

Multiple Mode Reliability Model ****Analyze Complete Systems as Easily as Individual Components****

The Weibull Dr.'s ****copyrighted Multiple Mode Reliability Model**** (also known as the System Simulation or Assembly Reliability routine) is a standout feature that sets it apart from other reliability software. It lets you combine multiple failure modes—or full component sets—into a ****single equivalent Weibull equation**** representing the entire system or assembly.

This is especially powerful for complex, real-world products and production environments where failures result from interactions across components.

****"It's a machine that makes machines."**** — Elon Musk (on Tesla Gigafactories)

Just as Musk emphasized optimizing the factory (the "machine") alongside the products it produces (the "machines made"), the Multiple Mode Model lets you evaluate ****both factory processes/subsystems and end products**** with equal ease. Model fleets of vehicles, production lines, wind farms, medical devices, or military equipment—then compare against market demand data for warranty predictions and reliability forecasting.

How It Works (Simple 3-Step Workflow) 1. Enter or retrieve Weibull parameters (β shape, η scale, **** γ offset****) for individual components/modes—directly from test data, saved sets, or hand entry. 2. Click ****Calculate System**** to generate the unified system Weibull distribution, complete with confidence limits (weighted by the least reliable mode) and MTTF. 3. Save the combined model for quick recall, reporting, or integration with Duty Cycle/Stress-Strength analysis.

Units of evaluation are flexible: ****cycles, hours, miles, revolutions, or any quantity**** that varies between individual units in a product line. Suspended data and quantity adjustments are fully supported.

Benefits of the Third Parameter (γ /Offset) The Multiple Mode Reliability Model fully supports—and strongly recommends—****Weibull's third parameter (γ /offset)****, which shifts the distribution to represent the minimum time/cycles before failures are likely to occur.

- ****Superior Data Fit****: Iteratively finds the optimal γ that maximizes correlation (often >0.99), aligning data points far better on the regression line than two-parameter models.
- ****Realistic System Modeling****: Accounts for "time served," component interactions, and no-failure periods common in assemblies—essential for accurate system-level predictions.
- ****Improved Accuracy****: Enhances B-life calculations, MTTF, confidence limits, and stress-strength comparisons; reduces overestimation of early risk.
- ****Practical Engineering Value****: Helps distinguish infant mortality from wear-out, supports better warranty forecasting, and is particularly powerful in life-critical or high-volume manufacturing applications.
- ****Easy in Weibull-DR****: One-click application with visual before/after feedback; integrates seamlessly into Multiple Mode for whole-system benefits.

The manual notes that ignoring the offset can lead to suboptimal results for mechanical/electrical systems—our routine makes including it straightforward and effective.

Key Benefits of the Model Overall - Handles real engineering complexity (interacting components) better than basic competing-risks approaches. - Produces clean, stand-alone PDF reports and graphics—copy/paste ready for Word, Excel, or presentations. - Ideal for FMEA, RCM, prototype comparisons, warranty costing, and large-scale fleet analysis. - Saves time: Far fewer steps than competitors, with built-in offset for superior accuracy. - Sample data and saved lists make it easy to learn and apply immediately.

****Example Outputs**** (Insert screenshots here): - [Image: Assembly input screen] - [Image: System Equivalent Weibull Plot with Offset] - [Image: Life-Survival curves]

This routine was developed by practicing engineers for practical results—from heart valves and consumer products to jet aircraft and full manufacturing systems. It works with all major industry and military standards.

****Download the Complete Statistical Reliability Analysis Manual**** (PDF) → [Weibull-DR Manual](/assets/Weibull-DR-Manual.pdf)

****CLICK THIS LINE TO DOWNLOAD WEIBULL-DR AS A 45-DAY DEMO OR TO UPGRADE A LICENSED INSTALLATION.****

To order by credit card:

<https://secure.softwarekey.com/solo/products/Cart.aspx?action=add&actiondata0=13075>

****Weibull Equations for Hand Calculations**** (PDF) → [Weibull-Equations.pdf](/assets/Weibull-Equations.pdf)

Questions? Call (763) 242-7721 or email
[info@applicationsresearch.com](mailto:info@applicationsresearch.com)