Reliability Workbench incorporating FaultTree+ is the world leading software suite for reliability and safety analysis of systems. It is widely used in industries such as Aerospace, Defense, Rail, Automotive, Oil & Gas, Chemical Process and Nuclear Power.

Reliability Workbench is an integrated environment for performing Reliability Prediction, Allocation and Growth, Maintainability Prediction, FMECA, Reliability Block Diagram Analysis, Fault Tree Analysis, Event Tree Analysis, Markov Analysis and Weibull Analysis.

Each of the modules is a powerful application in its own right and can be used independently. More power is gained by the integration of the modules in the Reliability Workbench environment. They can dynamically share data for ease and consistency. Users only need to input data once but can use it multiple times.

With the new Enterprise functionality, Reliability Workbench projects can be stored centrally on a corporate network. The projects can be checked in and out by multiple users. Reliability Workbench handles version control and user permissions for the enterprise projects.

Reliability Workbench has been in continuous development since 1990. It is a mature product with an impressive track record. Reliability Workbench is used in mission critical applications where its industrial strength is essential.

**Technical Specifications**

- Available as standalone, central network and enterprise deployments
- Runs under Windows 95, 98, NT, 2000, Me, Xp, Vista* and 7*. Recommended host memory requirements minimum 128Mb+
RELIABILITY WORKBENCH KEY FEATURES

- Fully integrated environment for performing reliability, safety and availability analysis
- Enterprise facilities for large-scale collaboration and version control
- Intuitive Reliability Prediction adhering to multiple industry standards
- Maintainability Prediction Failure Mode, Effects and Criticality Analysis including industry standard formatting
- Reliability Block Diagram Analysis
- Fault Tree Analysis
- Event Tree and Markov Analysis
- Weibull Analysis of historical failure data
- Reliability Allocation
- Reliability Growth
- Integrated parts libraries with data for electronic and mechanical parts
- Modular Program
- Extensive customizable reporting tools with output to Office®, and PDF formats
- Import and Export facilities to delimited text formats, Office®, SQL Server®, and Oracle®

AVAILABLE MODULES

- FaultTree+
- Reliability Prediction
- RBD
- FMECA
- Reliability Growth
- Weibull
- Reliability Allocation
**FAULT TREE+ MODULE**

FaultTree+ in Reliability Workbench is a powerful systems reliability analysis tool containing integrated fault tree, event tree and Markov analysis features. It can also be used in conjunction with Prediction, FMECA and RBD modules within Reliability Workbench. Fault tree, Event tree and Markov diagrams can be created very quickly. Automatic drawing facilities are used to create professional diagrams.

Data can be copy and pasted or dragged and dropped throughout the diagram with libraries allowing you to store commonly used sub-trees and share them with other users. Failure and repair data is assigned to the system components which allows for detailed analysis to calculate reliability and availability parameters for the system and identify critical components.

**Key Features**

- Intuitive interface enables fast creation of fault tree, event tree and Markov diagrams
- Enterprise facilities for large-scale collaboration and version control
- Robust minimal cut set algorithm with NOT logic
- Choice of quantitative solution methods - rare, Esary-Proschan or exact
- Integrated fault and event tree analysis for Probabilistic Risk Assessment (PRA)
- Markov models can be integrated into component failure analysis
- Dynamic (sequential) and disjoint failure models
- Common cause failure, importance, phased-mission, uncertainty and sensitivity analysis
- IEC 61508 failure models
- Integrated parts libraries with data for electronic and mechanical parts
- Customizable reports with output to Word® and PDF
- Import and Export facilities to delimited text formats, Office®, SQL Server® and Oracle®
IEC 61508 FAILURE MODELS

The Fault Tree module now includes IEC 61508 failure models to automatically determine HFT (hardware fault tolerance) requirements where appropriate.

IEC 61508 also includes Dormant Modeling features. Averaging algorithms for multiple dormant failures in a cut set are performed for up to 4 dormant failures.

EVENT TREE ANALYSIS

The Event Tree module is able to handle large problems and to fully handle success logic. An event tree model may be created independently of the fault tree model or may use fault tree analysis gate results as the source of event tree probabilities.

The event tree module handles both primary and secondary event trees, multiple branches and multiple consequence categories.

MARKOV ANALYSIS

The Markov module allows users to easily build state transition diagrams and performs numerical integration to solve complex problems.

The models created in the Markov analysis module may be linked to basic events in the fault tree and event tree analysis modules.
RELIABILITY PREDICTION

The Prediction Module is a powerful standards based reliability prediction tool that includes internationally recognised methods of calculating electronic and mechanical equipment reliability.

The standards use a series of models for various categories of electronic, electrical and mechanical components to predict failure rates affected by environmental conditions, quality levels, stress conditions, derating definitions and various other parameters.

The Prediction Module provides a powerful inheritance system that allows you to make global changes to certain parameters such as environment or quality levels.

An integrated parts library provides many tens of thousands of common electronic parts to assist in quickly constructing a prediction project.

System level

Prediction Standards
- MIL-HDBK-217
- RIAC 217 Plus
- RDF 2000 / IEC TR 62380
- Telcordia TR/SR-332
- GJB/z 299B & 299C
- NSWC 98
RELIABILITY BLOCK DIAGRAMS

The Reliability Block Diagram Module of Reliability Workbench can be used to build and analyze complex RBDs.

It produces minimal cut sets and calculates system and component results including unavailability, unreliability and the number of expected failures.

The RBD Module is useful for analyzing complex systems that include multiple common cause failures, component/system redundancy and voting arrangements. CCF Beta Factors may be used to associate groups of components and sub-systems with similar CCF models. Hot, Cold and Warm standby modes can be applied to dormant components.

The Reliability Block Diagrams are easy to construct and may be split, either manually or automatically, into a hierarchy of sub-systems for convenient navigation. It is possible to automatically create an RBD based on a FMECA or Prediction hierarchy and also to automatically produce a Fault Tree from an RBD.

RBD Features

- Multi-level diagram capability
- Common Cause Failure Analysis Component redundancy
- Minimal Cut Sets
- Large variety of quantitative results
- Automated RBD from other modules
FMECA

The FMECA Module of Reliability Workbench provides the full framework and reporting facilities to allow users to construct FMECAs to industry standards or their own custom requirements.

Process and Design FMEAs, commercial aircraft FMEAs and EFA format FMECAs may also be constructed and analysed within this module.

The FMECA Module provides a simple method of constructing block diagrams and entering failure data representing sub-systems and components. The constructed FMECA represents failure modes at various sub-system and component levels.

One of the most powerful features of the FMECA Module is its ability to automatically trace failure effects, severity values and failure causes through the system hierarchy.

Failure rate and criticality values are automatically calculated by the program. The FMECA Module will filter detectable and non-detectable failures. Failure rates may also be modified using beta factors associated with failure modes and individual effects.
RELIABILITY ALLOCATION

Reliability Allocation is usually applied during the design stages of a system. It uses methods to assign reliability targets to sub-systems and equipments based on a system reliability goal. A Reliability Allocation project may recommend redundancy configurations to meet reliability targets as well as assigning reliability requirements of individual sub-systems and equipments.

The Allocation module within Reliability Workbench supplies the user with six methods for assigning subsystem reliability values:

- Non-restricted equal allocation
- Non-restricted graded allocation
- Non-restricted proportional allocation
- Non-restricted redundancy proportional allocation
- Non-restricted reliability re-allocation
- Restricted direct research allocation

Inside the module, a system hierarchy can be constructed where sub-systems may be broken down further to component level, allowing a complete system allocation model.

RELIABILITY GROWTH

Reliability growth identifies trends of increasing or decreasing reliability in a system so that appropriate action can be taken.

The Reliability Growth module of Reliability Workbench analyzes test data by calculating scale and shape parameters defining a growth curve to fit the data. The scale and shape parameters can be used to calculate Failure Intensity, Mean Time to Failure (MTTF) or Unreliability.

WEIBULL ANALYSIS

Weibull Analysis is a method used to analyze historical failures and produce probabilistic failure distributions based on the data provided. Data can be input easily or imported from other sources and fitted to exponential, normal, lognormal, Weibayes and various Weibull distribution types.

The distributions obtained by performing Weibull Analysis can be used in other modules of Reliability Workbench.
Other Features

Enterprise System

Reliability Workbench now includes Isograph’s Enterprise System that allows large-scale collaboration and version control in large organizations. The Enterprise system is stored centrally on a corporate network and is managed by a database that is stored on SQL Server.

Enterprise Reliability Workbench will:

- Control user and group permissions
- Mitigate against data loss
- Allow for Anglo to establish a central library of models and modeling best practices
- Allow for a central depository of parts libraries
- Ensure that the integrity of these models and libraries are centrally managed through corporate permissions that will dictate the level of access for Reliability Engineers and users across the corporation.

Comprehensive Reporting

One of the most important aspects of reliability and safety studies is the creation of professional reports for the presentation of clear results to colleagues, management, customers and regulatory bodies. The Reliability Workbench Report Designer provides highly customizable text, graph and diagram reports. The reports can be exported directly to Microsoft Word® and PDF formats for distribution.

Import and Export

The import and export facilities in Reliability Workbench have been extended to include SQL Server® and Oracle® databases. They also include the ability to import and export to Access®, Excel®, XML and various delimited text formats. Data can be filtered easily and, upon import, validation is carried out so that you can be confident in the data you are using.