B&K SERVICES & SOLUTIONS GROUP

CASE STUDY

# Reducing Automation Costs in a Portable Pyrotechnics Control System

## Customer Overview

Our customer is a leading pyrotechnics company specializing in portable fire control systems used in specialty training for fire crews and first responders. Their products are designed for reliability, repeatability, and ease of deployment in demanding, safety-critical environments.

As their product line matured, the customer identified an opportunity to significantly reduce unit cost in their portable system without sacrificing performance, safety, or long-term supportability.

## The Challenge

The customer's existing portable system was built around:

- **Schneider Electric M340 PLC**
- **Schneider Electric HMIGTO6500 HMI**

While this architecture was robust and well-proven, it was originally designed for larger, more complex industrial applications. For a compact, portable system, the cost and feature set exceeded actual requirements.

The customer engaged our team to:

- Reduce overall automation hardware cost
- Maintain compatibility with Schneider Electric's ecosystem
- Preserve reliability and safety certifications
- Avoid major redesigns that could impact time to market

## Our Approach

We began with a comprehensive review of the existing system architecture, I/O requirements, communication protocols, and operating environment. From there, we evaluated automation platforms from multiple manufacturers, comparing:

- Hardware and lifecycle cost
- Environmental durability
- Programming and maintenance complexity
- Availability and long-term supplier support
- Integration effort with existing designs

Although several alternative platforms were technically viable, system reliability and long-term support remained key decision drivers.

## The Solution

After extensive evaluation, we ultimately returned to **Schneider Electric**, selecting a more appropriately sized control platform:

- **Schneider Electric Modicon M251 Machine PLC**
- **Schneider Electric HMIET6 Series HMI**

This solution delivered the functionality the customer required while eliminating unnecessary overhead present in the original platform.

## Why the M251 + HMIET6?

- Right-sized performance for a portable, embedded application
- Lower hardware cost compared to the M340-based solution
- Fully supported within Schneider Electric's EcoStruxure / SoMachine environment
- Simplified wiring, panel layout, and power requirements
- Maintained a familiar programming and maintenance experience

## Implementation

We supported the customer through:

- Controls architecture redesign
- PLC and HMI selection and configuration
- Program migration and optimization
- HMI screen resizing and modernization
- Validation testing to confirm operational equivalence

By retaining the Schneider Electric ecosystem, the transition was efficient and minimized learning curves for the customer's engineering and service teams.

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## Results

The final solution delivered measurable improvements:

- Significant reduction in automation hardware cost per unit
- Smaller, lighter control package ideal for portable systems
- No loss of system performance or reliability
- Improved manufacturability and simplified assembly
- Preserved vendor continuity and long-term support

Most importantly, the customer achieved their cost-reduction goals without compromising safety or quality—critical factors in pyrotechnic applications.

## Added Benefit: Improved Security and Intellectual Property Protection

In addition to cost and footprint advantages, the transition from the M340 platform to the Modicon M251 machine PLC delivered meaningful security and intellectual property (IP) protection benefits for the customer's portable pyrotechnics system.

## Embedded Machine Code vs. Traditional Program Access

With the previous **M340 PLC**, application logic was stored in a traditional, downloadable program format. While secure for most industrial environments, this architecture inherently allowed broader access for diagnostics, uploads, and service operations—an acceptable tradeoff in fixed industrial installations, but less ideal for portable equipment deployed in the field.

The **M251**, by contrast, supports deployment models that rely on tightly integrated **machine-level application code**, significantly limiting visibility into the underlying control logic. This distinction provides several critical advantages:

- Reduced risk of unauthorized program access or reverse engineering
- Protection of proprietary firing logic and sequencing algorithms
- Lower likelihood of accidental or malicious program modification
- Stronger separation between commissioning/maintenance access and core application logic

For a portable system that may be handled by multiple operators, transported between job sites, or stored outside traditional industrial controls environments, this represented a substantial security improvement.

## Smaller Attack Surface for Portable Systems

The M251's streamlined architecture also results in:

- Fewer exposed interfaces
- A narrower feature set tailored specifically for machine control
- Less need for open programming or debug services in the deployed system

This naturally **reduces the system's attack surface**, improving resilience against unintended access while simplifying validation in safety-critical pyrotechnic applications.

## Practical Security Without Added Complexity

Importantly, these security benefits were achieved **without adding complexity** for authorized users. The customer retained:

- Familiar Schneider Electric development tools
- Straightforward commissioning and service workflows
- Clear separation between user-facing HMI interaction and protected control logic

## Summary

By transitioning to the M251 machine PLC, the customer achieved not only cost savings and hardware optimization, but also a **more secure and IP-protected control platform**—an especially valuable advantage for portable pyrotechnic systems operating outside traditional industrial facilities.

## Conclusion

This project demonstrates the value of selecting automation hardware that matches the true requirements of the application. By right-sizing the control platform and leveraging deep product knowledge, we helped our customer reduce costs, improve system portability, and strengthen the long-term competitiveness of their product.