



**Manufacturing Career Cluster
Production Pathway
Knowledge and Skill Statements**

The Pathway Knowledge and Skills Chart describes what all/most learners/workers need to know and be able to do to demonstrate competence within a career pathway. Following the pathway description, there are four sets of knowledge and skill expectations:

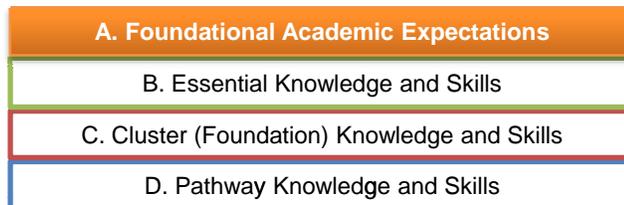


PATHWAY DESCRIPTION

Production Pathway: People with careers in production work on the shop floor making parts or assembling them. They work with machines, making or assembling electronic parts, constructing or assembling modular housing, performing welding jobs, or printing various materials.

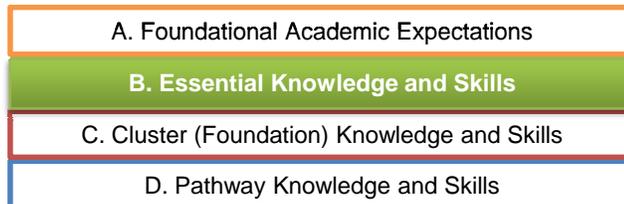
A. FOUNDATIONAL ACADEMIC EXPECTATIONS

All secondary students should meet their state’s academic standards. All Essential Cluster and Pathway Knowledge and Skills are predicated on the assumption that foundational academic skills have been attained. Some knowledge and skill statements will further define critical linkages and applications of academics in the cluster and/or pathway.



B. ESSENTIAL KNOWLEDGE AND SKILLS

The following Essential Knowledge and Skill statements apply to careers in all clusters and pathways. Persons preparing for careers in this pathway should be able to demonstrate these skills in the context of this cluster and pathway.



Essential Topic ESS01	ACADEMIC FOUNDATIONS: <i>Achieve additional academic knowledge and skills required to pursue the full range of career and postsecondary education opportunities within a career cluster.</i>
ESS01.01	Complete required training, education, and certification to prepare for employment in a particular career field.



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- ESS01.01.01 Identify training, education and certification requirements for occupational choice.
- ESS01.01.02 Participate in career-related training and/or degree programs.
- ESS01.01.03 Pass certification tests to qualify for licensure and/or certification in chosen occupational area.

ESS01.02 Demonstrate language arts knowledge and skills required to pursue the full range of post-secondary education and career opportunities.

- ESS01.02.01 Model behaviors that demonstrate active listening.
- ESS01.02.02 Adapt language for audience, purpose, situation. (i.e. diction/structure, style).
- ESS01.02.03 Organize oral and written information.
- ESS01.02.04 Compose focused copy for a variety of written documents such as agendas, audio-visuals, bibliographies, drafts, forms/documents, notes, oral presentations, reports, and technical terminology.
- ESS01.02.05 Edit copy to create focused written documents such as agendas, audio-visuals, bibliographies, drafts, forms/documents, notes, oral presentations, reports, and technical terminology.
- ESS01.02.06 Comprehend key elements of oral and written information such as cause/effect, comparisons/contrasts, conclusions, context, purpose, charts/tables/graphs, evaluation/critiques, mood, persuasive text, sequence, summaries, and technical subject matter.
- ESS01.02.07 Evaluate oral and written information for accuracy, adequacy/sufficiency, appropriateness, clarity, conclusions/solutions, fact/opinion, propaganda, relevancy, validity, and relationship of ideas.
- ESS01.02.08 Identify assumptions, purpose, outcomes/solutions, and propaganda techniques.
- ESS01.02.09 Predict potential outcomes and/or solutions based on oral and written information regarding trends.
- ESS01.02.10 Present formal and informal speeches including discussion, information requests, interpretation, and persuasive arguments.

ESS01.03 Demonstrate mathematics knowledge and skills required to pursue the full range of post-secondary education and career opportunities.

- ESS01.03.01 Identify whole numbers, decimals, and fractions.
- ESS01.03.02 Demonstrate knowledge of basic arithmetic operations such as addition, subtraction, multiplication, and division.
- ESS01.03.03 Demonstrate use of relational expressions such as equal to, not equal, greater than, less than, etc.
- ESS01.03.04 Apply data and measurements to solve a problem.
- ESS01.03.05 Analyze Mathematical problem statements for missing and/or irrelevant data.
- ESS01.03.06 Construct charts/tables/graphs from functions and data.
- ESS01.03.07 Analyze data when interpreting operational documents.



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ESS01.04 Demonstrate science knowledge and skills required to pursue the full range of post-secondary and career education opportunities.

- ESS01.04.01 Evaluate scientific constructs including conclusions, conflicting data, controls, data, inferences, limitations, questions, sources of errors, and variables.
- ESS01.04.02 Apply scientific methods in qualitative and quantitative analysis, data gathering, direct and indirect observation, predictions, and problem identification.

Essential Topic COMMUNICATIONS: *Use oral and written communication skills in creating, expressing and interpreting information and ideas including technical terminology and information.*
ESS02

ESS02.01 Select and employ appropriate reading and communication strategies to learn and use technical concepts and vocabulary in practice.

- ESS02.01.01 Determine the most appropriate reading strategy for identifying the overarching purpose of a text (i.e. skimming, reading for detail, reading for meaning or critical analysis).
- ESS02.01.02 Demonstrate use of content, technical concepts and vocabulary when analyzing information and following directions.
- ESS02.01.03 Select the reading strategy or strategies needed to fully comprehend the content within a written document (i.e., skimming, reading for detail, reading for meaning or critical analysis).
- ESS02.01.04 Interpret information, data, and observations to apply information learned from reading to actual practice.
- ESS02.01.05 Transcribe information, data, and observations to apply information learned from reading to actual practice.
- ESS02.01.06 Communicate information, data, and observations to apply information learned from reading to actual practice.

ESS02.02 Demonstrate use of the concepts, strategies, and systems for obtaining and conveying ideas and information to enhance communication in the workplace.

- ESS02.02.01 Employ verbal skills when obtaining and conveying information.
- ESS02.02.02 Record information needed to present a report on a given topic or problem.
- ESS02.02.03 Write internal and external business correspondence that conveys and/or obtains information effectively.
- ESS02.02.04 Communicate with other employees to clarify workplace objectives.
- ESS02.02.05 Communicate effectively with customers and employees to foster positive relationships.

ESS02.03 Locate, organize and reference written information from various sources to communicate with co-workers and clients/participants.



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ESS02.03.01 Locate written information used to communicate with co-workers and customers.

ESS02.03.02 Organize information to use in written and oral communications.

ESS02.03.03 Reference the sources of information.

ESS02.04 Evaluate and use information resources to accomplish specific occupational tasks.

ESS02.04.01 Use informational texts, Internet web sites, and/or technical materials to review and apply information sources for occupational tasks.

ESS02.04.02 Evaluate the reliability of information from informational texts, Internet Web sites, and/or technical materials and resources.

ESS02.05 Use correct grammar, punctuation and terminology to write and edit documents.

ESS02.05.01 Compose multi-paragraph documents clearly, succinctly, and accurately.

ESS02.05.02 Use descriptions of audience and purpose when preparing and editing written documents.

ESS02.05.03 Use correct grammar, spelling, punctuation, and capitalization when preparing written documents.

ESS02.06 Develop and deliver formal and informal presentations using appropriate media to engage and inform audiences.

ESS02.06.01 Prepare oral presentations to provide information for specific purposes and audiences.

ESS02.06.02 Identify support materials that will enhance an oral presentation.

ESS02.06.03 Prepare support materials that will enhance an oral presentation.

ESS02.06.04 Deliver an oral presentation that sustains listeners' attention and interest.

ESS02.06.05 Align presentation strategies to the intended audience.

ESS02.06.06 Implement multi-media strategies for presentations.

ESS02.07 Interpret verbal and nonverbal cues/behaviors to enhance communication with co-workers and clients/participants.

ESS02.07.01 Interpret verbal behaviors when communicating with clients and co-workers.

ESS02.07.02 Interpret nonverbal behaviors when communicating with clients and co-workers.

ESS02.08 Apply active listening skills to obtain and clarify information.

ESS02.08.01 Interpret a given verbal message/information.

ESS02.08.02 Respond with restatement and clarification techniques to clarify information.

ESS02.09 Develop and interpret tables, charts, and figures to support written and oral communications.

ESS02.09.01 Create tables, charts, and figures to support written and oral communications.

ESS02.09.02 Interpret tables, charts, and figures used to support written and oral communication.



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ESS02.10	Listen to and speak with diverse individuals to enhance communication skills.
ESS02.10.01	Apply factors and strategies for communicating with a diverse workforce.
ESS02.10.02	Demonstrate ability to communicate and resolve conflicts within a diverse workforce.
ESS02.11	Exhibit public relations skills to increase internal and external customer/client satisfaction.
ESS02.11.01	Communicate effectively when developing positive customer/client relationships.
Essential Topic ESS03	PROBLEM-SOLVING AND CRITICAL THINKING: <i>Solve problems using critical thinking skills (analyze, synthesize, and evaluate) independently and in teams. Solve problems using creativity and innovation.</i>
ESS03.01	Employ critical thinking skills independently and in teams to solve problems and make decisions (e.g., analyze, synthesize and evaluate).
ESS03.01.01	Identify common tasks that require employees to use problem-solving skills.
ESS03.01.02	Analyze elements of a problem to develop creative solutions.
ESS03.01.03	Describe the value of using problem-solving and critical thinking skills to improve a situation or process.
ESS03.01.04	Create ideas, proposals, and solutions to problems.
ESS03.01.05	Evaluate ideas, proposals, and solutions to problems.
ESS03.01.06	Use structured problem-solving methods when developing proposals and solutions.
ESS03.01.07	Generate new and creative ideas to solve problems by brainstorming possible solutions.
ESS03.01.08	Critically analyze information to determine value to the problem-solving task.
ESS03.01.09	Guide individuals through the process of recognizing concerns and making informed decisions.
ESS03.01.10	Identify alternatives using a variety of problem-solving and critical thinking skills.
ESS03.01.11	Evaluate alternatives using a variety of problem-solving and critical thinking skills.
ESS03.02	Employ critical thinking and interpersonal skills to resolve conflicts with staff and/or customers.
ESS03.02.01	Analyze situations and behaviors that affect conflict management.
ESS03.02.02	Determine best options/outcomes for conflict resolution using critical thinking skills.
ESS03.02.03	Identify with others' feelings, needs, and concerns.
ESS03.02.04	Implement stress management techniques.
ESS03.02.05	Resolve conflicts with/for customers using conflict resolution skills.



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ESS03.02.06 Implement conflict resolution skills to address staff issues/problems.
ESS03.03 Identify, write and monitor workplace performance goals to guide progress in assigned areas of responsibility and accountability.

ESS03.03.01 Write realistic performance goals, objectives and action plans.
ESS03.03.02 Monitor performance goals and adjust as necessary.
ESS03.03.03 Recognize goal achievement using appropriate rewards in the workplace.

ESS03.03.04 Communicate goal achievement with managers and co-workers.
ESS03.04 Conduct technical research to gather information necessary for decision-making.

ESS03.04.01 Align the information gathered to the needs of the audience.
ESS03.04.02 Gather technical information and data using a variety of resources.
ESS03.04.03 Analyze information and data for value to the research objectives.
ESS03.04.04 Evaluate information and data to determine value to research objectives.

**Essential Topic
ESS04 INFORMATION TECHNOLOGY APPLICATIONS: *Use information technology tools specific to the career cluster to access, manage, integrate, and create information.***

ESS04.01 Use Personal Information Management (PIM) applications to increase workplace efficiency.

ESS04.01.01 Manage personal schedules and contact information.
ESS04.01.02 Create memos and notes.

ESS04.02 Employ technological tools to expedite workflow.

ESS04.02.01 Use information technology tools to manage and perform work responsibilities.

ESS04.03 Operate electronic mail applications to communicate within a workplace.

ESS04.03.01 Use email to share files and documents.
ESS04.03.02 Identify the functions and purpose of email systems.
ESS04.03.03 Use email to communicate within and across organizations.

ESS04.04 Operate Internet applications to perform workplace tasks.

ESS04.04.01 Access and navigate Internet (e.g., use a web browser).
ESS04.04.02 Search for information and resources.
ESS04.04.03 Evaluate Internet resources for reliability and validity.

ESS04.05 Operate writing and publishing applications to prepare business communications.

ESS04.05.01 Prepare simple documents and other business communications.
ESS04.05.02 Prepare reports and other business communications by integrating graphics and other non-text elements.
ESS04.05.03 Prepare complex multi-media publications.

ESS04.06 Operate presentation applications to prepare presentations.

ESS04.06.01 Prepare presentations for training, sales and information sharing.



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ESS04.06.02	Deliver presentations with supporting materials.
ESS04.07	Employ spreadsheet applications to organize and manipulate data.
ESS04.07.01	Create a spreadsheet.
ESS04.07.02	Perform calculations and analyses on data using a spreadsheet.
ESS04.08	Employ database applications to manage data.
ESS04.08.01	Manipulate data elements.
ESS04.08.02	Manage interrelated data elements.
ESS04.08.03	Analyze interrelated data elements.
ESS04.08.04	Generate reports showing interrelated data elements.
ESS04.09	Employ collaborative/groupware applications to facilitate group work.
ESS04.09.01	Facilitate group work through management of shared schedule and contact information.
ESS04.09.02	Facilitate group work through management of shared files and online information.
ESS04.09.03	Facilitate group work through instant messaging or virtual meetings.
ESS04.10	Employ computer operations applications to manage work tasks.
ESS04.10.01	Manage computer operations.
ESS04.10.02	Manage file storage.
ESS04.10.03	Compress or alter files.
ESS04.11	Use computer-based equipment (containing embedded computers or processors) to control devices.
ESS04.11.01	Operate computer driven equipment and machines.
ESS04.11.02	Use installation and operation manuals.
ESS04.11.03	Troubleshoot computer driven equipment and machines.
ESS04.11.04	Access support as needed to maintain operation of computer driven equipment and machines.

**Essential Topic
ESS05**

SYSTEMS: *Understand roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. Identify how key organizational systems affect organizational performance and the quality of products and services. Understand global context of industries and careers.*

ESS05.01	Describe the nature and types of business organizations to build an understanding of the scope of organizations.
ESS05.01.01	List the types and functions of businesses.
ESS05.01.02	Describe the types and functions of businesses.
ESS05.01.03	Explain the functions and interactions of common departments within a business.
ESS05.02	Implement quality control systems and practices to ensure quality products and services.



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ESS05.02.01 Describe quality control standards and practices common to the workplace.

**Essential Topic
ESS06**

SAFETY, HEALTH AND ENVIRONMENTAL: *Understand the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance. Follow organizational policies and procedures and contribute to continuous improvement in performance and compliance.*

ESS06.01 Implement personal and jobsite safety rules and regulations to maintain safe and healthful working conditions and environments.

- ESS06.01.01 Assess workplace conditions with regard to safety and health.
- ESS06.01.02 Align safety issues with appropriate safety standards to ensure a safe workplace/jobsite.
- ESS06.01.03 Identify safety hazards common to workplaces.
- ESS06.01.04 Identify safety precautions to maintain a safe worksite.
- ESS06.01.05 Select appropriate personal protective equipment as needed for a safe workplace/jobsite.
- ESS06.01.06 Inspect personal protective equipment commonly used for selected career pathway.
- ESS06.01.07 Use personal protective equipment according to manufacturer rules and regulations.
- ESS06.01.08 Employ a safety hierarchy and communication system within the workplace/jobsite.
- ESS06.01.09 Implement safety precautions to maintain a safe worksite.

ESS06.02 Complete work tasks in accordance with employee rights and responsibilities and employers obligations to maintain workplace safety and health.

- ESS06.02.01 Identify rules and laws designed to promote safety and health in the workplace.
- ESS06.02.02 State the rationale of rules and laws designed to promote safety and health.

ESS06.03 Employ emergency procedures as necessary to provide aid in workplace accidents.

- ESS06.03.01 Use knowledge of First Aid procedures as necessary.
- ESS06.03.02 Use knowledge of CPR procedures as necessary.
- ESS06.03.03 Use safety equipment as necessary.

ESS06.04 Employ knowledge of response techniques to create a disaster and/or emergency response plan.

- ESS06.04.01 Complete an assessment of an emergency and/or disaster situation.
- ESS06.04.02 Create an emergency and/or disaster plan.



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**Essential Topic
ESS07**

LEADERSHIP AND TEAMWORK: *Use leadership and teamwork skills in collaborating with others to accomplish organizational goals and objectives.*

- ESS07.01 Employ leadership skills to accomplish organizational goals and objectives.**
- ESS07.01.01 Analyze the various roles of leaders within organizations (e.g. contribute ideas; share in building an organization; act as role models to employees by adhering to company policies, procedures, and standards; promote the organization's vision; and mentor others).
 - ESS07.01.02 Exhibit traits such as empowerment, risk, communication, focusing on results, decision-making, problem solution, and investment in individuals when leading a group in solving a problem.
 - ESS07.01.03 Exhibit traits such as compassion, service, listening, coaching, developing others, team development, and understanding and appreciating others when acting as a manager of others in the workplace.
 - ESS07.01.04 Exhibit traits such as enthusiasm, creativity, conviction, mission, courage, concept, focus, principle-centered living, and change when interacting with others in general.
 - ESS07.01.05 Consider issues related to self, team, community, diversity, environment, and global awareness when leading others.
 - ESS07.01.06 Exhibit traits such as innovation, intuition, adaptation, life-long learning and coachability to develop leadership potential over time.
 - ESS07.01.07 Analyze leadership in relation to trust, positive attitude, integrity, and willingness to accept key responsibilities in a work situation.
 - ESS07.01.08 Describe observations of outstanding leaders using effective management styles.
 - ESS07.01.09 Participate in civic and community leadership and teamwork opportunities to enhance skills.
- ESS07.02 Employ organizational and staff development skills to foster positive working relationships and accomplish organizational goals.**
- ESS07.02.01 Implement organizational skills when facilitating others' work efforts.
 - ESS07.02.02 Explain how to manage a staff that satisfies work demands while adhering to budget constraints.
 - ESS07.02.03 Describe how staff growth and development to increase productivity and employee satisfaction.
 - ESS07.02.04 Organize team involvement within a group environment.
 - ESS07.02.05 Work with others to develop and gain commitment to team goals.
 - ESS07.02.06 Distribute responsibility and work load fairly.
 - ESS07.02.07 Model leadership and teamwork qualities to aid in employee morale.
 - ESS07.02.08 Identify best practices for successful team functioning.
 - ESS07.02.09 Explain best practices for successful team functioning.



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- ESS07.03 Employ teamwork skills to achieve collective goals and use team members' talents effectively.**
- ESS07.03.01 Work with others to achieve objectives in a timely manner.
 - ESS07.03.02 Promote the full involvement and use of team members' individual talents and skills.
 - ESS07.03.03 Employ conflict-management skills to facilitate solutions.
 - ESS07.03.04 Demonstrate teamwork skills through working cooperatively with co-workers, supervisory staff, and others, both in and out of the organization, to achieve particular tasks.
 - ESS07.03.05 Demonstrate teamwork processes that provide team building, consensus, continuous improvement, respect for the opinions of others, cooperation, adaptability, and conflict resolution.
 - ESS07.03.06 Develop plans to improve team performance.
 - ESS07.03.07 Demonstrate commitment to and a positive attitude toward team goals.
 - ESS07.03.08 Take responsibility for shared group and individual work tasks.
 - ESS07.03.09 Assist team members in completing their work.
 - ESS07.03.10 Adapt effectively to changes in projects and work activities.
 - ESS07.03.11 Negotiate effectively to arrive at decisions.
- ESS07.04 Establish and maintain effective working relationships with all levels of personnel and other departments in order to accomplish objectives and tasks.**
- ESS07.04.01 Build effective working relationships using interpersonal skills.
 - ESS07.04.02 Use positive interpersonal skills to work cooperatively with co-workers representing different cultures, genders and backgrounds.
 - ESS07.04.03 Manage personal skills to accomplish assignments.
 - ESS07.04.04 Treat people with respect.
 - ESS07.04.05 Provide constructive praise and criticism.
 - ESS07.04.06 Demonstrate sensitivity to and value for diversity.
 - ESS07.04.07 Manage stress and control emotions.
- ESS07.05 Conduct and participate in meetings to accomplish work tasks.**
- ESS07.05.01 Develop meeting goals, objectives and agenda.
 - ESS07.05.02 Assign responsibilities for preparing materials and leading discussions.
 - ESS07.05.03 Prepare materials for leading discussion.
 - ESS07.05.04 Assemble and distribute meeting materials.
 - ESS07.05.05 Conduct meeting to achieve objectives within scheduled time.
 - ESS07.05.06 Demonstrate effective communication skills in meetings.
 - ESS07.05.07 Produce meeting minutes including decisions and next steps.
 - ESS07.05.08 Use parliamentary procedure, as needed, to conduct meetings.
- ESS07.06 Employ mentoring skills to inspire and teach others.**
- ESS07.06.01 Use motivational techniques to enhance performance in others.
 - ESS07.06.02 Provide guidance to enhance performance in others.

Essential Topic ETHICS AND LEGAL RESPONSIBILITIES: *Know and understand the importance of professional ethics and legal responsibilities.*
ESS08



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- ESS08.01 Apply ethical reasoning to a variety of workplace situations in order to make ethical decisions.**
- ESS08.01.01 Evaluate alternative responses to workplace situations based on legal responsibilities and employer policies.
 - ESS08.01.02 Evaluate alternative responses to workplace situations based on personal or professional ethical responsibilities.
 - ESS08.01.03 Identify personal and long-term workplace consequences of unethical or illegal behaviors.
 - ESS08.01.04 Explain personal and long-term workplace consequences of unethical or illegal behaviors.
 - ESS08.01.05 Determine the most appropriate response to workplace situations based on legal and ethical considerations.
 - ESS08.01.06 Explain the most appropriate response to workplace situations based on legal and ethical considerations.
- ESS08.02 Interpret and explain written organizational policies and procedures to help employees perform their jobs according to employer rules and expectations.**
- ESS08.02.01 Locate information on organizational policies in handbooks and manuals.
 - ESS08.02.02 Discuss how specific organizational policies and procedures influence a specific work situation.

**Essential Topic
ESS09 EMPLOYABILITY AND CAREER DEVELOPMENT: *Know and understand the importance of employability skills. Explore, plan, and effectively manage careers. Know and understand the importance of entrepreneurship skills.***

- ESS09.01 Identify and demonstrate positive work behaviors and personal qualities needed to be employable.**
- ESS09.01.01 Demonstrate self-discipline, self-worth, positive attitude, and integrity in a work situation.
 - ESS09.01.02 Demonstrate flexibility and willingness to learn new knowledge and skills.
 - ESS09.01.03 Exhibit commitment to the organization.
 - ESS09.01.04 Identify how work varies with regard to site, from indoor confined spaces to outdoor areas, including aerial space and a variety of climatic and physical conditions.
 - ESS09.01.05 Apply communication strategies when adapting to a culturally diverse environment.
 - ESS09.01.06 Manage resources in relation to the position (i.e. budget, supplies, computer, etc).
 - ESS09.01.07 Identify positive work-qualities typically desired in each of the career cluster's pathways.
 - ESS09.01.08 Manage work roles and responsibilities to balance them with other life roles and responsibilities.



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- ESS09.02 Develop a personal career plan to meet career goals and objectives.**
- ESS09.02.01 Develop career goals and objectives as part of a plan for future career direction.
 - ESS09.02.02 Develop strategies to reach career objectives.
- ESS09.03 Demonstrate skills related to seeking and applying for employment to find and obtain a desired job.**
- ESS09.03.01 Use multiple resources to locate job opportunities.
 - ESS09.03.02 Prepare a résumé.
 - ESS09.03.03 Prepare a letter of application.
 - ESS09.03.04 Complete an employment application.
 - ESS09.03.05 Interview for employment.
 - ESS09.03.06 List the standards and qualifications that must be met in order to enter a given industry.
 - ESS09.03.07 Employ critical thinking and decision-making skills to exhibit qualifications to a potential employer.
- ESS09.04 Maintain a career portfolio to document knowledge, skills and experience in a career field.**
- ESS09.04.01 Select educational and work history highlights to include in a career portfolio.
 - ESS09.04.02 Produce a record of work experiences, licenses, certifications and products.
 - ESS09.04.03 Organize electronic or physical portfolio for use in demonstrating knowledge, skills and experiences.
- ESS09.05 Demonstrate skills in evaluating and comparing employment opportunities in order to accept employment positions that match career goals.**
- ESS09.05.01 Compare employment opportunities to individual needs and career plan objectives.
 - ESS09.05.02 Evaluate employment opportunities based upon individual needs and career plan objectives.
 - ESS09.05.03 Demonstrate appropriate methods for accepting or rejecting employment offers.
- ESS09.06 Identify and exhibit traits for retaining employment to maintain employment once secured.**
- ESS09.06.01 Model behaviors that demonstrate reliability and dependability.
 - ESS09.06.02 Maintain appropriate dress and behavior for the job to contribute to a safe and effective workplace/jobsite.
 - ESS09.06.03 Complete required employment forms and documentation such as I-9 form, work visa, W-4 and licensures to meet employment requirements.
 - ESS09.06.04 Summarize key activities necessary to retain a job in the industry.
 - ESS09.06.05 Identify positive work behaviors and personal qualities necessary to retain employment.



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ESS09.07 Identify and explore career opportunities in one or more career pathways to build an understanding of the opportunities available in the cluster.

- ESS09.07.01 Locate and identify career opportunities that appeal to personal career goals.
- ESS09.07.02 Match personal interest and aptitudes to selected careers.

ESS09.08 Recognize and act upon requirements for career advancement to plan for continuing education and training.

- ESS09.08.01 Identify opportunities for career advancement.
- ESS09.08.02 Pursue education and training opportunities to acquire skills necessary for career advancement.
- ESS09.08.03 Examine the organization and structure of various segments of the industry to prepare for career advancement.
- ESS09.08.04 Research local and regional labor (workforce) market and job growth information to project potential for advancement.
- ESS09.08.05 Manage employment relations to make career advancements.

ESS09.09 Continue professional development to keep current on relevant trends and information within the industry.

- ESS09.09.01 Use self assessment, organizational priorities, journals, Internet sites, professional associations, peers and other resources to develop goals that address training, education and self-improvement issues.
- ESS09.09.02 Read trade magazines and journals, manufacturers' catalogues, industry publications and Internet sites to keep current on industry trends.
- ESS09.09.03 Participate in relevant conferences, workshops, mentoring activities and in-service training to stay current with recent changes in the field.

ESS09.10 Examine licensing, certification and credentialing requirements at the national, state and local levels to maintain compliance with industry requirements.

- ESS09.10.01 Examine continuing education requirements related to licensing, certification, and credentialing requirements at the local, state and national levels for chosen occupation.
- ESS09.10.02 Examine the procedures and paperwork involved in maintaining and updating licensure, certification and credentials for chosen occupation.
- ESS09.10.03 Align ongoing licensing, certification and credentialing requirements to career plans and goals.

ESS09.11 Examine employment opportunities in entrepreneurship to consider entrepreneurship as an option for career planning.

- ESS09.11.01 Describe the opportunities for entrepreneurship in a given industry.

**Essential Topic
ESS10**

TECHNICAL SKILLS: *Use of technical knowledge and skills required to pursue careers in all career cluster, including knowledge of design, operation, and maintenance of technological systems critical to the career cluster.*



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ESS10.01 Employ information management techniques and strategies in the workplace to assist in decision-making.

- ESS10.01.01 Use information literacy skills when accessing, evaluating and disseminating information.
- ESS10.01.02 Describe the nature and scope of information management.
- ESS10.01.03 Maintain records to facilitate ongoing business operations.

ESS10.02 Employ planning and time management skills and tools to enhance results and complete work tasks.

- ESS10.02.01 Develop goals and objectives.
- ESS10.02.02 Prioritize tasks to be completed.
- ESS10.02.03 Develop timelines using time management knowledge and skills.
- ESS10.02.04 Use project-management skills to improve workflow and minimize costs.

C. CLUSTER (FOUNDATION) KNOWLEDGE AND SKILLS

The following Cluster (Foundation) Knowledge and Skill statements apply to all careers in the Manufacturing Cluster. Persons preparing for careers in the Manufacturing Cluster should be able to demonstrate these skills in addition to those found on the Essential Knowledge and Skills Chart.



Cluster Topic MNC01	<p>ACADEMIC FOUNDATIONS: <i>Achieve additional academic knowledge and skills required to pursue the full range of career and postsecondary education opportunities within a career cluster.</i></p> <p><i>No additional statements in this topic beyond those found in the Essential Knowledge and Skills Chart.</i></p>
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Cluster Topic MNC02	<p>COMMUNICATIONS: <i>Use oral and written communication skills in creating, expressing and interpreting information and ideas including technical terminology and information.</i></p> <p><i>No additional statements in this topic beyond those found in the Essential Knowledge and Skills Chart.</i></p>
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Cluster Topic MNC03	<p>PROBLEM-SOLVING AND CRITICAL THINKING: <i>Solve problems using critical thinking skills (analyze, synthesize, and evaluate) independently and in teams. Solve problems using creativity and innovation.</i></p> <p><i>No additional statements in this topic beyond those found in the Essential Knowledge and Skills Chart.</i></p>
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**Manufacturing Career Cluster
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**Cluster Topic
MNC04**

INFORMATION TECHNOLOGY APPLICATIONS: *Use information technology tools specific to the career cluster to access, manage, integrate, and create information.*

No additional statements in this topic beyond those found in the Essential Knowledge and Skills Chart.

**Cluster Topic
MNC05**

SYSTEMS: *Understand roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. Identify how key organizational systems affect organizational performance and the quality of products and services. Understand global context of industries and careers.*

MNC05.01

Summarize and explain how manufacturing businesses operate to demonstrate an understanding of key functions within organizations in the industry.

MNC05.01.01

Sample Indicators

Identify the role and major functions of manufacturing businesses.

Explain the importance of manufacturing to society.

Identify the mission, major internal functions and structure of manufacturing businesses.
Identify the customers, suppliers, and stakeholders of manufacturing businesses, their roles, and how they relate.

Explain the major competitive challenges faced by the manufacturing businesses.

Identify and describe types of manufacturing systems.

Analyze current trends in manufacturing systems.

MNC05.01.02

Sample Indicators

Describe how manufacturing businesses manage performance.

Explain how financial performance is measured.

Explain how market performance is gauged.

Explain how service and internal operations performance is determined.

Explain how compliance and performance related to health, safety, and environment are evaluated.

MNC05.01.03

Sample Indicators

Describe how changes outside the manufacturing business impact the manufacturing business.

Explain the impact of economic changes.

Explain the impact of social changes.

Explain the impact of technology changes.

MNC05.01.04

Sample Indicators

Explain the role of risk management in reducing risks and improving performance in manufacturing businesses.

Explain the objectives of risk management programs.

Explain the major types of loss exposure for manufacturing businesses.

Explain the approaches for managing organizational risks.

MNC05.01.05

Sample Indicators

Identify the roles and functions of government in regulating and supporting manufacturing businesses.

Explain the roles in regulating domestic operations.

Explain the roles in regulating international operations.

Explain the roles in managing the infrastructures of manufacturing businesses.

Explain the roles in health, safety, and environmental management.



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MNC05.02 Analyze and summarize how manufacturing businesses improve performance to demonstrate an understanding of various methods for enhancing production.

MNC05.02.01 Describe how manufacturing businesses manage customer relationships.

Sample Indicators Identify needs and requirements of internal and external customers.
Describe customer satisfaction and fulfillment of customer requirements.

MNC05.02.02 Describe how manufacturing businesses respond to customer problems and complaints.
Describe how planning and budgeting are used to accomplish organizational goals and objectives.

Sample Indicators Explain how work plans and budgets are used to allocate people and resources.
Identify reports used to track performance and resource and explain how they are used.
Explain how plans and budgets are revised to meet goals and objectives.

MNC05.02.03 Explain how planning is used to improve overall business performance.
Identify and describe the most critical performance problems that manufacturing businesses typically face.

Sample Indicators Describe how improvements are identified.

**Cluster Topic
MNC06**

SAFETY, HEALTH AND ENVIRONMENTAL: *Understand the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance. Follow organizational policies and procedures and contribute to continuous improvement in performance and compliance.*

MNC06.01 Maintain safe and healthful working conditions and environment to ensure employee safety.

MNC06.01.01 Assess workplace conditions according to specified safety and health requirements.

Sample Indicators Identify the types of risk of injury/illness at work.
Identify those who are susceptible to risk of injury/illness at work.
Describe ways to positively impact occupational safety and health.

MNC06.02 Understand employee rights and responsibilities and employer obligations concerning occupational safety and health.

MNC06.02.01 Demonstrate knowledge of rules and laws designed to promote safety and health and their rationale.

Sample Indicators Identify key rights of employees related to occupational safety and health.
Identify the responsibilities of employers related to occupational safety and health.
Explain the role of government agencies in providing a safe workplace.

MNC06.03 Assess types and sources of workplace hazards in order to maintain safe working conditions in a manufacturing business environment.

MNC06.03.01 Demonstrate methods to correct common hazards following appropriate safety procedures.

Sample Indicators Identify and describe common hazards in the workplace.



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Identify and describe major sources of information about hazards in the workplace (e.g., MSDS, work procedures, exposure control plans, training materials, labels, and signage).

Identify sources of combustible/flammable materials, fire and emergencies to establish a fire safe environment.

Interpret safety signs and symbols.

Control workplace hazards in order to maintain safe working conditions in a manufacturing business environment.

MNC06.04

MNC06.04.01

Demonstrate safe workplace practices that promote personal and group health.

Sample Indicators

Identify procedures necessary for maintaining a safe work area.

Identify methods to correct common hazards.

Identify methods for disposing of hazardous materials.

Demonstrate principals of safe physical movement to avoid slips, trips, and spills.

Inspect and use protective equipment (PPE).

Summarize safety, health, and environmental management systems to build an understanding of compliance with governmental policies and procedures for manufacturing businesses.

MNC06.05

MNC06.05.01

Identify the major federal and state regulatory areas.

Sample Indicators

Identify specific health and safety laws and regulations that impact manufacturing and the major topics they address.

Identify specific environmental management laws and regulations and the major topics they address.

MNC06.05.02

Explain how government agencies ensure compliance with environmental regulations and promote improved performance.

Sample Indicators

Provide examples of the major regulations and types of data used by government to measure and monitor performance.

Provide examples of how manufacturing organizations ensure their compliance.

Provide examples of consequences that manufacturing organizations suffer when they fail to comply.

MNC06.05.03

Demonstrate workplace activities that comply with safety, health, and environmental policies and procedures.

Sample Indicators

Promote and maintain knowledge of organizational safety, health, and environmental management policies and procedures.

Follow organizational policies and procedures.

Educate and orient other workers.

Maintain a safe work area.

Identify, describe, and report workplace hazards.

Perform and participate in regular audits and inspections.

Provide and maintain documentation needed for compliance.

Conduct and participate in accident/incident investigations.

MNC06.05.04

Develop plans to improve safety performance.

Sample Indicators

Use structured problem-solving process to develop improvement plans.

**Cluster Topic
MNC07**

LEADERSHIP AND TEAMWORK: Use leadership and teamwork skills in collaborating with others to accomplish organizational goals and objectives.



Manufacturing Career Cluster Production Pathway Knowledge and Skill Statements

No additional statements in this topic beyond those found in the Essential Knowledge and Skills Chart.

Cluster Topic **ETHICS AND LEGAL RESPONSIBILITIES: Know and understand the importance of professional ethics and legal responsibilities.**
MNC08

No additional statements in this topic beyond those found in the Essential Knowledge and Skills Chart.

Cluster Topic **EMPLOYABILITY AND CAREER DEVELOPMENT: Know and understand the importance of employability skills. Explore, plan, and effectively manage careers. Know and understand the importance of entrepreneurship skills.**
MNC09

No additional statements in this topic beyond those found in the Essential Knowledge and Skills Chart.

Cluster Topic **TECHNICAL SKILLS: Use the technical knowledge and skills required to pursue the targeted careers for all pathways in the career cluster, including knowledge of design, operation, and maintenance of technological systems critical to the career cluster.**
MNC10

MNC10.01 **Describe and employ technical skills and knowledge required for careers in manufacturing in order to perform basic workplace activities common to manufacturing.**

MNC10.01.01 Demonstrate the planning and layout processes (e.g., designing, print reading, measuring) used in manufacturing.

Sample Indicators Read prints and use the information to play, lay out, and produce parts or products.

MNC10.01.02 Summarize how materials can be processed using tools and machines.

Sample Indicators Use tools and the processes of cutting, shaping, combining, forming, etc. of materials to manufacture a part or product.

MNC10.01.03 Describe various types of assembling processes (e.g., mechanical fastening, mechanical force, joining, fusion bonding, adhesive bonding) used in manufacturing.

Sample Indicators Apply appropriate fastening or joining procedure to the design and production of a manufactured part or product.

MNC10.01.04 Explain finishing processes (e.g., types of finishing materials, surface preparation, methods of application) used in manufacturing.

Sample Indicators Select a finishing process for a product appropriate to the job it must perform environment in which it functions, and its aesthetic appeal.

MNC10.01.05 Explain the processes of inspection and quality control used in manufacturing.

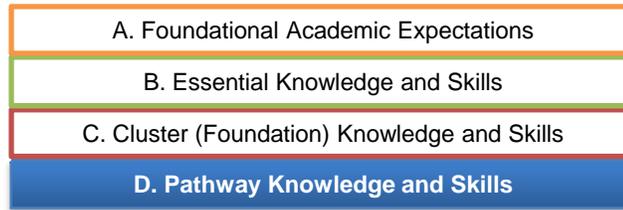
Sample Indicators Perform continuous on line inspections to ensure that parts or products meet design specifications.

D. PATHWAY KNOWLEDGE AND SKILLS

The following knowledge and skill statements apply to all careers in the Production Pathway. The statements are organized within eight topics.



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Pathway Topic
MNPB01 **QUALITY PROCESSES**

MNPB01.01	Recognize and correct production processes to assure that products meet production quality standards.
MNPB01.01.01	Communicate quality problems following the appropriate reporting process.
<i>Sample Indicators</i>	Review quality problems with production operators. Communicate quality problems promptly to appropriate parties. Use established processes to document quality problems. Summarize defect trends and report them to appropriate parties.
MNPB01.01.02	Suggest or perform corrective actions to correct quality problems.
<i>Sample Indicators</i>	Make minor quality issues/adjustments immediately. Document quality issues or adjustments properly. Make sure that recommendations for action are clear and concise, and supported by data. Make recommendations in a timely way to appropriate parties. Document follow-up activities and indicate that corrective action was taken. Document product quality following corrective action.
MNPB01.01.03	Determine appropriate action for sub-standard product.
<i>Sample Indicators</i>	Execute quality control procedures to catch sub-standard products promptly within the defined quality systems. Document decisions regarding sub-standard products for future retrieval. Process sub-standard products according to company policy. Distribute documentation required for customers to appropriate parties.
MNPB01.01.04	Identify trends using records of process outcomes.
<i>Sample Indicators</i>	Maintain records on quality process to appropriate standards. Chart outcomes of quality processes according to appropriate methods and standards. Check data on quality processes for accuracy. Analyze quality process performance data to identify trends. Report quality process performance data to appropriate parties in a timely way.
MNPB01.01.05	Recognize needed adjustments using records of process outcomes.
MNPB01.01.06	Identify performance and training issues.
MNPB01.01.07	Prepare reports regarding performance and training issues.
MNPB01.01.08	Assess the affect of performance and training issues on production quality.
MNPB01.01.09	Implement closed-loop corrective action to provide for ongoing production feedback.
<i>Sample Indicators</i>	Document evidence of corrective action in a timely manner. Report change resulting from the corrective action to appropriate parties in the correct format.



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Use spot checks to verify implementation of the corrective action.
Store reports properly for the required amount of time.
Perform ongoing audits to optimize the outcomes of the corrective actions.

Examine previous documentation on similar process issues to identify possible solutions.

Pathway Topic MNPB02	MAINTENANCE
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MNPB02.01	Maintain equipment, tools and workstations to provide a safe working environment and meet company regulations.
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MNPB02.01.01	Perform preventative maintenance and routine repair by contacting appropriate people and securing needed supplies.
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<i>Sample Indicators</i>	Verify that preventive maintenance schedule is in place and updated as appropriate. Verify that preventive maintenance is performed to schedule and documented completely in a timely manner. Use the correct procedures and forms to communicate repair needs to the responsible parties. Verify that necessary repair work is checked through follow-up. Have necessary supplies available to perform preventive maintenance.
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MNPB02.01.02	Predict the results of failing to effectively communicate the preventive maintenance schedule, documentation, equipment needs, and outstanding repairs from shift-to-shift, to team members, to managers, and to others as required. Follow all safety regulations when doing repairs.
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<i>Sample Indicators</i>	Monitor equipment indicators to ensure it is operating correctly. Compare equipment performance to optimal equipment operations on a regular schedule. Investigate and correct abnormal equipment conditions in a timely manner. Monitor equipment to ensure that the corrective action solved the problem.
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MNPB02.01.03	Keep documentation of equipment repair history complete, up-to-date, and accurate. Document training of maintenance activities according to company maintenance regulations .
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<i>Sample Indicators</i>	Conduct training in an effective and appropriate manner. Make documented preventive maintenance training materials readily available. Keep training records updated and readily available. Examine the relevancy of training for use of equipment, tools, materials, and processes at the workstation continuously. Provide cross-training when appropriate. Verify that training and training documentation meet all company and regulatory requirements.
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MNPB02.01.04	Maintain production schedules by completing daily housekeeping activities.
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<i>Sample Indicators</i>	Store tools and materials safely in proper locations. Identify and report unsafe conditions promptly. Take corrective action to correct unsafe conditions. Keep workstations clean and clear of safety hazards. Verify that scheduled housekeeping inspections are passed. Organize workstations to maximize efficiency.
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Verify that safety equipment is present and in proper working order.

Pathway Topic MNPB03	SAFETY
MNPB03.01	Summarize and employ safety protocols to maintain a safe and productive production workplace.
MNPB03.01.01	Perform environmental and safety inspections following local, federal and company regulations.
<i>Sample Indicators</i>	Identify, report and monitor potential hazards in the workplace. Take corrective action to correct potential hazards. Review health, safety, and environmental documentation and policies thoroughly and regularly. Ensure that inspections meet all relevant, health, safety, and environmental laws and regulations. Complete inspections according to company schedule and procedures. Document inspection records and store them correctly.
MNPB03.01.02	Perform emergency drills as part of an emergency response team.
<i>Sample Indicators</i>	Confirm that first aid training and certification on emergency and first aid procedures are complete and up-to-date. Comply with company and regulatory policies and procedures to respond to emergencies. Document emergency drills and incidents according to company and regulatory procedures promptly.
MNPB03.01.03	Identify unsafe conditions according to safety standards.
<i>Sample Indicators</i>	Identify, report, and document conditions presenting a threat to health, safety, and the environment. Identify corrective actions.
MNPB03.01.04	Implement corrective actions to follow safety protocols.
<i>Sample Indicators</i>	Consult appropriate parties about corrective actions and take corrective actions following company procedures promptly. Track and report ongoing safety concerns until corrective action is taken.
MNPB03.01.05	Implement safety orientation to train other employees in safe practices and emergency procedures.
<i>Sample Indicators</i>	Verify that all topics and procedures are covered in orientation to facilitate employee safety. Observe orientation to ensure that it makes clear the need and processes for employees to raise safety concerns, ask questions, and receive additional training. Use company requirements to document orientation. Verify that orientation meets all relevant laws, policies, and regulations. Deliver safety instruction and updates on a regular schedule.

Pathway Topic MNPB04	QUALITY IMPROVEMENT
MNPB04.01	Employ production process audits and inspections to maintain quality and encourage continuous improvement.
MNPB04.01.01	Perform periodic internal quality audits using company audit procedures.



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<i>Sample Indicators</i>	Perform audits in accordance with company and other required schedules and procedures.
	Complete all audit forms correctly in a timely manner and forward to the correct parties. Verify that audit data is relevant and correct.
	Verify that conformance to quality standards are properly assessed and documented. Include observation of operations to ensure performances meet specifications when appropriate.
MNPB04.01.02 <i>Sample Indicators</i>	Check calibration of gauges and other data collection equipment. Implement calibration schedule according to specifications. Make thorough careful observations and review documentation to check instrument certification. Recalibrate out-of-calibration instruments immediately or refer them to the appropriate parties for recalibration or repairs.
MNPB04.01.03 <i>Sample Indicators</i>	Recommend process improvements based upon audits and inspections. Use observation and data analysis to generate potential improvements. Communicate suggestions that are measurable and have data-driven benefits to the company, its customers, and employees. Use proper procedures and documentation to make suggestions. Assure that all data is reviewed prior to making suggestions.
MNPB04.01.04 <i>Sample Indicators</i>	Inspect materials at all stages of process to determine quality or condition. Sample and inspect in accordance with the schedule and procedures. Select correct inspection tools and procedures and use them correctly. Inspect materials against correct specifications. Identify materials not meeting specifications. Take corrective action on out-of specification material. Document inspection results properly and report them to the correct parties in a timely manner.
MNPB04.01.05 <i>Sample Indicators</i>	Document the results of quality testing using reliable data. Check data forms for completeness and accuracy. Evaluate and interpret information correctly. Forward data to correct parties. Select and use the appropriate analytical tools.
MNPB04.01.06 <i>Sample Indicators</i>	Adjust processes to restore or maintain quality based on data from audit or inspection reports. Identify appropriate correction actions and make sure that approvals are received when needed. Make adjustments to eliminate deviations and bring the process back into control. Make adjustments and document them in a timely manner.

Pathway Topic MNPB05

COMMUNICATIONS

MNPB05.01 Communicate with co-workers and/or external customers to ensure production meets business requirements.



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MNPB05.01.01	Communicate safety, training, and job-specific needs using effective speaking and presentation skills.
<i>Sample Indicators</i>	<p>Ensure that safety issues are understood and safety practices are being used. Explain the significance of on-the-job issues and concerns being discussed and quickly resolved. Identify current and future training issues in a timely way.</p> <p>Verify that communication shows knowledge of both customer and business needs. Be clear and relevant with communications related to safety, training, and job-specific needs. Communicate in a timely and accurate manner to the correct parties. Evaluate, track, and report back safety, training, and job-specific issues to original communicator.</p> <p>Track and document communications related to safety, training, and job-specific needs.</p>
MNPB05.01.02	Communicate material specifications and delivery schedules in a timely and accurate manner.
<i>Sample Indicators</i>	<p>Make sure that communication reflects knowledge of material specifications. Communicate delivery schedules clearly.</p> <p>Make sure that communication shows knowledge of both customer and business needs.</p> <p>Make sure that communication is clear and relevant to material and delivery issues. Communicate in a timely and accurate manner to the correct parties.</p> <p>Evaluate, track, and report back material and delivery issues to original communicator. Track and document material specifications and delivery schedules.</p>
MNPB05.01.03	Communicate production requirements and product specifications.
<i>Sample Indicators</i>	<p>Make sure that communication reflects knowledge of production requirements, levels, and product specifications. Initiate communication to meet production requirements, product specifications, or other customer or business needs cross-functionally as required. Notify all parties of production issues and problems in a timely way.</p> <p>Make sure that communication shows knowledge of both customer and business needs. Make sure that communication to production and products is clear and relevant.</p> <p>Evaluate, track, and report production and product issues back to original communicator. Track and document communications related to production requirements and product specifications as appropriate.</p>

**Pathway Topic
MNPB06**

WORK TEAMS

MNPB06.01 Coordinate work teams when producing products to enhance production process performance.

MNPB06.01.01	Provide training to other employees based on training needs.
<i>Sample Indicators</i>	<p>Provide cross training as appropriate. Assess training needs on a regular basis. Identify new requirements and training issues. Use varied approaches to achieve training goals.</p>



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MNPB06.01.02 <i>Sample Indicators</i>	Document training outcomes. Develop team goals to enhance performance. Make goals specific, measurable, and achievable. Align team goals to customer and business needs. Focus team goals to meet team objectives. Document team goals and share information with all parties.
MNPB06.01.03 <i>Sample Indicators</i>	Make job assignments to avail the use of the best personnel in key assignments. Make job assignments to match the skills needed for the work to be done and to maximize the use of available skills. Make job assignments to ensure that business and customer needs are met. Confirm that workers are notified of assignments effectively.
MNPB06.01.04 <i>Sample Indicators</i>	Coordinate workflow with team members and other work groups. Make sure that production schedules are met effectively. Notify team members of schedule requirements in a timely way. Make sure that production workflow runs efficiently. Take necessary action to minimize downtime. Explain the significance of relationships with others in facilitating workflow. Verify that workers actively participate in meetings and problem-solving groups.

**Pathway Topic
MNPB07**

EQUIPMENT SAFETY

MNPB07.01	Demonstrate the safe use of manufacturing process equipment in order to protect personal well-being in the production work environment.
MNPB07.01.01 <i>Sample Indicators</i>	Train others to use equipment following safe production practices. Give new operators a complete orientation of equipment. Make sure that all important information regarding equipment safety is communicated clearly and effectively. Make sure that maintenance workers obtain certification to train others in technical skills and knowledge where applicable. Make suggestions regarding training materials and content to appropriate parties. Use evaluations and feedback to improve training materials and methods. Make sure trainees have the correct tools to do the job during training. Conduct post-training evaluation to assure that workers can operate equipment safely. Use training and facilitation techniques appropriate for the audience. Document the quality and effectiveness of training appropriately.
MNPB07.01.02 <i>Sample Indicators</i>	Recommend processes and procedures to support safety and effectiveness in the work environment. Consult health and safety representatives to develop suggestions. Solicit operator feedback for use in creating a safer, more effective work environment. Make sure suggestions for training improvement are documented and sent to the appropriate parties. Make sure that content of suggestions addresses safety, quality, and productivity issues.



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MNPB07.01.03	Maintain, install, and repair equipment following required safety and health requirements.
<i>Sample Indicators</i>	<p>Make regular safety communications to all employees.</p> <p>Review job safety analyses regularly according to company policy.</p> <p>Follow hazardous materials procedures and policies such as Material Safety Data Sheet and "right to know" accurately.</p> <p>Perform environmental testing of workplace on a regular basis as required by company policy or regulation.</p> <p>Audit equipment to ensure there are no by-passes of safety guards.</p> <p>Verify that regulatory and company safety procedures are followed including lock-out & tag-out, confined space, and ergonomics.</p> <p>Follow good housekeeping procedures.</p> <p>Verify that safety and personal protective equipment is available, performs correctly, and has current certification.</p>
MNPB07.01.04	Monitor equipment and operator according to workplace safety and compliance with both company and national regulations.
<i>Sample Indicators</i>	<p>Perform monitoring responsibilities regularly.</p> <p>Report out-of-compliance or unsafe conditions immediately.</p> <p>Take corrective action on out-of-compliance or unsafe conditions.</p> <p>Check equipment to ensure it is operating according to specifications.</p> <p>Check tools for compliance with specifications.</p> <p>Forward accident and injury data to appropriate personnel for inclusion in OSHA recordables.</p> <p>Gather information on equipment use from operators to reveal existing or potential problems.</p> <p>Adjust equipment and processes as required.</p> <p>Document all monitoring data accurately.</p>

Pathway Topic MNPB08

CUSTOMER NEEDS

MNPB08.01	Produce a product that satisfies a customer's desires to demonstrate the relationship between production processes and meeting customer needs.
MNPB08.01.01	Identify customer needs through an in-depth investigation.
<i>Sample Indicators</i>	<p>Meet those needs that differ between internal and external customers as well as those that both share.</p> <p>Maintain contact with customer about the product aspects and its specifications to ensure thorough understanding of needs.</p> <p>Review, maintain, and communicate customer needs and specifications.</p> <p>Address issues preventing customer needs from being met proactively.</p>
MNPB08.01.02	Verify that needed resources are available for the production process.
<i>Sample Indicators</i>	<p>Use work orders when handling raw materials, while setting up of tools and equipment, and when scheduling workers to maximize productivity.</p> <p>Report any discrepancies related to raw materials, tools/equipment, and workers abilities/availability properly.</p> <p>Identify consequences of not reporting discrepancies in production.</p>
MNPB08.01.03	Set up equipment for the production process.
<i>Sample Indicators</i>	<p>Make proper repairs and adjustments to equipment prior to putting into service.</p> <p>Verify that set-up meets process specifications of both internal and external customers.</p>



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MNPB08.01.04	<p>Verify that the first piece or production meets both product specifications and production capacities. Document set-up procedures to ensure repeatability. Identify possible consequences resulting from failure to meet ergonomic and other relevant health, safety, and environmental standards.</p> <p>Monitor fabrication of the product using process control data. Use process control data to indicate that the manufacturing process complies with standards.</p> <p><i>Sample Indicators</i></p> <p>Make the manufacturing process cycle time meet customer and business needs.</p> <p>Identify possible consequences resulting from failure to perform operations safely. Verify that the product meets customer specifications.</p> <p>Complete, maintain, and forward product and process documentation to proper parties. Verify that production operations comply with all health, safety, and environmental policies and procedures.</p>
MNPB08.01.05	<p>Inspect the product to verify that it meets specifications. Verify the calibration of the testing equipment. Follow the established sampling plan and inspection policies/procedures. Identify product and production process that do not meet specifications. Complete inspection documents accurately and forward them to proper parties. Follow appropriate testing procedures. Identify and communicate adjustments needed to bring the production process back into specification. Make necessary adjustment in the manufacturing process in a timely manner.</p> <p><i>Sample Indicators</i></p>
MNPB08.01.06	<p>Document product and process to assure formal compliance with customer requirements. Write compliance documents legibly in the appropriate format and store them in a safe, secure place.</p> <p><i>Sample Indicators</i></p> <p>Complete compliance documentation, obtain "sign off," and forward to the proper parties. Label products for compliance and non-compliance appropriately.</p>
MNPB08.01.07	<p>Prepare a final product for shipping or distribution according to meet specified quantities and include proper documentation. Package materials to meet packaging and shipping specifications (including proper labeling). Complete package documentation and customer shipping instructions to accompany the product to the next destination. Communicate product availability to the proper parties in a timely manner. Check relevant information such as quantity, destination and packaging instructions against the work order. Verify that product is correctly stored or staged for shipping. Explain the significance of following all laws and regulations related to labeling, packaging, and transport.</p> <p><i>Sample Indicators</i></p> <p>Verify that material handling procedures are followed to prevent product damage.</p>