Windchill® Markov

MODEL AND ANALYZE COMPLEX SYSTEMS USING STATE TRANSITION DIAGRAMS

Windchill Markov (formerly Relex Markov) combines flexible, intuitive diagramming tools with powerful analytical capabilities, enabling you to model even the most complex systems and calculate their key reliability metrics.

With the ability to consider system states, the sequence of events, and event dependencies, Windchill Markov provides powerful analytical capabilities not traditionally supported by other types of analyses. Graphical representations of system states, the connections between these states, and the transition rates for each connection are facilitated by intuitive interface tools to model even the most complex systems. Powerful analytical capabilities can calculate capacity, reliability, and maintainability of the system in various states.

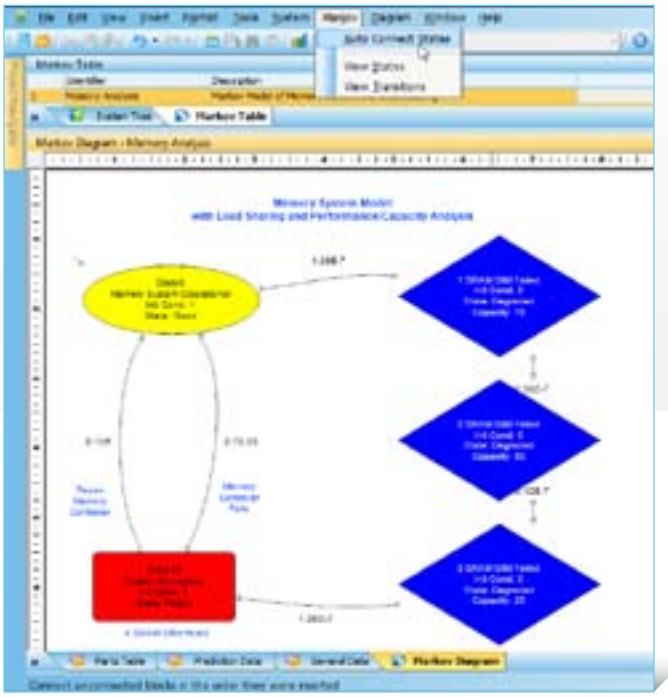
Key Benefits

Suitable for Modeling Complex Systems

- Model systems with complexity beyond that which can be handled in other high level modeling tools
- Suitable for systems exhibiting dynamic behavior, sequence dependency, and components with interdependencies
- Model a system whose future performance is determined solely by its current state

Model Dynamic Failure and Repair States

- State transition diagrams are capable of representing a system's operational, degraded, and failed states
- Account for the rate of transition between states



The intuitive graphical diagramming tools in Windchill Markov enable you to spend more time on your analysis and less time on layout

- Able to consider sequence of component failures and the effect of sequence on system reliability
- Useful in systems with complex repair or restart procedures, systems with event-dependent failure or repair properties, or systems with complex common-cause failures
- Able to account for consequences related to switchover mechanisms, repair priorities, limited repair resources, and failure sequence dependency

Intuitive Graphical Modeling Tools

- Graphical editing tools facilitate changes to all parts of a system diagram, including color, shape, and font
- Interactively develop and modify Markov diagrams, and then quickly update calculations to reflect your changes

Powerful Markov Analysis Capabilities

- Assign parameters to system components and their relationships
- Supports both transient and steady-state analysis results
- Calculates MTBF (Mean Time Between Failures), MTTF (Mean Time to Failure), and MTTR (Mean Time to Repair)
- Calculates capacity values, reliability and availability, failure frequency, costs, and frequency of visits of a state
- Consider associated costs in terms of currency, functionality, or throughput
- Calculate throughput when system is in a given state
- Dynamically link results to other Windchill modules, including Windchill FTA

Features and Specifications

Supported Calculations

- Availability
- Capacity
- Conditional failure intensity
- Conditional repair intensity
- Cost per unit time
- Failure density
- Failure frequency
- Failure rate
- Frequency of departures
- Frequency of transitions
- Frequency of visits
- Mean availability
- Mean capacity
- Mean cost
- Mean state probability
- Mean unavailability
- MTBF (Mean time between failures)
- MTTF/MTTFF (Mean time to first failure)
- MTTFSS (Mean time to failure, steady state)
- MTTR (Mean time to repair)
- Number of departures
- Number of failures
- Number of repairs
- Number of transitions
- Number of visits
- Reliability
- Repair frequency
- State probability
- Time spent in state
- Total capacity
- Total cost
- Total downtime
- Total uptime
- Unavailability
- Unreliability

Supported States

- Operational
- Degraded
- Failed

Supported Calculation Parameters

- Start time
- End time
- Number of data points
- Time point results
- Required capacity
- Precision
- Detection of non-absorbing states

Modeling Capabilities

- Standby failures
- Non-standard common cause failures

- Induced failure and shared load systems
- Imperfect fault coverage and switchover mechanisms
- Repair priorities
- Limited repair resources
- Failure sequence dependent consequences

Sample Analysis Outputs

- Graphical diagram
- Reliability vs. time
- Availability vs. time
- Frequency of visits per state
- Time spent per state
- Failures vs. time
- Total downtime over time
- Total uptime over time

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 FTA
- Windchill Markov supplies the proprietary analytical capabilities used in other Windchill Quality Solutions modules

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
- Available integration with the Windchill PDMLink bill-of-materials ensures a single, up-to-date version of the product BOM

Supported Languages

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

For More Information

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

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