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PTC® Windchill® FMEA

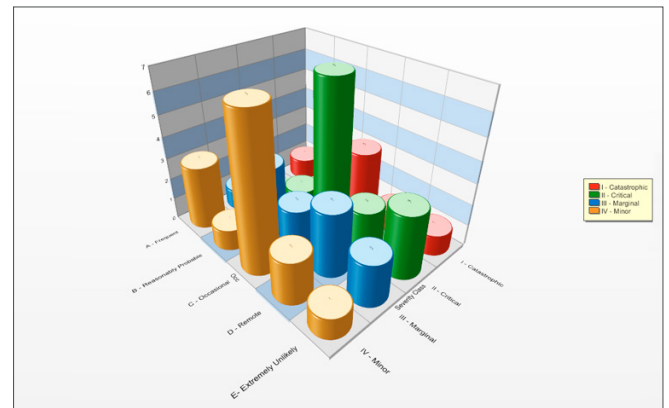## ANALYZE POTENTIAL FAILURES AND MINIMIZE THEIR EFFECTS

PTC Windchill FMEA (Failure Mode and Effects Analysis) provides a structured methodology to identify the failure modes of a system, analyze their effects, and introduce controls to improve product quality.

PTC 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, PTC 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.

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

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 PTC Windchill FMEA into an MIL-STD-1388 2B LS AR compatible format

- Perform quantitative risk analysis in support of FMECA (Failure Mode, Effects, and Criticality Analysis) methodologies

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

Address Identified Risks with FMEA Actions

- Support the traceability of actions taken to mitigate risks

- Identify recommended actions and track both Actions Taken and the results of these actions

- Create and track actions, including multiple actions to mitigate a single risk and multiple risks associated with the same mitigating action

- Multiple Actions can be associated to a problem, where they are grouped to address the problem with a change artifact

- The results of the change process can be shared out to all associated actions

- With a connection established between the FMEA system tree and the Bill of Materials in either PDMLink or MPMLink, an engineering change order, CAPA, or problem report can be generated as a result of the problem and its associated actions. This item can be traced through established PTC Windchill workflows for change management

Guide Testing with Design Verification Plan & Report (DVP&R)

- 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

Manage Quality-Critical Work Instructions with Control Plans

- 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

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

Features and Specifications

Risk Matrix Interface

- Support risk analysis across a wide range of industries

- Assignment of High, Medium, and Low risks

- Multiple risk matrices

- 2- and 3-axis matrices

- Easily configurable fields and lists

- An intuitive interface with "painting" available by clicking in cells and customizable colors

- Default risk matrices may be set for different types of FMEAs, with the risk level automatically set based on the matrix

- Coordination between the risk level graph and the matrix and drill-down capabilities

Supported FMEA Types

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

Supported Standards

- IEC62380 Failure Modes Library to support ISO 26262 calculations, MIL -STD-1629A, FMD-97, BS5760, HAZO P, 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-9, FMD-91, MIL -HD BK-338, NPRD 3, RADC-TR-84-244, RADC-TR-844-244 4-A

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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, LS AR 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, automerge 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

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 PTC Windchill Quality Solutions modules such as PTC Windchill RBD, PTC Windchill Prediction, and PTC Windchill FRACAS; generate a Fault Tree from FMEA data

Available Web Interface

- 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 PTC Windchill PDMLink ensures a single, upto-date version of the product BOM

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

Supported Languages

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

For More Information

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