Windchill® FMEA (Failure Mode and Effects Analysis)

ANALYZE POTENTIAL FAILURES AND MINIMIZE THEIR EFFECTS

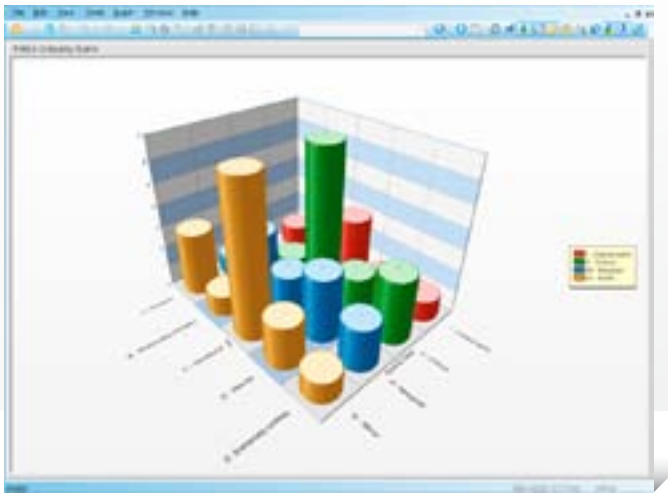
Windchill FMEA (formerly Relex FMEA) provides a structured methodology to identify the failure modes of a system, analyze their effects, and introduce controls to improve product quality.

Windchill FMEA is used to identify all potential failures or risks to a system and evaluate their effects, enabling design engineers to introduce risk controls that prevent or mitigate their impact. As part of an efficient product quality improvement strategy, Windchill FMEA guides product testing procedures, links product component verification to functional requirements, identifies specific manufacturing controls necessary to minimize system risks, and reduces costly rework by addressing risks to product safety and performance early, during product design.

Key Benefits

An Organized Approach to Risk Assessment

- Develop, organize, and implement a plan to address potential failure modes and lessen their impact
- Evaluate systems from a high-level or a detail-oriented perspective
- Perform design, process, or functional analyses
- Evaluate hardware and software systems, process control systems, and human tasks
- Track the compliance status of parts and products relative to industry standards
- Export data from Windchill FMEA into an MIL-STD-1388 2B LSAR compatible format
- Perform quantitative risk analysis in support of FMECA (Failure Mode, Effects, and Criticality Analysis) methodologies



Windchill FMEA supports criticality calculations to prioritize risks, as in this criticality matrix.

- Introduce risk control measures and quantify their impact on system performance

Effective Management of Highly Complex Systems

- Break down large, complex systems into smaller, more manageable subsystems
- Automatically roll up local effects to the failure mode of the next higher level item, and automatically build – or cascade down – the next effect, end effect, and severity to lower level items to ensure traceability

Design Verification Plan & Report (DVP&R) Guides Testing

- Verify that product requirements are met by system functionality and align test activities with identified risks and controls

- Detail testing needs, test planning, and test execution logistics, including materials, resources, location, personnel, etc.
- Supply measurable benchmarks required to pass tests, record test results, indicate pass/fail, and identify unanticipated failures/risks
- Facilitate cross-functional collaboration by communicating results to design engineers for efficient, effective product improvements
- May be created before, during, or after the FMEA; may be linked to a FMEA Item to associate testing procedure with failure mode cause

Control Plans Manage Critical-To-Quality Work Instructions

- Output by, and may be linked to, the Process FMEA
- Ensure product quality throughout a human process involving the product, especially manufacturing, by providing a structured methodology to specify and implement risk control measures
- Link design and testing phases, when risk controls are identified, to manufacturing phase, when controls must be implemented
- Comprise a "living document" to communicate manufacturing input back to design and test, such as best practices or limitations

Integration between Creo and Windchill FMEA

Import vital Creo product dimensions into Windchill FMEA for inclusion in DVPs (Design Verification Plans) and control plans, ensuring that the critical-to-quality product dimensions, control characteristics, and tolerances defined in the CAD model are communicated as process controls to manufacturing teams. With this integration:

- Define and designate parameters with tolerance information in the Creo model, and import as product characteristics into Windchill FMEA
- Import into Windchill FMEA via manual or scheduled import processes

Features and Specifications

Supported FMEA Types

- Process
- Design
- Functional
- Component
- Piece-Part
- FMES (Failure Mode and Effects Summary)

Supported Standards

- MIL-STD-1629A
- FMD-97
- BS5760
- HAZOP
- SAE ARP5580
- AIAG
- SAE J1739
- IEC 61508
- IEC 60812

Supported Calculations

- Item / mode failure rates
- Item / mode criticality
- Risk priority number (RPN)
- RPN improvement percentage
- Risk level
- Percent isolation
- Percent detection
- User-definable

Supplied Failure Mode Libraries

- FMD-97
- FMD-91
- MIL-HDBK-338
- NPRD3
- RADC-TR-84-244
- RADC-TR-844-244 4-A

Data Hierarchy

- Mode Only
- Single effect per mode

- Multiple effects per mode
- Multiple effects per cause
- Multiple causes per effect

Sample Analysis Outputs

- Standard report format per specifications
- Criticality matrices
- Risk levels
- Failure likelihood rank
- Top (n) failure modes by RPN
- Failure modes and effects summary
- Top (n) failure modes by mode criticality
- Action item list
- Failure mode cause Pareto
- LSAR 1388 2B

Automated Interface Tools for Managing Data

- Customizable lists and auto-populate features mean even large, complex FMEAs may be constructed quickly and efficiently
- Powerful data filtering to query and search large systems
- Color-code columns, indicate symbols to flag data, auto-merge cells, and freeze columns while scrolling for easier data entry
- Create Assembly Library files for easy reuse of data, or fault equivalencies for consistency in like failure modes and effects
- DVP and control plan functionality enable one-to-many, many-to-one, and many-to-many relationships
- Display DVP and control plan information in one report
- Import control plan and DVP data

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
- User-definable, wizard-driven custom graphs and reports; output reports to Microsoft Word or Excel, Adobe PDF, or Rich Text Format (RTF)
- Link to other Windchill Quality Solutions modules such as Windchill RBD, Windchill Prediction, and Windchill FRACAS; generate a Fault Tree from FMEA data

Available Web Interface Powered by Microsoft Silverlight

- Available zero-client, web-based interface provides for data entry and analysis anywhere, anytime; also supports out-of-browser installation
- Fully-featured Windows functionality and familiar Windows interface look-and-feel for easy usability
- Access data and system metrics from a web-based Dashboard interface for management-level overview
- Fully customizable start page with drag-and-drop controls includes reports, tables, graphs, rich text control, insert incident, favorites, links, announcements, recent files, workflow items, etc.

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
- API support enables improved integration with existing business systems, including data entry or lookup without opening Windchill Quality Solutions

Supported Languages

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

For More Information

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

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