# Stationary Engineering Standards and Skills

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## Health & Safety Standards

### Standard 1: Safety and Health in a Stationary Engineering Environment

Students will demonstrate health and safety practices in a stationary engineering work environment by correctly utilizing personal protective equipment (PPE), properly using, maintaining, and storing hand and power tools according to industry standards, identifying and mitigating potential hazards, and adhering to safety regulations to ensure a safe and compliant workspace.

* Aligned Industry Recognized Credentials: OSHA 10 – General

#### Skills:

1. Identify, describe, and demonstrate the effective use of Safety Data Sheets (SDS) to meet documentation requirements.
2. Locate emergency equipment, first aid kit, and emergency action and response plan, including labels and signage that follow OSHA Hazard Communication Program (HAZCOM).
3. Interpret chemical, product, and equipment labels to determine appropriate health and safety considerations.
4. Identify, describe, and apply Environmental Protection Agency (EPA) and other relevant environmental protection regulations related to the handling, disposal, and recycling of electronic waste, chemicals, and hazardous materials specific to electronics manufacturing and repair processes.
5. Demonstrate safe dress and use of relevant safety gear, and PPE, e.g., wrist rests, adjustable workspaces, equipment, gloves, proper footwear, earplugs, eye protection, and breathing apparatus.
6. Demonstrate appropriate safe body mechanics, including appropriate lifting techniques and workplace ergonomics.
7. Demonstrate the safe use, storage, and maintenance of equipment in the lab, shop, and classroom, e.g., the OSHA Lockout/Tagout Program (LOTO).
8. Describe safety practices and procedures for working with and around electricity, including the use of ground fault circuit interrupters (GFCIs).
9. Demonstrate appropriate workspace cleaning, sanitation, disinfection, and sterilization procedures in accordance with specific occupational regulations, such as OSHA guidelines, to ensure a safe and hygienic electronics work environment.
10. Demonstrate awareness and compliance with stationary engineering-specific hazards, such as pressure vessels, boiler systems, steam safety, and hot work safety protocols.
11. Describe procedures used to manage emergency situations, defensive measures, and accidents, including identification, reporting, response, evacuation plans, and follow-up procedures.
12. Apply fire protection procedures, precautions, and response plans.

## Technical & Integrated Academic Standards

### Standard 2: Role of Stationary Engineering Professionals in Society

Students will be able to evaluate the role of stationary engineering professionals in society, assessing their contributions to technological advancements in energy systems, their impact on industrial operations, and their responsibility in ensuring environmental sustainability and safety.

#### Skills:

1. Evaluate the impact of stationary engineers in advancing industrial technologies and energy systems, including innovations in heating, ventilation, air conditioning (HVAC), boiler systems, energy management systems, automation, and sustainability practices across various sectors, e.g., commercial, residential, manufacturing, healthcare, transportation, and energy production.
2. Evaluate the role of stationary engineers in promoting energy efficiency and environmental sustainability in industries by applying modern technologies, such as renewable energy integration, e.g., solar, geothermal, smart building systems, and advanced control systems for optimized energy use and reduced carbon footprint.
3. Assess regulatory compliance with relevant industry standards and government regulations, such as OSHA, EPA, state environmental agencies, e.g., MassDEP, and the American Society of Mechanical Engineers (ASME), focusing on their application in managing safety, system maintenance, and waste disposal, e.g., e-waste, refrigerants, chemical handling.
4. Investigate the ethical and social implications of automation and robotics in stationary engineering applications, considering both the potential benefits, e.g., reducing human error, improving efficiency, and risks, e.g., job displacement, cybersecurity.

### Standard 3: Fundamentals of Stationary Engineering

Students will be able to classify boilers, explain operational principles, and apply safety protocols to ensure efficient and compliant boiler system performance.

#### Skills:

1. Differentiate between high and low-pressure boilers, analyzing their respective operational conditions and specifications.
2. Examine the distinctions between water tube and fire tube boilers in terms of structure, function, and application.
3. Compare and evaluate conditions under which water tube boilers are more suitable than fire tube boilers and vice versa, considering factors, such as steam capacity and pressure requirements.
4. Contrast the features and applications of field-erected versus packaged boilers, evaluating their advantages and limitations.
5. Evaluate the role of safety valves in maintaining boiler system integrity and preventing overpressure conditions.
6. Analyze American Society of Mechanical Engineers (ASME) code requirements for safety valves on boilers and assess their importance for compliance and safety.
7. Differentiate between safety and relief valves, analyzing their respective functions and applications in boiler systems.
8. Explain the process for hand-testing safety valves under boiler pressure, explaining the correct procedures and evaluating safety considerations.
9. Calculate the percentage of safety valve blowback and explain its purpose in boiler pressure regulation.
10. Demonstrate the ability to disassemble, label, and reassemble a spring-loaded pop safety valve.
11. Explain the function of soot blowers in maintaining boiler efficiency and preventing fouling.
12. Analyze the hazards associated with the operation of soot blowers, applying safety protocols to mitigate risks.
13. Sequence and assess the appropriate order for blowing tubes on a boiler with auxiliary equipment, such as economizers, considering optimal cleaning efficiency.
14. Compare and contrast mechanical and natural draft systems, evaluating their operational efficiency in boiler systems.
15. Define forced, induced, and combination draft types, analyzing their respective roles and performance in regulating air flow in boiler systems.
16. Evaluate the role of dampers in controlling the flow of air entering and leaving boiler systems, considering their impact on operational efficiency.

### Standard 4: Energy Efficiency Components in Stationary Engineering

Students will apply energy efficiency components in stationary engineering systems, including economizers, superheaters, and steam traps, to optimize system performance, reduce energy consumption, and improve operational efficiency.

#### Skills:

1. Analyze the cost savings associated with the use of air pre-heaters and economizers, emphasizing their impact on energy efficiency and operational savings.
2. Assess when economizers become essential in a system, considering factors, such as steam pressure and overall system efficiency.
3. Identify the medium through which thermal energy is transferred in economizers and air pre-heaters and explain how it contributes to energy efficiency.
4. Diagram and label the piping of a condensing economizer, synthesizing knowledge of thermal systems and fluid dynamics.
5. Describe the function of superheated steam, comparing it to saturated steam in terms of energy content and system applications.
6. Evaluate the advantages of using superheated steam in industrial applications, focusing on system efficiency and operational benefits.
7. Identify and demonstrate the proper procedure for starting boilers with superheaters.
8. Evaluate methods for controlling superheated steam temperature, considering factors such as load, pressure, and safety protocols.
9. Assess the inherent risks of operating superheaters without proper flow and evaluate safety valve settings and venting procedures to mitigate those risks.
10. Explain the function of steam traps in steam systems, analyzing their impact on energy conservation and system efficiency.
11. Analyze the operation of various types of steam traps, including inverted bucket, impulse, float thermostatic, and thermostatic traps, comparing their advantages and limitations.
12. Disassemble, label, and reassemble the most common types of steam traps, demonstrating practical knowledge of their components and operation.
13. Isolate, bypass, remove, and rebuild a steam trap within a live boiler system, applying troubleshooting and maintenance procedures to ensure operational integrity.

### Standard 5: Combustion and Heat Transfer in Boilers

Students will apply fundamental concepts of combustion and heat transfer in boiler systems, including fuel types, combustion processes, and energy transfer mechanisms, to optimize system efficiency and safety.

#### Skills:

1. Explain how fuel combustion is required to generate the heat necessary for steam production in a boiler, demonstrating the role of combustion in energy generation.
2. Identify and compare the most common fuels used in modern boilers, evaluating their properties and efficiency in boiler operations.
3. Tabulate and calculate fuel consumption in various units, e.g., oil in gallons and barrels, natural gas in cubic feet and dekatherms, and coal in pounds and tons, demonstrating proficiency in fuel metering for different fuel types.
4. Explain the process of coal ranking, describing the criteria used to assess coal quality for combustion efficiency.
5. Identify and describe the equipment required to burn different fuels, explaining the operational differences between each fuel system.
6. List and explain the preparation requirements for fuels, including storage, handling, and treatment before firing in a boiler system.
7. State the flash point, pour point, and fire point of various fuels, and explain their significance for safe fuel handling and combustion control.
8. State and analyze the role of time, temperature, and turbulence in the combustion process, assessing their impact on combustion efficiency.
9. Define and compare perfect, complete, and incomplete combustion, analyzing their effects on fuel efficiency and emissions.
10. Differentiate between primary, secondary, and tertiary air in the combustion process, evaluating their roles in optimizing combustion and minimizing fuel waste.
11. Define and explain specific heat, distinguishing between sensible and latent heat of evaporation, and analyze their roles in boiler heat transfer.
12. Explain how energy is transferred through conduction, convection, and radiation, demonstrating the relationship between these processes and heat transfer in a boiler system.
13. Apply the first and second laws of thermodynamics to boiler operations, evaluating how these laws govern energy conversion and efficiency in steam systems.
14. Explain the importance of enthalpy in steam systems, analyzing how enthalpy values influence heat transfer and energy content in steam.
15. Discuss how energy transfer leads to circulation in a boiler, demonstrating the role of heat transfer in fluid movement and overall boiler efficiency.
16. Identify and describe the four systems that apply to any steam boiler, e.g., feedwater system, fuel system, steam system, and blowdown system, explaining their interdependence and contributions to boiler operation.

### Standard 6: Legal and Regulatory Standards in Stationary Engineering

Students will apply Massachusetts General Laws and ASME Code regulations to ensure legal compliance and safe operation, inspection, and maintenance of boilers and related systems.

#### Skills:

1. Explain the roles and significance of key terms in Chapter 146 of the Massachusetts General Laws (MGL), including chief, commissioner, department, division, and inspector, and describe their responsibilities in overseeing stationary engineering regulations.
2. Identify and describe the requirements for annual and bi-annual inspections of boilers and air tanks, in accordance with Massachusetts law, demonstrating the correct inspection procedures.
3. Use the state formula to calculate boiler horsepower, applying the correct unit conversions and understanding how this value influences boiler operations and inspections.
4. Explain the monitoring protocols for high-pressure boilers based on aggregate horsepower, including continuous, non-continuous, and periodic monitoring, and identify the appropriate operational checks.
5. Identify where and how a boiler operator’s license and boiler inspection certificate must be displayed according to state law, ensuring compliance during inspections and audits.
6. Describe the limitations and capabilities of the second-class fireman’s license, explaining the scope of responsibilities and duties associated with different classifications of boiler licenses.
7. State the minimum handhold and manhole dimensions as per the ASME Code, and explain their importance for safety, maintenance, and operational access in boiler systems.
8. Explain the requirements for minimum water column connection sizes and describe their function in maintaining proper water level measurement and control in boilers.
9. Understand the various steam line valve configurations, explaining their role in ensuring the safe and efficient operation of a steam system, including their functions in controlling pressure, flow, and preventing system damage.
10. Identify the minimum pressure gauge graduation and explain the valve arrangement, including the purpose of flooding, siphon, or pigtail protection when installing a pressure gauge on a boiler, ensuring the gauge operates safely and accurately.

### Standard 7: Mathematical Skills in Stationary Engineering

Students will apply fundamental mathematical skills, including operations with whole numbers, fractions, decimals, percentages, measurements, ratios, and basic geometry, to support the efficient operation and maintenance of stationary engineering systems.

#### Skills:

1. Solve word problems involving whole numbers, using operations like addition, subtraction, multiplication, and division.
2. Apply mathematical reasoning to compute word problems that require multiplication and division.
3. Convert fractions to decimals and decimals to fractions with accuracy.
4. Perform arithmetic operations on fractions, including addition, subtraction, multiplication, and division, in the context of boiler and stationary engineering applications.
5. Demonstrate rounding decimals to the appropriate precision for engineering calculations.
6. Convert decimals to fractions and perform multiplication and division with decimals in practical scenarios related to boiler systems.
7. Calculate percentage rates in real-world scenarios, such as fuel efficiency and energy savings.
8. Determine base rate amounts and cost calculations, applying percentage formulas to optimize boiler system operations.
9. Define and use denominate numbers, understanding their application in engineering contexts, including correct use of units of measurement in calculations and problem-solving.
10. Distinguish between units of measurement commonly used in stationary engineering, such as pressure, temperature, and volume.
11. Convert between various units of measurement, such as from PSI to bar, or gallons to liters, to support accurate boiler system calculations.
12. Solve problems involving ratios, such as fuel-to-air ratios in combustion systems, or steam-to-water ratios in boilers.
13. Apply both direct and inverse proportions to calculate values relevant to steam pressure, flow rates, and fuel consumption.
14. Calculate the radius, diameter, and circumference of circular elements, such as pipes and tanks, used in boiler systems.
15. Determine the volume of solid figures, such as the volume of a boiler drum or storage tanks, for system planning and design.
16. Use line, bar, and circle graphs to interpret data related to boiler performance, energy consumption, and system efficiency.
17. Present mathematical data visually to support decision-making and performance analysis in boiler operations.

### Standard 8: Fundamentals of Boiler Operations

Students will be able to demonstrate essential boiler operation practices, including proper procedures for blow-down, water level management, and plant start-up and shut-down, ensuring safe and efficient boiler operation in accordance with industry standards.

#### Skills:

1. State the correct valve sequence and procedure for blowing down a boiler, following manufacturers' specifications and industry standards.
2. Describe various valve arrangements and designs used in common boiler blow-down systems, analyzing their functions and benefits.
3. Explain the reasoning behind the proper opening sequence of blow-down valves to maintain safe and efficient boiler operation.
4. Describe the relationship between boiler blow-down and water conductivity, highlighting its impact on water treatment and efficiency.
5. Compare and contrast blow-down separators and flash tanks, explaining their functions, applications, and importance in maintaining boiler performance.
6. Explain the importance of maintaining a normal operating water level (NOWL) in a boiler, emphasizing its impact on safety and efficiency.
7. State the dangers of carrying too high or too low water levels in the boiler and outline preventative measures to avoid these conditions.
8. Demonstrate the procedure for manually adding water to the boiler, ensuring proper maintenance of water levels.
9. Demonstrate how to automatically add and adjust water to the boiler using a feed-water regulator, ensuring continuous safe operation.
10. Explain the operation of float, thermo-expansion, and thermo-hydraulic feed-water regulators, detailing their roles in maintaining proper water levels.
11. Differentiate between single, double, and triple element feed-water regulators, describing their respective uses and applications in boiler systems.
12. Illustrate the high and low-pressure feed-water systems, labeling all lines, valves, and equipment involved in their operation.
13. Employ the steps for starting a cold boiler according to industry standards, ensuring a safe and efficient start-up process.
14. Identify and locate all safety interlocks on the boiler before start-up, explaining their purpose in preventing unsafe conditions.
15. Demonstrate the proper testing and resetting of safety interlocks before and during boiler start-up, ensuring all safety measures are in place.
16. Illustrate the high and low-pressure steam systems, showing all lines, valves, and equipment pertinent to their operation during start-up and shutdown.

### Standard 9: Troubleshooting and Operational Practices for Boilers

Students will apply troubleshooting techniques to resolve common operational issues in on-line boilers and demonstrate essential shift duties, record-keeping, and maintenance practices to ensure safe and efficient boiler operation.

#### Skills:

1. Explain and implement the sequence of the pre-purge cycle on a boiler, ensuring safe ignition procedures.
2. Identify and execute the steps necessary to troubleshoot and diagnose no power at start-up, following industry best practices.
3. Demonstrate troubleshooting steps for diagnosing no pilot at start-up, determining potential causes and solutions.
4. Troubleshoot and diagnose no main flame at start-up, identifying the root causes and applying corrective measures.
5. Diagnose and troubleshoot flame failure during the run period, taking necessary actions to restore safe operation.
6. Identify and address low water conditions during the run period, demonstrating the proper response and corrective actions.
7. Explain the importance of arriving early to work, ensuring sufficient time to assess equipment and plant operations.
8. Demonstrate proper record-keeping procedures for the Massachusetts operator’s state logbook, ensuring accurate and comprehensive documentation.
9. Exhibit record-keeping practices for the Massachusetts engineer’s logbook, emphasizing legal and safety compliance.
10. Document and record all necessary information in the state operator’s logbook, ensuring that it is complete and up-to-date.
11. Explain the importance of establishing and maintaining a true water level in the boiler, documenting measurements appropriately.
12. Demonstrate the blow-down procedure on the lab water column and gauge glass, ensuring proper maintenance.
13. Exhibit blow-down procedures on a live boiler water column and gauge glass, adhering to safety protocols.
14. Demonstrate how to remove, measure, and install a new gauge glass, ensuring accurate water level readings.
15. Explain the purpose of the water column in the boiler and its role in maintaining safe operating conditions.
16. Demonstrate the operation of try cocks, explaining their theory and functionality in monitoring water levels.
17. Describe the methods and frequency of testing a Low Water Fuel Cut-Off (LWFCO), ensuring safety standards are met.
18. Explain the purpose and frequency of boiler inspections, highlighting their importance for maintaining safe operations.
19. Demonstrate the proper steps to prepare a boiler for an internal inspection, ensuring compliance with safety protocols.
20. Demonstrate the correct procedure for preparing a boiler for an external inspection, addressing key safety checks.
21. Explain the function of manhole and hand-hole plates, including their importance in boiler maintenance and inspection.
22. Describe and demonstrate the removal, preparation, and reinstallation of common gaskets and seals for hand-hole and manhole plates.
23. Demonstrate the operation of starting and stopping an electrically driven feed-water pump, ensuring safe and efficient control.
24. Demonstrate the operation of starting and stopping a steam-driven feed-water pump, applying an understanding of its role in maintaining boiler water levels.
25. Compare and contrast the operation and purpose of open and closed feed-water heaters, identifying equipment associated with each system.
26. Identify and describe all auxiliary equipment associated with the steam plant, explaining their functions and operational significance.

### Standard 10: Burner Operation and Combustion Control for Boilers

Students will be able to apply operation and maintenance practices related to boiler burners and combustion controls, ensuring safe and efficient flame monitoring, fuel system operation, and compliance with operational standards.

#### Skills:

1. Explain the purpose of automatic combustion controls and identify the four basic types of combustion controls (on/off, modulating, positioning, and metering), demonstrating an understanding of their role in optimizing combustion efficiency.
2. Identify and describe the controls for air combustion and combustion gases, evaluating their impact on fuel efficiency and emissions.
3. Demonstrate a flame failure in the boiler by manipulating the flame scanner, explaining the causes and corrective actions.
4. Describe and demonstrate the operation of the low oil pressure switch, ensuring safe burner operation and fuel system performance.
5. Explain the importance of pre-purge and post-purge cycling for the boiler, illustrating how it contributes to safety and efficiency in the combustion process.
6. Demonstrate the operation of different types of fuel oil burners, identifying their applications and efficiency factors.
7. List and describe components and accessories associated with the fuel oil system, explaining their functions in ensuring proper burner operation and fuel delivery.

### Standard 11: Joining and Assembling Piping and Associated Accessories

Students will be able to demonstrate the proper techniques for joining and assembling various types of piping, tubing, fittings, valves, and gauges according to industry standards.

#### Skills:

1. Demonstrate practices related to steel piping (ferrous) and tubing (non-ferrous) according to current industry standards.
2. Explain the methods used for measuring, cutting, reaming, filing, and joining ferrous (steel) pipe, ensuring alignment with industry practices and safety standards.
3. Explain the methods used for measuring, cutting, reaming, filing, and joining non-ferrous (brass, copper, and aluminum) pipe and tubing, adhering to best practices and material-specific requirements.
4. Compare different types of support and suspension systems used in the suspension of piping and tubing, evaluating their suitability for different applications in stationary engineering.
5. Integrate practices related to steel fittings (ferrous) and non-ferrous fittings as used in stationary engineering.
6. Describe the purpose, use, and installation techniques for ferrous (steel) fittings and non-ferrous fittings (brass, copper), focusing on material properties and application requirements.
7. Demonstrate all methods of measuring and joining steel fittings, ensuring proper fit, function, and security of the connection.
8. Describe and demonstrate the methods for measuring and joining all types of copper, brass, aluminum, and non-ferrous fittings, ensuring compliance with safety standards and operational requirements.
9. Describe the different types of valves (gate, globe, check, non-return, bottom blow-down, control, ball, and butterfly valves), explaining their functions, purposes, and uses in piping systems.
10. Describe the operation and maintenance of valves in relation to pressure, temperature, and specific application needs, ensuring proper functioning and safety during operation.
11. Compare and contrast the types of pressure gauges, vacuum gauges, compound gauges, and draft gauges commonly used in industry, highlighting their specific uses and performance characteristics.
12. Explain the purpose, function, location, and proper use of various gauges, emphasizing their role in monitoring system parameters.
13. Demonstrate the installation practices applicable to gauges, siphons, flooding, and vibration protection, ensuring accurate readings and safe operation of the system.

### Standard 12: Fundamentals of Drive and Electrical Systems

Students will apply mechanical and electrical practices to maintain and optimize mechanical drive systems, focusing on couplings, bearings, alignment, and basic electrical principles essential for the efficient operation of stationary engineering systems.

#### Skills:

1. Identify and describe the different types of couplings used in mechanical drive systems, understanding their functions and applications.
2. Describe the various methods used to connect couplings to different shaft arrangements, including both keyed and keyless connections.
3. Demonstrate the use of bearing key-ways, set screws, and other fastening methods to securely attach couplings to shafts, ensuring proper alignment and torque transmission.
4. Explain various bearing designs and their applications in mechanical systems, highlighting the selection criteria based on load, speed, and environment.
5. Identify and explain the methods used to install and remove bearings from shafts and bearing housings, ensuring proper alignment, and minimizing damage.
6. Demonstrate the use and purpose of bearing oil and water jackets, emphasizing their role in reducing friction and maintaining optimal bearing temperatures.
7. Utilize appropriate terminology related to coupling and shaft alignment, ensuring clear communication in technical settings.
8. Describe and demonstrate the alignment of shafts and couplings using a straight edge, thickness gauge, dial indicator, and rim face methods, ensuring correct operational alignment to prevent premature wear and failure.
9. Explain the fundamental concepts of alternating current (AC) and direct current (DC) in stationary engineering applications, including the differences in their uses and characteristics.
10. Differentiate between parallel and series circuits, understanding their configurations and applications in control and power distribution systems.
11. Measure voltage using a digital multimeter, demonstrating accuracy in diagnosing and troubleshooting electrical systems.
12. Demonstrate the isolation and removal of a circuit, and identify a failed fuse using a multimeter, following proper procedures for safely handling electrical issues and ensuring system functionality.

## Employability Standards

### Standard 13: Employability Skills

Students will be able to apply professional communication, critical thinking, problem-solving, professionalism, teamwork, and collaboration to ensure the safe, efficient, and compliant operation and maintenance of mechanical and electrical systems in the stationary engineering field.

#### Skills:

1. Apply effective communication skills to explain complex technical concepts related to boilers, HVAC systems, and mechanical systems clearly to non-technical stakeholders, including supervisors, facility managers, and other staff.
2. Demonstrate the ability to identify and meet the needs of clients or end-users while providing support and service throughout the lifecycle of mechanical systems and equipment, focusing on reliability, efficiency, and safety.
3. Demonstrate the ability to analyze complex problems related to boiler operations and other mechanical equipment and develop effective solutions that minimize downtime and ensure system integrity.
4. Apply active listening skills by giving full attention to others, taking the time to understand their points and asking appropriate questions to meet job expectations and production methods in the context of operations, repairs, and facility management.
5. Apply teamwork and communication skills in the field of stationary engineering, collaborating with professionals such as facility managers, electricians, and construction teams to ensure system integration, safety, efficiency, and regulatory compliance across various industries.
6. Demonstrate professionalism in adhering to industry standards and regulations, particularly in the context of safety and environmental considerations.

## Entrepreneurship Standards

### Standard 14: Entrepreneurship

Students will identify and evaluate entrepreneurship opportunities within the stationary engineering field by analyzing market potential, financial viability, and competitive advantages to assess the value proposition of business ownership.

#### Skills:

1. Conduct market research to identify current trends, gaps, and emerging technologies in stationary engineering, applying innovative thinking to develop solutions that address market needs in mechanical and building systems, energy management, and facility operations.
2. Identify and explain industry standards and regulations specific to stationary engineering, e.g., ASME codes, local and federal regulations, to ensure product safety, legal compliance, and adherence to environmental and operational guidelines.
3. Adapt to rapidly changing technologies, such as automation, energy efficiency, and green building practices, within the stationary engineering field, ensuring competitive advantages in a dynamic market.
4. Evaluate the business implications of entrepreneurship, including licensing, regulatory compliance, tax obligations, and insurance requirements for self-employment or business ownership in stationary engineering, and compare these with the benefits and drawbacks of W-2 employment in the industry.
5. Analyze business costs, potential revenue streams, e.g., maintenance contracts, facility management, and strategies for growth, focusing on sustainable business practices and long-term profitability in the stationary engineering sector.
6. Identify key competitive advantages in stationary engineering entrepreneurship, such as expertise in energy-efficient systems, preventive maintenance, and regulatory compliance, to differentiate a business in a competitive market.

## Digital Literacy Standards

### Standard 15: Digital Literacy

Students will be able to utilize digital technologies to support daily operations and professional responsibilities in stationary engineering, ensuring efficiency and effectiveness in system management.

#### Skills:

1. Demonstrate the ability to collaborate effectively through digital channels, including email, video conferencing, file-sharing platforms, and other messaging applications.
2. Demonstrate the use of spreadsheet and database management systems to organize, analyze, and interpret operational data, including energy consumption, system diagnostics, maintenance logs, and project information.
3. Locate and utilize online resources that support effective stationary engineering practices, such as industry standards, manuals, and training modules.
4. Apply principles of cybersecurity, particularly as they apply to protecting sensitive system data (such as SCADA systems or HVAC controls), maintaining data integrity, and ensuring secure communication within building management systems.
5. Apply strategies for using digital tools and technologies to drive efficiency in facility management, such as automated monitoring systems, energy management software, and predictive maintenance tools.