



ARBOR
Fault-Tree Analysis

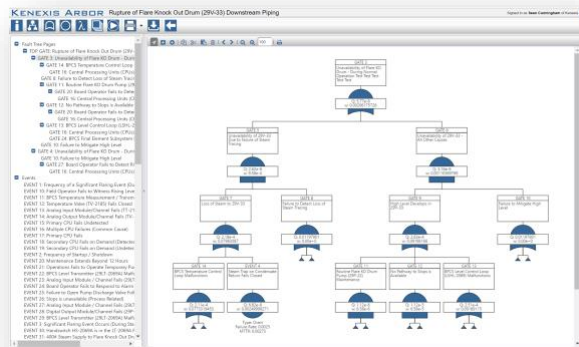


Fault-tree analysis software provides users with an environment for developing complex system reliability models through an inexpensive and easy to use interface taking the pain out of building and managing fault-tree models and integrating with our SIS Lifecycle Management software and SIL Verification.

- Inexpensive and easy to use
- Integrated with SIL Verification
- Integrated with SIS Lifecycle Management software
- Integrated with failure rate data
- Robust minimum cut set analysis reporting

Robust Minimum Cut Set Reporting

Allows users to quickly identify vulnerabilities in the system design by viewing details of the minimum cut set analysis through a clear and interactive interface. Provides valuable statistical analysis of the system highlighting the details of most significant combinations of events which could result in system failure which streamlines the process of sensitivity analysis and evaluation of alternative designs.



Utilization of the Kenexis Failure Rate Database

Kenexis builds and maintains an extensive database of failure rate data for instrumentation and controls equipment. A License to Arbor comes with full access to this database at no additional cost. Data can quickly be gotten, processed and applied in fault tree analysis within a matter a few simple mouse clicks, eliminating the time-consuming task of developing failure rate models for your fault trees. Our engineers use this data every day to perform a variety of process safety studies so you can be sure that the data have been well vetted and is always current.

Integration with Vertigo

Arbor extends the functionality of the Kenexis Vertigo™ SIS Lifecycle Management software by providing an environment to perform complex SIL Verification

calculations. By default, Vertigo will perform SIL Verification Calculations in conformance with the recommended practice of *ISA TR84.00.02 Safety Instrumented Functions (SIF) – Safety Integrity Level (SIL Evaluation Techniques Part 2: Determining the SIL of a SIF via Simplified Equations)*. For complex systems, this recommended practice is not sufficient. Integration of the Arbor Fault Tree Analysis application allows you an SIS designer to quickly and easily verify system designs regardless of the complexity of the system failure modes. Fault Tree Analysis results from Arbor are easily linked to Safety Instrumented Functions in Vertigo for reporting purposes.

Comprehensive Software Environment

Arbor - Fault Tree Analysis Software is part of the integrated-online engineering software from Kenexis. Our secure cloud-based model is accessed by any licensed user on any computer or tablet through a standard browser. The unique architecture ensures that your software is always available and up to date with the latest performance metrics and resource databases. Our solution makes it easy for a licensed user to share project information with others including contracts, EPCs, and to leverage Kenexis process safety engineers for project assistance, outsourcing, and verification and certification of your analyses.

- Compatibility with most browsers in most operating systems
- Extensive standard and custom equipment databases
- Detailed technical documentation and help
- Dedicated help desk and support

- Reports and graphical results output and export

KENEXIS ARBOR Rupture of Flare Knock Out Drum (29V-33) Downstream Piping Signed in as: Sean Cunningham of Kenexis

Select Gate: TOP GATE

		Gate Unavailability	NaN	Gate Frequency	6.46E-6
Cut Set	Number of Events	Unavailability Contribution	Frequency Contribution	Unavailability	Frequency
▼ Cut Set 1	5	NaN	68.15 %	0.00E+0	4.40E-6
Event Title	Event Description	Event Model			
EVENT 3	Significant Flaring Event Occurs (During Startup / Shutdown)			1.00E+0	0.00E+0
EVENT 36	Board Operator Fails to Respond to Alarm from LT-2069A (during Startup/Shutdown)	FAIL TO RESPONSE TO ALARM -> 60 MINUTES		4.40E-2	0.00E+0
EVENT 9	Operator Fails to Check Sight Glass	OMIT STEP FROM SCH. TASK W/O CHECKOFF		1.00E-2	0.00E+0
EVENT 35	Operator Failure to Follow Flare Drum Management Procedure	FAILURE TO CARRY OUT PLANT POLICY		1.00E-2	0.00E+0
EVENT 2	Frequency of Startup / Shutdown	FREQUENCY OF STARTUP / SHUTDOWN		0.00E+0	1.00E+0
▼ Cut Set 2	5	NaN	6.82 %	0.00E+0	4.40E-7
Event Title	Event Description	Event Model			
EVENT 3	Significant Flaring Event Occurs (During Startup / Shutdown)			1.00E+0	0.00E+0
EVENT 36	Board Operator Fails to Respond to Alarm from LT-2069A (during Startup/Shutdown)	FAIL TO RESPONSE TO ALARM -> 60 MINUTES		4.40E-2	0.00E+0
EVENT 35	Operator Failure to Follow Flare Drum Management Procedure	FAILURE TO CARRY OUT PLANT POLICY		1.00E-2	0.00E+0
EVENT 10	Field Operator Fails to Witness Rising Level in 29V-33 Sight Glass	FAIL TO CHECK ANALOG READING		1.00E-3	0.00E+0
EVENT 2	Frequency of Startup / Shutdown	FREQUENCY OF STARTUP / SHUTDOWN		0.00E+0	1.00E+0
▼ Cut Set 3	5	NaN	6.82 %	0.00E+0	4.40E-7
Event Title	Event Description	Event Model			
EVENT 3	Significant Flaring Event Occurs (During Startup / Shutdown)			1.00E+0	0.00E+0
EVENT 36	Board Operator Fails to Respond to Alarm from LT-2069A (during Startup/Shutdown)	FAIL TO RESPONSE TO ALARM -> 60 MINUTES		4.40E-2	0.00E+0
EVENT 35	Operator Failure to Follow Flare Drum Management Procedure	FAILURE TO CARRY OUT PLANT POLICY		1.00E-2	0.00E+0
EVENT 8	Operator Fails to Perform Rounds	FAILURE TO PERFORM SCHEDULED TASK		1.00E-3	0.00E+0
EVENT 2	Frequency of Startup / Shutdown	FREQUENCY OF STARTUP / SHUTDOWN		0.00E+0	1.00E+0
▶ Cut Set 4	4	NaN	5.18 %	0.00E+0	3.35E-7
▶ Cut Set 5	3	NaN	4.81 %	0.00E+0	3.11E-7

Kenexis is an independent consulting engineering firm that provides technical safety services, performance-based fire and gas mapping, and risk analysis for industries that manage risks related to chemicals or stored energy.

We specialize in analyzing risks of any process under control or material in containment in order to quantify the hazard, design reduction targets, and ensure the selected targets are met.

Analysis is done using a risk-based process where the selected equipment, maintenance, and testing procedures are tailored to specific requirements of an application.

The risk-based approach yields a design that provides the required risk reduction to a manageable level at minimal cost.

www.Kenexis.com

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