Apprenticeship Program Summary Sheet

for

Tooling U-SME

Division of Apprenticeship Standards (DAS)

To: **Chief Eric Rood**

From: **Ranai Browne**

CC:

Date: **July 31, 2020**

Program Name: **Tooling U-SME**

Industry(s): **Manufacturing**

DAS File No.

ACTIONS

Proposed New Apprentice Program

LIST OF LABOR ORGANIZATIONS REPRESENTING ANY OF THE APPRENTICES

None

LIST OF EMPLOYER(S)

Photo Sonics

Impresa Areospace

Apprenticeship Program Summary Sheet

For

Tooling U-SME

DISCLAIMER OF INTEREST IN THE BUILDING TRADES AND DISPATCH RESTRICTION

The Tooling U-SME Apprenticeship Program is not intended to train in the building and construction trades within the meaning of Labor Code section 3075, and is not eligible to dispatch apprentices to projects with public works, prevailing wage, or skilled and trained workforce requirements.

The Tooling U-SME Apprenticeship Program will train its apprentices to serve as fulltime employees for employers subscribing to these standards

SUMMARY

The Tooling U-SME Apprenticeship Training Committee oversees the apprenticeship program herein and seeks approval as a California-registered Apprenticeship Program from the Department of Industrial Relations, Division of Apprenticeship Standards. The unilateral single employer program committee offers the following apprenticeable occupation listed below.

The apprenticeable occupation within the program consists of the following related classroom instruction and hours of on-the-job training.

Aerospace Engineer	RSI 144 hours per year	Competency-Based
Industrial Engineering Technician	RSI 144 hours per year	Competency-Based

PROPOSED OCCUPATION(s) & WAGE RATES(s)			O*NET CODE
Aerospace Engineer			O*Net: 17-2011.00
Industrial Engineering Technician			O*Net: 17-3026.00
Aerospace Engineer	Apprentice Starting Wage	$15.00 per hour	
Aerospace Engineer	Journeyworker Wage	$17.00 per hour	
Industrial Engineering Technician	Apprentice Starting Wage	$15.00 per hour	
Industrial Engineering Technician	Journeyworker Wage	$17.00 per hour	

Program sponsors may pay at or above the minimum wage cited on the approved wage schedule, but never below the state or local minimum wage.

STATE OF CALIFORNIA
DEPARTMENT OF INDUSTRIAL
RELATIONS DIVISION OF APPRENTICESHIP STANDARDS
DAS-DOL Cover Sheet

DAS FILE NO. 100049
DISTRICT NO 13
NEW X

Apprenticeship Standards Incorporating and Adopting U.S. Department of Labor, Office of Apprenticeship Approved Standards

NAME OF EMPLOYER (PROGRAM SPONSOR) TELEPHONE NO..
Tooling U-SME (herein referred to as TUSME) 216-706-6600
3616 Superior Avenue East, Building 44, 5th Floor Cleveland, OH 44114
OCCUPATIONS
Aerospace Engineer O*Net: 17-2011.00
Industrial Engineering Technician O*Net: 17-3026.00

See Attachment "A" -- Approved Standards by U.S. Department of Labor Office of Apprenticeship that are herein incorporated adopted into these Standards

1. Purpose and Policy – Labor Code §3075.1; CCR §205 (e & g), §206, §212.2, §218
The parties hereto declare it their purpose and policy to incorporate the attached standards approved by U.S. Department of Labor Office of Apprenticeship to establish an organized, planned system of apprenticeship, conducted as an education-sponsored, employer-based undertaking. All provisions in the U.S. Department of Labor Office of Apprenticeship Standards attached hereto, that do not conflict with California law or create a higher standard than the California Apprenticeship laws and regulations shall be incorporated, adopted and agreed upon under the Shelley-Maloney Apprentice Labor Standards Act of 1939, as amended, to govern the employment and training of apprentices in the trade, craft or occupation defined herein, to become effective upon their approval under the California standards. In case of conflict of law, California Law shall prevail. No Section of these Standards of Apprenticeship shall be construed as permitting violation of any Federal Law or Regulations and the State of California Law or Regulations. When required by California Statute or Regulation, or by Section I – Program Administration of the attached U.S. Department of Labor Office of Apprenticeship Standards, there is hereby established the Tooling U-SME named master apprenticeship committee. The committee shall consist of at least three (3) members representing parties' signatory hereto, including employers who subscribe hereto participating in this program, an "Employer Subscription Agreement" (DAS-852) Attachment C. Committee members will be selected as outlined in the rules & regulations here to attached as Attachment D. In addition, there shall be advisors of the committee which shall consist of one apprenticeship consultant representing the Division of Apprenticeship Standards, one advisor from the Local Education Agency, and such other advisors as the committee shall determine. Such advisors and the apprenticeship consultant shall act without vote.
These standards shall apply to the organizations signatory hereto, their members, to other employers who subscribe hereto participating in this program, an "Employer Subscription Agreement" (DAS-852) Attachment C, will be provided to specify the information particular to that employer as noted herein, including the option to waive or

offer participation on the committee, employer committee members will be selected as outlined in the rules & regulations.

2. Craft, Trade, Occupation – Labor Code §3078 (c); CCR §212 (a,1)
The approved occupations are set forth in the U.S. Department of Labor Office of Apprenticeship
Standards attached to this California State standard. Additional occupations may be added or deleted by the above named sponsor by first submitting the proposed change(s) to the U.S. Department of Labor Office of Apprenticeship Standards. Once the U.S. Department of Labor Office of Apprenticeship Standards approves the change, the revised standards may be submitted to the California Division of Apprenticeship Standards (DAS) for approval of the Administrator of Apprenticeship.

3. Occupations
The occupational supplement(s) included in the attached U.S. Department of Labor Office of Apprenticeship Standards set forth the terms of the occupation, ratio, work processes, and related supplemental instruction for each individual occupation.

4. Responsibilities of Program Sponsor – CCR §212
The program sponsors are responsible for the administration and enforcement of all aspects of a Registered Apprenticeship program. Sponsor means any person, association, committee, or organization operating an apprenticeship program and in whose name the program is (or is to be) registered or approved. Sponsors will carry out the responsibilities and duties required of a Program Sponsor as described in Section I – Program Administration of the attached U.S. Department of Labor Office of Apprenticeship Standards.
In addition, the Sponsor(s) agree to:

(1) administer and enforce the standards as approved;
(2) establish rules and regulations governing the program and any apprenticeship committee if established;
(3) The recruitment, selection, employment, and training of apprentices during their apprenticeship, shall be without discrimination because of race, color, religion, national origin or sex. The sponsor will take affirmative action to provide equal opportunity in apprenticeship for both minorities and women as required under Title 29 of the Code of Federal Regulations, Part 30, and by the California Plan for Equal Opportunity in Apprenticeship and by the California Code of Regulations, Title 8, Chapter 215;
(4) provide training scheduled herein under competent trainers, including safety training through the program and first aid training, either in conjunction with the apprentices, related instruction classes or otherwise as appropriate;
(5) arrange for Related and Supplemental Instruction pursuant to LC 3074;
(6) have a Local Education Agency (L.E.A.) provide a letter approving the Related and Supplemental Instruction pursuant to LC 3074, 210212 (a, 7) (proof attached);
(7) maintain a record of each apprentice's work training, related instruction and progress therein;

(8) file a copy of each apprentice agreement with the Secretary of the California Apprenticeship Council;
(9) provide training in the recognition of illegal discrimination and sexual harassment;
(10) participate in the development of the training criteria;
(11) submit an annual Self-Assessment Review and Program Improvement Plan annually to the Chief of DAS.

5. Responsibilities of Program Employer Subscriber's – CCR §212
(1) administer and enforce the standards as approved;
(2) The recruitment, selection, employment, and training of apprentices during their apprenticeship, shall be without discrimination because of race, color, religion, national origin or sex. The sponsor will take affirmative action to provide equal opportunity in apprenticeship for both minorities and women. The sponsor select apprentices on the basis of qualifications alone, through fair and impartial procedures applied uniformly to all applicants will operate the apprenticeship program as required under Title 29 of the Code of Federal Regulations, Part 30, and by the California Plan for Equal Opportunity in Apprenticeship and by the California Code of Regulations, Title 8, Chapter 2;
(3) provide reasonably continuous employment to all apprentices in its employ;
(4) provide the diversified work training scheduled herein under competent trainers, including safety training through the program and first aid training, either in conjunction with the apprentices, related instruction classes or otherwise as appropriate;
(5) maintain a record of each apprentice's work training, related instruction and progress therein;
(6) file a copy of each apprentice agreement with the Secretary of the California Apprenticeship Council;
(7) grant apprentices credit for previous experience;
(8) provide training in the recognition of illegal discrimination and sexual harassment;
(9) participate in the development and comply with training criteria where such have been adopted;

6. Apprentice Agreements Labor Code – Labor Code § 3077, 3078; CCR § 206

Apprentices shall be at least 16 years of age. If the apprentice is under 18 years of age, the apprentice's parent or guardian must sign the agreement. When the period of training extends beyond 18, the apprentice agreement shall likewise be binding to such a period as may be covered. An apprentice is one who has been qualified and approved by the subscribing employer, signed an individual apprentice agreement with the program sponsor under these standards, which agreement has been approved by the Administrator or his duly authorized representative and filed with the California Apprenticeship Council. The standards shall be a part of the apprenticeship agreement. Apprentices shall be furnished a copy of the standards or given an opportunity to read them before indenture. The Administrator shall cancel apprentice agreements during the probationary period at the request in writing of either party; after the probationary period, agreements may be terminated by the Administrator by mutual consent of all the parties or cancelled for good

and sufficient reason. An apprentice agreement shall remain in effect during a lay-off unless cancelled. [See Attachment “B” – California Apprenticeship Agreement (DAS-1)].

7. Hours and Working Conditions – CCR §208 (b) (c, 4, 6), §212

The regular workday, workweek and other working conditions for apprentices shall conform to all applicable California laws and regulations. The employers must pay the higher hourly wage of either the Federal minimum wage, State minimum wage or the Living wage enacted in the County or City where the employer is located. Overtime shall not interfere with or impair training or schooling nor be detrimental to the health and safety of the apprentice. Establish a mechanism to rotate apprentices from work processes to work processes to assure complete training.

8. Wages and Wage Progression – Labor Code §3078; CCR §208 (a) (c-1, 2, 5, 6), §212 (a 5)

The wages shall be a progressively increasing wage, employee benefits and other compensation as set by Section CCR §208.Hours of related instruction and required school time need not be compensated.

9. Responsibilities of Apprentices – CCR §205 (c, e, i, & m), § 212(3), 224- CCR 212 (3)

Each apprentice shall satisfactorily perform all work and learning assignments, and complete a course of related instruction, as determined in accordance with California Labor Code Section 3078(d). There shall be no liability on the part of the employer for an injury sustained by an apprentice engaged in schoolwork at a time when the employment of the apprentice has been temporarily or permanently terminated.

10. Disciplining of Apprentice – Labor Code §3071; CCR §212 (b, 8), §213, § 218

All controversies or differences concerning the apprentice agreement, which cannot be adjusted locally, shall be submitted to the Administrator of Apprenticeship for determination.

11. Certificate of Completion - Labor Code §3071, §3078, §3092; CCR §§ 212, 224

The California Apprenticeship Council will issue a Certificate of Completion to apprentices upon receipt of competent evidence of their satisfactory completion of apprenticeship hereunder.

12. Modification of Standards - Labor Code § 3073, 3078; CCR § 212 (b) (13)

These Standards shall be modified to conform to any changes in prevailing practices, conditions and wages in the area and the industry when such changes occur. Requests of the program sponsor for modification are subject to the approval of the Administrator of Apprenticeship.

13. Where the program sponsors establish rules and regulations for governing of the apprentices in the program, a copy of such shall be provided to each apprentice.

14. Where applicable if an employer has a collective bargaining agreement with a labor organization applicable to these occupation(s), approval by the labor organization will be affixed to the Employer Subscription Agreement (DAS-752).

15. The foregoing standards are hereby agreed to and adopted on: June 20, 2020

16. Sponsoring Organization Designee:

By /s/ Chad Schron Senior Director

APPENDIX A1

WORK PROCESS SCHEDULE
AND
RELATED INSTRUCTION OUTLINE

DEVELOPED BY

TOOLING U-SME

FOR THE OCCUPATION OF

AEROSPACE ENGINEER

O*NET-SOC CODE : 17-2011.00 RAPIDS CODE : 2069CB

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

1. TYPE OF OCCUPATION

☐ Time-based ☒ Competency-based ☐ Hybrid

2. TERM OF APPRENTICESHIP

The term of the occupation shall be defined by the attainment of all competencies of the position, which would be reasonably expected to occur within 4,000 hours of OJL, supplemented by the minimum required 144 hours of related instruction each year, based on the specific employer's needs.

3. RATIO OF APPRENTICES TO JOURNEYWORKERS

A numeric ratio of apprentices to journeyworkers consistent with proper supervision, training, safety, and continuity of employment will be defined in the Employer Acceptance Agreement. The ratio language must be specific and clearly described as to its application to the job site. The apprentice to journeyworker ratio is: 1 apprentice(s) to 1 journeyworker, unless otherwise determined.

4. APPRENTICE WAGE SCHEDULE

Apprentice starting wages will be a minimum of $15.00 per hour. Apprentices shall be paid a progressively increasing schedule of wages based on either a percentage or a dollar amount of the current minimum hourly journeyworker wage rate of $17.00 per hour, or as specified in the Employer Acceptance Agreement.

Example Wage Schedule: 2-years to competency
1st 12 months = $15/hr. 2nd 12 months = $16/hr.
Final = $17/hr.

5. WORK PROCESS SCHEDULE (See attached Work Process Schedule)

The sponsor may modify the work processes to meet local needs prior to submitting these Standards to the appropriate Registration Agency for approval.

6. RELATED INSTRUCTION OUTLINE (See attached Related Instruction Outline)

The sponsor may modify the related instruction to meet local needs prior to submitting these Standards to the appropriate Registration Agency for approval.

WORK PROCESS SCHEDULE

AEROSPACE ENGINEER

O*NET-SOC CODE: 17-2011.00 RAPIDS CODE: 2069CB

Description : Perform engineering duties in designing, constructing, and testing aircraft, missiles, spacecraft, and associated equipment. May conduct basic and applied research to evaluate adaptability of materials and equipment to aircraft design and manufacture. May recommend improvements in testing equipment and techniques. Formulate mathematical models or other methods of computer analysis to develop, evaluate, or modify design, according to customer engineering requirements. Plan or conduct experimental, environmental, operational, or stress tests on models or prototypes of aircraft or aerospace systems or equipment. Formulate conceptual design of aeronautical or aerospace products or systems to meet customer requirements or conform to environmental regulations. Plan or coordinate activities concerned with investigating and resolving customers' reports of technical problems with aircraft or aerospace vehicles. Write technical reports or other documentation, such as handbooks or bulletins, for use by engineering staff, management, or customers. Conduct concise presentations to customers and engineers on concepts, development and engineering trade study results. Specialize in specific specialty functions in the engineering craft to meet employer needs.

WORK PROCESSES

1. Safety and Health
    a. Follow all safety procedures and policies
    b. Work safely around machinery and others
    c. Properly use all Tools, Test Equipment and required Personal Protective Equipment (PPE)
    d. Adhere Lock Out/Tag Out procedure whenever required
    e. Properly use, store and dispose of all trade-related hazardous materials
2. Aerospace Principles
    a. Adhere to Aerospace Laws and Regulations relevant to Aerospace work
        i. Federal Aviation Administration (FAA)
        ii. Federal Acquisition Regulations (FARs)
        iii. National Transportation Safety Board (NTSB)
        iv. National Aeronautics and Space Administration (NASA)
        v. European Aviation Safety Agency (EASA)\International Air Transport Association (IATA)
        vi. International Traffic in Arms Regulations (ITAR)
        vii. Import/Export Requirements
        viii. Other laws and regulations
    b. Adhere to safeguarding practices to protect information from others who do not possess the need to know to access the information.
        i. Comply with the organization's privacy policy and information security guidelines
        ii. Defend against potential abuses of private information
        iii. Recognize and respond appropriately to suspicious vulnerabilities and threats
        iv. Handle removable media with care, recognizing it as a potential source of malware
        v. Use recent security software, web browser, and operating system to protect against online threats
        vi. Recognize secure Web addresses
        vii. Ensure backups exist for important files and information, so that they can be restored in the event of corruption by malware or otherwise
3. Engineering Drawings & Prints
    a. Define and interpret various sections of blueprint, schematics and technical drawings, including title block, tolerances, change or revision blocks, including notes, scale and size details
    b. Select gauges according to feature or characteristics to be measured, the applicable tolerance and the accuracy, and the resolution and capability of the test instrument
    c. Read a GD&T print to determine all datum surfaces for a sample part
4. Metrology with Quality Control and Assurance
        i. The Fundamentals of Metrology introduce concepts of measurement systems, units, measurement uncertainty,

measurement assurance, traceability, basic statistics and how they fit into a Quality Management System.

ii. Identify and use reference materials to ensure good quality, accurate, traceable measurement results.

iii. Explain highlights and key concepts of key topics and how these topics fit in to a management system using ISO as the basis.

iv. Difference and understanding between quality assurance and quality control.

v. Understanding Inspection as the process of measuring, examining, and testing to gauge one or more characteristics of a product or service and the comparison of these with specified requirements to determine conformity.

vi. Products, processes, and various other results can be inspected to make sure that the object coming off a production line, or the service being provided, is correct and meets specifications.

vii. Understanding use of Portable and Stationary devices commonly used in an aerospace manufacturers environment for inspection and measurement.

viii. Basic review of Length, Mass, Time, Electric current, Thermodynamic temperature, Amount of substance and Luminous intensity.

5. Software and Programming
    a. Utilize Computer-Aided Design (CAD) and Computer-Aided Manufacturing (CAM) software
    b. Understand the concepts of computer numerical control (CNC) programming
    c. Program ladder logic and troubleshoot PLCs and microcontrollers
    d. Utilize Microsoft software applications, to include Office, Excel, Project, Access, PowerPoint and Outlook
    e. Program macros to apply to needs when working in Microsoft software
    f. Utilize diagnostic, configuration and calibration software
6. Continuous Improvement and Lean
    a. Identify and interpret the protocol for the various types of audits to include internal, external, system, product and process
    b. Develop and use various types of audit tools to include checklists, log sheets, sampling plans, record and document reviews and forward-and backward-tracing
    c. Develop Corrective Action Requests (CARs) to support quality improvement
    d. Develop quality tool and techniques to communicate quality data to include Pareto charts, cause and effect diagrams, flowcharts, control charts, check sheets, scatter diagrams and histograms
7. Perform the various stages of the audit process to include planning, performance, and closure
    a. Measure central tendency by calculating mean, median and mode and measure dispersion by calculating range, standard deviation and variance

and proportion by calculating percentage and ration measures for various data sets

b. Determine whether a process is in statistical control by analyzing data patterns (runs, trends and hugging) and what actions should be taken in response using principles of Statistical Process Control (SPC)
c. Apply lean tools for eliminating waste through the implementation of a 6S project and Value-Steam Mapping
d. Conduct a kaizen event to improve a designated process
e. Apply project management principles to monitor the success of plans

8. Engineering Sciences
    a. Apply a working knowledge of the engineering sciences (fluid mechanics, statics and dynamics, electric circuits, solid mechanics, thermodynamics, heat transfer, mass transfer, materials properties)
    b. Apply a working knowledge of the natural sciences (physics, chemistry, biology, geology)
    c. Apply a working knowledge of manufacturing processes (additive, material removal, fabrication, hot and cold forming, casting and molding, electrical, heat treatment, joining/welding/assembly, finishing, bulk/continuous flow, material handling/packaging, and maintenance systems)
    d. Production and processing – knowledge of raw materials, production processes, quality control, costs, and other techniques for maximizing the effective manufacture and distribution of goods
    e. Apply a working knowledge of software tools for engineers using the tenets of computer science (Analytical or scientific software, computer aided design CAD software, computer aided manufacturing CAM software, Computer Aided Design (CAD), and other word processing and project management and data management software)
9. Engineering Economics
    a. Prepare detailed cost estimates of capital and annual operating costs, maintenance and repair, and replacement costs for a project or component of a project, such as equipment, materials, assembly, inspection, modification, quality assurance, etc.
    b. Calculate the return on investment, present worth and/or annual cost and benefit of a project having initial capital and annual operation, maintenance, repair, salvage value and replacement costs using appropriate interest, discount, and projected inflation rates
    c. Identify and quantify the economic risks associated with a project or product, including how warranty costs are considered for a product
10. Compare design alternatives with varying cost profiles on a present worth or annual cost basis
    a. Interact with managers and other professionals in providing project economic information and opinions of project costs in financial analysis and financing process.
11. Program Management
    a. Demonstrate tracing of defects using root cause analysis

b. Apply problem-solving tools through the plan-do-check-act (PDCA) or plan-do-study-act (PDSA) cycles
c. Communicate effectively with co-workers, suppliers, customers, etc. to solve problems
d. Read machine inputs/outputs, diagnostics, and measuring instruments; use powers of observation (five senses) and identify the cause(s) of problem to determine a repair strategy
e. Refer/discuss problem(s) with appropriate personnel as needed; assist in completion of repair
f. Contact vendors to secure needed parts and/or to obtain technical assistance

12. Document failure modes; review results and available information; use analysis to improve future operations (if applicable)
    a. Build and manage a project plan using Gantt chart software

The above work process is intended as a guide. It is not to 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 him fully competent and use good workmanship in all work processes which are part of the trade. In addition, the apprentice shall be fully instructed in safety and OSHA requirements.
The above apprenticeship work processes are applicable only to training curricula for apprentices in approved programs. Apprenticeship work processes have no impact on classification determinations under Article 8 or 9 of the Labor Law.

Apprenticeship Competencies – Behavioral

In addition to mastering all the essential technical competencies, an apprentice must consistently demonstrate at an acceptable level the following behavioral competencies in order to complete the apprenticeship.

Item #	Behavioral Competencies
1	Participation in team discussions/meetings
2	Focus in team discussions/meetings
3	Focus during independent work
4	Openness to new ideas and change
5	Ability to deal with ambiguity by exploring, asking questions, etc.
6	Knows when to ask for help
7	Able to demonstrate effective group presentation skills
8	Able to demonstrate effective one-on-one communication skills
9	Maintains an acceptable attendance record
10	Reports to work on time
11	Completes assigned tasks on time
12	Uses appropriate language
13	Demonstrates respect for patients, co-workers and supervisors

14 Demonstrates trust, honesty and integrity
15 Requests and performs work assignments without prompting
16 Appropriately cares for personal dress, grooming and hygiene
17 Maintains a positive attitude
18 Cooperates with and assists co-workers
19 Follows instructions/directions
20 Able to work under supervision
21 Able to accept constructive feedback and criticism
22 Able to follow safety rules
23 Able to take care of equipment and work place
24 Able to keep work area neat and clean
25 Able to meet supervisor's work standards
26 Able to not let personal life interfere with work
27 Adheres to work policies/rules/regulations

RELATED INSTRUCTION OUTLINE

AEROSPACE ELECTRONICS TECHNICIAN (IT LAB TECHNICIAN)

O*NET-SOC CODE: 17-3023.01 RAPIDS CODE: 0169CB

The related instruction has been developed in cooperation with employer-partners as part of the apprenticeship. Participation in the Aero-Flex RA Program will require an individual to fully complete a BS/BA in an Engineering discipline from an accredited university or college prior to completing their apprenticeship, or be enrolled in an accredited university or college and be seeking a BS/BA in an Engineering discipline, or be seeking enrollment into an accredited university or college and be seeking a BS/BA in an Engineering discipline. Attainment of the degree requirement may occur prior to entering the apprenticeship, or during the apprenticeship or following completion of the apprenticeship OJL as long as they are enrolled, or seeking enrollment, in a university or college program during the apprenticeship. Obtainment of a BS/BA degree in an Engineering discipline from an accredited university or college will be required as part of completing the apprenticeship ‘s related technical instruction outline.

The following related technical instruction course topics will be required in addition to attaining this degree requirement. However, prior credit for any of the below course topics may be given at the employer’s discretion.

Related technical instruction - This instruction shall include, but not be limited to, at least 144 hours per year for each year of the apprenticeship. The related theoretical education is tightly integrated with real work product. The curriculum is defined as a variety of courses and course topics, around which the exams and projects are based. By defining the RTI in this way, all competencies required of the students are met, through project work.

Course Topics	Hours
Safety & Health	50
Engineering Drawings	60
Mathematics	40
Software Tools and Programming	20
Continuous Improvement and Lean	50
Problem Solving	10
Engineering Science	40
Engineering Ethics	10
Engineering Economics	10
Other Workplace Skills	40
TOTAL	330

Safety & Health (50 hours)
Observe safe practices, in accordance with OSHA, FDA and organizational requirements, when performing tasks within the working environment.

- General Workplace Safety
- Right-to-Know/ Safety Data Sheets (SDS)
- Proper Use of All Personal Protective Equipment (PPE)
- First Aid & CPR
- Lock-Out/Tag-Out (LOTO)
- 6S
- Hazardous Materials Awareness Training

Engineering Drawings (60 hours)
Apply a working knowledge of foundational drawing and print reading skills when interpreting specifications and performing tasks within the manufacturing environment.

- Blueprints
- Interpreting
- Drafting/Drawing/Modeling
- GD&T

Mathematics (40 hours)
Apply a working knowledge of foundational mathematics skills when interpreting specifications and performing tasks within the manufacturing environment.

- Algebra, including linear and quadratic equations
- Geometry
- Trigonometry
- Calculus
- Functions and Graphs
- Units of Measurement

Software Tools and Programming (20 hours)
Apply a working knowledge of computer hardware components and software applications to create, organize, manage and secure digital information within a manufacturing environment.

- CAD/CAM/CAE Applications
- Microsoft Office Suite
- Information Security

Continuous Improvement and Lean (50 hours)
Apply common systems for designing and measuring work processes and the commitment to continuous improvement through empowerment and management by people and data.

- Quality Programs
- Continuous Improvement Principles
- Lean Manufacturing Principles
- Project Management Principles

Problem Solving (10 hours)
Apply a working knowledge of analyzing information and evaluating results to choose the best solution and solve problems.

- Root Cause Analysis
- Six Sigma

Engineering Sciences (40 hours)
Apply a working knowledge of engineering science and common manufacturing processes within defined tolerances, to meet specific product requirements.

- Technical Physics, including Mechanics
- Chemistry
- Statics/Dynamics
- Metallurgy
- Foundations of Electricity
- Foundations of Electronics
- Metal Removal Processes
- Additive Manufacturing
- Fabrication Processes
- Hot and Cold Forming Processes
- Casting and Molding Processes
- Heat Treatment Processes
- Joining and Assembly Processes
- Finishing Processes
- Bulk and Continuous Flow Processes
- Material Handling/Packaging Processes
- Maintenance Systems

Engineering Ethics (10 hours)
Apply a working knowledge of the similarities among and differences between ethics, law, morals, and etiquette, while acting in the best interest of the company, the community, and the environment, in compliance with applicable laws and rules governing work and report loss, waste, or theft of company property to appropriate personnel.

- Professional Liability
- Ethics and Social Responsibility
- Intellectual Property
- Conflicts of Interest

Engineering Economics (10 hours)
Apply basic costs associated with manufacturing and how these costs are typically controlled. Understand common economic terminology and concepts surrounding supply and demand. Analyze the cost and pricing of products. Apply principles of profit and loss. Apply fundamental principles of accounting.

- Time Value of Money
- Basic Accounting
- Capital Budgeting
- Risk Identification
- Cost-Benefit Analysis
- Profit and Loss

Other Workplace Skills (40 hours)
Apply good practices in the exchange of information between two or more people in casual conversation or within a formal discussion through verbal and or written means.

- Interpersonal Communications: oral and written
- Sexual Harassment Prevention Training

Work Readiness Skills

APPENDIX A2

WORK PROCESS SCHEDULE
AND
RELATED INSTRUCTION OUTLINE

DEVELOPED BY

TOOLING U-SME

FOR THE OCCUPATION OF

INDUSTRIAL ENGINEERING TECHNICIAN

O*NET-SOC CODE : 17-3026.00 RAPIDS CODE : 2059CB

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

1. TYPE OF OCCUPATION

☐ Time-based ☒ Competency-based ☐ Hybrid

2. TERM OF APPRENTICESHIP

The term of the occupation shall be defined by the attainment of all competencies of the position, which would be reasonably expected to occur within 4,000 hours of OJL, supplemented by the minimum required 144 hours of related instruction each year, based on the specific employer's needs.

3. RATIO OF APPRENTICES TO JOURNEYWORKERS

A numeric ratio of apprentices to journeyworkers consistent with proper supervision, training, safety, and continuity of employment will be defined in the Employer Acceptance Agreement. The ratio language must be specific and clearly described as to its application to the job site. The apprentice to journeyworker ratio is: 1 apprentice(s) to 1 journeyworker, unless otherwise determined.

4. APPRENTICE WAGE SCHEDULE

Apprentice starting wages will be a minimum of $15.00 per hour. Apprentices shall be paid a progressively increasing schedule of wages based on either a percentage or a dollar amount of the current minimum hourly journeyworker wage rate of $17.00 per hour, or as specified in the Employer Acceptance Agreement.

Example Wage Schedule: 2-years to competency
1st 12 months = $15/hr. 2nd 12 months = $16/hr.
Final = $17/hr.

5. WORK PROCESS SCHEDULE (See attached Work Process Schedule)

The sponsor may modify the work processes to meet local needs prior to submitting these Standards to the appropriate Registration Agency for approval.

6. RELATED INSTRUCTION OUTLINE (See attached Related Instruction Outline)

The sponsor may modify the related instruction to meet local needs prior to submitting these Standards to the appropriate Registration Agency for approval.

WORK PROCESS SCHEDULE

INDUSTRIAL ENGINEERING TECHNICIAN

O*NET-SOC CODE: 17-3026.00 RAPIDS CODE: 2059CB

Description: Works within the organization's quality team to support the administration of ISO quality system (such as AS9100) and is tasked with creating documentation, devising quality tests and defining the criteria a test result should meet.

WORK PROCESSES

1. Safety and Health
    a. Follow all safety procedures and policies.
    b. Work safely around machinery and others.
    c. Properly use all Tools, Test Equipment and required Personal Protective Equipment (PPE).
    d. Adhere Lock Out/Tag Out procedure whenever required.
    e. Properly use, store and dispose of all trade-related hazardous materials.
2. Aerospace Principles and Laws & Regulations
    a. Demonstrate understanding of the concepts of science, engineering and business related to aeronautics and space research, design, manufacture, operation and maintenance.

    b. Adhere to Aerospace Laws and Regulations relevant to Aerospace work.
3. Engineering Drawings & Prints / Sciences
    a. Define and interpret various sections of blueprint, schematics and technical drawings.
    b. Select gauges according to feature or characteristics to be measured the applicable tolerance and the accuracy, and the resolution and capability of the test instrument.
    c. Read a Geometric Dimensioning and Tolerancing (GD&T) print to determine all datum surfaces for a sample part.
    d. Apply a working knowledge of the engineering sciences.
    e. Apply a working knowledge of the natural sciences.
    f. Apply a working knowledge of manufacturing processes.
    g. Apply a working knowledge of raw materials.
    h. Apply a working knowledge of production processes, quality control, costs, and other techniques for maximizing the effective manufacture and distribution of goods.
4. Metrology & Quality Assurance, Total Quality Management
    a. The Fundamentals of Metrology introduce concepts of measurement systems, units, measurement uncertainty, measurement assurance, traceability, basic statistics and how they fit into a Quality Management System.
    b. Identify and use reference materials to ensure good quality, accurate, traceable measurement results.
    c. Explain highlights and key concepts of key topics and how these topics fit in to a management system using ISO as the basis.
    d. Difference and understanding between quality assurance and quality control.
    e. Understanding Inspection as the process of measuring, examining, and testing to gauge one or more characteristics of a product or service and the comparison of these with specified requirements to determine conformity.
    f. Products, processes, and various other results can be inspected to make sure that the object coming off a production line, or the service being provided, is correct and meets specifications.
    g. Understanding use of Portable and Stationary devices commonly used in an aerospace manufacturer's environment for inspection and measurement.
    h. Basic review of Length, Mass, Time, Electric current, Thermodynamic temperature, Amount of substance and Luminous intensity.
    i. Document process, procedures and responsibilities for achieving quality policies and objectives using a Quality Management System (QMS) as applicable to the facility.
    j. Follow ISO 9001:2015 quality management system protocols for the seven quality management principles to be applied for organizational improvement: customer focus, leadership, engagement of people, process

approach, improvement, evidence-based decision making and relationship management.
   k. Utilize the aerospace specific quality management standards prescribed by AS9100.
   l. Appropriately apply concepts of Total Quality Control and Total Quality Management as applicable.
5. Quality Control
   a. Perform Quality Control functions as applicable to company processes, procedures and products.
   b. Conduct tests and inspections of products to evaluate quality or performance.
6. 100% sampling or Statistical Process Control (SPC).
   a. Evaluate information to determine compliance with standards, laws and regulations.
   b. Monitor and review information from materials, events or the environment to detect or assess problems.
   c. Estimating the Quantifiable Characteristics of Products, Events, or Information - Estimating sizes, distances, and quantities; or determining time, costs, resources, or materials needed to perform a work activity.
   d. Interpreting the Meaning of Information for Others - Translating or explaining what information means and how it can be used.
   e. Inspecting Equipment, Structures, or Material - Inspecting equipment, structures, or materials to identify the cause of errors or other problems or defects.
   f. Processing Information - compiling, coding, categorizing, calculating, tabulating, auditing, or verifying information or data.
   g. Analyze data to inform operational decisions or activities.
   h. Monitor organizational procedures to ensure proper functioning.
   i. Communicate organizational information to customers or other stakeholders.
   j. Maintain knowledge of current developments in area of expertise.
   k. Develop operating strategies, plans, or procedures.
   l. Analyze data to assess operational or project effectiveness.
   m. Recommend organizational process or policy changes.
   n. Advise customers on technical or procedural issues.
   o. Inspect condition or functioning of facilities or equipment.
7. Software Systems and Information Safeguarding
   a. Utilize Microsoft applications including Excel, Word, PowerPoint, Outlook, Project and Access.
   b. Program macros to apply the needs when working in Microsoft software.
   c. Utilize diagnostic, configuration and calibration software.
   d. Utilize testing and analytical software applications.
   e. Utilize documentation management applications.
   f. Adhere to safeguarding practices to protection information from others who do not possess the need to know or access the information.
8. Continuous Improvement and Lean

a. Identify and interpret the protocol for the various types of audits to include internal, external, system, product and process.
b. Develop and use various types of audit tools to include checklists, log sheets, sampling plans, record and document reviews and forward and backward tracing.
c. Develop Corrective Action Requests (CARs) to support quality improvement.
d. Develop quality tool and techniques to communicate quality data to include Pareto charts, cause and effect diagrams, flowcharts, control charts, check sheets, scatter diagrams and histograms.
e. Perform the various stages of the audit process to include planning, performance and closure.
f. Measure central tendency by calculating mean, median and mode and measure dispersion by calculating range, standard deviation and variance and proportion by calculating percentage and ration measures for various data sets.
g. Determine whether a process is in statistical control by analyzing data patterns (runs, trends and hugging) and what actions should be taken in response using principles of Statistical process Control (SPC).
h. Apply lean tools for eliminating waste through the implementation of a 6S project and Value-Stream Mapping.
i. Conduct a Kaizen event to improve a designated process.
j. Apply project management principles to monitor the success of pans.
k. Utilize Six Sigma concepts to demonstrate the improved output quality of a process by identifying and removing the causes of defects and minimizing variability in manufacturing and business process.

9. Problem Solving
    a. Demonstrate tracing of defects using root cause analysis.
10. Apply problem-solving tools through the plan-do-check-act (PDCA) or plan-do-study-act (PDSA) cycles.
    a. Communicate effectively with co-workers, suppliers, customers, etc. to solve problems.
    b. Read machine inputs/outputs, diagnostics, and measuring instruments; use powers of observation (five senses) and identify the cause(s) of problem to determine a repair strategy.
    c. Refer/discuss problem(s) with appropriate personnel as needed; assist in completion of repair.
    d. Contact vendors to secure needed parts and/or to obtain technical assistance.
    e. Document failure modes; review results and available information; use analysis to improve future operations (if applicable).
    f. Build and manage a project plan using Gantt chart software.

Apprenticeship Competencies – Behavioral

In addition to mastering all the essential technical competencies, an apprentice must consistently demonstrate at an acceptable level the following behavioral competencies in order to complete the apprenticeship.

Item # Behavioral Competencies

1. Participation in team discussions/meetings
2. Focus in team discussions/meetings
3. Focus during independent work
4. Openness to new ideas and change
5. Ability to deal with ambiguity by exploring, asking questions, etc.
6. Knows when to ask for help
7. Able to demonstrate effective group presentation skills
8. Able to demonstrate effective one-on-one communication skills
9. Maintains an acceptable attendance record
10. Reports to work on time
11. Completes assigned tasks on time
12. Uses appropriate language
13. Demonstrates respect for patients, co-workers and supervisors
14. Demonstrates trust, honesty and integrity
15. Requests and performs work assignments without prompting
16. Appropriately cares for personal dress, grooming and hygiene
17. Maintains a positive attitude
18. Cooperates with and assists co-workers
19. Follows instructions/directions
20. Able to work under supervision
21. Able to accept constructive feedback and criticism
22. Able to follow safety rules
23. Able to take care of equipment and work place
24. Able to keep work area neat and clean
25. Able to meet supervisor's work standards
26. Able to not let personal life interfere with work
27. Adheres to work policies/rules/regulations

RELATED INSTRUCTION OUTLINE

INDUSTRIAL ENGINEERING TECHNICIAN

O*NET-SOC CODE: 17-3026.01 RAPIDS CODE: 0159CB

he related instruction has been developed in cooperation with employer-partners as part of the apprenticeship. Prior credit for any of the below course topics may be given based on the employer’s assessment of the apprentice’s knowledge, skills and abilities.

Related technical instruction - This instruction shall include, but not be limited to, at least 144 hours per year for each year of the apprenticeship. The related theoretical education is tightly integrated with real work product. The curriculum is defined as a variety of courses and course topics, around which the exams and projects are based. By defining the RTI in this way, all competencies required of the students are met, through project work.

Course Topics	Hours
Safety & Health	24
Aerospace Industry Principles and Laws & Regulations	16
Engineering Drawings & Prints / Sciences	40
Metrology, Quality Assurance, Total Quality Management	80
Quality Control	200
Software Systems and Information Safeguarding	80
Continuous Improvement and Lean	80
Problem Solving	40
Other Workplace Skills	16
TOTAL	576

Quality and Process Improvement Certifications
At the option of the employer, certification may be required to document proficiency in the following in order to complete the RTI:

- Six Sigma White/Green belt or higher

The above course topics are described and include feature design, technical hints and tips from industry experts, and review questions.

Safety & Health
Observe safe practices, in accordance with OSHA, FDA and organizational requirements, when performing tasks within the working environment.

- 6S
- First Aid & CPR
- General Workplace Safety
- Hazardous Materials Awareness Training
- Lock-Out/Tag-Out (LOTO)
- Proper Use of All Personal Protective Equipment (PPE) to include respiratory protection/hearing conservation training
- Right-to-Know/ Safety Data Sheets (SDS)/GHS System

Aerospace Industry Principles and Laws & Regulations
Apply a working knowledge of foundational drawing and print reading skills when interpreting specifications.

- Aerospace Industry Overview
- Industry Rules, Regulations, and Requirements

Engineering Drawings & Prints / Sciences
Apply foundational or working knowledge of engineering science, mathematics skills, and common manufacturing processes within defined tolerances, to meet specific product requirements and when interpreting specifications.

- Functions and Graphs
- Geometric Dimensioning & Tolerances
- Interpreting Blueprints
- Mathematics (Algebra, Geometry, Trigonometry, Calculus, Statistics)
- Metallurgy
- Physical Sciences (Physics, Chemistry)
- Statics/Dynamics
- Units of Measurement

Metrology, Quality Assurance, Total Quality Management
Apply a working knowledge of metrology, calibration, and quality management techniques to meet product and customer requirements.

A. Closed-Loop Quality Management System
B. Metrology & Calibration
C. Planning and implementing a quality assurance program
D. Total Quality Management
E. Measurement and Testing Techniques

Human Factors in Quality Assurance

Quality Control
Apply a working knowledge of quality control practices, concepts, terminology and quality tools to ensure the product meets required specifications.

- Good Manufacturing Practices
- Process Improvement and Quality Control
- Quality Project Management
- Quality Concepts and Terminology
- Precision Measuring Instruments
- Quality Control of Manufactured Products
- Statistical Process Control

Software Systems and Information Safeguarding
Apply a working knowledge of software applications to create, organize, manage and secure digital information within a manufacturing environment.

- Analytical or Scientific Software such as MATLAB
- Compliance Software as applicable
- Content Workflow Software as applicable
- Data Entry and Data Query
- Documentation Management Software such as AS9102 Software
- Enterprise Resource Planning Software
- Program Testing Software as applicable

- Microsoft Office Suite – Excel, Word, PowerPoint
- Microsoft Project and Access
- Information Security Best Practices/Cybersecurity - NIST 171

Continuous Improvement and Lean
Apply common systems for designing and measuring work processes and the commitment to continuous improvement through empowerment and management by people and data.

- Continuous Improvement Principles
- Lean Manufacturing Principles
- Lean Management Principles
- Lean Six Sigma Principles

Problem Solving
Apply a working knowledge of analyzing information and evaluating results to choose the best solution and solve problems.

- Root Cause Analysis
- Six Sigma

Other Workplace Skills
Apply good practices in the exchange of information between two or more people in casual conversation or within a formal discussion through verbal and or written means.

- Interpersonal Communications: oral and written
- Sexual Harassment Prevention Training

Work Readiness Skills