

# Safety Instrumented Systems

Safety instrumented systems (SIS) are flexible and effective tools for safeguarding process plants. SIS can be configured in many ways to meet a variety of process goals and performance targets. As a result, establishing a suitable design and ensuring the design is carried out are essential. Kenexis helps our clients to utilize SIS by assisting in the design, verification and ongoing mechanical integrity programs. This assistance includes risk-based establishment of performance targets, safety requirements specification, quantitative design verification, test planning and assistance, and continuing performance assessment and auditing.



Safety instrumented systems are the most prevalent of the engineered safeguards employed by process plants. These safeguards are required<sup>1</sup> to be designed, implemented, maintained, and tested in accordance with a mechanical integrity program that is consistent with “good and generally accepted engineering practice”. The Kenexis safety instrumented solution provides cost-effective solutions that

- ◆ Comply with applicable standards and regulations
- ◆ Meet corporate and site risk analysis and tolerable risk policies
- ◆ Ensure the most cost-effective options are selected
- ◆ Deliver ongoing integrity through the safety lifecycle

<sup>1</sup> Based on the OSHA Process Safety Management Regulation

The **Kenexis Safety Instrumented System Solution™** helps to ensure appropriate design, implementation, maintenance and testing, by risk-based requirements development and quantitative verification of system reliability.

✓ **Safety Integrity Level Selection**

Proper design of safety instrumented systems begins with the selection of a performance target for the functions employed by a SIS. Standards such as ISA 84.01 call this target the Safety Integrity Level (SIL). Selection of an appropriate SIL as an exercise in risk analysis. Selection considers the frequency of initiating events, consequences of inaction, and other independent protection layers to determine the performance target.

✓ **Conceptual Design Verification**

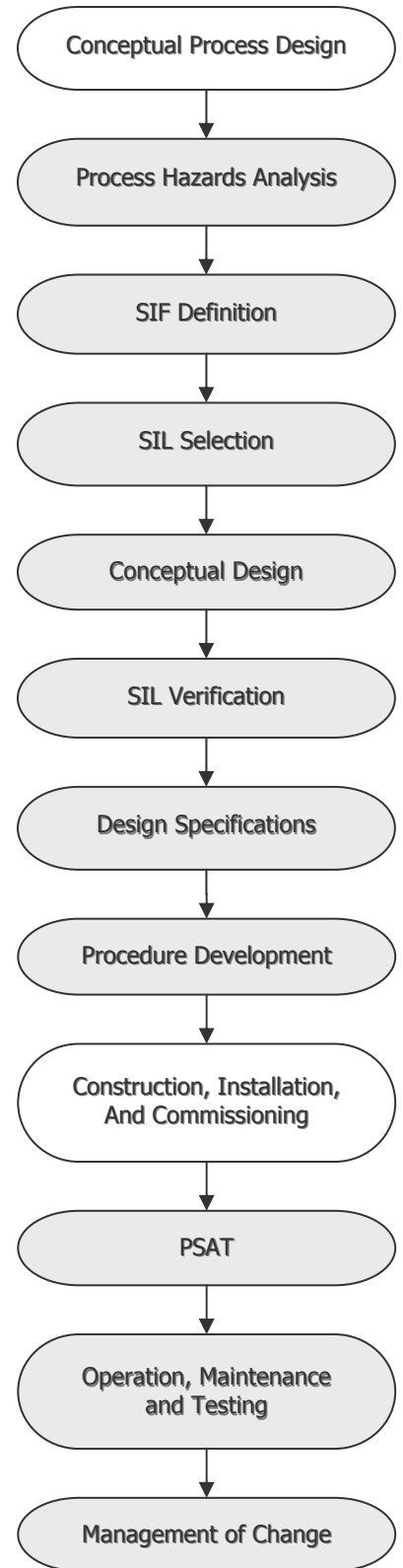
After a performance target has been selected, achievement of this target should be verified by quantitative means. Verification includes determination of probability of failure on demand, spurious trip rates, and other performance metrics. This verification considers the type of equipment employed, advanced voting arrangements, diagnostics, and testing frequency. Kenexis performs design verification utilizing its advanced software tools and proprietary data-bases of equipment performance statistics.

✓ **Safety Requirements Specification**

All of the requirements developed during risk analysis and conceptual design phases of the lifecycle, and other safety critical requirements, need to be collected and presented in a design basis document that can be used for subsequent detailed design engineering. Kenexis assists in the preparation of safety requirements specifications packages that ensure a sound design basis and provide a guideline for subsequent acceptance testing activities.

✓ **Maintenance and Testing (Validation)**

Ensuring the ongoing integrity of a SIS throughout its lifecycle requires vigilant maintenance and testing practices that are in alignment with the risk analysis assumptions and requirements specifications. Kenexis helps its customers to meet their mechanical integrity requirements by developing test procedures for safety instrumented systems, and assisting in the implementation of those tests. Kenexis also helps to ensure good lifecycle performance by monitoring and tracking actual equipment performance against assumptions, and auditing system activity and changes to reconcile system performance and equipment changes against initial assumptions and specifications.



**Kenexis Consulting Corporation**

2929 Kenny Road, Suite 225  
Columbus, OH 43221

Phone: (614) 451-7031 Fax: (614) 451-2643

[WWW.KENEXIS.COM](http://WWW.KENEXIS.COM)