

Student Name: _____

Date: _____

PROGRAM COMPETENCY PROFILE FOR CAREER TECHNICAL EDUCATION
Career Cluster: Manufacturing

Program Name: Manufacturing Technology/Technician CIP: 150613

Effective 3/10

National Standard: National Council for Advanced Manufacturing (NACFAM)

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) Student will:	<u>NH Common Core State Standards – Aligned</u> <ul style="list-style-type: none"> • English/Language Arts/Literacy: E • Mathematics: M • Science: S • Art: A 	Rating Scale -Sample Performance Assessments (Performance tasks the student needs to demonstrate in order to be rated proficient in meeting the competency) Student Will:				
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: Explain the health and safety laws and practices affecting the employee, the surrounding community, and the environment in this industry.		<table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table>	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, hammers, scribes, etc.).		<table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table>	1	2	3	4
	1	2	3	4			
3. Demonstrate, apply, and practice appropriate personal safety.		<table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table>	1	2	3	4	
1	2	3	4				
4. Recognize hazardous materials and interpret MSDS requirements.		<table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table>	1	2	3	4	
1	2	3	4				
Understand the underlying principles of and the interaction between multiple disciplines in the manufacturing process	5. Demonstrate the ability to create Technical Drawings and Schematics and its application to the manufacturing processes.		<table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table>	1	2	3	4
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	6. Demonstrate CAD Drawing Fundamentals and its application to a manufacturing project.		<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4
1	2	3	4				
	7. Describe various Troubleshooting Processes as they apply to the manufacturing processes.		<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4
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Understand machines and mechanisms as used in manufacturing	8. Demonstrate the use of various tools and machines and describe their function and use in manufacturing.		<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4
1	2	3	4				
	9. Discuss and explain the five types of machine tools and their uses.		<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4
1	2	3	4				
	10. Demonstrate the use of measurements and how to apply them in manufacturing.		<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4
1	2	3	4				
	11. Show the operation of various Hand tools: Drill Press, Band Saw, CNC Machine.		<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4
1	2	3	4				
Understand the principles and concepts of robotics and their use in manufacturing	12. Identify and calculate examples of electrical laws and basic measurements (Ohm's, Kirchhoff's, and watts) applied to series and parallel circuits, impedance, capacitance, inductance and magnetism.		<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4
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	13. Identify and convert numbering systems and codes for binary, decimal, hexadecimal, BCD and Cartesian coordinates.		<table border="1" style="display: inline-table;"> <tr> <td style="width: 20px; text-align: center;">1</td> <td style="width: 20px; text-align: center;">2</td> <td style="width: 20px; text-align: center;">3</td> <td style="width: 20px; text-align: center;">4</td> </tr> </table>	1	2	3	4
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	14. Interpret and apply the six parts of logic: AND, OR, NOR, NAND, memory, and truth tables.		<table border="1" style="display: inline-table;"> <tr> <td style="width: 20px; text-align: center;">1</td> <td style="width: 20px; text-align: center;">2</td> <td style="width: 20px; text-align: center;">3</td> <td style="width: 20px; text-align: center;">4</td> </tr> </table>	1	2	3	4
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	15. Describe concepts of industrial controllers as applied to CNC, PLC, and robotics. AAI 5. Underlying Principles of Technology: Explain through discussion the technological systems used within this industry.		<table border="1" style="display: inline-table;"> <tr> <td style="width: 20px; text-align: center;">1</td> <td style="width: 20px; text-align: center;">2</td> <td style="width: 20px; text-align: center;">3</td> <td style="width: 20px; text-align: center;">4</td> </tr> </table>	1	2	3	4
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	16. Identify the basic components of a robotic system and their operations.		<table border="1" style="display: inline-table;"> <tr> <td style="width: 20px; text-align: center;">1</td> <td style="width: 20px; text-align: center;">2</td> <td style="width: 20px; text-align: center;">3</td> <td style="width: 20px; text-align: center;">4</td> </tr> </table>	1	2	3	4
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	17. Demonstrate basic electronic connection techniques such as soldering, crimping, and cable repair.		<table border="1" style="display: inline-table;"> <tr> <td style="width: 20px; text-align: center;">1</td> <td style="width: 20px; text-align: center;">2</td> <td style="width: 20px; text-align: center;">3</td> <td style="width: 20px; text-align: center;">4</td> </tr> </table>	1	2	3	4
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	18. Perform logical steps of troubleshooting electronic systems. AAI 4. Technical and Production Skills: Identify specific production and technical skills required for this industry.		<table border="1" style="display: inline-table;"> <tr> <td style="width: 20px; text-align: center;">1</td> <td style="width: 20px; text-align: center;">2</td> <td style="width: 20px; text-align: center;">3</td> <td style="width: 20px; text-align: center;">4</td> </tr> </table>	1	2	3	4
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Understand computer/controller programming as applied to the manufacturing process	19. Write a basic CNC program and describe what it entails.		<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4
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	20. Demonstrate application of Cartesian coordinates for milling machines and/or lathes.		<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4
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	21. Demonstrate concepts of tool offsets (i.e., tool fixture, length, and radius).		<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4
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	22. Demonstrate application of basic nontraditional machining processes.		<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4
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Understand the dynamics of hydraulic and pneumatic systems in manufacturing	23. Illustrate the fundamentals of mechanical power and how it is used in the manufacturing process.		<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4
1	2	3	4				
	24. Demonstrate and explain pneumatic and hydraulic symbols and circuits.		<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4
1	2	3	4				
Understand the principles of electrical systems as applied to manufacturing	25. Follow safe work practices in accordance with OSHA, NED and Local codes.		<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4
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	26. Identify and calculate examples of electrical law.		<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4
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	27. Differentiate between AD and DC theory.		<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4
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	28. Describe different uses of transformers and their voltages.		<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4
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	29. Identify, discuss, and demonstrate basic metallurgical properties.		<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4
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	30. Identify, discuss and demonstrate basic heat treating processes.		<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4
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	31. Identify and list properties of basic ferrous and non-ferrous materials used by local industry.		<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4
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Understand the use of plasma equipment and its performance to produce a quality cut	32. Demonstrate safety procedures for cutting (E2-1), describe theory of plasma cutting (E2-1), and set up and operate plasma cutting equipment (E2-3, E2-4).		<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4
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	33. Demonstrate layout and make straight line cuts (E2-3).		<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4
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Understand and apply the inspection tools and methods for controlling quality	34. Identify various types of power saws and their purposes for cutting.		<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4
	1	2	3	4			
	35. Set up and safely perform material cutting operations.		<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4
	1	2	3	4			
	36. Identify, set up, and safely operate a drill press (operations include hole drilling, reaming, and countersinking).		<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4
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37. Set up and safely perform off-hand grinding (operations include tool bit sharpening and drill-bit sharpening).		<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4	
1	2	3	4				
38. Identify, set up, and safely operate a precision surface grinder (operations include wheel selection and precision grinding to .001").		<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4	
1	2	3	4				
39. 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).		<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4	
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	40. Identify, set up, and safely operate a lathe (operations include, but should not be limited to, turning, facing, threading, knurling, and selection of proper speeds and feeds).		<table border="1" style="width: 100%; text-align: center;"> <tr> <td style="width: 25%;">1</td> <td style="width: 25%;">2</td> <td style="width: 25%;">3</td> <td style="width: 25%;">4</td> </tr> </table>	1	2	3	4
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Understand the fundamental concepts of entrepreneurship and how entrepreneurship influences the economy	41. Identify the resources and steps needed for venture startup and operation and options in planning the venture’s future (growth, development, demise). AAI 1. Planning: Explain the key elements of a long-term plan for a successful company. AAI 2. Management: Discuss the different forms of management and ownership within this industry. AAI 6. Labor Issues: Explain the employees’ and employers’ rights and responsibilities in this industry. AAI 7. Community Issues: Discuss the ways a company can impact its community and the ways community can impact a company.		<table border="1" style="width: 100%; text-align: center;"> <tr> <td style="width: 25%;">1</td> <td style="width: 25%;">2</td> <td style="width: 25%;">3</td> <td style="width: 25%;">4</td> </tr> </table>	1	2	3	4
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Understand the importance of personal growth and leadership to enhance career success	42. Demonstrate personal growth, community leadership, democratic principles and social responsibility.		<table border="1" style="width: 100%; text-align: center;"> <tr> <td style="width: 25%;">1</td> <td style="width: 25%;">2</td> <td style="width: 25%;">3</td> <td style="width: 25%;">4</td> </tr> </table>	1	2	3	4
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Understand the necessary employability skills in order to achieve success in today’s workplace	Decision-Making & Problem Solving: 43. Demonstrate and apply good decision making and problem solving skills by outlining issues in situations/problems and determining, collecting, and organizing information needed in order to formulate a solution.		<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: - create an outline - create a troubleshooting log - make class presentation - develop and test strategies or options that work - provide examples of the strategies or options tested or tried - compare and analyze pros and cons of identified strategies or options - through teamwork, arrive at a decision or determine a solution that is well suited to the task - independently arrive at a decision or determine a solution that is well suited to the task - communicate in a clear format how the solution was formed - justify or describe how and why a particular solution option was chosen	1	2	3	4
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	<p>Self –Management: 44. Demonstrate and apply self-management skills by adhering to regulations, being responsible, and following through on commitments.</p>		<table border="1" style="width: 100%; text-align: center;"> <tr> <td style="width: 25%;">1</td> <td style="width: 25%;">2</td> <td style="width: 25%;">3</td> <td style="width: 25%;">4</td> </tr> </table> <p>For Example:</p> <ul style="list-style-type: none"> - have a written test on applicable policies and procedures - assess student orientation knowledge through instructor observations and written unit test - review student handbook - adhere to regulations in school, classroom, and everyday settings - build trust by being consistent, dependable, and verbally positive with others - ask questions and listen to others - keep track of assignments and/or responsibilities - have work done on time - respond positively to constructive feedback - show respect for others and their points of view - set individual goals and document progress toward achieving those goals - take initiative to pursue learning - adapt as necessary to create a positive outcome for self and others - advocate appropriately for himself/herself 	1	2	3	4
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	<p>Communication Skills: 45. Demonstrate and apply effective communication skills: verbal, written, visual, and listening.</p>		<table border="1" style="width: 100%; text-align: center;"> <tr> <td style="width: 25%;">1</td> <td style="width: 25%;">2</td> <td style="width: 25%;">3</td> <td style="width: 25%;">4</td> </tr> </table> <p>For Example: be given a work order that contains written instructions of a specific job and complete the work order - create a power point presentation - participate in a debate - perform mock interviews - develop a topic - include details to support a main point - use appropriate grammar and sentence structure - organize writing and/or presentation materials - use constructive feedback to improve skill - participate in discussion and conversation by listening, entering in, taking turns, responding to others remarks, asking questions, summarizing and closing, as appropriate to the given context - use varied vocabulary for clarity and effectiveness - support his/her ideas in a public forum using the appropriate visual/audio aides - select and use the appropriate media and method(s) to communicate the subject effectively - adapt writing, speaking, and/or visual representations effectively to a particular audience - act on or respond appropriately to verbal and non-verbal cues from the audience</p>	1	2	3	4
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	Ability to Work with Others: 46. Demonstrate and apply the necessary skills in order to work effectively with others. AAI 9. Personal Work Habits: Explain the work habits an employer looks for in an employee in this industry.		<table border="1" style="width: 100%; text-align: center;"> <tr> <td style="width: 25%;">1</td> <td style="width: 25%;">2</td> <td style="width: 25%;">3</td> <td style="width: 25%;">4</td> </tr> </table> For Example: - role play a situation in which there is a conflict which must be resolved - compose a list of what she/he believes to be the most common problems within that profession after reviewing appropriate work ethics standards - conduct an interview with a manager and share report with classmates - demonstrate knowledge of individual strengths he/she brings to a group - demonstrate knowledge of and respect for cultural and individual differences - demonstrate beginning skills in conflict management by outlining the issues involved and others' points of view - demonstrate knowledge of the possible roles and responsibilities that individuals assume while working with others - demonstrate knowledge of group skills: listening, brainstorming, clarifying information, showing initiative, acknowledging contributions, defining group tasks, and responding positively to constructive feedback - demonstrate increasing skills in conflict management by brainstorming a variety of solutions and their possible outcomes - apply his/her individual strengths to enhance a group's performance - assume responsibilities within a group - demonstrate the use of group skills in a way that enhances a group's performance - demonstrate skills in conflict management by describing, justifying, and applying a resolution process, and reflecting on the outcome	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.)

PROGRAM COMPETENCY PROFILE FOR CAREER TECHNICAL EDUCATION
Career Cluster: Manufacturing

Program Name: Manufacturing Technology/Technician CIP: 150613

Effective 3/10

National Standard: National Council for Advanced Manufacturing (NACFAM)

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) Student will:	<u>NH Common Core State Standards</u> – Aligned <ul style="list-style-type: none"> • English/Language Arts/Literacy: E • Mathematics: M • Science: S • Art: A 	Rating Scale -Sample Performance Assessments (Performance tasks the student needs to demonstrate in order to be rated proficient in meeting the competency) Student Will:				
	Information Use - Research, Analysis, Technology: 47. Demonstrate and apply the use of information through research, analysis, and technology.		<table border="1" style="width: 100%; text-align: center;"> <tr> <td style="width: 25%;">1</td> <td style="width: 25%;">2</td> <td style="width: 25%;">3</td> <td style="width: 25%;">4</td> </tr> </table> For Example: do a research project and develop a presentation for the class - keep a daily notebook - show use of a plan for gathering information - gather information from a variety of sources, using a variety of technologies - use sources that are current and appropriate to the topic - evaluate sources for correct and trustworthy information - document sources of information appropriately - demonstrate and apply the skills in using software applications (MS Office) - use a filing/organization system for information, such as notebook, disk, etc. - justify the use of a particular organizational system for a particular product - demonstrate effective communication skills (written, oral, listening) - effectively present a thesis, supporting evidence, and a conclusion using a variety of media	1	2	3	4
1	2	3	4				

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	Mathematical Concepts: 48. Demonstrate mathematical and computation skills as applied to real world situations. AAI 3. Finance: Explain the key components of financial management of a company.		<table border="1" style="width: 100%; text-align: center;"> <tr> <td style="width: 25%;">1</td> <td style="width: 25%;">2</td> <td style="width: 25%;">3</td> <td style="width: 25%;">4</td> </tr> </table> For Example: - keep a log of all possible uses of mathematics noticed throughout the class/lab/worksite - compute accurately, applying addition, subtraction, multiplication, and division on real numbers, fractions, percents, and decimals - collect, interpret, organize and display relevant data for solving a mathematics problem - translate real world problems into mathematical representations - express and present mathematical ideas clearly in everyday written and oral language - express in written and oral language how mathematics connects to other contexts outside the mathematics classroom - use basic numerical concepts such as whole numbers and percentages in practical situations; make reasonable estimates of arithmetic results without a calculator; and use tables, graphs, diagrams, and charts to obtain or convey quantitative information - approach practical problems by choosing appropriately from a variety of mathematical techniques; use quantitative data to construct logical explanations for real world situations; express mathematical ideas and concepts orally and in writing; and understand the role of chance in the occurrence and prediction of events	1	2	3	4
1	2	3	4				

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	General Safety: 49. Demonstrate and apply safe practices and procedures in the workplace.		<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: - develop scenarios of hazards and accidents using publications and the internet - be observed by teacher - take written quizzes/written tests - demonstrate knowledge of safety and sanitation practices and procedures - identify and report hazardous conditions and safe working procedures - use personal protective equipment and clothing	1	2	3	4
1	2	3	4				
	Career Development: 50. Demonstrate personal/career development skills by completing a career plan.		<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: - complete a self-awareness inventory - develop a career portfolio - use a career software, such as Choices, to measure their aptitudes and abilities for particular careers - use available resources (college catalogs and websites) to research information about postsecondary educational opportunities - select a career in the field and outline educational and skill requirements, expected job growth, and salaries - review with teacher software printout to assess their aptitudes and abilities - make appropriate choices in pursuit of postsecondary education or training and/or direct entry into the world of work - plan a senior experiential project to review and evaluate a variety of career choices	1	2	3	4
1	2	3	4				

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