

flexible solutions for
your business needs

Failure Modes, Effects and Criticality Analysis (FMECA)

BQR tool for analyzing consequences
of components' failures



RELIABILITY OPTIMIZATION

System reliability analysis for sophisticated and large scale systems.

COST REDUCTION

Improving System's Reliability and Up-Time while Saving Maintenance Cost

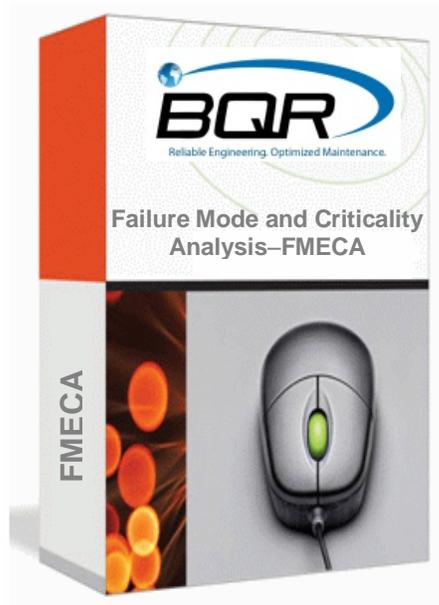
BUSINESS SOLUTIONS

BQR integrates software, business consulting and IT services into business solutions to meet your goals.

Overview

If the system blocks have many failure modes and present multilevel configuration, the analysis of all consequences of the components' failures may be enough complex and requires a special tool making it enough visual, accurate and easy.

If only qualitative consequences are analyzed, the corresponding tool is FMEA (Failure Modes and Effects Analysis). The main purpose of this process is to define for each failure mode (FM) of a system blocks all possible effects, i.e. one or several higher level FM caused by this failure. Going from the bottom to the top level of the system tree the process finishes on FM of the system, which are named 'end effects'. The set of sequential effects from a lowest FM ('end cause') to a highest FM ('end effect') presents a possible 'path' of the failure propagation. Knowing relative 'severities' of end effects, we can thereby classify their end causes and intermediate effects by these severities.



Such analysis helps to select most severe end causes and plan design or maintenance activities to avoid them. If also quantitative consequences are analyzed, the corresponding tool is FMECA (Failure Modes, Effects and Criticality Analysis). It adds some important calculations allowing in the end estimating each FM rate per a time unit causing end effects of each severity.

This parameter is named 'Criticality'. Sum of FM criticalities gives the FM rate. Sum of FM rates of a block gives the block failure rate.

Using failure rates of a FM and corresponding block one can calculate the FM probability for a mission phase time.

The combination of the FM probability (or FM rate) and its worst severity defines the measure of the FM danger. So, using FMECA it is possible to classify all FM by their danger measure and plan the activities to reduce the danger.

BQR FMECA tool presents both FMEA and FMECA capabilities, allows FM classification and colored indication of danger measure. It is also integrated (uses the common data base and user interface) with Testability tool estimating the degree of built-in tests (BIT) efficiency in failure detection and diagnostics (failure causes isolation).



BQR Reliability Software.

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TECHNICAL SUPPORT

BQR Technical Support provides telephone and online answers to your technical questions about BQR Software products, software updates and upgrade.

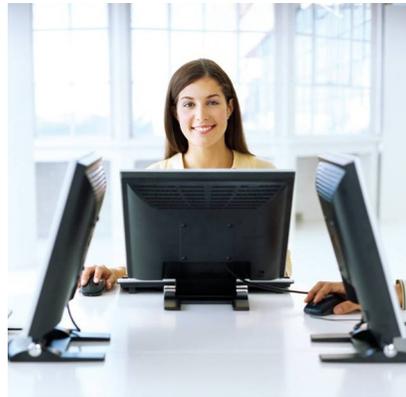
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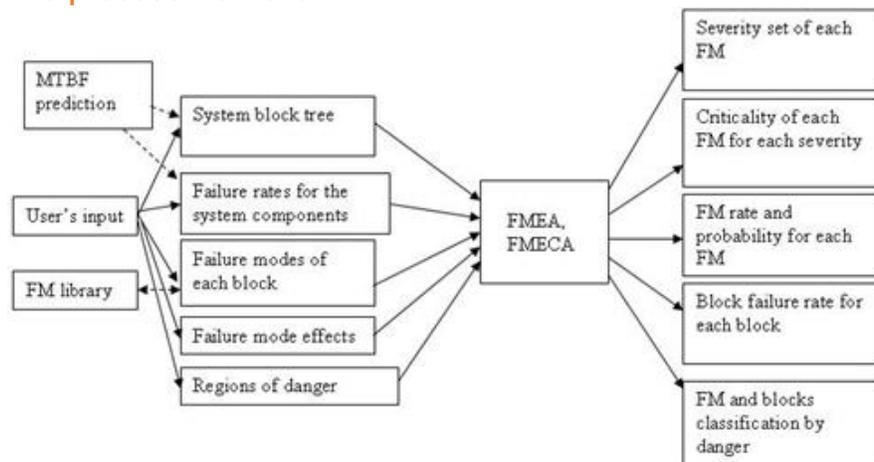
Key Features



- Different movable views showing the system blocks tree and failure modes effects and causes, and also the same information in tabular form presenting entire failure propagation paths from a FM up to end effects.
- Possibility to define for each FM not only Next higher effects (to parent FM), but also Next 'brother' effects (to a 'brother block' FM).
- Colored indication of a FM data readiness for calculation. BQR FMECA allocates the severity of each end effect (system FM) to all FM of the system blocks participating in the failure propagation paths leading to this end effect. By this it becomes clear for each FM, what is the set of its severities

- BQR FMECA calculates criticality of each FM for each its severity, FM rate, FM ratio to the block failure rate and FM probability for Mission phase time. The same parameters are calculated also for each system block of all levels.
- The user can define the regions of danger in the plane 'failure probability – failure severity': low danger (green), intermediate danger (yellow) and high danger (red). Thereby each FM having a certain probability and worst severity may be positioned in one of these regions. The program colors this FM with the region color, to which it relates. The same colored classification is used also for all system blocks. Thus, in all views the danger degree of each FM and block is clearly visible.
- There are 2 methods of regions definition: according to MIL-ST-1629 and SAE FMECA requirements. In both cases the tool allows defining any region by specifying only one combination 'probability – severity' (left lower corner vertex). So, totally the user should specify only 3 combinations to define all regions.

The process flow chart:



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Movable FMEA/FMECA views: Block tree, failure propagation paths, FM effects and causes

About BQR

Established in 1989, BQR provides software tools and consulting services for Reliability, Availability, Maintenance and Safety (RAMS) and Integrated Logistic Support (ILS). Over the years BQR has successfully completed thousands of projects for major customers around the world. The propriety know-how that BQR has developed over the years has been encapsulated in original software package and is now being provided for customers.

Regions of danger according to MIL-ST-1629 and SAE

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