



**DRAFTING  
MECHANICAL DRAFTER  
SKILLS STANDARDS  
OD42703**

## ***COMPETENCY-BASED EDUCATION: OKLAHOMA'S RECIPE FOR SUCCESS***

### ***BY THE INDUSTRY FOR THE INDUSTRY***

Oklahoma's *CareerTech* system of competency-based education uses industry professionals and certification standards to identify the knowledge and abilities needed to master an occupation. This industry input provides the foundation for development of instructional materials that help prepare the comprehensively trained, highly skilled employees demanded by our workplace partners.

### ***TOOLS FOR SUCCESS***

*CareerTech* relies on three basic instructional components to deliver competency-based instruction: skills standards, curriculum materials, and competency assessments.

**Skills standards** provide the foundation for competency-based instruction in Oklahoma's *CareerTech* system. The skills standards outline the knowledge, skills, and abilities needed to perform related jobs within an industry. Skills standards are aligned with national skills standards; therefore, a student trained to the skills standards possesses technical skills that make him/her employable in both state and national job markets.

**Curriculum materials** contain information and activities that teach students the knowledge and skills outlined in the skills standards. In addition to complementing classroom instruction, curriculum resources provide supplemental activities to enhance learning and provide hands-on training experiences.

**Competency Assessments** test the student over material outlined in the skills standards and taught using the curriculum materials. When used with classroom performance evaluations, written competency assessments provide a means of measuring occupational readiness.

Although each of these components satisfy a unique purpose in competency-based education, they work together to reinforce the skills and abilities students need to gain employment and succeed on the job.

### ***MEASURING SUCCESS***

Written competency assessments are used to evaluate student performance. Results reports communicate competency assessment scores to students and provide a breakdown of assessment results by duty area. The results breakdown shows how well the student has mastered skills needed to perform major job functions and identifies areas of job responsibility that may require additional instruction and/or training.

Group analysis of student results also provides feedback to instructors seeking to improve the effectiveness of career and technology training. Performance patterns in individual duties indicate opportunities to evaluate training methods and customize instruction.

### ***TRUE TO OUR PURPOSE***

"We prepare Oklahomans to succeed in the workplace, in education, and in life" defines the mission of Oklahoma *CareerTech* and its competency-based system of instruction. Skills standards, curriculum, and assessments that identify and reinforce industry expectations provide accountability for programs and assure *CareerTech*'s continued role in preparing skilled workers for a global job market

Copyright 2007  
Oklahoma Department of Career and Technology Education  
All rights reserved

Printed in the United States of America by the  
Oklahoma Department of Career and Technology Education  
Stillwater, Oklahoma

The Oklahoma Department of Career and Technology Education does not discriminate on the basis of race, creed, color, national origin, sex, age, veteran status, or qualified handicap.

**DRAFTING  
MECHANICAL DRAFTER  
SKILLS STANDARDS  
Desired Skills Level Ratings**

Duty ES: Demonstrate Employability Skills

**Desired Skill Level:** The level of training necessary for the student to be employable in the occupation specified:

- 4 – Skilled                      Can perform the task independently with no additional training
- 3 – Moderately Skilled      Has performed the task independently during training program; limited additional training may be required
- 2 – Limited Skill              Has practiced task during training program; additional training is required to develop the skills
- 1 – No Exposure              No experience or knowledge in this area

**\*DSL = Desired Skill Level**

**DUTY ES: Demonstrate Employability Skills**

CODE	TASK	DSL
ES.01	Demonstrate personal characteristics desired by employers <ul style="list-style-type: none"> <li>• Good communication skills</li> <li>• Good attendance</li> <li>• Neat appearance</li> <li>• Honest/ethical</li> <li>• High self-esteem</li> <li>• Flexible</li> <li>• Goal-oriented</li> <li>• Commitment</li> <li>• Cooperative</li> <li>• Initiative</li> <li>• Responsible</li> <li>• Positive attitude</li> <li>• Self management</li> <li>• Drug free/alcohol free</li> </ul>	4
ES.02	Demonstrate effective interpersonal skills	3
ES.03	Demonstrate a positive attitude	4
ES.04	Demonstrate customer service skills	3
ES.05	Demonstrate personal resource skills	3
ES.06	Utilize proper telephone techniques	2
ES.07	Use job-related terminology, symbols, and abbreviations	3
ES.08	Interpret and follow oral and written directions	4

ES.09	Recognize the importance of team work and participate as a team member	4
ES.10	Use critical thinking skills in workplace situations	4
ES.11	Demonstrate negotiation skills	3
ES.12	Demonstrate leadership skills	2
ES.13	Understand organization structure and employee roles	3
ES.14	Understand cultural diversity in the workplace	3
ES.15	Explore opportunities for advanced training	3
ES.16	Participate in computer literacy training, when applicable	3
ES.17	Perform self-evaluation to establish/modify career goals	3
ES.18	Identify employment opportunities	4
ES.19	Identify levels of training recommended for related careers	3
ES.20	Understand salary, wages, and benefits packages	3
ES.21	Complete an employment application	4
ES.22	Prepare a resume	4
ES.23	Complete an employment interview	4
ES.24	Complete a W-4 form	3
ES.25	Create an employment portfolio	3
	<b>Safety</b>	
ES.26	Explain the purpose for safety policies	4
ES.27	Discuss the role of OSHA and EPA <ul style="list-style-type: none"> <li>• Locate information in MSDS</li> </ul>	4
ES.28	Participate in OSHA training <ul style="list-style-type: none"> <li>• Lock Out/Tag Out</li> <li>• HAZCOM <ul style="list-style-type: none"> <li>• MSDS</li> </ul> </li> <li>• Blood Born Pathogens</li> </ul>	4
ES.29	Explain the proper steps in reporting an accident or emergency	4
ES.30	Explain the hazards associated with specific types of equipment and tools	4
ES.31	Perform machine operator safety checks of equipment and accessories, when necessary	4
ES.32	Practice tool safety	4
ES.33	Demonstrate and use appropriate tools for the job	4
ES.34	Describe the types of fire hazards found in the workplace	4
ES.35	Discuss electrical hazards	3
ES.36	Demonstrate safe use of personal protective equipment	4
ES.37	Demonstrate safe material handling techniques <ul style="list-style-type: none"> <li>• Lifting</li> <li>• Transporting</li> <li>• Storing</li> </ul>	4
ES.38	Understand established first aid procedures	4
ES.39	Practice good housekeeping	4
ES.40	Comply with company safety policies	4

	<b>Academic Skills</b>	4
ES.41	Apply reading and writing skills, when necessary	4
ES.42	Apply mathematical operations involving whole numbers, fractions, decimals, percentages, mathematical word problems, formulas, ratios, etc., when necessary <ul style="list-style-type: none"> <li>• Addition</li> <li>• Subtraction</li> <li>• Multiplication</li> <li>• Division</li> </ul>	4
ES.43	Apply advanced mathematical operations, when necessary <ul style="list-style-type: none"> <li>• Algebra</li> <li>• Geometry</li> <li>• Trigonometry</li> </ul>	3
ES.44	Apply scientific principles, when necessary <ul style="list-style-type: none"> <li>• Physics</li> <li>• Chemistry</li> </ul>	2
ES.45	Interpret charts, table, and graphs	3
	<b>Quality Assurance &amp; Problem Solving</b>	
ES.46	Understand the principles of quality assurance	3
ES.47	Participate in the implementation of quality assurance programs <ul style="list-style-type: none"> <li>• Material and Labor Utilization</li> </ul>	3
ES.48	Identify the effects of continuous quality improvement	3
ES.49	Utilize problem solving and critical thinking techniques to identify and solve problems <ul style="list-style-type: none"> <li>• Brainstorming</li> </ul>	4
ES.50	Discuss data collection techniques for the quality assurance and problem solving process	3
ES.51	Identify opportunities for applying problem solving skills	3
	<b>Blueprints</b>	
ES.52	Identify basic elements of blueprints <ul style="list-style-type: none"> <li>• Terms</li> <li>• Components <ul style="list-style-type: none"> <li>• Revisions</li> </ul> </li> <li>• Symbols</li> </ul>	4
ES.53	Discuss different types of drawings	3
ES.54	Interpret drawings <ul style="list-style-type: none"> <li>• Bill of Materials</li> <li>• Revisions</li> <li>• Tolerances</li> <li>• Document system changes</li> <li>• Modify prints</li> </ul>	4
ES.55	Interpret symbols	4
	<b>Measurement Tools &amp; Techniques</b>	
ES.56	Identify types of measuring instruments	4
ES.57	Use appropriate measurement instrument for a measurement task	4

ES.58	Read measuring instruments	4
ES.59	Identify the appropriate formula and units for a measurement task	3
ES.60	Differentiate between English and Metric measurement systems, when necessary	3
ES.61	Communicate measurements using proper symbols or words	4
ES.62	Demonstrate the importance of calibration	3

**DRAFTING  
MECHANICAL DRAFTER  
SKILLS STANDARDS  
Frequency and Criticality Ratings**

Duty T: Demonstrate Appropriate Use of Reference Criteria and Application Software

Duty U: Measurements, Annotations, Geometric Dimensioning and Tolerancing

Duty V: Prepare Detail, Working, and Assembly Drawings

Duty W: Demonstrate Appropriate Use of Manufacturing Processes

Duty X: Prepare Power Transmission Drawings

Duty Y: Prepare Fasteners, Intersections, Developments, and Revolutions

Duty Z: Solve Mathematical Problems Related to Mechanical Drafting

**Frequency:** represents how often the task is performed on the job. Frequency rating scales vary for different occupations. The rating scale used in this publication is presented below:

- 1 = less than once a week
- 2 = at least once a week
- 3 = once or more a day

**Criticality:** denotes the level of consequence associated with performing a task incorrectly. The rating scale used in this publication is presented below:

- 1 = slight
- 2 = moderate
- 3 = extreme

**Duty T: Demonstrate Appropriate Use of Reference Criteria and Application Software**

CODE	TASK	F/C
T.01	Prepare bill of materials for drawings	3/3
T.02	Denote manufacturing treatments of materials in drawings	3/3
T.03	Denote shop processes to be used	3/3
T.04	Use appropriate application software for mechanical drafting	3/3

**Duty U: Measurements, Annotations, Geometric Dimensioning and Tolerancing**

CODE	TASK	F/C
U.01	Use precision measuring equipment	3/3
U.02	Prepare revision drawings and notes	3/3
U.03	Use tables to determine tolerances and fits	3/3
U.04	Apply geometric dimensioning and tolerancing	2/3

**Duty V: Prepare Detail, Working, and Assembly Drawings**

CODE	TASK	F/C
V.01	Prepare working, assembly, and development drawings	3/3
V.02	Prepare weldment drawings	3/3
V.03	Prepare working drawings	3/3
V.04	Prepare assembly drawings of bearings and seals	1/3
V.05	Prepare geometry for exporting/translation for manufacturing processes	2/3

**Duty W: Demonstrate Appropriate Use of Manufacturing Processes**

CODE	TASK	F/C
W.01	Prepare casting drawings	1/3
W.02	Prepare forging drawings	1/3
W.03	Prepare jig and fixture drawings	1/3
W.04	Prepare tool and die drawings	1/3

**Duty X: Prepare Power Transmission Drawings**

CODE	TASK	F/C
X.01	Prepare spur, bevel, and worm gear drawings	1/3
X.02	Prepare cam drawings	1/3
X.03	Prepare spring drawings	1/3
X.04	Prepare mechanical power transmission drawings <ul style="list-style-type: none"><li>• Belts, chains, and gears</li></ul>	2/3

**Duty Y: Prepare Fasteners, Intersections, Developments, and Revolutions**

CODE	TASK	F/C
Y.01	Prepare drawings of fasteners	3/3
Y.02	Prepare intersections	1/3
Y.03	Prepare developments	1/3
Y.04	Prepare revolution drawings	1/3
Y.05	Prepare sheet metal assembly drawings	1/3

**Duty Z: Solve Mathematical Problems Related to Mechanical Drafting**

CODE	TASK	F/C
Z.01	Calculate bend allowances <ul style="list-style-type: none"><li>• Depending on area of specialization</li></ul>	1/3
Z.02	Solve problems in trigonometry	3/3