Appendix A

(Sponsor(s) with multiple occupations must complete an Appendix A for each occupation)

WORK PROCESS SCHEDULE

AND

RELATED INSTRUCTION OUTLINE

Kansas
Department of Commerce

Appendix A

WORK PROCESS SCHEDULE
Mechanical Maintenance Manger

O*NET-SOC CODE : 49-9071.00 RAPIDS CODE : 0311HY

This schedule is attached to and a part of these Standards for the above identified occupation.

1. APPRENTICESHIP APPROACH

☐ Time-based ☐ Competency-based ☒ Hybrid

2. TERM OF APPRENTICESHIP

The term of the apprenticeship is 3-4 years with an OJL attainment of 6,000-8,000 hours, supplemented by the minimum required 915 hours of related instruction.
(Note: The competency-based training approach does not require hours.)

3. RATIO OF APPRENTICES TO JOURNEYWORKERS

The apprentice to journey worker ratio is: 1 Apprentice(s) to 1 Journey worker(s).

4. APPRENTICE WAGE SCHEDULE

Apprentices shall be paid a progressively increasing schedule of wages based on either a percentage or a dollar amount of the current hourly journey worker wage rate, which is: [redacted]:

1st year: [redacted] **2nd year:** [redacted] **3rd year:** [redacted] **4th year:** [redacted]

5. PROBATIONARY PERIOD

Every applicant selected for apprenticeship will serve a probationary period of 0 weeks.

6. SELECTION PROCEDURES

1. Review applications
2. Interview qualified applicants that are interested in [redacted] Automation Engineering program; to become Electrical Automation Engineer apprentice
3. Hire as a full-time employee while taking part-time RTI

WORK PROCESS SCHEDULE
Mechanical Maintenance Manager

O*NET-SOC CODE 49-9071 RAPIDS CODE : 0311HY

ON-THE-JOB TRAINING HOURS	
DESCRIPTION	HOURS
PRELIMINARY WORK: • Learning the names and uses of the equipment used in the trade. Kind, size and use of cable, wire, boxes, conduits, and fittings, switches, receptacles, service switches, cutouts, etc. • Learning the names and uses of the various tools used in troubleshooting and repair of electrical control circuits and components. Learning the care of these tools, and other instructions necessary to familiarize the apprentice with the material and tools of the trade.	1,000-1,500
ELECTRICAL MAINTENANCE TASK • Evaluating an Electrical Circuit for proper function using proper tools. • Wire and Evaluate Electric Motor. • Read Electrical Schematics. • Perform Single Stop/Start Station wiring. • Perform Multiple Stop/Start Station wiring. • Install Control Circuit Wiring. • Install electric Motor Power Supply wiring. • Troubleshoot DC Motor and associated controls. • Test for Electric Motor Fault. • Reset Circuit Breakers, Test Fuses. • Replace a Photo Eye and Switches. • Calibrate and Adjust Meters. • Wire a circuit and Evaluate Contactors. • Assist electricians in pulling wires to branch circuits. • Install and or repair lighting fixtures. • Install proper size and types of fuses or circuit breakers. • Assisting electricians in installation and completion of work inaccordance with the rules and regulations of the National Fire Protection Association and special local regulations, including proper size of wires, service, conduits, etc.	2,000-2,500
INSTRUMENTATION & CONTROL TASK • Change Parameters in a thermal Controller. • Calibrate a Pressure Transmitter. • Calibrate a Load Cell in a blender controller. • Troubleshoot Blender drive control functions. • Reset Temperature Controller Parameters. • Troubleshoot Variable Frequency Drives (VFD). • Modify Parameters in VFD.	1,000-1,500

• Troubleshoot Ladder Logic (PLC). • Understand network interconnection between controllers, HMI's, VFD's, and remote I/O. • Make Software Backups.	
TROUBLESHOOTING AND SERVICE WORK • Repairing all kinds of electrical work. • Checking out trouble and making repairs under the supervisionof an electrician. • Tracing the polarity of conductors and devices. • Testing the circuit for grounds and shorts and locating and correcting job defects. • Use proper testing equipment and meters.	2,000-2,500

TOTAL HOURS 6,000 – 8,000

RELATED INSTRUCTION OUTLINE
Mechanical Maintenance Manager

O*NET-SOC CODE : 49-9071.00 **RAPIDS CODE :** 0311HY

AAS Degree – Technical Studies

Related Instruction Descriptions: **Approximate Hours:**

COURSE	DESCRIPTION	HOURS
	INDUSTRIAL MECHANICAL MAINTENANCE (min. 15 credits)	
AE100	AC/DC Circuits	60
	Introductory course on electrical and electronic theory and their applications to alternating and direct current circuits for beginning students with no formal experience in electricity or electronics.	
AE105	Industrial Wiring	45
OR	Introductory course on commercial and industrial wiring and conduit fabrication. Students will calculate the size of electrical loads and determine wiring applications for supply, feeder and branch circuits as they implement code requirements.	
AE155	Electrical Maintenance	45
OR	Operation, application, maintenance and troubleshooting of electrical equipment including transformers, relays, motor controls and wiring with emphasis on diagnostic troubleshooting.	
ME106	Industrial Fluid Power	45
OR	Theory of hydraulic and small pneumatic components; function of cylinders, valves, pumps and hydraulic motors and their interrelationship in power application; controls for these systems.	
ME110	Fundamentals of Motor Controls	45
OR	Principles and operations of AC motor control with emphasis on maintenance, operation and utilization.	
ME129	Mechanical Maintenance Skills	
	Basic mechanical skills required for the installation, maintenance and troubleshooting of mechanical industrial equipment as well as preventive maintenance techniques.	
	BUSINESS/LEADERSHIP (min. 15 credits)	
BU105	Intro to Business	45
	Economic environment, organization, management, labor, marketing, finance and career opportunities available in business; for both non-business and business majors.	

BU118	Intro to Leadership	45
	Introduction to the concept of leadership that provides an opportunity to develop essential leadership skills through study, observation and application.	
BU109	Business Communications	45
	Practice in writing business letters and business reports; using business vocabulary; verbal, non-verbal, and interpersonal communications; listening and oral reporting.	
BU121	Customer Service/Professional Image	45
	Development of professional image and service attitude; business etiquette; conflict resolution; communications; adding value to customer relations.	
	Maintenance Internship	45
	On-the-job experiences under the supervision of work site manager and course instructor.	

ELECTIVE COURSES (min. 15 additional credits)

AE150	Programmable Logic Controls (PLCs)	45
	This course examines types, installation and troubleshooting of programmable logic controllers (PLCs). Hardware and programming aspects, as well as ladder logic symbols and operations necessary to develop a PLC program, are also covered.	
AE200	Variable Frequency Drives and Electric Motors	45
	This class is designed for any person requiring a general knowledge and understanding of Variable Frequency Drives (VFDs), electric motors and DC drives.	
AE205	Intermediate Programmable Logic Controllers	45
	Hands-on experience with modular PLC's in developing advanced ladder logic programs and routines including applications, advanced PLC instructions, programming and troubleshooting ladder logic for discreet and analog systems.	
AE250	Distributed/Integrated Control Systems	45
	Study of distributed and PC-based control systems; integration of process and programmable logic control systems into central control, data gathering and report generating systems.	
AE252	Control Systems Development	45

Practical application of problems in control systems technology, application of studied concepts toward the development of a control solution by evaluating the problem definition and providing the control system to solve that problem.

GEN ED COURSES (min. 15 credits)

EN108	Technical Writing	45
	Developing skills that can apply to a variety of technical documents appropriate to each student's course of study including principle of organizing, writing, and revising clear, readable documents for industry and business	
TR100	Technical Math	45
	Review of basic math principles, through fraction and decimal measurements and equivalents, ratios, powers and roots, and basic geometry for industrial technology program majors	
PS101	Human Relations	45
OR	Psychological principles applied to everyday living with an emphasis on self-understanding and on building successful relationships.	
GO101	State & Local Government	45
OR	American state, county and municipal government with special attention to the Kansas Constitution and governmental structure and operation.	
SO103	Stress Management	45
OR	Recognizing and alleviating stress. Identifying and gaining control of factors that contribute to how a person handles stressful situations.	
TR120	Work Ethics	
	Skills required for success in the workplace with focus on the development of positive work habits and communication skills.	
	TOTAL	**915**

TOTAL MINIMUM HOURS 915

Mechanical Maintenance Manger – JOB COMPETENCIES

CORE COMPETENCIES

JOB FUNCTION 1: Safety	MEETS	EXCEEDS
Student will be able to properly identify electrical hazards.		
Student will be able to demonstrate working safely.		
Student will be able to list the personal protective equipment (PPE) needed when working with electricity.		
Student will be able to identify electrical safety and principles.		
Student will be able to demonstrate working safely with electricity.		
JOB FUNCTION 2: Fundamentals	MEETS	EXCEEDS
Student will be able to demonstrate knowledge of the fundamentals of electricity.		
Student will be able to list the different types of test equipment to troubleshoot electrical circuits.		
Student will be able to define the purpose of the National Electrical Code (NEC).		
Student will be able to series, parallel, and combination circuits.		
Student will be able to describe precision Ohms, Watts, and Kirchhoff Laws.		
JOB FUNCTION 3: Design and Testing	MEETS	EXCEEDS
Student will be able to identify tools and test instruments.		
Student will be able to explain electrical standards and codes.		
Student will be able to read drawings and specifications.		
Student will be able to calculate the size of electrical loads.		
Student will be able to identify raceway systems.		
Student will be able to list examples of devices and circuits.		
Student will be able to summarize electrical symbols and diagrams.		
JOB FUNCTION 4: PM & Troubleshooting	MEETS	EXCEEDS
Student will be able to interpret basic control logic diagrams.		
Student will be able to demonstrate understanding of power distribution systems.		
Student will be able to evaluate contractors, magnetic motor starters and reversing motor starters.		
Student will be able to differentiate among solid state devices, solid state starters, relays, solid state relays and system integration.		
Student will be able to conduct preventive and predictive maintenance.		
JOB FUNCTION 5: NEC Navigation	MEETS	EXCEEDS
Student will be able to describe precision circuits and feeders' requirements -Article 100 of the NEC.		
Student will be able to explain services - Article 230.		

Student will be able to recall size conductors and overcurrent Protection - Article 310.		
Student will be able to recite the importance of grounding - Article 250.		
Student will be able to demonstrate wiring methods for support - Article 300.		
Student will be able to classify switches, switchgear and panelboards - Article 404.		
Student will be able to prepare equipment for general use - Article 400.		
Student will be able to identify Motors, Generators - Article 430.		
JOB FUNCTION 6: Hard-Wire Controls	MEETS	EXCEEDS
Student will be able to maintain timers, relay, and time delay relays.		
Student will be able to electromagnetic motor starters.		
Student will be able to overload/over current protection and monitoring circuits.		
Student will be able to solenoid operated devices.		
Student will be able to basic electrical circuits.		
Student will be able to a manual electric motor control circuit.		
Student will be able to transformers.		
JOB FUNCTION 7: PLC Controls	MEETS	EXCEEDS
Student will be able to describe precision the invention and the development history of programmable logic controller (PLC systems).		
Student will be able to properly set up communications to a PLC.		
Student will be able to create correct relay logic circuits using the standard relay logic rules.		
Student will be able to create PLC ladder logic programs.		
Student will be able to create PLC ladder logic diagrams that incorporate one or more subroutines.		
Student will be able to distinguish between fixed and modular PLC devices.		
JOB FUNCTION 8: Control Networking and Communications	MEETS	EXCEEDS
Student will be able to explain the concepts of data communications.		
Student will be able to explain and set up Internet IP networks.		
Student will be able to properly set up a Device Net network.		
Student will be able to properly set up a wireless device into a network.		