

**CORE COMPETENCIES IN MATERIALS
TECHNOLOGY**

National Resource Center For Materials Technology Education

Update February 2009

CATEGORIES AND CONCENTRATION AREAS	
<i>Category</i>	<i>Competency Concentration Areas A, B, C, ... for each Category</i>
0	Basic competencies related to work as a technician
A	Demonstrate Good Communication Skills
B	Prepare Tests and Analyze data
C	Utilize Good Workplace Performance Methods
D	Demonstrate General Technical Competence
1	Measurement and basic technical skills
A	Carry Out Measurements of Dimensions and of Physical Phenomena
B	Interpret Technical Drawings
C	Demonstrate Laboratory Skills
D	Apply Electrical Phenomena to Physical Measurements
2	Mathematics, calculations, and data analysis
A	Apply Basic Mathematics Fundamentals
B	Demonstrate Proper Use of Units and Conversions
C	Apply Geometry and Trigonometric Fundamentals
D	Demonstrate Appropriate Use of Algebra and Functions
E	Demonstrate Appropriate Use of Statistics
3	Computer skills
A	Practice Appropriate Computer Skills and Uses
B	Demonstrate Use of Computer Applications
C	Apply Technical Software to Practice
4	Teamwork, professionalism, globalism, and multiculturalism skills
A	Demonstrate Effective Work with Teams
B	Determine and Develop Effective Project Interactions
C	Show Personal Professionalism
D	Demonstrate Cultural Awareness in the Workplace
E	Recognize where a Global Perspective Should be Used in the Workplace
5	Chemical Science skills
A	Apply Safe and Environmentally Appropriate Methods to Chemical Handling
B	Demonstrate Knowledge of Chemistry fundamentals
C	Describe Atomic and Nuclear Structure and Radioactive Decay
6	Physical Science skills
A	Apply Basic Concepts of Mechanics
B	Apply Concepts of Fluids, Heat and Thermal Conduction
C	Describe and Apply Concepts of Electricity and Magnetism
D	Apply Concepts of Light and Sound

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7	Fundamentals of materials science and technology
A	Identify the General Nature of Metals
B	Discuss the General Nature of Plastics
C	Describe the General Nature of Composite Materials
D	Identify the General Nature of Semiconductors and Optical Materials
E	Describe the General Nature and Behavior of Ceramics and Glasses
F	Identify the General Nature and Properties of Other Materials used in Engineering
G	Define Stress and Strength
H	Define Strain and Deformation
I	Explain Causes for Differing Materials Properties
J	Demonstrate How Materials Properties are Used in Engineering Design
K	Compare Thermal, Physical, and Other Properties of Materials
M	Describe the General Nature and Behavior of Emerging Materials Technologies
8	Materials testing
A	Demonstrate the Planning and Execution of Materials Experiments
B	Apply Mechanical Testing Processes to Solid Materials
C	Perform Visual and Nondestructive Testing Methods for Solids
D	Demonstrate Knowledge of Standards Applied to Materials
E	Perform Appropriate Tests of Metallic Materials
F	Perform Appropriate Tests of Plastics and Composites
G	Perform Appropriate Tests of Wood and Concrete
H	Perform Appropriate Tests of Liquids
9	Materials and processing - Metals
A	Define and Describe Constituents, Properties and Processing of Steel
B	Define and Describe Types and Properties of Cast iron
C	Identify Types, Properties and Processing of Aluminum and its Alloys
D	Discuss Types and Advantages of Copper and its Alloys
E	Explain Common Uses for Zinc and its Alloys
F	Identify Properties and Uses for Magnesium and its Alloys
G	Discuss Advantages of Nickel Alloys and their Uses
H	Identify Uses and Processing of Titanium and its Alloys
10	Materials and processing - Plastics
A	Identify Properties and Applications of Thermoplastic Materials
B	Identify Properties and Applications of Thermoset Plastics
11	Materials and processing - Composites
A	Describe the Structure and Advantages of Composite Materials
B	Explain Basic Processing Procedures for Composite Materials
12	Materials and processing - Wood
A	Describe the Properties and Testing Processes for Wood
13	Materials and processing - Concrete
A	Describe Constituents and Testing Procedures for Concrete

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14	Materials and processing - Glasses
A	Describe Structure, Properties and Behavior of Glass
15	Materials and processing - Ceramics
A	Describe Structure, Properties and Processing of Ceramics
16	Relationships between processing variables, quality, defects and properties
A	Explain Effects of Processing and Manufacturing Variations on Material Properties
B	Describe the Effects of Defects on Material Properties
17	Fabrication and processing of materials
A	Explain General Means for Processing Materials
B	Describe Techniques Used for Metals Processing
C	Explain Methods for Processing of Plastics and Composites
18	Tooling, dies, jigs and fixtures used in materials processing
A	Describe General Tooling Practices
B	Explain Use of Dies and Jigs used for Metal Processing
C	Explain Use of Tooling for Plastics and Composites Processing
19	Manufacturing operations and quality management
A	Demonstrate Processes to Promote Quality Management Practices
B	Apply Statistical, Cost, Lifecycle and Related Management Principles to Manufacturing Production and Management
Reference For details on this study, please refer to http://www.materialseducation.org/competencies.php	