

## Articulation Agreement

Between

New Century Careers MANUFACTURING 2000 (M2K)  
PA State registered pre-apprenticeship program

and

Pittsburgh Public Schools  
CTE Program

The New Century Careers (NCC) MANUFACTURING 2000 (M2K) pre-apprenticeship program and Pittsburgh Public Schools, CTE Programs support setting criteria by which each student is judged to determine eligibility for receiving Advanced Standing to the NCC MANUFACTURING 2000 (M2K) machinist pre-apprenticeship training program. If eligible upon completion, each student would receive credit for 50 of 50 required Tooling-U online modules and two (2) National Institute for Metalworking Skills (NIMS) credentials. Approval of each criterion would be approved through records maintained by Tooling-U and NIMS and given access to NCC. Trainees would then be admitted directly into the hands-on portion of M2K training.

The following criteria have been established and agreed upon by both New Century Careers and Pittsburgh Public Schools. Each student:

1. Must successfully complete **50** of the 50 core online (Class Order #1-#50) Tooling-U modules as outlined in appendix A.
2. Must complete the required 1\_National Institute for Metalworking Skills (NIMS) credentials:
  - a. Job Planning, Benchwork, and Layout, and;
  - b. Measurement, Materials, and Safety.
3. Must complete an M2K application.
4. Must submit two letters of reference to NCC as part of the application process.
5. Must be 18 years or older at time of application to M2K.
6. Must have a High School Diploma or GED
7. Must participate in Safety and Orientation training and adhere to all M2k program requirements.



July 22, 2024

Neil Arthur Ashbaugh (Date)  
New Century Careers  
President/CEO



Angela E. Mike (Date)  
Pittsburgh Public Schools, CTE Division  
Executive Director

07-29-2024

## APPENDIX A

Class Order	Class Name	Class Description	Date Completed	Final Grade
<b>Safety Classes</b>				
1	Safety for Metal Cutting 101	Safety for Metal Cutting provides a comprehensive overview of the safety hazards associated with metal cutting operations, such as hot flying chips, broken tools, and rotating components.		
2	Safety for Lifting Devices 211	Covers the different pieces of lifting equipment that may be used in the workplace.		
3	Hand & Power Tool Safety 201	Provides guidelines for the safe use of common hand and power tools.		
4	Personal Protective Equipment 111	Introduces the purpose and use of personal protective equipment (PPE).		
5	Fire Safety and Prevention 181	The class "Fire Safety and Prevention" examines common workplace fire safety procedures. Fires, no matter how small, should be reported immediately. Buildings are equipped with extinguishing systems that actuate an alarm and discharge an extinguishing agent to control advanced stage fires.		
6	Machine Guarding 140	This class covers basic machine guarding practices and devices and includes information on hazardous machine components, motions, and actions.		
<b>Math</b>				
7	Math Fundamentals 101	The class "Math Fundamentals" covers basic arithmetic operations, including addition, subtraction, multiplication, and division. Additionally, it introduces the concept of negative numbers and integers.		
8	Math: Fractions and Decimals 111	"Math: Fractions and Decimals" provides the methods used to perform basic mathematical operations using fractions, decimals, and percentages. The class covers addition, subtraction, multiplication, and division with fractions and decimals.		
9	Math: Units of Measurement 112	This class addresses common units of measurement used in manufacturing and explains how to convert from one unit of measurement to another.		
10	Algebra Fundamentals 141	"Math: Algebra Fundamentals" provides a detailed overview of the basics of algebra, including the operations needed to solve a single variable equation. Basic algebra is used constantly in manufacturing, from the production floor to the accounting department.		
11	Speed & Feed for the Lathe 301	Speed and Feed for the Lathe provides a thorough explanation of cutting variables for lathe operations, including how these variables are measured, selected, and set.		
12	Speed & Feed for the Mill 311	Speed and Feed for the Mill provides a thorough explanation of cutting variables for mill operations, including how these variables are measured, selected, and set. Many variables affect speed and feed selection.		

13	Basic Measurement 101	The class "Basic Measurement" offers an overview of common gaging and variable inspection tools and methods. Variable inspection takes a specific measurement using common devices such as calipers and micrometers.		
14	Basics of Tolerance 121	"Basics of Tolerance" provides a comprehensive overview on part tolerancing, including different types of tolerances and the relationship between tolerances and part dimensions. Every manufactured part must meet certain specifications.		
		<b>Blueprints</b>		
15	Blueprint Reading 131	The class "Blueprint Reading" provides a thorough understanding of blueprints and how to read them. Blueprints are documents that contain three major elements: the drawing, dimensions, and notes.		
16	Interpreting Blueprints 230	This class provides an overview of common features found in prints and describes how to properly inspect them. Includes an Interactive Lab.		
		<b>Benchwork &amp; Layout</b>		
17	Benchwork and Layout Operations 241	Provides a detailed overview of the various benchwork and layout processes that operators often need to perform during manual machining. Layout is the process of marking a workpiece prior to cutting.		
		<b>Geometry</b>		
18	Geometry: Lines and Angles 151	The class Geometry: Lines and Angles discusses the basic building blocks of all geometry: the line and the angle. Every print used in manufacturing is composed of lines and angles which must be interpreted to manufacture the depicted part.		
19	Geometry: Triangles 161	Triangles discusses triangles and the specific mathematical operations unique to them. While the triangle is a very basic shape, it can be found as a part of more complex shapes.		
20	Shop Geometry Overview 170	This class presents a general overview and refresher for the the most common rules of geometry.		
21	Geometry: Circles and Polygons 171	"Geometry: Circles and Polygons" covers the specifics of geometry involving circles and polygons with any number of sides.		
		<b>Trig</b>		
22	Shop Trig Overview 210	This class presents a general overview and refresher for the rules of trigonometry.		
23	Trigonometry: Sine, Cosine, Tangent 211	The class "Trigonometry: Sine, Cosine, and Tangent" discusses the three basic ratios that are the basis for trigonometry. Trigonometry is based on the specific relationships between the sides and angles of right triangles. Using trigonometry, a person can determine the missing angle and side measurements of a right triangle based on the information present in a drawing. Although solving trigonometric ratios often requires a calculator, users must know which ratios to apply to a particular problem and how to calculate them. In situations where parts are being manufactured, this knowledge is crucial to effective production of parts that require specific dimensions and angles. After taking this class, a user should be able to define the various trigonometric ratios, and use them to solve various problems, including calculating a taper angle on a print.		

24	Trigonometry: Sine Bar Applications 221	"Trigonometry: Sine Bar Applications" discusses sine bars and the trigonometry required to use them. Sine bars are used when an angle needs to be machined, measured, or inspected. Sine bars are used with gage blocks to set a workpiece at an angle. To find the necessary measurements for the gage blocks or the sine bar angle, trigonometric ratios are used. These ratios include sine, cosine, and tangent. Gage pins are sometimes used with sine bars and gage blocks to increase the range of measurements. After taking this class, a user should be able to make the necessary calculations for setting up a specific workpiece angle using a sine bar.		
<b>Metals &amp; Mfg</b>				
25	Introduction to Metals 121	Intro to Metals" provides an overview of popular ferrous and nonferrous metals and their properties. This course introduces users to the three types of metal crystal structures, how grains develop in metal, the purpose of heat treating, and how these aspects impact a material's characteristics. Steel, aluminum, titanium, and other metals have a wide range of commercial and advanced applications, including structural shapes, machine components, and medical devices.		
26	Cutting Processes 111	Provides an introductory overview of the common metal cutting operations. To those new to manufacturing and machining, familiarity with the basic machines, tools, and principles of metal cutting is essential.		
27	Overview of Machine Tools 121	Provides an overview of the basic machine tools used in metal cutting operations. The class describes the appearance, components, and uses of lathes, mills, drill presses, saws, and broaches.		
<b>Workholding</b>				
28	Clamping Basics 131	Describes fundamental principles and concepts for clamping for manufacturing operations.		
29	Chucks, Collets, and Vises 141	Discusses the basics of three of the most common workholding devices in machining.		
<b>Lathe</b>				
30	Engine Lathe Basics 211	Engine Lathe Basics provides an introduction to the components and controls used on a manual lathe. The lathe creates cylindrical parts by producing a round diameter on a part by rotating a workpiece against a stationary single-point cutting tool.		
31	Engine Lathe Operations 261	"Engine Lathe Operation" serves as a guide for manually machining various features onto a workpiece. The class establishes principles of basic lathe operation and takes users through procedures for common outer diameter operations, including turning, facing, taper turning, knurling, parting off, grooving, and threading, and inner diameter operations, such as drilling, boring, reaming, and tapping. It focuses on step-by-step instructions on how to perform each operation, allowing students to create precise parts on the engine lathe.		
32	Engine Lathe Set-up 231	Engine Lathe Setup details important considerations that a lathe operator must take before starting any cutting process as well as the steps to ensure proper engine lathe setup. Lathe setup requires operators to know how to select appropriate cutting variables ...		

33	Intro to Fastener Threads 110	This class describes fastener threads and their characteristics, as well as explains different thread standards and classifications. Includes an Interactive Lab.		
34	Overview of Threaded Fasteners 117	This class summarizes the various types of threaded fasteners used in assemblies and describes their common applications.		
35	Threading on the Engine Lathe 301	Explains threads and how to make them using a manual lathe.		
36	Hole Standards & Inspection 141	The class Hole Standards and Inspection provides a comprehensive introduction to hole inspection using contact instruments. Hole inspection ensures that a hole will meet its proper job specifications, including fit, diameter, roundness, and condition.		
		<b>Mill</b>		
37	Manual Mill Basics 201	Manual Mill Basics provides an introduction to the manual milling machine. Manual mills are generally either vertical or horizontal, depending on their spindle orientation. This class introduces the machine components, cutting tools and workholding devices commonly used on milling machines. .		
38	Manual Mill Setup 221	This class describes the proper setup for a typical mill operation and explains how to determine mill settings, align mill components, and select proper tooling.		
39	Manual Mill Operation 251	Provides a guide for manually machining various features onto a workpiece.		
40	Calibration Fundamentals 111	The class "Calibration Fundamentals" provides a basic introduction to the importance of calibrating measuring instruments. Calibration determines the accuracy of measuring instruments by comparing its value to a higher-level measurement standard, usually a working standard gage block.		
		<b>Surface Grinding</b>		
41	Intro to Abrasives 100	This class defines abrasive processes and explains the major groups of abrasive tools.		
42	Basics of Surface Grinder 231	Provides an overview of the components, considerations, and varieties of the surface grinding machine. Surface grinders are classified by their table types and spindle orientations, and vary in levels of automation.		
43	Basic Grinding Theory 221	Provides an overview of the general process of grinding . Grinding occurs at the point of contact between an abrasive wheel and a workpiece. Like any other cutting process, grinding removes material in the form of chips.		
44	Grinding Processes 201	Provides a comprehensive overview of the various types of grinding used in modern manufacturing environments. Surface, cylindrical, centerless, and internal grinding processes are commonly used for workpieces of various shapes.		
		<b>CNC</b>		
45	History and Definition of CNC 100	This class outlines the origin of today's CNC machines and explains how modern CNC evolved from its original designs.		

46	Introduction to CNC Machines 201	Provides a comprehensive introduction to computer numerical control (CNC), which uses numerical data to control a machine. CNC machines rely on a system of three linear and three rotational axes in order to calculate the motion		
47	Basics of the CNC Lathe 211	Explains the components and functions of both the chucker and bar machine CNC lathe varieties. CNC lathes have spindles that spin workpieces held in chucks or collets.		
48	Coordinates of the CNC Lathe 221	Provides an overview of the coordinates used to program cutting operations on CNC lathes or turning centers. It introduces the systems of both Cartesian and polar coordinates and describes how Cartesian axes are used		
49	Basics of the CNC Mill 212	Explains the components and function of CNC mills. A CNC mill produces flat or curved surfaces on square or rectangular workpieces. CNC mills may have a vertical spindle or a horizontal spindle		
50	Coordinates of the CNC Mill 222	Provides an overview of the coordinates used to program cutting operations on CNC mills or machining centers. It introduces the systems of both Cartesian and polar coordinates and explains the Cartesian axes		
		<b>Supplemental Career Development Classes (OPTIONAL)</b>		
51	Essentials of Communication 120	This class describes key types of communication and common roadblocks to communication, as well as how to use effective communication as a tool to help build teamwork and manage conflict. Includes an Interactive Lab.		
52	Conflict Resolution Principles 150	This class covers the basic steps that a manager can take to resolve conflicts in the workplace and help ensure that the same conflicts do not return. Includes an Interactive Lab.		
53	Harassment & Discrimination 215	This class covers how to identify and prevent harassment and discrimination in a diverse workplace, as well as some basic Federal laws that protect workers from harassment and discrimination. Includes an Interactive Lab.		
54	Personal Effectiveness 190	This class introduces the importance of effective communication and the various forms and mediums of communication in the workplace. The need for encouraging creativity, innovation, and the importance of knowledge and learning in the 21st century workplace is also described.		
55	Basics of Manufacturing Costs 140	This class describes the basic costs associated with manufacturing and how these costs are typically controlled.		