

# Windchill<sup>®</sup> FTA (Fault Tree Analysis)

ASSESS THE RISK AND RELIABILITY OF COMPLEX SYSTEMS THROUGH VISUALIZATION AND ANALYSIS

Windchill FTA (formerly Relex Fault Tree) combines an intuitive graphical representation of fault trees and event trees with powerful analytical tools to assess the risk and reliability of complex processes and systems.

In applications where reliability and safety are paramount, Windchill FTA provides the ability to focus on a top-level event, such as a safety issue or a critical failure, so you can mitigate its occurrence or impact. Intuitive graphical diagramming and calculation tools allow you to easily define the critical failure, its contributing events, and their logical relationships to produce a powerful mathematical model of even the most complex systems. Windchill FTA also supports Event Tree construction to model the likelihood of downstream consequences.

## Key Benefits

### Determine the Probability of Mission-Critical Events

- Event-oriented methodology allows for both quantitative and qualitative analysis of a range of contributing factors, including hardware and software failures, human error, and environmental influences
- During quantitative analysis, each contributing event is assigned failure parameters, which are propagated up the logic tree to calculate the probability of the top event
- Statistical techniques identify the contributing event or events with the greatest impact on system performance
- Enable targeted decisions about design, maintenance, and controls to reduce the probability of failure

### Intuitive Graphical Tree Construction

- Correct tree logic is enforced by the software



Build easy-to-navigate fault trees of complex systems with intuitive diagramming and data linking tools.

- Powerful visualization tools make each component of the fault tree easy to define, manipulate, and update
- Graphics automatically realign within the tree structure as components are added or changed
- Export a graphical view of the fault tree diagram as a bmp or jpeg for use in reports, presentations, or Web pages

### Easy-to-Navigate Table Format

- Convenient filter tools enable easy navigation of table even in large, complex systems
- Expand and collapse table to display and edit properties of fault tree elements

### Perform Powerful Statistical and Mathematical Calculations

- Supports dynamic gates, which account for the sequence of contributing events using an internal Markov engine

- Qualitative analysis techniques include a minimal cut set engine using logic gates to calculate and highlight minimal cut sets
- Quantitative analysis techniques provide the numeric probability of occurrence for critical events and for minimal cut sets
- Common-cause analysis techniques identify the events that cause two or more failures to occur simultaneously
- Lambda-Tau analysis allows for short mission times and varying preventive maintenance schedules
- Importance measures help you identify the event with the greatest impact on overall system reliability

### Features and Specifications

#### Static Gate Types

- AND
- OR
- Voting
- XOR (Exclusive OR)
- NAND
- NOR
- NOT
- Inhibit
- Transfer
- Remarks
- Pass-Through

#### Dynamic Gate Types

- Priority AND
- Functional dependency
- Sequence enforcing
- Spare

#### Event Types

- Basic
- Spare
- House

- Undeveloped
- Conditional

#### Importance Measures

- Birnbaum
- Criticality
- Fussell-Vesely

#### Common-Cause Failures

- Beta
- MGL
- Alpha
- BFR

#### Calculation Methods

- Cut set summation
- Cross product
- Esary Proschan
- Exact
- Qualitative
- Quantitative

#### Supported Calculations

- Unreliability
- Unavailability
- Frequency of failures
- Number of failures
- Cut sets

#### Sample Analysis Outputs

- Graphical diagram
- Event importance
- Minimal cut sets
- Unreliability/reliability vs. time
- Unavailability/availability vs. time
- Gate/event results
- Failure frequency vs. time

### Supports Event Library and Styles

- Store events for use in multiple fault trees or event trees
- Store entire fault tree branches, including gates and events
- Create and store styles to define visual properties for gates and events

### 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, including Windchill FMEA, Windchill Markov, and Windchill Prediction

### 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
- Integration with Windchill PDMLink 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 FTA, please visit:

[PTC.com/products/windchill/fta](http://PTC.com/products/windchill/fta)

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6466-Windchill-FTA-DS-EN-0411