

# CNC TOOL AND CUTTER GRINDER (Time-Based)

## APPENDIX A

O\*NET CODE 51-4194.00

This training outline represents minimum standards for work processes and related instruction. Changes in technology and regulations may result in the need for additional on-the-job or classroom instruction.

### WORK PROCESSES

	<b>Approximate Hours</b>
<b>A. Workplace Orientation</b>	<b>100</b>
1. Demonstrate knowledge of workplace procedures, policies, etc.	
2. Describe workplace structure and workflow.	
3. Practice working safely around machines and throughout shopfloor.	
4. Demonstrate knowledge of workplace safety plans.	
5. Properly perform physical work tasks.	
<b>B. Machining Fundamentals</b>	<b>1500</b>
1. Identify common machining and grinding equipment, such as: CNC (Computer Numerical Control) machining centers, CNC grinding machines. Identify manual lathes, mills, drill presses, grinders (if applicable).	
2. Demonstrate understanding of engineering drawings; explain and describe components, such as: line types, views, symbols, and notations(s), especially tolerances.	
3. Learn and demonstrate an understanding of Geometric Dimensioning and Tolerancing (GD &T).	
4. Develop an understanding of/demonstrate ability to utilize Computer-Aided Design (CAD) software to design cutting tools.	
5. Identify and understand geometric elements of cutting tools (e.g., end mills).	
6. Become familiar with all manner of substrates and coatings.	

7. Use shop math, such as decimals and basic geometry.

**C. Grinding and Inspection Fundamentals** **1000**

1. Identify CNC grinder parts, especially wheel shapes, abrasive types, workholding pieces.
2. Operate manual grinders (for example: Astro, Brown & Sharp, and Cincinnati).
3. Dress and true abrasive wheels and wheel measurement (where applicable).
4. Work with a variety of hand and inspection tools, such as: screwdrivers, pliers, box wrenches, micrometers, calipers, indicators, comparators.

**D. CNC Tool and Cutter Grinder Operations** **1000**

1. Prepare blanks for grinding using automatic grinders, e.g., Peel/Plunge grinders.
2. Learn CNC grinder controls and software basics, e.g., standard navigation.
3. Operate CNC tool and cutter grinders to grind cutting tools, including transferring programs from PC.

**E. Tool and Cutter Grinder Setup and Operation** **3800**

1. Learn and use various tool and cutter software programs to set-up CNC operation, including simulation.
2. Pick and dress proper wheels for part(s) to be manufactured.
3. Set-up and run regrinds for cutting tools (if applicable).
4. Create engineering drawings of parts to be ground.
5. Write programs for tool grinding/manufacturing from scratch, including wheel selection, dressing, and measuring.
6. Run tool and cutter grinder jobs independently and make adjustments.

**F. Quality Control, Machine Maintenance, and Workplace Cleanliness** **600**

1. Conduct in-process quality control analysis per employer procedure(s), using a variety of metrology devices.
2. Perform first-piece inspections to ensure pieces are within tolerances prior to production runs.

3. Sweep and vacuum workspaces to maintain cleanliness; use cleaners and degreasers when appropriate.
4. Recycle and/or dispose of substrate refuse (e.g., carbide sludge) when necessary.
5. Follow prescribed schedule of preventative maintenance on shop machinery.

**Approximate Total Hours      8000**

*Apprenticeship work processes are applicable only to training curricula for apprentices in approved programs. Apprenticeship work processes have no impact on classification determinations under Article 8 or 9 of the Labor Law. For guidance regarding classification for purposes of Article 8 or 9 of the Labor Law, please refer to: <https://dol.ny.gov/public-work-and-prevailing-wage>*

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## APPENDIX B

### RELATED INSTRUCTION

#### **Safety & Health**

1. General Workplace Safety
2. Personal Protective Equipment (PPE)
3. Right-to-Know/Safety Data Sheets (SDS)
4. Sexual Harassment Prevention – must comply with Section 201-g of the Labor Law
5. Lock-Out/Tag-Out (LO/TO)

#### **Trade Theory and Skills**

1. Trade Math, especially decimal system, precision measurements
2. Geometry
3. Metallurgy
4. Engineering Drawings
5. Computer-Aided Design (CAD)/Computer-Aided Manufacturing (CAM)
6. Machining Substrates
7. Geometric Dimensioning & Tolerancing (GD&T)
8. Basic Machining: Concepts, Materials, and Machinery
9. Abrasives
10. Dressing/Truing Tool and Cutter Grinder Wheels
11. Manual Grinders
12. CNC Tool and Cutter Grinders
13. Cutting Tools
14. End Mills (if applicable)
15. Quality Control Basics
16. Standardization/Standards
17. Metrology & Measuring Instruments
18. Data Collection
19. CNC Program Writing

## **Other Courses As Necessary**

A Minimum of 144 Hours of Related Instruction is Required for Each Apprentice for Each Year.

Appendix B topics are approved by New York State Education Department.