



# Mangan Burner Management System (BMS) Capabilities

# Mangan BMS Capabilities Brief

Mangan Inc. has provided Burner Management Systems (BMS) since the mid-90s with over 500 project installations across the Refining, Petrochemical, Midstream, and Terminal & Storage markets. Our work scope typically starts with a front-end engineering gap analysis against NFPA (85,86,87), API 556, IEC 61511 and client LOPA. This drives the requirements for instrument specification (burner, controller, flame detector, igniter, pressure transmitters, valves), SIS/SRS documentation compliance, I&E design package, system specification/integration/configuration/FAT/SAT, systems startup and commissioning and life cycle support of required on-line and off-line testing.

Our differentiation is that we bring depth of field, application, and BMS control experience as a single company. This provides us with the on-staff competency to develop BMS control narratives working from P&IDs or modify existing systems through reverse engineering to successfully configure startup/shutdown, emergency trip & relight, and purge sequences. Our capability is derived from decades of linked engineering-operations-maintenance experience and a project methodology that focuses on a collaborative design process with our clients.

Mangan's BMS experience spans across the full spectrum of fired equipment including Heaters, Dryers, Ovens, Boilers, Thermal Oxidizers, hot oil, regen, reactor feed, reboilers.... process heaters. With our extensive application experience and expertise in providing lifecycle services for Burner Management Systems (BMS) and Safety Instrumented Systems (SIS), Mangan is well positioned to support the lifecycle phases for your BMS applications.



1

**Allocation of safety and protective functions to reduce process risk:** Assessment of PHA, LOPA, QRA and other risk assessments recommendations to define the BMS and other risk reduction measures (such as SIS, interlocks, controls, alarms with operation intervention) to close process risk gaps. This steps includes the audit and reviews of existing installations against relevant standards and client requirements:

- a. LOPA recommendations
- b. NFPA-85 (*Boiler and Combustion Systems Hazard Code*),
- c. NFPA- 86 (*Standard for Ovens and Furnaces*),
- d. NFPA-87 (*Standard for Fluid Heaters*),
- e. API STD 560 (*Fired Heaters for General Refinery Services*),
- f. API RP 556 (*Instrumentation and Control Systems for Fired Heaters and Steam Generators*) and other similar



## 2 BMS Safety, Functional and Equipment Specifications development:

- a. SRS (Safety Requirements Specification) for safety and auxiliary functions per ISA/IEC 61511.
- b. SRS for the logic solver includes related and support systems such as power, cabinet design, communications, input, and output interfaces, and other similar. Documentation suitable for equipment quotation and requisition.
- c. SRS for the software and related configuration of the logic solver, to ensure the logic solver code addresses safety, reliability, and requirements per applicable standards.

## 3 Design, engineering, and procurement

- a. Development and implementation of project safety plans addressing:
  - ▶ Competency of personnel associated with the safety system
  - ▶ Planning for lifecycle phases verifications and reviews
  - ▶ Planning for the FSA (Functional Safety Assessment)
  - ▶ Installation and commissioning plan
  - ▶ Planning and requirements for FAT, SAT, Integration tests and other similar safety validation activities
  - ▶ Documentation development, management, and approvals
  - ▶ Selection, specification, requisition of safety devices, and other system components
- b. Specification and design of logic solver including:
  - ▶ Hardware and software specification and requisition
  - ▶ Design and configuration of support systems such as communications, power, associated cabinets, and HMIs.
- c. Development and management of the SIS application program for the SIS logic.
- d. Design of piping related to SIS devices like transmitters and valves.
- e. Mechanical and civil engineering including platforms, supports, siting and others.
- f. Electrical design, schematics, power, controls, conduit, wiring, and related items.
- g. Instrumentation specification, interfaces, process calculations and parameters.
- h. SIL Availability and Reliability calculations using recognized tools such as ExSILentia, Fault Tree, SIL Solver. Special calculations including the impact of systematic failures, shared components, and other cases.



- i. Design, configuration, and implementation of DCS interfaces, controls, interlocks, communications.

4

#### **Factory Acceptance Test (FAT), Commissioning, safety validation (SAT) and Functional Safety Assessments (FSA)**

- a. Planning, development, and execution of comprehensive and fit-for-purpose BMS/SIS Safety Validation inspection, test cases and test procedures such as:
  - ▶ FAT Hardware and software at Mangan Integration facility or other location
  - ▶ Application program validation using emulation or automated software testing applications
  - ▶ Integrated test for DCS, other safety PLC or associated systems
  - ▶ Full SAT for SIS, BMS, and other interlock systems
  - ▶ Testing of DCS logic
  - ▶ Inspection, calibration checks of SIS and BMS field devices
  - ▶ Startup, on-line testing
- b. Functional Safety Assessments: Provide the templates for check list, reports, planning. Lead the panel sessions, complete the reports, recommendations.

5

#### **Operations and Maintenance: Collaborative work with client:**

- a. Development and update of operations and maintenance procedures
- b. Analysis, tracking and resolution of BMS trips, failures, and modifications
- c. Training development and execution. Design of operating manuals
- d. Developing off-line, commissioning, and on-line proof test procedures
- e. Client support for scheduling, executing, and reviewing of SIS/BMS testing

Burner Management Systems (BMS) in Brownfield installations face challenges with old equipment meeting current codes (NFPA, API) and ensuring acceptable risk levels. Upgraded older systems may struggle with current standards compliance.

**Does your Fired Equipment meet Code of Record (NFPA, API) and Acceptable Risk Criteria?**



**Contact Mangan for Assistance**



FOR MORE INFO VISIT US AT  
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