

# Quick Tour

---



# BlockSim

VERSION 2023

---

***ReliaSoft***

© 1992-2023 Hottinger Bruel & Kjaer UK Ltd ("HBK UK Ltd"), at Technology Centre, Advanced Manufacturing Park, Brunel Way, Catcliffe, Rotherham S60 5WG. HBK UK Ltd is an affiliate of Hottinger Bruel & Kjaer Inc. ALL RIGHTS RESERVED.

This license agreement ("License Agreement") sets forth the terms and conditions that govern the distribution and use of the HBK UK Ltd software documentation (the "HBK Software Documentation"), including any and all derivative works. Any unauthorized distribution or use of the HBK Software Documentation is strictly prohibited.

Licensee hereby acknowledges and agrees to the following terms and conditions of this License Agreement for its use of the HBK Software Documentation:

HBK UK Ltd grants the Licensee who accepts and abides by the terms of this License Agreement a non-exclusive, non-transferable, royalty-free, and revocable license to the HBK Software Documentation. Unless otherwise indicated, all HBK Software Documentation are copyrighted and are the property of HBK UK Ltd or, where applicable, the relevant member of HBK UK Ltd's corporate group. They are licensed to you and for your use only as an individual who has purchased the software ("Licensee"). Notwithstanding this License Agreement, the Licensee shall not have a license to the trademarks, logos, or any other intellectual property of HBK UK Ltd and/or its affiliates or Licensors(s).

Licensee may print a single copy of the HBK Software Documentation for his/her reference. Licensee may reprint the HBK Software Documentation, as needed, if the original printed copy is damaged and/or destroyed.

Except as provided above, no part of the HBK Software Documentation, either text or image, may be used for any purpose other than Licensee's own personal use and reference as a learning aid. Therefore, the reproduction, modification, creation of derivative works, storage in a retrieval system, or retransmission, in any form or by any means, electronic, mechanical or otherwise, for reasons other than Licensee's personal use, is strictly prohibited.

Certain photos and images in the HBK Software Documentation are used under non-transferable licenses obtained by HBK UK Ltd and/or its affiliates and are owned by its Licensors(s) ("Licensor"). Images depicting photos of actual persons are licensed to HBK UK Ltd and/or its affiliates and the signed model releases for these images are on file with the Licensors(s). HBK UK Ltd makes no copyright claims on these images. All ownership and intellectual property rights to the HBK Software Documentation are reserved by either HBK UK Ltd and/or its affiliates or its Licensors(s).

**DISCLAIMER: THE HBK SOFTWARE DOCUMENTATION IS PROVIDED "AS IS" WITHOUT WARRANTIES OF ANY KIND, EITHER EXPRESS OR IMPLIED,**

INCLUDING, BUT NOT LIMITED TO: 1) ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR NON-INFRINGEMENT OF INTELLECTUAL PROPERTY; 2) ANY WARRANTY THAT THE HBK COURSE MATERIALS WILL CONFORM TO SPECIFICATIONS; 3) ANY WARRANTY THAT THE WORK WILL BE ERROR FREE OR VIRUS FREE. IN NO EVENT SHALL HBK UK LTD, ITS AFFILIATES, DISTRIBUTORS, CONTRACTORS, AGENTS, AND ITS LICENSOR(S) BE LIABLE FOR ANY DAMAGES, INCLUDING, BUT NOT LIMITED TO, DIRECT, INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES, ARISING OUT OF, RESULTING FROM, OR IN ANY WAY CONNECTED WITH THE HBK SOFTWARE DOCUMENTATION, WHETHER OR NOT BASED UPON WARRANTY, CONTRACT, TORT, OR OTHERWISE, WHETHER OR NOT LOSS WAS SUSTAINED FROM, OR AROSE OUT OF THE RESULTS OF, OR USE OF, THE HBK SOFTWARE DOCUMENTATION. LICENSEES AGREE TO WAIVE ANY AND ALL CLAIMS AGAINST HBK UK LTD, ITS AFFILIATES, DISTRIBUTORS, CONTRACTORS, AGENTS, AND ITS LICENSOR(S), AND SHALL INDEMNIFY, DEFEND AND HOLD HARMLESS HBK UK LTD, ITS AFFILIATES, DISTRIBUTORS, CONTRACTORS, AGENTS, AND ITS LICENSOR(S) FOR ANY AND ALL LIABILITIES, CLAIMS, DEMANDS, DAMAGES, EXPENSES OR LOSSES THAT MAY ARISE FROM THE LICENSEE'S USE OR DISTRIBUTION OF THE HBK SOFTWARE DOCUMENTATION, INCLUDING ANY LIABILITIES OR DAMAGES FROM DERIVATIVE WORKS OR OTHER PRODUCTS BASED ON, OR RESULTING FROM, THE USE THEREOF.

This License Agreement is subject to change without notice and does not represent any commitment on the part of HBK UK Ltd and/or its affiliates to the Licensee, including any commitment to maintain or update the HBK Software Documentation. The names of companies, products, people, characters, and/or data mentioned in the HBK Software Documentation are not intended to represent any real individual, company, product or event, unless otherwise noted. Any rights not expressly granted herein are reserved for HBK UK Ltd.

#### TRADEMARKS:

ReliaSoft, Weibull++, BlockSim, Lambda Predict, XFMEA, RCM++ and XFRACAS are all trademarks of Hottinger Bruel & Kjaer Inc.

GlyphWorks, VibeSys, DesignLife and the nCode logos are all trademarks of HBK UK Ltd.

Other product names and services identified in the HBK Software Documentation are trademarks belonging to their respective trademark holders, and are used for illustration purposes. Their use in no way conveys an endorsement or other affiliation with HBK UK Ltd and/or its affiliates.

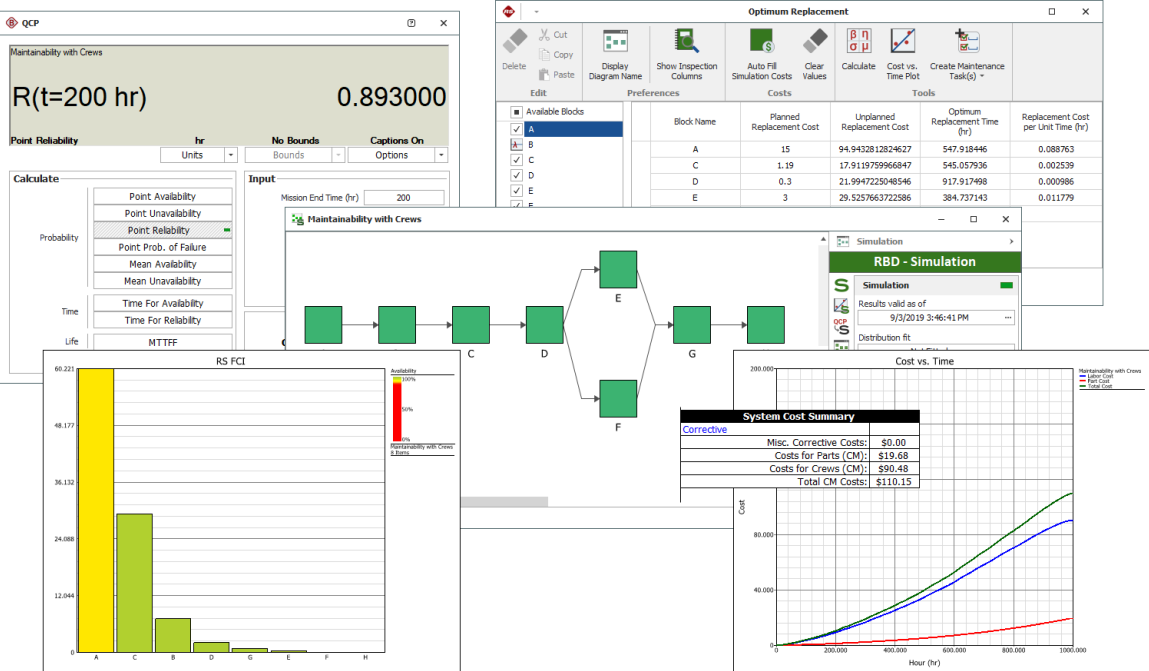
This License Agreement is subject to change without notice and does not represent any commitment on the part of HBK UK Ltd and/or its affiliates to the Licensee, including any commitment to maintain or update the HBK Software Documentation. The names of companies, products, people, characters, and/or data mentioned in the HBK Software Documentation are not intended to represent any real individual, company, product or event, unless otherwise noted. Any rights not expressly granted herein are reserved for HBK UK Ltd.

# Quick Tour of BlockSim

**BlockSim** supports a wide variety of system reliability, availability and related analyses using **reliability block diagrams (RBDs)**, **fault trees (FTA)** and/or **Markov analysis**. It's also packed with tools for related analyses, such as reliability allocation, optimum replacement and inspection, reliability importance measures and throughput analysis. In addition, BlockSim's **event analysis flowcharts** use Monte Carlo simulation to model and analyze even the most complex probabilistic or deterministic scenarios.

You can use this application to answer a wide variety of questions, such as:

- What is the expected reliability of the system? What are the most critical components? What component reliabilities are required to meet the system reliability goal?
- What is the expected availability (uptime) or throughput? Where are the critical components or bottlenecks? What changes are needed to meet the operational goals?
- What is the optimum maintenance strategy? When is the best time for scheduled maintenance? How many spares should we keep on hand? Is crew capacity sufficient?
- How much will it cost to operate the system? How will a change in the design or operating conditions affect costs? Which components are the most costly?
- What is the risk of catastrophic failure? Which components or failure modes pose the greatest risk? How will a change in the design or operating conditions affect safety?
- How does the system perform across different operational phases?
- What is the effect of variability on performance? How will the outcome be affected by changes in specific inputs? What are the probabilities of different possible outcomes?



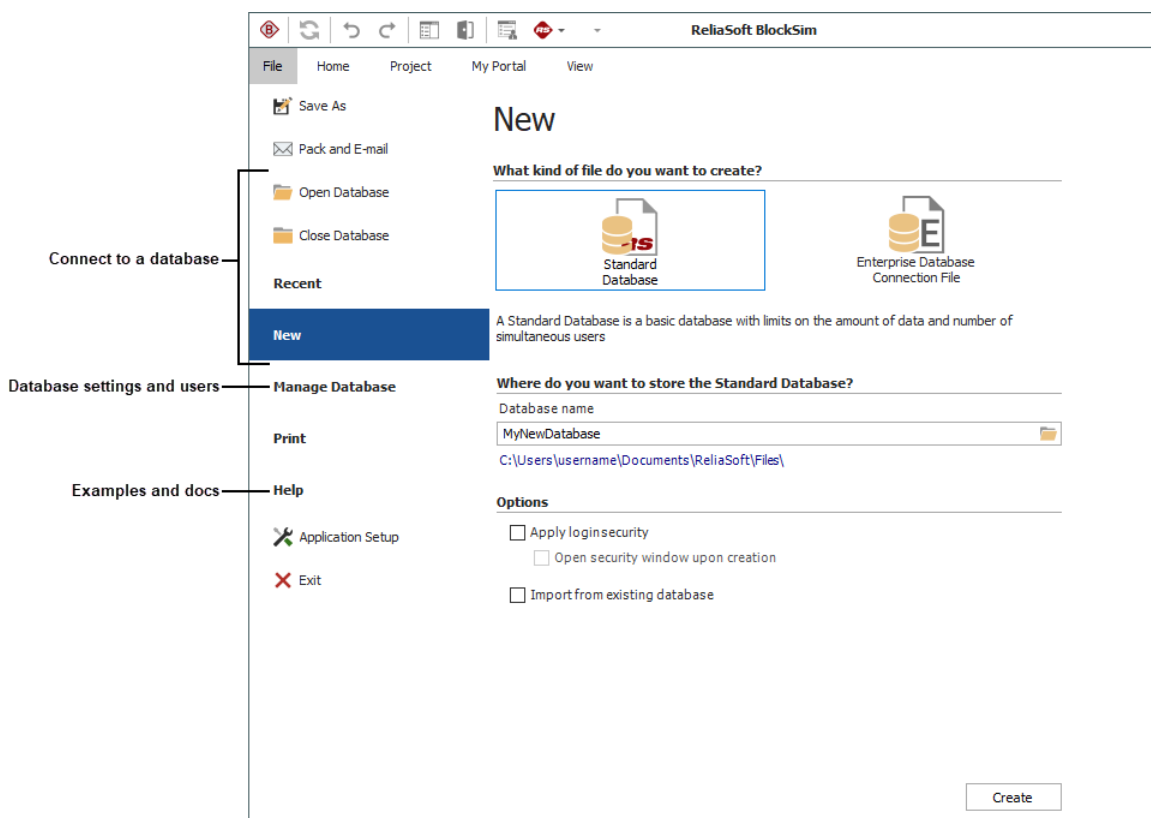
## Using Databases and Projects

### File Menu

Use commands on the **File** menu (**New**, **Recent** or **Open Database**) to create or open a database.

Each database supports simultaneous access by multiple users. If you have admin permissions, use **File > Manage Database** to control user access and manage configurable settings that apply throughout the database.

Use **File > Help** to access online help and shipped examples.

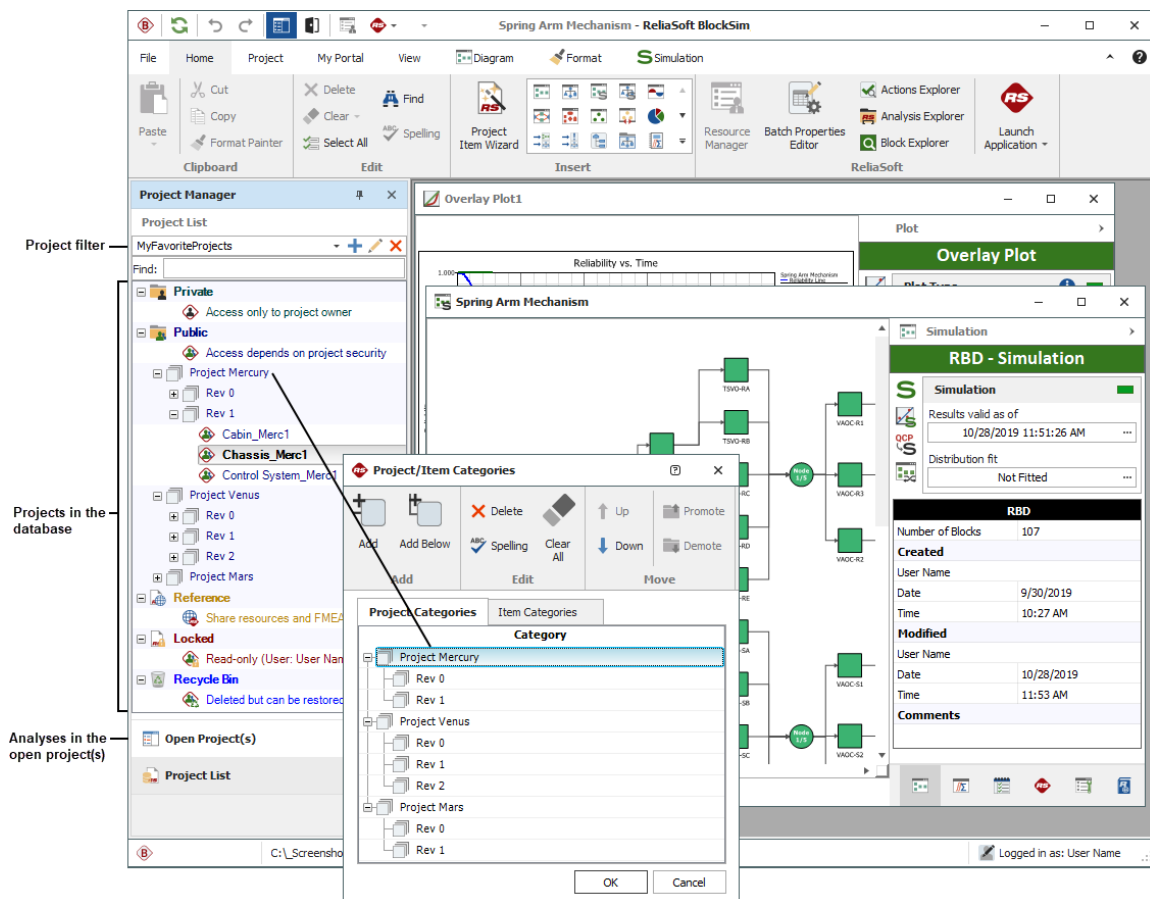


### Project List

Each database can contain multiple projects. Use the **project list** to create or open a project.

If you have a lot of projects:

- Use the **project filter** to limit what's displayed.
- Use the **project category** to group projects within the list.



## Current Project Explorer

Use the **current project explorer** to create or open analyses and reports.

You can open the same project in any ReliaSoft desktop application. Analyses and reports are visible only in the application(s) that can edit them:

- Life data folios are visible only in Weibull++
- Fault trees are visible only in BlockSim
- FMEAs are visible only in XFMEA/RCM++
- Etc.



Common features such as **resources** and **project attachments** are visible in all ReliaSoft desktop applications.

## Using Fault Trees

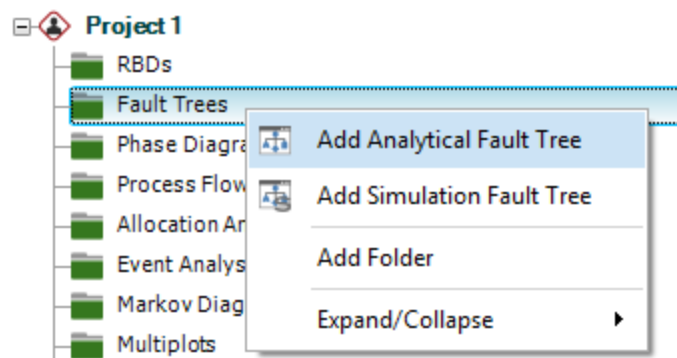
BlockSim's fault trees can be configured as analytical diagrams (which use the exact mathematical solution for the system model but impose limitations on what can be modeled and what results can be obtained) or simulation diagrams (which provide more modeling options and results but must be analyzed with discrete event simulation).

Fault trees and reliability block diagrams (RBDs) can be used together in the same analysis (e.g., a subdiagram block in a fault tree can point to an RBD and vice versa).

The basic steps for using an analytical fault tree are:

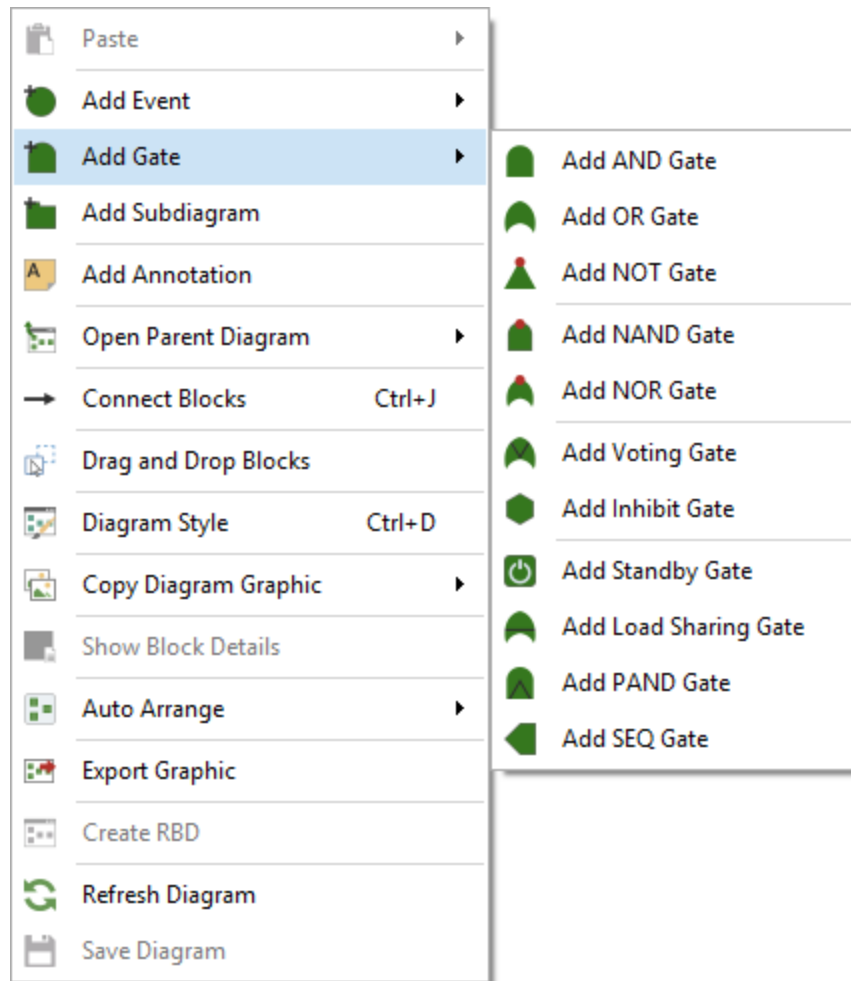
1. Add fault tree diagram

Right-click the Fault Trees folder in the current project explorer and choose **Add Analytical Fault Tree**.



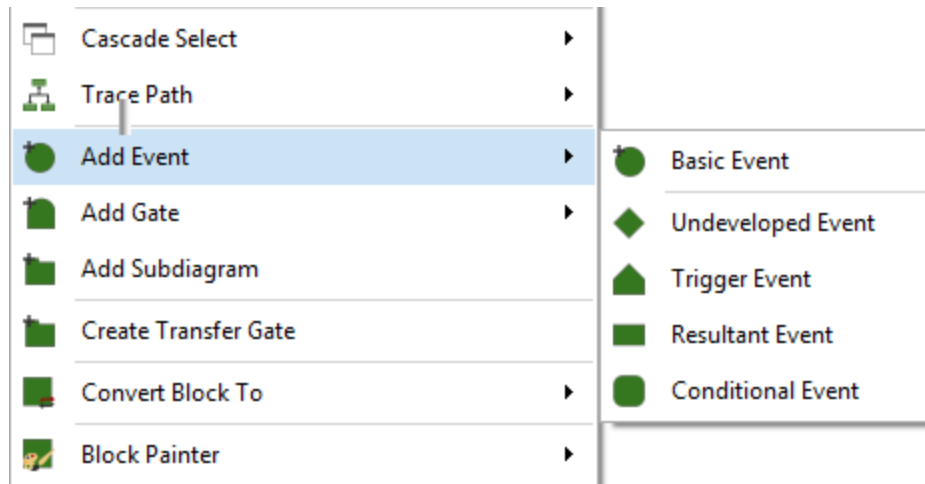
2. Add gates

Right-click inside the diagram and choose the type of gate to add.



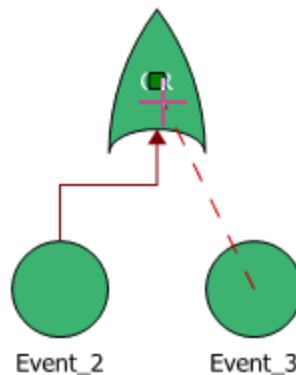
### 3. Add events

Right-click a gate and choose **Fault Tree > Add Event > [Type of Event]**. When a gate is selected, the event will be added below the gate, already connected.



#### 4. Connect blocks (if applicable)

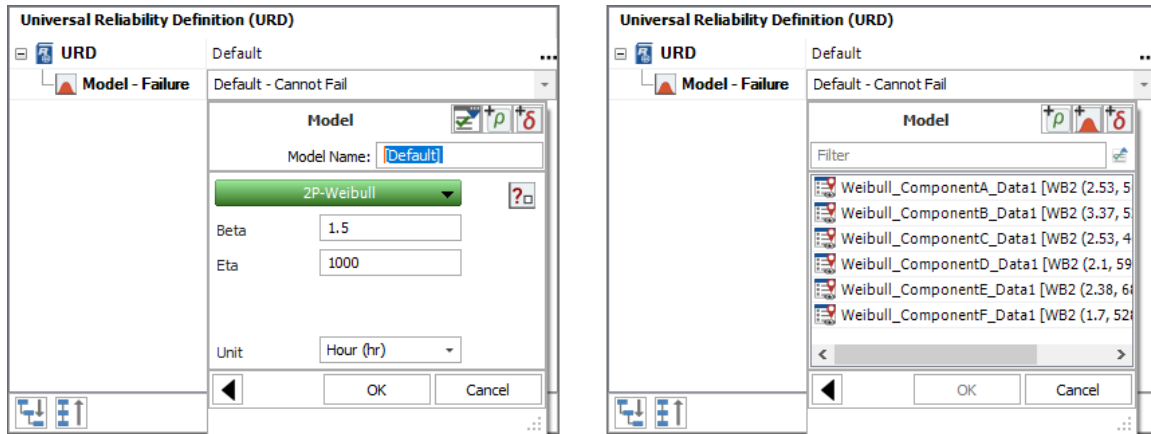
If you need to create a new connection, hold down the **ALT** key, click the source block and drag a line to the destination block.



#### 5. Set block properties

To edit a block's properties, right-click it and choose **Block Properties**. For gate blocks, you can change the name and identifiers. For event blocks, specify any operational and cost properties and use *universal reliability definitions* (URDs) to specify the reliability properties.

- To select an existing URD, click inside the **URD** field.
- To create a new URD, click inside the **Model - Reliability** field and follow the wizard. You can create a new model (left) or select an existing model (right). Existing models may have been manually created, or may have been published from other analyses in BlockSim, Weibull++ or Lambda Predict.

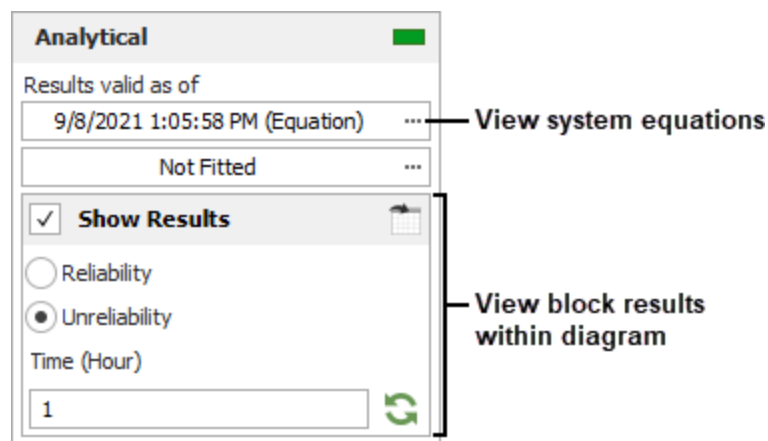


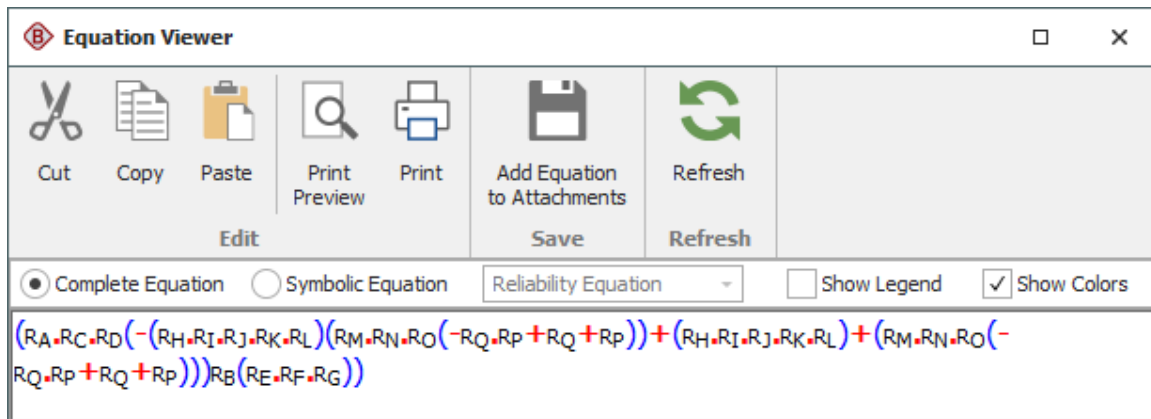
## 6. Analyze the diagram

Click the **Analyze** icon on the control panel.



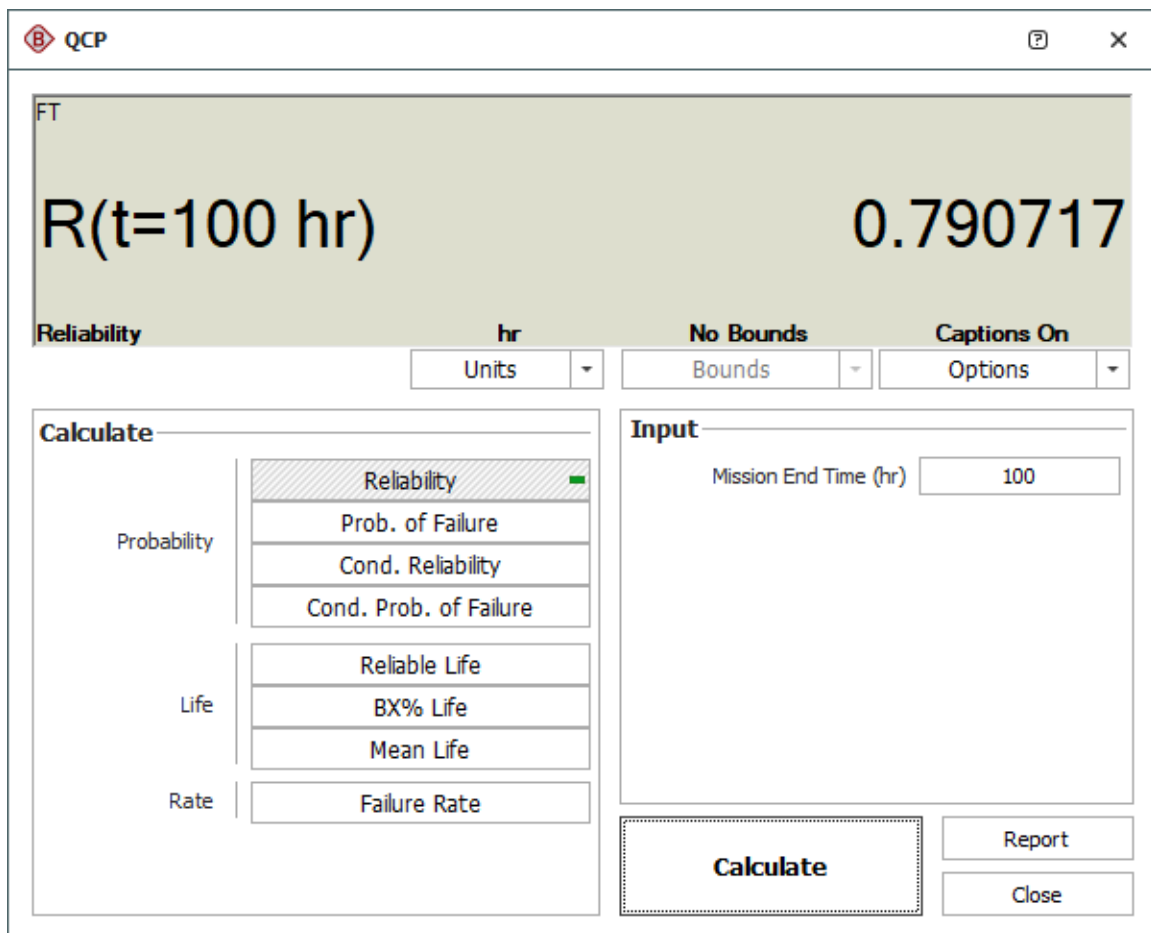
To view the calculated reliability or unreliability at a specific time for each block, select **Show Results** on the control panel and specify the time. To view the algebraic equations for the system reliability, *pdf* and failure rate, click the **Results valid as of** field on the control panel. Note that starting in Version 2022, you have a choice of analysis methods for analytical fault trees; algebraic equations are available only for the Equation analysis type, not for the new Binary Decision Diagram analysis types.





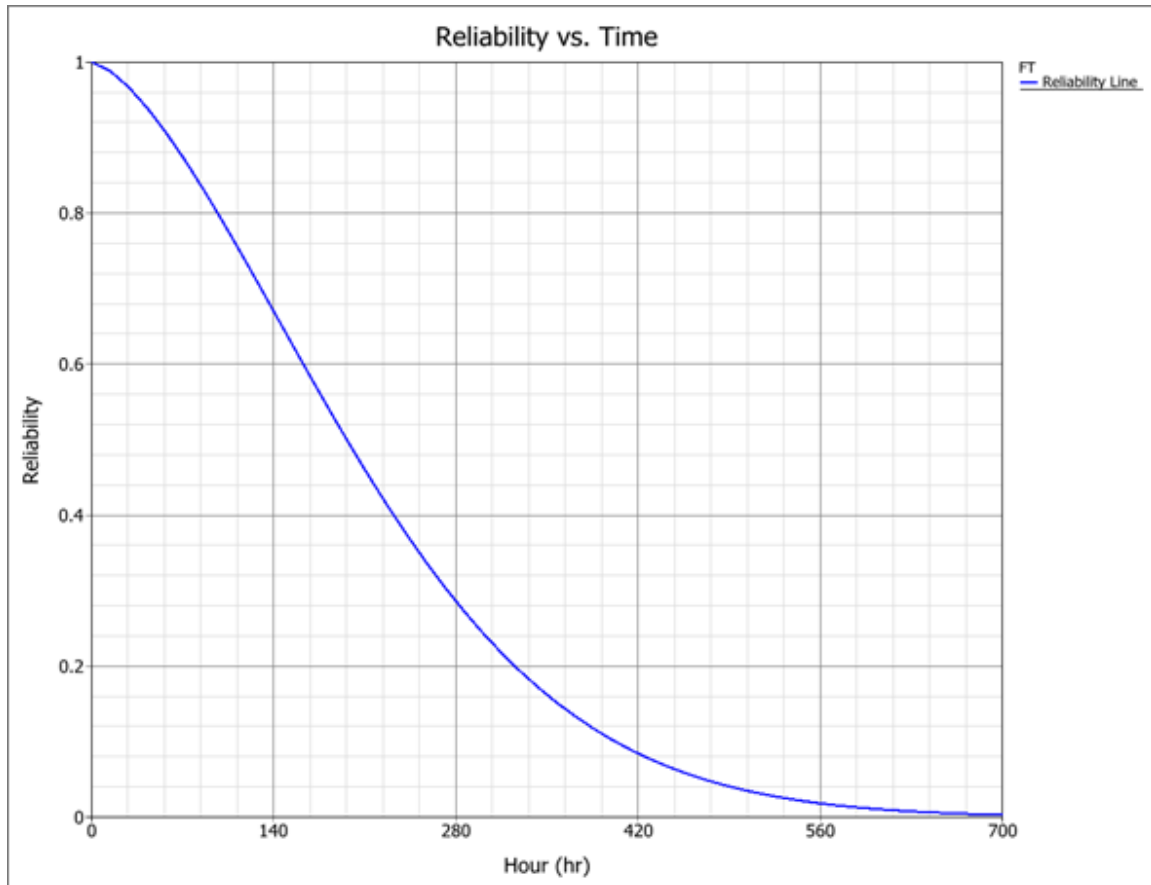
## 7. Calculate metrics

Click the **QCP** icon on the control panel to open the Quick Calculation Pad.



**8. View plots**

Click the **Plot** icon on the control panel to open the plot sheet.



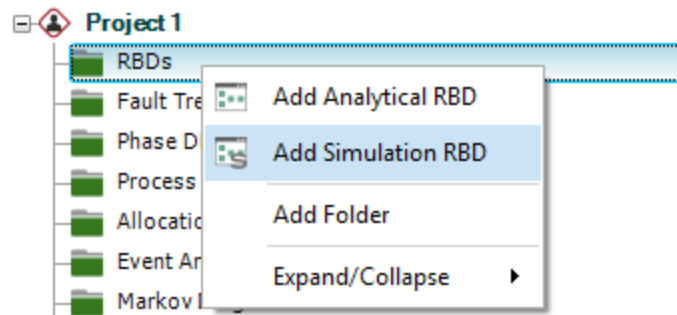
## Using Simulation RBDs

A reliability block diagram (RBD) is a graphical representation of how the components of a system are reliability-wise connected. BlockSim's RBDs can be configured as analytical diagrams (which use the exact algebraic equation for the system model but impose limitations on what can be modeled and what results can be obtained) or simulation diagrams (which provide more modeling options and results but must be analyzed with discrete event simulation).

The basic steps for using a simulation RBD are:

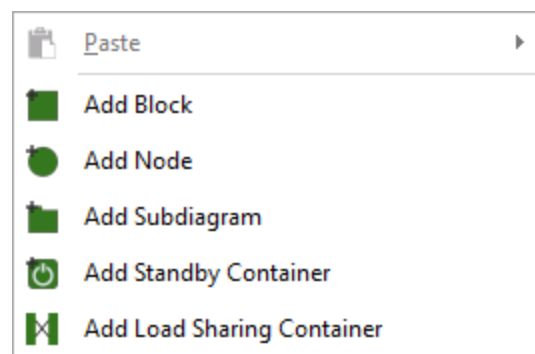
1. Add diagram

Right-click the RBDs folder in the current project explorer and choose **Add Simulation RBD**.



2. Add blocks

Right-click inside the diagram and choose the type of block to add.



3. Connect blocks

Hold down the **ALT** key, click the source block and drag a line to the destination block.

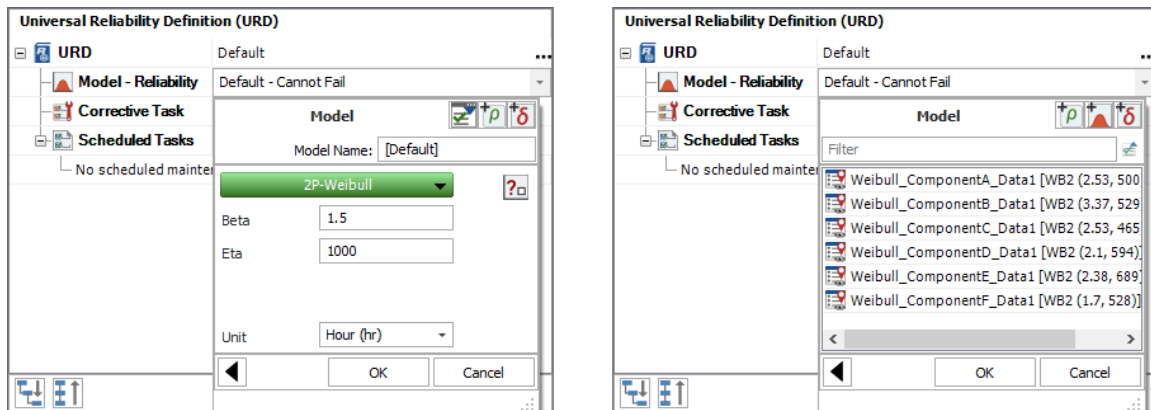




#### 4. Set block properties

To edit a block's properties, right-click it and choose **Block Properties**. Use a *universal reliability definition* (URD) to specify the reliability properties.

- To select an existing URD, click inside the **URD** field.
- To create a new URD, click inside the **Model - Reliability** field and follow the wizard. You can create a new model (left) or select an existing model (right). Existing models may have been manually created, or may have been published from other analyses in BlockSim, Weibull++ or Lambda Predict.

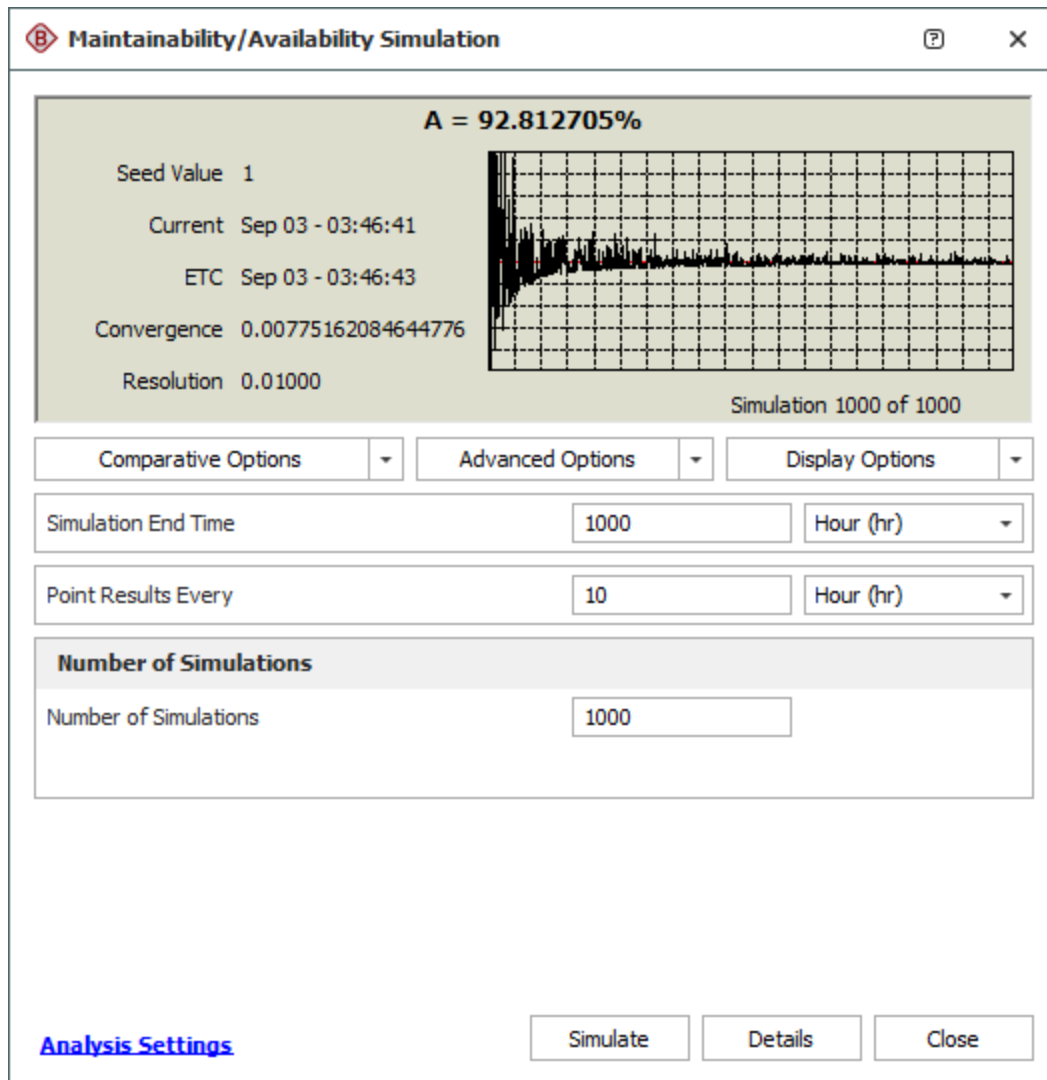


#### 5. Simulate the diagram

Click the **Simulate** icon on the control panel.



Specify the simulation settings and click **Simulate**.



**Maintainability/Availability Simulation**

**A = 92.812705%**

Seed Value 1

Current Sep 03 - 03:46:41

ETC Sep 03 - 03:46:43

Convergence 0.00775162084644776

Resolution 0.01000

Simulation 1000 of 1000

Comparative Options Advanced Options Display Options

Simulation End Time 1000 Hour (hr)

Point Results Every 10 Hour (hr)

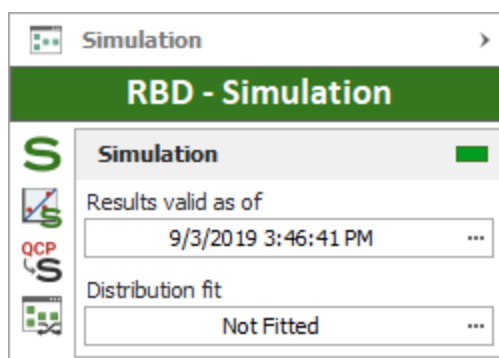
**Number of Simulations**

Number of Simulations 1000

[Analysis Settings](#) Simulate Details Close

6. View the simulation results

From within the Maintainability/Availability Simulation window, click **Details**. If you have closed the window, click the **Results valid as of** field on the control panel.



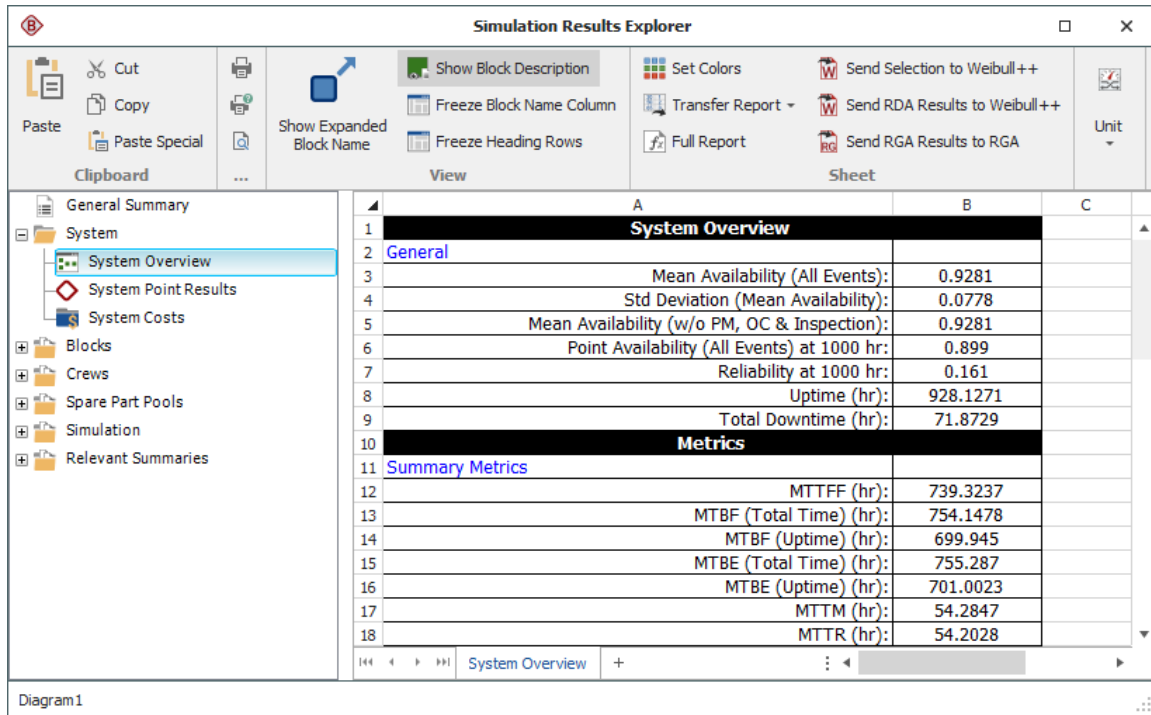
**Simulation**

**RBD - Simulation**

**Simulation**

Results valid as of  
9/3/2019 3:46:41 PM

Distribution fit  
Not Fitted



The screenshot shows the 'Simulation Results Explorer' window. The left sidebar contains a tree view with categories: General Summary, System (selected), System Point Results, System Costs, Blocks, Crews, Spare Part Pools, Simulation, and Relevant Summaries. The main area displays a table with two sections: 'System Overview' and 'Metrics'.

|    | A  | B        | C |
|----|--|----------|---|
| 1  | <b>System Overview</b>                       |          |   |
| 2  | <b>General</b>                               |          |   |
| 3  | Mean Availability (All Events):              | 0.9281   |   |
| 4  | Std Deviation (Mean Availability):           | 0.0778   |   |
| 5  | Mean Availability (w/o PM, OC & Inspection): | 0.9281   |   |
| 6  | Point Availability (All Events) at 1000 hr:  | 0.899    |   |
| 7  | Reliability at 1000 hr:                      | 0.161    |   |
| 8  | Uptime (hr):                                 | 928.1271 |   |
| 9  | Total Downtime (hr):                         | 71.8729  |   |
| 10 | <b>Metrics</b>                               |          |   |
| 11 | <b>Summary Metrics</b>                       |          |   |
| 12 | MTTFF (hr):                                  | 739.3237 |   |
| 13 | MTBF (Total Time) (hr):                      | 754.1478 |   |
| 14 | MTBF (Uptime) (hr):                          | 699.945  |   |
| 15 | MTBE (Total Time) (hr):                      | 755.287  |   |
| 16 | MTBE (Uptime) (hr):                          | 701.0023 |   |
| 17 | MTTM (hr):                                   | 54.2847  |   |
| 18 | MTTR (hr):                                   | 54.2028  |   |

The bottom of the window shows a tab labeled 'System Overview' and a status bar with 'Diagram1'.

## 7. Calculate metrics

Click the **QCP** icon on the control panel to open the Quick Calculation Pad.



QCP

Diagram1

**Am(t=1000)** **0.928127**

**Mean Availability** **hr** **No Bounds** **Captions On**

Units Bounds Options

**Calculate**

Probability

- Point Availability
- Point Unavailability
- Point Reliability
- Point Prob. of Failure
- Mean Availability**
- Mean Unavailability

Time

- Time For Availability
- Time For Reliability

Life

- MTTF

**Input**

Mission End Time (hr) 1000

**Calculate**

Report

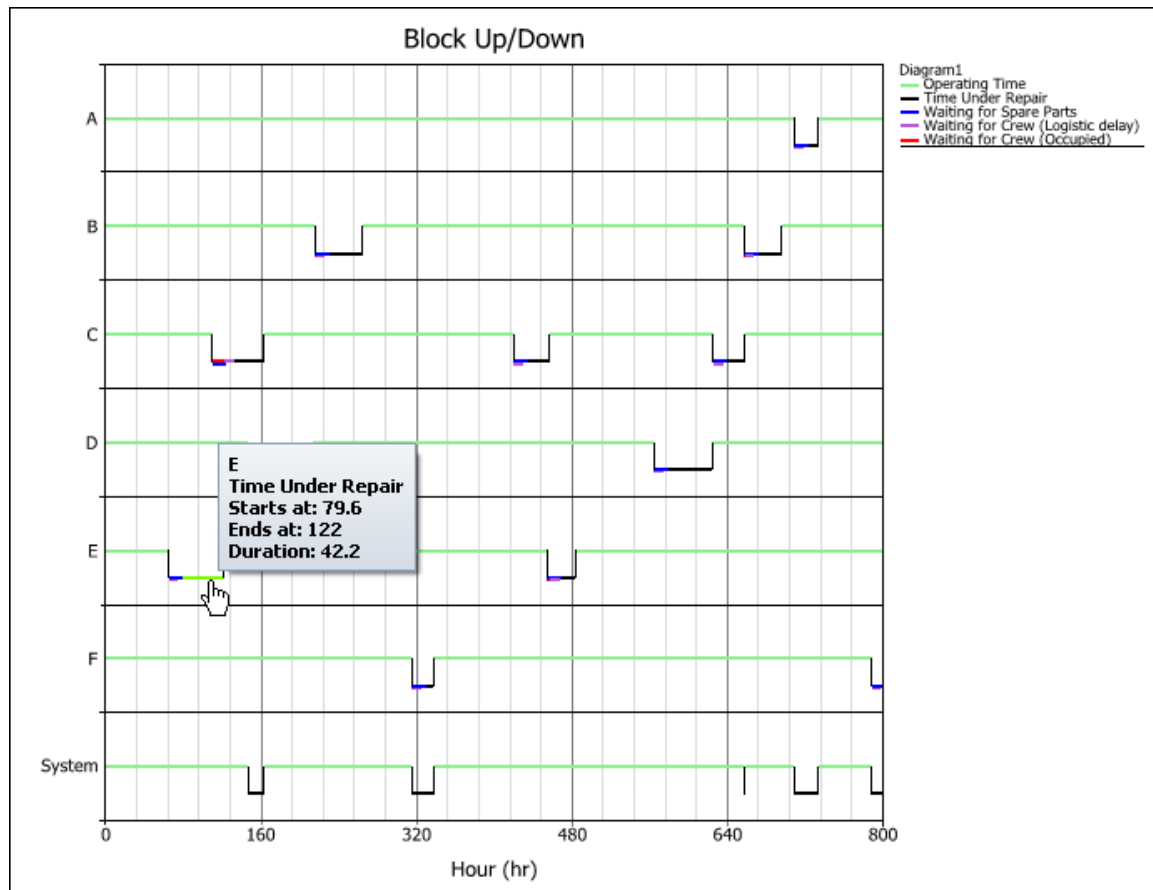
Details

Close

## 8. View plots

Click the **Plot** icon on the control panel to open the plot sheet.





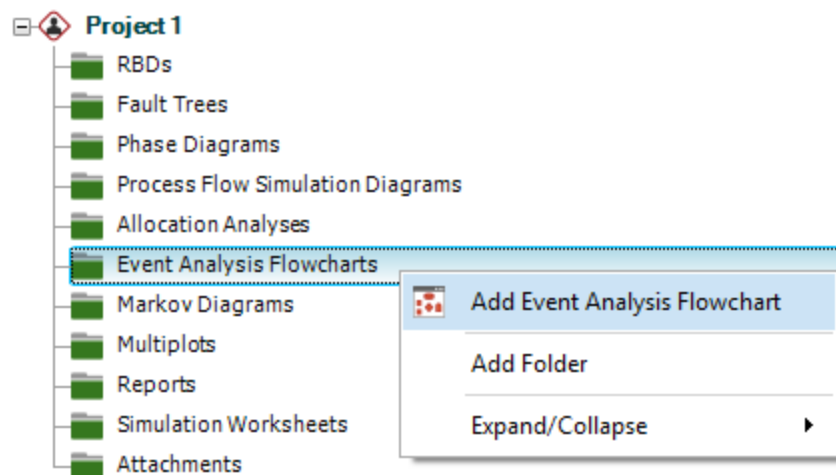
## Using Event Analysis Flowcharts

Event analysis flowcharts (formerly RENO flowcharts) are used to build models of probabilistic or deterministic problems, processes or scenarios in order to help you understand and/or quantify them. The flowchart is a graphical representation of the mathematical process of predicting an outcome.

The example that follows demonstrates some of the basic techniques used in working with event analysis flowcharts. This simple flowchart generates failure times for 10 items.

### 1. Add diagram

Right-click the Event Analysis Flowcharts folder in the current project explorer and choose **Add Event Analysis Flowchart**.



### 2. Define resources

#### a. Create a variable

*This resource will control the number of items to generate failure times for.*

Choose **Home > ReliaSoft > Resource Manager**.

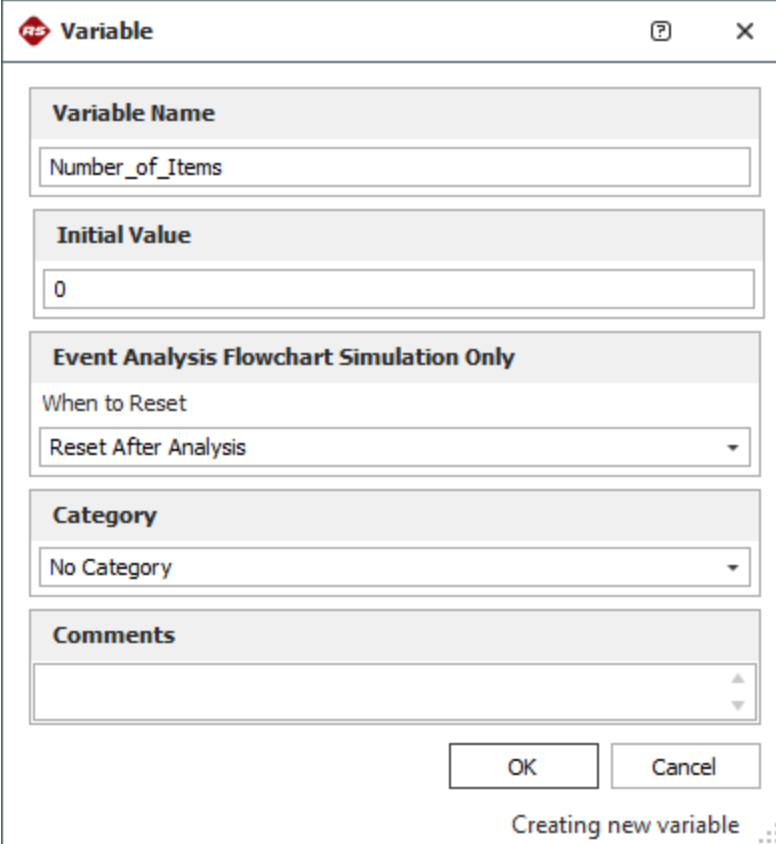


In the Resource Manager, choose **Variables** and then choose **Home > Edit > Add**.

The screenshot shows the Resource Manager interface for 'Project: Project 1'. The left sidebar contains a list of resource types: URDs, Variables (highlighted with a red box), Models, Corrective Tasks, and Scheduled Tasks. The main area displays a table of resources. The table has columns for Variable Name, Value, When to Reset, Comments, and Category. A single row is visible with the variable name 'ABC' and corresponding values. The top toolbar includes buttons for Show All, Show Only Unused, Show Only Duplicates, Show Local, Show Global, Show Reference, Add (highlighted with a red box), Batch Add, Duplicate, View, Delete, Trace Usage, and Make Global.

| Variable Name | Value | When to Reset | Comments | Category |
|---------------|-------|---------------|----------|----------|
| ABC           | ABC   | ABC           | ABC      | ABC      |

Define the variable properties.



The image shows a 'Variable' dialog box with the following fields and options:

- Variable Name:** Number\_of\_Items
- Initial Value:** 0
- Event Analysis Flowchart Simulation Only:**
  - When to Reset: Reset After Analysis
- Category:** No Category
- Comments:** (Empty text area)

Buttons: OK, Cancel

Creating new variable



- b. Create a model

*This resource will define the model used to generate the failure times.*

In the Resource Manager, choose **Models** and then choose **Home > Edit > Add**.

Define the model properties.

**Model**

Model Name  
Item\_Failure\_Distribution

**Model Properties**

- Model Category**
  - Category: Reliability
- Model Type**
  - Type: Distribution
- Distribution**
  - Distribution: 2P-Weibull
- Parameters and Inputs**
  - Beta: 2.3
  - Eta: 1750
  - Units: Day (day)

OK Cancel

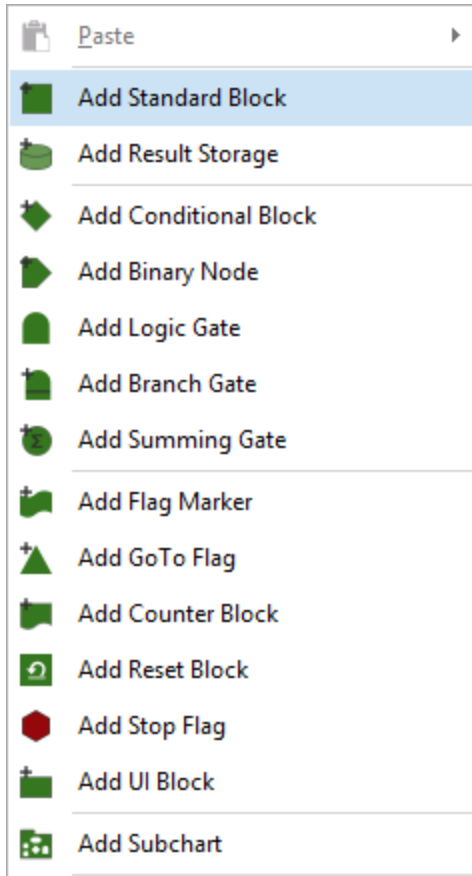
Creating new model

### 3. Add blocks

- a. Add a standard block (to increment the variable)

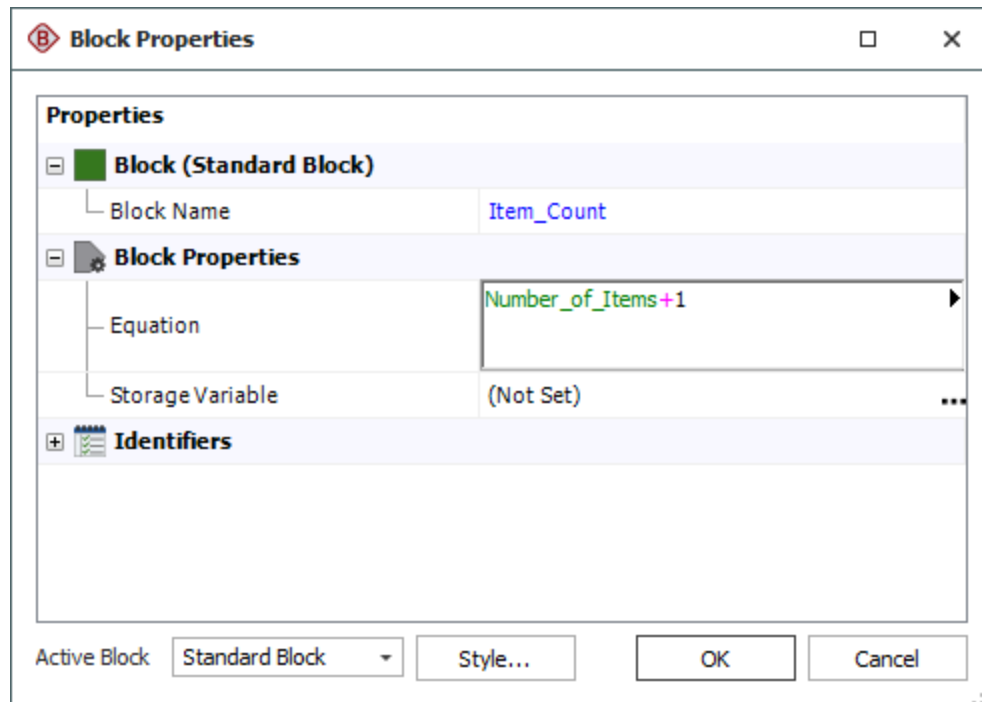
*This block will increment the value of the Number\_of\_Items variable.*

Right-click inside the diagram and choose to add a standard block.

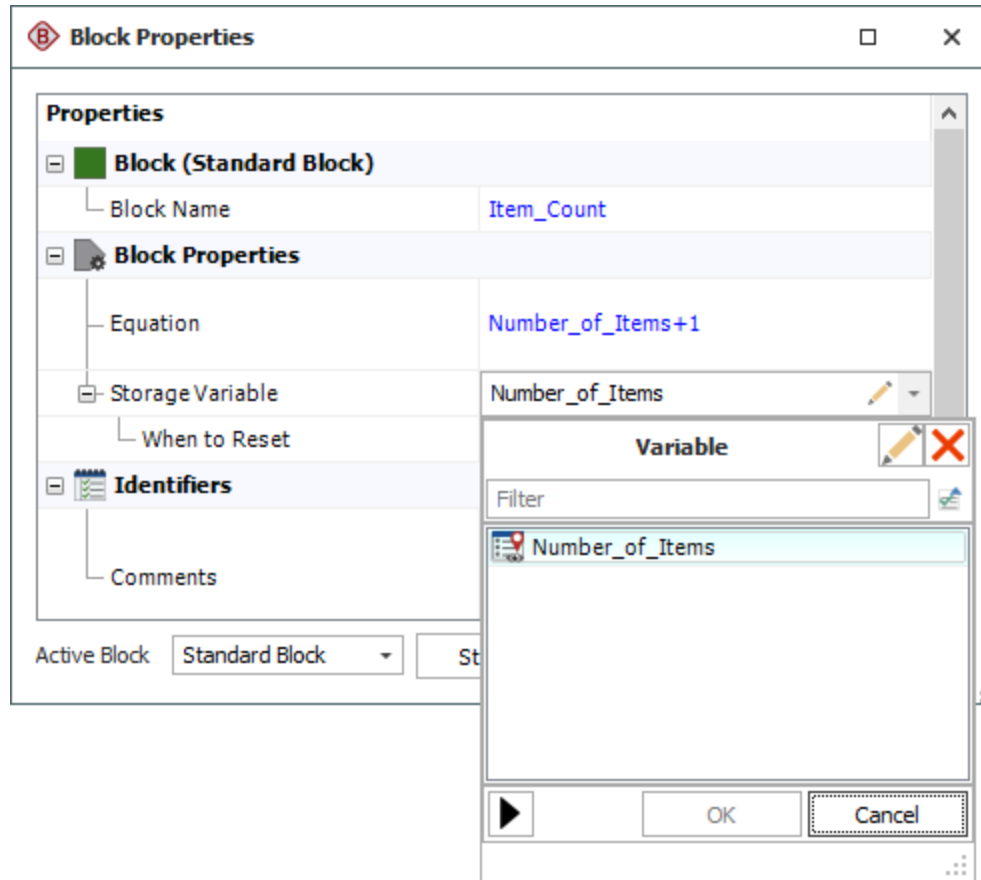


To edit the block's properties, right-click it and choose **Block Properties**.

Click inside the **Equation** field and type **Number\_of\_Items + 1**.



Click inside the **Storage Variable** field and select the **Number\_of\_Items** variable.

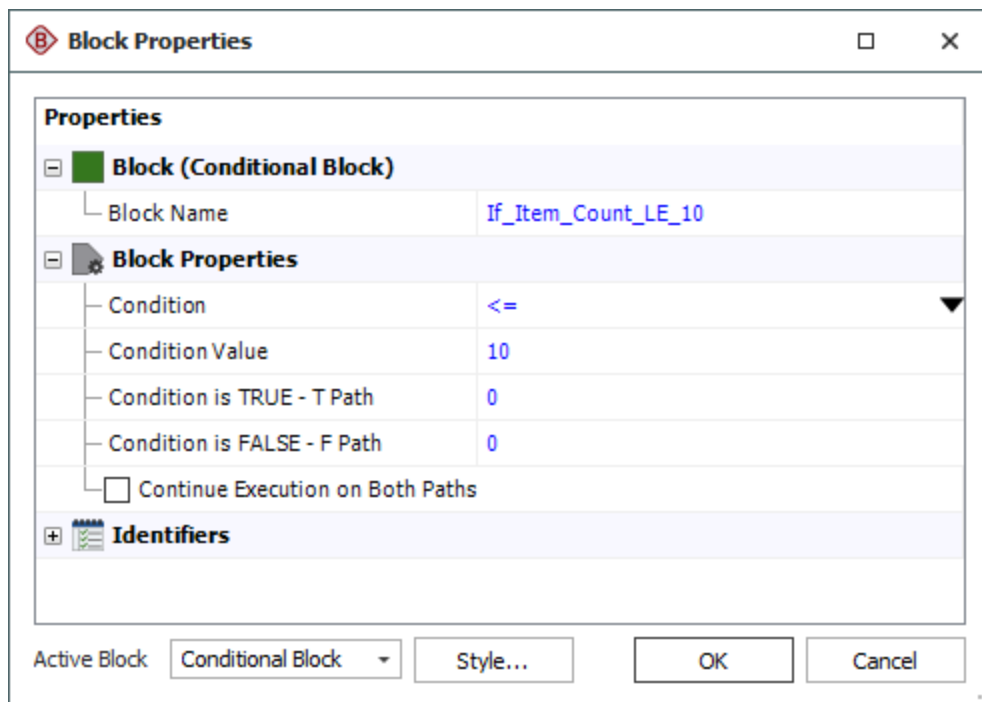


- b. Add a conditional block (i.e., create an IF statement)

*This block will determine the simulation path based on whether the item count has reached 10.*

Right-click inside the diagram and choose to add a conditional block.

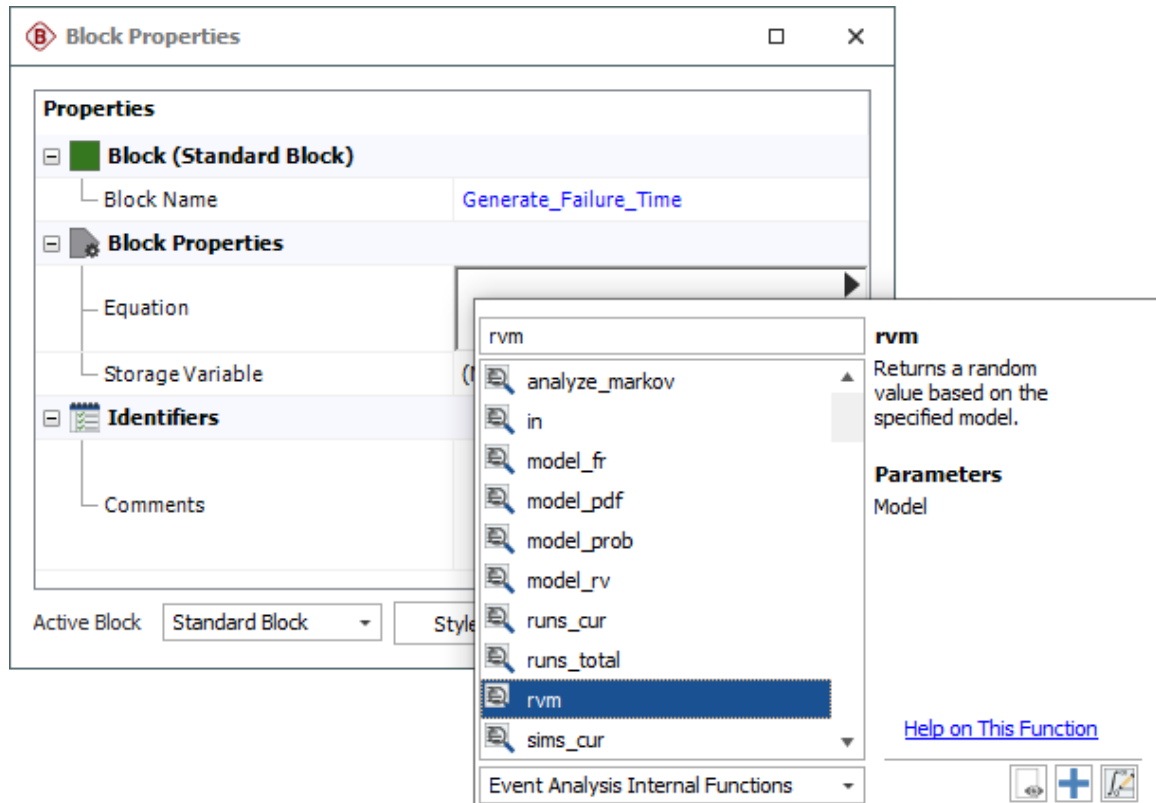
In the block's properties window, specify that if the incoming value is less than or equal to 10, a value of 0 will be passed on the "true" path. Otherwise, a value of 0 will be passed on the "false" path.



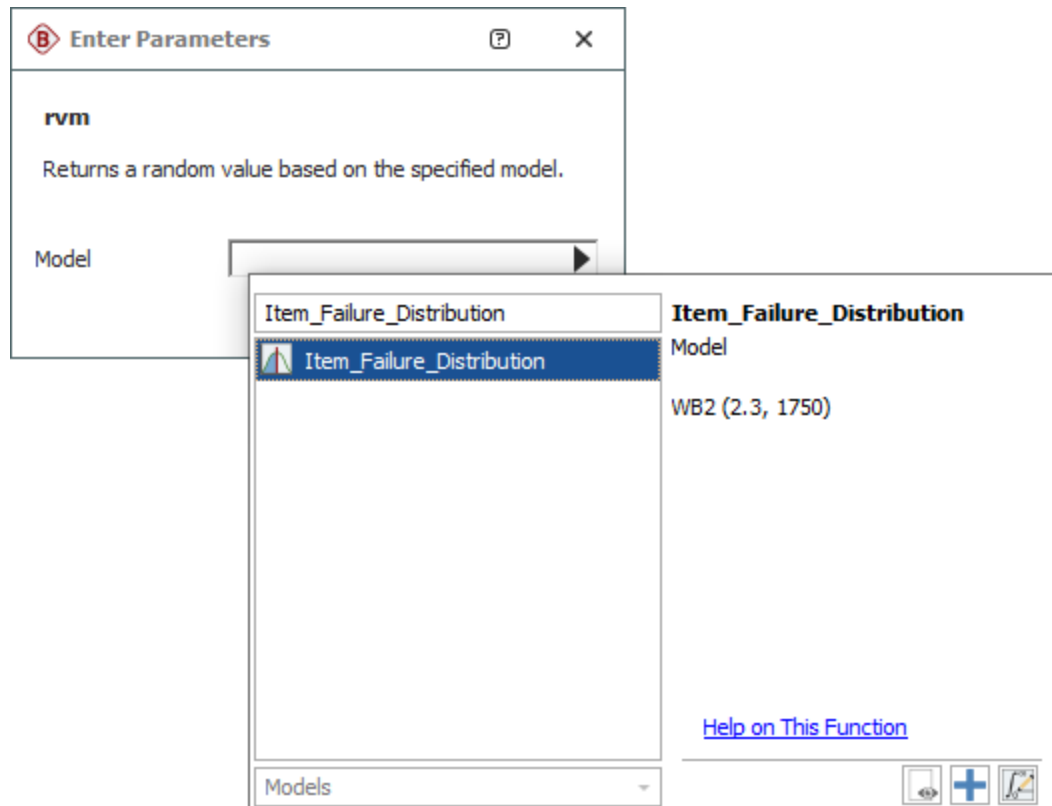
- c. Add a standard block (to generate the failure times)

*This block will generate a failure time by returning a random value based on the Item\_Failure\_Distribution model.*

In the block's properties window, right-click inside the **Equation** field, choose **Show Function Selector** then choose **Event Analysis Internal Functions** from the drop-down list. Double-click the **rvm** function.



In the Enter Parameters window that appears, right-click in the **Model** field and open the Function Selector. Double-click the **Item\_Failure\_Distribution** model.

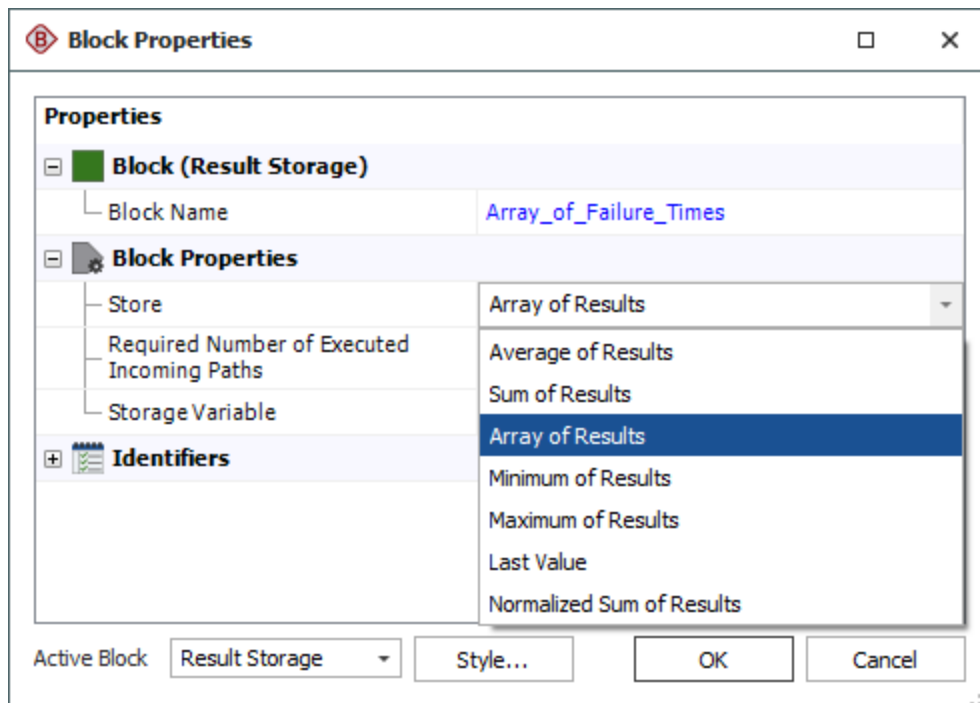


- d. Add a result storage block

*This block will store an array of the failure times generated by the standard block.*

Right-click inside the diagram and choose to add a result storage block.

In the block's properties window, specify that it will store an array of results.



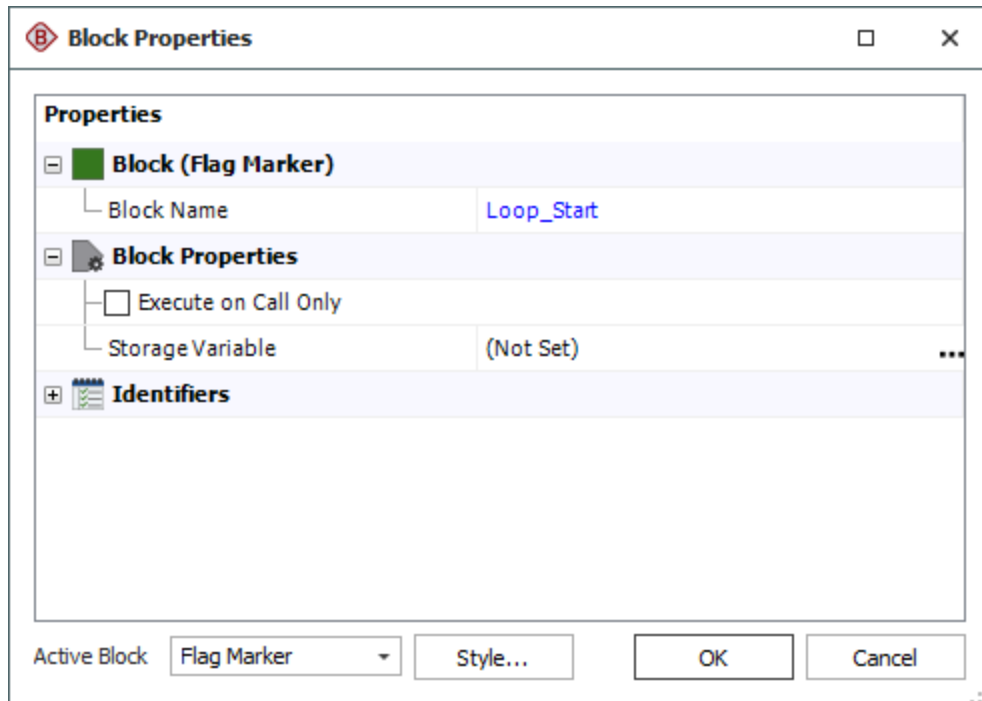


- e. Create a FOR loop

*These blocks will form a loop that will cycle through the flowchart until the variable value reaches 10.*

Add a flag marker block, a go-to-flag block and a stop flag.

Define the properties.



**Block Properties**

**Properties**

- Block (GoTo Flag)**
  - Block Name: Loop\_End
- Block Properties**
  - Flag Marker: Loop\_Start
- Identifiers**
  - Loop\_Start
- Comments

Active Block: GoTo Flag    Style...    OK    Cancel

**Block Properties**

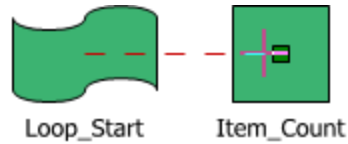
**Properties**

- Block (Stop Flag)**
  - Block Name: Loop\_Exit
- Block Properties**
  - What to Abort: AbortAnalysis
- Identifiers**

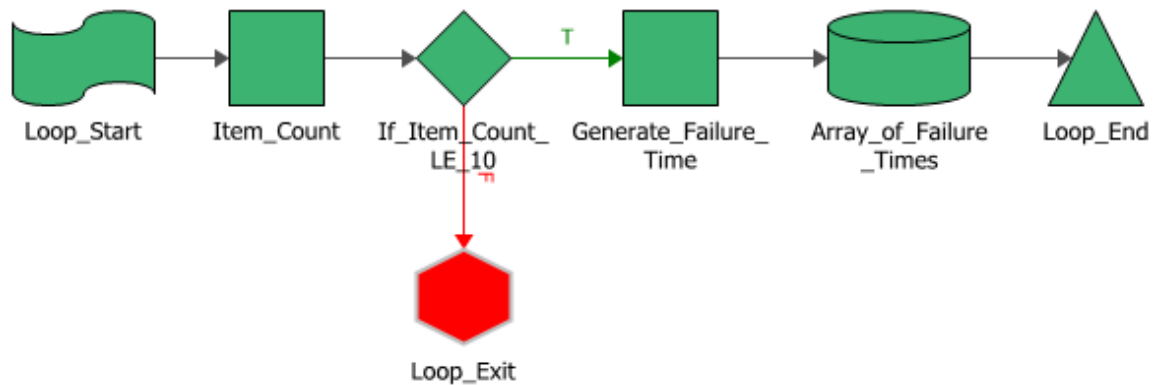
Active Block: Stop Flag    Style...    OK    Cancel

#### 4. Connect blocks

Connect the blocks as shown below. To create each connection, hold down the **ALT** key, click the source block and drag a line to the destination block.



The first connector you create from the conditional block will be marked as the "true" path and the second as the "false" path. If necessary, you can switch these designations by right-clicking the connector and choosing **Set to Failure** or **Set to Success** on the shortcut menu.

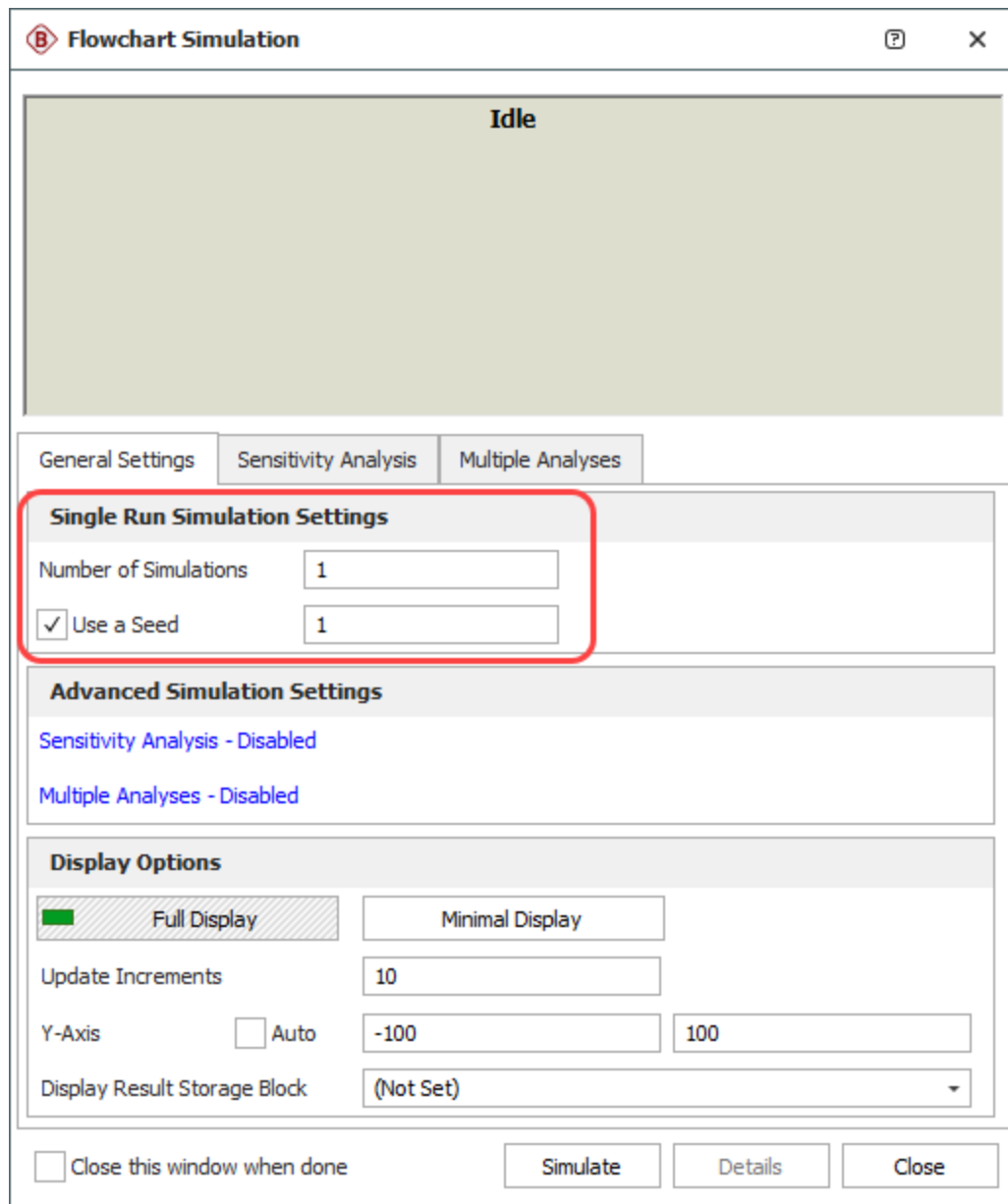


## 5. Simulate the flowchart

Click the **Simulate** icon on the control panel.



Specify to run a single simulation with a seed of 1 and click **Simulate**.



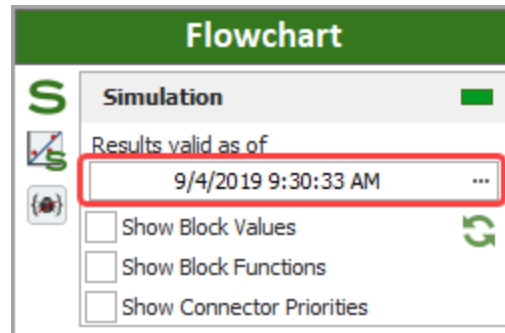
The image shows the 'Flowchart Simulation' dialog box. The main area is labeled 'Idle'. Below the main area are three tabs: 'General Settings', 'Sensitivity Analysis', and 'Multiple Analyses'. The 'General Settings' tab is selected and contains the following sections:

- Single Run Simulation Settings** (highlighted with a red box):
  - Number of Simulations: 1
  - ☒ Use a Seed: 1
- Advanced Simulation Settings**:
  - Sensitivity Analysis - Disabled
  - Multiple Analyses - Disabled
- Display Options**:
  - ☒ Full Display (selected) and ☐ Minimal Display
  - Update Increments: 10
  - Y-Axis: ☐ Auto, -100, 100
  - Display Result Storage Block: (Not Set)

At the bottom, there is a checkbox 'Close this window when done' and three buttons: 'Simulate', 'Details', and 'Close'.

## 6. View the simulation results

From within the Flowchart Simulation Window, click **Details**. If you have closed the window, click the **Results valid as of** field on the diagram control panel.



To view the failure times generated during the simulation, click the result storage block in the navigation panel.

The 'Simulation Results Explorer' window displays the 'Array\_of\_Failure\_Times' block selected in the navigation panel. The main area shows a table with the following data:

| Result # | Array_of_Failure_Times |
|----------|------------------------|
| 1        | 1930.926056            |
| 2        | 2008.575072            |
| 3        | 2546.727667            |
| 4        | 1291.008805            |
| 5        | 647.42902              |
| 6        | 2164.346878            |
| 7        | 1562.131953            |
| 8        | 525.730922             |
| 9        | 2397.02994             |
| 10       | 1653.12614             |

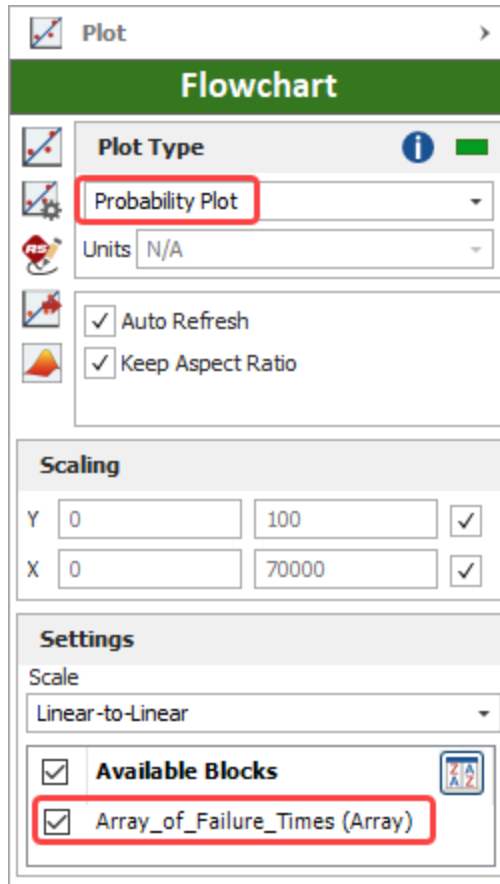
The table is titled 'Block Name: Array\_of\_Failure\_Times' and includes metadata such as 'Flowchart(s) Location: ->Event Analysis Flowchart1', 'Storage Type: Array', and 'Runs Stored: 1'. The bottom status bar indicates 'Event Analysis Flowchart1'.

## 7. View plots

Click the **Plot** icon on the diagram control panel to open the plot sheet.

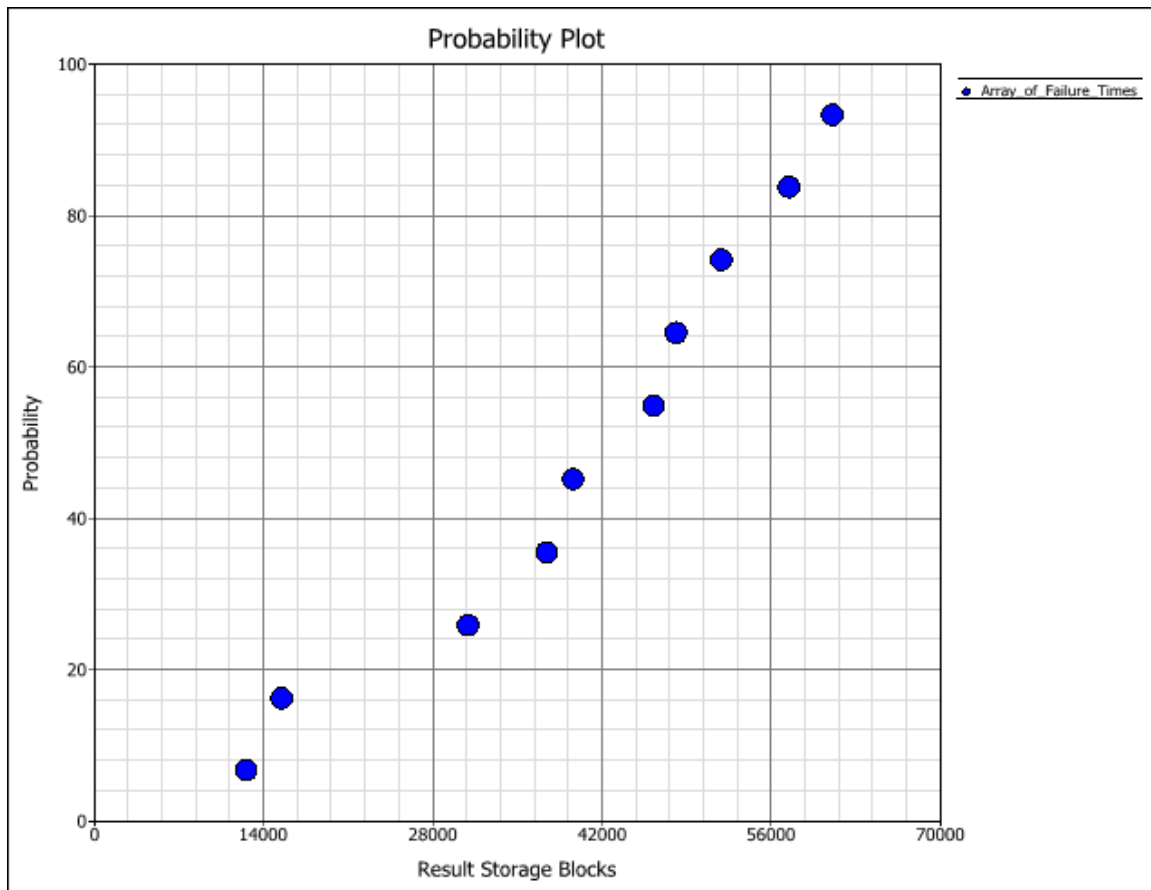


On the plot sheet control panel, choose the plot type, then select the result storage block(s) to show in the plot.



The screenshot shows the 'Plot' control panel with a green header bar labeled 'Flowchart'. The panel is divided into several sections:

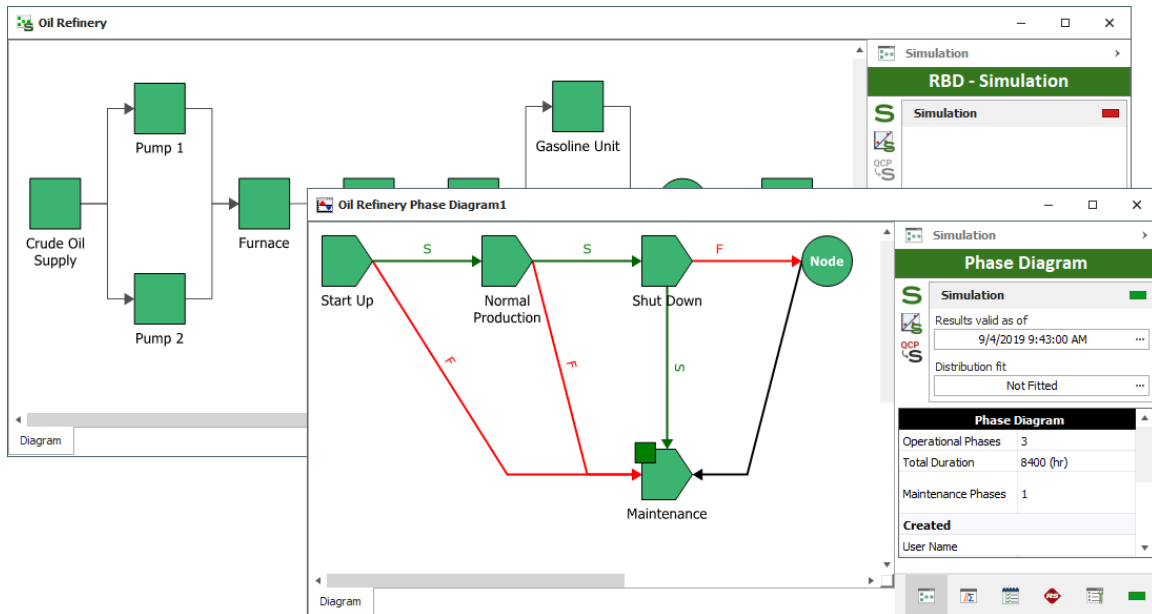
- Plot Type**: A dropdown menu set to 'Probability Plot' (highlighted with a red box).
- Units**: A dropdown menu set to 'N/A'.
- Auto Refresh**: A checked checkbox.
- Keep Aspect Ratio**: A checked checkbox.
- Scaling**: A section with two rows of input fields for Y and X axes. The Y-axis has values 0 and 100, and the X-axis has values 0 and 70000. Both rows have a checked checkbox.
- Settings**: A section with a 'Scale' dropdown set to 'Linear-to-Linear'.
- Available Blocks**: A section with a checked checkbox and a list of available blocks. The block 'Array\_of\_Failure\_Times (Array)' is highlighted with a red box.



## More Analyses and Tools

### Phase Diagrams

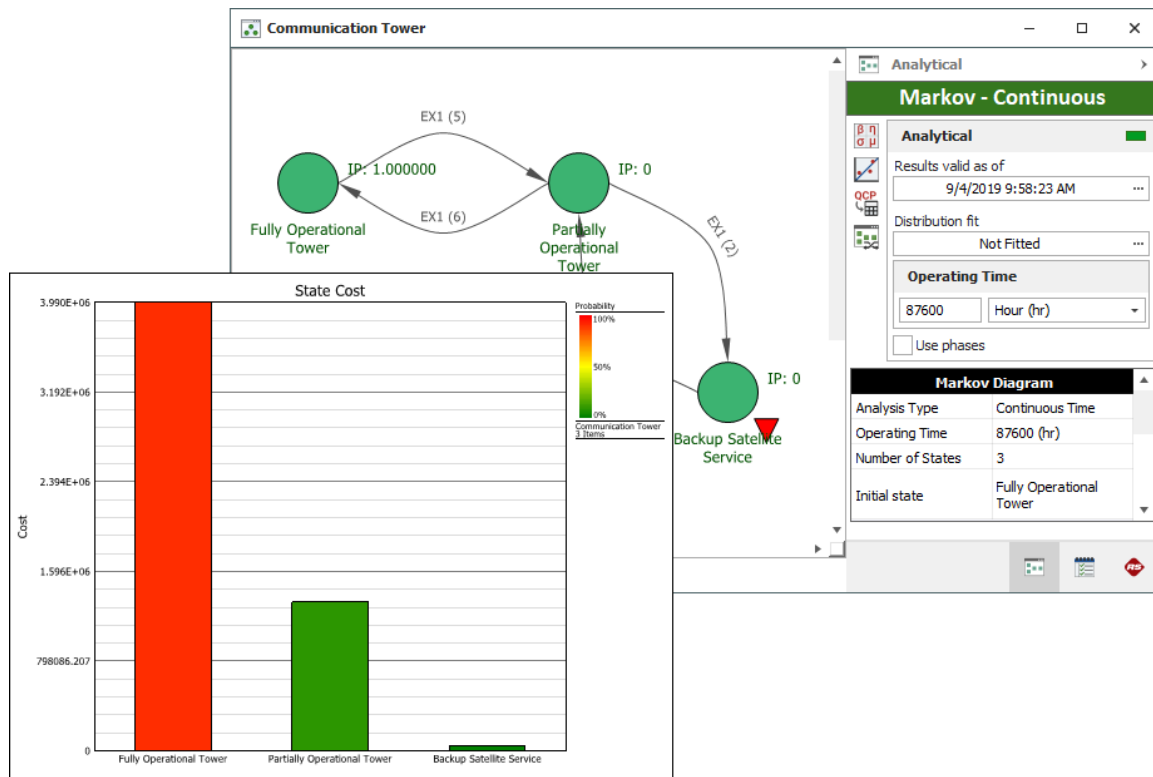
Reliability phase diagrams represent scenarios in which a system may undergo changes over time.





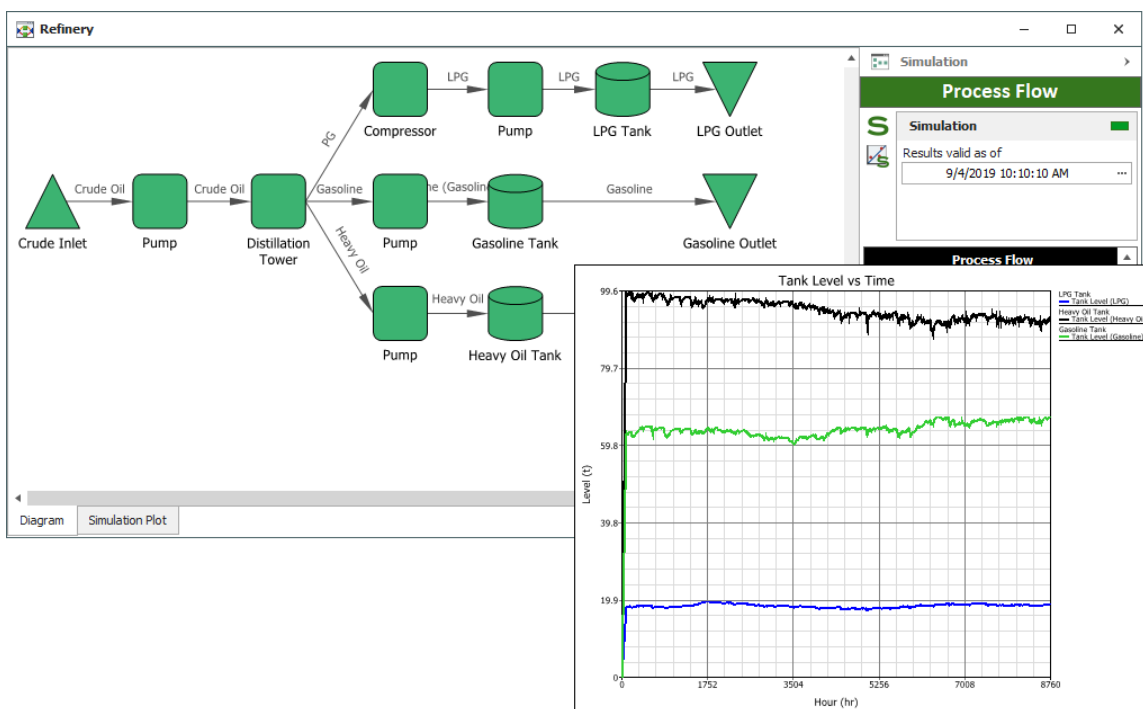
## Markov Diagrams

Markov diagrams model the behavior of systems based on memoryless transitions between states, allowing you to look at partial or degraded working states, and to start analysis in varying states.



## Process Flow Simulation Diagrams

A process flow simulation diagram is used to model a continuous process flow, typically a fluid flow, using a diagram in which the components are connected in flow-wise configuration. The simulation can be used to estimate the amount of raw material consumed by the process, as well as the amount of finished product and waste generated by the process in a given time frame.



## Reliability Allocation

The allocation analysis tool helps determine the reliability requirements for individual components/assemblies that would be needed to achieve an overall reliability goal.

The screenshot displays the 'Allocation Analysis1' window. It features a table with columns: Block Name, Reliability Importance, Current Reliability, Maximum Achievable Reliability, Feasibility, Target Reliability, Equivalent Parallel Units, and Comments. The table lists 'Subsystem A' and 'Subsystem B' with their respective reliability values. A red arrow points from 'Subsystem A' in the table to the 'Allocation Analysis' sidebar on the right. The sidebar includes an 'Allocation Type' dropdown set to 'Cost Optimized', a 'Refresh' button, and input/output fields for Target Reliability (0.968431), Time (500), Units (Hour (hr)), Iterations (50), Current Reliability (0.952914), and System Reliability (0.968431). It also shows 'Color Limits' and a 'Subsystem A' link.

| Block Name  | Reliability Importance | Current Reliability | Maximum Achievable Reliability | Feasibility | Target Reliability | Equivalent Parallel Units | Comments |
|-------------|------------------------|---------------------|--------------------------------|-------------|--------------------|---------------------------|----------|
| Subsystem A | 0.980968               | 0.952914            | 1                              | Easy (1)    | 0.968431           | 1.130834                  |          |
| Subsystem B | 0.952914               | 0.980968            | 1                              | Hard (9.9)  | 0.980968           | 1.000000                  |          |

| Block Name | Reliability Importance | Current Reliability | Maximum Achievable Reliability | Feasibility  | Target Reliability | Equivalent Parallel Units | Comments |
|------------|------------------------|---------------------|--------------------------------|--------------|--------------------|---------------------------|----------|
| Assembly A | 0.998807               | 0.954052            | 1                              | Moderate (5) | 0.969342           | 1.131355                  |          |
| Assembly B | 0.037541               | 0.979923            | 1                              | Moderate (5) | 0.986369           | 1.099088                  |          |
| Assembly B | 0.037541               | 0.979923            | 1                              | Moderate (5) | 0.979923           | 1.000000                  |          |
| Assembly B | 0.037541               | 0.979923            | 1                              | Moderate (5) | 0.979923           | 1.000000                  |          |

**Allocation Analysis**

Allocation Type: Cost Optimized

Refresh

**Inputs**

Target Reliability: 0.968431

Time: 500

Units: Hour (hr)

Iterations: 50

**Outputs**

Current Reliability: 0.952914

System Reliability: 0.968431

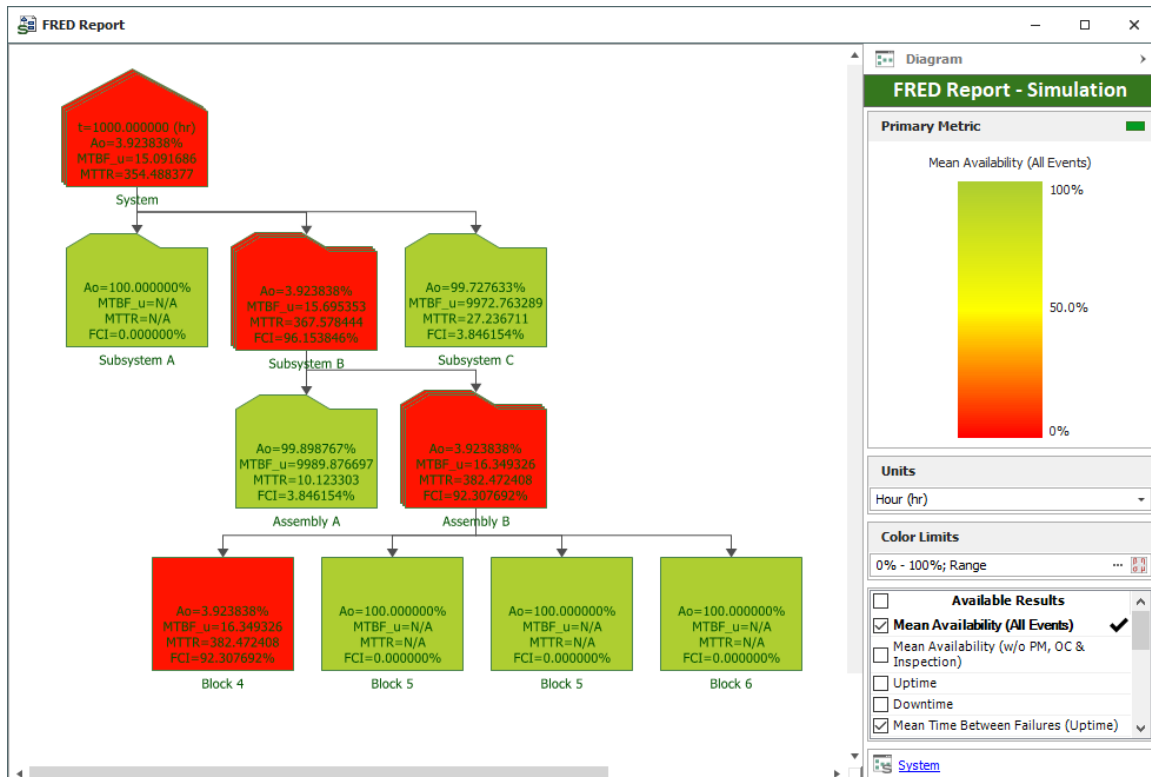
**Color Limits**

0.00% - 100.00%; Range

Subsystem A

## FRED Reports

FRED reports provide a graphical demonstration of the reliability and maintainability/availability characteristics of the components in a system and help to identify the components that may require improvement.



## Optimum Replacement

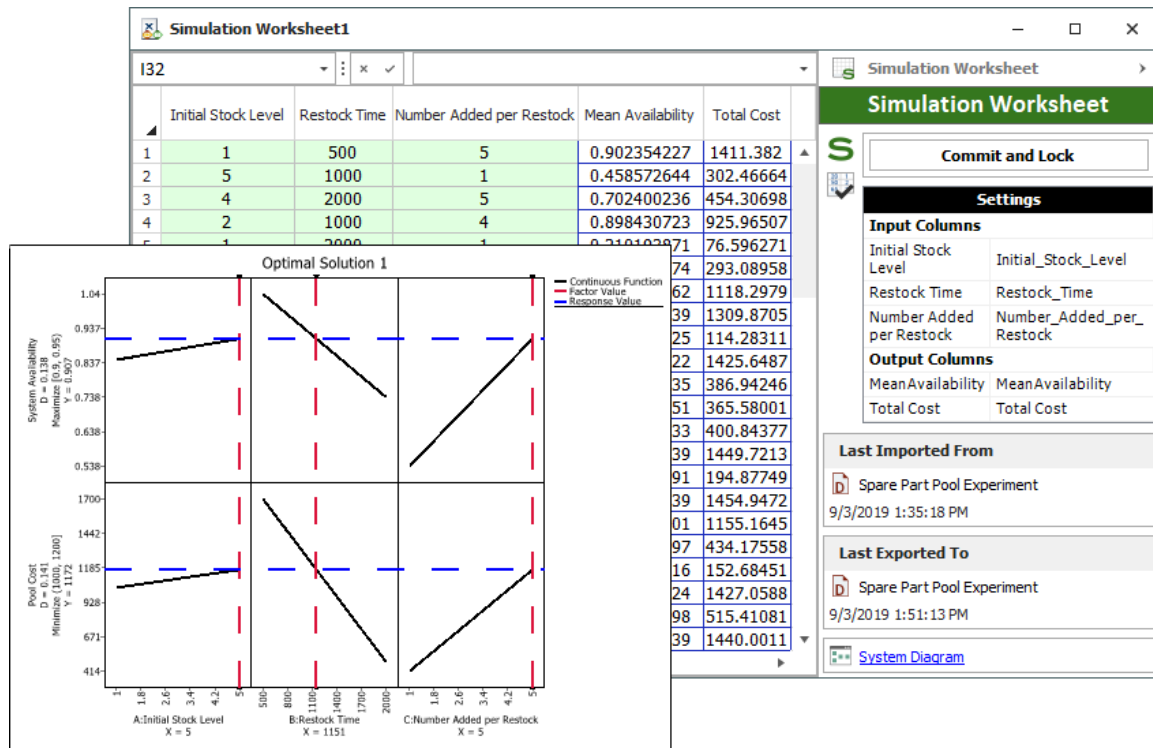
The Optimum Replacement tool helps to determine the best time to inspect and/or replace components, based on the costs for planned and unplanned maintenance.

| Block Name   | Planned Replacement Cost | Unplanned Replacement Cost | Optimum Replacement Time (hr) | Replacement Cost per Unit Time (hr) |
|--------------|--------------------------|----------------------------|-------------------------------|-------------------------------------|
| Oil & Filter | 30                       | 5000                       | 3196.434610                   | 0.011045                            |
| Water Pump   | 700                      | 4000                       | 37209.829755                  | 0.038682                            |
| Timing Belt  | 800                      | 4500                       | 37209.829755                  | 0.036619                            |
| Air Filter   | 25                       | 1500                       | 3196.434610                   | 0.012295                            |
| Spark Plugs  | 80                       | 250                        | 37209.829755                  | 0.008932                            |
| Fuel Filter  | 70                       | 800                        | 10920.363780                  | 0.009673                            |

Replacement Cost Per Unit Time (hr) 0.117246

## Simulation Worksheets

Simulation worksheets can vary values that are used when simulating an RBD or a flowchart, allowing you to investigate the effect of various factors on the simulation results (e.g., how the restocking interval and initial quantity in a spare part pool affect the cost of maintaining a system). The values can be entered manually, or can be transferred from an experiment design folio in Weibull++. After simulation, you can transfer the results into the design folio in Weibull++ for analysis and/or optimization.



# End User License Agreement

*Click Wrap Agreement at time of product installation*

BY INSTALLING THIS SOFTWARE OR BY CLICKING THE "I ACCEPT" BUTTON AND ACCEPTING THIS LICENSE IN ACCORDANCE WITH SECTION D (LICENSE ACCEPTANCE PROCEDURES) YOU AGREE TO THE TERMS OF THIS LICENSE WHICH WILL BIND YOU, THE COMPANY ON WHOSE BEHALF YOU ARE ENTERING INTO THIS LICENSE AGREEMENT, AND ITS EMPLOYEES, AS APPLICABLE.

THIS LICENSE AGREEMENT IS A LEGAL AGREEMENT BETWEEN HOTTINGER BRUEL & KJAER UK LTD, A COMPANY INCORPORATED IN THE UNITED KINGDOM, WHOSE REGISTERED NUMBER IS 1589921 AND WHOSE REGISTERED OFFICE IS AT TECHNOLOGY CENTRE, ADVANCED MANUFACTURING PARK, BRUNEL WAY, CATCLIFFE, ROTHERHAM S60 5WG (THE "LICENSOR") AND THE END USER LICENSEE OR ITS REPRESENTATIVE/AGENT AUTHORISED TO BIND THE END USER LICENSEE (REFERENCED HEREIN AS "YOU" OR "YOUR").

**PLEASE READ THIS CAREFULLY BEFORE USING THE SOFTWARE PRODUCT**

## **A: BACKGROUND**

THIS LICENSE AGREEMENT SHALL BE BETWEEN YOU AND THE LICENSOR REGARDLESS OF WHETHER YOU HAVE PURCHASED THE SOFTWARE PRODUCT DIRECTLY FROM THE LICENSOR OR AN AUTHORISED RESELLER AS SET OUT BELOW.

THE LICENSOR APPOINTS EXPERIENCED PROVIDERS OF SOFTWARE RESALE SERVICES WHO DISTRIBUTE THE SOFTWARE PRODUCT TO END USERS ("AUTHORISED RESELLER"). IF YOU HAVE PURCHASED THE SOFTWARE PRODUCT AND ANY ASSOCIATED SUPPORT AND MAINTENANCE SERVICES FROM AN AUTHORISED RESELLER, SUCH PRODUCTS AND SERVICES WILL BE PROVIDED DIRECTLY TO YOU BY THE RELEVANT AUTHORISED RESELLER AND ALL PAYMENTS SHALL BE MADE TO THE AUTHORISED RESELLER ON THE AUTHORISED RESELLER'S TERMS AND PRICES.

IF YOU HAVE PURCHASED THE SOFTWARE PRODUCT AND SUPPORT AND MAINTENANCE SERVICES DIRECTLY FROM THE LICENSOR, SUCH SUPPORT AND MAINTENANCE SERVICES WILL BE DEALT WITH IN A SEPARATE AGREEMENT

BETWEEN YOU AND THE LICENSOR AND ALL PAYMENTS WILL BE MADE TO THE LICENSOR AND GOVERNED BY THE LICENSOR'S TERMS OF SALE.

## **B: PROPERTY OF LICENSOR**

THE LICENSOR, OR, WHERE APPLICABLE, THE RELEVANT MEMBER OF THE LICENSOR'S CORPORATE GROUP, IS THE ENTIRE LEGAL AND BENEFICIAL OWNER OF CERTAIN SOFTWARE PRODUCT(S) (THE "SOFTWARE PRODUCT") AS SET OUT IN THE QUOTATION OF INFORMATION, WHICH SHALL ALSO INCLUDE YOUR LICENSE KEY, SENT TO YOU BY EMAIL EITHER BY THE LICENSOR OR, IF YOU HAVE PURCHASED THE SOFTWARE PRODUCT FROM AN AUTHORISED RESELLER, BY THE AUTHORISED RESELLER ("QUOTATION"). THE LICENSOR IS WILLING TO GRANT YOU A LICENSE TO USE THE SOFTWARE PRODUCT ONLY IF YOU ACCEPT ALL THE TERMS AND CONDITIONS SET OUT BELOW.

## **C: LICENSE TO BE GRANTED**

THE LICENSOR IS PROPOSING TO GRANT YOU ONE OF THE FOUR FORMS OF LICENSES IN RESPECT OF THE SOFTWARE PRODUCT. THE DETAILS OF EACH FORM OF LICENSE ARE SET OUT IN CLAUSES 2.1 AND 3 BELOW. THE FORM OF LICENSE THAT IS PROPOSED TO BE GRANTED TO YOU IS SET OUT IN THE QUOTATION. THE QUOTATION FORMS PART OF THE LICENSE AGREEMENT AND BY ACCEPTING THE TERMS OF THE LICENSE YOU ARE ACCEPTING THOSE TERMS IN THE QUOTATION. IF YOU HAVE NOT RECEIVED THE QUOTATION FROM EITHER THE LICENSOR OR FROM THE AUTHORISED RESELLER (IF YOU HAVE PURCHASED THE SOFTWARE PRODUCT FROM AN AUTHORISED RESELLER) AT THE DATE HEREOF OR IF ANY DETAILS WITHIN THE QUOTATION ARE INCORRECT THEN YOU SHOULD FOLLOW THE "LICENSE REJECTION PROCEDURES" SET OUT AT PARAGRAPH E BELOW AND IMMEDIATELY CONTACT THE LICENSOR OR THE AUTHORISED RESELLER (AS APPLICABLE).

## **D: LICENSE ACCEPTANCE PROCEDURES**

BY CLICKING ON THE ACCEPTANCE BUTTON WHICH FOLLOWS THIS LICENSE AGREEMENT (MARKED "I ACCEPT") IN THE UI, YOU INDICATE ACCEPTANCE OF THIS LICENSE AGREEMENT AND THE LIMITED WARRANTY AND LIMITATION OF LIABILITY SET OUT IN THIS LICENSE AGREEMENT. SUCH ACCEPTANCE IS ON YOUR OWN BEHALF, IF YOU ARE AN INDIVIDUAL, AND ON BEHALF OF ANY CORPORATE ENTITY WHICH EMPLOYS YOU OR WHICH YOU REPRESENT



("CORPORATE LICENSEE") IN ENTERING INTO THIS LICENSE AND YOU WARRANT THAT YOU HAVE THE NECESSARY AUTHORITY TO BIND THE CORPORATE ENTITY IN THIS RESPECT OR THAT THE AUTHORISED REPRESENTATIVES OF THE CORPORATE ENTITY ARE AWARE OF YOUR ACCEPTANCE OF THIS AGREEMENT ON ITS BEHALF. IN THIS LICENSE AGREEMENT, "YOU" REFERS TO THE LICENSEE, ANY SUCH CORPORATE LICENSEE, OR BOTH, AS A COMMON SENSE INTERPRETATION OF THE RELEVANT SECTION DICTATES.

## **E: LICENSE REJECTION PROCEDURES**

IF YOU DO NOT ACCEPT THESE TERMS AND CONDITIONS, YOU SHOULD CLICK ON THE "I DO NOT ACCEPT" BUTTON IN THE UI, DELETE THE SOFTWARE PRODUCT FROM YOUR COMPUTER AND PROMPTLY (AND IN ANY EVENT, WITHIN 14 DAYS OF RECEIPT) RETURN TO THE RESELLER (A) ANY MEDIA; AND (B) ANY OTHER ITEMS PROVIDED, THAT ARE PART OF THIS PRODUCT.

## **F: OTHER AGREEMENTS**

IF THE LICENSOR HAS EXPRESSLY AGREED WITH YOU IN WRITING THAT YOUR USE OF THE SOFTWARE PRODUCT IS GOVERNED BY A PRIOR EXECUTED LICENSE AGREEMENT WITH THE LICENSOR, SUCH AGREEMENT SHALL APPLY INSTEAD OF THE FOLLOWING TERMS AND CONDITIONS TO THE EXTENT THAT THEY CONFLICT.

YOU SHOULD PRINT A COPY OF THIS LICENSE AGREEMENT FOR FUTURE REFERENCE.

## **LICENSE AGREEMENT**

### **1. Ownership of Software Product and Copies**

1.1 The Software Product and any printed materials or electronic documentation accompanying the Software Product ("**Documentation**") are copyrighted works of authorship, and are also protected under applicable database laws. The Licensor, or, where applicable, the relevant member of the Licensor's corporate group, retains ownership of the Software Product and all subsequent copies of the Software Product, regardless of the form in which the copies may exist. This License Agreement is not a sale of the original Software Product or any copies.

## 2. Commercial License

2.1 In consideration of You agreeing to abide by the terms of this License Agreement and payment of the applicable License fees either to the Licensor or, if You have purchased the Software Product from an Authorised Reseller, to the Authorised Reseller (as specified in the Quotation), the Licensor hereby grants to You a personal, non-exclusive, and (unless expressly agreed otherwise by the Licensor in accordance with clause 5.1) non-transferable License to use the Software Product and the Documentation on the terms of this License Agreement. The License shall take one of the following forms, and shall be set out in the Quotation:

### **(a) Annual License:**

(i) Duration – this License shall continue for a period of 12 months ("Initial Period") from the date of delivery of the Quotation ("the Delivery Date") and, provided that You have paid all applicable renewal fees, from year to year thereafter unless terminated in accordance with any provision of clause 10 below or any other clause of this License Agreement.

(ii) Termination – You must give the Licensor 90 days' written notice prior to the anniversary of the Delivery Date, such notice not to expire before such anniversary date.

### **(b) Perpetual License:**

(i) Duration – this License shall continue for a period of 25 years from the Delivery Date unless terminated in accordance with any provision of clause 10 below or any other clause of this License Agreement.

(ii) Conversion – this License may be converted to a Token Based Annual License, upon application to either the Licensor or the Authorised Reseller (if You have purchased the Software Product from an Authorised Reseller), and payment of an additional fee to the Licensor or the Authorised Reseller(as applicable), which shall be additional to the fees paid or payable in respect of any maintenance and support services provided by either by the Licensor or the Authorised Reseller (if You have purchased the Software Product from an Authorised Reseller). You may reverse this conversion to the same terms as agreed in the Perpetual License at the anniversary of the conversion by giving the Licensor 90 days' written notice prior to the anniversary of the Delivery Date, such notice not to expire before the anniversary of the Delivery Date.

### **(c) Token Based Annual License (referenced in the Quotation as a Prenscia Access System, CDS, CRS, or CDRS License):**

(i) Subject to the terms and conditions of this License Agreement, You may access any of the Software Product in the Quotation at any one time and in any combination up to the number of subscriptions granting You access to the Software Product for simultaneous use by You and purchased by You pursuant to this Agreement ("Access Credits"). You may add additional Access Credits which shall be charged in accordance with either the Licensor's prices or the Authorised Reseller's prices (if You have purchased the Software Product from an Authorised Reseller). Such increase in Access Credits shall apply to the following 12 month period, unless You give the Licensor or the Authorised Reseller (as applicable) written notice at least 90 days in advance of the expiration of the Initial Period, that You do not wish to sustain such increase in Access Credits. You may opt to reduce the number of Access Credits with 90 days' written notice in advance of the 12 month period following from the anniversary of the Delivery Date, provided that the total number of Access Credits does not fall below the minimum threshold set by the Licensor or the Authorised Reseller (as applicable) or below the initial number of Access Credits calculated at the time of conversion of any Perpetual License.

(ii) Duration – this License shall continue for the Initial Period and, provided that You have paid for the applicable Access Credits, from year to year thereafter unless terminated in accordance with any provision of clause 10 below or any other clause of this License Agreement.

(iii) Reporting – in order to serve the Licensor's customers better, the Licensor needs to be able to understand how its customers use the Token Based Annual License. As a condition of Your continued access to the system, You are asked to provide to the Licensor on a quarterly basis, the log file. You will be provided with easy-to-follow instructions on how to do this.

(iv) Termination – You must give the Licensor 90 days' written notice in advance of the expiration of the Initial Period of Your intention to discontinue the Token Based Annual License, such notice not to expire before the anniversary of the Delivery Date, and You must have submitted all reports required of You in clause 2.1(c)(iii) above. Failure to provide such notice and reports will mean that the License shall automatically continue on the same terms until terminated in accordance with this clause.

2.2 As an end user licensee of the Software Product, You may, subject to the following conditions and any conditions specified in the Quotation:

(a) use and copy the Software Product only for use on any computer system that is detailed in the release notes of the respective Software Product and which is licensed, leased and/or controlled by You (the Corporate Licensee) or any member of Your corporate group, which expression includes the Corporate Licensee's majority-owned subsidiaries, any parent

company having a majority-owned interest in the Corporate Licensee, and such parent's majority-owned subsidiaries;

(b) load the Software Product into and use it only on computers at the locations specified in the Quotation and which are under Your control; and

(c) copy the Software Product only for back-up and archival purposes and make up to three copies of the Documentation, provided that the original and each copy is kept in Your possession and that Your installation and use of the Software Product does not exceed any restrictions contained in the Quotation.

### **3. Demonstration License**

3.1 If the Licensor has provided You with the Software Product free of charge for evaluation purposes, this clause 3 shall apply to Your use of the Software Product.

3.2 You may use the Software Product on a computer solely for the purposes of evaluating the Software Product.

3.3 The Software Product is provided to You free of charge and on an “AS IS” basis, without any technical support or warranty of any kind from the Licensor including, without limitation, a warranty of satisfactory quality, fitness for purpose and non-infringement.

3.4 This License shall continue for a period of 30 days from the Delivery Date unless terminated in accordance with any provision of clause 10 below or any other applicable clause of this License Agreement or until such License is converted into an Annual License, Perpetual License or Token Based Annual License, if earlier.

3.5 As part of the Licensor’s testing and evaluation of the Software Product, You shall share with the Licensor the input and views received and any reports and analysis produced promptly upon receipt of such feedback.

3.6 Clauses 4, 5.1(a), 6.1(b), 6.1(f), 8.1, 8.2, 8.5, 10.1(a) of this License Agreement shall not apply to a Demonstration License.

### **4. Delivery and Risk**

4.1 The Software Product shall consist of one copy of the object code of the Software Product on machine-readable form only, on the disk, dongle or other media on which the Software Product is delivered as described in the Quotation (the “Media”). Risk in the Media shall pass to You on delivery. If any part of the Media shall thereafter be lost, damaged or destroyed, You must contact either the Licensor or the Authorised Reseller from whom You have purchased the

Software Product who will arrange for a repair or replacement of such Media at a cost (if any) determined by the Licensor or the Authorised Reseller (as applicable).

## **5. License Restrictions**

5.1 You may not nor permit others to:

- (a) transfer the Software Product from one location to another, without the express written consent of the Licensor and provided such transfers do not exceed two in any twelve month period. It will be a condition of the grant of any such consent that the Software Product held on hard drives at the current location must be erased and You must enter into a new License agreement with the Licensor before a Software Product License key is provided to You. The administration charge (currently US \$1,500) will be payable by You in respect of such transfer. This charge is only applicable to end user licensees who do not have a support and maintenance services agreement with the Licensor or Authorised Reseller;
- (b) exceed the number of concurrent users specified in the Quotation, if any;
- (c) sub-License, sell, assign, rent, pledge, lease, transfer or otherwise dispose of the Software Product, on a temporary or permanent basis, without the prior written consent of the Licensor;
- (d) translate, reverse engineer, decompile, disassemble, modify or create derivative works based on the Software Product except as permitted by law;
- (e) make copies of the Software Product, in whole or part, except for back-up or archival purposes as permitted in this License Agreement;
- (f) use any back-up copy of the Software Product for any purpose other than to replace the original copy in the event that it is destroyed or becomes defective;
- (g) copy the Documentation (except as provided by this License Agreement);
- (h) adapt, modify, delete or translate the Documentation in any way for any purpose whatsoever;
- (i) vary, delete or obscure any notices of proprietary rights or any product identification or restrictions on or in the Software Product.

## 6. Open Source

Notwithstanding the foregoing provisions, You acknowledge that certain components of the Software Product may be covered by so-called open source software licenses (“Open Source Components”), which means any software licenses approved as open source licenses by the Open Source Initiative or any substantially similar licenses, including without limitation any license that, as a condition of distribution of the software licensed under such license, requires that the distributor make the software available in source code format. To the extent required by the licenses covering Open Source Components, the terms of such licenses will apply to such Open Source Components in lieu of the terms of this Agreement. To the extent the terms of the licenses applicable to Open Source Components prohibit any of the restriction in this License Agreement with respect to such Open Source Components, such restrictions will not apply to such Open Source Components. To the extent the terms of the licenses applicable to Open Source Components require Licensor to make an offer to provide source code or related information in connection with the Software Product, such offer is hereby made. Any request for source code or related information should be directed only to Customer Support, Hottinger Bruel & Kjaer UK LTD, AMP Technology Centre, Brunel Way, Catcliffe, Rotherham, South Yorkshire, S60 5WG, United Kingdom. You acknowledge receipt of notices for the Open Source Components for the initial delivery of the Software Product

## 7. Undertakings

### 7.1 You undertake:

- (a) to ensure that, prior to use of the Software Product by Your employees or agents, all such parties are notified of this License and the terms of this License Agreement and that any such use as aforesaid is in accordance with the terms of this License Agreement;
- (b) to replace the current version of the Software Product with any updated or upgraded version or new release provided by the Licensor or the Authorised Reseller (if applicable) under the terms of this License Agreement immediately on receipt of such version or release;
- (c) to use the Software Product only as described in the Documentation and subject to the restrictions as set out in clause 5 (License Restrictions above);
- (d) to reproduce and include the Licensor’s copyright notice (or such other party’s copyright notice as specified on the Software Product) on all and any copies of the Software Product, including any partial copies of the Software Product as permitted to be made under the terms of this License Agreement;

(e) to hold all drawings, specifications, data (including object and source codes), Software Product listings and all other information relating to the Software Product confidential and not at any time, during this License or after its expiration, disclose the same, whether directly or indirectly, to any third party without the Licensor's consent and

(f) to effect and maintain adequate security measures to safeguard the Software Product from access or use by any unauthorised person and indemnify the Licensor for losses flowing from Your failure to do so.

## **8. Intellectual Property Rights**

8.1 You acknowledge that all intellectual property rights in the Software Product and the Documentation throughout the world belong to the Licensor, that rights in the Software Product are licensed (not sold) to You, and that You have no rights in, or to, the Software Product or the Documentation other than the right to use them in accordance with the terms of this License Agreement.

8.2 You acknowledge that You have no right to have access to the Software Product in source code form or in unlocked coding or with comments.

8.3 The integrity of this Software Product is protected by technical protection measures ("TPM") so that the intellectual property rights, including copyright, in the software of the Licensor are not misappropriated. You must not attempt in any way to remove or circumvent any such TPM, nor to apply, manufacture for sale, hire, import, distribute, sell, nor let, offer, advertise or expose for sale or hire, nor have in Your possession for private or commercial purposes, any means whose sole intended purpose is to facilitate the unauthorised removal or circumvention of such TPM.

## **9. Limited Warranty**

9.1 Subject to the limitations and exclusions of liability below and providing the Software is used in accordance with the Documentation and on an operating system or computer for which it was designed, the Licensor warrants that (a) the Media on which the Software Product is furnished will be free from material defects under normal use for a period of 90 days from the date of delivery (the "Warranty Period"); and that (b) during the Warranty Period, the Software Product will, when properly used, perform substantially in accordance with the functions described in the Documentation; and (c) that the Documentation correctly describes the operation of the Software Product in all material respects.

9.2 If, within the Warranty Period, You notify the Licensor in writing of any defect or fault in the Software Product in consequence of which it fails to perform substantially in accordance

with the Documentation, and such defect or fault does not result from You having amended the Software Product or used it in contravention of the terms of this License Agreement, the Licensor will, at its sole option, i) repair or replace the Software Product, provided that You make available all information that may be necessary to assist the Licensor in resolving the defect or fault, including sufficient information to enable the Licensor to recreate the defect or fault, or ii) terminate this License Agreement immediately by notice in writing to You and the Licensor will refund or if the Software Product has been purchased from an Authorised Reseller will procure that the Authorised Reseller shall refund; any of the fees paid as at the date of termination (less a reasonable sum in respect of Your use of the Software Product to the date of termination) on return of the Software Product and all copies thereof. The Licensor's obligation under this clause 8.2 is subject to Your compliance with clause 6.1(b).

9.3 You acknowledge that the Software Product has not been developed to meet Your individual requirements and that it is therefore Your responsibility to ensure that the facilities and functions of the Software Product as described in the Documentation meet Your requirements.

9.4 You acknowledge that the Software Product may not be free of bugs or errors and You agree that the existence of any minor errors shall not constitute a breach of this License Agreement.

9.5 The Licensor shall not be liable under the said warranty above if the Software Product fails to operate in accordance with the said warranty as a result of any modification, variation or addition to the Software Product not performed by the Licensor or caused by any abuse, corruption or incorrect use of the Software Product, including use of the Software Product with equipment or other software which is incompatible.

9.6 All other conditions, warranties or other terms which might have effect or be implied or incorporated into this License Agreement or any collateral contract, whether by statute, common law or otherwise, are hereby excluded, including, without limitation, the implied conditions, warranties or other terms as to satisfactory quality, fitness for purpose or the use of reasonable skill and care.

## **10. Exclusion of Liability**

10.1 Nothing in this License Agreement shall limit or exclude the liability of either party for death or personal injury resulting from negligence, for fraud or for fraudulent misrepresentation.

10.2 Subject to clause 9.1, the Licensor shall have no liability for any losses or damages which may be suffered by You (or any person claiming under or through You), whether the same are suffered directly or indirectly or are immediate or consequential, and whether the same arise in



contract, tort (including negligence) or otherwise howsoever, which fall within any of the following:

- (a) loss of income;
- (b) loss of business profits or contracts;
- (c) business interruption;
- (d) loss of the use of money or anticipated savings;
- (e) loss of information;
- (f) loss of opportunity, goodwill or reputation;
- (g) loss of, damage to or corruption of data; or
- (h) any indirect or consequential loss or damage of any kind howsoever arising and whether caused by tort (including negligence), breach of contract or otherwise;

provided that this clause 9.2 shall not prevent claims for loss of or damage to Your tangible property that fall within the terms of clause 8 or a claim for a refund of the License fees paid to the Licensor or the Authorised Reseller (as applicable) for the License of the Software Product.

10.3 Subject to clause 9.1 and clause 9.2, the Licensor's maximum aggregate liability under or in connection with this License Agreement, or any collateral contract, whether in contract, tort (including negligence) or otherwise, shall be limited to a sum equal to the fees paid by You to the Licensor or the Authorised Reseller (as applicable) for the License of the Software Product.

10.4 Subject to clause 9.1, clause 9.2 and clause 9.3, the Licensor's liability for infringement of third party intellectual property rights shall be limited to breaches of third party rights subsisting in the UK and USA.

10.5 This License Agreement sets out the full extent of the Licensor's obligations and liabilities in respect of the supply of the Software and Documentation. In particular, there are no conditions, warranties, representations or other terms, express or implied, that are binding on the Licensor except as specifically stated in this License Agreement. Any condition, warranty, representation or other term concerning the supply of the Software and Documentation which might otherwise be implied into, or incorporated in, this License Agreement, or any collateral contract, whether by statute, common law or otherwise, is hereby excluded to the fullest extent permitted by law.

## 11. Term and Termination

11.1 This License Agreement is effective for the period referred to in clause 2.1 or until otherwise terminated in accordance with that clause. The Licensor may terminate this License Agreement immediately by written notice to You if:

- (a) save in respect of a Perpetual License, if You purchase the Software Product directly from the Licensor, You fail to pay any renewal or other fees due by You to the Licensor in respect of this License Agreement;
- (b) You fail to comply with any provisions of this License Agreement;
- (c) You commit a material or persistent breach of this License Agreement which You fail to remedy (if remediable) within 14 days after the service on You of written notice requiring You to do so;
- (d) a petition for a bankruptcy order to be made against You has been presented to the court; or
- (e) where You, as the Corporate Licensee, become insolvent or unable to pay its (the company's) debts, enters into liquidation, whether voluntary or compulsory (other than for reasons of bona fide amalgamation or reconstruction), passes a resolution for its winding-up, has a receiver or Administrator manager, trustee, liquidator or similar officer appointed over the whole or any part of its assets, makes any composition or arrangement with its creditors or takes or suffers any similar action in consequence of its debt, or becomes unable to pay its debts or ceases to trade.

11.2 In the event of termination in accordance with clause 10.1, You must immediately pay to the Licensor any sums due to the Licensor under the License Agreement and (at the Licensor's sole option) You must return, destroy or delete all copies of the Software Product from all storage media in Your control and, in the case of destruction, certify to the Licensor that You have done so.

## 12. Export

12.1 You will comply with all applicable laws, rules, and regulations governing export of goods and information, including the laws of the countries in which the Software Product was created. In particular, You will not export or re-export, directly or indirectly, separately or as a part of a system, the Software Product or other information relating thereto to any country for which an export License or other approval is required, without first obtaining such License or other approval.

## 13. General

13.1 You agree that the Licensor shall have the right, after supplying undertakings as to confidentiality, to audit any computer system on which the Software Product are installed in order to verify compliance with this License Agreement.

13.2 You agree that the Licensor may use Your company name in Licensor's customer lists and other promotional materials describing Your company as a customer or user of Licensor's software or services, as applicable, unless it receives written notice from You objecting to such use.

13.3 This License Agreement, its subject matter or its formation (including non-contractual disputes or claims) shall be governed by and construed in accordance with English law and submitted to the non-exclusive jurisdiction of the English courts.

13.4 This License Agreement constitutes the complete and exclusive statement of the agreement between the Licensor and You with respect to the subject matter of this License and supersedes all proposals, representations, understandings and prior agreements, whether oral or written, and all other communications between the parties relating to that subject matter except for those expressly referred to in this License Agreement.

13.5 Any clause in this License Agreement that is found to be invalid or unenforceable shall be deemed deleted and the remainder of this License Agreement shall not be affected by that deletion.

13.6 Failure or neglect by either party to exercise any of its rights or remedies under this License Agreement will not be construed as a waiver of that party's rights nor in any way affect the validity of the whole or part of this License Agreement nor prejudice that party's right to take subsequent action.

13.7 This License Agreement is personal to You and You may not assign, transfer, sub-contract or otherwise part with this License or any right or obligation under it without the Licensor's prior written consent.

13.8 In certain cases as indicated during installation, the Software Products track and store anonymized usage data so that Licensor can better understand how the Software Products are being used. The information tracked and stored does not contain any identifying information for any of the users beyond a single machine-based identifier that Licensor does not track anywhere else. In addition, the tracking mechanism does not collect any proprietary information, but stores data relating to the usage of the Software or may communicate with computers controlled by Licensor in order to report such collected data. Where usage data is available to be tracked, there is a prompt during installation to opt out of this data collection and this can be turned on,

or off, at any time within the software applications themselves within the standard user settings. Licensor shall not provide any of the information it gathers in connection with this tracking process to any third party, except as may be required by law or legal process.