



# Combustion Management

for Industrial Process Applications

## Safety, Operability, Reliability, Code Compliance

- Burner Management
- Burner Application
- Ignition and Controls
- Fuel Trains

# Customer First

Spartan Controls Ltd. is the recognized leading provider of industrial automation, valves, measurement and process controls solutions, and services for process industries in Western Canada. Our partnerships with leading solution providers enable us to connect our customers with world-class technology, superior technical expertise, and full lifecycle services.

We are a Canadian, employee-owned company with project experience spanning multiple industries delivering industrial solutions to help customers improve Safety, Reliability, Performance and Emission Management of their operations.

Our Combustion Management team delivers objectives focusing predominantly on combustion fired equipment: Boilers, Process Heaters, Furnaces, OTSGs, HRSGs, Reformers, Kilns, Reactors, Sulfur Reaction Units (SRUs), Incinerators, Dryers.

Our single point of accountability and 'Front to Back' execution approach improves cost certainty and overall customer experience, allowing us to quickly apply solutions and services to meet our customers automation expectations.

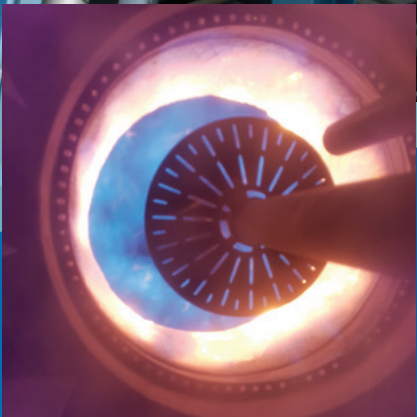
We invest to earn your business; we invest even more to keep it.



**Spartan Controls can apply proven process and combustion knowledge, products and experience to support your projects from beginning to end.**

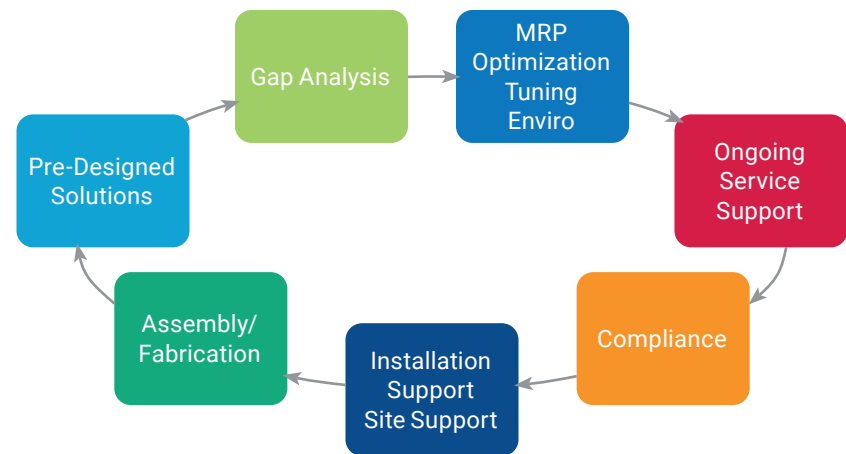
Spartan Controls is your reliable source for the support, products and integration of Combustion Systems for your process heating needs.

With over 150 years of combined experience in combustion system applications, we can support our customers and working partners, for complete project scope including design, manufacturing assembly, functional testing, field commissioning, start-up, tuning optimization, and operations training.



# Combustion Management: Front to Back

SEAMLESS, COST EFFECTIVE AND COMPLIANT PERFORMANCE



## EXPERTISE

- Full system support from 100,000 BTU/h to 800 million+ BTU/h
- Once-Through Steam Generators (OTSG), Heat Recovery Steam Generators (HRSG), Boilers, Reforming/Cracking furnaces, Cement kilns, Process heaters, Sulfur furnaces, Incinerators, Dryers
- Combined systems and product integration capabilities improving – Safety Compliance, Reliability, Efficiency and Environment Sustainability
- Natural and Forced Draft systems: single or multi-burner/multi-fuel designs
- Dedicated team of experts and best-in-class products for combustion solutions

## SPARTAN ADVANTAGES

- Comprehensive knowledge of **CSA B149.3/NFPA 85/86/IEC61511** regulations and standards
- Proven project execution processes delivering application expertise
- Strategic planning support for upgrades, lifecycle initiatives and administrative support
- Scalable scope – delivering solutions at any stage, independently or as an integrated resource within our customers' engineer teams, EPCs and contributing to product design, sizing and best practices

# The Role of a Combustion System

Combustion solutions are used in a variety of applications and for specific safety critical reasons:

- Inhibit start-up when unsafe conditions exist
- Protect against the unsafe operating conditions and admission of improper quantities of fuel to the furnace
- Provide the operator with status information and troubleshooting assistance
- Initiate a safe operating condition or conduct a shutdown interlock if unsafe conditions exist
- Ensure optimum delivery of combustion air and fuel(s) for stable and efficient combustion
- Protect people, property, and processes

The combustion solution is responsible for the safe start-up, operation and shutdown of a gas fired burner on process heaters used in many industries. The system monitors and controls igniters and burners; utilizes flame scanners to detect and discriminate between the igniter and main flames; employs safety shut-off valves,

pressure, temperature, flow and valve position limit switches and uses blowers to cool the scanners and/or provide combustion air for the igniters.

Burner management systems (BMS) are defined as safety instrumented systems (SIS) if they contain sensors, a logic solver and a final control element according to IEC 61511. All safety critical processes must be analyzed and their potential risk determined as its proper operation is crucial to the safety of a boiler.

While the BMS manages the safe start/stop of the unit, Combustion Controls System (CCS) performs the role of consistent delivery of fuel and air to the burner system ensuring safe and efficient operation from light off to maximum continuous nameplate rating (MCR).

# Spartan Combustion Management Capabilities

**OUR PROJECT TEAM IS COMPOSED OF EXPERIENCED PROFESSIONALS WITH THE EXPERTISE NEEDED TO SUPPORT YOUR COMBUSTION PROJECTS.**

Combustion systems are designed to safely operate and manage fired equipment. What makes these applications unique among typical process control and automation projects is the need to have deep knowledge in the field of Combustion Engineering. These systems require skilled Application Specialists to support the complete design, configuration and commissioning of a fired appliance — an area of expertise in which Spartan distinguishes itself. With decades of experience in combustion and process control, Spartan knows how to safely and efficiently control the combustion process, understanding that the effects of combustion on the mechanical integrity of the surrounding equipment and process control is critical to an overall successful implementation.

Understanding specialized requirements and having the trained personnel on our project team to execute this scope of work are significant differentiators for Spartan. We strive to ensure that the best possible resources are assigned to each specific project in a manner that leverages the existing knowledge and the experience of each member of our respective teams.

## REGULATORY COMPLIANCE

**CSA B149:** Until recently, the Canadian Standards Association (CSA) B149.3 code was only considered a 'best practice' and mandatory compliance was not required by industry. Now adopted in Alberta and Saskatchewan, the code states that all gas-fired equipment not previously certified under previous versions of this standard must comply with the 2020 release. As Customers now work toward receiving proper approvals, Spartan can support all aspects of these approval efforts.

**MSAPR:** Our team also works to support Customers in complying to other federal regulations including Multi-Sector Air Pollution Regulations (MSAPR) and NOx reduction efforts.



## COMPLIANCE SUPPORT

Spartan has invested in building a team of professionals capable of executing burner management projects per the CSA and National Fire Protection Association (NFPA85/86/87) guidelines. We leverage our 50+ years of project execution and our team approach to support the success of our customers' combustion projects. Designing and implementing effective control strategies for fired equipment is a core competence within the Spartan team. This includes not only burner management for the safe start up, monitoring and shut down of an appliance, but proper combustion control, mechanical layout and appliance start-up/tuning as well.

Our Spartan combustion group provides a full range of combustion support for complete project execution including:

- CSA B149.3 or NFPA85/86/87 compliance consulting and front-end scope development
- Burner sizing, selection and installation details
- Fuel train design and sizing including piping and instrumentation diagram (P&ID) development and piping spools – Variable Fuel and Multi-burner designs
- Sizing and specification of process Instrumentation
- Computational Fluid Dynamics (CFD) Modelling
- Specification of the flame scanner & igniter
- Selection and specification of the Burner Management System (BMS)
- Controls engineering: control narratives, state diagrams, system configuration, testing
- BMS electrical panel design and fabrication
- Fuel train Mechanical layout and assembly
- Appliance start-up/commissioning
- System testing and burner tuning
- Operator, systems, maintenance personnel training
- International Electrotechnical Commission (IEC 61511) safety instrumented system lifecycle services
- Appliance hazard and operability study (HAZOP) and layers of protection analysis (LOPA) as necessary
- Project documentation
- Coordination of required CSA B149.3 field inspections and appliance certifications

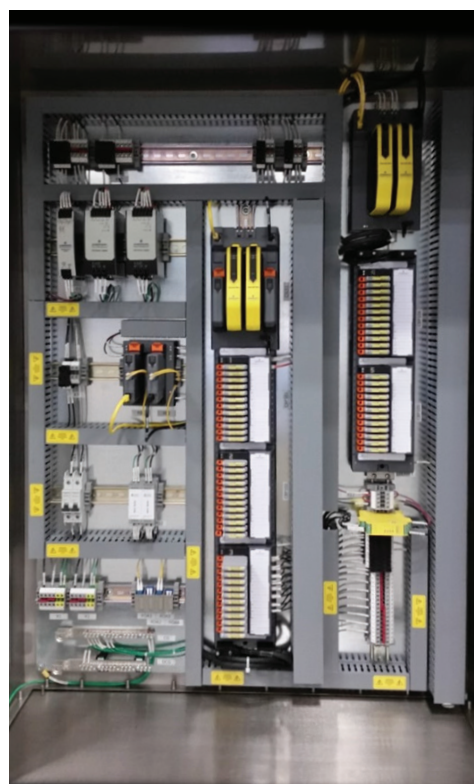


# Safety Through Layers Of Protection – IEC 61511 Safety Lifecycle

**OUR COMBUSTION EXPERTS CAN HELP WITH SELECTION, DESIGN AND BEST PRACTICES FOR SIS, SIL AND SAFETY REQUIREMENT SPECIFICATIONS (SRS) REQUIREMENTS.**

Safety integrity is defined as the likelihood of a safety instrumented system satisfactorily performing the required safety functions under all stated conditions within a given period. A safety integrity level (SIL) is defined as a discrete level for specifying the safety integrity requirements of safety functions.

Today, the main cause of SIS failure is the failure of field devices. A protective system needs to address overall health of safety loops by incorporating the checking of field devices in its overall design. Consequently, the ability to provide an integrated safety solution from sensor to actuator should be an important criterion when selecting an SIS.

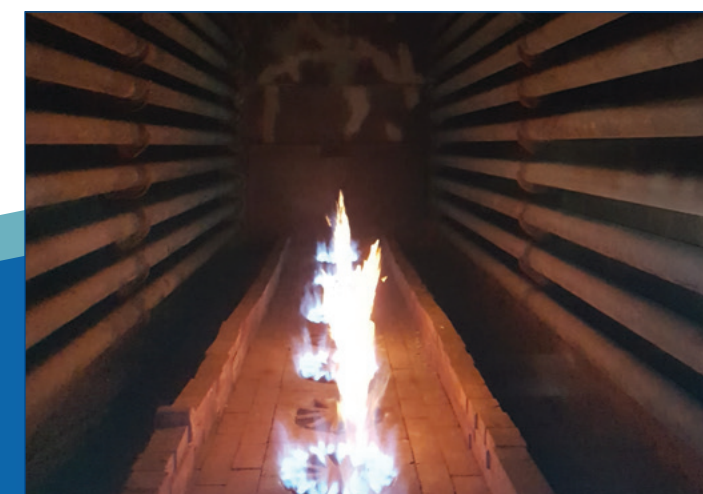
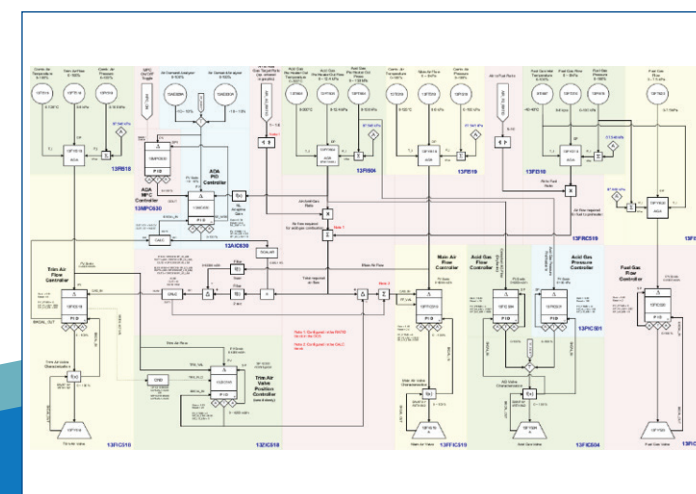
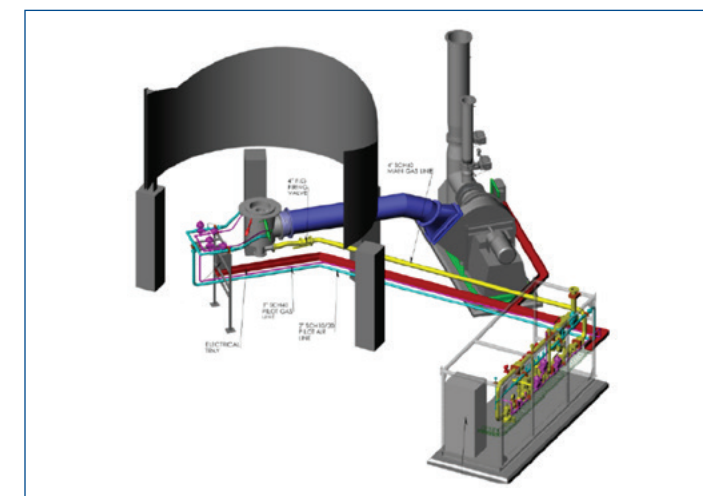


# Safety Through Experience

**OUR EXPERIENCE TEAM ENSURES YOU HAVE THE PROPER DOCUMENTATION NEEDED FOR YOUR PROJECT.**

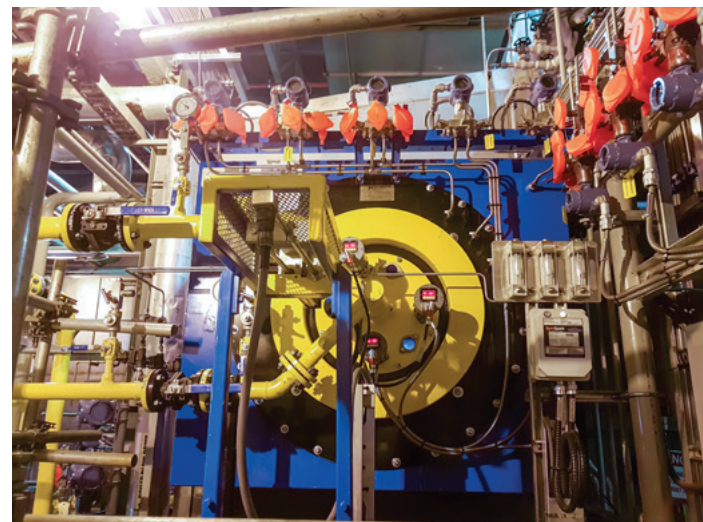
All completed projects require the proper support documentation to ensure years of reliable operation, troubleshooting and support.

Proper documentation helps through all project phases: Engineering, Assembly, Installation.



# Proven Project Execution

- Start with the End in Mind - Our combustion team is focused on delivering the complete solution
- Standardized Products, process and application expertise
- Front to Back: One source and One point of responsibility
- Customer Benefits:
  - Minimize Project Risks
  - Cost Certainty
  - Faster Implementation
  - Complete user and management support through asset lifecycle



## FEED/ENGINEERED DESIGNS

- Project management experience
- Application Engineering know-how
- Single point of accountability
- Solution support

## OPTIMIZED EXECUTION

- Main supply partner
- Easy purchasing
- CO minimalization
- Collaborative design techniques (EPC/Contractors)
- ONE Plant supplier accountability
- Standardized products processes, applications

## STARTUP & COMMISSION

- Local technicians to facilitate vital startup tasks associated with scope
- Proven methodology for success with measures taken to meet expectations

# Environmental Social Governance

With growing global energy demands coupled with Net Zero targets by 2050 puts our industry in a unique and challenging road ahead, where maintaining 'Status-Quo' is no longer sufficient.

While combustion fired equipment is essential to every processing facility, they are major contributors towards emissions. Spartan Controls is committed to supporting the journey for lowering Nitrogen Oxides (NOx) & Green House Gas (GHG) emissions resulted from these industrial combustion fired appliances. With a full portfolio of products, technical support and experience, Spartan can

ensure regulatory compliance, productivity, performance and meet Environment sustainability goals.

By performing appropriate baseline analysis and front-end studies, we can support customers identify gaps/ opportunities and recommend solutions to meet the required emission targets, such as - Federal Multi-sector Air Pollutants Regulations (MSAPR) NOx compliance, Improved Combustion Efficiency lowering GHG emissions, Burner Conversions, and Alternate fuels considerations (Hydrogen, Biodiesel, etc.)

## COMBUSTION MANAGEMENT SERVICES

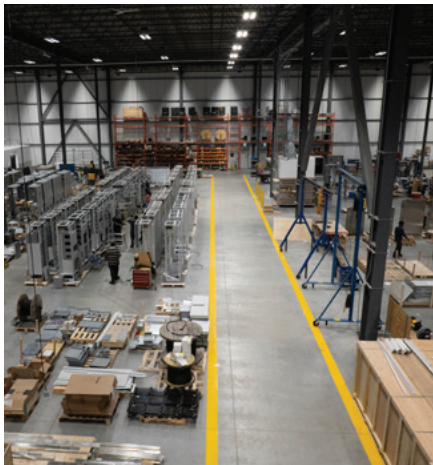
- Perform Baseline Analysis - Opportunity maps identifying areas of consideration
- Leveraging field technicians for single or multiple sites & appliances
- Lifecycle planning with NOx upgrades - Ultra LoNOx Burners, Flue Gas Recirculation (FGRs), Steam Injection
- Combustion Efficiency Improvements (GHG)– Efficiency Audits, Combustion Controls Design & Implementation (Model Predictive Control - MPC), Natural to Forced Draft Burner Conversions, Economizers & Waste Heat Recovery Units (WHRU) for emission reductions
- Variable Fuel Co-Firing considerations – Natural gas, Propane, Produced Off-gas, Refinery gas, Hydrogen fuels and blending
- Field Startup & Commissioning and CSA compliance
- Asset Lifecycle Support – Annual Maintenance and 24/7/365 available support

# Our Process

## REGIONAL SUPPORT CENTRES

Our company understands the importance of being close by when our customers need us. Our employees, whom we call Spartans, live in the communities where we work. Spartan is present in 14 communities, providing support to our customers throughout Western Canada.

Comprising of 209,000 sq. ft, the largest of its kind in Western Canada, our Edmonton Automation Centre provides unmatched breadth and depth of support to our Customers. It is our primary facility for assembly, service and repair operations. It also serves as our warehouse and shipping and receiving terminal which operates on a same-day/next-day delivery cycle.



## MANUFACTURING AND FABRICATION CAPABILITIES

At our Calgary Solutions Centre we provide Customer pneumatic, electronic, electrical, and hazardous location panels and assemblies in one of the largest facilities in Canada that houses fabrication, storage, staging, and warehousing space.

Spartan Controls is CSA-approved for in-house certification of custom assemblies for hazardous locations and general-purpose areas and it's pneumatic assemblies are built to ABSA standards.

# Our People

Spartan Controls provides integrated industry solutions and advanced services focused on improving our customer's operational reliability, safety, and performance. Our team of combustion specialists are focused on providing emissions control and burner management applications. A strength within the team is driving efficiency and environmental compliance across all industry applications. Our team specializes in CSA B149.3 or NFPA85/86 compliance programs that include IEC 61511 processes to ensure the safety of your plant throughout its lifecycle.



# The Process Industries We Serve

The industry segments we serve are key drivers of Canada’s economy. Spartan has been at the center of it for over 50 years, supporting companies that make Canada great.

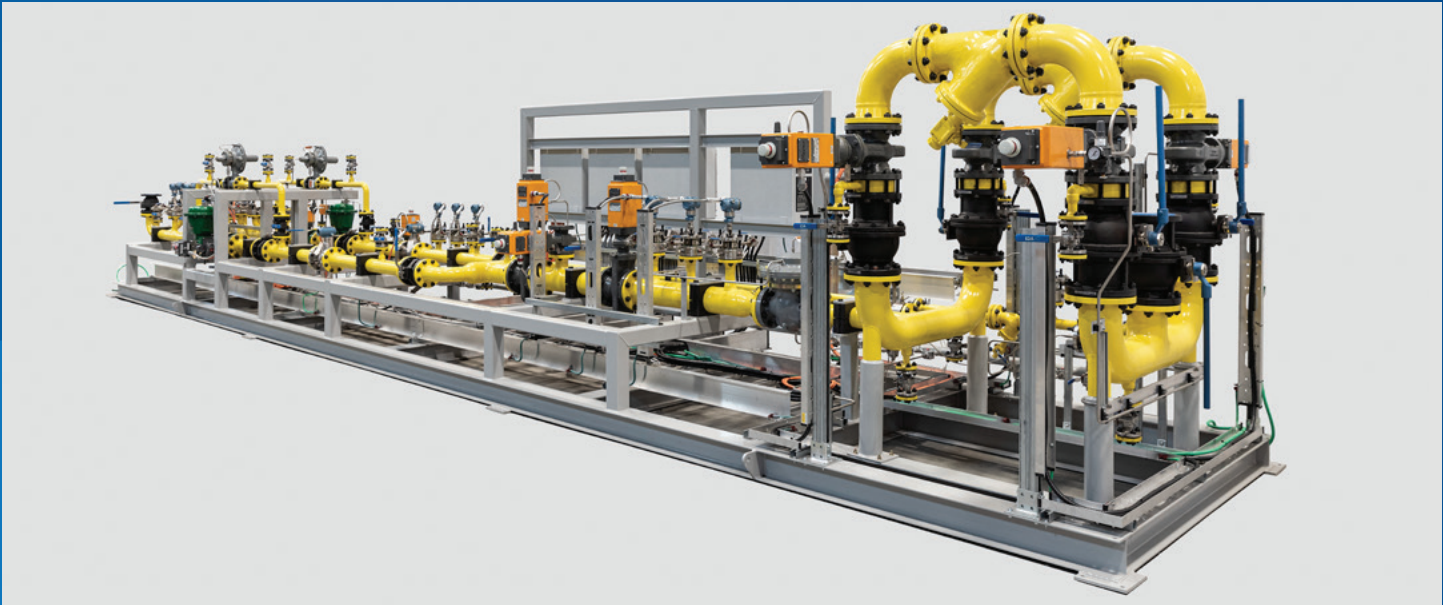
With over 10,000 years of combined industry experience, Spartans are driven to serve our Customers with the highest degree of responsiveness, knowledge and commitment, and to be recognized as the benchmark for exceptional customer value, service and loyalty.



# Communities We Serve



Serving our Customers with the highest degree of responsiveness, knowledge and commitment.





Experience Industrial Innovation

Call us or request a quote online 24/7

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