N/A
Minor - Injury Due to Fire	Result Storage	N/A

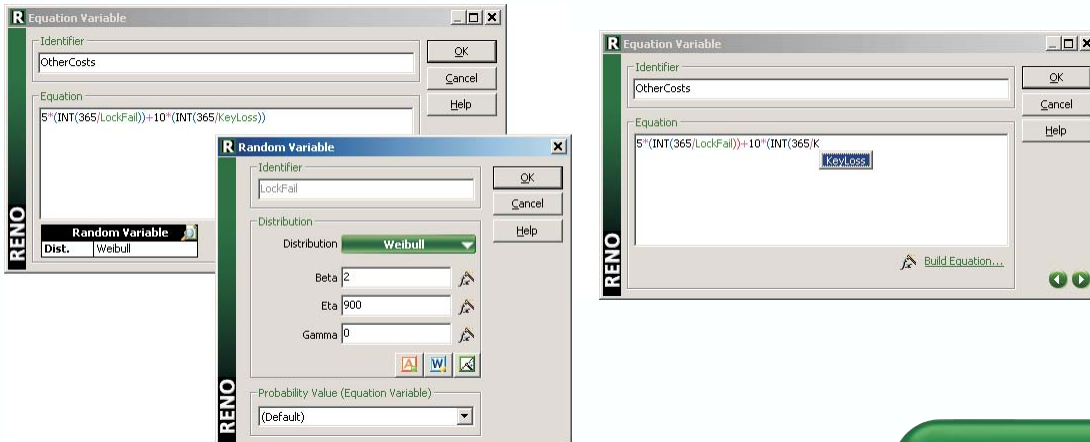


**“Intelligent” Features to Help You Build Equations**

All equation-enabled windows in **RENO** provide “intelligent” features to help you save time and avoid errors when building equations. These include:

- **Auto-Complete/Intelli-Sense:** When you press Ctrl+Space while building an equation, **RENO** provides a list of recognized variables and functions.
- **Color-Coding:** As you type, **RENO** automatically color-codes recognized variables, functions and operands to make it easy for you to spot typing errors, undefined variables, unmatched parentheses, etc.
- **Variable Preview:** **RENO** provides a summary of the properties of each defined variable that you use in your equations and allows you to view/edit the full definition with the click of a button.

**Auto-Complete, Color-Coding and Variable Preview to assist with building equations**



**Integration with Weibull++ and ALTA**

If ReliaSoft’s Weibull++ and/or ALTA software are installed on your computer, you can use them to define the distribution and parameters for Probabilities and Random Variables based on the distributional analysis for existing data sets. The Parameter Experimenter is also available.

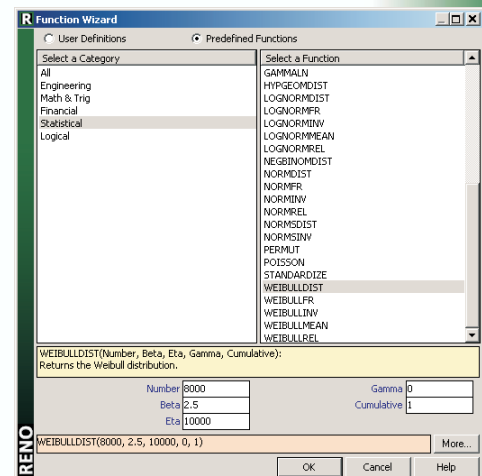
**More Than 100 Reserved Keywords and Built-In Functions**

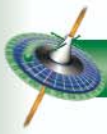
The integrated Function Wizard provides instant access to the reserved keywords, defined variables and built-in functions that you will use in the equations for your analyses. This includes:

- **User-Defined Variables:** A list of the Constants, Equation Variables, Probabilities, Random Variables and other variables defined in the project.
- **Reserved Keywords:** A list of keywords that instruct the software to insert specific information into the equation, such as the value passed from the previous flowchart construct (IN), the total number of simulations performed (SIMS\_TOTAL), the maximum value in a table (MAX\_TABLE), etc.
- **Pre-Defined Functions:** A list of built-in functions supported by the software. This includes:
  - **Engineering** functions such as Bessel, Error functions, etc.
  - **Math and Trigonometry** functions such as Sine, Derivative, Integral, Logarithm, etc.
  - **Financial** functions such as Future Value, Cumulative Interest Paid, Periodic Payment for an Annuity, etc.
  - **Statistical** functions such as the Weibull distribution, the Fisher Transformation, the Chi-Squared distribution, etc.
  - **Logical** functions such as IF statements and TRUE/FALSE statements.

**Extensive array of built-in functions:**

- Engineering
- Math/Trig
- Financial
- Statistical
- Logical

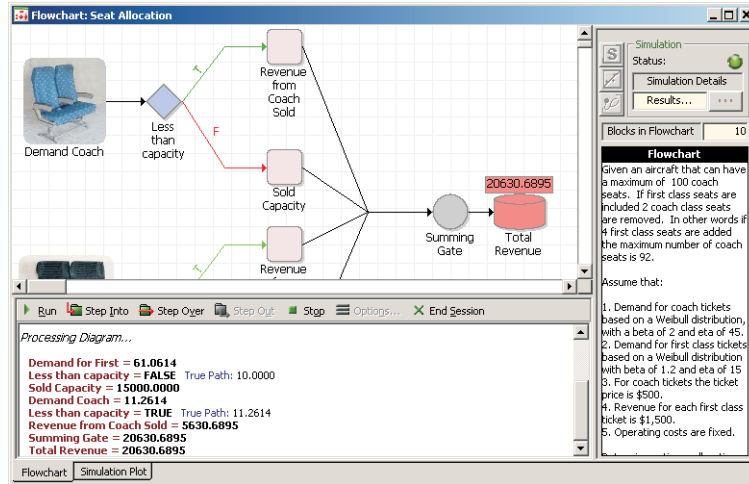




### Debugger Utility to Step Through Flowcharts

RENO includes an integrated utility to help you validate and “debug” your flowchart models. This feature allows you to move through each step in a flowchart and watch the values as each definition or construct is executed. You can also watch the progress as the software automatically performs a specified number of simulations in “debug” mode.

Automated utility to validate and debug flowchart models



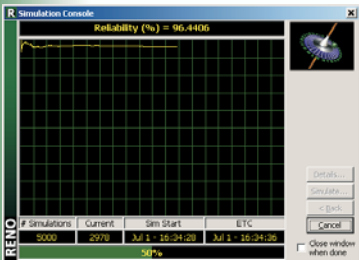
View results during the execution and/or simulation, in flowcharts, in spreadsheets and/or in graphical plots

### Flexible Array of Results with Multiple Display Options

RENO can generate a wide variety of results for your analyses, including averages, sums, arrays, minimum values, maximum values, etc. Simply construct the flowchart to generate the metrics of interest to you and then execute or simulate the model. For models without random variables, a single execution will yield all results of interest. When random variables are present, simulation (repeating the model analysis multiple times) can be utilized. Results are presented in a variety of ways, including:

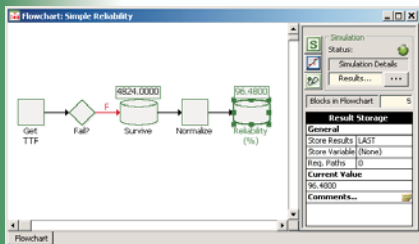
#### During the Execution and/or Simulation

You can configure the Simulation Console to display a specific variable of interest while the analysis is executed and/or the simulation is running and watch the variation as the analysis progresses.



#### In the Simulation Results Explorer

The Simulation Results Explorer displays the full results of the simulation in Excel®-compatible spreadsheets that present the data in an organized fashion and make it easy to explore, copy/paste or export results of interest to your reports or customized analyses.

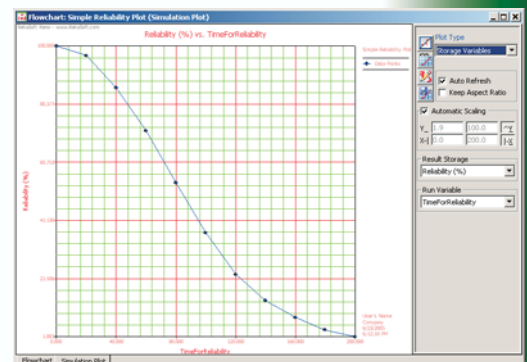
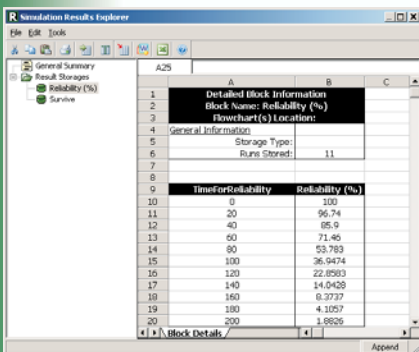


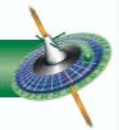
#### In the Flowchart

After a flowchart has been analyzed/simulated, the values for all Result Storage constructs are displayed directly within the chart. You also have the option to show the last values for other constructs, if desired.

#### In the Plot Sheet

RENO's integrated Plot Sheet provides a graphical display of your analysis/simulation results with the click of a button. You can choose to display the data for any Result Storage construct in the flowchart and control other display options, such as scaling, fonts, colors, etc. The utility provides both 2-dimensional and 3-dimensional plots to present analysis results in the most effective way to support decision-making. You can export plots as Windows metafile graphics that can be inserted into other documents and/or use the RS Draw metafile editor to annotate and customize the plot graphics.



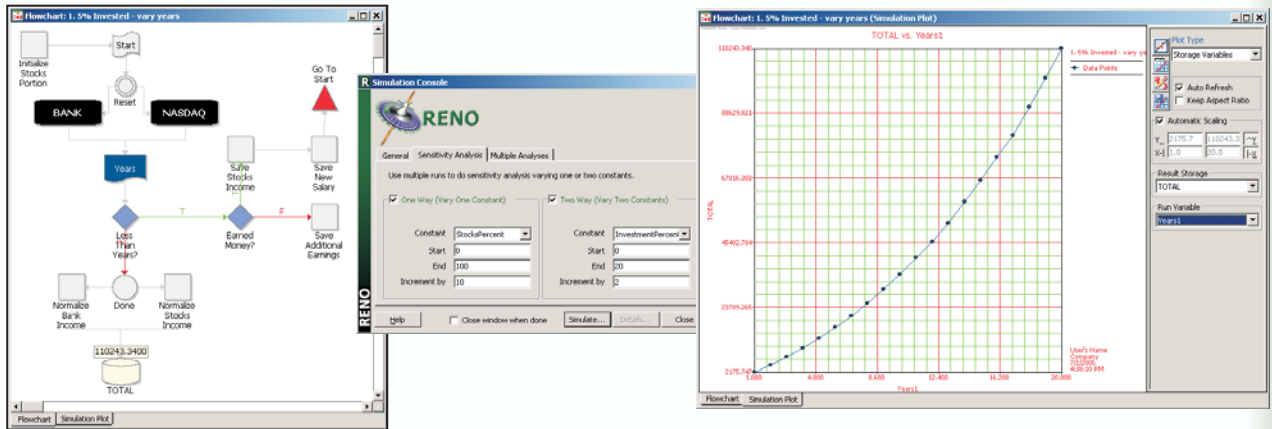


### Sensitivity Analysis to Vary Constants Across Simulation Runs

**RENO's** Sensitivity Analysis feature allows you to vary one or two constants across analyses/simulation runs. For example, if you are analyzing potential investment strategies, you may wish to vary the number of years that you will be investing and/or the percentage of your income that will be invested to see how different inputs will affect the final results. Likewise, you may wish to generate reliability or availability results for a range of times in order to examine the equipment's behavior over time. Potential applications are limited only by your imagination!

**Sensitivity Analysis to vary one or two constants across analyses/simulation runs**

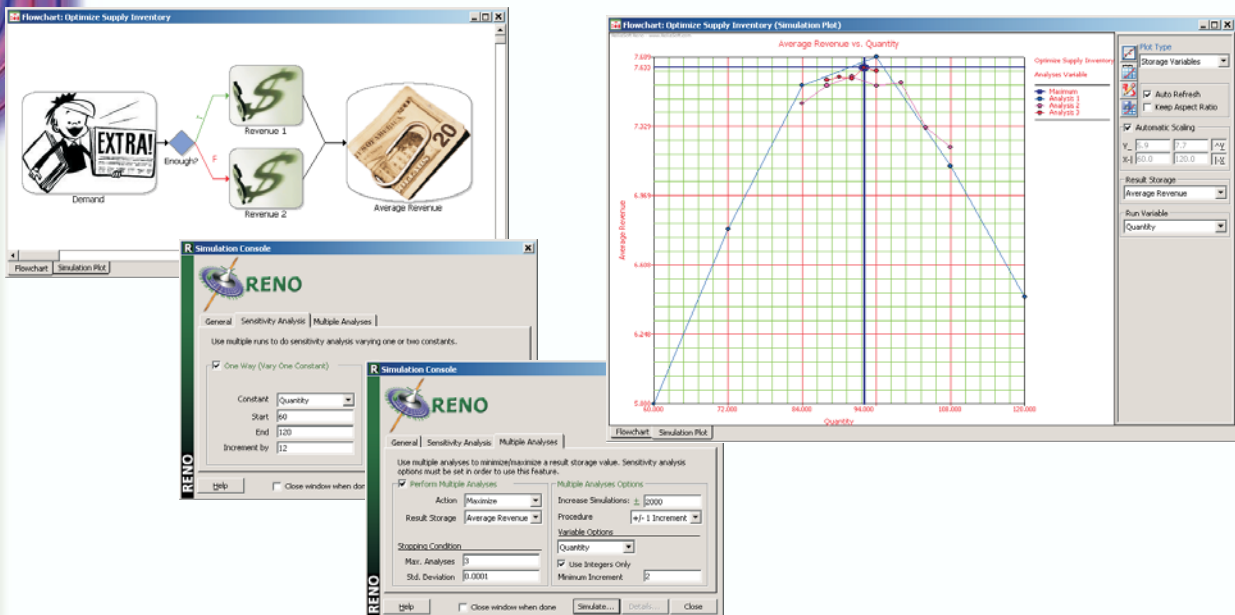
Simply enter the starting, ending and increment values for the variable constant(s) and then **RENO** automatically varies the inputs and performs multiple analyses under each set of conditions.

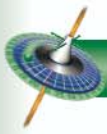


### Perform Multiple Runs to Automatically Estimate Optimum Values

The Multiple Runs feature takes the sensitivity analysis capability a step further by allowing you to configure the software to automatically vary the specified constant(s) in order to determine the value that minimizes or maximizes a specified result. For example, you could use this feature to automatically determine the optimum amount of inventory to maximize profits or the optimum preventive maintenance (PM) interval to minimize costs. The results of each analysis can be displayed in the Plot Sheet, with the optimum value marked on the plot.

**Multiple Runs to automatically determine the value that minimizes or maximizes a specified result**





## Other application examples that are shipped with the software include:

### Financial Analysis

- Retirement Strategy
- Life Cycle Cost Analyses
- Lease vs. Buy a Vehicle
- Investment Property

### Optimization

- Airline Seat Allocation
- Newspaper Inventory
- Preventive Maintenance

### Reliability

- Aircraft Readiness
- Simple Reliability Metrics
- Variable Usage/Reliability
- Stress-Strength Analysis

### Risk Analysis

- Complex Fuel System
- Lotion Chemical Exposure
- Risk of Gym Locker Theft

### Decision (Event) Trees

- Birthday Party Menu
- Legal Settlement
- Fire Risk Assessment

### Miscellaneous/Fun

- Blackjack
- Lottery
- Roulette
- Dice Roll
- Rain Prediction

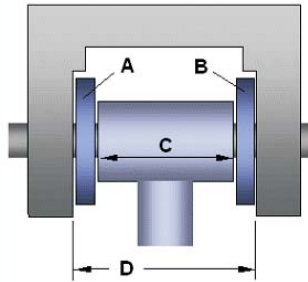
And more...

Perhaps the best way to explore **RENO's** features and functionality is by considering some application examples. The software is shipped with an assortment of sample files that address reliability, optimization, risk, financial and other types of analyses. Each file includes documentation on the analysis process and you can use these sample projects to familiarize yourself with the software's analytical potential.

The simple example presented here has been designed to estimate the percentage of times that a hinge assembly will be out of specification based on the known variabilities for its component parts.

### Problem Statement

A hinge is made up of four components. Suppose that the part dimensions vary as follows:

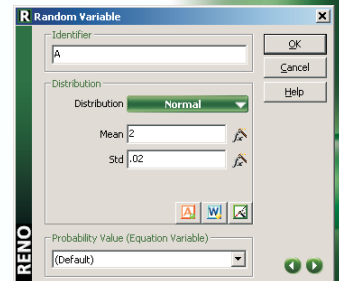


- A - Normal distribution with mean = 2 and std = .02
- B - Normal distribution with mean = 2 and std = .02
- C - Normal distribution with mean = 30 and std = .2
- D - Normal distribution with mean = 34.5 and std = .5

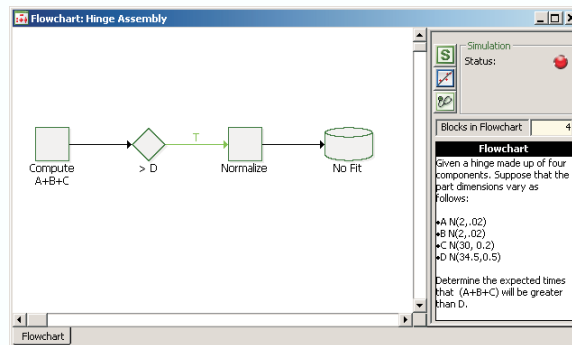
Determine the expected percentage of the time that  $(A+B+C)$  will be greater than D (i.e. that the hinge assembly will be out of spec).

### RENO Solution

The first step to define this model in **RENO** is to create definitions for the Random Variables A, B, C and D. This will allow the simulation to set the width of each component with a randomly generated number based on the specified distribution and parameters.

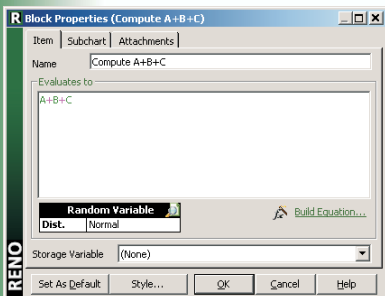
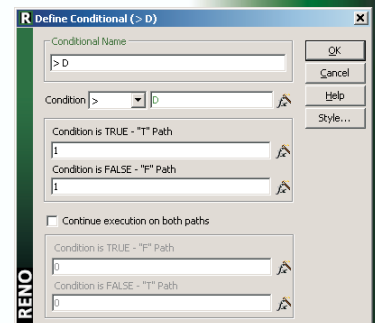


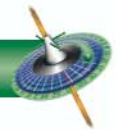
The next step is to create a flowchart to model the problem. There are usually many different ways to model a particular analysis problem. The flowchart presented here includes four steps executed sequentially from left to right (based on the direction of the arrows).



The equation defined in the first Standard Block computes the combined widths of components A, B and C, using values that are randomly generated based on the variable definitions.

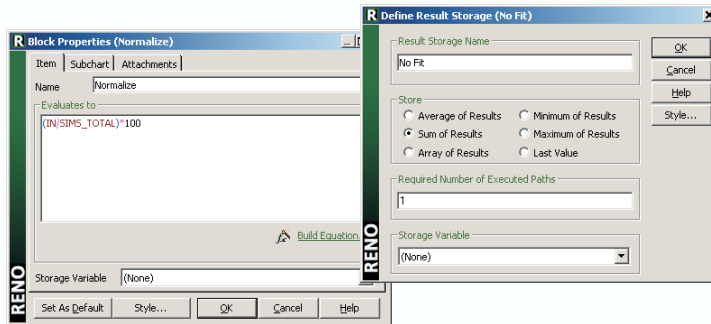
Next, a Conditional Block checks to see if  $A+B+C$  is greater than D. The input from the "Compute  $A+B+C$ " Block is passed to the Conditional Block, which in turn checks against the width of component D (based on the distribution and parameters defined for Random Variable D). If true, then it continues the execution by passing a specified value (in this case, 1) to the next construct in the true path. The false path is not used for this analysis.



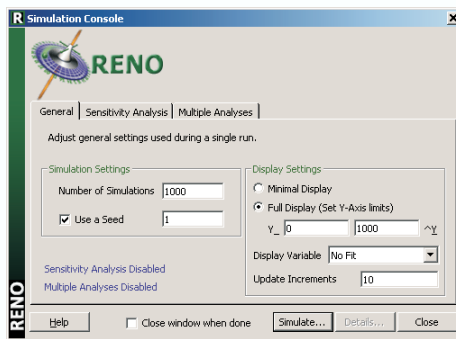


Another Standard Block represents an equation that converts the results from a count to a percentage. The reserved keyword IN represents the value passed from the previous construct and SIMS\_TOTAL represents the total number of simulations performed on the flowchart.

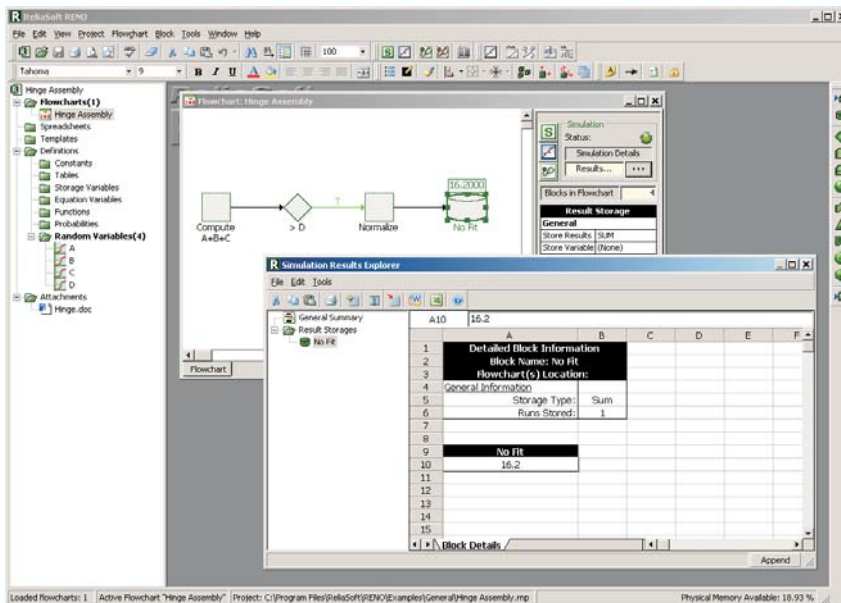
A Result Storage construct stores a sum of the results across all simulations. This represents the estimated percentage of times that A+B+C was greater than D.



The final step is to use the Simulation Console to specify the simulation settings, including the number of simulations to be performed, and to start the simulation.



When the simulation completes, the storage variable results are displayed in the Excel-compatible Simulation Results Explorer and in the flowchart.



To solve problems in RENO, simply:

- 1) Use definitions and constructs to build the flowchart model.
- 2) Run the simulation.
- 3) Evaluate the results.

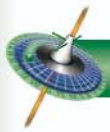
That's all it takes to put a powerful simulation engine to work for you!

If you can flowchart it...

You can simulate it!™

**Conclusion**

Based on 1,000 simulations, the analysis estimates that A+B+C will exceed D approximately 16.2% of the time. You can follow a similar procedure to model and analyze scenarios of interest to you!



Detailed user documentation in printed manual and on-line help files

### **Comprehensive Documentation**

ReliaSoft's **RENO** comes with complete and detailed printed product documentation and on-line help files, as well as a multitude of example files and guides designed to get you up and running the minute the application is installed.



### **Total Customer Support**

ReliaSoft is totally committed to providing you with immediate support to answer any questions you might have and/or to assist you with any problems that may arise. Support options include free telephone, fax and e-mail support as well as free minor version product updates.

### **System Requirements**

**RENO** is compiled and designed for Windows NT, 2000 and XP and takes advantage of the features available in these platforms. Minimum system requirements: 433-MHz Intel Pentium-class processor or equivalent, with 64MB RAM (128MB or higher are recommended for optimum performance), SVGA display and at least 70MB of hard disk space.

### **How much does ReliaSoft's RENO cost and how do I order it?**

This information is available at <http://RENO.Reliasoft.com>. To order, use our on-line Web store, print-ready order form or contact ReliaSoft (1.888.886.0410 or +1.520.886.0410). Please visit <http://www.Reliasoft.com/internat.htm> for a list of international offices and distributors.

### **How quickly can I get RENO?**

ReliaSoft will process your order on the same business day that we receive it, with shipment via Federal Express (2nd Day or International). If requested, domestic orders can be shipped via FedEx Overnight so that you can have the package on your desk by the next business day. For faster access, we also offer the option of immediate software downloads via ReliaSoft's Web site.

### **Is RENO better than the package I am using now?**

ABSOLUTELY. We invite you to try **RENO** and compare it with any other package on the market. If you do not agree that the software is better than any competitor, just return the package within 30 days for a full refund.

### **What other reliability software is available from ReliaSoft?**

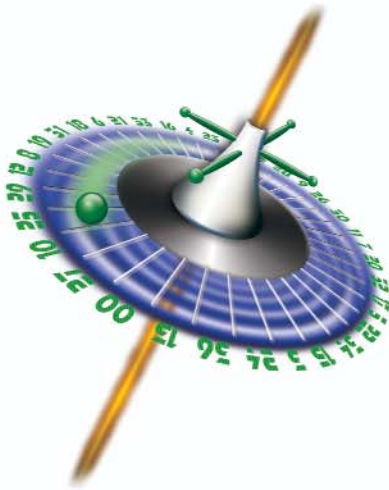
ReliaSoft's reliability analysis software products have become the industry standard for complete reliability analysis and are used worldwide by most manufacturers with an active quality/reliability engineering program. Complete product details are available on the Web at <http://www.Reliasoft.com>.

- **Weibull++** for life data analysis
- **ALTA** for quantitative accelerated life testing (QALT) data analysis
- **BlockSim** for system reliability, maintainability, availability and related analyses using Reliability Block Diagrams (RBDs) or Fault Tree Analysis
- **RGA** for reliability growth analysis
- **Xfmea** for failure modes, effects and criticality analysis (FMEA/FMECA)
- **RCM++** for reliability centered maintenance (RCM) analysis
- **MPC 3** for MSG-3 aircraft systems and powerplant analysis and reporting
- **Lambda Predict** for standards based reliability prediction analysis
- **QTMS** for failure reporting, analysis and corrective action (FRACAS)

Free comprehensive technical support via phone, fax or e-mail

Try a demonstration copy of RENO and decide for yourself!

# ReliaSoft®



# RENO



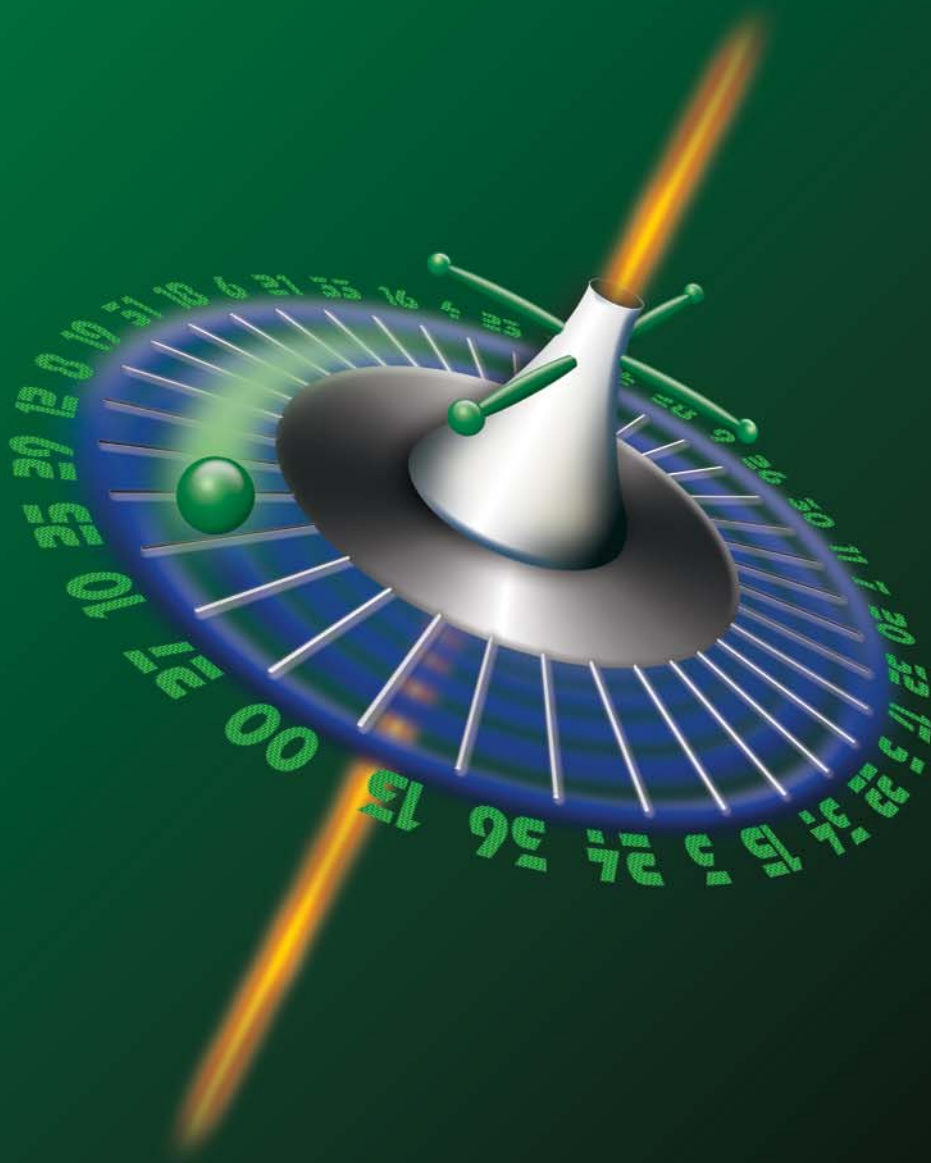
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<http://RENO.Reliasoft.com>

ReliaSoft



Reliability Office



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