

Student Name: _____

Date: _____

PROGRAM COMPETENCY PROFILE FOR CAREER TECHNICAL EDUCATION
Career Cluster: Manufacturing

Program Name: Machine Shop Technology/Assistant CIP: 480503

Effective 10/15

National Standard: Manufacturing Skill Standards Council

Competencies (statement that provides the overview and defines the instructional area) Student will:	Knowledge, Content and Skills (what a student needs to know and be able to do and upon which they will be assessed) http://www.education.nh.gov/career/career/aaoi.htm Student will:	Common Core: College & Career Readiness Standards http://www.corestandards.org English Language Arts :ELA Mathematics: M	Rating Scale -Sample Performance Assessments (Performance tasks the student needs to demonstrate in order to be rated proficient in meeting the competency)				
Understand the concepts, procedures, methods and practices related to safety in order to provide a safe work environment.	1. Demonstrate, apply, and practice appropriate laboratory safety. AAI 8. Health, Safety, and Environment	ELA:2, 4, 6, 9	<table border="1" style="width:100%; text-align:center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table> For Example: As the safety officer you are responsible for training all new employees. Your supervisor has asked you to design a safety manual to be used at all new employee training programs. You will create a draft manual and present it to your supervisor. Include #1 & 3	1	2	3	4
	1	2	3	4			
	2. Using standard procedures; demonstrate approved safe use of all basic hand tools used for precision machining processes (i.e., files, saws, tap and dies, fasteners, threads, hammers, scribes, etc.). AAI 4. Technical and Production Skills	ELA: 2, 6, 7	<table border="1" style="width:100%; text-align:center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table> For Example: You are a machine operator producing a metal part that develops a burr. To meet quality standards, you must select the proper tool to get rid of the burr. Use that tool safely to remove the burr.	1	2	3	4
	1	2	3	4			
3. Demonstrate, apply, and practice appropriate personal safety to industry best practices. AAI 8. Health, Safety, and Environment	ELA: 2, 4, 7	<table border="1" style="width:100%; text-align:center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table> For Example:	1	2	3	4	
1	2	3	4				
4. Recognize hazardous materials and interpret SDS and requirements, as well as related OSHA and DES standards. (Global Harmonizing System). AAI 8. Health, Safety, and Environment	ELA:2, 4, 7, 8	<table border="1" style="width:100%; text-align:center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table> For Example: You have been hired as a new safety supervisor for Whelen Engineering. Your first task is to update the safety manual and make sure that all MSDS, SDS requirements are being met.	1	2	3	4	
1	2	3	4				

Key: Rating Scale: 1 NO EXPOSURE; 2 = NOVICE (Information was covered in class, but student cannot demonstrate skill or knowledge without significant supervision); 3 = PROFICIENT (Student regularly demonstrates the knowledge or skill); 4= MASTERY (Student demonstrates successful completion of this skill numerous times without supervision.)

Common Core: E=English/Language Arts (Reading, Writing, Research, Listening Speaking, Technology) | M=Mathematics (Numbers Quantity, Algebra, Functions, Geometry, Stat&Prob)

All Aspects of Industry (AAI) | Career Ready Practices (CRP)

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Understand the concepts, procedures, methods and practices related to quality assurance.	5. Identify and be able to discuss the components of quality assurance concepts such as, LEAN & 6SIGMA: group dynamics, 5S principles, push-pull.	ELA: 2, 7, 8, 9	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table> For Example: You are a department supervisor who has been green belt trained. Your task is to teach your department about LEAN concepts through a power point presentation.	1	2	3	4
1	2	3	4				
	6. Explain, discuss and apply personal ethics in the manufacturing industry.	ELA: 2, 7, 8	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table> For Example: As a new hire you have to attend the new hire orientation. The orientation is going to confirm the norms , do you show up on time and ready for work every day? Do you show respect to your supervisor, equipment, coworkers and the products you are producing? Are you striving for personal success as well as the success of the company you work for? http://smallbusiness.chron.com/manufacturing-code-ethics-46028.html	1	2	3	4
1	2	3	4				
	7. Using standard procedures, demonstrate approved use of all basic measurement tools used for precision machining processes (i.e., indicators, micrometers, calipers, scales, tapes, etc.). AAI 4. Technical and Production Skills	ELA: 2, 4 M: 1, 2, 9, 10	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table> For Example: You have been assigned to the quality control department you are faced with teaching a new employee the best practices in how to use appropriate precision measuring equipment to qualify random sample parts including non-conformance reports. Include #7 - 9	1	2	3	4
1	2	3	4				

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	8. Be able to identify and document defects (i.e. Non-conformance reports (NCR))	ELA: 2, 4	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table> For Example: As an employee you must fill out a Non-conformance report (NCR) and be able to identify proper procedures for rejected part.	1	2	3	4
1	2	3	4				
	9. Discuss and explain the processes and procedures utilized to prevent defects in the machining/ manufacturing industry (i.e. foreign object debris (FOD), clean room practices, environmental factors, calibration)	ELA: 2, 4, 6, 9	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table> For Example: Write a procedures manual on cleanroom practices which contains information on how to deal with environmental factors, foreign object debris, and proper procedures on how to calibrate the tools you are using.	1	2	3	4
1	2	3	4				
	10. Read and record basic precision measuring tools: micrometers to .0001 and digital calipers to .001.	ELA:2, 4, 7, 9 M:9, 16, 19	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table> For Example: You are a machinist working with a blueprint that has various tolerances down .0001 and .001 you must apply the appropriate tool to measure the proper resolution of tolerance. Include #10-11	1	2	3	4
1	2	3	4				
	11. Identify common aspects of precision measuring including height gage, gage blocks, and precision dial indicator. Compare and Contrast common aspects of precision measuring (i.e.: dial calipers, sine plate, cmm, height gages, etc.)	ELA:2, 4, 7, 8, 9 M: 9, 16, 19	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table> For Example:	1	2	3	4
1	2	3	4				

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Understand the concepts, procedures, and processes in print reading and measurements to implement the proper mathematical calculations on the parts being manufactured	12. Use triangulation to determine basic right angles within 1 degree of accuracy. (Discuss working knowledge of trigonometry).	ELA:2, 7, 8 M:6, 8, 10, 12, 15	<table border="1" style="width:100%; text-align:center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table> For Example: You are a machinist. You must make sure the taper is straight and true according to blueprint specifications within the tolerances specified. Through use of decimal precision measuring tools, build a machine taper according to given specifications. Include # 12-14	1	2	3	4
	1	2	3	4			
	13. Read and interpret a 3-view orthographic projection print. Include knowledge and exposure to geometric dimensioning and tolerancing (GD&T) as well as design.	ELA:2, 4, 6, 7, 8,9	<table border="1" style="width:100%; text-align:center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table> For Example:	1	2	3	4
	1	2	3	4			
14. Read and interpret a title block on a print to determine tolerances, materials, and other relevant information.	ELA:2, 6, 7, 8, 9	<table border="1" style="width:100%; text-align:center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table> For Example:	1	2	3	4	
1	2	3	4				
15. Identify and demonstrate basic concepts of CAD/CAM technology. AAI 5. Underlying Principles of Technology	ELA:2, 4, 6, 7, 8, 9	<table border="1" style="width:100%; text-align:center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table> For Example: You are a mechanical engineer. You are faced with the issue of making a part. Design the part to company specifications using CAD software.	1	2	3	4	
1	2	3	4				

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Understand the basic properties and processes of various materials and in order to be able to select the proper tooling and machine set-up	16. Identify, discuss, and demonstrate basic material properties.	ELA:2, 4, 6, 7, 8	<table border="1" style="width:100%; text-align:center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table> For Example: As a tool maker you are tasked to create a mold. You must select the appropriate materials and the heat treat process required to build the mold within the specifications. Include # 16-19	1	2	3	4
	1	2	3	4			
	17. Discuss the basic nomenclature of different materials in relation to the ASM Standards.	ELA:2, 6, 7, 8, 9	<table border="1" style="width:100%; text-align:center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table> For Example:	1	2	3	4
	1	2	3	4			
18. Identify, discuss, and demonstrate basic heat treating processes and stress relieving, as well as the curing of composites.	ELA:2, 6, 7, 8, 9	<table border="1" style="width:100%; text-align:center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table> For Example:	1	2	3	4	
1	2	3	4				
19. Identify and list properties of basic ferrous, non-ferrous, and composite materials used by local industry.	ELA:2, 6, 7, 8, 9	<table border="1" style="width:100%; text-align:center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table> For Example:	1	2	3	4	
1	2	3	4				
Understand the concepts of basic operations and use of tools and equipment of the trade in order to select the proper equipment to produce the product	20. Identify and safely use various types of power cutting saws.	ELA: 2, 4, 6, 7, 8, 9 M:1, 2, 4, 6, 8, 15	<table border="1" style="width:100%; text-align:center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table> For Example: As a machinist, you are to make a part that was designed. According to the specifications, you need to select the materials to make the part. Determine what particular saw should be used and what set-up procedures that need to be followed. Calculate the speed and feed rate to safely make the cut. Include #20-21	1	2	3	4
1	2	3	4				

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	21. Calculate feeds, speeds, proper tooling, and lubricants for safe machine operation, and select the appropriate tooling and lubricants based upon materials.	ELA:2, 4, 6, 7, 8, 9 M:1, 2, 4, 6, 8, 15	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table> For Example:	1	2	3	4
1	2	3	4				
	22. Identify, set up, and safely operate a drill press (operations include hole drilling, tapping, reaming, and countersinking).	ELA:2, 4, 7, 8 M:1, 2, 4, 6, 8, 15	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table> For example: You are in a production line. You have to produce a ¼-20 threaded hole. Find the appropriate tap drill for creating the hole, and describe the process.	1	2	3	4
1	2	3	4				
	23. Set up and safely perform off-hand grinding (operations include tool bit sharpening, wheel dressing, and drill-bit sharpening).	ELA:2, 4, 6, 7, 8, 9	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table> You are a machinist faced with the problem of a dull drill. Identify the correct wheel for the material of the drill you are grinding.	1	2	3	4
1	2	3	4				
	24. Identify, set up, and safely operate a milling machine (operations include, but should not be limited to, edge milling, face milling, selection of proper speeds and feeds, proper work holding set ups such as vices, clamps, vacuum, magnets).	ELA:2, 4, 6, 7, 8, 9 M:1, 2, 4, 5, 8, 9, 10, 11, 12, 13, 14, 15,17,19	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table> For Example: You are a machinist that must rough machine a 1-2-3 block in preparation for grinding. Identify the set up and proper operation of the milling machine.	1	2	3	4
1	2	3	4				
	25. Identify, set up, and safely operate a precision surface grinder (operations include wheel selection and precision grinding to .0001”).	ELA:2, 4, 6, 7, 8, 9 M:2, 6, 8	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table> For Example: As a machinist you have to grind a 1-2-3 Block. You have to grind it to .0001 flatness and tolerance with the precision surface grinder. Demonstrate the steps needed.	1	2	3	4
1	2	3	4				

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	26. Identify, set up, and safely operate a lathe (operations include, but should not be limited to: turning, facing, threading, knurling, boring and selection of proper speeds and feeds).	ELA:2, 4, 6, 7, 8, 9 M:2, 6, 8	<table border="1" style="width:100%; text-align:center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table> For Example: You are a machinist. Create a two-step cylinder meeting blueprint specifications of 1 inch and 1.5 inch.	1	2	3	4
1	2	3	4				
Understand the concepts in applying Computer Integrated Manufacturing technology in order to properly program and manufacture a product	27. Write a CNC program; conversational and G and M code. AAI 5. Underlying Principles of Technology	ELA:2, 4, 6, 7, 8, 9 M:2, 6, 8, 9, 10, 11, 12, 13, 14, 15	<table border="1" style="width:100%; text-align:center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table> For Example: Your supervisor comes to you with a print. He has asked you to write a program appropriate to the machine tool. Include #27- 29	1	2	3	4
	1	2	3	4			
	28. Demonstrate application of Cartesian coordinates as applies to various machines. AAI 4. Technical and Production Skills	ELA:2, 4, 6, 7, 8, 9 M:2, 6, 8, 9, 10, 11, 12, 13, 14, 15	<table border="1" style="width:100%; text-align:center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table> For Example:	1	2	3	4
1	2	3	4				
29. Demonstrate concepts of tool offsets on machining centers and turning centers (i.e., tool fixture, length, and radius).	ELA:2, 4, 6, 7, 8, 9	<table border="1" style="width:100%; text-align:center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table> For Example:	1	2	3	4	
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	30. Identify application of basic nontraditional machining processes and their interactions (id: electronic discharge (EDM), laser, water jet, electrical chemical machining (ECM), direct metal laser sintering (DMLS)). AAI 5. Underlying Principles of Technology	ELA:2, 4, 7, 8	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table> For Example: As a machinist, you are faced with the problem of a broken tap. You must set up the EDM to remove the tap. Describe how this was accomplished safely to your supervisor.	1	2	3	4
1	2	3	4				
Understand and apply the concepts, methods and processes in welding.	31. Discuss and / or demonstrate basic practices of acetylene welding and brazing of ferrous materials and the post and preheating materials associated with welding.	ELA:2, 4, 7, 8	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table> For Example: As a machinist, you must drive an extremely deep hole. Your drill is not long enough. Explain the process for extending the drill by brazing an extension to achieve the proper depth.	1	2	3	4
1	2	3	4				
	32. Identify and/or demonstrate basic practices of MIG, TIG, and arc welding of ferrous materials.	ELA:2, 4, 7, 8	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table> For Example: As the welding instructor, you receive broken items from other departments in the school. Select and use the appropriate welding materials to repair the stools from the science department.	1	2	3	4
1	2	3	4				

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Understand the fundamental concepts of small business ownership and operations, as well as how small business impacts the economy	33. Discuss and assess business possibilities and identify the steps in planning a small business. AAI 1. Planning AAI 2. Management AAI 3. Finance	ELA:2, 4, 5, 6, 7, 8, 9	<table border="1" style="width:100%; text-align:center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table> For Example: You have decided that you want to open your own shop. You have made an appointment to meet with a small business representative to discuss the steps in developing a business plan. Include #34-35 http://www.buzgate.org/8.0/nh/ch_youth.html http://www.entre-ed.org/teach/busplan.htm	1	2	3	4
	1	2	3	4			
	34. Identify the resources needed for business startup and operation.	ELA:2, 4, 5, 6, 7, 8, 9	<table border="1" style="width:100%; text-align:center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table> For Example:	1	2	3	4
1	2	3	4				
35. Identify and discuss the traits and behaviors of a small business owner (skills, abilities, interests, personal assessment, and self-management).	ELA: 2, 5, 6, 7, 8, 9	<table border="1" style="width:100%; text-align:center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table> For Example: You are taking a course at DEN Un. on entrepreneurship. An assignment is to interview a local business owner (sole proprietor, partnership, LLC, Franchise Owner, etc.). From the interview findings, you create a self-assessment chart and take the online assessment to test your entrepreneurial aptitude. http://www.forbes.com/sites/tompost/2012/06/04/are-you-an-entrepreneur-startup/	1	2	3	4	
1	2	3	4				

Key: Rating Scale: 1 NO EXPOSURE; 2 = NOVICE (Information was covered in class, but student cannot demonstrate skill or knowledge without significant supervision); 3 = PROFICIENT (Student regularly demonstrates the knowledge or skill); 4= MASTERY (Student demonstrates successful completion of this skill numerous times without supervision.)

Common Core: E=English/Language Arts (Reading, Writing, Research, Listening Speaking, Technology) | M=Mathematics (Numbers Quantity, Algebra, Functions, Geometry, Stat&Prob)

All Aspects of Industry (AAI) | Career Ready Practices (CRP)

Student Name: _____

Date: _____

PROGRAM COMPETENCY PROFILE FOR CAREER TECHNICAL EDUCATION
Career Cluster: Manufacturing

Program Name: Machine Shop Technology/Assistant CIP: 480503

Effective 10/15

National Standard: Manufacturing Skill Standards Council

Competencies (statement that provides the overview and defines the instructional area) Student will:	Knowledge, Content and Skills (what a student needs to know and be able to do and upon which they will be assessed) http://www.education.nh.gov/career/career/aaoi.htm Student will:	Common Core: College & Career Readiness Standards http://www.corestandards.org <u>English Language Arts :ELA</u> <u>Mathematics: M</u>	Rating Scale -Sample Performance Assessments (Performance tasks the student needs to demonstrate in order to be rated proficient in meeting the competency)				
Understand the necessary career readiness and employability skills in order to achieve success in today's workplace	36. Demonstrate personal growth, community leadership, democratic principles, and social responsibility by participating in activities/events offered through student and professional organizations.	ELA:7, 8, 9	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table> For Example: You have gone to your supervisor requesting a performance review due to the completion of additional trainings attended. The fact that you now have additional knowledge and skills, justifies why you should be promoted. Your supervisor has told you to review her calendar and schedule a meeting. Include #36 - 37	1	2	3	4
	1	2	3	4			
37. Identify, discuss and demonstrate the skills to be an effective employee and contributing citizen (personal qualities, habits, attitudes, and social graces).	ELA: 6, 7, 8, 9	<p align="center">http://www.careertech.org/career-ready-practices</p>					

Key: Rating Scale: 1 NO EXPOSURE; 2 = NOVICE (Information was covered in class, but student cannot demonstrate skill or knowledge without significant supervision); 3 = PROFICIENT (Student regularly demonstrates the knowledge or skill); 4= MASTERY (Student demonstrates successful completion of this skill numerous times without supervision.)

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