



Manufacturing Career Cluster

Cluster Knowledge and Skill Statements

The following Cluster (Foundation) Knowledge and Skill Chart provides statements that 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. The Pathway Knowledge and Skill Charts are available in separate documents.

Cluster Topic MNC01

ACADEMIC FOUNDATIONS: *Achieve additional academic knowledge and skills required to pursue the full range of career and postsecondary education opportunities within a career cluster.*

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

Cluster Topic MNC02

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

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

Cluster Topic MNC03

PROBLEM-SOLVING AND CRITICAL THINKING: *Solve problems using critical thinking skills (analyze, synthesize, and evaluate) independently and in teams. Solve problems using creativity and innovation.*

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

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.



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MNC05.01.02	Analyze current trends in manufacturing systems.
<i>Sample Indicators</i>	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	Describe how changes outside the manufacturing business impact the manufacturing business.
<i>Sample Indicators</i>	Explain the impact of economic changes. Explain the impact of social changes. Explain the impact of technology changes.
MNC05.01.04	Explain the role of risk management in reducing risks and improving performance in manufacturing businesses.
<i>Sample Indicators</i>	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	Identify the roles and functions of government in regulating and supporting manufacturing businesses.
<i>Sample Indicators</i>	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.

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.
<i>Sample Indicators</i>	Identify needs and requirements of internal and external customers. Describe customer satisfaction and fulfillment of customer requirements. Explain how manufacturing businesses respond to customer problems and complaints.
MNC05.02.02	Describe how planning and budgeting are used to accomplish organizational goals and objectives.
<i>Sample Indicators</i>	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.
<i>Sample Indicators</i>	Identify and describe the most critical performance problems that manufacturing businesses typically face. 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.*



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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.
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.

MNC06.04 Control workplace hazards in order to maintain safe working conditions in a manufacturing business environment.

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 Identify the major federal and state regulatory areas.

MNC06.05.01 Identify specific health and safety laws and regulations that impact manufacturing and the major topics they address.

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



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MNC06.05.02	Explain how government agencies ensure compliance with environmental regulations and promote improved performance. <i>Sample Indicators</i> 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. <i>Sample Indicators</i> 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. <i>Sample Indicators</i> 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.*

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

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

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

Cluster Topic MNC09 **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.*

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

Cluster Topic MNC10 **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.*

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

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



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<i>Sample Indicators</i> MNC10.01.02	Read prints and use the information to play, lay out, and produce parts or products. Summarize how materials can be processed using tools and machines.
<i>Sample Indicators</i> MNC10.01.03	Use tools and the processes of cutting, shaping, combining, forming, etc. of materials to manufacture a part or product. Describe various types of assembling processes (e.g., mechanical fastening, mechanical force, joining, fusion bonding, adhesive bonding) used in manufacturing.
<i>Sample Indicators</i> MNC10.01.04	Apply appropriate fastening or joining procedure to the design and production of a manufactured part or product. Explain finishing processes (e.g., types of finishing materials, surface preparation, methods of application) used in manufacturing.
<i>Sample Indicators</i> MNC10.01.05	Select a finishing process for a product appropriate to the job it must perform environment in which it functions, and its aesthetic appeal. Explain the processes of inspection and quality control used in manufacturing.
<i>Sample Indicators</i>	Perform continuous on line inspections to ensure that parts or products meet design specifications.