



TORO Analysis of Mechanical Engineering Technicians to Mechanical Drafters

INPUT SECTION:

Transfer	Title	O*NET	Filters		
From Title:	Mechanical Engineering Technicians	17-3027.00	Abilities:	Importance Level: 50	Weight: 1
To Title:	Mechanical Drafters	17-3013.00	Skills:	Importance Level: 69	Weight: 1
Labor Market Area:	Maine Statewide		Knowledge:	Importance Level: 69	Weight: 1

OUTPUT SECTION:

Grand TORQ:



89

Ability TORQ		Skills TORQ		Knowledge TORQ	
Level	95	Level	86	Level	87

Gaps To Narrow if Possible				Upgrade These Skills				Knowledge to Add			
Ability	Level	Gap	Impt	Skill	Level	Gap	Impt	Knowledge	Level	Gap	Impt
Number Facility	55	11	59	Technology Design	67	15	74	Design	89	22	95
Speech Recognition	50	8	68	Equipment Selection	72	9	71	Mathematics	70	9	75
Fluency of Ideas	59	8	65	Complex Problem Solving	65	8	71	Engineering and Technology	80	7	84
Visualization	69	5	84	Mathematics	70	7	79				
Near Vision	69	5	84	Critical Thinking	60	6	74				
Written Expression	66	4	78	Reading Comprehension	69	5	82				
Originality	59	4	62	Active Listening	66	3	77				
Speed of Closure	44	3	53	Instructing	62	3	75				
Mathematical Reasoning	64	2	75								
Far Vision	50	2	53								

LEVEL and IMPT (IMPORTANCE) refer to the Target Mechanical Drafters. GAP refers to level difference between Mechanical Engineering Technicians and Mechanical Drafters.

ASK ANALYSIS

Ability Level Comparison - Abilities with importance scores over 50

Description	Mechanical Engineering Technicians	Mechanical Drafters	Importance
Oral Expression	69	66	84



Visualization	64	69	84
Near Vision	64	69	84
Oral Comprehension	69	66	81
Written Expression	62	66	78
Problem Sensitivity	66	62	78
Written Comprehension	71	64	75
Deductive Reasoning	71	64	75
Inductive Reasoning	66	59	75
Information Ordering	67	57	75
Mathematical Reasoning	62	64	75
Speech Clarity	44	44	72
Speech Recognition	42	50	68
Fluency of Ideas	51	59	65
Originality	55	59	62
Category Flexibility	59	59	59
Number Facility	44	55	59
Flexibility of Closure	57	50	59
Selective Attention	44	42	59
Arm-Hand Steadiness	46	46	56
Finger Dexterity	53	42	56
Speed of Closure	41	44	53
Perceptual Speed	53	46	53
Far Vision	48	50	53

Skill Level Comparison - Abilities with importance scores over 69

Description	Mechanical Engineering Technicians	Mechanical Drafters	Importance
Reading Comprehension	64	69	82
Mathematics	63	70	79
Active Listening	63	66	77
Instructing	59	62	75
Critical Thinking	54	60	74
Technology Design	52	67	74
Complex Problem Solving	57	65	71



Equipment Selection	63	72	71
Knowledge Level Comparison - Knowledge with importance scores over 69			
Description	Mechanical Engineering Technicians	Mechanical Drafters	Importance
Design	67	89	95
Engineering and Technology	73	80	84
Mathematics	61	70	75

Experience & Education Comparison					
Related Work Experience Comparison			Required Education Level Comparison		
Description	Mechanical Engineering Technicians	Mechanical Drafters	Description	Mechanical Engineering Technicians	Mechanical Drafters
10+ years	10%	0%	Doctoral	0%	0%
8-10 years	1%	2%	Professional Degree	0%	0%
6-8 years	7%	0%	Post-Masters Cert	0%	0%
4-6 years	2%	7%	Master's Degree	0%	0%
2-4 years	39%	26%	Post-Bachelor Cert	0%	0%
1-2 years	10%	0%	Bachelors	43%	0%
6-12 months	0%	30%	AA or Equiv	23%	81%
3-6 months	4%	25%	Some College	0%	5%
1-3 months	11%	0%	Post-Secondary Certificate	14%	13%
0-1 month	0%	0%	High School Diploma or GED	16%	0%
None	11%	5%	No HSD or GED	0%	0%
Mechanical Engineering Technicians			Mechanical Drafters		
Most Common Educational/Training Requirement:					
Associate degree			Postsecondary vocational award		
Job Zone Comparison					
<p>3 - Job Zone Three: Medium Preparation Needed</p> <p>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.</p> <p>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.</p> <p>Employees in these occupations usually need one or two years of training involving both on-the-job experience and informal training with experienced workers.</p>			<p>3 - Job Zone Three: Medium Preparation Needed</p> <p>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.</p> <p>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.</p> <p>Employees in these occupations usually need one or two years of training involving both on-the-job experience and informal training with experienced workers.</p>		

Tasks	
Mechanical Engineering Technicians	Mechanical Drafters
Core Tasks	Core Tasks



Generalized Work Activities:

- Getting Information - Observing, receiving, and otherwise obtaining information from all relevant sources.
- Interacting With Computers - Using computers and computer systems (including hardware and software) to program, write software, set up functions, enter data, or process information.
- Communicating with Supervisors, Peers, or Subordinates - Providing information to supervisors, co-workers, and subordinates by telephone, in written form, e-mail, or in person.
- Identifying Objects, Actions, and Events - Identifying information by categorizing, estimating, recognizing differences or similarities, and detecting changes in circumstances or events.
- 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.

Specific Tasks

Occupation Specific Tasks:

- Analyze test results in relation to design or rated specifications and test objectives, and modify or adjust equipment to meet specifications.
- Calculate required capacities for equipment of proposed system to obtain specified performance and submit data to engineering personnel for approval.
- Confer with technicians and submit reports of test results to engineering department and recommend design or material changes.
- Devise, fabricate, and assemble new or modified mechanical components for products such as industrial machinery or equipment, and measuring instruments.
- Discuss changes in design, method of manufacture and assembly, and drafting techniques and procedures with staff and coordinate corrections.
- Draft detail drawing or sketch for drafting room completion or to request parts fabrication by machine, sheet or wood shops.
- Estimate cost factors including labor and material for purchased and fabricated parts and costs for assembly, testing, or installing.
- Evaluate tool drawing designs by measuring drawing dimensions and comparing with original specifications for form and function using engineering skills.
- Inspect lines and figures for clarity and return erroneous drawings to designer for correction.

Generalized Work Activities:

- Drafting, Laying Out, and Specifying Technical Devices, Parts, and Equipment - Providing documentation, detailed instructions, drawings, or specifications to tell others about how devices, parts, equipment, or structures are to be fabricated, constructed, assembled, modified, maintained, or used.
- Interacting With Computers - Using computers and computer systems (including hardware and software) to program, write software, set up functions, enter data, or process information.
- Getting Information - Observing, receiving, and otherwise obtaining information from all relevant sources.
- Making Decisions and Solving Problems - Analyzing information and evaluating results to choose the best solution and solve problems.
- Processing Information - Compiling, coding, categorizing, calculating, tabulating, auditing, or verifying information or data.

Specific Tasks

Occupation Specific Tasks:

- Check dimensions of materials to be used and assign numbers to the materials.
- Compute mathematical formulas to develop and design detailed specifications for components or machinery using computer-assisted equipment.
- Confer with customer representatives to review schematics and answer questions pertaining to installation of systems.
- Coordinate with and consult other workers to design, lay out, or detail components and systems and to resolve design or other problems.
- Design scale or full-size blueprints of specialty items such as furniture and automobile body or chassis components.
- Develop detailed design drawings and specifications for mechanical equipment, dies, tools, and controls, using computer-assisted drafting (CAD) equipment.
- Draw freehand sketches of designs, trace finished drawings onto designated paper for the reproduction of blueprints, and reproduce working drawings on copy machines.
- Lay out and draw schematic, orthographic, or angle views to depict functional relationships of components, assemblies, systems, and machines.
- Lay out, draw, and reproduce illustrations for reference manuals and technical publications to describe operation and maintenance of mechanical systems.



- Operate drill press, grinders, engine lathe, or other machines to modify parts tested or to fabricate experimental parts for testing.
- Prepare parts sketches and write work orders and purchase requests to be furnished by outside contractors.
- Read dials and meters to determine amperage, voltage, electrical output and input at specific operating temperature to analyze parts performance.
- Record test procedures and results, numerical and graphical data, and recommendations for changes in product or test methods.
- Review project instructions and blueprints to ascertain test specifications, procedures, and objectives, and test nature of technical problems such as redesign.
- Review project instructions and specifications to identify, modify and plan requirements fabrication, assembly and testing.
- Set up and conduct tests of complete units and components under operational conditions to investigate proposals for improving equipment performance.
- Set up prototype and test apparatus and operate test controlling equipment to observe and record prototype test results.
- Test equipment, using test devices attached to generator, voltage regulator, or other electrical parts, such as generators or spark plugs.

Detailed Tasks

Detailed Work Activities:

- analyze engineering design problems
- analyze engineering test data
- analyze technical data, designs, or preliminary specifications
- calculate engineering specifications
- communicate technical information
- conduct performance testing
- confer with engineering, technical or manufacturing personnel
- develop plans for programs or projects
- diagnose mechanical problems in machinery or equipment
- draw prototypes, plans, or maps to scale
- estimate cost for engineering projects
- evaluate engineering data
- examine engineering documents for completeness or accuracy
- fill out purchase requisitions
- follow manufacturing methods or techniques
- follow statistical process control procedures

reading and review designs to correct operating deficiencies or to reduce production problems.

- Position instructions and comments onto drawings.
- Review and analyze specifications, sketches, drawings, ideas, and related data to assess factors affecting component designs and the procedures and instructions to be followed.
- Shade or color drawings to clarify and emphasize details and dimensions or eliminate background using ink, crayon, airbrush, and overlays.
- Supervise and train other drafters, technologists, and technicians.

Detailed Tasks

Detailed Work Activities:

- analyze technical data, designs, or preliminary specifications
- analyze test data
- collect scientific or technical data
- communicate technical information
- conduct training for personnel
- confer with engineering, technical or manufacturing personnel
- consult with customers concerning needs
- create mathematical or statistical diagrams or charts
- direct and coordinate activities of workers or staff
- draw prototypes, plans, or maps to scale
- evaluate engineering data
- examine engineering documents for completeness or accuracy
- follow manufacturing methods or techniques
- inspect manufactured products or materials
- prepare technical reports or related documentation
- read blueprints
- read schematics
- read technical drawings
- understand engineering data or reports
- understand technical operating, service or repair manuals
- use computer aided drafting or design software for design, drafting, modeling, or other engineering tasks
- use drafting or mechanical drawing techniques
- use government regulations
- use knowledge of metric system
- use precision measuring tools or equipment
- use spreadsheet software
- work as a team member



- inspect facilities or equipment for regulatory compliance
- modify electrical or electronic equipment or products
- operate metal or plastic fabricating equipment/machinery
- operate pneumatic test equipment
- operate precision test equipment
- prepare technical reports or related documentation
- read blueprints
- read schematics
- read technical drawings
- read vehicle manufacturer's specifications
- recommend solutions to engineering problems
- record test results, test procedures, or inspection data
- set up and operate variety of machine tools
- test equipment as part of engineering projects or processes
- understand engineering data or reports
- understand service or repair manuals
- understand technical operating, service or repair manuals
- use drafting or mechanical drawing techniques
- use electrical or electronic test devices or equipment
- use knowledge of metric system
- use precision measuring tools or equipment
- use robotics systems technology
- use scientific research methodology
- use technical information in manufacturing or industrial activities
- use technical regulations for engineering problems

Technology - Examples

Analytical or scientific software

- ANSYS Mechanical
- MSC Software Adams
- Spectral Dynamics STARAcoustics
- Spectral Dynamics STARModal
- The Mathworks MATLAB
- Wolfram Research Mathematica

Computer aided design CAD software

- Autodesk AutoCAD Mechanical
- Autodesk Inventor

WORK AS A TEAM MEMBER

Technology - Examples

Computer aided design CAD software

- Autodesk AutoCAD software
- Autodesk Inventor
- Autodesk Mechanical
- Bentley Microstation
- Bentley Navigator
- Dassault Systemes CATIA software
- Piping and instrumentation design PID software
- PTC Pro/Cable
- PTC Pro/ENGINEER software
- PTC Pro/ENGINEER Wildfire
- PTC Pro/Mechanica
- PTC Pro/Pipe
- PTC Pro/Sheetmetal
- Reverse engineering software
- SofTech CADRA
- SolidWorks CAD software

Computer aided manufacturing CAM software

- Rapid prototyping software

Data base user interface and query software

- Microsoft Access

Document management software

- Document management software

Graphics or photo imaging software

- Adobe Systems Adobe After Effects
- Adobe Systems Adobe LiveMotion
- Graphic presentation software
- McNeel Rhino software
- Motion graphics software
- Non uniform rational b-splines NURBS software

Materials requirements planning logistics and supply chain software

- Bill of materials software

Optical character reader OCR or scanning software



- Bentley MicroStation
- Computer aided design CAD software
- IBM CATIA V5
- PTC Pro/ENGINEER software
- SolidWorks CAD software
- Computer aided manufacturing CAM software
 - CNC Mastercam
 - Computer aided manufacturing CAM software
 - Three-dimensional 3D solid modeling software
- Development environment software
 - Microsoft Visual Basic
 - National Instruments LabVIEW
- Industrial control software
 - Computerized numerical control CNC programming software
 - Robotic control software
 - Soft Servo Systems LadderWorks PLC
- Internet browser software
 - Web browser software
- Office suite software
 - Microsoft Office
- Presentation software
 - Microsoft PowerPoint
- Project management software
 - Microsoft Project
- Spreadsheet software
 - Microsoft Excel
- Word processing software
 - Corel WordPerfect software
 - Microsoft Word

Tools - Examples

- Accelerometers
- Adjustable wrenches
- Air compressors
- Clamp-on ammeters
- High-voltage amplifiers

- Scanning software
 - Three-dimensional scanning software
- Presentation software
 - Microsoft PowerPoint
- Spreadsheet software
 - Microsoft Excel
- Word processing software
 - Microsoft Word

Tools - Examples

- Calculators
- Compasses
- Three-dimensional motion controllers
- Flexible curves
- Desktop computers
 - Computer aided design CAD multi-unit display graphics cards
 - Notebook computers
- Cutting plotters
- Print servers
- Protractors
- Architects' scales
- Backlit digitizers
- T-squares
- Graphics tablets
- Estimating keypads
- Triangles



- Anemometers
- Optical microscopes
- C clamps
- Dial calipers
- Electronic comparators
- Compression testing machines
- Coordinate measuring machines CMM
- Dynamometers
- Extrusion machines
- Fatigue testers
- Mill files
- Fluid meters
- Rotameters
- Force sensors
- Plane-parallel gauge blocks
- Arc welding equipment
- Bore gauges
- Go/no-go gauges
- Safety goggles
- Digitizing tablets
- Surface grinders
- Polishing machines
- Claw hammers
- Durometers
- Vernier height gauges
- Hex keys
- Impact testers
- Heat treatment furnaces
- Injection molders
- Metallographs
- Computerized numerical control CNC lathes
- Spirit levels



- Granite surface plates
- Load cells
- Locking pliers
- Long nose pliers
- Metal inert gas MIG welding equipment
- Marking gauges
- Bend test fixtures
- Programmable logic controllers PLC
- Micrometers
- Microprocessors
- Combination milling machines
- Milling machines
- Digital multimeters
- Laptop computers
- Nut drivers
- Oscilloscopes
- Personal computers
- Drafting plotters
- Positioning jigs
- Power drills
- Cylindrical grinders
- Belt sanders
- Band saws
- Pressure sensors
- Safety gloves
- Protractors
- Center punches
- Hacksaws
- Offset screwdrivers
- Scribes
- Shear testing fixtures
- Power shears



- Signal conditioners
- Signal generators
- Arc-joint pliers
- Socket sets
- Soldering equipment
- Combination squares
- Steel rules
- Strain gauges
- Wire strippers
- Measuring tapes
- Dies
- Temperature sensors
- Tensile testers
- Dynamic mechanical analyzers DMA
- Snap gauges
- Screw thread gauges
- Tungsten inert gas TIG welding equipment
- Twin-screw extruders
- Twist drills
- Ultrasound inspection equipment
- Utility knives
- Vacuum molders
- Freon recovery equipment
- Vibration testers
- Spot welders
- Welding masks
- Dry rod ovens
- Wire cutters
- Drill presses

Labor Market Comparison

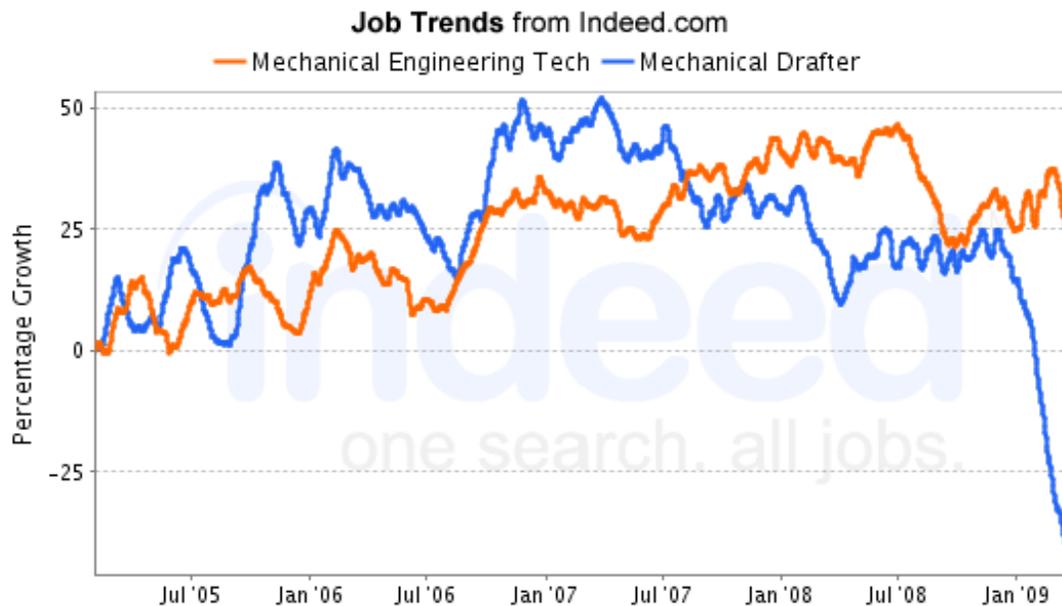


Description	Mechanical Engineering Technicians	Mechanical Drafters	Difference
Median Wage	\$ 44,890	\$ 46,630	\$ 1,740
10th Percentile Wage	\$ 30,530	\$ 38,290	\$ 7,760
25th Percentile Wage	N/A	N/A	N/A
75th Percentile Wage	\$ 51,860	\$ 50,240	\$(1,620)
90th Percentile Wage	\$ 61,330	\$ 52,420	\$(8,910)
Mean Wage	\$ 45,460	\$ 46,320	\$ 860
Total Employment - 2007	130	710	580
Employment Base - 2006	129	742	613
Projected Employment - 2016	132	754	622
Projected Job Growth - 2006-2016	2.3 %	1.6 %	-0.7 %
Projected Annual Openings - 2006-2016	3	22	19

National Job Posting Trends

Trend for Mechanical Engineering Technicians

Trend for Mechanical Drafters

Data from [Indeed](#)

Recommended Programs

Mechanical Drafting and Mechanical Drafting CAD/CADD

Mechanical Drafting and Mechanical Drafting CAD/CADD. A program that prepares individuals to apply technical knowledge and skills to develop working drawings and electronic simulations in support of mechanical and industrial engineers, and related professionals. Includes instruction in manufacturing materials and processes, mechanical drafting, electrode-mechanical drafting, basic metallurgy, geometric dimensioning and tolerancing, blueprint reading and technical communication.

No schools available for the program



Maine Statewide Promotion Opportunities for Mechanical Engineering Technicians

O* NET Code	Title	Grand TORQ	Job Zone	Employment	Median Wage	Difference	Growth	Annual Job Openings
17-3027.00	Mechanical Engineering Technicians	100	3	130	\$44,890.00	\$0.00	2%	3
17-3023.03	Electrical Engineering Technicians	91	3	430	\$45,180.00	\$290.00	-20%	9
27-1021.00	Commercial and Industrial Designers	91	4	140	\$49,170.00	\$4,280.00	5%	5
17-3013.00	Mechanical Drafters	89	3	710	\$46,630.00	\$1,740.00	2%	22
17-2141.00	Mechanical Engineers	89	4	620	\$67,210.00	\$22,320.00	-9%	14
17-2072.00	Electronics Engineers, Except Computer	88	4	210	\$76,420.00	\$31,530.00	-26%	4
17-2112.00	Industrial Engineers	87	4	580	\$68,350.00	\$23,460.00	11%	22
17-2131.00	Materials Engineers	87	4	40	\$70,250.00	\$25,360.00	-7%	1
17-2121.02	Marine Architects	86	4	60	\$75,520.00	\$30,630.00	-9%	1
51-4111.00	Tool and Die Makers	86	3	160	\$51,670.00	\$6,780.00	-11%	2
17-3026.00	Industrial Engineering Technicians	86	3	370	\$51,700.00	\$6,810.00	6%	9
17-2111.03	Product Safety Engineers	85	5	90	\$49,940.00	\$5,050.00	3%	3
17-2031.00	Biomedical Engineers	84	4	20	\$86,560.00	\$41,670.00	-10%	1
17-2071.00	Electrical Engineers	84	4	260	\$73,050.00	\$28,160.00	-10%	6
17-2121.01	Marine Engineers	84	4	60	\$75,520.00	\$30,630.00	-9%	1

Top Industries for Mechanical Drafters

Industry	NAICS	% in Industry	Employment	Projected Employment	% Change
Architectural and structural metals manufacturing	332300	6.37%	4,993	5,394	8.04%
Self-employed workers, primary job	000601	4.81%	3,771	4,064	7.77%



Metalworking machinery manufacturing	333500	4.69%	3,674	3,043	-17.18%
Other general purpose machinery manufacturing	333900	4.37%	3,423	3,126	-8.68%
Employment services	561300	3.41%	2,669	3,075	15.23%
Agriculture, construction, and mining machinery manufacturing	333100	2.98%	2,333	2,204	-5.55%
Aerospace product and parts manufacturing	336400	2.73%	2,139	2,372	10.88%
Industrial machinery manufacturing	333200	2.48%	1,945	1,612	-17.13%
Other fabricated metal product manufacturing	332900	2.03%	1,593	1,427	-10.37%
Motor vehicle parts manufacturing	336300	1.85%	1,446	1,164	-19.46%
Navigational, measuring, electromedical, and control instruments manufacturing	334500	1.78%	1,397	1,353	-3.15%
Ventilation, heating, air-conditioning, and commercial refrigeration equipment manufacturing	333400	1.70%	1,328	1,236	-6.94%
Management of companies and enterprises	551100	1.39%	1,089	1,270	16.62%
Plumbing, heating, and air-conditioning contractors	238220	1.36%	1,064	1,215	14.23%
Commercial and service industry machinery manufacturing	333300	1.17%	918	814	-11.27%

Top Industries for Mechanical Engineering Technicians

Industry	NAICS	% in Industry	Employment	Projected Employment	% Change
Research and development in the physical, engineering, and life sciences	541710	8.52%	4,072	4,344	6.69%
Navigational, measuring, electromedical, and control instruments manufacturing	334500	6.30%	3,013	2,884	-4.26%
Testing laboratories	541380	5.16%	2,467	3,037	23.12%
Other general purpose machinery manufacturing	333900	5.01%	2,393	2,376	-0.70%
Semiconductor and other electronic component manufacturing	334400	3.33%	1,593	1,392	-12.59%
Aerospace product and parts manufacturing	336400	3.02%	1,442	1,468	1.84%
Agriculture, construction, and mining machinery manufacturing	333100	2.58%	1,234	1,152	-6.63%
Employment services	561300	2.19%	1,047	1,325	26.56%
Industrial machinery manufacturing	333200	2.14%	1,022	921	-9.88%
Engine, turbine, and power transmission equipment manufacturing	333600	2.05%	980	822	-16.07%
Motor vehicle parts manufacturing	336300	2.00%	957	762	-20.39%
Ventilation, heating, air-conditioning, and commercial refrigeration equipment manufacturing	333400	1.94%	926	852	-8.01%
Medical equipment and supplies manufacturing	339100	1.78%	851	870	2.29%

Communications equipment manufacturing	334200	1.74%	833	839	0.79%
Commercial and service industry machinery manufacturing	333300	1.63%	780	684	-12.28%