

For L&I Staff Use Only

Received: L&I Tukwila, 2A
November 18, 2024 *SKH*

Feri Gardner 11-18-24

L&I Apprenticeship Consultant

L&I Admin

Department of Labor and Industries
Apprenticeship Section
PO Box 44530
Olympia WA 98504-4530



Request for Revision of Standards

TO: Washington State Apprenticeship & Training Council

FROM: Northwest Machinists Apprenticeship Committee, #95

Please update our Standards of Apprenticeship to reflect the following changes:

- Additions shall be underlined (underlined).
- Deletions shall be struck through (~~struck through~~).
- See attached.

Form must be signed by Committee Chair and Secretary or Program's Authorized Signer

<input type="checkbox"/> Chair	Date	<input type="checkbox"/> Secretary	Date
<input checked="" type="checkbox"/> Authorized Signer	11/18/24		
Print Name: Tommy Hunt		Print Name:	
Signature: <i>Tommy Hunt</i>		Signature:	

Approved By: Washington State Apprenticeship & Training Council
Signature of Secretary of the WSATC:
Date:

Attach additional sheets if necessary

Cover Page

Teri Gardner 11-19-24

Received: L&I Tukwila, 2A
November 19, 2024 *SH*

Occupational Objective(s):

SOC#

Term [WAC 296-05-015]

MACHINE OPERATOR

51-4081.00

3000 HOURS

III. CONDUCT OF PROGRAM UNDER WASHINGTON EQUAL EMPLOYMENT OPPORTUNITY PLAN:

A. Selection Procedures:

3. Applicants will be considered qualified and notified to appear for an in-person or virtual interview when they complete the following:
 - a. Apprenticeship applications shall be obtained from the Machinists Institute. The completed application and documents verifying Minimum Qualifications stated in Section II of these standards shall be submitted to the Machinists Institute. Requests and submissions will be accepted via e-mail, by US mail, or in person, and be clearly addressed to the attention of the ~~“Apprenticeship and Student Affairs Specialist.”~~ Apprenticeship Administrator. Methods to make a request and to submit documents to the Machinists Institute are listed below.

IV. TERM OF APPRENTICESHIP:

Fabrication Welder	3 years (6000 hours) of employment
Heavy Duty Equipment Mechanic	4 years (8000 hours) of employment
Industrial Machinery Technician	4 years (8000 hours) of employment
Machinist	4 years (8000 hours) of employment
<u>Machine Operator</u>	<u>18 months (3000 hours) of employment</u>
Trailer, Container and Van Repair Mechanic	4 years (8000 hours) of employment

V. INITIAL PROBATIONARY PERIOD:

B.

3. For the occupation of Machine Operator: The initial probationary period shall be the first 600 hours of employment as an apprentice, or one year from date of registration, whichever occurs first.

VII. APPRENTICE WAGES AND WAGE PROGRESSION:

B. Wage Progression Schedules:

3. For Machine Operator:

<u>Step</u>	<u>Hour Range or competency step</u>	<u>Percentage of journey-level wage rate</u>
<u>1</u>	<u>0000 – 1000 Hours</u>	<u>85%</u>
<u>2</u>	<u>1001 – 2000 Hours</u>	<u>90%</u>
<u>3</u>	<u>2001 – 3000 Hours</u>	<u>95%</u>

VIII. WORK PROCESSES:

F. Machine Operator

- 1. Introduction to and carrying out duties pertaining to General Shop Safety, Industry Specific Safety, Material Handling, and Shipping/Receiving500**
 - 2. Introduction to manufacturing documents, materials, methods, and tools involved in production200**
 - 3. Plan work processes, prepare part layout, select tools and equipment needed for machine Set-ups, Work Holdings, Tools, manage Toolbox and Tool Room, inventory control1200**
 - 4. Measure and Inspect Work Using Mechanical Tools and Testing Equipment500**
 - 5. Verify product quality following quality work instructions, Inspect Equipment, Inventory and Material Processes, participate in continuous improvement processes600**
- TOTAL HOURS: 3000**

IX. RELATED/SUPPLEMENTAL INSTRUCTION:

B. (See Below) Minimum RSI hours per year defined per the following [see WAC 296-05-015(6)]:

- 4. Machine Operator: minimum of 157 hours in Year 1, and a minimum of 82 hours in Year 2.**

X. ADMINISTRATIVE/DISCIPLINARY PROCEDURES:

A. Administrative Procedures:

3. Sponsor Procedures:

- d. Failure of the foreperson or supervisor to approve or disapprove OJT hours reports shall result in contact by Machinists Institute to remind, or assist in**

approving or not approving the OJT hours submitted by the apprentice. Delays resulting from the failure of the foreperson or supervisor to approve or disapprove of OJT hour reports shall not result in a negative impact to the apprentice.

- g. Each apprentice not taking related training classes at or through the Machinists Institute will provide a record of related training class attendance (in hours), noting which are paid, by the 10th day of the following month, submitted electronically to info@MachinistsInstitute.org or via US mail to: Machinists Institute attention ~~Apprenticeship and Student Services Specialist~~ **Apprenticeship Administrator, 9125 15th Place South, Seattle, WA 98108.** This record of related training classes must be provided even if the hours equal zero for any given month. In addition, upon request, apprentices shall submit copies of school transcripts and/or verification of course completion to the Apprenticeship Committee.**

- k. Apprentices may request credit for advanced standing (additional credit) during the term of apprenticeship by sending a request addressed to the Apprenticeship Committee. The request must include an employer evaluation and recommendation, or a letter describing performance and recommending advancement. Requests must be submitted electronically to info@MachinistsInstitute.org or via US mail to: Machinists Institute attention ~~Apprenticeship and Student Services Specialist~~ **Apprenticeship Administrator, 9125 15th Place South, Seattle, WA 98108.****

- l. An employer shall not terminate an apprentice without first contacting the Apprenticeship Committee, as continued employment is required to maintain status as an apprentice. When an employer terminates the employment of an apprentice they must notify the Apprenticeship Administrator within 30 business days and include the date and reason for separation.**

XI. SPONSOR – RESPONSIBILITES AND GOVERNING STRUCTURE:

E. Committee governance (if applicable): (see WAC 296-05-009)

1.

[Please delete and replace the committee in its entirety]

c. The employer representatives shall be:

**Joey Arnold, Chair
Stevedoring Service of America
1131 SW. Klickitat Way
Seattle, WA 98134**

**Chris Beck
Pacific Power Group
7215 S. 228th Street
Kent, WA 98032**

**Isaac Wisdom
King Street Center
Fleet Operations
MS: KSC-ES-0822**

**Martha Hale
Bradken
3021 S. Wilkeson Street
Tacoma, WA 98409**

FROM: **Northwest Machinists Apprenticeship Committee, #95**

**201 S. Jackson, Ste. 822
Seattle, WA 98104**

d. The employee representatives shall be:

**Tommy Hunt, Secretary
9135 15th Pl. S., 2nd Floor
Seattle, WA 98108**

**Joseph Gallegos
Stevedoring Service of America
1131 SW. Klickitat Way
Seattle, WA 98134**

**Chris McElroy
Cadence Aerospace
4101 Industry Drive E.
Tacoma, WA 98424**

**John Curley
Bradken
3021 S. Wilkeson Street
Tacoma, WA 98409**

**Shana Peschek, Alternate
9135 15th Pl. S., 2nd Floor
Seattle, WA 98108**

**Oscar Miller, Jr., Alternate
Stevedoring Service of America
1131 SW. Klickitat Way
Seattle, WA 98134**

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Teri Gardner 11-18-24
L&I Admin

Department of Labor and Industries
Apprenticeship Section
PO Box 44530
Olympia WA 98504-4530



Journey Level Wage Rate
From which apprentices' wage rates are computed

TO: Washington State Apprenticeship & Training Council
FROM: Northwest Machinists Apprenticeship Committee #95

Occupation:	County(ies):	Journey Level Wage Rate:	Effective Date:
Machine Operator	<ul style="list-style-type: none"> •Washington State (with the exception Heavy Duty Mechanic apprentices employed by the City of Seattle) •Oregon State •Idaho counties of Bonner, Kootenai, Benewah, Latah and Nez Perce. 	\$ 19.60/hr	1/18/25
		\$	
		\$	
		\$	

Sponsors must submit the journey-level wage at least annually or whenever changed to the Department.

Form must be signed by Committee Chair and Secretary or Program's Authorized Signer

<input type="checkbox"/> Chair	Date	<input type="checkbox"/> Secretary	Date
<input checked="" type="checkbox"/> Authorized Signer	11/8/2024		
Print Name: Tommy Hunt	Print Name:		
Signature: <i>Tommy Hunt</i>	Signature:		

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 Apprenticeship Section
 PO Box 44530
 Olympia WA 98504-4530



Apprenticeship Related/Supplemental Instruction (RSI) Plan Review


Program Name Northwest Machinists Apprenticeship Committee	
Occupation Machine Operator	
Term/OJT Hours 3,000 Hours	Total RSI Hours 239
Training Provider Machinists Institute	

By the signature placed below, the **program sponsor** agrees to provide the prescribed RSI for each registered apprentice and assures that:

1. The RSI content and delivery method is and remains reasonably consistent with the latest occupational practices, improvements, and technical advances.
2. The RSI is coordinated with the on-the-job work experience.
3. The RSI is provided in safe and healthful work practices in compliances with WISHA and applicable federal and state regulations.
4. The RSI Plan is maintained, updated and submitted to the Department a minimum of once every 5 years (WSATC Policy 2015-01; rev, 10-21-21).
5. The RSI will be conducted by instructors who meet the qualification of the “competent instructor” as described in WAC 296-05-003:
 - a. Has demonstrated a satisfactory employment performance in her/her occupation for a minimum of three years beyond the customary learning period for that occupation; and
 - b. Meets the State Board for Community and Technical Colleges requirements for a professional technical instructor (see WAC 131-16-080 through -094), or be a subject matter expert, which is an individual, such as a journey worker, who is recognized within the industry as having expertise in a specific occupation; and
 - c. Has training in teaching techniques and adult learning styles, which may occur before or within one year after the apprenticeship instructor has started to provide the related technical instruction.
6. If using alternative forms of instruction, such as correspondence, electronic media, or other self-study, instruction shall be clearly defined.

Signatures on next page

Form must be signed by Committee Chair *and* Secretary or Program's Authorized Signer

<input type="checkbox"/> Chair	Date	<input type="checkbox"/> Secretary	Date
<input checked="" type="checkbox"/> Authorized Signer	11/18/24		
Print Name: Tommy Hunt		Print Name:	
Signature: 		Signature:	

Training Provider Signature

Approved By (Print Name): Shana Peschek	Title: Executive Director
Signature of the Training Provider: 	
Date: 11/18/24	

If additional training providers are needed, go to page 4.

SBCTC

Print Name:	Title:
Signature of the Program Administrator:	
Date:	
<input type="checkbox"/> SBCTC recommends approval	<input type="checkbox"/> SBCTC recommends return to sponsor

Program Name Northwest Machinists Apprenticeship Committee	Occupational Objective Machine Operator
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Note: The description of each element must be in sufficient detail to provide adequate information for review by the SBCTC and Review Committee. To add more elements, click on the plus sign that appears below the "Description of Element/Course" field.

Describe minimum hours of study per year in terms of (check one):

- 12-month period from date of registration.
- Defined 12-month school year.
- 2,000 hours of on-the-job training.

YEAR 1 144 Hours

Element/Course: Quarter - 1 Machine Operator Fundamentals	Planned Hours: 51
Mode of Instruction (check all that apply) <input checked="" type="checkbox"/> Classroom: 51, of that 25 hrs. hands on <input type="checkbox"/> Lab <input type="checkbox"/> Online <input type="checkbox"/> Self-Study Provided by: Machinists Institute	
<p>Description of quarter: This is a preparatory course for the machine operator The course introduces safety for manufacturing, communication skills, fundamentals of math, employability skills and manufacturing 101. Instruction will include a mix of classroom, virtual and lab with a small self-study component.</p> <p>Courses include:</p> <ul style="list-style-type: none"> • Safety • Math Fundamentals • Communication • Employability • Manufacturing 101 • Tool Basics for Industrial Machinery Technicians <p>The above courses are described in detail as follows with the 51 hours of RSI broken down:</p>	

Element/Course: Q1/Course 1: Safety for Manufacturing	Planned Hours: 20
Mode of Instruction (check all that apply) <input checked="" type="checkbox"/> Classroom: 20, of that 10 hrs. hands on <input type="checkbox"/> Lab <input type="checkbox"/> Online <input type="checkbox"/> Self-Study Provided by: Machinists Institute	
<p>Description of element/course:</p> <p>Description of course: This is a preparatory course for the apprenticeship program. Coursework includes shop safety; workplace documentation; and an introduction to machinery as applied to real-world manufacturing. The course explores machine operation training options available in the Puget Sound Aerospace and Advanced Manufacturing sectors.</p> <p>At the completion of this course, students will be able to define OSHA; distinguish between employees covered by OSHA; describe the various hazards covered by OSHA standards and compliance program; describe the involvement of employees in OSHA onsite inspections; describe employer and employee responsibilities for workplace safety standards; recordkeeping and reporting requirements for employers; and elaborate on the effect that OSHA has on workplace accidents. Students will identify methods of blocking; the basic requirements of an energy control program; OSHA's typical minimal lockout procedure; the steps in the lockout sequence for a typical minimal lockout procedure and the sequence of steps for restoring equipment to service after lockout. Students will describe the ways hazard communication exists and is enforced and identify chemical hazard classifications, types of physical and health hazards with systemic effects. They will describe the labeling requirements necessary for a hazardous communication program. In addition, students will learn the general guidelines for hand and power tool safety and how to identify characteristics of a well-organized work including proper tool maintenance, materials handling, Personal Protective Equipment (PPE), ergonomics, and the safety risks of tasks that require repetition, force, or vibration. Students will describe arc flash and common causes of arc flash; the dangers associated</p>	

with arc flash; the different pieces of PPE employees most commonly use to protect against arc flash; how to use NFPA 70E tables to select arc flash PPE; different safeguarding devices used to prevent arc flash; the steps for establishing Electrically Safe Work Conditions (ESWC); and the arc flash safety responsibilities of employers and employees.

Students will describe the importance of safety when performing maintenance duties; how lockout/tagout keeps employees safe during maintenance; and how safety blocking prevents movement of machine components. Students will identify common hazards during metal cutting; the importance of personal responsibility when operating machine tools; safe lifting practices; common fire hazards for cutting operations; basic procedures necessary before operating a machine tool safely; common point-of-operation hazards and safety hazards associated with cutting fluids; methods to minimize operator contact with chips; safety hazards on the manual lathe and mill; machine guarding methods for CNC machines and the characteristics of a well-organized worksite. Students will identify machine motion hazards and other hazardous activity; basic safeguarding standards and devices; maintenance safeguarding; and machine safeguard training.

Topics include: Intro to OSHA 101, Lockout/Tagout Procedures 141, SDS/Hazardous Communication 151, Hand and Power Tool Safety 201, Arc Flash Safety 251, Stamping Safety 115, Safety for Mechanical Work 111, Safety for Metal Cutting 101, Press Brake Safety 100, Rigging Inspection and Safety 210, and Machine Guarding 271

Element/Course: Q1/Course 2: Math Fundamentals	Planned Hours: 10
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Mode of Instruction (check all that apply)

Classroom: 10, of that 5 hrs. hands on Lab Online Self-Study

Provided by: Machinists Institute

Description of element/course:

Description of course: In this course, students develop basic and foundational math skills that are useful for calculations and problem solving within the manufacturing industry. Topics include fractions, decimals, metric conversions, tolerances, and an introduction to basic geometry, angular measure, and dimensional analysis. Mathematics as a form of industry-based communication is emphasized.

Students will define geometry, points, lines, and rays; parts of, and different types of angles and angle pairs; finding perpendicularity, parallelism, and planes; variables; how to solve a bolt circle problem with angle relationships and how to solve bolt circle problems using angle relationships. Students will also define interior angles of triangles; properties of lines and adjacent and vertical angles; and the identification of the different types of triangles by their sides and by their angles. Students will be able to solve for the missing measurements in singular or multiple right triangles and describe the basic properties of circles and semicircles including contrasting radiuses and diameters, circumference, area, and the angles of a circle. They will solve for missing angles in a bolt circle problem; tangents; and polygons; emphasize the characteristics of a right triangle using the Pythagorean theorem including relationships between the sides and angles of right triangles; common trigonometric ratios; SOHCAHTOA; solving for missing dimensions using less common trigonometric ratios; common methods for specifying tapers in prints; calculating the taper per foot of conical tapers; and solving for the total included angle of conical tapers.

Topics include: Math Fundamentals 101, Math: Fractions and Decimals 111, Units of Measurement 112, Algebra Fundamentals 141 Geometry

Element/Course: Q1/Course 3: Basic Employability Skills	Planned Hours: 8
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Mode of Instruction (check all that apply)

Classroom: 8, of that 4 hrs. hands on Lab Online Self-Study

Provided by: Machinists Institute

Description of element/course:

Description of course: This course will immerse students in the acceptable employee standards including the importance of timeliness, conflict resolution, ability to take direction, task completion, appropriate communication styles, personal appearance, ethics, honesty, integrity, and reliability. Mentorship Matters content.

In addition to learning about the internal attributes to employability, students will learn to describe the

manufacturing workforce and distinguish between common pathways to manufacturing careers. They will be able to describe common functions of development and design, production, programming, quality control (QC), quality assurance (QA), maintenance, health and safety, and coordination roles. Students will also be able to distinguish between different departments involved with manufacturing functions.

Topics include: Careers in Manufacturing 102

Element/Course: Q1/Course 4: Basic Communication Skills	Planned Hours: 8
Mode of Instruction (check all that apply) <input checked="" type="checkbox"/> Classroom: 8, of that 4 hrs. hands on <input type="checkbox"/> Lab <input type="checkbox"/> Online <input type="checkbox"/> Self-Study Provided by: Machinists Institute	
Description of course: This introductory course teaches techniques for effective communication in the workplace and includes lessons that emphasize the importance of verbal, written and reading skills in the trades. Students will be able to define the role of effective communication, list common forms of written business communication; explain the steps in business writing, how to effectively use business email; list the steps for an effective presentation including how use of various visual aids, plan a meeting, and the execution of a meeting. At the completion of this course, students will demonstrate the importance of creativity in the workplace, how individuals and teams can develop their creativity, and how organizations can promote innovation. Students will define the role of knowledge in the workplace. Topics include: Personal Effectiveness 190, Department of Transportation Hazardous Communication Overview 153	
Description of element/course: Click or tap here to enter text.	

Element/Course: Q1/Course 5: Manufacturing 101	Planned Hours: 5
Mode of Instruction (check all that apply) <input checked="" type="checkbox"/> Classroom: 5, of that 2 hrs. hands on <input type="checkbox"/> Lab <input type="checkbox"/> Online <input type="checkbox"/> Self-Study Provided by: Machinists Institute	
Description of course: Manufacturing 101” provides a broad overview of the manufacturing process and industry. Manufacturing involves a wide range of processes that are used to turn materials into products. Many organizations work together in a supply chain to produce a product. Products start out as designs and are then produced from materials and assembled to create the final product. The manufacturing industry is a vast, diverse network of organizations that offers a wide variety of career opportunities. After taking this class, users will have a foundational understanding of the manufacturing industry and the various activities that are required to create a product. This will prepare them for further learning about specific manufacturing processes and considerations, as well as pursuing a career in manufacturing. Topics include: Manufacturing processes, materials, supply chain, design to production phases, regulations and standards, and career pathways	

Element/Course: Quarter - 2 Processes and Literacy	Planned Hours: 55
Mode of Instruction (check all that apply) <input checked="" type="checkbox"/> Classroom: 55, of that 27 hrs. hands on <input type="checkbox"/> Lab <input type="checkbox"/> Online <input type="checkbox"/> Self-Study Provided by: Machinists Institute	
Description of quarter: This is a preparatory course for the machine operator The course introduces tools basics and safety, work documentation and systems, digital literacy and financial literacy. Instruction will include a mix of classroom, virtual and lab with a small self-study component. Courses include: <ul style="list-style-type: none"> • Work Documentation 	

- **Tool Basics**
- **Digital Literacy**
- **Financial Literacy**

The above courses are described in detail as follows with the 55 hours of RSI broken down:

Element/Course	Q2/Course 2: Introduction to Work Documentation	Planned Hours:	15
Mode of Instruction (check all that apply)			
<input checked="" type="checkbox"/> Classroom: 15, of that 7 hrs. hands on <input type="checkbox"/> Lab <input type="checkbox"/> Online <input type="checkbox"/> Self-Study			
Provided by: Machinists Institute			
<p>Description of course: Introduction to Workplace Documentation emphasizes students' ability to develop effective communication skills for the workplace using technical reports. Students will apply formal and informal documentation practices that include familiarity and proficiency with workorders, travelers, and Enterprise Resource Planning (ERP) / Material Requirement Planning (MRP) systems.</p> <p>An overview of quality auditing, the various types of industry audits, and the elements and applications of each audit; documentation processes for First Articles (FA), inspection, and sampling; business management; ERP/MRP systems; details and applications of different quality systems and standards used in advanced manufacturing industries.</p> <p>Topics include: Communication skills, Utilization of Workorders, Job Travelers, ERP Systems, Fundamentals of Print Reading,</p>			

Element/Course:	Q2/Course 3: Tool Basics for Machine Operator	Planned Hours:	24
Mode of Instruction (check all that apply)			
<input checked="" type="checkbox"/> Classroom: 24, of that 12 hrs. hands on <input type="checkbox"/> Lab <input type="checkbox"/> Online <input type="checkbox"/> Self-Study			
Provided by: Machinists Institute			
Description of element/course:			
<p>Description of course: This is a preparatory course that introduces common manufacturing related tools and the various roles of testing instruments in maintaining safety on the job. Students will gain a better understanding of the operating conditions of working around machinery to describe and demonstrate how to use tools safely and accurately.</p> <p>Because tool costs are a significant component of overall maintenance expenditures, students will learn how to recognize, lessen, and possibly prevent tool wear, how apprentices can prolong tool life, reduce tool cost, and improve productivity. Students will be able to identify common types of tool wear and strategies to reduce or prevent them from occurring. Students will have the ability to:</p> <ul style="list-style-type: none"> • Describe manual tool and equipment setup and operation. • Describe manufacturing equipment monitoring including performance and in/out of spec conditions. • Describe manufacturing equipment set up and operation including product and process setup, power up/down procedures. • Describe manufacturing equipment and system analysis. • Describe manufacturing equipment qualification including adjustment, calibration, and testing. • Explain plant information and flow of operations. <p>Topics include: Optimizing Tool Life and Processes 381 and Electrical Instruments 251</p>			

Element/Course:	Q2/Course 4: Digital Literacy	Planned Hours:	8
Mode of Instruction (check all that apply)			

<input checked="" type="checkbox"/> Classroom: 8, of that 4 hrs. hands on <input type="checkbox"/> Lab <input type="checkbox"/> Online <input type="checkbox"/> Self-Study Provided by: Machinists Institute
Description of element/course: Description of the course: The student will understand computer basics to have the ability to describe the basic functions and terminology related to computer hardware, software, information systems, and communication devices. They will learn to use basic computer software, hardware, and communication devices to perform tasks and be able to use basic computer operation for recording industry metrics. Maintain quality tools and accurate record keeping. They will be familiar with word processing software to compose, organize, edit, and print documents and other business communications; use spreadsheet software to enter, manipulate, edit and format text and numerical data. They will learn good habits to create and maintain a well-organized electronic file storage system. Topics include: Use of office applications, documentation, file storage, data entry, interned and web-based tools, electronic mail and proper etiquette, social media protocols, and cyber security

Element/Course: Q2/Course 5: Financial Literacy	Planned Hours: 8
Mode of Instruction (check all that apply) <input checked="" type="checkbox"/> Classroom: 8, of that 4 hrs. hands on <input type="checkbox"/> Lab <input type="checkbox"/> Online <input type="checkbox"/> Self-Study Provided by: Machinists Institute	
Description of element/course: Description of course: Financial literacy contributes to job retention for the apprentice to maintain a lifestyle within their income. The apprentice will learn the fundamentals of Income, Payments, and Financial Records. They will understand their paycheck to follow the deductions. They will learn the value of income and expense record keeping to have the ability to assess their personal and financial situation including wage garnishment. The course leads to an understanding of monitoring current spending (saving, investing) patterns, financial responsibility for financial decision making and to create a household budget to avoid over extension - poor money management including how to avoid scams and frauds. They will learn how to calculate future expenses and budget for rent, monthly expenses, loans, and purchasing a car or a house. Topics include: Budgeting, Managing Income, and Expenses, Identifying Risk, Taxes, Financial Safety Nets, Balancing Risk and Reward, Financial Landscape, Products, Services, and Borrowing versus saving.	

Element/Course: Quarter - 3 Systems and Prints	Planned Hours: 51
Mode of Instruction (check all that apply) <input checked="" type="checkbox"/> Classroom: 51, of that 25 hrs. hands on <input type="checkbox"/> Lab <input type="checkbox"/> Online <input type="checkbox"/> Self-Study Provided by: Machinists Institute	
Description of quarter: This is a preparatory course for the machine operator program. Coursework includes systems, diagnostics, trouble shooting and introduction to understanding blue prints and drawings. Courses include: <ul style="list-style-type: none"> • Fluid Systems • Trouble shooting and diagnostics • Engineering/Blue Print Reading The above courses are described in detail as follows with the 51 hours of RSI broken down:	

Q3/Course 1: Fluid Systems	Planned Hours: 21
Mode of Instruction (check all that apply) <input checked="" type="checkbox"/> Classroom: 21, of that 10 hrs. hands on <input type="checkbox"/> Lab <input type="checkbox"/> Online <input type="checkbox"/> Self-Study Provided by: Machinists Institute	
Description of course: The Fuel Systems course provides a comprehensive overview of pneumatics, fittings, control valves, and filtration systems, as well as an overview of the maintenance processes required for these operations. The unique types of fittings have a profound impact on the effectiveness of pneumatic and fuel systems. The course will develop successful preventive maintenance programs to help industrial facilities reduce downtime, lessen the need for costly repairs, and increase productivity. Students will gain an understanding of the benefits of a well-designed	

preventive maintenance program for fluid systems.

In this class, students will be able to identify fittings used in pneumatic systems; proper fittings selections that provide optimal efficiency; and identification of fluid conductors and specific advantages and disadvantages within fluid systems. They will demonstrate an understanding of how different pneumatic valves affect the flow of pressurized air in a system; how to evaluate and select components that control pressurized flow in pneumatic systems; and understand the functions of hydraulic control valves, and their proper placement within hydraulic circuits to produce usable power. Students will understand the main types of hydraulic control valves and their various functions and identify schematic symbols for common control valves.

At the completion of this course, students will define pressure and flow ratings, identify types of leakage and common issues that lead to failure in fluid systems. Adequate fluid levels and associated preventive maintenance tasks are critical to industrial maintenance. Students will describe the purpose of seals for fluid systems and demonstrate seal installation and maintenance; they will distinguish between pressure-compensated and temperature-compensated flow control valves; identify the types of pneumatic valves; describe the fluid system contaminants; how an ISO 4406:1999 rating indicates a fluid's cleanliness and discuss how filter condition indicator monitor filter performance; elaborate on preventive maintenance for fluid and filters; and system flushing methods.

Topics include: Intro to Fluid Conductors 241, Fittings for Fluid Systems 251, Preventative Maintenance for Fluid Systems 261, Hydraulic Control Valves 341, Pneumatic Control Valves 351, Contamination and Filter Selection 381

Element/course: Q3/Course 2: Troubleshooting and Diagnostics

Planned Hours: 20

Mode of Instruction (check all that apply)

Classroom: 20, of that 10 hrs. hands on Lab Online Self-Study

Provided by: Machinists Institute

Description of course: The Troubleshooting and Diagnostics course provides a comprehensive overview of various methods and tools used to troubleshoot problems.

In this course, students will apply tools and techniques to find the root cause of problems, and will distinguish deviations from problems, including identifying early warning signs of equipment failure. They will use check sheets, fishbone diagrams, and Pareto charts as troubleshooting tools, and the 5 Whys, brainstorming, and troubleshooting teams as common methods of gathering troubleshooting data.

At the completion of this course, students will be able to solve problems and understand how to work on preventing in many different settings. Without this knowledge, students would not be able to solve problems effectively. The instructor will contextualize projects in lab for students in specialized areas of focus.

Topics include: Troubleshooting 181

Element/Course: Q3/Course 3: Engineering Drawings / Blueprint Reading

Planned Hours: 10

Mode of Instruction (check all that apply)

Classroom: 10, of that 5 hrs. hands on Lab Online Self-Study

Provided by: Machinists Institute

Description of element/course:

Description of the course: The first course on the fundamentals of creating and interpreting blueprints and/or engineering drawings focuses on the basic concepts of print reading such as defining line types, applying orthographic projections, identifying dimensions, and applying tolerances described in the print in manufacturing processes.

Students will identify orthographic projections and the alphabet of lines; dimensions and tolerances of specified parts; what blueprints are; differences between auxiliary and section views; types of section views; different lines and their applications such as object and hidden lines; differences in dimensions; what tolerances are and how they are used; title blocks; notes; and special considerations such as inspection tools for round and angled features, threads, and custom surface finish callouts.

Topics include: Blueprint Reading 131 and Interpreting Prints 231

Year 2: 82 Hours

Element/Course: Quarter - 1	Planned Hours: 48
Mode of Instruction (check all that apply) <input checked="" type="checkbox"/> Classroom: 48, of that 24 hrs. hands on <input type="checkbox"/> Lab <input type="checkbox"/> Online <input type="checkbox"/> Self-Study Provided by: Machinists Institute	
Description of quarter: This is a preparatory course for the machine operator. The course introduces tools basics and safety, work documentation and systems, digital literacy and financial literacy. Instruction will include a mix of classroom, virtual and lab with a small self-study component.	
Courses include: <ul style="list-style-type: none"> • Mechanical Knowledge • Measurement, gauges and tools The above courses are described in detail as follows with the 48 hours of RSI broken down:	

Element/Course: Q1/Course 1: Mechanical Knowledge	Planned Hours: 24
Mode of Instruction (check all that apply) <input checked="" type="checkbox"/> Classroom: 24, of that 12 hrs. hands on <input type="checkbox"/> Lab <input type="checkbox"/> Online <input type="checkbox"/> Self-Study Provided by: Machinists Institute	
Description of element/course: Description of the course: The course on the fundamentals of mechanical processes focuses on the basic concepts of physics, tools, and equipment operations. Students will be able to demonstrate an understanding of automated systems and control operations. They will be able to define and explain the use of the following:	
<ul style="list-style-type: none"> • Automated equipment • Automated systems • Computer control • Pneumatic systems • Robotics • Process control • Vacuum systems <p>The content will provide knowledge of manufacturing process applications and operations and processes for assembly, fabrication, electrical/electronic manufacturing, bulk/continuous flow/line balancing, finishing, "Clean Room," and experiment design/implementation.</p> <p>Topics include: Components of force, effects of inertia, friction, heat, functions of pulleys, levers, gears and other machinations, manual tool and equipment set up and operation, monitoring performance, and conditions.</p>	

Element/Course: Q1/Course 2: Measurements, Gauges and Tools	Planned Hours: 24
Mode of Instruction (check all that apply) <input checked="" type="checkbox"/> Classroom: 24, of that 12 hrs. hands on <input type="checkbox"/> Lab <input type="checkbox"/> Online <input type="checkbox"/> Self-Study Provided by: Machinists Institute	
Description of element/course: Description of the course: The course focuses on measurements, use of gauges, and tools to take those measurements to precision. The student will learn the following:	
<ul style="list-style-type: none"> • Use a micrometer to measure to nearest fraction of an inch, • Measure weight to nearest ounce or gram, angles to the nearest degree, temperature in Fahrenheit, Celsius • Read numbers on various scales and gauges. • Interpolate measurement values using hash marks between written numbers. 	

- Convert from English to metric units and from metric to English units.
- Measure perimeters and circumferences.
- Compute areas of squares, rectangles, other polygons, circles, volume of cylinders, rectangular solids, and mass from volume and density.
- Use trigonometry tables.
- Compute missing angles of triangles.
- Compute missing sides of triangles.
- Make basic electrical readings using a multimeter.

The student will be introduced to precision measurement and demonstrate an understanding of

- Physical dimension measurement instruments and techniques (e.g., micrometers, calipers).
- Volume measurement instruments and techniques (volumetric glassware).
- Microscope instruments and techniques (e.g., optical, charged particle, scanning probe).
- Pressure and flow measurement instrument and techniques (e.g., digital manometer, vacuum gauge).
- Detection instrument and techniques (e.g., gas detection, leak detection).
- Electrical measurement instruments and techniques (e.g., digital multimeter, voltmeter).

The student will apply math to measuring and inspection of work, be able to interpret, add, subtract, multiply and divide the following:

- Whole numbers, Decimals, and Fractions
- Weights
- Measures
- Conversions between English and metric systems
- Tolerance range
- Compute data, such as gear dimensions or machine settings, applying knowledge of shop mathematics

Topics include: Measurement, precision measurement, and application of math to measuring and inspection of work

Element/Course: Quarter - 2	Planned Hours: 34
Mode of Instruction (check all that apply) <input checked="" type="checkbox"/> Classroom: 34, of that 17 hrs. hands on <input type="checkbox"/> Lab <input type="checkbox"/> Online <input type="checkbox"/> Self-Study Provided by: Machinists Institute	
Description of quarter: This is a preparatory course for the machine operator The course introduces tools basics and safety, work documentation and systems, digital literacy and financial literacy. Instruction will include a mix of classroom, virtual and lab with a small self-study component.	
Courses include: <ul style="list-style-type: none"> • Metrology materials • Quality Assurance and Continuous Improvement The above courses are described in detail as follows with the 34 hours of RSI broken down:	

Element/Course: Q2/Course 1: Metrology Fundamentals	Planned Hours: 10
Mode of Instruction (check all that apply) <input checked="" type="checkbox"/> Classroom: 10, of that 5 hrs. hands on <input type="checkbox"/> Lab: 5 hrs. <input type="checkbox"/> Online <input type="checkbox"/> Self-Study Provided by: Machinists Institute	
Description of element/course: Description of course: The Metrology Fundamentals course introduces students to the importance of metrology in manufacturing. Students will differentiate between accuracy and precision; apply basic geometric tolerance and dimensioning specifications for metrology; describe basic metrology tools used for	

surface textures, part interiors, contact and non-contact probes for CMMs. Students will evaluate metrology issues for inspection processes such as post-processing inspections and advanced technologies.

Students will define how measuring system analysis work; compare Statistical Process Control (SPC) with Measurement System Analysis (MSA); identify common factors that impact measuring systems; apply the four variables that combine to yield a measurement value; how measurement uncertainty affects tolerance limits; common practices that are included in measurement assurance operations; sources of gage, random variation, and system variation. Students will identify the commonality between gage linearity and gage stability; how to conduct an ideal gage capability study; gage repeatability, and reproducibility experiments. The course will introduce common approaches for choosing optimum test variables and list the steps of effective measurement study preparation using a typical range of acceptable criteria used in manufacturing.

Topics include: Intro to Laser Trackers 365, NIMS Core Measurement and Material Skill 211, Measurement System Analysis 300,

Element/Course: Q2/Course 2: QA and Continuous Improvement	Planned Hours: 24
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Mode of Instruction (check all that apply)

Classroom: 24, of that 12 hrs. hands on Lab: 5 hrs. Online Self-Study

Provided by: Machinists Institute

Description of element/course:

Description of course: This is an introductory course in the study of the ISO 9000 series of quality system standards with emphasis on manufacturing industry applications. The course addresses standards interpretation, documentation, and implementation including preparation for, and creation of internal and external audits. Students will apply the fundamental quality requirements to successfully procure and allocate resources and to effectively deliver end products or manufacturing operations. Topics include basic supplier issues of specifications, process inspection, tool selection, rating, certification, and related quality audits.

Students will learn how to complete first article inspection documents necessary for process verification and validity, including how to apply geometric dimension and tolerance (GD&T) to read blueprints and notes for the setup and inspection of first article parts.

Instructor-led projects are designed to extend knowledge, skills, and abilities in ISO 9000 standards and inspection processes. The focus of these assignments is on how each student learns and applies skills related to quality assurance in the manufacturing process and the promotion of independent learning. Course activities will build on previous courses and topics covered and may involve projects that require students to work in teams.

Topics include: Instructor-determined Assignments/Projects, First Article Inspection and Documentation

Description of course: The apprentices will learn how to ensure the product and process meets quality system requirements as defined by industry specifications. The student will have the ability to demonstrate an understanding of how to confirm materials, processes, and final product meet quality specifications, explain how to support and maintain quality systems, describe how to employ audits and inspections to maintain quality to meet industry standards. They will be able to apply and analyze concepts associated with measuring quality. The student will become familiar with continuous improvement processes such as Lean Manufacturing and Six Sigma.

Topics include: Critical Work Functions, Quality Inspection, and Principles of Lean Manufacturing

Additional Training Providers (if necessary)

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