YA Manufacturing to RA Industrial Manufacturing Technician Competency Crosswalk

This document is intended to serve as a guide for manufacturing employers and instructors when comparing the work skills of youth apprentices to those required of registered apprentices in the Industrial Manufacturing Technician (IMT) program. It compares the IMT Apprenticeship On-the-Job Training Core (Job Book) with the Required Skills Curriculum of the Manufacturing Youth Apprenticeship Program (Competency Checklist).

The manufacturing employer and Apprenticeship Training Representative are intended to use this crosswalk, in combination with a Youth Apprentice's complete Competency Checklist, to make a recommendation for advanced standing awards. "YA Credit Awarded" should be checked if the student completed the relevant competencies in their Competency Checklist. "RA Credit Awarded" should be checked if the RA representative(s) recommend giving credit for those duties and tasks.

Keep the following in mind when evaluating the Manufacturing Youth Apprenticeship Program:

- Manufacturing YA Units 1, 2, 3 must be completed by **all** Manufacturing YA students. Students must also complete **one of** Units 4-9, or two of these units for a Level Two YA student.
- Students are allowed to mix and match any of Units 4-9 within the Manufacturing Cluster, at the discretion of their employer.
- Manufacturing YA Unit 6 (Machining) applies to one of the following machines: Grinder, Machine Center, or Lathe. A Level Two Machining YA student would complete Unit 6 again for a different process. They would not be expected by state standards to know all three machines, although the employer may train them in additional competencies if appropriate
- Competencies from all Manufacturing YA Units are included when appropriate, but youth apprentices are only required to complete one Pathway as part of the YA program.

The required Manufacturing YA units are listed at the end of the document (Appendix A).

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Competency 1:

Protect Self and Other Workers from Accidents and Injuries

IMT Duties and Tasks		YA Manufacturing Competencies	YA Credit Awarded	RA Credit Awarded
A.	**Follow industry specific safety procedures around electricity, machines, equipment and manufacturing processes** *The apprentice shall properly perform the following:*	**Unit 2: Required Skills Safety** Competencies: 1. Follow personal safety requirements; 2. Maintain a safe work environment; 3.Demonstrate professional role to be used in an emergency		
01	Use of lock-out/tag-out procedures, both OSHA 1910.269 and employer specific	9(7) Perform safety checks – Ensure Lock Out/Tag Out procedures have been implemented as required by maintenance		
02	Demonstrate awareness of employer's safety policies	1(5) Act professionally - Communicate safety, training, and job-specific needs. Adhere to safety rules and regulations.		
03	Use and explain the purpose for required personal protective equipment, including but not limited to head, hand, ear, eye, foot, and body protection	2(1) Follow personal safety requirements - Define the Personal Protective Equipment (PPE) required for specific tasks in your facility 3(3) Operate tools and equipment safely - Wear the required Personal Protective Equipment (PPE) at all times as required for the operation of the tool/equipment.		
04	Identify proper tools and use	3(3) Operate tools and equipment safely - Distinguish between common hand tools including hammers, wrenches, pliers, punches, taps, and dies. List the various tools and equipment used at your worksite such as cutting and non-cutting hand tools, sawing machines, pedestal (bench) grinders, drill presses, vertical milling machines, CNC equipment, lathes, molding equipment, etc.		
05	Demonstrate proper personal lifting techniques	2(1) Follow personal safety requirements - Apply principles of proper body mechanics when necessary; Explain the ergonomic impact of work techniques		
06	Identify and inspect appropriate lifting equipment, such as hoists, straps, lifts, etc.	2(1) Follow personal safety requirements - Describe proper techniques for lifting loads		
07	Demonstrate proper use of appropriate lifting equipment	DWD(270.12(12)) **Forklift operation Prohibited to students**		
08	Obtain proper certification/license for operating a forklift and other lifting devices	DWD(270.12(12)) **Forklift operation Prohibited to students**		
09	Demonstrate proper and safe operation of forklift and other motor-operated vehicles	DWD(270.12(12)) **Forklift operation Prohibited to students**		
10	Identify, ventilate and enter a confined space (OSHA 1910.146)	**N/A**		
11	Adhere to employer's emergency/hazard response procedures	2(3) Demonstrate professional role to be used in an emergency- Participate in emergency safety simulations and drills		

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12	Identify location of first-aid materials	2(3) Demonstrate professional role to be used in an emergency- Locate and explain use of first aid emergency care kits		
13	Follow other applicable OSHA or employer safety regulations	2(1)Follow personal safety requirements - Adhere to equipment safety standards 2(2) Maintain safe work environment - Compare national, state and local regulators that oversee the manufacturing industry: Environmental Protection Agency (EPA), Occupational Safety and Health Administration (OSHA), the Federal Trade Commission (FTC), etc. as applicable		
14	Adhere to employer fire-extinguishing procedures	2(3) Demonstrate professional role to be used in an emergency - Demonstrate how to use the fire blanket and/or fire extinguisher		
15	Using personal fall arrest equipment when working from an elevated	**N/A**		
B.	**Minimize potential hazards** *The apprentice shall properly perform the following:*	2(2) Maintain a safe work environment - List the major components of a facility safety program		
01	Maintain a safe and organized work area	2(2) Maintain a safe work environment - Help maintain a clean and safe working environment free of debris and obstacles Clean, organize, put away items in the work area		
02	Identify location and demonstrate proper use of Material Safety Data Sheets (MSDS)	2(1) Follow personal safety requirements - Locate and can find key information on Material Safety Data Sheets (MSDS)		
03	Demonstrate awareness of material moving equipment in area, such as forklifts, tuggers, cranes, hoists, etc.	3(3) Operate tools and equipment safely - List the safeguards that apply to the equipment used in your facility for tools, automated machines, material handling equipment, and lifts		
04	Follow employer-specific safety procedures for identifying and addressing potential hazards	2(3) Demonstrate professional role to be used in an emergency - Identify appropriate alarms and procedures for using alarms Outline the company's policy and procedure for worksite incidents, accidents, electrical, fire, tornado, bomb threats, robbery, hostage situations, and other emergency situations		
C.	**Demonstrate awareness of first aid, CPR, and blood borne pathogens** *Apprentices must properly identify and explain the following:*	2(3) Demonstrate professional role to be used in an emergency - Locate and explain use of spill kits, if applicable to worksite Explain who in your facility can give first aid care in the event of an emergency		
01	Demonstrate awareness of employer's first-aid procedures	2(3) Demonstrate professional role to be used in an emergency - Locate and explain use of first aid emergency care kits		
02	Demonstrate awareness of employer's procedures for blood borne pathogens	2(1) Follow personal safety requirements - Explain potential hazards associated with blood borne pathogens		
03	Obtain CPR certification(s) required by employer	2(3) Demonstrate professional role to be used in an emergency - Detail steps to use in medical emergencies requiring First Aid, CPR, and/or Heimlich maneuver		

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Competency 2:

Interpret Production Specifications

IMT Duties and Tasks		YA Manufacturing Competencies	YA Credit Awarded	RA Credit Awarded
A.	**Identify employer production documents** *Apprentices must properly identify and explain the following:*	**Unit 5: Production Pathway Manufacturing Processes 1. Read technical drawings and work orders**		
01	Operational sequence	4(3) Identify set up for assembly - Consult with worksite professional to verify assembly schedule, deadlines, and timeframes,6(1) Determine machining instructions and specifications		
02	Material requirements	8(12) Productions Operations Management-Assist to analyze production process for productivity – Explain the impact of material specifications and delivery schedules to all internal and external customers		
03	Tooling requirements	6(4)Production Pathway – Machining – Select tools and materials; 6(15) Machining-Use CNC equipment-Describe how part geometry is analyzed to select appropriate cutting tools and fixturing devices		
04	Inspection requirements	6(1) Determine critical dimensions and tolerances Analyze supplementary data		
05	Machine set-up requirements (such as programming)	6(15) Use CNC Equipment – Identify program codes, Write &/or test CNC program; edit program as needed		
B.	**Identify production requirements using employer production documents** *Apprentices must identify and explain the following:*	**Unit 6(1) Production Pathway-Machining- Read machining technical drawings & work orders** - Explain how technical drawings detail work piece design parameters, lay out and specifications Explain how product design and production are related		
01	Required processes	5(11) Production Pathway-Manufacturing Processes-Process production documents		
02	Run time	6(3) Machining - Consult with worksite professional to verify production schedule, deadlines, and timeframes		
03	Inspection processes	6(10) Machining – Monitor machining product & process specifications		
04	Required tooling or fixtures	6(4) Machining – Select tools & materials		

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Competency 3:

Set Up, Inspect and Adjust Production Equipment

IMT Duties and Tasks		YA Manufacturing Competencies	YA Credit Awarded	RA Credit Awarded
A.	**Set up production equipment to meet production specifications** *Apprentices must properly perform the following:*	**Unit 5(3): Production Pathway Manufacturing Processes - Identify set up; Unit 6(3) Machining – Identify Set up Unit 7(6) Welding –Set up to fabricate base metal;**		
01	Select and assemble tooling, fixtures and equipment according to the operational method sheet	6(3) Machining – Identify Set up --Plan sequencing, tools, and equipment needed for machining process, Identify set up needed		
02	Install tooling	**N/A**		
03	Verify tooling offsets	6(7) Machining-Verify Set up- Verify set up meets machining requirements and product specifications		
04	Install CNC program	**N/A**		
05	Verify CNC program	6(7) Machining-Verify setup- Verify repeatability of set up if applicable		
06	Perform mechanical set-up	7(6) Welding-Set up to fabricate base metal (detailed steps)		
07	Perform ergonomic set-up, such as proper work heights, weight limits, lifting techniques, appropriate lighting, etc.	2(1) Safety- Explain the ergonomic impact of work techniques; 3(2) Measure using various instruments - Inspect tools and work area for safety considerations		
08	Interpret visual controls accurately	3(2) Measure using various instruments - Consider the degree of precision required by the part feature		
09	Adjust set-up as needed	6(7) Machining-Verify setup- Make adjustments to ensure piece/product meets specification if needed		
B.	**Inspect production equipment and surrounding work area** *Apprentices must properly perform the following:*	4(9) Perform quality checks, 5(10) Monitor product and Process specifications -List the quality checks performed as part of the manufacturing process, 6(10) List the quality checks performed as part of the production process 7(10) List the quality checks performed as part of the welding process		
01	Visually inspect tooling, fixtures and equipment are properly assembled, installed and in working order	6(5) Machining- Perform Safety Checks -List the types of labeling used on tools and equipment at your facility to indicate whether a tool or piece of equipment is functional and safe to use		
02	Visually inspect surrounding work area to ensure it is free of hazards, such as spills, obstructions, and loose wires	6(5) Machining-Perform Safety Checks – Inspect tools and work area for safety considerations		
03	Ensure work is performed in designated area and does not obstruct adjacent traffic patterns and work areas	3(3) Manufacturing Fundamentals –Operate tools and equipment safely - Inspect tool/equipment and work area for safety considerations; 6(5) Machining – Perform Safety Checks - List the situations which require you to obtain help to resolve problems with equipment or production		

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04	Ensure proper ergonomic set-up	2(1) Follow personal safety requirements - Explain the ergonomic impact of work techniques		
C.	**Adjust production equipment to meet and maintain production specifications** *Apprentices must properly perform the following:*	**3(3) Manufacturing Fundamentals-Operate tools and equipment safely**- Monitor tool/equipment for safe operation while operating; 7(10) Production Pathway Welding. Weld Metal - List the quality checks performed as part of the production process, Monitor, and adjust robotic welding production lines if applicable		
01	Continually monitor all mechanical and visual controls	3(3) Checks accuracy of tool/equipment operation with first run Monitor tool/equipment for safe operation while operating		
02	Continually interpret all mechanical and visual controls	3(3) Operates tool/equipment safely with guarding devices in the manner required for the job task		
03	Monitor product and recommend adjustments	3(3) Compare tool/equipment performance regularly to optimal equipment operations		
04	Adjust equipment and tooling to maintain product specifications	3(3) Perform any required preventative maintenance procedures, Document use and maintenance as required		

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Competency 4:

Operate Production Equipment

IMT Duties and Tasks		YA Manufacturing Competencies	YA Credit Awarded	RA Credit Awarded
A.	**Works according to production schedules to meet job specifications** *The apprentice shall properly perform the following:*	**Unit 3(3) Required Skills-manufacturing Fundamentals – Operate tools and equipment safely);** 6(17) Document equipment use &/or operational problems; 9(3) Industrial Equipment – Basic – Maintain schedules, communication, and documentation		
01	Acquire the production schedule(s) for the piece(s) of equipment to be			
	operated by the apprentice			
02	Interpret the production schedule accurately			
03	Follows standard work instructions properly			
04	Demonstrate comprehension of production capacity for machine(s)			
B.	**Operates equipment safely and efficiently** *The apprentice shall properly perform the following:*	**5(9) Production Pathway- Manufacturing Processes – Operate Equipment** - Operate equipment safely in the manner required for the job task; 6(9) Machining – Operate Machining equipment-Monitor equipment for correct operation while operating		
01	Develop and explain plan to achieve desired production expectation			
02	Monitor rate v. schedule (planned v. actual volume)			
03	Explain the relationship between equipment cycle times, quality and safe work pace			
C.	**Monitor and inspect products and processes** *The apprentice shall properly perform the following:*	3**(4) Manufacturing Fundamentals-Practice Quality Assurance principles**- Monitor materials, processes, equipment, tools, and products throughout the production process for safety and quality specifications; 4(8) Production Assembly and Packaging – Inspect final assembled product; 5(8) Inspect piece/product; 7(12) Welding: Assist to inspect, measure, and/or test completed metal pieces		
01	Identify and explain individual role in achieving product specifications			
02	Follow inspection guidelines established			

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	by quality department			
03	Adapts to process changes including cycle times, set-ups and tooling			
D.	**Monitor and adjust equipment during operations as needed** *The apprentice shall properly perform the following:*	**6(10) Machining – Monitor machining product & process specifications**- Adjust the process for quality and/or productivity as needed 7(10) Welding – Verify settings for required processes, adjust equipment to correct for problems		
01	Interpret and explain steps needed to achieve planned volume for quality and yield			

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Competency 5:

Measure and Inspect Work Using Mechanical Tools and Testing Equipment

IMT Duties and Tasks		YA Manufacturing Competencies	YA Credit Awarded	RA Credit Awarded
A.	**Measure and visually inspect materials, products or parts, and finished goods accurately in accordance with job specifications** *Apprentices must properly select and properly use the most appropriate item in each of the following categories:*	3(2) Manufacturing Fundamentals-Measure using various instruments-Consider the degree of precision required by the part feature Choose correct measuring instrument for task 9(11)Maintenance, Installation and Repair Pathway – Industrial Equipment-assist with basic equipment problem identification and diagnosis		
01	Hand tools	6(14) Production pathway – Machining – Use hand tools (detailed list)		
02	Mechanical tools			
03	Hard gauges			
04	Electronic gauges			
05	Measuring devices	7(3,9) Welding – Demonstrate the proper use of and interpretation of measuring devices to determine size, length, angle, and distance		
06	Automated testing equipment	9(11) Industrial Equipment-Basic assist with basic equipment problem identification and diagnosis - Assist the worksite professional to take appropriate readings using meters and testing equipment …		
07	Manual testing equipment	9(11) Describe the purpose, function, and components of common diagnostic testing equipment		
	Apprentices must properly identify non-compliant stock in the following areas:			
08	Form			
09	Fit			
10	Function			
11	Finish			
B.	**Apply math to measuring and inspection of work** *Apprentices must be able to interpret, add, subtract, multiply and divide the following:*	**Unit 1: Required Skills-Apply academic knowledge- Math** - Add, subtract, multiply, and divide whole numbers, fractions, decimals and percents Calculate averages, ratios, proportions, and rates Convert decimals to fractions, fractions to percents and vice versa Measure and accurately report		

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		measurements of time, temperature, length, width, height, width, perimeter, area, volume, and weight Use appropriate formulas Convert measurements correctly (e.g., English (standard) to metric) Interpret meaning from data		
01	Whole numbers			
02	Decimals			
03	Fractions			
04	Weights			
05	Measures			
06	Conversions between English and metric systems			
07	Tolerance range	4(1) Production Pathway – Read technical drawings and work orders - Determine critical dimensions and tolerances		

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Competency 6:

Produce Quality Product

IMT Duties and Tasks		YA Manufacturing Competencies	YA Credit Awarded	RA Credit Awarded
A.	**Verifies product quality following quality work instructions** *Apprentices must properly perform the following:*	**Unit 3(4) Manufacturing Fundamentals – Practice quality assurance principles** 6(8) Machining –Perform start-up – Inspect piece/product; 7(12) Welding - Assist to inspect, measure, and/or test completed metal pieces; 8(1) Production Operations Management - Assist worksite professional to inspect raw materials against quality specifications 10(2) Industrial Equipment Advanced –Inspect, measure, or test completed metal pieces		
01	Explain the quality program(s) used by employer, including roles and responsibilities of the departments involved	8(16) Participate in quality improvement process - Use quality tools to map a production process, 8(16) Describe the impact of Total Quality Management (TQM) principles and ISO9000 certification in manufacturing Describe inspection and auditing procedures		
02	Explain the purpose, steps and expected results of the product inspection process, and the responsible parties	8(16) Identify methods of inspecting materials, processes, and final products Explain the purpose of documentation and record keeping for inspections Explain the purpose of a quality audit		
03	Explain the tools required to perform the inspection process	8(10) Use quality tools; Compare the 7 quality tools for purpose and best time to use 8(13) Describe different methods of destructive and non-destructive product testing		
04	Verify and prepare inspection and documentation procedures. Update and maintain as needed.	8(16) Describe inspection and auditing procedure		
05	Conduct dimensional, visual, and mechanical inspection according to employer documentation and procedures.	8(16) Assist worksite professional to perform periodic internal quality audit activities including testing of raw materials, of product at different production stages, and prior to final release		
06	Verify conformance to applicable procedure and other approved documents	8(16) Document the results of quality tests or audits		
07	Explain characteristics of a non-compliant part and the effects on	8(15) Take corrective action - Categorize defect types to		

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	overall quality, including cost and rework	determine root cause, Corrective actions are supported by data		
B.	**Report and document results using applicable procedures** *Apprentices must properly perform the following:*	**Unit 8(13) Production Operations Management Pathway Production Operations Management – Monitor operations for product and process quality**		
01	Properly record results of inspection	8(13) Document all quality monitoring activities		
02	Provide acceptance or rejection	8(15) Take corrective action to restore or maintain quality - Use quality tools		
03	Move compliant parts to next operation or shipment	8(15) Suggest continuous improvements to process, piece/product, and/or maintenance to improve production and/or reduce waste		
04	Tag parts that are non-conforming, if required	8(15) Determine appropriate action for sub-standard piece/product		
05	Identify root cause of non-conforming product	8(14) Assist to investigate root causes of product &/or process failure		
06	Recommend corrective action(s)	8(15) Take corrective action to restore or maintain quality		

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Competency 7:

Demonstrate Knowledge of Routine Equipment Maintenance

IMT Duties and Tasks		YA Manufacturing Competencies	YA Credit Awarded	RA Credit Awarded
A.	**Inspect equipment** *Apprentices must properly perform the following:*	**Unit 3(3) Required Skills – Manufacturing Fundamentals-Operate tools and equipment safely,** Monitor tool/equipment for safe operation while operating, Investigate and promptly reports abnormal tool/equipment conditions		
01	Ensure machine is properly guarded	3(3) Operates tool/equipment safely with guarding devices in the manner required for the job task		
02	Ensure work area is clean and safe	3(3) Inspect tool/equipment and work area for safety considerations		
03	Check water daily and adjust according to general equipment guidelines	3(3) Set up and prepare tool/equipment for safe operation- Lubrication and fluid level checks		
04	Check oil daily and adjust if necessary according to general equipment guidelines	3(3) Set up and prepare tool/equipment for safe operation- Lubrication and fluid level checks		
05	Check power daily and adjust if necessary according to general equipment guidelines	3(3) Set up and prepare tool/equipment for safe operation-Power supply		
06	Check air pressure daily and adjust if necessary according to general equipment guidelines	3(3) Set up and prepare tool/equipment for safe operation- Air and pressure supplies		
B.	**Demonstrate mechanical problem solving abilities** *Apprentices must properly perform the following:*	3(3) Explain how to recognize and address malfunctions for the tool/equipment you will operate		
01	Identify when a machine is not working properly via sight, sound, smell, and touch (vibrations) of machine or part	3(3) Describe how to recognize wear and tear on equipment components		
02	Identify cause(s), such as a part out of tolerance, jam, running out of stock, low fluid levels, etc., by following appropriate troubleshooting guide(s)	3(3) Explain how to recognize and address malfunctions for the tool/equipment you will operate		
03	Apply appropriate corrections, such as clearing jam, adding stock, and adding fluid	3(3) Perform any required preventative maintenance procedures		
C.	**Apply preventative maintenance practices effectively** *Apprentices must properly perform the following:*	**9(11) Maintenance and Repair Pathway-Industrial Equipment-Assist with basic equipment problem identification and diagnosis -**		
01	Use manufacturers service manual to identify proper service cycles and replacement parts	9(11) Locate the equipment reference materials and manuals		
02	Test safety equipment and features	9(11) Ensure that appropriate safety devices and personal protective equipment are in place prior to		

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		diagnosis Ensure that all labeling and Lock Out/Tag Out procedures are in place prior to diagnosis Follow all safety requirements and wears appropriate Personal Protective Equipment (PPE) as required		
03	Maintains records regarding machine repairs	9(11) Maintenance and Repair Pathway-Industrial Equipment-Assist with basic equipment problem identification and diagnosis - Review previous preventative maintenance and repair history records on the equipment under investigation		
04	Maintains records of machine servicing	9(11) Document testing and evaluation		
05	Explain the purpose of collecting maintenance data	9(12) Describe how diagrams schematics, equipment manuals, and equipment specifications are used to repair specific systems on equipment 9(13) Explain the purpose of documentation and record keeping for equipment qualification		
06	Predict life cycle of wear parts using maintenance data	9(12) Identify when to use preventive action and when to use corrective action		
D.	**Assist and communicate with maintenance personnel on equipment malfunctions** *Assist with basic equipment repair- Apprentices must properly perform the following:*	**Unit 5 (15) Production Pathway-Manufacturing Processes – Document equipment use and/or operational problems Unit 9: Maintenance, Installation, and Repair Pathway Industrial Equipment- Basic-Assist with basic equipment problem identification and diagnosis**		
01	Inform supervisor of equipment malfunctions	5(15) Verify all internal and external communication with appropriate parties in a timely manner 9(4) Industrial Equipment-Basic – Monitor equipment for correct operation - Report any noted deviations from expected performance		
02	Inform proper maintenance personnel of equipment malfunctions	5(15) List the parties that need to be involved of repair and maintenance issues 7(17) Production Welding – Document equipment use, PM, and/or operational problems - Communicate maintenance and repair needs clearly Use the correct reporting formats for communication		
03	Record equipment malfunctions in log book	5(15) Describe the importance of documenting communications 7(17) Document use, maintenance, and repair activities accurately Report back and document any maintenance and repair issues in a timely manner		

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Competency 8:

Demonstrate Knowledge of Inventory and Material Processes

IMT Duties and Tasks		YA Manufacturing Competencies	YA Credit Awarded	RA Credit Awarded
A.	**Demonstrate awareness of employer's process for materials management** *Apprentices must explain the employer's process for the following:*	**Unit 8(5): Production Operations Management Pathway Production Operations Management** Assist to develop inventory forecasts		
01	Raw material flow to completed product	8(1) Assist to purchase materials and supplies, Assist worksite professional to inspect raw materials against quality specifications		
02	Work order system	8(1) Track and maintain order and receipt schedules; Explain the importance of tracking and documentation for inventory control and production processing		
03	Concept of supply and demand	8(5) Determine most appropriate demand forecasting method		
04	Inventory documentation process	8(1) Explain the importance of tracking and documentation for inventory control and production processing		
05	Logistics related to raw materials	8(1) Assist worksite professional to inspect raw materials against quality specifications		
06	Customer materials	8(4) Distribute materials and products - Assist worksite professional to follow up with customer to ensure no customer complaints about the shipment or damaged goods		
07	Product bill of material	8(8) Assist to record and summarize financial data - Assist worksite professional to process financial information such as bills of lading, accounts receivable, and accounts payable records		
08	Material supplier roles and responsibilities	8(1) Assist to purchase materials and supplies, Describe the supplier qualification process		
B.	**Demonstrate awareness of employer's process flow** *Apprentices must properly explain the following:*	**Unit 8(3) Production Operations Management Pathway Manage Inventory Levels**		
01	Company inventory flow and responsible departments	8(3) Assist worksite professional to monitor master production schedule and inventory master file for ordering levels		
02	Routing	8(1) Assist to purchase materials and supplies - Describe how to read bills of lading and routing sheets		
03	Inventory turns	8(3) Check that cycle counts for raw and finished goods meet established standards Rotate raw materials and stock to minimize old and outdated inventor		
04	Just-in-time manufacturing concept	8(3) Manage Inventory levels - List methods of productivity measurement and just-in-time inventory control		
05	Material movement process (ex. forklift, crane, etc)	8(4) Distribute materials and products - Verify that most appropriate and cost-effective carrier or method is used to distribute product		

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Competency 9:

Demonstrate Continuous Improvement

IMT Duties and Tasks		YA Manufacturing Competencies	YA Credit Awarded	RA Credit Awarded
A.	**Demonstrate knowledge of business motives and strategies for continuous improvement** *Apprentices must properly explain and give examples of and challenges to the following:*	**Unit 8(16) Production Operations Management Pathway Production Operations Management –participate in a quality improvement process-** Explain why facilities become involved with improvement processes Define continuous improvement		
01	"Customer Satisfaction" from the customer and employer perspectives	8(16) Production Operations Management – Participate in quality improvement processes- assist worksite professional to evaluate customer feedback		
02	"Process Baseline"			
03	"Waste"	(related instruction) 1(9) Required Skills-Use Resources Wisely- Give examples of wasteful uses of resources (unnecessary waste and duplication) at the worksite		
04	"Added Value"			
05	"Improvement"	8(16) Participate in a quality improvement process-define continuous improvement		
06	"Organizational Empowerment"	1(5) Required Skills-Act professionally- Locate and explain written organizational policies, rules and procedures to help employees perform their jobs		
B.	**Participate in Continuous Improvement** *Apprentices must properly perform the following:*	**8(15) Production Operations Management-Take corrective action to restore of maintain quality**		
01	Identify and give examples of Lean Manufacturing tools (Ex. 5S, 6S, etc.)	3(4) Manufacturing Fundamentals practice quality assurance principles- Explain quality systems such as SPC, Six Sigma, TQM, ISO9000 8(12) Production Operations Management-Assist to analyze production processes for productivity- Compare and contrast advantages and disadvantages of different types of production principles such as Lean, Mass, Batch, Unit, Continuous, Kanban, Kaizan, etc.		
02	Actively participate in process improvement (Ex. Suggesting	8(15) Production Operations Management-Take corrective action		

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	improvements from production line; process improvement or self-directed work team, etc.)	to restore of maintain quality - Suggest continuous improvements to process, piece/product, and/or maintenance to improve production and/or reduce waste, correct the piece/product and/or process to meet quality standards and bring process back into control		
03	Report on the before-and-after differences to a process improvement and/or problem-solving project to management	8(15) Document corrective actions and their outcome		
04	Identifies potential defects	8(15) Apply problem solving steps to reported production issues; Know Pareto analysis to identify priorities for solving multiple sub-standard product problems		
C.	**Applies root cause analyst to continuous improvement of manufacturing work processes** *Apprentices must properly explain and give examples of the following:*	**UNIT 8 (14). Assist to investigate root causes of product and/or process failure -** participate on a (worksite) team investigation of product and/or process failure		
01	Root cause analysis	8(14) Assist to investigate root causes of product and/or process failure- List common categories of root cause classification such as materials, equipment, machine, environment, manpower, etc.		
02	Problem solving tools used by the employer to identify the root cause	8(14) Gather data as it pertains to the problem (magnitude, location, timing) Review all relevant data and quality monitoring tools Develop a detailed description of the problem or process failure Develop a timeline or sequence of events to identify potential contributory relationships Explore solution options Take corrective action		
D.	**Participates in cross-training opportunities** *Apprentices must properly perform the following:*	**8(12) Production Operations Management – Assist to analyze production processes for productivity** Identify trends in manufacturing		
01	Explain how cross training adds value to Customer Satisfaction, and give examples	8(12) Explain how staff training and safety requirements impact production processes		

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Competency 10:

Demonstrate Knowledge of Trends and the Current State of the Business

IMT Duties and Tasks		YA Manufacturing Competencies	YA Credit Awarded	RA Credit Awarded
A.	**Apply basic business terms to manufacturing related work processes** *Apprentices must properly explain and identify examples of the following, or equivalent terms used by the employer:*	**8(7) Production Operations Management Assist to develop a production plan for a customer order** (worksite OR simulated in related instruction)		
01	Competitive advantage	5(9) Manufacturing Processes- Describe advantages and limitations of automated production		
02	Global economy	(required related instruction) 1(3) Apply manufacturing industry knowledge- Describe how the global economy is impacting manufacturing		
03	Lean manufacturing	8(7) Define the following resource planning terms: lean manufacturing, just-in-time production, process flow, lead time, build to demand, kanban, work cell design, and push-pull systems		
04	Six sigma	3(4) Manufacturing Fundamentals- Practice Quality Assurance principles- Explain quality systems such as SPC, Six Sigma, TQM, ISO9000		
05	Department and plant goals (Key Performance Indicators)	8(16) Identify performance indicators that should be monitored		
06	Individual and/or team performance expectations	1(6) Required Skills 6. Cooperate with others in a team setting (both worksite and related instruction)		
07	Upstream			
08	Downstream			
09	Continuous improvement	8(16) Participate in quality improvement process-define continuous improvement		
10	Customer satisfaction	8(8) Production Operations Management-Assist to record and summarize financial data- Compare the objectives of lean manufacturing to cost containment and customer satisfaction		
11	Cost of repair and rework	8(8) Assist to summarize financial data- Estimate required resources including staff time, staff training, equipment time, equipment maintenance and repair costs…		
12	SWOT or related analysis			
13	Supply chain	8(1) Assist to purchase materials		

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		and supplies - Compare logistics and supply chain management 8(2) Identify elements of a supply chain 8(7) Explain supply chain management		
B.	**Explain and identify competition and potential opportunities** *Apprentices must explain and identify competition and potential opportunities in each of the following scopes:*	**8(5) Production Operations Management - Assist to develop inventory forecasts-** Evaluate internal/external, local/global environments for threats or opportunities (economic, geography, history, political, competition, regulatory, cultural, technological; Compare costs/benefits of utilizing local, national and/or international markets		
01	Internally			
02	Locally			
03	Regionally			
04	Nationally			
05	Globally			

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Appendix A: Manufacturing Youth Apprenticeship Required Skills

This appendix provides an overview of the Required Skills of the Manufacturing Youth Apprenticeship Program. A more detailed description of each of these required skills can be found in the full Manufacturing Program Guide and Appendices, located at the Youth Apprenticeship website: http://dwd.wisconsin.gov/youthapprenticeship/programs.htm#

Manufacturing Youth Apprenticeship

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REQUIRED SKILLS

Unit 1: Core Skills

1. Apply academic knowledge
2. Apply career knowledge
3. Apply manufacturing knowledge
4. Communicate effectively
5. Act professionally
6. Cooperate with others in a team setting
7. Think critically
8. Exhibit regulatory and ethical responsibilities
9. Use resources wisely
10. Use basic technology

Unit 2: Safety

1. Follow personal safety requirements
2. Maintain a safe work environment
3. Demonstrate professional role in an emergency

Unit 3: Manufacturing Fundamentals

1. Focus on customer needs
2. Measure using various instruments
3. Operate tools and equipment safely
4. Practice quality assurance principles

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PATHWAY UNITS

Unit 4: Production Pathway: Assembly & Packaging

1. Read technical drawings & work orders
2. Interpret assembly & packaging symbols & procedures
3. Identify set up for assembly
4. Select tools and materials
5. Perform safety checks
6. Perform assembly set up
7. Verify assembly set up
8. Perform assembly
9. Perform quality checks
10. Build packaging
11. Package product
12. Process packaging documents
13. Clean up
14. Monitor equipment for correct operation
15. Document equipment use &/or operational problems

Unit 5: Production Pathway: Manufacturing Processes

1. Read technical drawings & work orders
2. Interpret symbols & procedures
3. Identify set up
4. Select tools & materials
5. Perform safety checks
6. Assist to perform set up
7. Verify set up
8. Perform start up
9. Operate equipment

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10. Monitor product & process specifications
11. Process production documents
12. Shutdown process
13. Clean up
14. Monitor equipment for correct operation
15. Document equipment use &/or operational problems

Unit 6: Production Pathway: Machining

1. Read machining technical drawings & work orders
2. Interpret machining symbols & procedures
3. Identify set up
4. Select tools and materials
5. Perform safety checks
6. Assist to perform set up
7. Verify set up
8. Perform start up
9. Operate machining equipment
10. Monitor machining product and process specifications
11. Process production documents
12. Shutdown machining process
13. Clean up
14. Use hand tools
15. Use CNC equipment (W/S)
16. Monitor equipment for correct operation
17. Document equipment use &/or operational problems

Unit 7: Production Pathway: Welding

1. Read welding technical drawings & work orders

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2. Interpret welding symbols & procedures
3. Layout & plan work
4. Perform safety checks
5. Prepare base metal
6. Set up to fabricate base metal
7. Fabricate base metal
8. Thermally/chemically cut metal
9. Tack work pieces
10. Weld metal
11. Monitor product & process
12. Assist to inspect, measure, &/or test completed metal pieces
13. Process production documents
14. Clean up
15. Monitor equipment for correct operation
16. Perform routine preventive maintenance (PM)
17. Document equipment use, PM, &/or operational problems

Unit 8: Production Operations Management Pathway: Production Operations Management

Inventory

1. Assist to purchase materials & supplies
2. Receive inventory
3. Manage inventory levels
4. Distribute materials & products
5. Assist to develop inventory forecasts (W/S)
6. Maintain inventory records

Resources

7. Assist to develop a production plan for customer order (W/S)
8. Assist to record & summarize financial data

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9. Assist to coordinate work schedules & duty assignments

Quality Management

10. Use quality tools

11. Calibrate tools & equipment (W/S)

12. Assist to analyze production process for productivity (W/S)

13. Monitor operations for product & process quality

14. Assist to investigate root causes of product &/or process failure

15. Take corrective action to restore or maintain quality

16. Participate in quality improvement processes

Units 9-10: Maintenance, Installation, & Repair Pathway: Industrial Equipment

Basic Industrial Equipment Unit

1. Read technical drawings & work orders
2. Interpret equipment symbols & procedures
3. Maintain schedules, communication, & documentation
4. Monitor equipment for correct operation
5. Identify maintenance requirements
6. Layout & plan work
7. Perform safety checks
8. Use hand tools
9. Perform preventive maintenance (PM)
10. Perform lubrication procedures
11. Assist with basic equipment problem identification & diagnosis
12. Assist with basic equipment repair
13. Assist to re-qualify equipment

Advanced Industrial Equipment Unit

1. Calibrate tools and instruments (W/S)
2. Set up & fabricate metal

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3. Mount a bearing
4. Install mechanical fasteners
5. Assist with electrical circuit problem identification & diagnosis
6. Assist with motor control problem identification & diagnosis
7. Assist with hydraulic &/or pneumatic problem identification & diagnosis
8. Maintain and repair mechanical drive system components
9. Maintain and repair electrical control system components
10. Maintain and repair hydraulic &/or pneumatic system components
11. Assist to install & qualify equipment

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