Modern Analog Safety System (MASS)
Instrumentation & Controls

CURTISS-WRIGHT

Traditional plant safety systems are simple: Built with highly reliable, long lived analog systems for safe, cyber-immune operations, they were meant to last 30 to 40 years without needing replacement. As these systems have aged, Curtiss-Wright re-engineered and replaced many of them with one-to-one technology duplication, fostering a deep understanding of their analog nuances.

However, repeatedly replacing old analog systems with the same system does not move the industry forward; this is why Curtiss-Wright developed the Modern Analog Safety System (MASS) to maintain the best qualities of legacy systems while implementing modern technological advances to optimize safety systems. This innovative streamlined platform is perfect replacing not only legacy analogy systems, but also for replacing the obsolete digital systems that can no longer be supported by plants or manufacturers.

Easy to Understand, Easy To Test

MASS is partitioned into simple modules – It has analog and contact input and output modules; summer modules; multiplier modules; divider modules; square root extractor modules; and alarm modules – all implemented with user-friendly visual design in mind. In addition to these traditional modules, MASS possesses built-in test equipment, making testing fast and easy. All input modules have test jacks, sliding links, built-in banana jack connections, advanced terminal blocks, and LEDs on the front plate, making it simple to switch to a test mode, where the module provides an adjustable simulated input signal for testing.

Highly Accurate and Extremely Stable

Typical MASS modules have an accuracy of ±0.05% span, and a total device uncertainty including 120 day drift of ±0.10% span. This is approximately five times more accurate than typical legacy modules, and with a ±0.05% drift over 120 days, recalibrations will be few and far between, saving time and providing more accurate data.

Lower Cost

Modern surface mount technology allows circuit board production at a fraction of the cost of the older through hole technology. Additionally, the ease of licensing MASS reduces its cost significantly, especially in comparison to digital safety systems where the licensing burden is often large, unpredictable, costly, and unnecessary. Because of this advanced technology and licensing burden, a typical MASS module costs less than half of a re-engineered replacement module.

Simple to License, Industry Certified Cyber Secure Platform

Because an analog system is not a Critical Digital Asset, there is no existing or future cyber security threat – MASS modules have no computer control over any aspect of any safety function. The US NRC has reviewed MASS; like the legacy analog systems, the review was based on SRP 7.2 and 7.3 and applicable BTPs. Unlike with digital safety systems, MASS has no DI&C ISGs, no safety related software, and no complex licensing strategy required, marking MASS as both more secure and easy to license than other systems. Since the MASS platform is designed for use as a protection system, it meets all the applicable standards, including:

- IEEE 338
- IEEE 352 and 577
- IEEE 383
- RG 1.89 / IEEE 323

- RG 1.100 / IEEE 344
- RG 1.53 / IEEE 379
- RG 1.75 / IEEE 384

- RG 1.97 / IEEE 497
- RG 1.180
- E 279 and 603

Effortless Setup

When Curtiss-Wright provides users the MASS platform, they also supply a monitoring computer in two available configurations. In both options, the computer runs a small version of Curtiss-Wright's plant computer software, R-Time, providing all the capabilities of a normal plant process computer – custom displays, alarm lists, trending, historian, and many others. Custom software is then installed to monitor the performance of each module, allowing online diagnostics of any failure. The signals required for online monitoring and diagnostics are sent from the safety-related analog system through 1E-to-non-1E isolators to the non-safety related monitoring touch-screen computer. As an additional option, Curtiss-Wright can provide an add-on to the monitoring computer, allowing it to perform semi-automated surveillance testing. Once manually connected and initiated, the computer fully exercises each module while continuing to monitor performance. When the test is completed, the computer is again only connected through the isolators, preventing any cyber concerns.