Windchill® RBD (Reliability Block Diagram)

ANALYZE RELIABILITY, AVAILABILITY, AND COST USING ADVANCED RELIABILITY BLOCK DIAGRAM (RBD) SYSTEM MODELING

Windchill RBD (formerly Relex OpSim) combines intuitive reliability block diagramming tools with powerful optimization and simulation calculations to analyze the performance and lifetime costs of complex, real-world systems.

By combining reliability block diagram (RBD) capabilities with optimization and simulation analyses, Windchill RBD computes reliability and availability metrics for complex systems while accounting for maintenance policies, spare parts, and repair resources. Model even the most complex system configurations and operating profiles. Augment your system diagram with a wide selection of maintenance-related parameters to accurately compute reliability, availability, and cost metrics.

Key Benefits

Powerful Analytical Capabilities

- Model your complete operational profile using phase modeling
- Supports parallel, load-sharing, and standby redundancy types
- Analyzes the diagram to determine the best approach for problem solving: purely analytical solutions, simulations, or both
- Optimizes spares quantities, preventive maintenance intervals, and inspection intervals
- Monte Carlo simulation tool supports various failure distributions
- Compare alternate system configurations, including those that use redundancy or dependency, to determine the best overall design

Windchill RBD supports many diagram types, including simple series, parallel operating, standby redundant, bridge network, and random network configurations.

- Simulation log functionality visually represents failures over time as the simulation is carried out

Address Multiple Facets of Component Maintenance

- Account for onsite and offsite repairs and spares, discard units, and repair resources
- Designate rules for handling spares allocations, repair team allocations and costs, and partial or perfect repairs
- Define maintenance plans that specify time interval, cost, and type of maintenance being performed

Flexible, User-Defined Parameters

- Specify a calculation goal: minimal costs, maximum reliability, or maximum capacity
- Define repair personnel, availability, and hourly rates for specific diagram components
- Assign overall maintenance time and availability of parts
- Specify degradation factors on all backup and repaired components to account for repairs that are not "good as new"
- Associate a fixed cost with component repair
- Assign costs to various capacity levels to determine the downtime-dependent or capacity-dependent costs of the system

Intuitive RBD Modeling Tools

- Supports load-sharing and block dependency diagramming
- Block library stores components and diagrams for re-use
- Add NPRD and EPRD parts directly as RBD Blocks
- Address any level of system analysis, from a detailed parts analysis to an analysis of higher-level assemblies

Features and Specifications

Supported Configuration Types

- Series
- Parallel operation
- Hot standby
- Cold standby
- Warm standby
- Redundant
- Bridge
- k-out-of-n
- Generic and random network
- Load-sharing redundancy

Supported Calculations

- Failure Rate
- MTBF
- Effective MTBF
- MTTF
- Reliability
- Availability
- Expected number of failures
- Optimize spares
- Optimize preventive maintenance intervals
- Total downtime
- Hazard rate
- Operational availability
- Steady-state availability
- Cost of initial configuration
- Cut sets
- Path sets

Supported Distributions

- Exponential
- Normal
- Lognormal
- Weibull
- Rayleigh
- Uniform
- Time independent
- Constant time

Modeling Features

- Switching mechanisms
- Switch delays
- Logistics delays
- Conditional repair processes
- Junctions

Confidence Intervals

- Reliability
- Availability
- MTBF
- MTTF

Component Repair Policies

- Upon system failure
- Immediately after component failure
- Block dependency

Sample Analysis Outputs

- Graphical diagram
- Total cost vs. time
- Recommended spares per item
- Recommended preventive maintenance interval per item
- Capacity vs. time
- Failures vs. time
- Reliability/unreliability vs. time
- Availability/unavailability vs. time
- Hazard rate vs. time
- Expected failures vs. time
- Total downtime per item

Input and Output Data in a Variety of Formats

- Easily import from or export to commonly used formats like Microsoft Excel, Microsoft Access, XML, and plain text files
- Create reports in Microsoft Word, Microsoft Excel, Adobe PDF, and Rich Text Format (RTF)
- User-definable, wizard-driven custom graphs and reports
- Dynamically link to other Windchill Quality Solutions modules, such as Windchill FMEA, Windchill FRACAS, Windchill LCC, Windchill Prediction, and Windchill Weibull

Available Enterprise-Class Features

- Multi-user environment with login permissions, security features, administrator control, and audit trail functionality
- Database integration at enterprise level supports Microsoft SQL Server 2000, SQL Server 2005, SQL Server 2005 Express, SQL Server 2008, SQL Server 2008 Express, Oracle 9i, Oracle 10g, or Oracle 11g
- Feature-rich FlexNet license management tool

Supported Languages

- English, French, German, Japanese, Korean, Russian, Simplified Chinese

For More Information

For more information on Windchill RBD, please visit:
PTC.com/products/windchill/RBD

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