COMPANY OVERVIEW

RIZZO Associates is an award-winning, highly focused firm specializing in all aspects of the civil engineering and earth sciences fields. For over a quarter century our firm has worked around the world on unique, challenging, and technically demanding projects. Our services include consulting, design, and construction management in the oil and gas, power generation, dams, water resources, mining, and transportation industries. We take pride in our commitment to providing personal and professional services in a responsive, high quality manner, and continually strive to exceed our clients’ expectations by providing innovative and economically smart solutions.

KEY SERVICES

RIZZO provides the key specialists and tools for the management and execution of safety and reliability programs and RAM Analysis for large projects, in compliance with latest norms, including specific standards (i.e. IEEE Std 762:2006) on Electric/Electronic Systems Reliability, Availability, and Productivity.

RIZZO specialists have experience in the application of RAM Engineering at a complex level for Oil & Gas, Chemical and, more generally, process plants, electrical, electronic, telecommunication, and safety systems and in the use of methods such as FMEA/FMECA (Failure Modes, Effects and Criticality Analysis).

FAILURE MODE, EFFECTS (AND CRITICALITY) ANALYSIS

RIZZO skills covers all technical aspects for developing FMEA/FMECA analysis at any complexity level and the use of Fault Tree Analysis, Event Tree Analysis, RBD design (Reliability Block Diagram), dynamic Monte Carlo Simulation (focused on complex systems i.e. process plant), and System Simulation.

Failure Mode, Effects (and Criticality) Analysis or FMEA/FMECA is the most widely used and most effective design reliability analysis method. It consists in a semi-quantitative procedure for analysis of potential failure modes within a system for classification by frequency of occurrence against the severity of their consequences (determination of the effect of failures on Personnel Safety, Environment, Asset, Production, and Company Reputation) and the detectability of the failure itself. A Risk Priority Number (FMEA) or Criticality Index (FMECA) is assigned to each considered failure modes or to each item.

FMEA/FMECA can be preparatory to Fault Tree Analysis, RAM analysis, feeding the RBD with the identified critical failure modes.

OFFICE LOCATIONS WORLDWIDE

www.rizzoassoc.com
RELIABILITY BLOCK DIAGRAMS

It is a block diagram that shows how system performance depends on the performance of its constituent's parts that are required to sustain system operation, defining the logical interaction of failures within the system. It consists of a number of elements, which function either singly (i.e. control loops and rotating machineries) or as a defined group, including more single items. The groups represent various types of combinations of the elements, with respect to the effect of their failure on system availability.

RAM ANALYSIS

RIZZO provides the key specialists and tools (i.e.: Monte Carlo simulation computer programs) for the assessment of the availability, reliability, productivity and maintainability characteristics of complex systems.

Utilising failure and repair characteristics and repair trades and spares availability data, RIZZO specialists determine ‘up-time’ and ‘down-time’ for each element within a complex system, calculating the statistical parameters required to assess system reliability and availability, shortfall in throughput and down-time.

Simulation using Monte Carlo methods allows the operational capability of complex plants to be examined, including the interaction of many complicating factors such as queuing for repairs and spares, common mode failures, the effects of preventive maintenance, changes in plant configuration, changes in plant loading (e.g. demand) etc. This allows the calculation of plant Reliability and Availability when sizing the plant or setting contract terms for the output, the predicted performance of the system on the mission time, in terms of equivalent throughput, and the identification of plant critical items, on which the project team shall focus their attention in order to study and implement effective measures for enhancing the overall plant reliability and availability.

RELIABILITY DATA

RIZZO specialists offers their experience/expertise to help customers to individuate the most suitable reliability data for each critical failure mode or item, by means of experts engineering judgment or referenced data banks. Moreover, for each reliability evaluation and related statistical uncertainty, the physical models are evaluated as applicable by using a Bayesian approach, which enables the integration of subjective judgment and available field data.

FAULT TREE ANALYSIS (FTA)

The Fault Tree is a graphic “model” of the potential pathways in a complex system which can lead to a foreseeable undesired event. The pathways interconnect several kind of contributory events and conditions, using the Boolean Algebra logic symbols (AND, OR, etc.). The FTA uses numerical single probabilities of occurrence of the basic events (Component reliability data, or failure data) to evaluate the propagation through the model and eventually assess the expected frequency of the Top Event.

FTA is particularly suitable for calculation of complex systems Reliability Data, specifically Mean Time To Failure (MTTF), Mean Time To Repair (MTTR), and Probability of Failure on Demand (PFD).

APPLICABILITY

Process Plants (Chemical, Petrochemical, Oil&Gas)
- Assess the performance (Reliability and Availability) of complex multi-products process systems
- Identification of Critical Components for Production/Functionality
- Safety Integrity Level (SIL) Assessment and Verification

Power Generation
- Model performance of Power Generation Units and their associated transmission distribution network.
- Evaluation of forced outage rates, outage states, commercial availability, group performance indexes, and time-based calculations for group performance indexes
- Identification of Critical Components for Production/Functionality,
- Assess the impact on Availability caused by external events (seasons, weather, etc.).
- Safety Integrity Level (SIL) Assessment and Verification

Manufacturers (Electronics, Hydraulics, Mechanics)
- Assess the performance of complex systems: Machineries, Packages, Control Panels, HVAC, etc.
- Calculation of Reliability Parameters (MTTF, MTTR, PFD)
- Identification of Critical Components for Production/Functionality
- Safety Integrity Level (SIL) Assessment and Verification