

Quick Tour



Weibull++

VERSION 2021

ReliaSoft

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Quick Tour of Weibull++

Weibull++ offers the most comprehensive toolset available for **reliability life data analysis**, with support for all life data types and all commonly used product lifetime distributions.

Accelerated Life Testing (ALTA) and **Accelerated Life Testing PRO (ALTA PRO)** utilize powerful life-stress relationship models to design and analyze data from **accelerated life tests**.

Reliability Growth (RGA) supports all of the major **reliability growth models** and can analyze data from both developmental testing and fielded repairable systems. It also includes a comprehensive toolset for advanced reliability growth projections, planning and management.

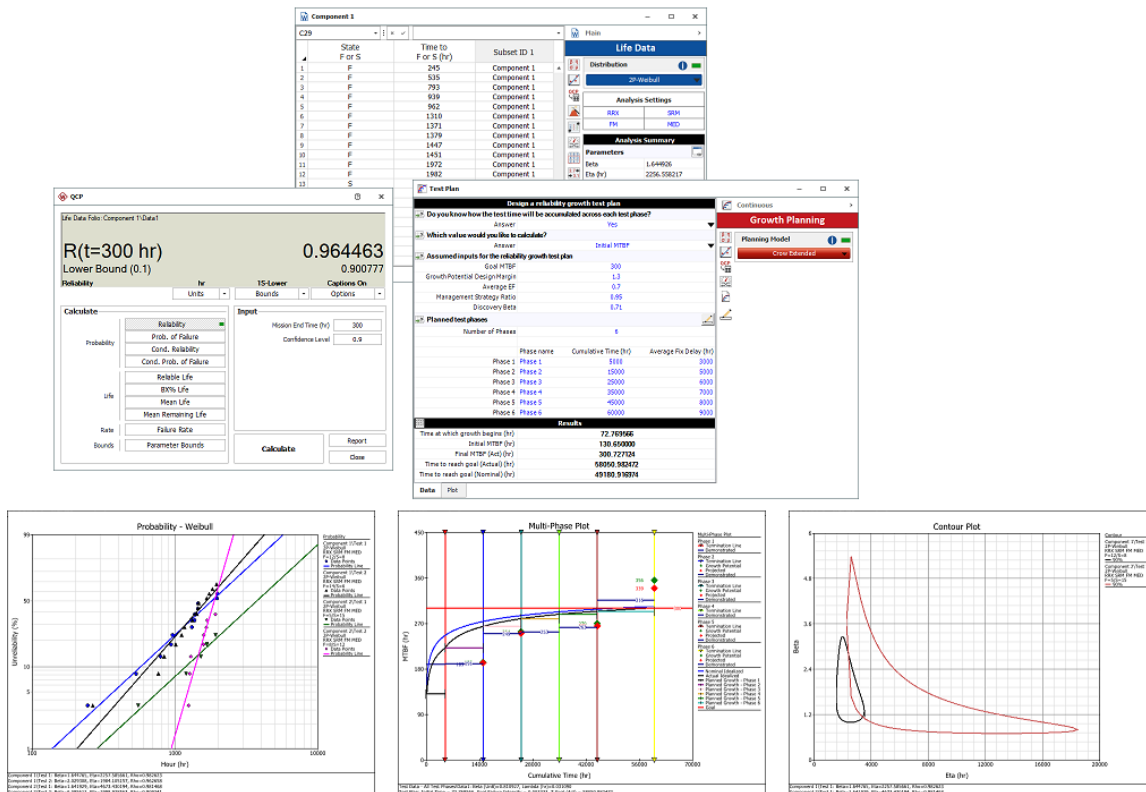
These applications are also packed with tools for related reliability analysis such as degradation data analysis, stress-strength comparison, reliability test design and design of experiments (DOE). In addition, Weibull++ also supports warranty data analysis, non-parametric data analysis and recurrent event data analysis.

For life data and life-stress data analysis, you can use this application to answer a wide variety of questions such as:

- How many units do you need to test? How much test time? At which stress levels?
- Will the product meet the reliability requirement?
- What is the influence of different failure modes? How does accelerated stress affect life?
- Which design (or supplier) will be more cost-effective over time?
- How many units are likely to be returned under warranty?
- Is there an emerging reliability problem in the field? With a particular supplier? In a particular region?
- When will a crack, wear, etc. degrade to the point of failure?
- What is the typical time to repair? How effective are the repairs?

For growth data analysis, you can use this application to answer a wide variety of questions, such as:

- Will the product meet the MTBF goal? How much test time is required?
- How does the product perform across different test phases? At which phase will the product meet the reliability requirement? What is the initial MTBF?
- How do the test data compare to the reliability growth test plan?
- What failure modes should be fixed and when?
- What is the optimum growth maintenance strategy? When is the best time to schedule maintenance/overhauls?



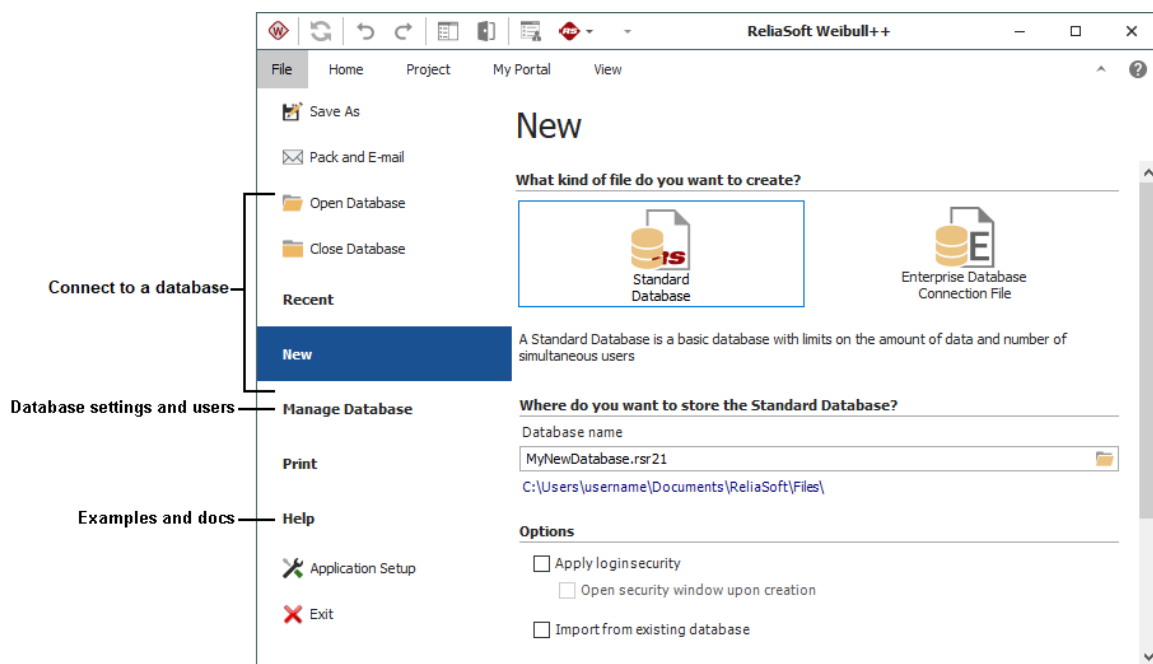
Using Databases and Projects

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.

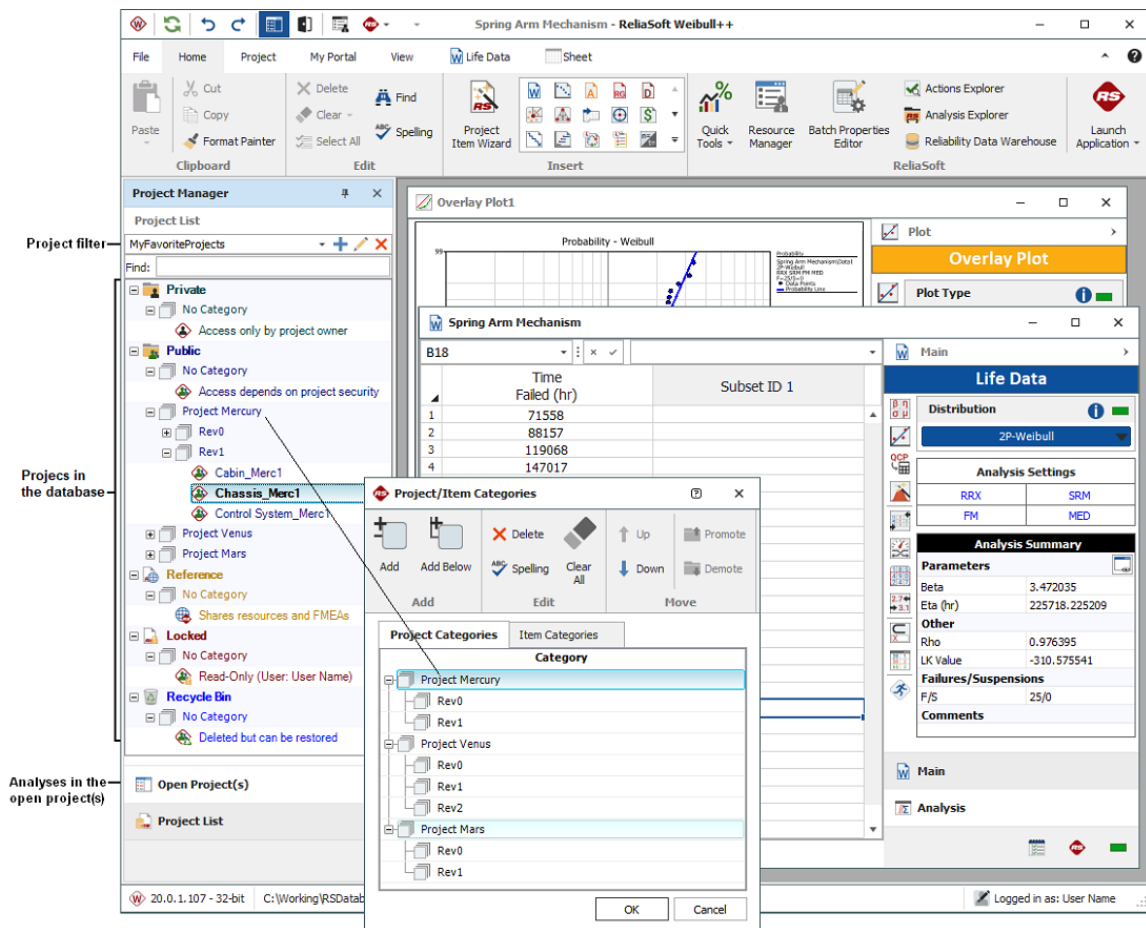


Project List

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 **project plans**, **resources** and **project attachments** are visible in all ReliaSoft desktop applications.

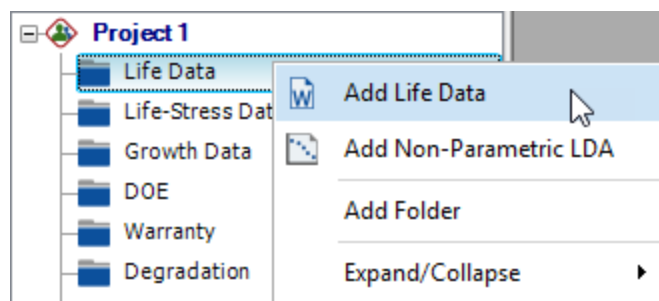
Using Life Data Folios

Weibull++'s life data folio allows you to fit a statistical distribution to failure time data in order to understand the reliability performance of a product over time or to make projections about future behavior. From the analysis, you can obtain reliability information about a product such as probability of failure, reliability, mean life or failure rate.


The basic steps for using a life data folio are:


1. Add life data folio

Right-click the Life Data folder in the current project explorer and choose **Add Life Data**.



In the setup window, select the desired data type and the units for time/usage values (hours, cycles, etc.).


Weibull++ Folio Data Sheet Setup
×

Data Sheet Options


Specify the type of data that you will be entering into the folio for life data analysis.

Data Type

☒ **Times-to-failure data**

☐ **Free-form (probit) data**

Units

Hour (hr)

Options for the Times-to-Failure Data Type


☒ **My data set contains suspensions (right censored data)**

Select this if your data set contains units that did not fail.

☐ **My data set contains interval and/or left censored data**

Select this if your data set contains uncertainty as to exactly when a unit failed or was suspended. This will allow you to specify the interval in which each failure or suspension occurred.

☐ **I want to enter data in groups**

 Select this if your data set contains one or more groups of units that have the same failure or suspension time.

Based on your selections, the data sheet will include these failure/suspension time columns:

| State F or S | Time to F or S |
|-----------------|-------------------|
| | |

< Back
Next >
OK
Cancel

2. Enter data

Enter the data and use the control panel to specify the life distribution and analysis settings.


The screenshot displays the WEIBULL++ 2021 software interface. On the left, a data table is shown with columns for 'State F or S', 'Time to F or S (hr)', and 'Subset ID 1'. The data rows are numbered 1 through 14. The 'State F or S' column contains 'F' for rows 1-6 and 'S' for rows 7-10. The 'Time to F or S (hr)' column contains values 16, 34, 53, 75, 93, 120, 120, 120, 120, and 120. The 'Subset ID 1' column contains 'prototype unit' for rows 1-10. Below the table is a 'Data1' tab. On the right, the 'Life Data' panel is visible, showing the 'Distribution' section with '2P-Weibull' selected. Below this is the 'Analysis Settings' section with 'MLE', 'SRM', 'LRB', and 'MED' options. The 'Main' panel is also visible, showing the 'Analysis' section.

| | State F or S | Time to F or S (hr) | Subset ID 1 |
|----|-----------------|------------------------|----------------|
| 1 | F | 16 | prototype unit |
| 2 | F | 34 | prototype unit |
| 3 | F | 53 | prototype unit |
| 4 | F | 75 | prototype unit |
| 5 | F | 93 | prototype unit |
| 6 | F | 120 | prototype unit |
| 7 | S | 120 | prototype unit |
| 8 | S | 120 | prototype unit |
| 9 | S | 120 | prototype unit |
| 10 | S | 120 | prototype unit |
| 11 | | | |
| 12 | | | |
| 13 | | | |
| 14 | | | |

3. Analyze data

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



The Analysis Summary area displays the parameters of the distribution. Click the **Detailed Summary** icon  to view more information.

W Main >

Life Data

Distribution ⓘ

2P-Weibull ▼

Analysis Settings

| | |
|-----|-----|
| MLE | SRM |
| LRB | MED |

Analysis Summary

Parameters ⓘ

| | |
|----------|------------|
| Beta | 1.506995 |
| Eta (hr) | 128.641436 |

Other

| | |
|----------|------------|
| LK Value | -35.335766 |
|----------|------------|

Failures/Suspensions

| | |
|-----|-----|
| F/S | 6/4 |
|-----|-----|

Comments

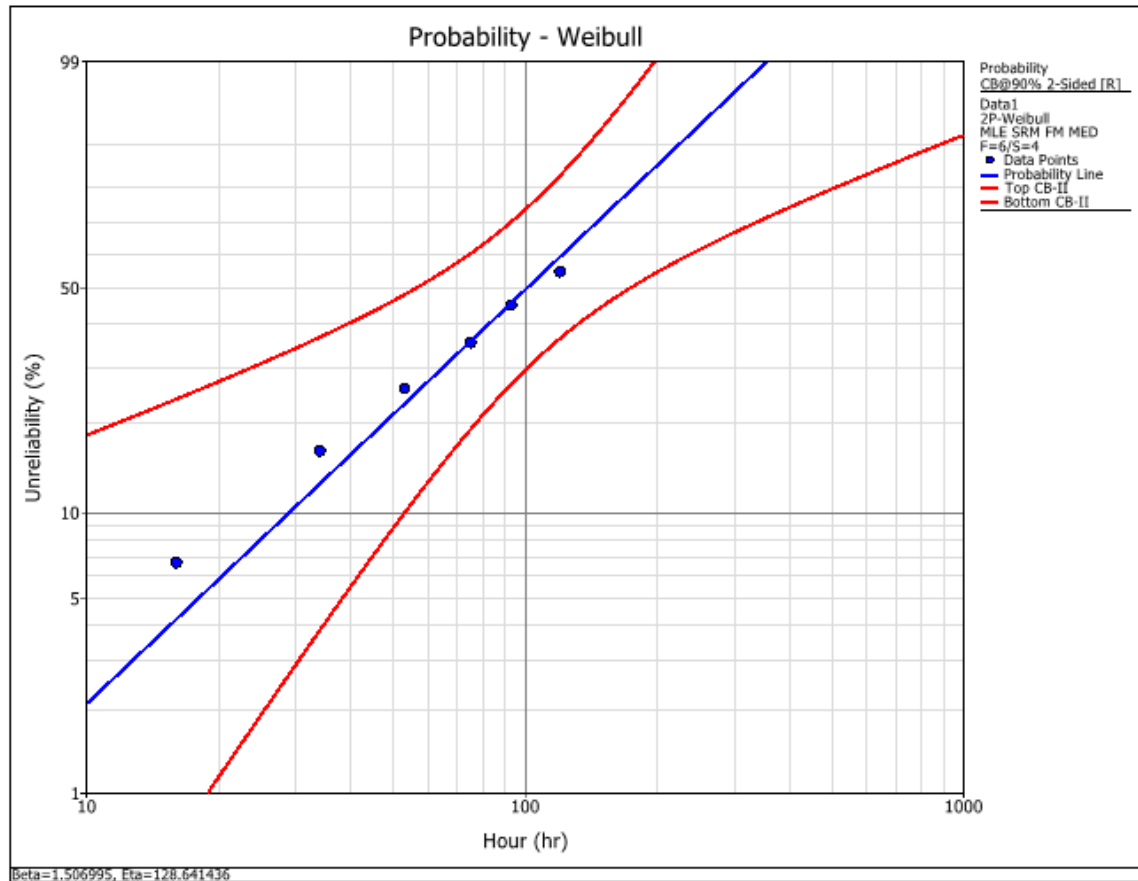
W Σ AAS RS

4. View plots

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



To show the confidence bounds, click the **Confidence Bounds** link on the plot's control panel, and then set the desired type of bounds and confidence level.



5. Calculate metrics

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



The following example shows the estimates for the reliability and the lower one-sided 90% confidence bound.

Life Data Folio: Folio1\Data1

R(t=60 hr)
Lower Bound (0.1)

0.728448
0.543195

Reliability hr 1S-Lower Captions On
Units Bounds Options

Calculate

Probability

- Reliability
- Prob. of Failure
- Cond. Reliability
- Cond. Prob. of Failure

Life

- Reliable Life
- BX% Life
- Mean Life
- Mean Remaining Life

Rate

- Failure Rate

Bounds

- Parameter Bounds

Input

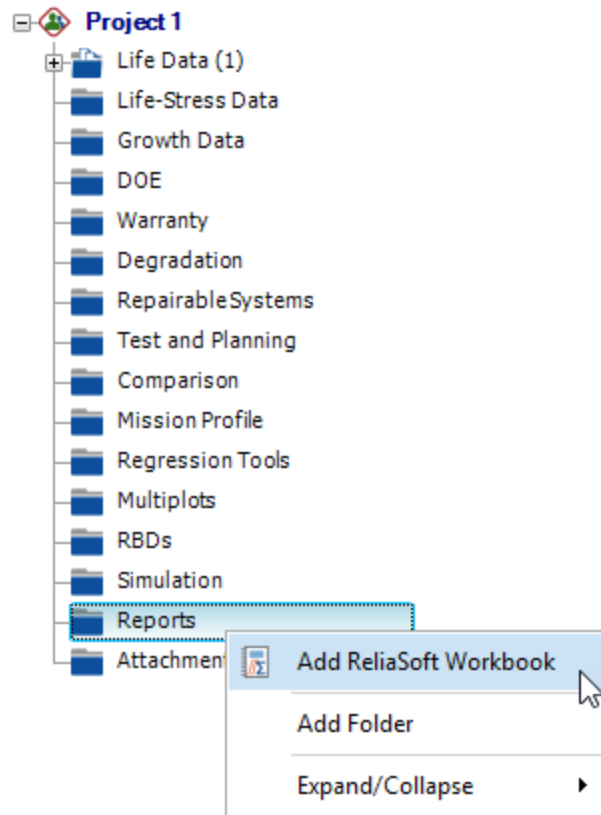
Mission End Time (hr) 60

Confidence Level 0.9

Calculate Report Close

6. Create report

Right-click the Reports folder in the current project explorer and choose **Add ReliaSoft Workbook**.



In the ReliaSoft Workbook wizard, select the folio as the default data source. If desired, you can also select a standard or user-defined report template (e.g., the "Weibull Summary Style 1 Template" is shown below).

Workbook1

Home Document Page Layout Formulas Data Review View

Send to Excel Report Clipboard Font Alignment Number Styles Editing

Modules < C42

Spreadsheet Word Processing

Basic Report Sample

Analysis Settings

| | | | | |
|--------------------|------------------|-------|---------|--------|
| Distribution | Weibull 2P | | | |
| Method Used: | MLE | | | |
| Confidence Limits: | Lower | 5.00% | Upper | 95.00% |
| Method for CL: | Likelihood Ratio | | 2-Sided | 90.00% |

Estimates and Confidence Bounds for Distribution Parameters

| Parameter | Estimate | Lower Limit | Upper Limit |
|-----------|-------------|-------------|-------------|
| Beta | 1.506994639 | 0.758399828 | 2.607276213 |
| Eta | 128.6414361 | 84.69230273 | 257.5742323 |

Selected Metrics

| Parameter | Estimate | Lower Limit | Upper Limit |
|-----------|-------------|-------------|-------------|
| Mean | 116.0654733 | 74.6168519 | 220.866107 |
| Median | 100.8688464 | 61.78887984 | 181.1700023 |
| B10 | 28.89727771 | 7.191877701 | 55.99633019 |

Sheet1

100%

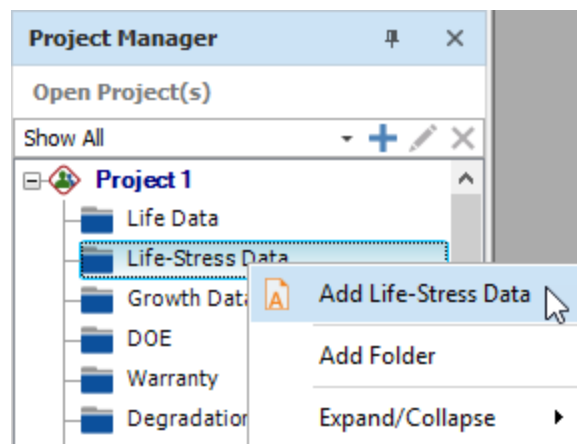
Using Life-Stress Data Folios

Weibull++'s life-stress data folio allows you to perform quantitative accelerated life testing data analysis. In this analysis, you extrapolate a product's failure behavior at normal conditions from life data obtained at accelerated stress levels. Since products fail more quickly at accelerated stress levels, the analysis allows you to obtain reliability information about a product (e.g., mean life, probability of failure at a specific time, etc.) in a shorter time.

The basic steps for using a life-stress data folio are:

1. Add life-stress data folio

Right-click the Life-Stress Data folder in the current project explorer and choose **Add Life-Stress Data**.



In the setup window, select the desired censoring type and units for time/usage values (hours, cycles, etc.).

ALTA Folio Data Sheet Setup

Data Sheet Options
Specify the type of data that you will be entering into the folio for life-stress analysis.

Data Type


☒ Times-to-failure data ☐ Free-form (probit) data

Units
Hour (hr)

Options for the Times-to-Failure Data Type

☒ **My data set contains suspensions (right censored data)**
Select this if your data set contains units that did not fail.

☐ **My data set contains interval and/or left censored data**
Select this if your data set contains uncertainty as to exactly when a unit failed or was suspended. This will allow you to specify the interval in which each failure or suspension occurred.

☐ **I want to enter data in groups**
 Select this if your data set contains one or more groups of units that have the same failure or suspension time.

Based on your selections, the data sheet will include these failure/suspension time columns:

| State F or S | Time to F or S |
|-----------------|-------------------|
| | |

< Back Next > OK Cancel

On the next page, define the stress type(s) to use in the analysis and the use stress level.

ALTA Folio Data Sheet Setup

Select Stress Columns

Define the stress columns that will appear in the data sheet, and specify the use stress level(s). The following table contains some commonly used stress types, but you can change any of the labels (e.g., if your vibration values use meters per second squared instead of hertz, you can change Hz to m/s²).

Define Stress Columns and Use Stress Levels

| | Stress Name | Stress Units | Use Level |
|-------------------------------------|---------------|----------------|-----------|
| <input checked="" type="checkbox"/> | Temperature | K | 298 |
| <input type="checkbox"/> | Voltage | V | 100 |
| <input type="checkbox"/> | Humidity | RH | 50 |
| <input type="checkbox"/> | Vibration | Hz | 25 |
| <input type="checkbox"/> | Temperature | R | 580 |
| <input type="checkbox"/> | Mechanical | kips | 25 |
| <input type="checkbox"/> | <Stress name> | <Stress units> | 10 |
| <input type="checkbox"/> | <Stress name> | <Stress units> | 10 |

Based on your selections, the data sheet will also include these stress columns:

| |
|------------------|
| Temperature K |
|------------------|

< Back Next > OK Cancel

2. Enter data

Enter the data and use the control panel to specify the life-stress model.


The screenshot shows the WEIBULL++ 2021 software interface. On the left, a data table is displayed with columns: State F or S, Time to F or S (hr), Temperature K, and Subset ID 1. The table contains 14 rows of data. On the right, the 'Main' control panel is visible, featuring a 'Life-Stress Data' section with a 'Model' dropdown set to 'Arrhenius-Weibull'. Below this, there are links for 'Select Stress Columns...', 'Stress Transformation...', and 'Set Use Stress...'. A 'Not Analyzed' status is shown, along with a 'Comments' section. The bottom of the interface has a toolbar with various icons.

| | State F or S | Time to F or S (hr) | Temperature K | Subset ID 1 |
|----|-----------------|------------------------|------------------|-------------|
| 1 | F | 105 | 313 | |
| 2 | F | 170 | 313 | |
| 3 | F | 224 | 313 | |
| 4 | F | 278 | 313 | |
| 5 | S | 350 | 313 | |
| 6 | S | 350 | 313 | |
| 7 | S | 350 | 313 | |
| 8 | F | 38 | 328 | |
| 9 | F | 62 | 328 | |
| 10 | F | 82 | 328 | |
| 11 | F | 103 | 328 | |
| 12 | F | 128 | 328 | |
| 13 | F | 165 | 328 | |
| 14 | | | | |

3. Analyze data

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



The Analysis Summary area displays the parameters of the distribution. Click the **Detailed Summary** icon  to view more information.

The screenshot displays the 'Life-Stress Data' analysis summary in the WEIBULL++ 2021 software. The interface includes a top bar with 'Main' and a right arrow. Below this is a control panel with various icons and links. The 'Model' section is set to 'Arrhenius-Weibull'. The 'Analysis Summary' table provides the following data:

| Analysis Summary | |
|--|--------------|
| Parameters | |
| Beta | 2.282545 |
| B (K) | 8245.573645 |
| C (hr) | 1.296656E-09 |
| Activation Energy | |
| Ea (eV) | 0.710548 |
| Scale Parameter (at Use Stress) | |
| Eta (hr) | 1347.806035 |
| Other | |
| LK Value | -58.425859 |
| Use Stress | |
| Temperature | 298 |
| Failures/Suspensions | |
| F/S | 10/3 |
| Comments | |

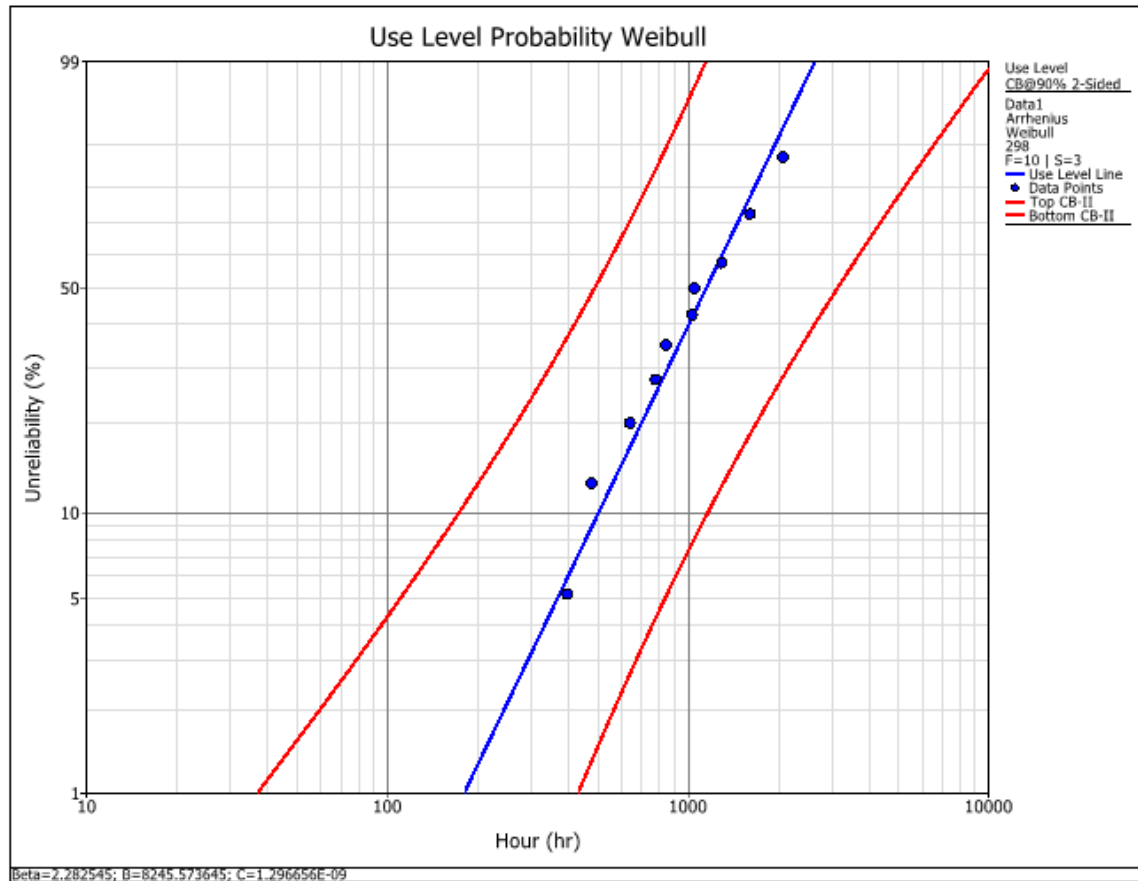
The bottom of the interface features a toolbar with icons for 'Main', 'Plot', 'Data', 'Model', 'Results', and 'Help'.

4. View plots

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



To show the confidence bounds, click the **Confidence Bounds** link on the plot's control panel, and then set the desired type of bounds and confidence level.






5. Calculate metrics

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



The following example shows the estimates for reliability and the lower one-sided 90% confidence bound.

 QCP

Life-Stress Data Folio: Folio1\Data1


$R(t=300 \text{ hr})$ **0.968113**

Lower Bound (0.1) 0.842874

Reliability **hr** **1S-Lower** **Captions On**

Units Bounds Options

Calculate

| | |
|--------------|---|
| Probability | Reliability  |
| | Prob. of Failure |
| | Cond. Reliability |
| | Cond. Prob. of Failure |
| Life | Reliable Life |
| | BX% Life |
| | Mean Life |
| | Mean Remaining Life |
| Rate | Failure Rate |
| Acceleration | Acceleration Factor |
| Bounds | Parameter Bounds |

Input

Stress 298

Mission End Time (hr) 300

Confidence Level 0.9

Calculate Report Close

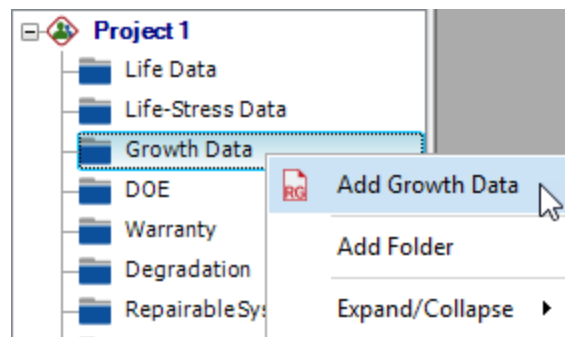
Using Growth Data Folios

Weibull++'s growth data folio supports traditional reliability growth analysis, repairable systems analysis and reliability growth projections. The data type you select determines the type of analysis you can perform.

The basic steps for using a growth data folio are:

1. Add growth data folio

Right-click the Growth Data folder in the current project explorer and choose **Add Growth Data**.



In the setup window, select the desired data type. Then click **Next** to set the units for values (hours, cycles, etc.) and other preferences.

The screenshot shows the 'Project Item Wizard' dialog box, specifically the 'Data Sheet Options' screen. The title bar reads 'Project Item Wizard' with a close button (X) on the right. Below the title bar, the text 'Data Sheet Options' is followed by the instruction 'Select the data type for the folio.' The main area is divided into three sections. On the left, under 'All Data Types', there is a list: 'Developmental', 'Times-to-Failure Data' (which is highlighted with a blue dashed border), 'Discrete Data', 'Multi-Phase Data', 'Reliability Data', and 'Fielded'. In the center, under the 'Times-to-Failure Data' heading, there is a list of options, each preceded by a red 'RG' icon: 'Failure Times', 'Grouped Failure Times', 'Multiple Systems - Known Operating Times', 'Multiple Systems - Concurrent Operating Times', 'Multiple Systems - Dates', and 'Multiple Systems with Event Codes'. On the right, there is a text box explaining the 'Failure Times' data type: 'The \'Failure Times\' data type is used for situations where the exact failure times have been recorded. This data type can be used to analyze the data from a single system or for the combined times from multiple systems (e.g., if 3 identical systems are tested and 1 fails at 10 hours, the recorded failure time is 30 hours). If you will assume that all fixes are applied during the observed test time, you can use the Crow-AMSAA (NHPP) or Duane models for analysis. If you want to account for different fix strategies used for different failure modes, choose the Crow Extended model. The extended model requires you to identify and classify the failure mode responsible for each failure (A = no fix, BC = fixed during test or BD = delayed fix), and also specify the \'effectiveness factor\' for each delayed fix.' Below this text is a blue link labeled 'Learn More'. At the bottom of the dialog, there are four buttons: '< Back', 'Next >', 'OK', and 'Cancel'.

Project Item Wizard

Data Sheet Options
Select the data type for the folio.

All Data Types

- Developmental
- Times-to-Failure Data**
- Discrete Data
- Multi-Phase Data
- Reliability Data
- Fielded

Times-to-Failure Data

- Failure Times
- Grouped Failure Times
- Multiple Systems - Known Operating Times
- Multiple Systems - Concurrent Operating Times
- Multiple Systems - Dates
- Multiple Systems with Event Codes

The 'Failure Times' data type is used for situations where the exact failure times have been recorded. This data type can be used to analyze the data from a single system or for the combined times from multiple systems (e.g., if 3 identical systems are tested and 1 fails at 10 hours, the recorded failure time is 30 hours). If you will assume that all fixes are applied during the observed test time, you can use the Crow-AMSAA (NHPP) or Duane models for analysis. If you want to account for different fix strategies used for different failure modes, choose the Crow Extended model. The extended model requires you to identify and classify the failure mode responsible for each failure (A = no fix, BC = fixed during test or BD = delayed fix), and also specify the 'effectiveness factor' for each delayed fix.

[Learn More](#)

< Back Next > OK Cancel

2. Enter data

Enter the data and use the control panel to specify the growth model and analysis settings.


The screenshot displays the WEIBULL++ 2021 software interface. On the left, a data table titled 'B52' shows 'Time to Event (hr)' and 'Comments' for 20 rows. A red box highlights the last row with the text 'Note: Complete data set is not shown.' On the right, the 'Main' control panel is visible, featuring a 'Growth Data' section with a 'Model' dropdown set to 'Crow-AMSAA (NHPP)' and 'Calculation Options' set to 'Standard'. Below this, a table shows 'Developmental' and 'Failure Times' with options for 'MLE', 'Crow', 'No Gap', and 'Cumulative'. The 'Failure Terminated' checkbox is also present. The bottom of the interface shows the 'Analysis' section with various icons.

| | Time to Event (hr) | Comments |
|----|--------------------|----------|
| 1 | 0.7 | |
| 2 | 3.7 | |
| 3 | 13.2 | |
| 4 | 17.6 | |
| 5 | 54.5 | |
| 6 | 99.2 | |
| 7 | 112.2 | |
| 8 | 120.9 | |
| 9 | 151 | |
| 10 | 163 | |
| 11 | 174.5 | |
| 12 | 191.6 | |
| 13 | 282.8 | |
| 14 | 355.2 | |
| 15 | 486.3 | |
| 16 | 490.5 | |
| 17 | 513.3 | |
| 18 | 558.4 | |
| 19 | 678.1 | |
| 20 | 688 | |

3. Analyze data

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



The Analysis Summary area displays the parameters of the growth model. Click the **Detailed Summary** icon  to view more information.

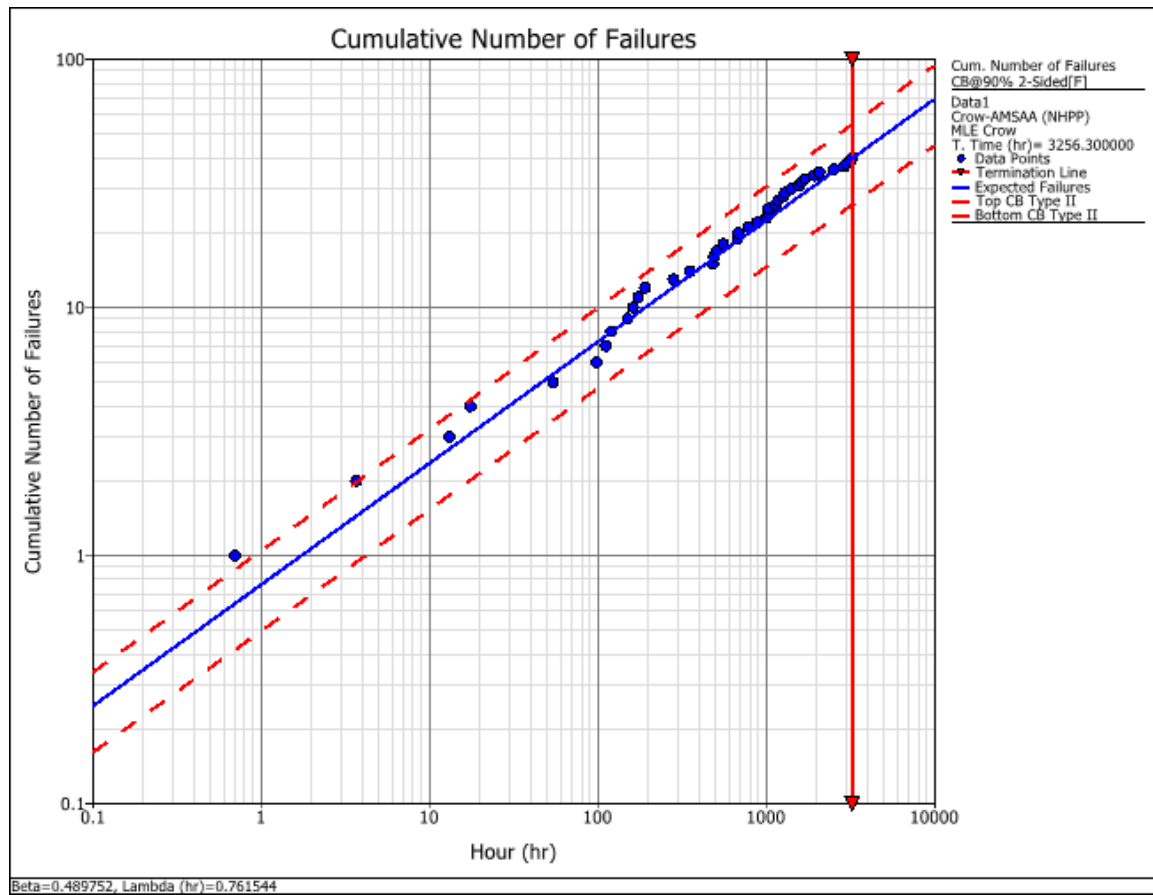
| Results | |
|------------------------------------|------------|
| Parameters | |
| Beta | 0.489752 |
| Lambda (hr) | 0.761544 |
| Growth Rate | 0.510248 |
| DMTBF (hr) | 166.221749 |
| DFI | 0.006016 |
| Statistical Tests | |
| Significance Level | 0.1 |
| CVM | Passed |
| Other | |
| Termination Time (hr): 3256.300000 | |

4. View plots

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



To show the confidence bounds, right-click the plot, choose **Show Confidence Bounds**, and then set the desired type of bounds and confidence level.






5. Calculate metrics

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



The following example shows the instantaneous MTBF with the lower one-sided 90% confidence bound.

 QCP

Folio1\Data1

IMTBF(t=32...**166.221749 hr**

Lower Bound (0.1)**131.212225 hr**

Instantaneous MTBF**hr****1S-Lower****Captions On**

Units Bounds Options


Calculate

Cumulative

MTBF

Failure Intensity

Instantaneous

MTBF 

Failure Intensity

Time (hr)

Time Given:

Failures

Number of Failures

Bounds

Parameter Bounds

Input

Time (hr)

3256.3

Confidence Level

0.9

Calculate

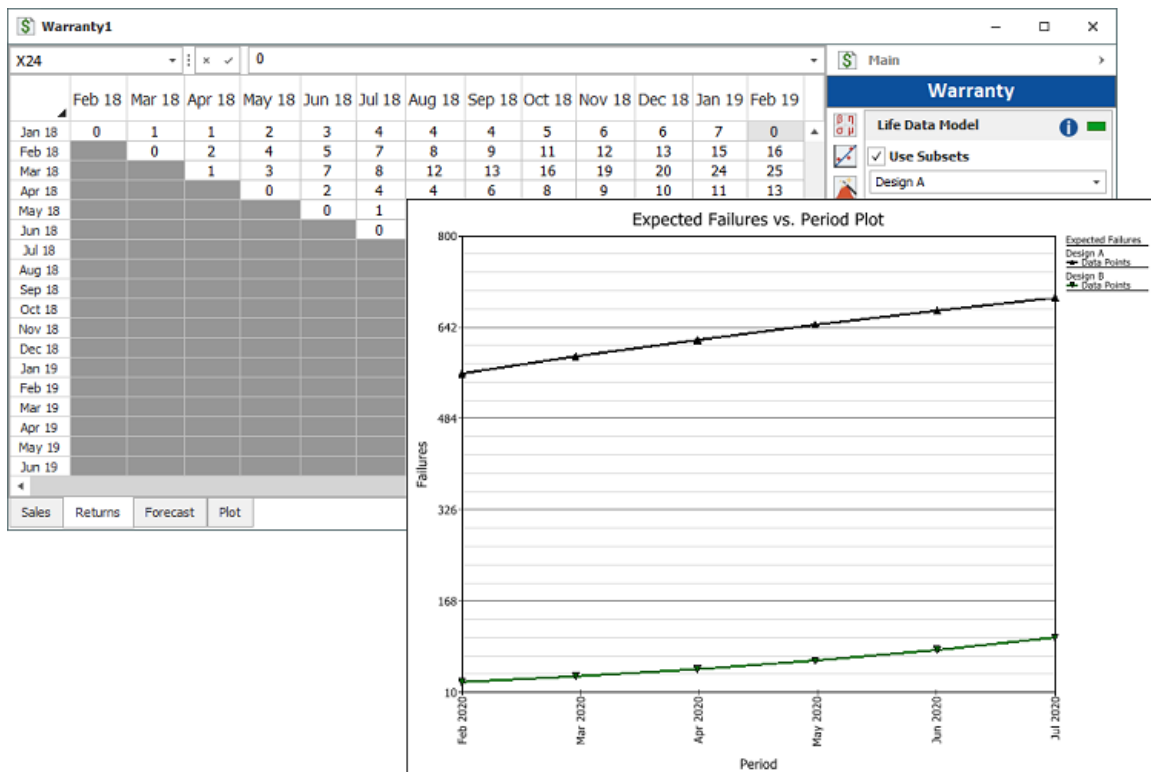
Report

Close

More Analyses and Tools

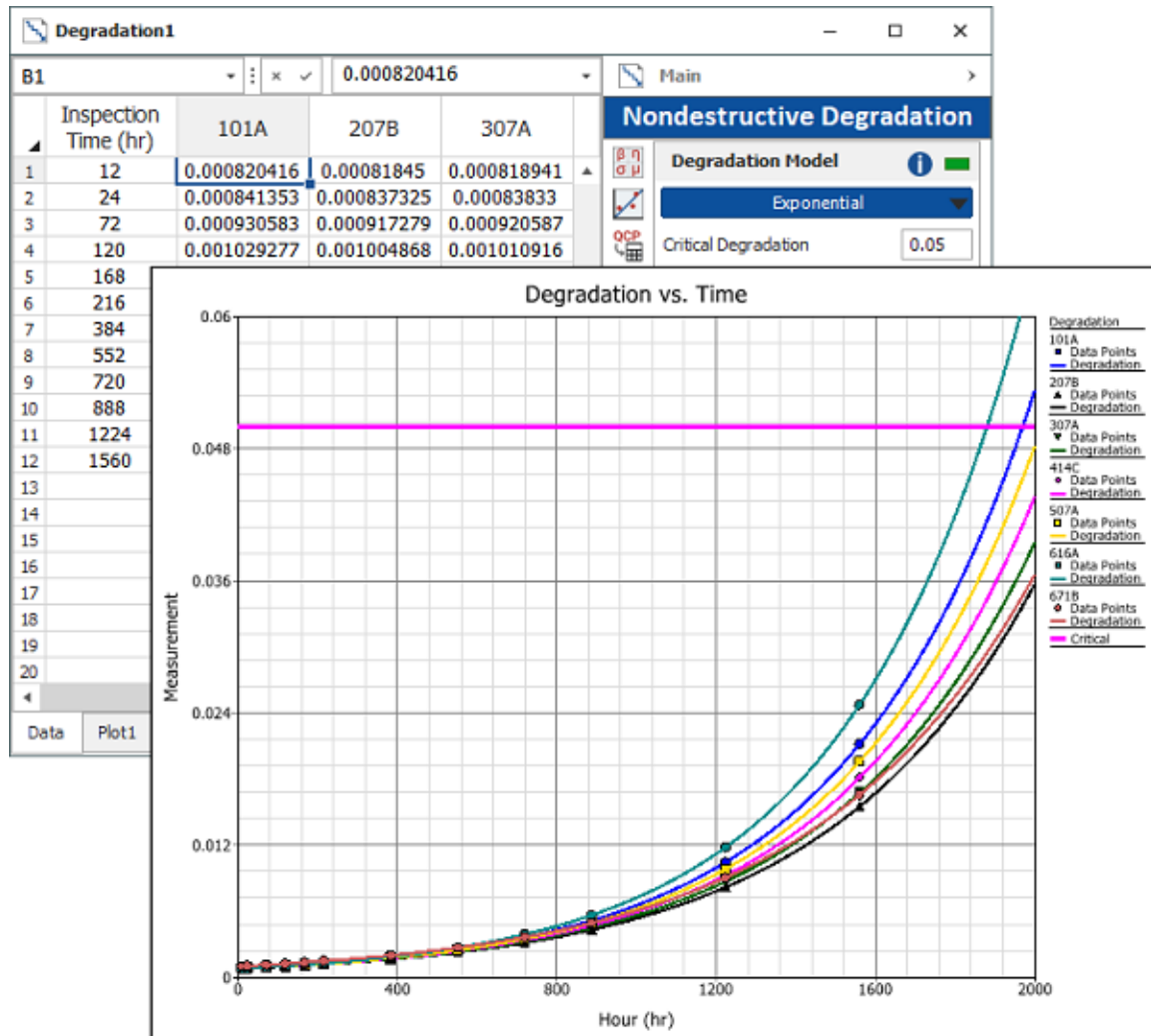
Warranty Data Analysis

For life data analysis, the warranty folio offers a choice of 4 data entry formats that use sales and returns data to predict future returns under warranty: Nevada, Times-to-Failure, Dates of Failure and Usage.



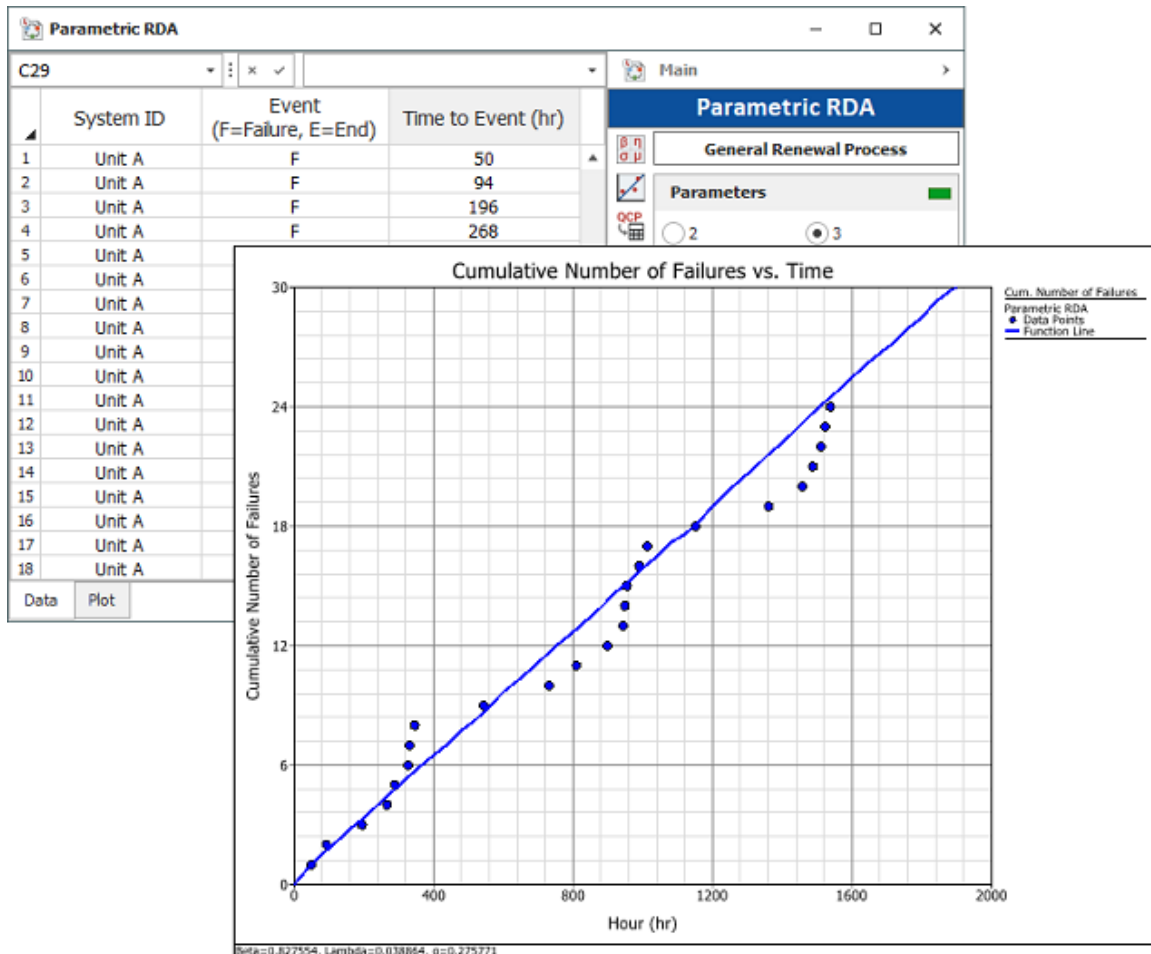
Degradation

For life data and life-stress analyses, the degradation folio extrapolates expected failure times based on how a performance measure (e.g., crack propagation, tread depth, vibration) has degraded over time.



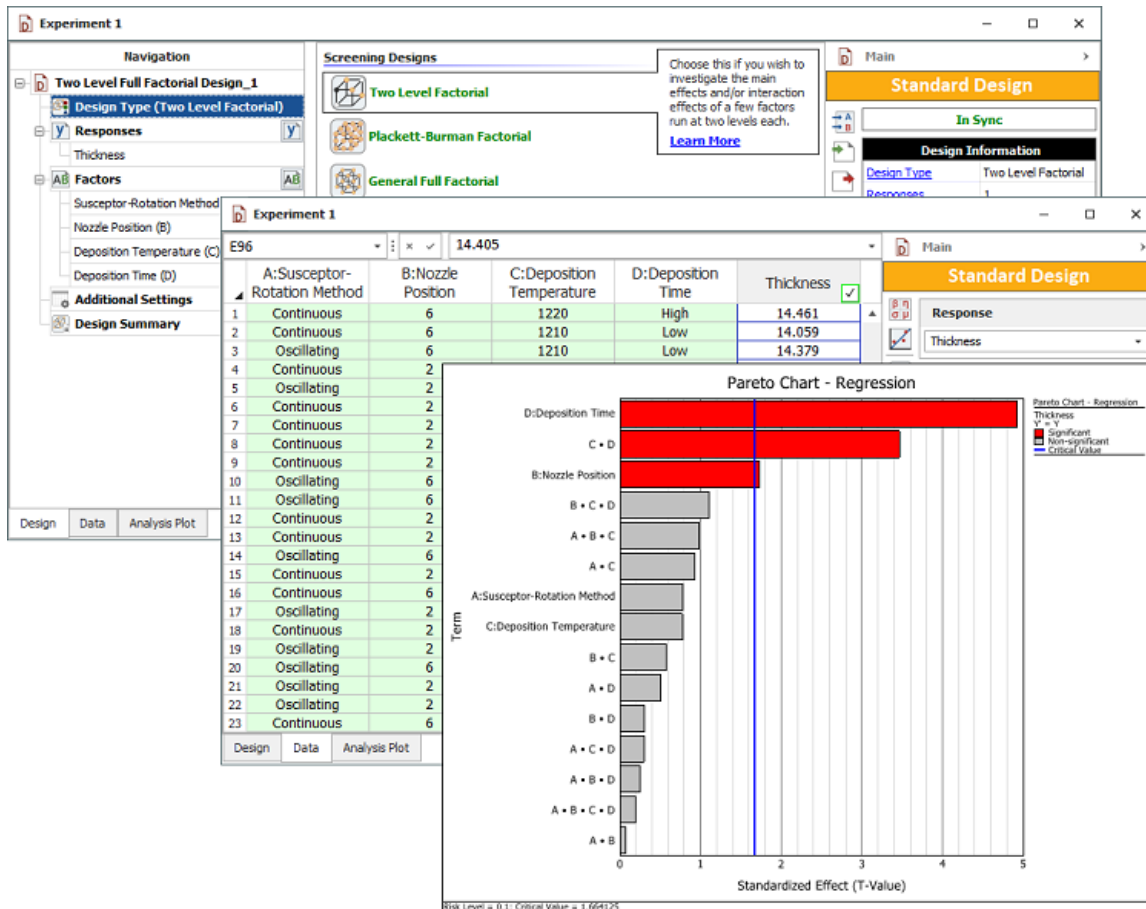
Recurrent Event Data Analysis

For life data analysis, the non-parametric RDA folio uses the Mean Cumulative Function to plot the average number of recurring failures over a given period of time. The parametric RDA folio uses the General Renewal Process (GRP) model, which considers the effectiveness of repairs, to model the cumulative number of failures over time.



Design of Experiments

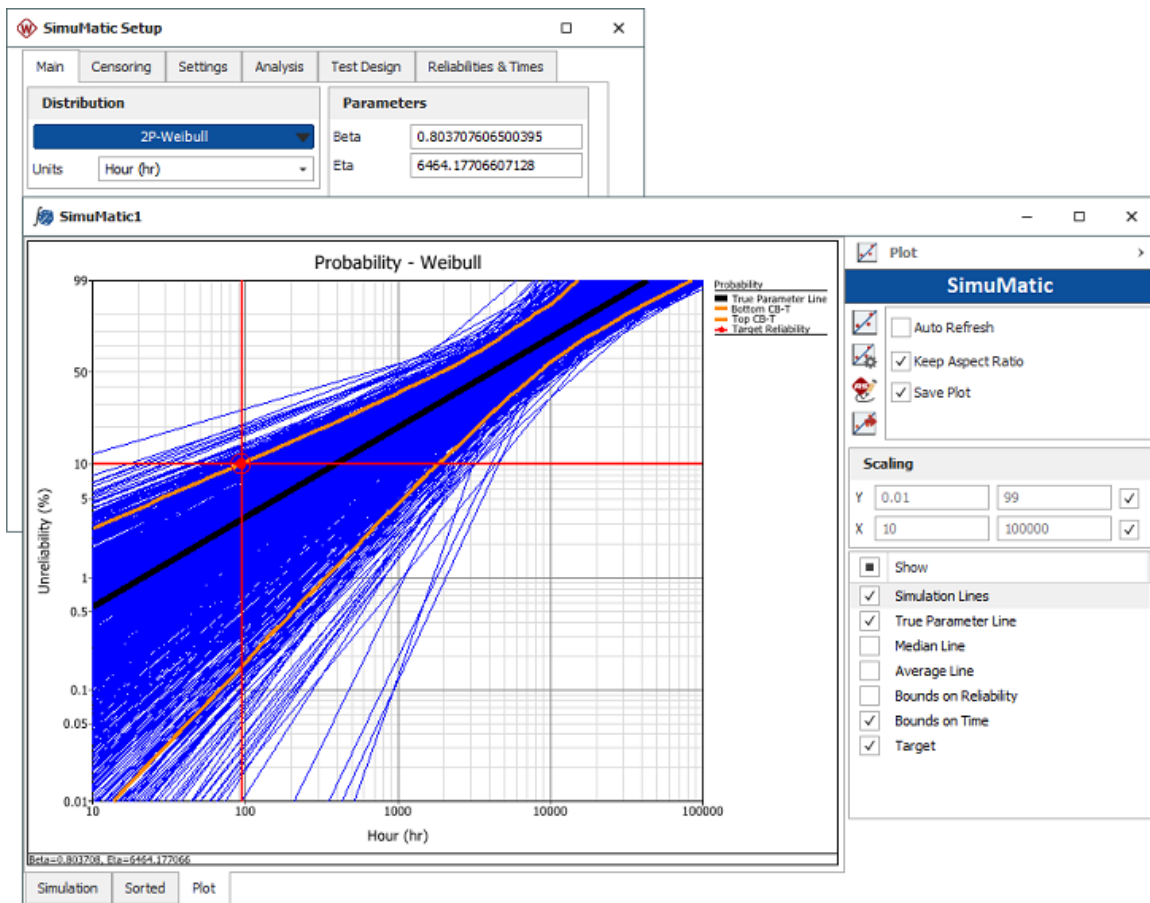
A set of design folios provide techniques for DOE analyses such as identifying key factors that affect performance (standard design), minimizing a system's sensitivity to noise (robust design) and determining the best proportion of components in a mixture (mixture design).



Monte Carlo Data Generation and SimuMatic

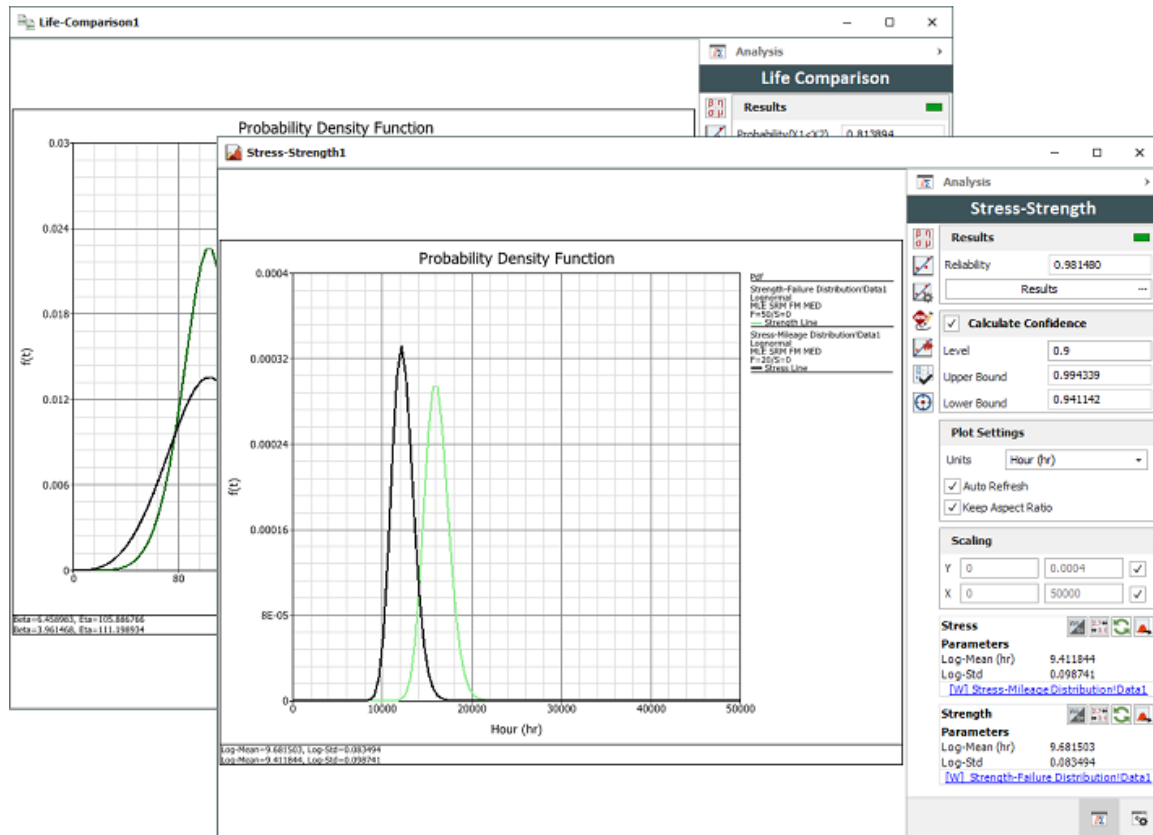
For life data and life-stress data analyses, the Monte Carlo utility generates a data set based on a specified probability distribution. SimuMatic performs analyses on a large number of simulated data sets, based on a specified probability distribution. For growth data analysis, the Monte Carlo utility generates a data set based on the Crow-AMSAA model, with specified beta and lambda parameters while SimuMatic performs analyses on a large number of simulated data sets, based on the Crow-AMSAA model.

The life data versions look like this:



Comparison Folios

The life comparison folio determines the probability that the life of one population will be greater or less than that of the second. The stress-strength analysis folio determines the probability of failure based on the probability of stress exceeding strength.



Test Design

For life data analysis, Weibull++ offers a choice of tools to assist with reliability test design: Reliability Demonstration Test (Parametric Binomial, Non-Parametric Binomial, Exponential Chi-Squared or Non-Parametric Bayesian), Expected Failure Times Plot and Difference Detection Matrix. For growth data analysis, the Test Design folio uses the non-homogeneous Poisson process (NHPP) to design a demonstration test for repairable systems by solving for either the test time required per system or the number of systems that must be tested.

The screenshot displays the 'Test Design Folio1' window, which contains several sub-windows and panels for reliability test design.

Design 1 Mean Life: A table showing the relationship between Design 1 Mean Life (rows) and Design 2 Mean Life (columns). The values are 0 or 1, indicating the presence or absence of a failure.

Expected Failure Times: A plot showing the relationship between Units vs. Time.

Parametric Binomial: A window for designing a reliability demonstration test. It includes fields for Metric (Reliability value at a specific time), Confidence level (%), At this time (hr), Distribution (2P-Weibull), and Beta. The 'Solve for this value' section shows the Value (With this test time (hr)) and the maximum number of failures.

Test Design Assistant: A window for selecting the test design method. It lists three options: Reliability Demonstration Test Design, Expected Failure Times Plot, and Difference Detection Matrix.

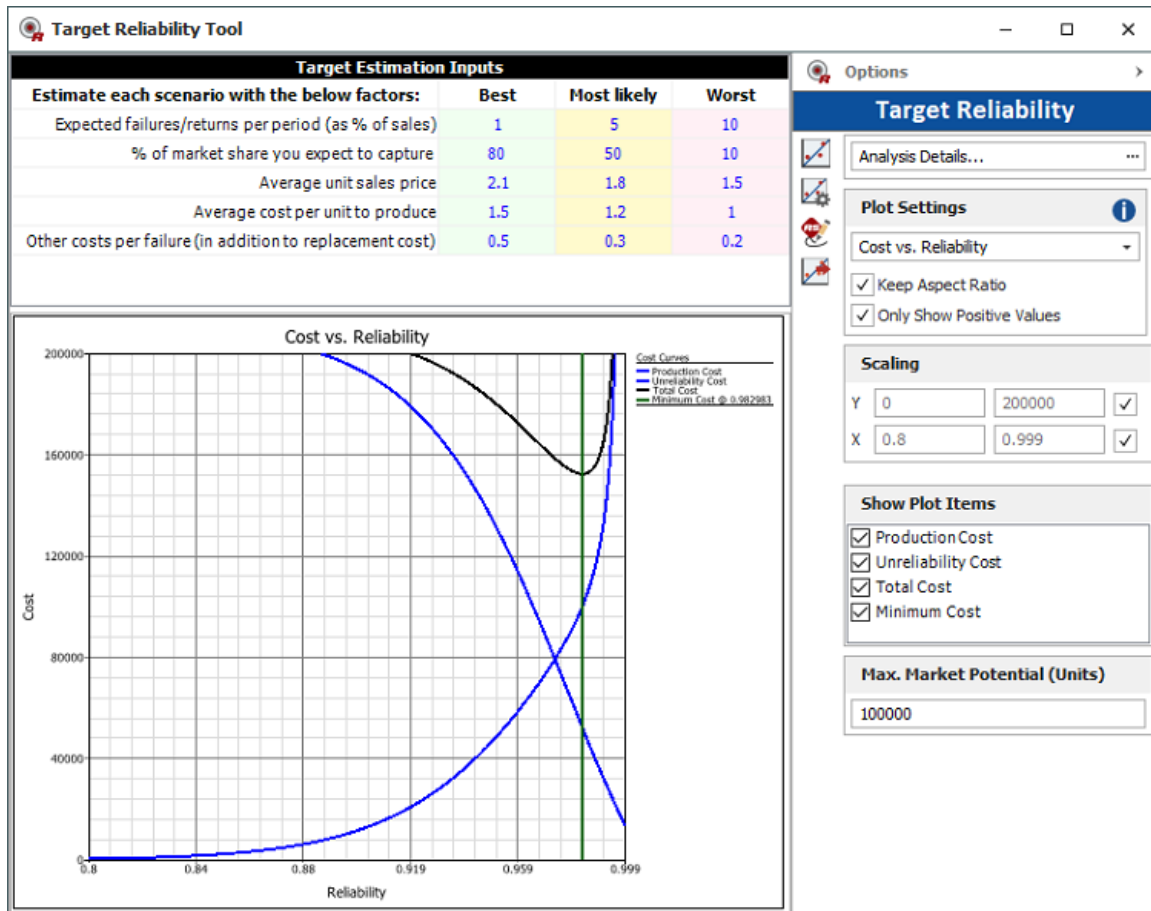
Test Design: A window for setting up the test design. It includes fields for Sample Size, Two-Sided Confidence (%), Acceleration Factor, Actual Failures, Expected Failure Model (WB2 (2, 500)), Plot Options (Keep Aspect Ratio, Auto Refresh), X-Axis Scaling (Linear, Logarithmic), and Scaling (Y, X).

Results: A section showing the Sample size and Notes. The Notes state: 'This is based on both the assumed failure specified distribution and the specified ac'.

Notes: A section showing the Sample size and Notes. The Notes state: 'This is based on both the assumed failure specified distribution and the specified ac'.

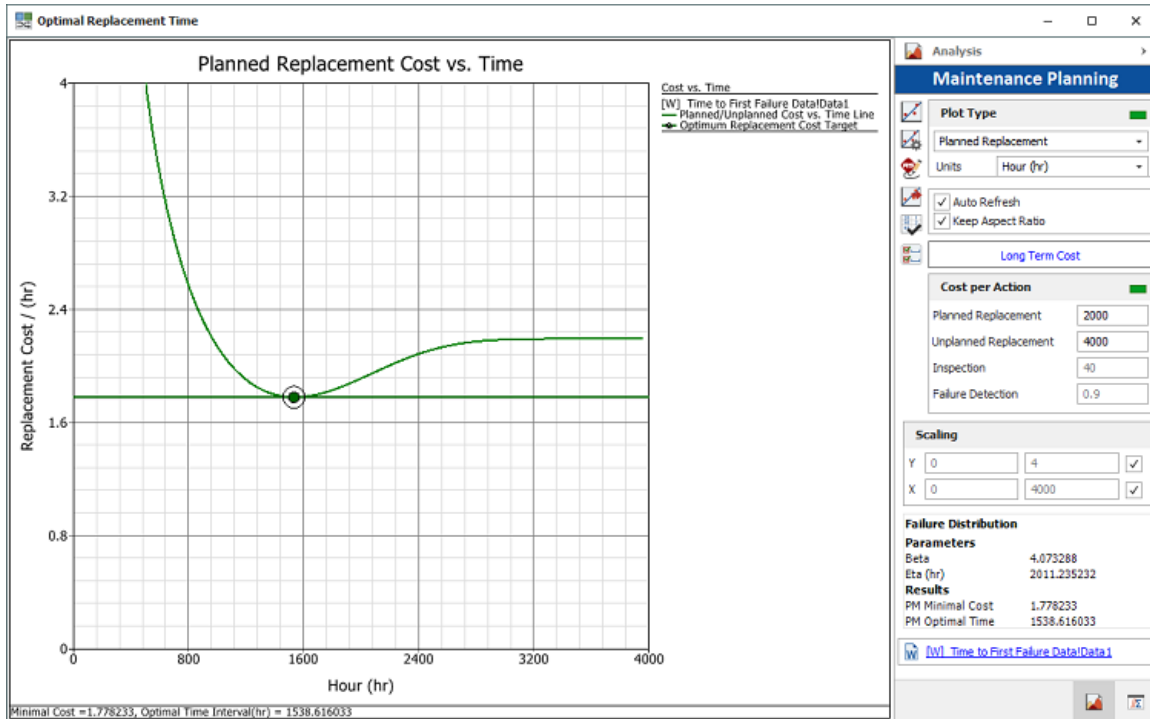
Target Reliability Planner

For life data analysis, the Target Reliability folio finds the optimum cost and reliability of a product, given estimates for various factors involved in the product's production and sale.



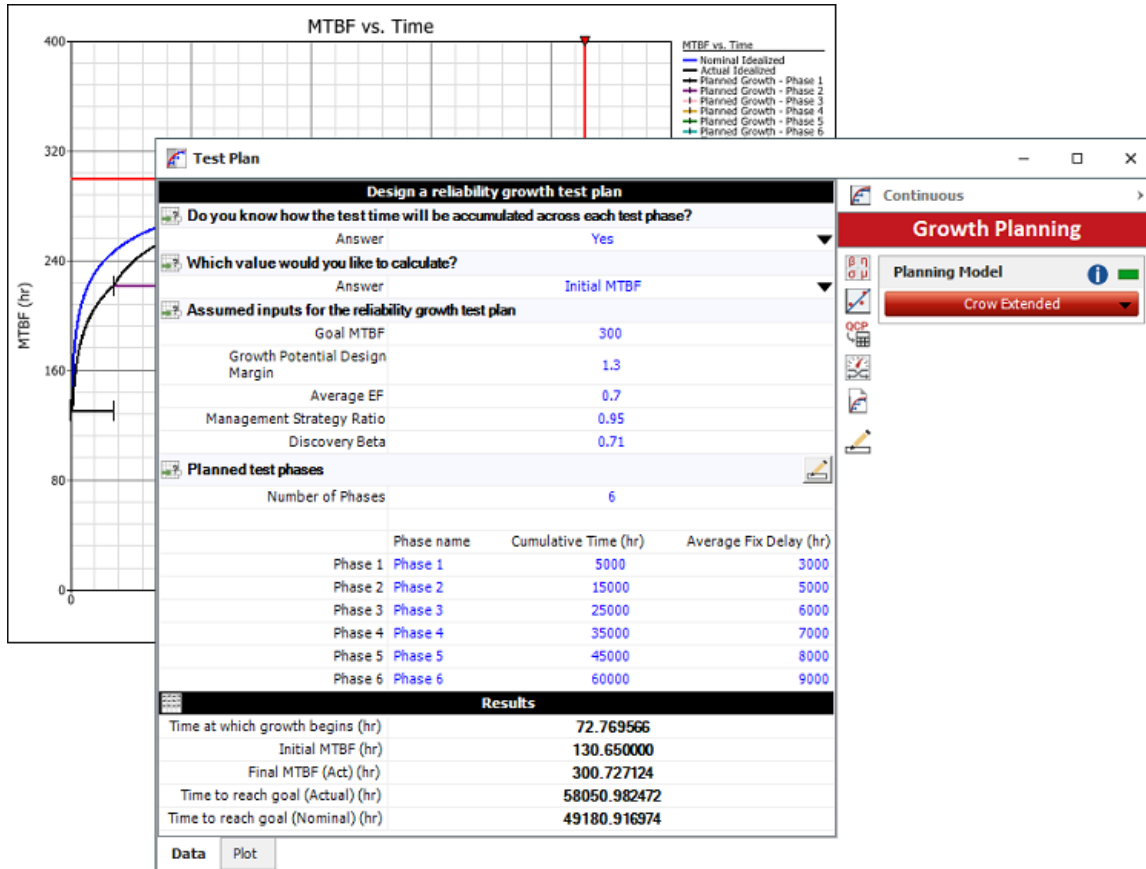
Maintenance Planning

For life data analysis, the Maintenance Planning folio uses the optimum replacement age model to determine the most cost-effective time to replace aged components.



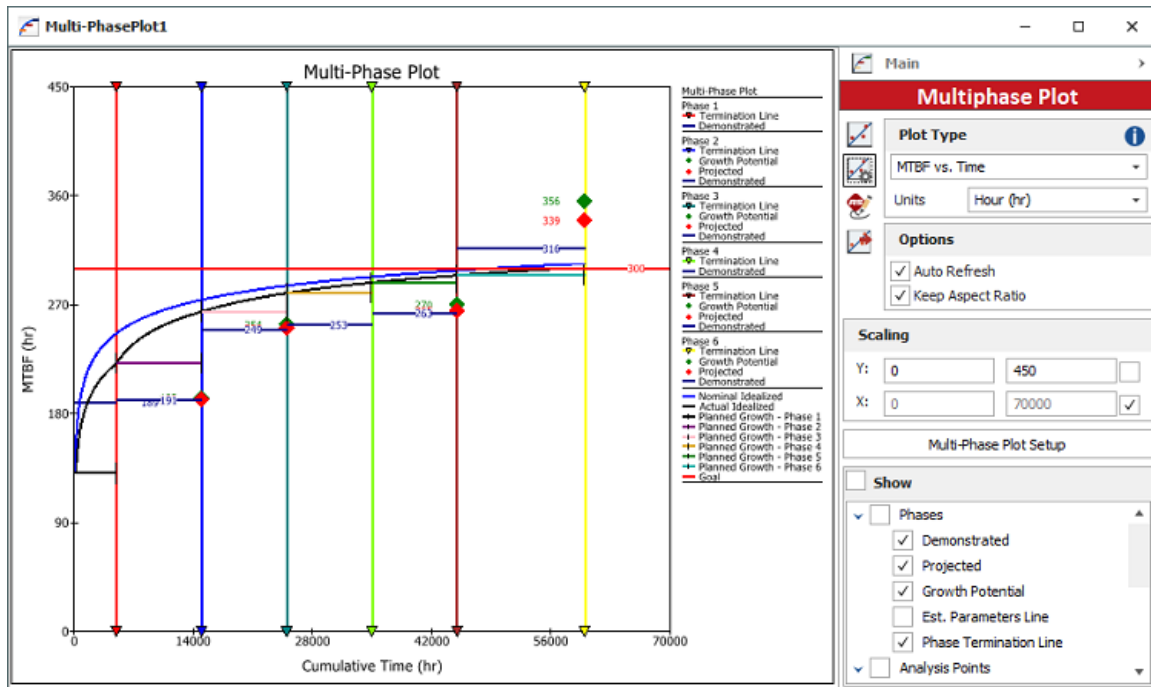
Growth Planning

For growth data analysis, the growth planning folio helps you to create a multi-phase reliability growth testing program that is designed to achieve a specific MTBF or reliability goal.



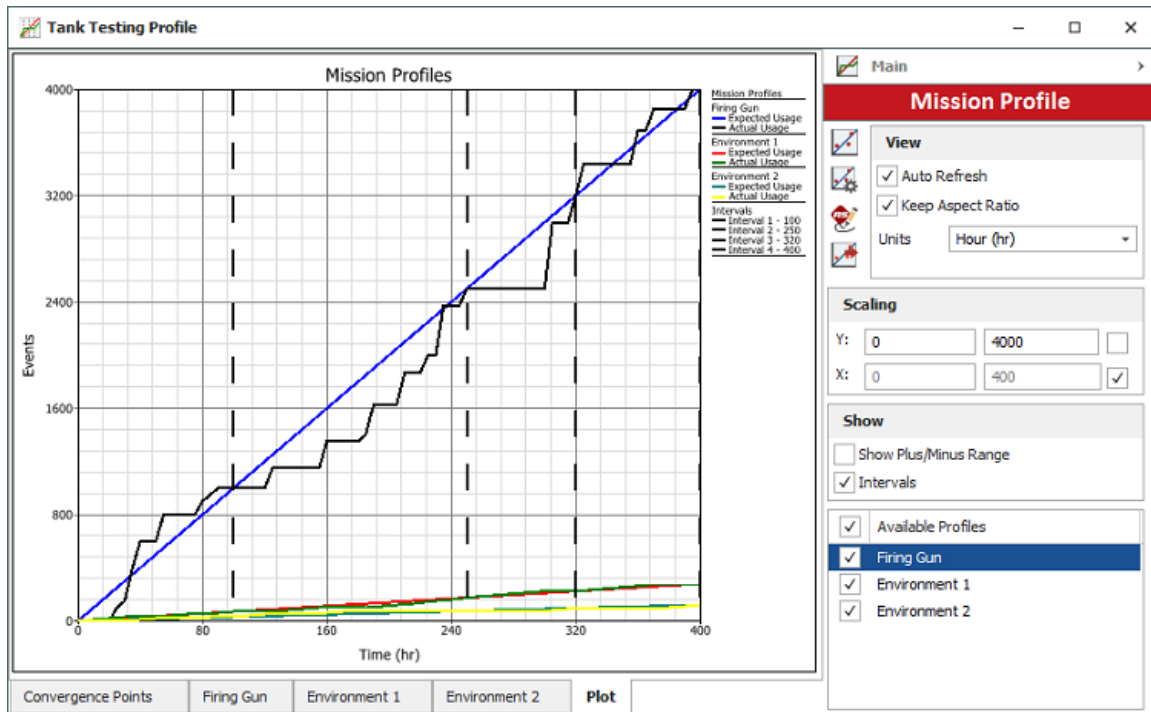
Multi-Phase Plot

For growth data analysis, the multi-phase plot displays actual test results (e.g., demonstrated, projected and growth potential MTBF or failure intensity) across multiple analysis points and/or test phases. It can be linked to a growth planning folio to compare actual test results against the test plan.



Mission Profiles

For growth data analysis, mission profiles help to create a balanced operational test plan and track the actual testing against the plan to make sure the data will be suitable for reliability growth analysis.



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(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.