

# Design for Reliability

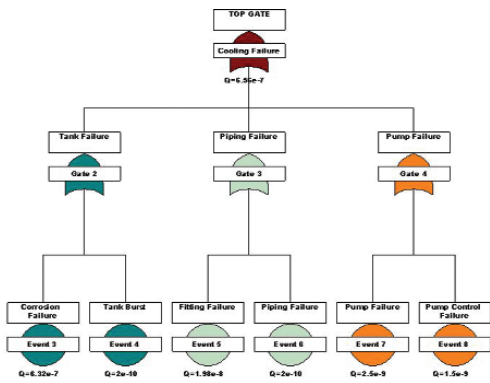
Engineering for optimization of high-reliability and safety-critical systems.

- Environmental Requirements Analysis
- Reliability Design Analysis from System to Component Levels
- Boundary Condition Specifications
- Model-Based Predictions
- Fault Tree Analysis
- Physics of Failure Analysis
- Design Optimization to Improve Electronic System Reliability
- Failure Modes, Effects and Criticality Analysis (FMEA/FMECA)
- Prognostics Based Fault Mitigation
- Environmental Compliance Validation

RELIABILITY

## Model-Based Design

### Pump System Example



FAULT TREE



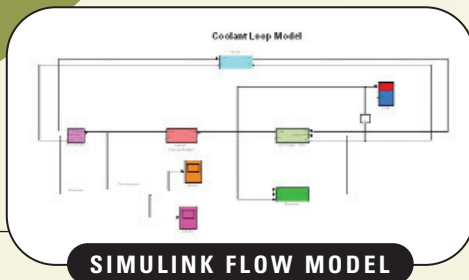
TANK BURST FEA

Mode Ref. ID	Comp ID	Part Number	Failure Mode	Failure Cause	End Eff
1	PUMP01	PUMP01	mechanical	corrosion leak	mechanical
2	MFECA02	MFECA02	wire	hard failure	software
				mechanical	control
				pipe control	pipe rupture

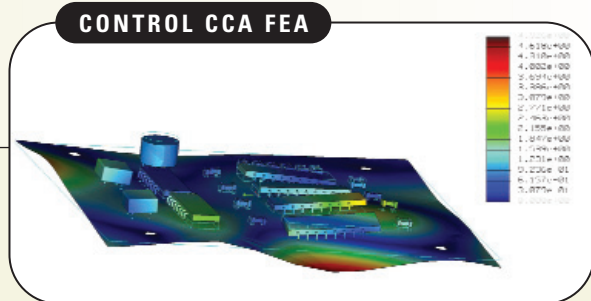
  

End Effect	Severity ID	Detectable ID	Detectable ID	Time Detectable ID	Time Detectable ID
1	mechanical			Task 5	corrosion leak
2	software	Task 7	hard failure	piping 1	blow rock
3	mechanical	Pump 2	mechanical		
4	mechanical	Pump 3	pump control		
5	mechanical	Piping 3	pipe rupture		

FMECA



SIMULINK FLOW MODEL



CONTROL CCA FEA