



CNC TOOL AND CUTTER GRINDER
(Time-Based)

APPENDIX A
D.O.T. CODE 603.280-018
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

| | <u>Approximate Hours</u> |
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| A. <u>Workplace Orientation</u> | 100 |
| 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. <u>Machining Fundamentals</u> | 1500 |
| 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. <u>Grinding and Inspection Fundamentals</u> | 1000 |
| 1. Identify CNC grinder parts, especially wheel shapes, abrasive types, workholding pieces. | |

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| 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. <u>CNC Tool and Cutter Grinder Operations</u> | 100 |
| 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. <u>Tool and Cutter Grinder Setup and Operation</u> | 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. <u>Quality Control, Machine Maintenance, and Workplace Cleanliness</u> | 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. | |
| 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: <http://www.labor.state.ny.us/workerprotection/publicwork/PDFs/Article8FAQA.pdf>

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RELATED INSTRUCTION

Safety & Health

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

Trade Theory and Skills

Trade Math, especially decimal system, precision measurements
Geometry
Metallurgy
Engineering Drawings
Computer-Aided Design (CAD)/Computer-Aided Manufacturing (CAM)
Machining Substrates
Geometric Dimensioning & Tolerancing (GD&T)
Basic Machining: Concepts, Materials, and Machinery
Abrasives
Dressing/Truing Tool and Cutter Grinder Wheels
Manual Grinders
CNC Tool and Cutter Grinders
Cutting Tools
End Mills (if applicable)
Quality Control Basics
Standardization/Standards
Metrology & Measuring Instruments
Data Collection
CNC Program Writing

Other Courses As Necessary

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