

Appendix A

WORK PROCESS SCHEDULE AND RELATED INSTRUCTION OUTLINE



HILLYARD TECHNICAL CENTER/SAINT JOSEPH SCHOOL DISTRICT

For the Occupation of:
INDUSTRIAL MAINTENANCE MECHANIC

O*NET-SOC CODE: 49-9041.00
RAPIDS CODE: 0308CB

Developed in Cooperation with:
U.S. DEPARTMENT OF LABOR
OFFICE OF APPRENTICESHIP



Appendix A

**WORK PROCESS SCHEDULE
HILLYARD TECHNICAL CENTER/ST. JOSEPH SCHOOL DISTRICT
INDUSTRIAL MAINTENANCE MECHANIC
O*NET-SOC CODE: 49-9041.00 RAPIDS CODE: 0308CB**

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 a minimum OJL attainment of **2,000-4,000 hours**, supplemented by the minimum required **288** hours of related instruction.

3. RATIO OF APPRENTICES TO JOURNEYWORKERS

The apprentice to journeyworker ratio is: 1 Apprentice to 1 Journeyworker.

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 journeyworker wage rate as determined by employers/advisory committee.

Wages will never be less than the minimum wage as determined by the State of Missouri

5. PROBATIONARY PERIOD

Every applicant selected for apprenticeship will serve a probationary period of approximately 90 days . Students readiness for continuation in the program will be assessed at spring conferences. Input will be collected from the student's home school, technical instructor and employer.



6. SELECTION PROCEDURES

Students engage in a rigorous selection process for apprenticeship positions. Students apply online to indicate interest in preapprenticeship. Students are selected for preapprenticeship based on recommendation by the sending school counselor and their technical instructor.

The Apprenticeship Coordinator promotes diversity in the program by making it accessible to all who are interested. Students receive support in composing a resume, preparing for interviews, researching job opportunities and companies, completing OSHA training and workplace communication. Students who follow through and complete these tasks dutifully will be presented to employers as candidates for hire. Those who procure employment become registered apprentices with our program upon confirmation with the sending school and parent/guardian.

All Registered Youth Apprentices are celebrated at a spring signing ceremony and become the next cohort for our program.



**WORK PROCESS SCHEDULE
HILLYARD TECHNICAL CENTER/ST. JOSEPH SCHOOL DISTRICT**

INDUSTRIAL MAINTENANCE MECHANIC	
Job Description: Apply electrical and electronic theory and related knowledge, usually under the direction of engineering staff, to design, build, repair, adjust, and modify electrical components, circuitry, controls, and machinery for subsequent evaluation and use by engineering staff in making engineering design decisions.	
RAPIDS Code: 0308CB	O*NET Code: 49-9041.00
Estimated Program Length: 2,000-4,000 hours	
Apprenticeship Type: <input checked="" type="checkbox"/> Competency-Based <input type="checkbox"/> Time-Based <input type="checkbox"/> Hybrid	

Suggested On-the-Job Learning Outline

Apprenticeship Competencies – Technical

The below on-the-job-learning (OJL) work process competencies are intended as a guide. It need not be followed in any particular sequence, and it is understood that some adjustments may be necessary in the hours allotted for different work experience. In all cases, the apprentice is to receive sufficient experience to make them fully competent and use good workmanship in all work processes, which are a part of the trade. In addition, the apprentice shall be fully instructed in safety and OSHA requirements.

Ratings are:

- No Exposure- Apprentice has not been exposed to this skill/concept yet.
- Not Mastered- Apprentice requires instruction and close supervision.
- Requires Supervision- Apprentice can complete task with limited or periodic supervision.
- Proficient- Can work independently without supervision



JOB FUNCTION 1: Operates in the workplace in a safe and effective manner				
Competencies	No Exposure	Not Mastered	Requires Supervision	Proficient
A. Adheres to safety, health, and environmental rules and regulations				
B. Performs machine operation, including start-up, emergency, and normal shutdown and manual functions to effectively and safely meet production and maintenance requirements (with operator present)				
C. Monitors machine operation and verifies that performance meets production requirements				
D. Locates, interprets, and stores machine operation and maintenance documentation				
E. Performs planned and unscheduled machine maintenance procedures in accordance with a company-approved maintenance plan				
JOB FUNCTION 2: Monitors, troubleshoots, installs, and repairs basic mechanical systems				
Competencies	No Exposure	Not Mastered	Requires Supervision	Proficient
A. Adheres to mechanical power transmission safety rules				
B. Uses dimensional measurement tools properly to inspect dimensions of shafts and other components				
C. Safely examines, troubleshoots and repairs power transmission				
D. Aligns and adjusts gear drives				
E. Installs, aligns and adjusts a pillow block bearing				



F. Lubricates equipment using correct lubricants and as recommended by manufacturer's guidance				
G. Performs a preventive maintenance procedure for a given machine to extend machine life and minimize downtime				
H. Performs predictive maintenance on a given machine to extend machine life and minimize downtime				
I. Reads and interprets technical drawings of parts and assemblies with tolerances and basic Geometric Dimensioning and Tolerancing (GD&T)				
J. Uses hand tools to inspect, adjust/tighten and assemble/disassemble equipment and support preventive maintenance, inspection and troubleshooting activities				
K. Uses hoists and other tools to safely handle and move parts and equipment				
L. Selects and uses troubleshooting methodologies to find malfunctions in machine systems to return the system to reliable, productive use in the shortest time possible				
JOB FUNCTION 3: Monitors, troubleshoots, installs, and repairs basic hydraulic systems				
Competencies	No Exposure	Not Mastered	Requires Supervision	Proficient
A. Adheres to fluid power systems safety rules while understanding safety, health, and environmental rules and regulations				



B. Interprets basic fluid power schematics and identifies schematic symbols, process flow and operation of the components and systems				
C. Starts up and shuts down a hydraulic system and adjusts system pressure using a fixed displacement pump				
D. Adjusts hydraulic actuator speed using a flow control valve				
E. Services a hydraulic filter to maximize hydraulic fluid cleanliness				
F. Adds, changes and properly disposes of waste hydraulic fluid				
G. Installs hydraulic conductors				
H. Installs and tests components in a basic hydraulic circuit				
I. Troubleshoots a basic hydraulic circuit or rotary actuator circuit				
JOB FUNCTION 4: Monitors, troubleshoots, installs, and repairs basic pneumatic systems				
Competencies	No Exposure	Not Mastered	Requires Supervision	Proficient
A. Adheres to fluid power systems safety rules				
B. Adjusts pneumatic system branch and actuator speed operating pressure using a regulator				
C. Services a pneumatic filter through inspection, drainage, and changes				
D. Services a pneumatic lubricator through inspection, fills, and adjustments				
E. Installs, fills, and adjusts pneumatic conductors				



F. Starts up and shuts down a reciprocating air compressor and adjusts operating pressure				
G. Installs and tests the operation of components in a basic pneumatic linear or rotary circuit given a schematic				
H. Installs and tests components in a pneumatic circuit that uses vacuum generators given a schematic				
I. Troubleshoots a basic pneumatic circuit				
JOB FUNCTION 5: Monitors, troubleshoots, and repairs electrical systems				
Competencies	No Exposure	Not Mastered	Requires Supervision	Proficient
A. Adheres to electrical power and control systems safety rules for electrical power and control systems				
B. Interprets electrical control and power schematics to ensure the operation of the components and system				
C. Adjusts limit switches and electronic sensors				
D. Measures voltage, current and resistance in an electrical circuit to verify system operation and power levels				
E. Selects, installs, and tests fuses and circuit breakers				
F. Installs and tests DC electric motors in a manual control circuit				
G. Installs and tests AC electric motors in a manual control circuit				



H. Installs and tests electrical relay control components and circuits				
I. Installs and tests electro-fluid power components and circuits				
J. Tests and repairs machine electrical ground				
K. Troubleshoots an electrical motor relay control circuit				
L. Troubleshoots a solenoid-operated fluid power relay control circuit				
M. Replaces electrical control wiring using terminal attachment				
N. Replaces electrical control wiring using solder attachment				
O. Installs, examines, repairs, and replaces transformers				
JOB FUNCTION 6: Monitors, troubleshoots, installs, and repairs electronic and process control systems				
Competencies	No Exposure	Not Mastered	Requires Supervision	Proficient
A. Adheres to safety, health, and environmental rules and regulations for electronic power and control systems				
B. Connects and tests a DC power supply to ensure proper operation				
C. Installs and tests solid-state AC and DC discrete and analog relays				
D. Installs and tests analog electronic sensors and signal conditioning equipment				
E. Adjusts and repairs AC drive to control motor speed and torque				



F. Transfers programs to programmable controller using a PC				
G. Creates a basic Programmable Logic Controller (PLC) ladder-style program using internal and external contacts, timers, counters, non-retentive output coils, internal coils, subroutines, conditional commands and math commands				
H. Installs and tests basic PLC components that uses a ladder logic program to interface to a hardware component				
I. Performs basic troubleshooting of PLC and controlled components				x
JOB FUNCTION 7: Performs maintenance welding to manufacture or repair parts, equipment, and other materials				
Competencies	No Exposure	Not Mastered	Requires Supervision	Proficient
A. Adheres to safety, health, and environmental rules and regulations for welding				
B. Uses an acetylene torch properly while using appropriate safety equipment and precautions to cut steel parts				
C. Performs basic welding and achieves necessary strength, resilience, shape and size requirements				
D. Prepares parts to be welded including degreasing, cleaning, grinding and inspecting				
E. Uses Shielded Metal Arc Welding (SMAW) Welder to				



make basic welds on flat stock				
F. Uses Gas Metal Arc Welding (GMAW) Welder to make basic welds on flat stock				
G. Inspects welds for integrity and functionality				
H. Uses plasma cutter to cut flat stock				
JOB FUNCTION 8: Installs, removes, repairs, and replaces piping systems				
Competencies	No Exposure	Not Mastered	Requires Supervision	Proficient
A. Adheres to safety, health and environmental rules and regulations for piping systems				
B. Interprets basic piping schematics including specifications and fittings				
C. Identifies and selects correct piping materials				
D. Accurately measures, cuts and prepares piping for installation				
E. Installs and tests piping systems				



Behavioral Competencies	4- Exceeds Target	3- Achieves Target	2- Meets Some Targets	1- Not Meeting Targets
Manufacturing Basics: Student shows a basic understanding of Manufacturing and desire to learn the industry.				
Communication: Student is receptive to learning and communicates effectively with coworkers.				
Enthusiasm & Attitude: Student shows a positive mental attitude and enthusiasm toward learning.				
Leadership & Teamwork: Student contributes ideas and collaborates with coworkers to accomplish goals.				
Networking: Student communicates well within the workplace in order to further productivity.				
Problem Solving & Critical Thinking: Student identifies solutions to most problems and knows when and who to ask for help.				
Professionalism: Exhibits appropriate behavior on the job and is productive.				

Date of evaluation: _____ Company Name: _____

Apprentice Name: _____ Apprentice Signature: _____

Mentor Name: _____ Mentor Signature: _____

Date turned in: _____ Instructor Signature: _____



RELATED INSTRUCTION OUTLINE
INDUSTRIAL MAINTENANCE MECHANIC
O*NET-SOC CODE: 49-9041.00 RAPIDS CODE: 0308CB

Please provide the Related Instruction Outline to include a list of the anticipated courses, the learning objectives, and the estimated number of hours that each course will last.

Related Technical Instruction provided by Hillyard Technical Center, Saint Joseph, Missouri <https://hillyardtech.sjsd.k12.mo.us/>

Each apprentice **will receive annual compliance training in anti-harassment** in accordance with Paragraph 30.3, CFR. 29.30. Additional resources can be found at <https://www.apprenticeship.gov/eo/sponsors/prevent-harassment>

Course Descriptions:

Industrial Equipment Repair & Maintenance

Textbook (provided): Industrial Maintenance and Troubleshooting, 4th Edition

Instructor: Gary Bruns

This program prepares the students who seek entry level position in the Industrial Maintenance and Repair Industry, and it will satisfy the **the minimum 288 hours of Related Technical Instruction (RTI)**.

Course Outline:

Introduction

What is Industrial Equipment Repair & Maintenance (IER&M), Industry jobs and Employee Characteristics, Terminology

Safety

Regulations & Planning, Personal Protective Equipment, Fire & Electrical Safety

Prints, Diagrams, & Manuals

Introduction, Safety, Terminology, Reading/Interpreting, Measuring Devices

Service and Repair Principles

Introduction, Safety, Mechanics, Heat, Fastening, Sealing, Tools and their uses

Mechanical Drives

Introductions, Safety, Terminology, Types, Accessories, Maintenance,

Troubleshooting Electrical Systems

Introduction, Safety, Terminology, Distribution, Testing, Print Reading



Plumbing

Introduction, Safety, Terminology, Maintenance, Troubleshooting

Fluid Power

Introduction, Safety, Terminology, Maintenance, Troubleshooting

HVACR

Introduction, Safety, Terminology, Maintenance, Troubleshooting

Welding

Introduction, Safety, Terminology, Role in IER&M

Machining

Introduction, Safety, Terminology, Role in IER&M

Electronic Systems

Introduction, Safety, Terminology