



Mechanical/Electrical Engineering

Youth Apprenticeship

MECHANICAL/ELECTRICAL ENGINEERING

Mechanical/Electrical Engineering youth apprentices use mechanical/electrical drawings to contribute to the construction of prototypes, concepts, and mechanical/electrical engineering projects. Apprentices must adhere to industry safety and security standards.

Length of Apprenticeship: One year. Completion of the Engineering Drafting pathway is a prerequisite to this program.

COMPETENCIES

Youth apprentices must complete a **total of 11** competencies. **Ten** must be from the list below. If necessary, employers can substitute **1** competency with another occupationally appropriate skill. That skill should be added to the competency list for assessment.

Competencies
<ol style="list-style-type: none">1. Interpret mechanical and/or electrical technical drawings2. Develop the engineering problem and plan with team3. Research physical limitations4. Research required material properties5. Research manufacturing/assembly process and limitations6. Design prototype with team7. Prepare prototype technical drawings8. Prepare technical drawing prototype9. Test and revise prototype10. Analyze prototype test results11. Apply quality concepts to project

POST-SECONDARY PATHWAY OPPORTUNITIES

There are several post-secondary pathway opportunities in this area. The following is a partial list.

- Mechanical Design Technology
- Mechanical Engineering Technology



Mechanical/Electrical Engineering

Youth Apprenticeship
ON-THE-JOB LEARNING PERFORMANCE STANDARDS GUIDE
(TO BE COMPLETED BY YA CONSORTIUM)

YOUTH APPRENTICE INFORMATION

Youth Apprentice Name	
YA Coordinator	YA Consortium
School District	High School Graduation Date

REQUIREMENTS

Level One Requirements

Youth apprentices must complete ALL the items listed below. Check completed areas.

- ☐ Required 1st year Engineer Drafting has been completed
- ☐ Competency checklist
- ☐ Employability Skills checklist (in this OJL Guide) or the DPI Employability Skills Certificate
- ☐ Related instruction equal to 1 high school credit or at least 3 college credits
- ☐ Minimum of 450 work hours

HOURS

Record the hours the youth apprentice worked.

Total Hours Employed	Company Name	Telephone Number

RELATED INSTRUCTION

YEAR 1: Indicate which related instruction courses the youth apprentice completed.

Dual Credit	Course Number and Title	Credits	Instruction Provider
<input type="checkbox"/>			
<input type="checkbox"/>			
<input type="checkbox"/>			
<input type="checkbox"/>			

SIGNATURES

The On-the-Job Learning Performance Standards Guide includes a list of competencies youth apprentices learn through mentoring and training at the worksite.

Instructions for the Worksite Employers/Mentors and School-Based or YA coordinators: This document should be reviewed with the employer/mentor, school-based or YA coordinator on a regular basis with the youth apprentice to record progress and plan future steps to ensure completion of the required competencies. Mentors, school-based/YA coordinator, and the apprentice sign below.

Employer/Mentor Signature	Employer/Mentor Signature
Employer/Mentor	Employer/Mentor
Business/Company	Business/Company
Date Signed	Date Signed
School-Based and/or YA Coordinator Signature	School-Based and/or YA Coordinator Signature
School-Based and/or YA Coordinator	School-Based and/or YA Coordinator
School District or Organization	School District or Organization
Date Signed	Date Signed
Youth Apprentice Signature	Youth Apprentice Signature
Youth Apprentice	Youth Apprentice
School District / High School	School District / High School
Date Signed	Date Signed

EMPLOYABILITY SKILLS (TO BE COMPLETED BY YA EMPLOYER/MENTOR)

Youth apprentices must demonstrate key employability skills.

The DWD YA program employability skills requirement may be attained and demonstrated through two processes. (See options listed below.) Employability skills must be completed for every year a student is in the program. The DPI Employability Skills Certificate may be counted as meeting one of those two years, provided the certificate is earned in the same year the student is enrolled in youth apprenticeship or they can complete the YA Employability Skills in the OJL. The Employability Skills Certificate must be obtained through the DPI.

1. If a student has successfully completed a Wisconsin Department of Public Instruction (DPI) State-Certified Cooperative Education, [Co-Op Employability Skill certification](#) then they have met the YA Employability Skills requirement for that year. A copy of the student's DPI Co-Op Employability Skill Certificate must be maintained on file with their YA regional consortium.

☐ Earned Wisconsin Employability Skills Certificate (checked if applicable) or,

2. Completed and rated "Employability Skills" through this YA OJL guide as described below.

3	Exceeds Expectations: Exceeds entry-level criteria; requires minimal supervision; consistently displays this behavior
2	Meets Expectations: Meets entry-level criteria; requires some supervision; often displays this behavior
1	Working to Meet Expectations: Needs improvement; requires much assistance and supervision; rarely displays this behavior

The following skills are required of all youth apprentices.

Employability Skills	Rating		
	Minimum Rating of 2 for EACH		
	Check Rating		
Competency and Rating Criteria	1	2	3
1. Develops positive work relationships with others. <i>Examples of qualities and habits that the employee might exhibit include . . .</i> <ul style="list-style-type: none"> • Interacts with others with respect and in a non-judgmental manner • Responds to others in an appropriate and non-offensive manner • Helps co-workers and peers accomplish tasks or goals • Applies problem-solving strategies to improve relations with others • When managing others, shows traits such as compassion, listening, coaching, team development, and appreciation 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Employability Skills		Rating		
Competency and Rating Criteria		Minimum Rating of 2 for EACH Check Rating		
		1	2	3
2. Communicates effectively with others <i>Examples of qualities and habits that the employee might exhibit include . . .</i> <ul style="list-style-type: none"> • Adjusts the communication approach for the target audience, purpose, and situation to maximize impact • Organizes messages/information in a logical and helpful manner • Speaks clearly and writes legibly • Models behaviors to show active listening • Applies what was read to actual practice • Asks appropriate questions for clarity 		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Collaborates with others <i>Examples of qualities and habits that the employee might exhibit include . . .</i> <ul style="list-style-type: none"> • Works effectively in teams with people of diverse backgrounds regardless of sex, race, ethnicity, nationality, sexuality, religion, political views, and abilities • Shares responsibility for collaborative work and decision making • Uses the problem-solving process to work through differences of opinion in a constructive manner to achieve a reasonable compromise • Avoids contributing to an unproductive group conflict • Shares information and carries out responsibilities in a timely manner 		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Maintains composure under pressure <i>Examples of qualities and habits that the employee might exhibit include . . .</i> <ul style="list-style-type: none"> • Uses critical thinking to determine the best options or outcomes when faced with a challenging situation • Carries out assigned duties while under pressure • Acts in a respectful, professional, and non-offensive manner while under pressure • Applies stress management techniques to cope under pressure 		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Demonstrates integrity <i>Examples of qualities and habits that the employee might exhibit include . . .</i> <ul style="list-style-type: none"> • Carries out responsibilities in an ethical, legal and confidential manner • Responds to situations in a timely manner • Takes personal responsibility to correct problems • Models behaviors that demonstrate self-discipline, reliability, and dependability 		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Employability Skills		Rating		
Competency and Rating Criteria		Minimum Rating of 2 for EACH Check Rating		
		1	2	3
6. Performs quality work <i>Examples of qualities and habits that the employee might exhibit include . . .</i> <ul style="list-style-type: none"> • Carries out written and verbal directions accurately • Completes work efficiently and effectively • Performs calculations accurately • Conserves resources, supplies, and materials to minimize costs and environmental impact • Uses equipment, technology, and work strategies to improve workflow • Applies problem-solving strategies to improve productivity • Adheres to worksite regulations and practices • Maintains an organized work area 		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Provides quality goods or services (internal and external) <i>Examples of qualities and habits that the employee might exhibit include . . .</i> <ul style="list-style-type: none"> • Shows support for the organizational goals and principles by own personal actions • Displays a respectful and professional image to customers • Displays an enthusiastic attitude and desire to take care of customer needs • Seeks out ways to increase customer satisfaction • Produces goods to workplace specifications 		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Shows initiative and self-direction <i>Examples of qualities and habits that the employee might exhibit include . . .</i> <ul style="list-style-type: none"> • Prioritizes and carries out responsibilities without being told • Responds with enthusiasm and flexibility to handle tasks that need immediate attention • Reflects on any unsatisfactory outcome as an opportunity to learn • Improves personal performance by doing something different or differently • Analyzes how own actions impact the overall organization • Supports own action with sound reasoning and principles • Balances personal activities to minimize interference with work responsibilities 		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Employability Skills		Rating		
Competency and Rating Criteria		Minimum Rating of 2 for EACH Check Rating		
		1	2	3
9. Adapts to change <i>Examples of qualities and habits that the employee might exhibit include . . .</i> <ul style="list-style-type: none"> Shows flexibility and willingness to learn new skills for various job roles Uses problem-solving and critical-thinking skills to cope with changing circumstances Modifies own work behavior based on feedback, unsatisfactory outcomes, efficiency, and effectiveness Displays a "can do" attitude 		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Demonstrates safety and security regulations and practices <i>Examples of qualities and habits that the employee might exhibit include . . .</i> <ul style="list-style-type: none"> Follows personal safety requirements Maintains a safe work environment Demonstrates professional role in an emergency Follows security procedures Maintains confidentiality 		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Applies job-related technology, information, and media <i>Examples of qualities and habits that the employee might exhibit include . . .</i> <ul style="list-style-type: none"> Applies technology effectively in the workplace Assesses and evaluates information on the job Assesses training manuals, website, and other media related to the job 		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Fulfills training or certification requirements for employment <i>Examples of this requirement may include . . .</i> <ul style="list-style-type: none"> Participation in required career-related training and/or educational programs Passing certification tests to qualify for licensure and/or certification Participation in company training or orientation 		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Sets personal goals for improvement <i>Examples of this requirement may include . . .</i> <ul style="list-style-type: none"> Setting goals that are specific and measurable Setting work-related goals that align with the organization's mission Identifying strategies to reach goals Reflecting on goal progress to regularly evaluate and modify goals 		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

OCCUPATIONAL COMPETENCIES

(TO BE COMPLETED BY YA EMPLOYER/MENTOR)

Youth apprentices must complete a **total of 11** competencies. **Ten** must be from the list below. If necessary, employers can substitute **1** competency with another occupationally appropriate skill. That skill should be added to the competency list for assessment.

Rating Scale

3: Exceeds entry level criteria | Requires minimal supervision | Consistently displays this behavior

2: Meets entry level criteria | Requires some supervision | Often displays this behavior

1: Needs improvement | Requires much assistance and supervision | Rarely displays this behavior

If any competencies are rated "1" on the final performance review checklist that is submitted to WI DWD it is considered a failed checklist.

Occupational Competencies		Ratings		
Competency and Rating Criteria		Minimum Rating of 2 for EACH Check Rating		
		1	2	3
1. Interpret mechanical and/or electrical technical drawings <ul style="list-style-type: none">• use appropriate terminology• identify basic elements of mechanical and/or electrical technical drawings• identify lines, views, symbols, and representations• interpret dimensions and scale• interpret product specifications• interpret dimensioning and tolerancing symbols• analyze part prints		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Occupational Competencies		Ratings		
Competency and Rating Criteria		Minimum Rating of 2 for EACH Check Rating		
		1	2	3
2. Develop the engineering problem and plan with team <ul style="list-style-type: none"> • review the engineering problem, project instructions, and/or specifications requirements • brainstorm possible solutions to meet project specifications with engineering team • identify engineering work piece/part/process • contribute to a decision matrix based on the problem statement • identify and plan requirements for research and drawing • identify research needed prior to drawing • identify critical features on the part/process • identify the key control characteristics • research previous Failure Mode and Effectives Analysis (FMEA) and work projects for similar work pieces/parts/processes • assess the seriousness of the failure effect on the next component or the user • determine design methods or product features that help diagnose failure • review conclusions • document problem statement, planning and identification process 		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Occupational Competencies		Ratings		
Competency and Rating Criteria		Minimum Rating of 2 for EACH Check Rating		
		1	2	3
3. Research physical limitations <ul style="list-style-type: none"> • review research strategies identified in the problem statement • obtain/contact resources for researching physical limitations of piece/part/process • research physical constraints of limitations • analyze forces applied to structures and mechanical devices • identify the basic stress and vibration equations (mechanical only) • determine shear and moment forces in a diagram (mechanical only) • identify temperature and sensor ranges (electrical only) • determine current loads and wire sizes (electrical only) • determine environmental limitations of connectors (electrical only) • analyze loads applied to structures and mechanical devices • calculate moment of inertia of structural members • use graphical and mathematical analysis to identify physical limitations • determine efficiency in a mechanical system • determine efficiency in an electrical system • document physical research process 		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Research required material properties <ul style="list-style-type: none"> • review research strategies identified in the problem statement • obtain/contact resources for researching physical limitations of piece/part/process • identify material properties • select a material and standard structural shape to fit design specifications and environmental conditions • review research, testing, and conclusions with worksite professional • document material properties research as required 		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Occupational Competencies		Ratings		
Competency and Rating Criteria		Minimum Rating of 2 for EACH Check Rating		
		1	2	3
5. Research manufacturing/assembly process and limitations <ul style="list-style-type: none"> • review research strategies identified in the problem statement • obtain/contact resources for researching physical limitations of piece/part/process • identify manufacturing processes used to fabricate and assemble part • determine product handling during manufacturing • identify features to be added to ensure proper assembly orientation • identify available parts and assemblies • document manufacturing process research 		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Design prototype with team <p>review the problem statement identified</p> <ul style="list-style-type: none"> • define the work piece/part/process engineering specifications based on preliminary research and testing • select mechanical and/or electrical elements by type and size • select prototype materials • determine form, fit, function, and relationship of components and assembly • integrate design for manufacturing and assembly • complete engineering calculations for prototype • set initial tolerances based on preliminary research factors • estimate cost factors 		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Occupational Competencies		Ratings		
Competency and Rating Criteria		Minimum Rating of 2 for EACH Check Rating		
		1	2	3
7. Prepare prototype technical drawings <ul style="list-style-type: none"> draw appropriate views of standard components position the components in relationship to other components select references dimension and fully constrain the drawing create pattern drawings for parts transfer parts into an assembly simulate fit or motion to analyze problems, issues, or processes edit features such as depth, direction, planes, attributes resolve failed features (redefine, reroute, reorder, delete) create and edit assemblies (insert, align, mate) create features in assemblies using mate features assess fastener selection based on strength, cost, material, appearance, and ease of assembly during installation detail drawing to request parts fabrication compare measurements with original specifications for form and function designated in engineering problem statement revise drawing 		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Prepare technical drawing prototype <ul style="list-style-type: none"> request parts fabrication order commercial materials and/or parts needed for prototype build models/prototypes operate fabrication tools and machines (i.e., drill press, grinders, engine lathe, soldering irons, etc.) assemble part(s) and components as specified in prototype drawing verify assembly as indicated in prototype drawings verify assembly of prototype with worksite professional 		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Occupational Competencies		Ratings		
Competency and Rating Criteria		Minimum Rating of 2 for EACH Check Rating		
		1	2	3
9. Test and revise prototype <ul style="list-style-type: none"> determine testing required based on engineering problem statement create documents of testing procedures and scenarios set up prototype test apparatus operate test controlling equipment record prototype test results set up and conduct tests of complete units and components test fit or motion test different scenarios to multiple variables test the feasibility of product/design test operational conditions test extreme conditions record test procedures and testing information record test results data organize testing data 		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Analyze prototype test results <ul style="list-style-type: none"> obtain prototype testing data calculate required capacities for work piece/part/process to obtain specified performance analyze data and study performance verify reliability and/or validity of the data manipulate data into tables, graphs, spreadsheets organize data into written and visual formats compare test results with design or rated specifications and test objectives recommend changes in product or test methods adjust work piece/part/process/equipment to meet specifications review prototype testing with engineering team refer back to engineering problem statement present final project recommendations revise engineering plan or drawings document prototype testing results 		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Occupational Competencies		Ratings		
Competency and Rating Criteria	Minimum Rating of 2 for EACH Check Rating			
	1	2	3	
11. Apply quality concepts to project <ul style="list-style-type: none"> • monitor customer requirements and specifications documents throughout process • follow written standards and procedures • communicate progress at each step of process • justify decisions with data • inspect quality of prototype and manufactured work pieces/parts/processes • document failures and errors • identify failures and errors • recommend corrective actions • complete basic statistical process control charts • document all research, design, testing, and production activities • follow the process for change control of design, process, and final product • track versions of drawings, parts, etc. (version control) 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Competency Substitute (if you replaced a competency above, note the competency and rating)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Comments:				



Post-Program Completion Survey

Youth Apprenticeship

YA POST-PROGRAM COMPLETION SURVEY: **EMPLOYER FEEDBACK**

Employers complete the following information. YA Coordinators will enter this into the Post-Program Completion Survey.

YA Employer Post-Program Completion Questions	
Will you offer or have you offered the Youth Apprentice a continuing position with your company?	<input type="checkbox"/> Yes <input type="checkbox"/> No
If continuing position offered to youth apprentice, did they accept?	<input type="checkbox"/> Yes <input type="checkbox"/> No
If yes, please answer the questions below:	
Was the offer for full time or part time work?	<input type="checkbox"/> Full-time <input type="checkbox"/> Part-time
Title of the position offered:	
What is the wage of the continuing employment offer?	
If applicable, will the youth apprentice advance to a Registered Apprenticeship?	

YA POST-PROGRAM COMPLETION SURVEY: **COMPLETED BY YA CONSORTIUM**

The [Post-Program Completion Survey](#) form is to be provided to each student completing the Youth Apprenticeship program to capture information on the student's plans after leaving the program. This **form should be completed by the Youth Apprenticeship Coordinator** to capture information from all high school seniors and their employers after successful completion of the Youth Apprenticeship Program.

The form should be completed during the final meeting between the student, mentor, and Youth Apprenticeship Coordinator, when the final checklist or On-the-Job Learning (OJL) Guide is filled out and signed. Information captured on this form must be entered online using the Bureau of Apprenticeship Standards Electronic Records System (BASERS).

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