TORQ Analysis of Machinists to Tool and Die Makers

INPUT SECTION:

Transfer	Title	O*NET	Filters		
From Title:	Machinists	51-4041.00	Abilities:	Importance LeveL: 50	Weight: 1
To Title:	Tool and Die Makers	51-4111.00	Skills:	Importance LeveL: 69	Weight: 1
Labor Market Area:	Maine Statewide		Knowledge:	Importance Level: 69	Weight: 1

OUTPUT SECTION:

Grand TORQ: 85

Ability TORQ		Skills TORQ		Knowledge TORQ	
Level	87	Level	88	Level	79

Gaps To Narrow if Possible

Ability	Level	Gap	Impt
Category Flexibility	57	16	53
Finger Dexterity	50	11	50
Selective Attention	50	2	59

Upgrade These Skills

Skill	Level	Gap	Impt
Mathematics	75	11	78
Troubleshooting	65	1	75

Knowledge to Add

Knowledge	Level	Gap	Impt
Design	70	30	74
Mechanical	77	7	78

LEVEL and IMPT (IMPORTANCE) refer to the Target Tool and Die Makers. GAP refers to level difference between Machinists and Tool and Die Makers.

ASK ANALYSIS

Ability Level Comparison - Abilities with importance scores over 50

Description	Machinists	Tool and Die Makers	Importance
Visualization	60	55	65
Near Vision	57	46	65
Oral Comprehension	57	55	62
Oral Expression	59	51	62
Selective Attention	48	50	59
Arm-Hand Steadiness	55	50	59
Control Precision	57	55	59
Problem Sensitivity	55	50	56
Inductive Reasoning	53	50	56
Written Comprehension	53	53	53
Deductive Reasoning	57	50	53
Information Ordering	67	51	53
Category Flexibility	41	57	53

Finger Dexterity	39	50	50

Skill Level Comparison - Abilities with importance scores over 69

Description	Machinists	Tool and Die Makers	Importance
Equipment Selection	74	68	81
Mathematics	64	75	78
Troubleshooting	64	65	75

Knowledge Level Comparison - Knowledge with importance scores over 69

Description	Machinists	Tool and Die Makers	Importance
Mechanical	70	77	78
Design	40	70	74
Mathematics	66	64	70

Experience & Education Comparison

Related Work Experience Comparison

Description	Machinists	Tool and Die Makers
10+ years	0%	27%
8-10 years	0%	0%
6-8 years	2%	14%
4-6 years	46%	35%
2-4 years	4%	16%
1-2 years	16%	0%
6-12 months	1%	0%
3-6 months	1%	0%
1-3 months	1%	0%
0-1 month	0%	0%
None	24%	4%

Required Education Level Comparison

Description	Machinists	Tool and Die Makers
Doctoral	0%	0%
Professional Degree	0%	0%
Post-Masters Cert	0%	0%
Master's Degree	0%	0%
Post-Bachelor Cert	0%	0%
Bachelors	0%	0%
AA or Equiv	14%	2%
Some College	2%	28%
Post-Secondary Certificate	12%	54%
High Scool Diploma or GED	69%	14%
No HSD or GED	1%	0%

Machinists	Tool and Die Makers
Most Common Educational/Training Requirement:	
Long-term on-the-job training	Long-term on-the-job training
Job Zone Comparison	
3 - Job Zone Three: Medium Preparation Needed	3 - Job Zone Three: Medium Preparation Needed
Previous work-related skill, knowledge, or experience is required for these occupations. For example, an electrician must have completed three or four years of apprenticeship or several years of vocational training, and often must have passed a licensing exam, in order to perform the job.	Previous work-related skill, knowledge, or experience is required for these occupations. For example, an electrician must have completed three or four years of apprenticeship or several years of vocational training, and often must have passed a licensing exam, in order to perform the job.
Most occupations in this zone require training in vocational schools, related on-the-job experience, or an associate's degree. Some may require a bachelor's degree.	Most occupations in this zone require training in vocational schools, related on-the-job experience, or an associate's degree. Some may require a bachelor's degree.

Employees in these occupations usually need one or two years of training involving both on-the-job experience and informal training with experienced workers.	Employees in these occupations usually need one or two years of training involving both on-the-job experience and informal training with experienced workers.

Tasks

Machinists

Core Tasks

Generalized Work Activities:

- Controlling Machines and Processes - Using either control mechanisms or direct physical activity to operate machines or processes (not including computers or vehicles).
- Communicating with Supervisors, Peers, or Subordinates - Providing information to supervisors, co-workers, and subordinates by telephone, in written form, e-mail, or in person.
- Getting Information - Observing, receiving, and otherwise obtaining information from all relevant sources.
- Handling and Moving Objects - Using hands and arms in handling, installing, positioning, and moving materials, and manipulating things.
- Monitor Processes, Materials, or Surroundings - Monitoring and reviewing information from materials, events, or the environment, to detect or assess problems.

Specific Tasks

Occupation Specific Tasks:

- Advise clients about the materials being used for finished products.
- Align and secure holding fixtures, cutting tools, attachments, accessories, and materials onto machines.
- Calculate dimensions and tolerances using knowledge of mathematics and instruments such as micrometers and vernier calipers.
- Check work pieces to ensure that they are properly lubricated and cooled.
- Clean and lubricate machines, tools, and equipment to remove grease, rust, stains, and foreign matter.
- Confer with engineering, supervisory, and manufacturing personnel to exchange technical information.
- Confer with numerical control programmers to check and ensure that new programs or machinery will function properly, and that output will meet specifications.
- Design fixtures, tooling, and experimental parts to meet special engineering needs.
- Dismantle machines or equipment, using hand tools and power tools, to examine parts for defects and replace defective

Tool and Die Makers

Core Tasks

Generalized Work Activities:

- Controlling Machines and Processes - Using either control mechanisms or direct physical activity to operate machines or processes (not including computers or vehicles).
- Getting Information - Observing, receiving, and otherwise obtaining information from all relevant sources.
- Updating and Using Relevant Knowledge - Keeping up-to-date technically and applying new knowledge to your job.
- Evaluating Information to Determine Compliance with Standards - Using relevant information and individual judgment to determine whether events or processes comply with laws, regulations, or standards.
- Making Decisions and Solving Problems - Analyzing information and evaluating results to choose the best solution and solve problems.

Specific Tasks

Occupation Specific Tasks:

- Conduct test runs with completed tools or dies to ensure that parts meet specifications; make adjustments as necessary.
- Cut, shape, and trim blanks or blocks to specified lengths or shapes, using power saws, power shears, rules, and hand tools.
- Design jigs, fixtures, and templates for use as work aids in the fabrication of parts or products.
- Develop and design new tools and dies, using computer-aided design software.
- File, grind, shim, and adjust different parts to properly fit them together.
- Fit and assemble parts to make, repair, or modify dies, jigs, gauges, and tools, using machine tools and hand tools.
- Inspect finished dies for smoothness, contour conformity, and defects.
- Lift, position, and secure machined parts on surface plates or worktables, using hoists, vises, v-blocks, or angle plates.
- Measure, mark, and scribe metal or plastic stock to lay out machining, using instruments such as protractors, micrometers, scribes, and rulers.
- Select metals to be used from a range of

parts where needed.

- Establish work procedures for fabricating new structural products, using a variety of metalworking machines.
- Evaluate experimental procedures, and recommend changes or modifications for improved efficiency and adaptability to setup and production.
- Fit and assemble parts to make or repair machine tools.
- Install experimental parts and assemblies such as hydraulic systems, electrical wiring, lubricants, and batteries into machines and mechanisms.
- Install repaired parts into equipment, or install new equipment.
- Lay out, measure, and mark metal stock to display placement of cuts.
- Machine parts to specifications using machine tools such as lathes, milling machines, shapers, or grinders.
- Maintain industrial machines, applying knowledge of mechanics, shop mathematics, metal properties, layout, and machining procedures.
- Measure, examine, and test completed units to detect defects and ensure conformance to specifications, using precision instruments such as micrometers.
- Monitor the feed and speed of machines during the machining process.
- Observe and listen to operating machines or equipment to diagnose machine malfunctions and to determine need for adjustments or repairs.
- Operate equipment to verify operational efficiency.
- Position and fasten work pieces.
- Prepare working sketches for the illustration of product appearance.
- Program computers and electronic instruments such as numerically controlled machine tools.
- Select the appropriate tools, machines, and materials to be used in preparation of machinery work.
- Set controls to regulate machining, or enter commands to retrieve, input, or edit computerized machine control media.
- Set up and operate metalworking, brazing, heat-treating, welding, and cutting equipment.
- Set up, adjust, and operate all of the basic machine tools and many specialized or advanced variation tools to perform precision machining operations.
- Study sample parts, blueprints, drawings, and engineering information to determine methods and sequences of operations needed to fabricate products, and determine product dimensions and tolerances.
- Support metalworking projects from

metals and alloys, based on properties such as hardness and heat tolerance.

- Set pyrometer controls of heat-treating furnaces, and feed or place parts, tools, or assemblies into furnaces to harden.
- Set up and operate conventional or computer numerically controlled machine tools such as lathes, milling machines, and grinders to cut, bore, grind, or otherwise shape parts to prescribed dimensions and finishes.
- Set up and operate drill presses to drill and tap holes in parts for assembly.
- Smooth and polish flat and contoured surfaces of parts or tools, using scrapers, abrasive stones, files, emery cloths, or power grinders.
- Study blueprints, sketches, models, or specifications to plan sequences of operations for fabricating tools, dies, or assemblies.
- Verify dimensions, alignments, and clearances of finished parts for conformance to specifications, using measuring instruments such as calipers, gauge blocks, micrometers, and dial indicators.
- Visualize and compute dimensions, sizes, shapes, and tolerances of assemblies, based on specifications.

Detailed Tasks

Detailed Work Activities:

- adjust production equipment/machinery setup
- design tools or mechanical devices
- determine tasks needed to complete machined products
- examine products or work to verify conformance to specifications
- fabricate, assemble, or disassemble manufactured products by hand
- identify base metals for welding
- install equipment or attachments on machinery or related structures
- lay out machining, welding or precision assembly projects
- load or unload material or workpiece into machinery
- monitor production machinery/equipment operation to detect problems
- move or fit heavy objects
- operate hoist, winch, or hydraulic boom
- operate metal or plastic fabricating equipment/machinery
- perform safety inspections in manufacturing or industrial setting
- read blueprints
- read specifications
- read technical drawings

planning and fabrication through assembly, inspection, and testing, using knowledge of machine functions, metal properties and mathematics.
- Test experimental models under simulated operating conditions for such purposes as development, standardization, and feasibility of design.

Detailed Tasks

Detailed Work Activities:

- adjust production equipment/machinery setup
- advise clients or customers
- confer with engineering, technical or manufacturing personnel
- design tools or mechanical devices
- determine tasks needed to complete machined products
- examine products or work to verify conformance to specifications
- fabricate, assemble, or disassemble manufactured products by hand
- follow statistical process control procedures
- identify base metals for welding
- install equipment or attachments on machinery or related structures
- lay out machining, welding or precision assembly projects
- load or unload material or workpiece into machinery
- maintain or repair industrial or related equipment/machinery
- maintain welding machines or equipment
- monitor production machinery/equipment operation to detect problems
- move or fit heavy objects
- operate metal or plastic fabricating equipment/machinery
- perform safety inspections in manufacturing or industrial setting
- program computer numerical controlled machines
- read blueprints
- read specifications
- read technical drawings
- recognize characteristics of alloys
- recognize characteristics of metals
- set up and operate variety of machine tools
- set up computer numerical control machines
- set up production equipment or machinery
- solve machine tool problems
- understand machine setup instructions
- understand technical operating, service or repair manuals

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- recognize characteristics of metals
- set up and operate variety of machine tools
- set up computer numerical control machines
- set up production equipment or machinery
- solve machine tool problems
- understand machine setup instructions
- understand technical operating, service or repair manuals
- use arc welding equipment
- use hand or power tools
- use machining practices
- use non-destructive test equipment
- use precision measuring tools or equipment
- use x-ray or magnetic inspection techniques
- weld together metal parts, components, or structures

Technology - Examples

Computer aided design CAD software

- Autodesk AutoCAD software
- Autodesk Inventor
- Bentley Microstation
- CimatronE Master
- Dassault Systemes CATIA software
- data M Software COPRA MetalBender
- Kubotek USA KeyCreator
- Logopress software
- MAKER CAD/CAM Services DIEMAKER
- Parametric Technology Pro/ENGINEER software
- SolidWorks CAD software
- Striker Systems SS-Die Design
- Striker Systems SS-Draw Form
- Striker Systems SS-Strip Design
- Vero International VISI-Mold
- VX Corporation VX Mold & Die

Computer aided manufacturing CAM software

- 1CadCam Unigraphics
- CNC Mastercam

- use arc welding equipment
- use drafting or mechanical drawing techniques
- use hand or power tools
- use knowledge of fire suppression methods in industrial emergencies
- use knowledge of metric system
- use machining practices
- use non-destructive test equipment
- use precision measuring tools or equipment
- use robotics systems technology
- use technical information in manufacturing or industrial activities
- use x-ray or magnetic inspection techniques
- weld together metal parts, components, or structures

Technology - Examples

Analytical or scientific software

- Armchair Machinist software
- CNC Consulting Machinists' Calculator
- EditCNC software
- Kentech Kipware Software
- Kentech Trig Kalculator

Computer aided design CAD software

- Autodesk AutoCAD software
- Computer aided design CAD software

Computer aided manufacturing CAM software

- CNC Mastercam
- CNC TurboCAD/CAM
- Computer aided manufacturing CAM software
- JETCAM software

Electronic mail software

- Microsoft Outlook

Facilities management software

- Faster Fleet Management software

Industrial control software

- Pro CNC software

Office suite software

- Microsoft Office

Project management software

- Kentech Kipware PLN
- DP Technology ESPRIT
- OPEN MIND Technologies hyperMILL
- Virtual Gibbs CADD/CAM

Materials requirements planning logistics and supply chain software

- JobPack MES Scheduler

Project management software

- Microsoft Project

Word processing software

- Microsoft Word

Tools - Examples

- Adjustable widemouth pliers
- Air compressors
- Vertical bandsaws
- Workshop bench vises
- Toolmakers microscopes
- Acetylene torches
- Boring bars
- Bridge cranes
- Broachers
- Dial calipers
- Chuck keys
- Cold chisels
- Optical comparators
- Dividers
- Coordinate measuring machines CMM
- Counterbores
- Countersinks
- Laser cutters
- Deburring machines
- Desktop computers
- Drilling machines
- Dust collectors
- Ear plugs

- Kentech Kipware QTE
- Kentech Kipware TRK

Spreadsheet software

- Microsoft Excel

Word processing software

- Microsoft Word

Tools - Examples

- Adjustable wrenches
- Anvils
- Grinding wheel arbors
- Bandsaws
- Grinding dogs
- Milling vises
- Chamfer tools
- Jointers
- Torches
- Boring bars
- Broachers
- Calipers
- Chucks
- Cold chisels
- Combination wrenches
- Deburring tools
- Desktop computers
- Center drills
- Side cutting pliers
- Angled feeler gauges
- Files
- Forklifts
- Marking blocks
- Brazing equipment
- Angle plates
- Shapers
- Engraving machines
- Protective face shields
- Feeler gauges
- Hand files
- Forklifts
- Furnace ladles
- Angle gauge blocks
- Brazing equipment
- Angle plates
- Safety goggles
- Grease guns
- Profile grinders
- Diamond dressers
- Grit blasting cabinets
- Claw hammers
- Hand clamps
- Refractometers
- Hardness testing devices
- Vernier height gauges
- Allen wrenches
- Hoisting equipment
- 1-2-3 blocks
- Hydraulic pressing equipment
- Heat treatment furnaces
- Hand jacks
- Laser scanner coordinate capturing equipment
- Knurling tools
- Gap lathes
- Precision levels
- Loupes
- Mallets
- Dust masks
- Metal inert gas MIG welders

- Crankshaft grinders
- Ball peen hammers
- Clamps
- Gauges
- Hex keys
- Edge finders
- Hydraulic presses
- Ladders
- Laser printers
- Breaker lathes
- Spirit levels
- Channel lock pliers
- Magnetic retrievers
- Microscopes
- Rubber mallets
- Metal inert gas MIG welders
- Prick punches
- Inside micrometers
- 3-axis computerized numerical control CNC machines
- Milling machines
- Needlenose pliers
- Personal computers
- Personal digital assistants PDA
- Pipe wrenches
- Screw pitch gauges
- Planers
- Plasma welders
- Platforms
- Sandblasters
- Buffers
- Chippers
- Combination drills

- Metal inert gas MIG welders
- Metal markers
- Depth gauges
- Combination milling machines
- Laptop computers
- Oil dispensing cans
- Plasma arc welding equipment
- Digital plotters
- Air grinders
- Air-powered sandblasters
- Portable drills
- Bench grinders
- Vertical belt sanders
- Abrasive cutoff saws
- Protractors
- Bearing pullers
- Punch sets
- Rasps
- Hand reamers
- Honing machines
- Riveters
- Precision rulers
- Safety glasses
- Hacksaws
- Flat blade screwdrivers
- Metal scribers
- Honing stones
- Power shears
- Combination squares
- Stamping presses
- Steel rules
- T-style tap wrenches
- Tap extractors

- Cylindrical grinders
- Sanders
- Cold saws
- Vernier bevel protractors
- Pry bars
- Putty knives
- Ratchet sets
- Reamers
- Resurfacing machines
- Welding lenses
- Hacksaws
- Phillips head screwdrivers
- Scribers
- Cylinder honers
- Metal shears
- Shims
- Machine shop rigging equipment
- Socket sets
- Soldering equipment
- Machinists' squares
- Steel rules
- Swaging equipment
- Taps
- Thread gauges
- Threading machines
- Pipe threaders
- Aviation snips
- Tongs
- Bending machines
- Tungsten inert gas TIG welding equipment
- Radial drills
- Utility knives
- Measuring tapes
- Taps and dies
- Tensile strength testers
- Turning tools
- Thread gauges
- Tin snips
- Tongs
- Tube benders
- Tungsten inert gas TIG welding equipment
- Computerized numerical control CNC turning centers
- Ultrasonic testing equipment
- Arc welders
- Wire brushes
- Electrical Discharge Machining EDM machines
- Workshop crane equipment
- Arbor presses

- Steel wedges
- Arc welders
- Welding shields
- Metal spray equipment
- Cranes
- Arbor presses

Labor Market Comparison

Description	Machinists	Tool and Die Makers	Difference
Median Wage	$ 41,560	$ 51,670	$ 10,110
10th Percentile Wage	$ 26,250	$ 34,940	$ 8,690
25th Percentile Wage	N/A	N/A	N/A
75th Percentile Wage	$ 48,290	$ 59,710	$ 11,420
90th Percentile Wage	$ 56,030	$ 64,750	$ 8,720
Mean Wage	$ 41,780	$ 50,310	$ 8,530
Total Employment - 2007	1,860	160	-1,700
Employment Base - 2006	1,832	165	-1,667
Projected Employment - 2016	1,905	147	-1,758
Projected Job Growth - 2006-2016	4.0 %	-10.9 %	-14.9 %
Projected Annual Openings - 2006-2016	35	2	-33

National Job Posting Trends

Trend for Machinists

Trend for Tool and Die Makers

Data from Indeed

Recommended Programs

Tool and Die Maker/Technologist

Tool and Die Technology/Technician. A program that prepares individuals to apply technical knowledge and skills to operate machine tools used in the forming of metal components, as well as the fabrication of special tools, dies, jigs and fixtures used in cutting, working and finishing metal components.

No schools available for the program

Maine Statewide Promotion Opportunities for Machinists

O*NET Code	Title	Grand TORQ	Job Zone	Employment	Median Wage	Difference	Growth	Annual Job Openings
51-4041.00	Machinists	100	3	1,860	$41,560.00	$0.00	4%	35
51-4111.00	Tool and Die Makers	85	3	160	$51,670.00	$10,110.00	-11%	2
51-4192.00	Lay-Out Workers, Metal and Plastic	82	2	180	$43,870.00	$2,310.00	-24%	3
51-4012.00	Numerical Tool and Process Control Programmers	79	3	60	$43,530.00	$1,970.00	21%	2
49-2094.00	Electrical and Electronics Repairers, Commercial and Industrial Equipment	78	3	440	$49,450.00	$7,890.00	-19%	15
17-3023.01	Electronics Engineering Technicians	76	3	430	$45,180.00	$3,620.00	-20%	9

17-3023.03	Electrical Engineering Technicians	75	3	430	$45,180.00	$3,620.00	-20%	9
49-2095.00	Electrical and Electronics Repairers, Powerhouse, Substation, and Relay	75	5	20	$60,790.00	$19,230.00	5%	1
49-9012.00	Control and Valve Installers and Repairers, Except Mechanical Door	74	3	170	$47,860.00	$6,300.00	-9%	3
49-9061.00	Camera and Photographic Equipment Repairers	73	3	0	$44,660.00	$3,100.00	0%	0
49-3011.00	Aircraft Mechanics and Service Technicians	73	3	210	$44,280.00	$2,720.00	-2%	2
51-8013.00	Power Plant Operators	73	3	480	$50,240.00	$8,680.00	10%	21
17-3027.00	Mechanical Engineering Technicians	72	3	130	$44,890.00	$3,330.00	2%	3
53-6051.07	Transportation Vehicle, Equipment and Systems Inspectors, Except Aviation	72	3	60	$42,890.00	$1,330.00	5%	2
47-4021.00	Elevator Installers and Repairers	72	4	0	$50,960.00	$9,400.00	0%	0

Top Industries for Tool and Die Makers

Industry	NAICS	% in Industry	Employment	Projected Employment	% Change
Metalworking machinery manufacturing	333500	22.13%	22,307	19,176	-14.03%
Motor vehicle parts manufacturing	336300	16.85%	16,980	14,194	-16.40%
Forging and stamping	332100	6.53%	6,577	5,404	-17.84%
Plastics product manufacturing	326100	5.64%	5,683	6,325	11.30%
Self-employed workers, primary job	000601	3.65%	3,678	4,115	11.86%
Aerospace product and parts manufacturing	336400	3.33%	3,353	3,585	6.94%
Machine shops	332710	2.87%	2,897	2,516	-13.14%
Other fabricated metal product manufacturing	332900	2.75%	2,768	2,575	-6.96%
Foundries	331500	2.53%	2,545	1,938	-23.87%
Turned product and screw, nut, and bolt manufacturing	332720	2.04%	2,058	1,566	-23.90%

Converted paper product manufacturing	322200	1.71%	1,726	1,521	-11.89%
Cutlery and handtool manufacturing	332200	1.68%	1,689	1,333	-21.09%
Agriculture, construction, and mining machinery manufacturing	333100	1.66%	1,672	1,639	-1.96%
Other electrical equipment and component manufacturing	335900	1.55%	1,559	1,517	-2.70%
Other general purpose machinery manufacturing	333900	1.39%	1,402	1,329	-5.21%

Top Industries for Machinists

Industry	NAICS	% in Industry	Employment	Projected Employment	% Change
Machine shops	332710	18.50%	73,341	63,702	-13.14%
Metalworking machinery manufacturing	333500	6.55%	25,986	22,339	-14.03%
Motor vehicle parts manufacturing	336300	6.18%	24,524	20,501	-16.40%
Employment services	561300	6.04%	23,956	31,835	32.89%
Aerospace product and parts manufacturing	336400	4.53%	17,976	19,223	6.94%
Other general purpose machinery manufacturing	333900	4.05%	16,052	15,215	-5.21%
Other fabricated metal product manufacturing	332900	3.34%	13,262	12,338	-6.96%
Turned product and screw, nut, and bolt manufacturing	332720	2.38%	9,427	7,174	-23.90%
Industrial machinery manufacturing	333200	2.04%	8,073	6,944	-13.98%
Navigational, measuring, electromedical, and control instruments manufacturing	334500	1.97%	7,831	7,872	0.53%
Plastics product manufacturing	326100	1.87%	7,414	8,252	11.30%
Engine, turbine, and power transmission equipment manufacturing	333600	1.70%	6,751	5,949	-11.87%
Commercial and industrial machinery and equipment (except automotive and electronic) repair and maintenance	811300	1.55%	6,143	6,826	11.11%
Architectural and structural metals manufacturing	332300	1.55%	6,163	6,912	12.14%
Self-employed workers, primary job	000601	1.47%	5,836	6,528	11.86%

