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HIMA Removes Confusion Around Burner Management Safety Standards Compliance

By Mark Sen Gupta

Keywords

HIMA, Burner Management System (BMS), Combustion Control, Safety, SIL, SIS, NFPA

Summary

More than a century ago, industry started taking note of the potential safety hazards related to combustion equipment, particularly for burner management. Following multiple incidents, governments began enacting related legislation and entire organizations were founded with the express goal of

After decades of discord, many global safety regulations and standards activities related to burner management systems and combustion control have finally become more-or-less aligned, reducing some of the confusion among industrial stakeholders.

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avoiding further accidents. Today, after decades of discord, many global regulations and standards activities have finally become more-or-less aligned, reducing at least some of the confusion among industrial stakeholders.

[HIMA Paul Hildebrandt GmbH](#) recently discussed its activities around [burner management](#) with ARC Advisory Group. The company offers end users full project services to help them navigate the standards changes when updating their burner

safety systems and combustion control. These changes now include a safety integrity level concept consistent with ISA 84.

Key findings include:

- Considerable confusion remains around how industrial end users can best comply with the newly harmonized BMS and combustion control standards and regulations
- HIMA offers complete lifecycle support, helping customers with planning, designing, and implementation



- HIMA libraries include burner management and combustion control templates with TÜV-certified function blocks for easy implementation and maintenance
- HIMA's solution can combine all safety and combustion control functions on a single SIL-3 platform for some applications

Updated Standards

There are thousands of pieces of fired equipment in use today across a huge variety of industrial sectors. Many have been in place for decades; others installed more recently.

In North America, burner management systems have typically been designed by applying the prescriptive requirements contained in codes and standards such as NFPA 85 (Boiler and Combustion Systems Hazard Code), NFPA 86 (Standard for Ovens and Furnaces), NFPA 87 (Recommended Practice for Fluid Heaters) or API 556 (Instrumentation and Control Systems for Fired Heaters and Steam Generators). These documents provide detailed guidance on the quantity and types of sensors and valves required, along with the logic necessary to safely trip the unit as needed. However, these codes and standards do not adequately address the different risk levels associated with burner management systems.

Industry has also begun to utilize new performance-based standards (i.e., IEC 61508, IEC 61511 and ANSI/ISA S84.01) to design safety systems in general. These standards provide a set of criteria related to the amount of risk a particular end user is willing to assume and thus can help address the risks associated with a given site. When properly applied, these standards provide a wealth of information regarding the proper use and design of a programmable logic solver in a safety application.

When evaluating a burner management system, both the prescriptive codes and standards (NFPA, API) and the performance-based standards (IEC, ANSI/ISA) should be considered to ensure a properly designed burner management system that reduces the facility's risk to a tolerable level at the most economical price.

Changes Have Consequences

Burner management systems have been around for centuries and a vast number of them have outdated components. These older systems can cause nuisance trips and potentially create safety issues. Although many existing systems are grandfathered, any changes in the system would require that the new standards and guidelines be applied.

Unfortunately, many end users find the standards confusing because they are not clear as to which standard(s) to use or do not understand how the changes in the standards affect them. Combine this with the fact that the standards get closer together. NFPA standards now mention SIL, allow for ISA84 solutions instead of NFPA solutions, and even allow combustion control and safety in the same SIL-3 rated controller under certain circumstances. Today's shrinking engineering staff and retiring experience only make this situation worse.

How HIMA Can Help

Combustion equipment is associated with a wide variety of potential hazards for people, plants, and the environment. Functional safety is

HIMA uses its knowledge to create complete turnkey burner management solutions. The company can take a project from concept to commissioning.

frequently employed to safeguard against such hazards. This involves different levels of protection. Clearly, qualified support in all phases of the safety lifecycle is crucial.

HIMA explained how it can help end users navigate the challenges of BMS projects. Because the company performs BMS projects worldwide, it has developed the expertise to help end users properly understand and apply the standards. HIMA engineers can help end users determine the upgrades required and the specific equipment that must be addressed, and identify cost-effective solutions that can anticipate future standards changes. HIMA's experience with thousands of different systems helps it integrate with a wide variety of supervisory systems, and do so in a cyber-secure manner.

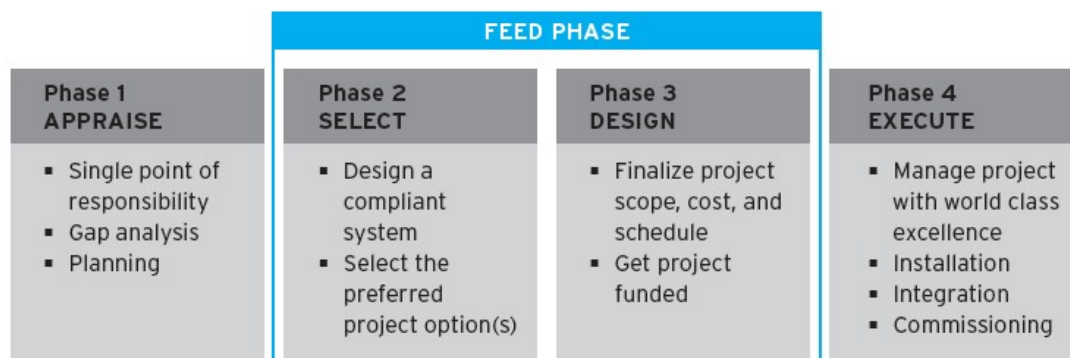
According to the company, its specialists have the knowledge and expertise to create complete turnkey burner management solutions and take a project from concept to commissioning. To address cost, HIMA is templating its experience using TÜV-Rheinland-certified function blocks. This approach reduces training and maintenance costs and supports more consistent design. Furthermore, since the applicable codes and standards increasingly

refer to or require safety integrity levels (SIL), the company believes its solutions can be made “future proof” to further reduce overall lifecycle costs.

At the very onset of the project HIMA can provide a single point of responsibility to ensure that the scope is properly defined, all standards are met, and that budgetary and funding requirements are achieved.

Project Phases

The company identified five phases of a project lifecycle: appraisal, front end engineering, front end design, execution, and operation. HIMA BMS specialists support all five phases to help ensure a successful project.



HIMA’s BMS Project Lifecycle

Appraisal

HIMA personnel evaluate every aspect of the fired equipment relative to the applicable codes or customer standards to identify any gaps.

Every valve, instrument, and field device is reviewed to ensure proper installation, suitability, and compliance. The company then makes recommendations utilizing all existing devices when possible, along with any new devices required. Company personnel also interview engineering and operations personnel to gain insight into any operational issues that may need to be addressed and maintain consistency with other objectives.

The 2015 editions of NFPA 85, 86, 87 produced some of the most significant changes in recent years (NFPA 87 did not even exist until 2011). As a result, a lot of equipment in industry was installed before that standard existed, and this legacy equipment needs to be evaluated and documented.

HIMA believes its experience and templated approach allow customers to avoid the pitfalls of under- and over-compliance. Its experience also gives

HIMA professionals insight into industry best practices that look toward the future of compliance.

Front End Engineering and Front End Design (FEED)

Using the insight gained from the appraisal and gap analysis, detailed engineering and design can begin. All the field devices identified in the gap analysis are also specified at this point. If burner modifications or replacements are required to accommodate flame detection instrumentation or ignitors, those items are specified in this stage.

Benefits of Using a SIL-Rate Logic Solver for Combustion Control and Burner Management?

- Standards are moving toward use of SIL-rated devices
- SIL-rated devices are more reliable
- SIL-rated devices have defined failure states
- Outputs are monitored and tested on every scan

The FEED is crucial to the project because it creates the information that enables HIMA to develop an optimized, built-for-purpose system and provide a more precise estimate for project funding. At this point, HIMA develops the system architecture, system logic, instrument lists for purchase if required by the gap analysis, and even the definition of requirements for piping modifications and burner modifications. HIMA coordinates this with site personnel based on existing customer standards.

Execute

HIMA can coordinate all field activities - from demolition, to field modifications, to final inspection - to ensure every task is done safely, per the established plan. Once completed, the commissioning engineers ensure that every loop and function is tested. Customers typically have operations resources involved at this point as part of the training process. The company can also provide additional training, as needed. All documentation is updated based on the project implementation, as are the standard operating procedures (SOPs).

Operate

After start up, HIMA provides ongoing support for the equipment and continues to provide training as needed.

Conclusion

Based on ARC research, HIMA's holistic approach to burner management projects aligns with the current labor trends. Expertise is leaving the job

market at a rate faster than it is being replaced. Unlike in years past, it no longer makes sense for most resource-constrained companies today to maintain in-house expertise for specialized projects like these.

To help counteract the depletion of expertise, ARC recommends that end user organizations consider developing collaborative business relationships with service companies like HIMA that have the specialized expertise and proven track record in projects like these.

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