Great Oaks CNC Advanced Manufacturing Technologies Essential Skills Profile

This profile provides an outline of the skills required for successful completion of this career program. Additional information is located on the Great Oaks website at http://hs.greatoaks.com/essential-skills-high-school-programs/ and selecting the corresponding career program.

Recommended WorkKeys® Scores for CNC Advanced Manufacturing Technologies

Applied Mathematics-4	Graphic Literacy-4
Workplace Documents-4	

*Practice tests and more information at www.act.org/workkeys

Essential Skills Needed to Successfully Complete the Program			
Rating Key:	**Low = Slightly Essential**	**Medium = Essential**	**High = Very Essential**

Key Vocational Factors		Rating
Visual Acuity	The ability to detect differences/details visually	High
Depth Perception	The ability to detect the physical distance/depth of objects in space and time	High
Oral Communication	The ability to express/explain ideas	Medium
Oral Expression	The ability to verbally explain and express self in an intelligible manner so others will understand	Medium
Written Communication	The ability to communicate in a written format and record information accurately	Medium
Physical Mobility/Strength	Extended standing/sitting, bending, and stooping	Medium
Eye-hand Coordination	The ability to use tools	High
Auditory Acuity	The ability to detect differences in pitch and sound	Medium
Safety Understanding	Able to comprehend hazards of working with tools, materials, equipment, and environmental conditions; able to wear personal protective equipment suitable for task	High

Worker Trait Skills	Rating
Ability to get along with others	Medium
Ability to work independently, without close supervision	Medium
Ability to work toward work including tasks of minimal interest	Medium
Ability to follow and retain:	
Multistep oral instructions	Medium
Written instructions/technical manuals - multistep	Medium
Simple to complex diagram instructions	Medium
Visual models or demonstrated instructions	Medium

Ability to use tools of trade (horizontal turning center, height gauges, drill press, radial drill, calipers, boring machines, computer, compass, ruler, protractor, etc.)	High
Ability to use numerical data (count, measure, compute, etc.) in applied setting	Medium
Ability to discriminate between objects of similar:	
Size	Medium
Shape	Medium
Color (MUST be able to distinguish between colors)	Medium
Spatial Relationship	Medium
Ability to organize work process/follow defined procedures	Medium
Coordination (eye-hand)	High
Ability to solve problems through a logical process/sequence of steps	High
Ability to stick to assigned task to a positive/expected conclusion	High
Able to sequence events or follow a sequence as necessary	High
Dexterity (fine finger)	Medium
Attendance and Punctuality	High
Operation Monitoring: Watching gauges, dials, or other indicators to make sure a machine is working properly.	High
Critical Thinking: Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems.	High
Operation and Control: Controlling operations of equipment or systems.	High

Reading Skills *See Recommended WorkKeys® Scores Above	
Math Skills *See Recommended WorkKeys® Scores Above	
Counting-Recording-Comparing-Calculating	Whole numbers and decimals
Calculating fractions, decimals, ratios, order of operations	Geometry
Ratio, Algebra, Formulas, Square Roots	Solid and strong Math skills

Additional Abilities Required

Arm-Hand Steadiness	The ability to keep your hand and arm steady while moving your arm or while holding your arm and hand in one position.
Manual Dexterity	The ability to quickly move your hand, your hand together with your arm, or your two hands to grasp, manipulate, or assemble objects.
Control Precision	The ability to quickly and repeatedly adjust the controls of a machine or a vehicle to exact positions.

Knowledge Required in CNC Advanced Manufacturing Technologies Field

Mathematics	Knowledge of arithmetic, algebra, geometry, calculus, statistics, and their applications.
Mechanical	Knowledge of machines and tools, including their designs, uses, repair, and maintenance.
Production and Processing	Knowledge of raw materials, production processes, quality control, costs, and other techniques for maximizing the effective manufacture and distribution of goods.

CNC Advanced Manufacturing Technologies Activities

Calculate dimensions or tolerances, using instruments such as micrometers or Vernier calipers.	Machine parts to specifications, using machine tools, such as lathes, milling machines, shapers, or grinders.
Set up, adjust, or operate basic or specialized machine tools used to perform precision machining operations.	Align and secure holding fixtures, cutting tools, attachments, accessories, or materials onto machines.
Measure, examine, or test completed units to check for defects and ensure conformance to specifications, using precision instruments, such as micrometers.	Study sample parts, blueprints, drawings, or engineering information to determine methods or sequences of operations needed to fabricate products.
Monitor the feed and speed of machines during the machining process.	Maintain machine tools in proper operational condition.
Operate equipment to verify operational efficiency.	Check work pieces to ensure they are properly lubricated or cooled.
Program computers or electronic instruments, such as numerically controlled machine tools.	Diagnose machine tool malfunctions to determine need for adjustments or repairs.
Design fixtures, tooling, or experimental parts to meet special engineering needs.	Confer with engineering, supervisory, or manufacturing personnel to exchange technical information.
Lay out, measure, and mark metal stock to display placement of cuts.	Fit and assemble parts to make or repair machine tools.
Confer with numerical control programmers to check and ensure that new programs or machinery will function properly and that output will meet specifications.	Support metalworking projects from planning and fabrication through assembly, inspection, and testing, using knowledge of machine functions, metal properties and mathematics.
Dispose of scrap or waste material in accordance with company policies and environmental regulations.	Evaluate machining procedures and recommend changes or modifications for improved efficiency or adaptability.
Establish work procedures for fabricating new structural products, using a variety of metalworking machines.	Test experimental models under simulated operating conditions for purposes such as development, standardization, or feasibility of design.
Install repaired parts into equipment or install new equipment.	Prepare working sketches for the illustration of product appearance.

Advise clients about the materials being used for finished products.	Install experimental parts or assemblies, such as hydraulic systems, electrical wiring, lubricants, or batteries into machines or mechanisms.
Stop machines to remove finished work pieces or to change tooling, setup, or work piece placement, according to required machining sequences.	Set up and operate computer-controlled machines or robots to perform one or more machine functions on metal or plastic work pieces.
Review program specifications or blueprints to determine and set machine operations and sequencing, finished work piece dimensions, or numerical control sequences.	Adjust machine feed and speed, change cutting tools, or adjust machine controls when automatic programming is faulty or if machines malfunction.
Calculate machine speed and feed ratios and the size and position of cuts.	Implement changes to machine programs and enter new specifications, using computers.

Technology

Office Suite software	Enterprise Resource Planning (ERP) software
Analytical or Scientific software	Computer Aided CAM software
Computer Aided Design (CAD) software	

Additional Considerations

Sitting and standing for long periods of time	Strong computer skills
Independent work	Strong organizational skills
Creative	Detail oriented
Enjoy math and science	Strong math background

Available Certifications

National Institute for Metal Working Skills (NIMS) Certification (12 Points)	CPR/First Aid Certification (1 Point)
OHSA 10-General Industry (1 Point)	ECSI (Emergency Care and Safety Institute)
FANUC CNC Certification	

Possible College Credits

College Credit Plus in English, Math, Social Studies, or Science	Must be preapproved. Must pass a college course at an Ohio college or College Credit Plus class at Great Oaks.
Articulated Credit	Great Oaks has agreements with certain colleges that may give you credits for a specific degree. Possible agreements are: • Cincinnati State Technical and Community College (Mechanical Engineering Technology, up to 9 credit hours possible)
Career Technical Credit Transfer	The Ohio Transfer to Degree Guarantee helps career and technical students transfer credits earned in high school to community college or four-year degree programs. The credit can be used at any Ohio public college or university: • If you successfully completed your career-technical program and passed certain required assessments. • If you attend a similar program at a public Ohio college or university. For more information, go to www.transfercredit.ohio.gov

*Additional college or post-secondary education may be required in this field

Possible Career Pathways

CNC Operator	Manufacturing Maintenance
Inspector	Engineer