MOORE INDUSTRIES WORLDWIDE

A Guide to Cost-Effective SIS

Bridging the Gap Between Safety Compliance and Efficient Deployment

As industrial facilities continue to raise the bar on their investment in Safety Instrumented Systems (SIS) and functional safety compliance, many process engineers find themselves stuck in the same uncomfortable position when choosing the right-sized safety logic solver. Safety Instrumented Functions (SIF) are becoming more common, expectations are rising, and standards like IEC 61511 leave little room for shortcuts. Yet not every safety function fits neatly into the solutions the industry has traditionally offered.

The problem shows up most often in smaller SIFs. When an application requires more than a simple alarm trip—but only a handful of safety loops—the default response is often to deploy a full-blown Safety PLC. From a compliance standpoint, that choice is defensible. From a practical standpoint, it is frequently excessive. Hardware costs escalate quickly, licensed software becomes mandatory, and projects suddenly depend on specialized programmers for even minor changes. This is the “Safety Gap”: the space between basic alarm devices and large safety PLC systems where many real-world applications actually live.

This paper examines that gap and explores a hybrid approach using the Moore Industries SLA Multiloop & Multifunctional Logic Solver and Alarm—designed to deliver certified SIL (Safety Integrity Level) performance without the cost and complexity typically associated with traditional safety PLC architectures.

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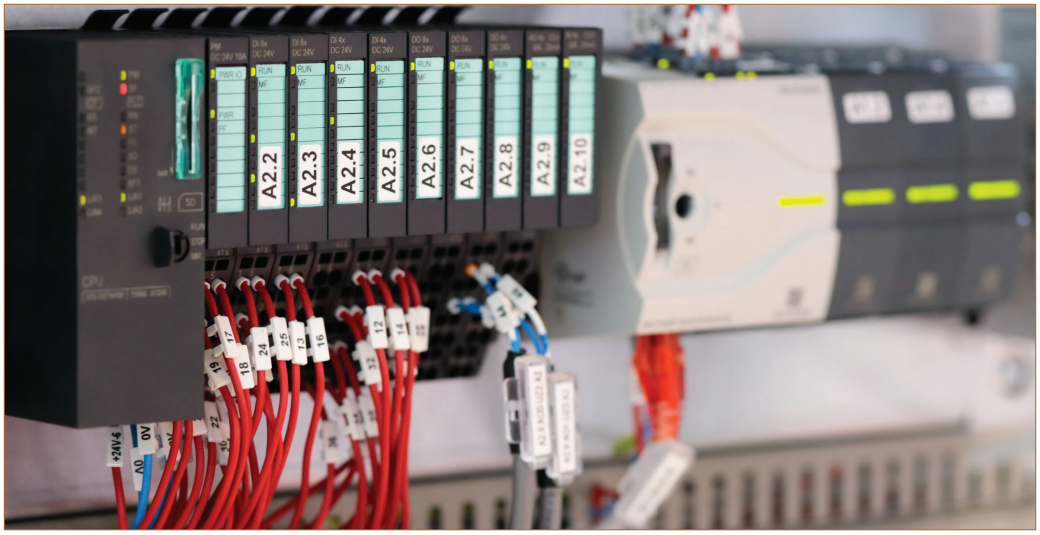

When Safety Becomes Over-Engineered

In many plants, overengineering can quietly become the norm. Engineers tasked with implementing safety functions for applications such as overpressure protection, pump protection, or temperature monitoring often need only two or three safety loops. These functions are critical, but they are not complex by nature.

The choices today, however, are limited. Using a standard, non-certified PLC is certainly allowed by the IEC 61511 standard, but the difficulty of documenting the required lifetime failure and operational performance data can expose the facility to regulatory and liability risk. The alternative, deploying a certified Safety PLC, solves the compliance problem but introduces a new set of challenges: higher upfront cost, long commissioning cycles, licensed programming environments, and reliance on certified specialists for logic changes or troubleshooting.

The result is a familiar pattern. Facilities invest in safety platforms that use only a fraction of their available I/O, occupy valuable cabinet space, and increase total cost of ownership over the life of the safety system. Modifications that should be straightforward become time-consuming, and safety projects that were designed to reduce risk begin to strain budgets and schedules.

Two factors tend to drive this outcome. First is cost. For applications involving only a few safety loops, a Safety PLC is often a significant over-investment. Hardware, power supplies, racks, and networking infrastructure are sized for far more capability than the application requires.

Second is complexity. Certified safety PLC systems depend on specialized programming languages and licensed software tools. This creates a bottleneck during commissioning and locks facilities into higher long-term maintenance costs whenever changes are required.
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Filling the Space Between Safety PLCs and Alarm Trips – Multi-loop Logic Solvers

The hybrid approach addresses this problem by rethinking how safety logic is implemented in smaller SIS applications. Instead of forcing every function into a centralized safety PLC, certified multi-loop logic solvers allow safety logic to be placed closer to the process, where it can be applied more efficiently.

The Moore Industries SLA is designed to operate in this space. It provides single and complex alarming strategies, dynamic voting architectures, and logic capabilities typically associated with a safety PLC, but in a compact form factor more comparable to a field instrument. This allows engineers to match the architecture to the application rather than oversizing the system by default.

Figure 1. *The SLA bridges the gap between inexpensive Single Loop Logic Solvers and Safety PLCs by providing the compromise of three safety loops and up to 16 alarms with simplified programming for complex calculations and functions at very reasonable cost.*

From a functional safety perspective, the SLA is exida® certified to IEC 61508:2010, supporting systematic integrity up to SIL 3 and random integrity up to SIL 2. Unlike devices that are merely “safety-rated,” it is designed specifically for SIS use.

Functionally, the device supports multiple safety loops simultaneously and handles voting schemes such as 1oo2, 2oo3, and 5oo8 without external relay wiring or logic. Internal alarms and logic equations allow engineers to implement shutdown logic, permissive conditions, and interlocks directly within the device. Discrete I/O can be used to manage startup conditions or suppress trips during known transient states, which is especially useful in batch or startup-heavy operations.

Just as important, the SLA does not isolate safety from basic process control operations. Through Modbus/TCP communication, basic process control systems (BPCS) can be continuously apprised and alerted with any parameter within the SLA to include process variables, alarms, internal equation variables, diagnostics, and more. Additionally, the SLA supports HART pass-through, which allows any of the connected field devices’ critical diagnostic data to be passed on to the SLA’s analog outputs that could be tied to an asset management system or other monitoring host. This helps operators and maintenance teams understand not only when a trip has occurred, but why and whether a developing issue is present elsewhere in the loop(s).

Reducing Engineering Time Without Reducing Integrity

One of the most practical advantages of the hybrid approach is the reduction in engineering effort. Configuring and validating a Safety PLC often requires many hours of specialized labor, particularly when documentation, verification, and testing are included.

By contrast, configuring an SLA-based safety function typically takes less than an hour. Logic is created using a graphical interface with preconfigured combo boxes, radio buttons, check boxes, and an Excel-like equation editor with prebuilt easy-to-use functions rather than ladder logic or function block code. Configuration is performed using royalty-free PACTware software, eliminating licensing concerns and simplifying long-term support.

This changes who can own the safety function. Instead of relying exclusively on certified safety PLC specialists, process engineers and safety practitioners can configure and manage certified safety logic much more efficiently. Commissioning becomes faster, small changes are easier to implement, and safety projects are less likely to become “frozen” due to cost or resource constraints.

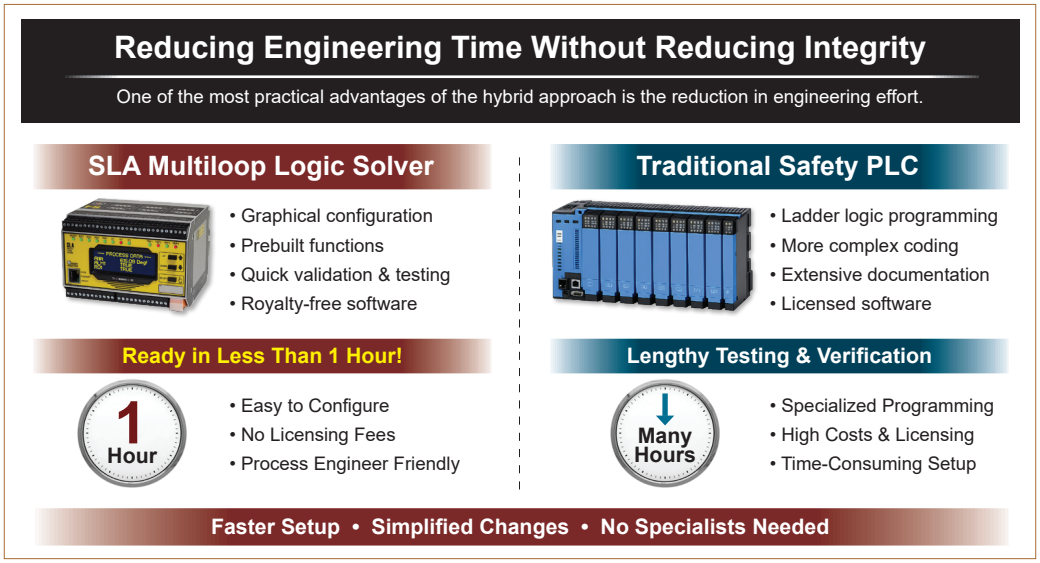

Figure 2. *Besides costs, one of the biggest advantages of the SLA is the configuration time, which is a fraction compared to setting up a Safety PLC.*

Operational ROI, Security, and Field Deployment

Beyond initial implementation, safety systems must remain reliable and secure over decades of operation. The SLA addresses this through features designed for long-term use in industrial environments.

Physical security jumpers provide hardware-level protection for Ethernet and Modbus ports, preventing unauthorized configuration changes once the system is commissioned. Unlike software-based security alone, this creates a clear physical boundary that is simple to audit and difficult to bypass.

Environmental resilience also plays a role in cost control. With a wide operating temperature range of -40 to +85°C, and FM approval for Class I, Div 2 locations, the SLA can be mounted closer to the process. This reduces wiring runs, cabinet space requirements, and installation costs, particularly in retrofit or brownfield projects where space is limited.

Conclusion

For many SIS applications, the challenge is not achieving safety; it is avoiding unnecessary complexity in the process. When a function requires certified safety logic but only a few loops, defaulting to a full safety PLC often adds cost, time, and long-term burden without materially improving risk reduction. Over time, this approach makes safety systems harder to justify, harder to maintain, and harder to adapt.

The hybrid approach outlined here offers a more balanced alternative. By delivering certified SIL performance, native voting and logic, fast configuration, and field-ready deployment in a compact platform, the Moore Industries SLA allows engineers to implement right-sized safety solutions. It closes the Safety Gap by aligning functional safety requirements with practical engineering and business realities without compromising compliance or integrity.

For more details about the SLA Multiloop & Multifunctional Logic Solver and Alarm, visit www.miinet.com/sla.