

New Jersey's Advanced Manufacturing Industry Cluster

Prepared by:
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STATE OF NEW JERSEY
DEPARTMENT OF LABOR AND
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The goal of this report is to get an “IDEA” of what advanced manufacturing means to New Jersey

Identify the types of industries and establishments that make up the advanced manufacturing cluster based on a standard industry classification system

Describe any similarities and differences among its components with regard to such variables as employment, wage, occupation type, education, and demographic characteristics

Examine any present distinctions within the cluster and its components that give New Jersey a competitive advantage compared to neighboring states, regions or the nation, or show areas where New Jersey could improve to add to the state’s economy

Analyze the current state of the advanced manufacturing cluster and provide an outlook for employment into the future

New Jersey Advanced Manufacturing Highlights

- The advanced manufacturing industry cluster contributed nearly \$30.9 billion to the Gross Domestic Product in 2015, or about 6.1 percent of all output
- In 2016, New Jersey employed nearly 44,000 people in chemical manufacturing, the state's largest segment of advanced manufacturing, which ranks fifth among states behind only California, Texas, Illinois, and Ohio
- Approximately two-thirds of all manufacturing industry employment in the state is classified as advanced
- Average wages paid in many advanced manufacturing industries are well above the statewide private sector average of \$62,420 in 2016
- Advanced manufacturing employers paid more than \$14 billion in total wages in 2016, or about 6.6 percent of all wages paid

Overview

There were over 5,450 establishments in New Jersey that employed nearly 159,500 people in the advanced manufacturing cluster in 2016. Employment is scattered throughout the state and found in places ranging from very large pharmaceutical firms to much smaller machine shops. These establishments are generally found in the Northeastern part of the state and also along the Interstate 95 corridor.

The occupational composition within advanced manufacturing industries is continuously changing as more technical skills are required to operate more advanced processes. The expectation of higher skills has resulted in many higher paying jobs, especially among chemical manufacturing firms.

According to the U.S. Census Bureau's 2015 American Community Survey, the profile of the average New Jersey resident worker is generally older than average and male. Nearly 58 percent of the workforce is aged 45 and over. Racially, it is more diverse than average, especially among the Asian population. The workforce is highly educated, as almost 48 percent having attained at least a bachelor's degree.

INDUSTRIAL COMPOSITION



The five primary components of the advanced manufacturing sector with some examples of industries classified within them

Food Manufacturing

- Bakeries
- Dairy products
- Fruit & vegetable preserving
- Seafood product preparation & packaging

Chemical Manufacturing

- Basic chemical
- Pharmaceutical & medicine
- Cleaning compound and toiletry
- Paint, coating & adhesive

Machinery Manufacturing

- Industrial machinery
- HVAC and commercial refrigeration equipment
- Commercial and service industry machinery
- Turbine and power transmission

Fabricated Metal Product Manufacturing

- Architectural and structural metals
- Machine shops and threaded product
- Forging and stamping
- Coating, engraving, and heat treating metals

Computer and Electronic Product Manufacturing

- Computers and peripheral equipment
- Communications equipment
- Audio and visual equipment
- Semiconductors and other electronic components

The complete list of 273 detailed NAICS industries classified as advanced manufacturing

Food Manufacturing

311111	Dog and Cat Food Mfg	311412	Frozen Specialty Food Mfg	311811	Retail Bakeries
311119	Other Animal Food Mfg	311421	Fruit and Vegetable Canning	311812	Commercial Bakeries
311211	Flour Milling	311422	Specialty Canning	311813	Frozen Cakes, Pies, and Other Pastries Mfg
311212	Rice Milling	311423	Dried and Dehydrated Food Mfg	311821	Cookie and Cracker Mfg
311213	Malt Mfg	311511	Fluid Milk Mfg	311824	Dry Pasta, Dough, and Flour Mixes Mfg from Purchased Flour
311221	Wet Corn Milling	311512	Creamery Butter Mfg	311830	Tortilla Mfg
311224	Soybean and Other Oilseed Processing	311513	Cheese Mfg	311911	Roasted Nuts and Peanut Butter Mfg
311225	Fats and Oils Refining and Blending	311514	Dry, Condensed, and Evaporated Dairy Product Mfg	311919	Other Snack Food Mfg
311230	Breakfast Cereal Mfg	311520	Ice Cream and Frozen Dessert Mfg	311920	Coffee and Tea Mfg
311313	Beet Sugar Mfg	311611	Animal (except Poultry) Slaughtering	311930	Flavoring Syrup and Concentrate Mfg
311314	Cane Sugar Mfg	311612	Meat Processed from Carcasses	311941	Mayonnaise, Dressing, and Other Prepared Sauce Mfg
311340	Nonchocolate Confectionery Mfg	311613	Rendering and Meat Byproduct Processing	311942	Spice and Extract Mfg
311351	Chocolate and Confectionery Mfg from Cacao Beans	311615	Poultry Processing	311991	Perishable Prepared Food Mfg
311352	Confectionery Mfg from Purchased Chocolate	311710	Seafood Product Preparation and Packaging	311999	All Other Miscellaneous Food Mfg
311411	Frozen Fruit, Juice, and Vegetable Mfg				



The complete list of 273 detailed NAICS industries classified as advanced manufacturing, continued...

Chemical Manufacturing

325110	Petrochemical Mfg	325311	Nitrogenous Fertilizer Mfg	325611	Soap and Other Detergent Mfg
325120	Industrial Gas Mfg	325312	Phosphatic Fertilizer Mfg	325612	Polish and Other Sanitation Good Mfg
325130	Synthetic Dye and Pigment Mfg	325314	Fertilizer (Mixing Only) Mfg	325613	Surface Active Agent Mfg
325180	Other Basic Inorganic Chemical Mfg	325320	Pesticide and Other Agricultural Chemical Mfg	325620	Toilet Preparation Mfg
325193	Ethyl Alcohol Mfg	325411	Medicinal and Botanical Mfg	325910	Printing Ink Mfg
325194	Cyclic Crude, Gum and Wood Chemical Mfg	325412	Pharmaceutical Preparation Mfg	325920	Explosives Mfg
325199	All Other Basic Organic Chemical Mfg	325413	In-Vitro Diagnostic Substance Mfg	325991	Custom Compounding of Purchased Resins
325211	Plastics Material and Resin Mfg	325414	Biological Product (except Diagnostic) Mfg	325992	Photographic Film, Paper, Plate, and Chemical Mfg
325212	Synthetic Rubber Mfg	325510	Paint and Coating Mfg	325998	All Other Misc. Chemical Product and Preparation Mfg
325220	Artificial and Synthetic Fibers and Filaments Mfg	325520	Adhesive Mfg		



The complete list of 273 detailed NAICS industries classified as advanced manufacturing, continued...

Fabricated Metal Product Manufacturing

332111	Iron and Steel Forging	332323	Ornamental and Architectural Metal Work Mfg	332812	Metal Coating and Allied Services to Manufacturers
332112	Nonferrous Forging	332410	Power Boiler and Heat Exchanger Mfg	332813	Electroplating, Plating, Polishing, and Coloring
332114	Custom Roll Forming	332420	Metal Tank (Heavy Gauge) Mfg	332911	Industrial Valve Mfg
332117	Powder Metallurgy Part Mfg	332431	Metal Can Mfg	332912	Fluid Power Valve and Hose Fitting Mfg
332119	Metal Crown, Closure, and Other Metal Stamping	332439	Other Metal Container Mfg	332913	Plumbing Fixture Fitting and Trim Mfg
332215	Metal Kitchen Cookware and Flatware Mfg	332510	Hardware Mfg	332919	Other Metal Valve and Pipe Fitting Mfg
332216	Saw Blade and Handtool Mfg	332613	Spring Mfg	332991	Ball and Roller Bearing Mfg
332311	Prefabricated Metal Building and Component Mfg	332618	Other Fabricated Wire Product Mfg	332992	Small Arms Ammunition Mfg
332312	Fabricated Structural Metal Mfg	332710	Machine Shops	332993	Ammunition (except Small Arms) Mfg
332313	Plate Work Mfg	332721	Precision Turned Product Mfg	332994	Small Arms, Ordnance, and Accessories Mfg
332321	Metal Window and Door Mfg	332722	Bolt, Nut, Screw, Rivet, and Washer Mfg	332996	Fabricated Pipe and Pipe Fitting Mfg
332322	Sheet Metal Work Mfg	332811	Metal Heat Treating	332999	All Other Misc. Fabricated Metal Product Mfg



The complete list of 273 detailed NAICS industries classified as advanced manufacturing, continued...

Machinery Manufacturing

333111	Farm Machinery and Equipment Mfg	333413	Industrial and Commercial Fan and Air Purification Equipment Mfg	333912	Air and Gas Compressor Mfg
333112	Lawn and Garden Tractor Equipment Mfg	333414	Heating Equipment Mfg	333913	Measuring and Dispensing Pump Mfg
333120	Construction Machinery Mfg	333415	AC, Refrigeration, & Forced Air Heating	333921	Elevator and Moving Stairway Mfg
333131	Mining Machinery and Equipment Mfg	333511	Industrial Mold Mfg	333922	Conveyor and Conveying Equipment Mfg
333132	Oil and Gas Field Machinery and Equipment Mfg	333514	Special Die and Tool, Die Set, Jig, and Fixture Mfg	333923	Overhead Crane, Hoist, and Monorail System Mfg
333241	Food Product Machinery Mfg	333515	Cutting Tool and Machine Tool Accessory Mfg	333924	Industrial Truck, Tractor, and Trailer Machinery Mfg
333242	Semiconductor Machinery Mfg	333517	Machine Tool Mfg	333991	Power-Driven Handtool Mfg
333243	Sawmill, Woodworking, and Paper Machinery Mfg	333519	Rolling Mill and Other Metalworking Machinery Mfg	333992	Welding and Soldering Equipment Mfg
333244	Printing Machinery and Equipment Mfg	333611	Turbine and Turbine Generator Set Units Mfg	333993	Packaging Machinery Mfg
333249	Other Industrial Machinery Mfg	333612	Speed Changer, Industrial High-Speed Drive, and Gear Mfg	333994	Industrial Process Furnace and Oven Mfg
333314	Optical Instrument and Lens Mfg	333613	Mechanical Power Transmission Equipment Mfg	333995	Fluid Power Cylinder and Actuator Mfg
333316	Photographic and Photocopying Equipment Mfg	333618	Other Engine Equipment Mfg	333996	Fluid Power Pump and Motor Mfg
333318	Other Commercial and Service Industry Machinery Mfg	333911	Pump and Pumping Equipment Mfg	333997	Scale and Balance Mfg



The complete list of 273 detailed NAICS industries classified as advanced manufacturing, continued...

Computer and Electronic Product Manufacturing

334111	Electronic Computer Mfg	334413	Semiconductor and Related Device Mfg	334513	Industrial Process Variable Instruments
334112	Computer Storage Device Mfg	334416	Capacitor, Resistor, Coil, and Other Inductor Mfg	334514	Totalizing Fluid Meter and Counting Device Mfg
334118	Terminal and Other Computer Peripheral Equip. Mfg	334417	Electronic Connector Mfg	334515	Instrument Mfg for Measuring Electrical Signals
334210	Telephone Apparatus Mfg	334418	Printed Circuit Assembly Mfg	334516	Analytical Laboratory Instrument Mfg
334220	Radio and Other Broadcasting Equipment Mfg	334419	Other Electronic Component Mfg	334517	Irradiation Apparatus Mfg
334290	Other Communications Equipment Mfg	334510	Electromedical and Electrotherapeutic Apparatus Mfg	334519	Other Measuring and Controlling Device Mfg
334310	Audio and Video Equipment Mfg	334511	Search, Detection & Navigation Instrument	334613	Blank Magnetic and Optical Recording Media Mfg
334412	Bare Printed Circuit Board Mfg	334512	Automatic Environmental Control Mfg.	334614	Software, CD, Tape, and Record Reproducing



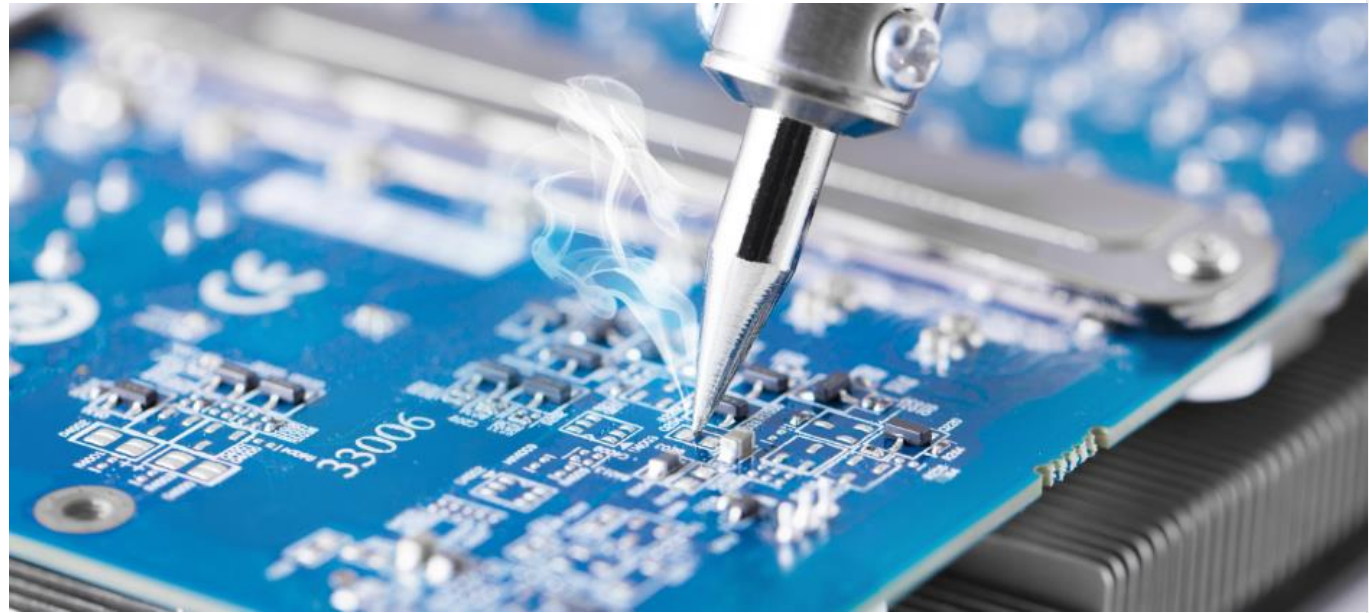
The complete list of 273 detailed NAICS industries classified as advanced manufacturing, continued...

All Other Advanced Manufacturing

324110	Petroleum Refineries	335313	Switchgear and Switchboard Apparatus Mfg	336412	Aircraft Engine and Engine Parts Mfg
324121	Asphalt Paving Mixture and Block Mfg	335314	Relay and Industrial Control Mfg	336413	Other Aircraft Parts and Auxiliary Equipment Mfg
324122	Asphalt Shingle and Coating Materials Mfg	336310	Motor Vehicle Gasoline Engine and Engine Parts Mfg	336414	Guided Missile and Space Vehicle Mfg
324191	Petroleum Lubricating Oil and Grease Mfg	336320	Motor Vehicle Electrical and Electronic Equipment Mfg	336415	Space Vehicle Propulsion Units and Parts
324199	All Other Petroleum and Coal Products Mfg	336330	Motor Vehicle Steering and Suspension Mfg	336419	Other Guided Missile/Space Vehicle Parts
327211	Flat Glass Mfg	336340	Motor Vehicle Brake System Mfg	336611	Ship Building and Repairing
327212	Other Pressed and Blown Glass and Glassware Mfg	336350	Motor Vehicle Transmission and Power Train Mfg	336612	Boat Building
327213	Glass Container Mfg	336360	Motor Vehicle Seating and Interior Trim Mfg	339112	Surgical and Medical Instrument Mfg
327215	Glass Product Mfg Made of Purchased Glass	336370	Motor Vehicle Metal Stamping	339113	Surgical Appliance and Supplies Mfg
335311	Power, Distribution, and Specialty Transformer Mfg	336390	Other Motor Vehicle Parts Mfg	339114	Dental Equipment and Supplies Mfg
335312	Motor and Generator Mfg	336411	Aircraft Mfg	339115	Ophthalmic Goods Mfg
				339116	Dental Laboratories



ECONOMIC IMPACT



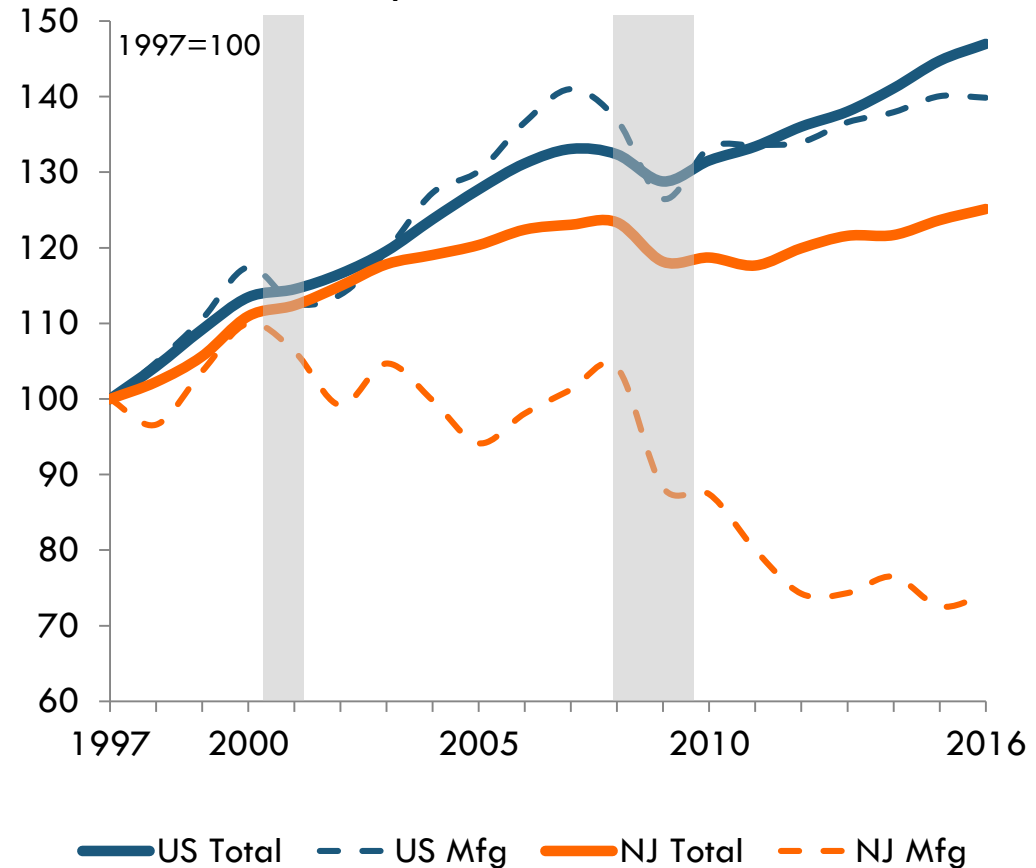
GDP growth in New Jersey has averaged 1.2 percent per year from 1997 to 2016, and now exceeds half of a trillion dollars

Over the same period, the national GDP has averaged 2 percent annual growth

Manufacturing GDP in the United States has grown in line with the overall economy, but in New Jersey, the declining manufacturing GDP estimate has been a detractor

New Jersey's manufacturing sector averaged marginal growth of 0.4 percent per year from 1997 through 2008, but tumbled to decline by an annual average of 4.2 percent from 2008 through 2016

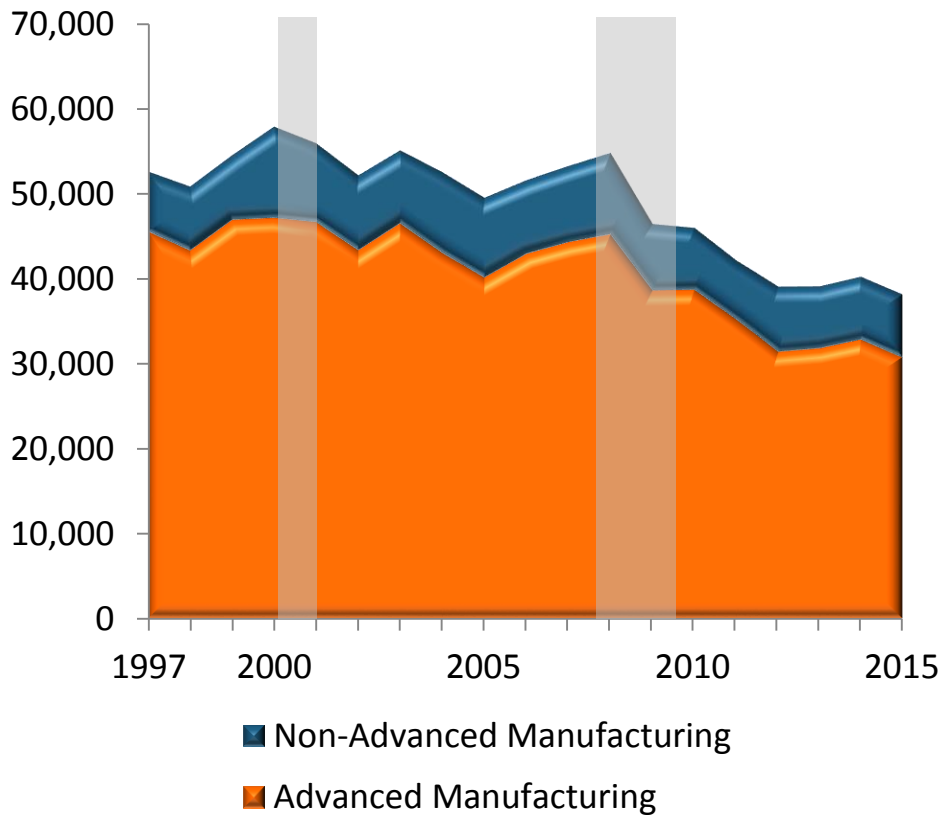
Gross Domestic Product Index (Chained 2009 Dollars)
New Jersey & United States: 1997-2016



Gray area denotes U.S. economic recession as defined by the National Bureau of Economic Research (NBER)

Roughly 81 percent of manufacturing GDP in New Jersey is derived from industries classified as advanced

Gross Domestic Product of Manufacturing Sector
(Billions of Chained 2009 Dollars)
New Jersey: 1997-2015



These advanced manufacturing industries also accounted for roughly 81 percent of manufacturing GDP at the national level

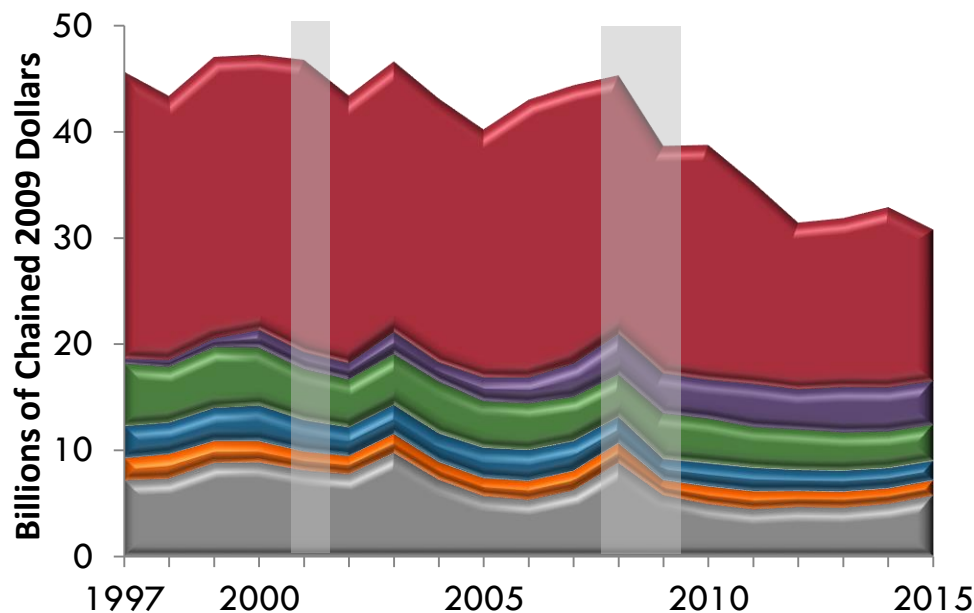
Total manufacturing GDP in New Jersey exceeded \$50 billion consistently from 1997 through 2008, averaging 0.4 percent annual growth

GDP in statewide advanced manufacturing industries were essentially unchanged from 1997-2008, but declined by an annual average rate of 5.3 percent over the next five years following the national recession

Gray area denotes U.S. economic recession as defined by the National Bureau of Economic Research (NBER)

Output produced from the chemical manufacturing sector dominates GDP output among advanced manufacturing industries

Gross Domestic Product by Advanced Manufacturing Segment
New Jersey: 1997-2015



- Chemical products
- Computer and electronic products
- Food and beverage and tobacco products
- Fabricated metal products
- Machinery
- Other advanced manufacturing

Chemical manufacturing accounted for 59 percent of advanced manufacturing GDP in 1997, but only 46 percent in 2015

The **fabricated metal**, **machinery**, and all other advanced manufacturing segments maintained a fairly steady share of total GDP throughout this time period.

Computer and electronic products manufacturing has been the best performing industry among this group, increasing its GDP from \$591 million in 1997 to nearly \$4.2 billion in 2015

Gray area denotes U.S. economic recession as defined by the National Bureau of Economic Research (NBER)

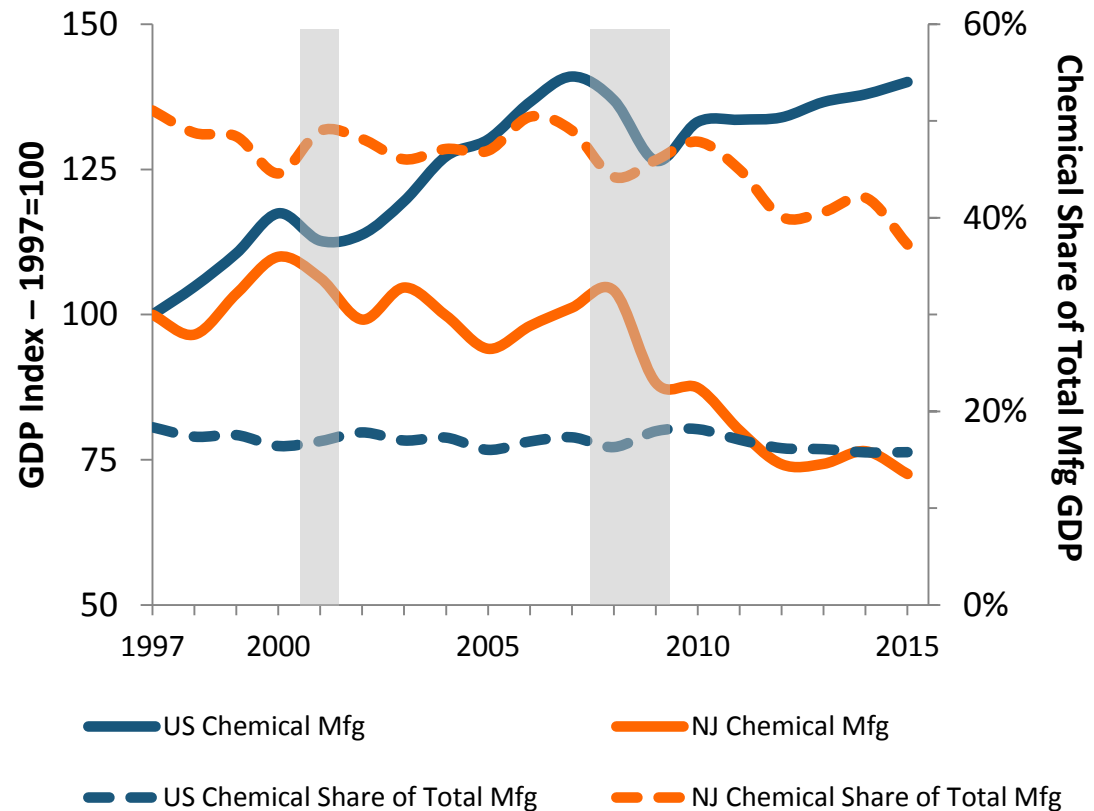
Chemical manufacturing accounts for nearly half of New Jersey's manufacturing GDP, which makes the rate of decline alarming

Annual average change in GDP by chemical manufacturers in New Jersey and the nation have been moving in opposite directions for some time

From 1997-2007, the nation had robust growth of 3.5 percent per year while New Jersey increased slightly

From 2007-2015, New Jersey experienced deep losses in GDP of 4.1 percent per year while the nation is only slightly below its pre-recession peak

Measures of GDP for Chemical Manufacturing
New Jersey & United States: 1997-2015



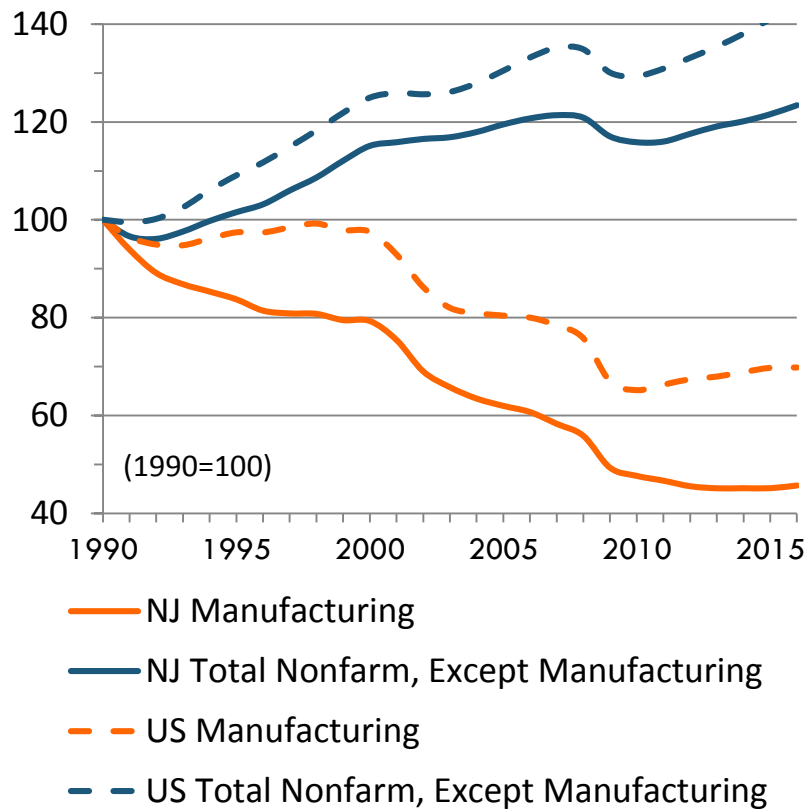
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INDUSTRY ANALYSIS



New Jersey has followed a similar employment trend as the nation, but has fared worse over the last 26 years

Employment: Manufacturing vs. All “other” Industries
New Jersey & United States: 1990-2016



Manufacturing has lost 297,300 jobs in New Jersey since 1990, a 3 percent annual decline, while the nation has declined at a 1.4 percent annual rate, shedding roughly 5.3 million jobs

The “other” non-agricultural industries grew by an annual average of 0.8 percent posting a net gain of 728,000 jobs in New Jersey, while the United States added over 40 million jobs, an average gain of 1.4 percent per year

From 2015 to 2016, New Jersey’s manufacturing sector experienced its best year since 1990, gaining 2,900 jobs, and continuing a three year trend over the past 26 years of avoiding an employment decline

Manufacturing employment in New Jersey has declined from 14.6 percent of all jobs in 1990 to 5.9 percent in 2016

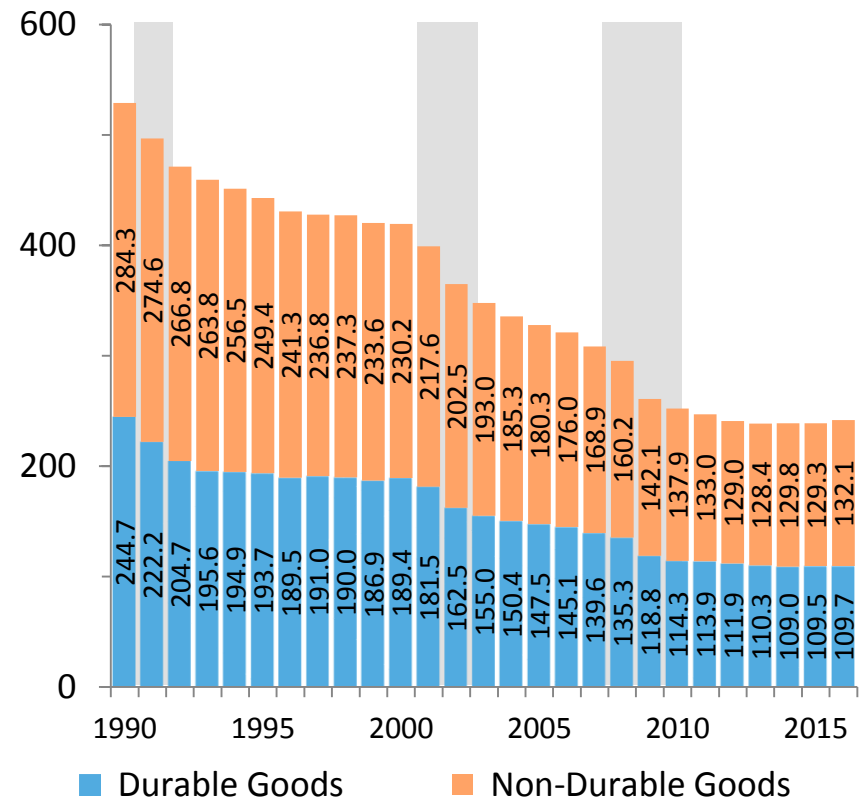
Nationally, manufacturing's share of total employment has declined from 16.2 percent in 1990 to 8.6 percent in 2016

Widespread and consistent losses among industries that manufacture both durable and non-durable goods have resulted in closely distributed annual average losses of 3.0 and 2.9 percent, respectively

During the six worst years for manufacturing employment in New Jersey ('91-'92, '01-'03, '09), more than 163,000 of the 291,000 total jobs losses occurred, an average rate of decline of more than 6 percent per year

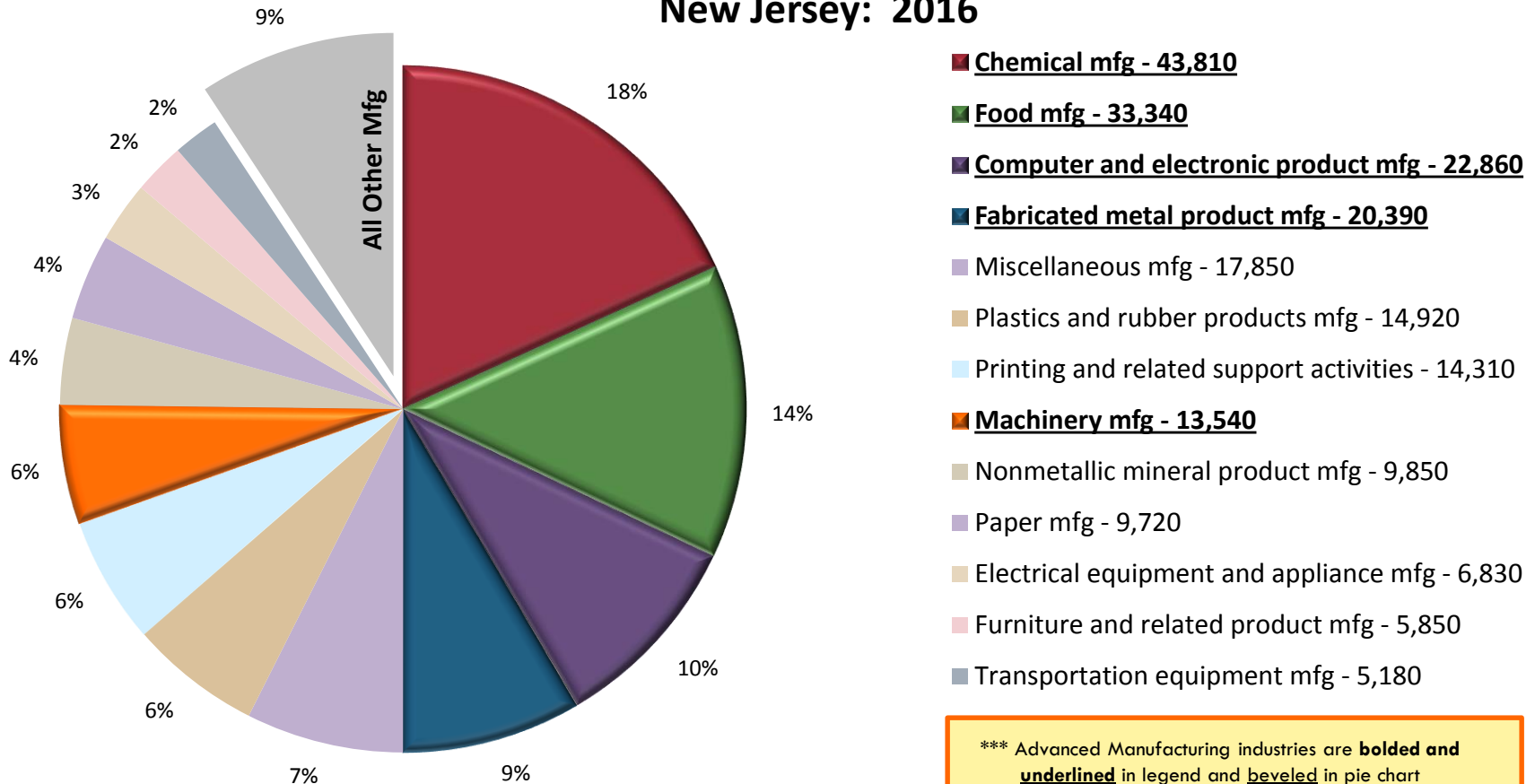
Gray area denotes U.S. economic recession as defined by the National Bureau of Economic Research (NBER)

Employment (000s) breakdown
Durable vs. Non-durable Goods
New Jersey: 1990-2016



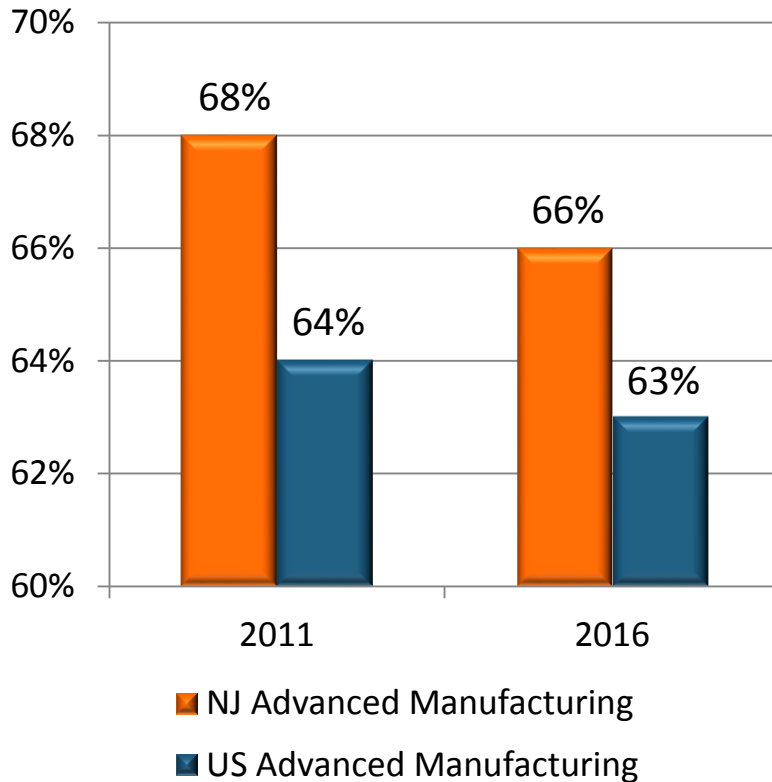
The chart below shows the distribution of all manufacturing employment across its many different industries

All Manufacturing Industries as a Percentage of Total Manufacturing in New Jersey: 2016



The New Jersey Department of Labor and Workforce Development has classified 209 out of 362 NAICS-based manufacturing industries as advanced

Percentage of Manufacturing Employment
Classified as Advanced
New Jersey and United States: 2011 & 2016



Employment in advanced manufacturing industries declined at a faster rate than non-advanced industries in New Jersey from 2011 to 2016, averaging a 1.4 percent loss per year

In 2016, there were nearly 159,500 people employed in industries classified as advanced manufacturing in New Jersey

Roughly 66 percent of all manufacturing employment in New Jersey occurred in advanced industries in 2016 versus only 63 percent nationwide

The five major components of advanced manufacturing accounted for nearly 84 percent of its employment in New Jersey in 2016

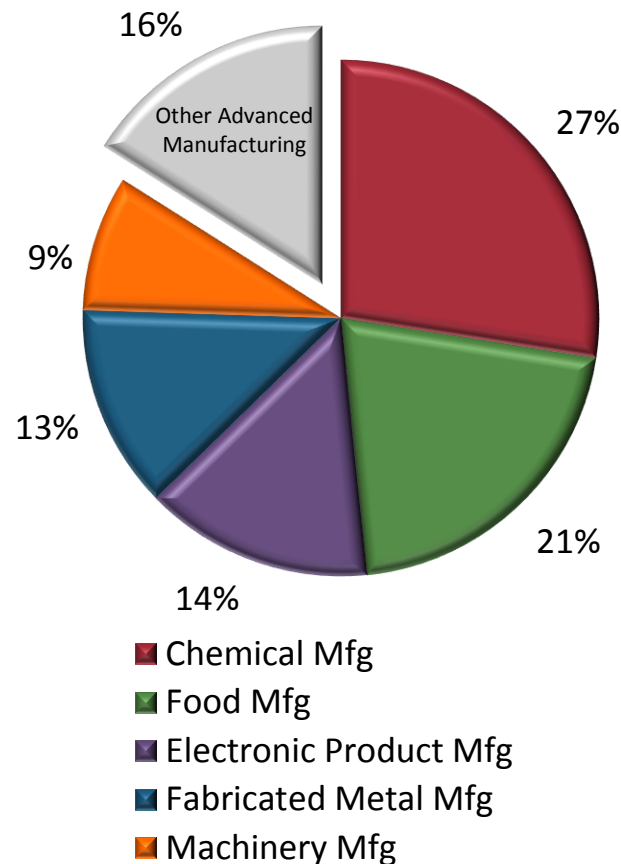
Chemical manufacturing, which includes pharmaceuticals and medicine, employed nearly 43,900 in 2016, which is about 18 percent of all manufacturing in the state

Food manufacturing is the second largest segment and employed more than 33,300 in 2016

Computer and electronic product and fabricated metal product manufacturing together employed nearly 43,300 in 2016

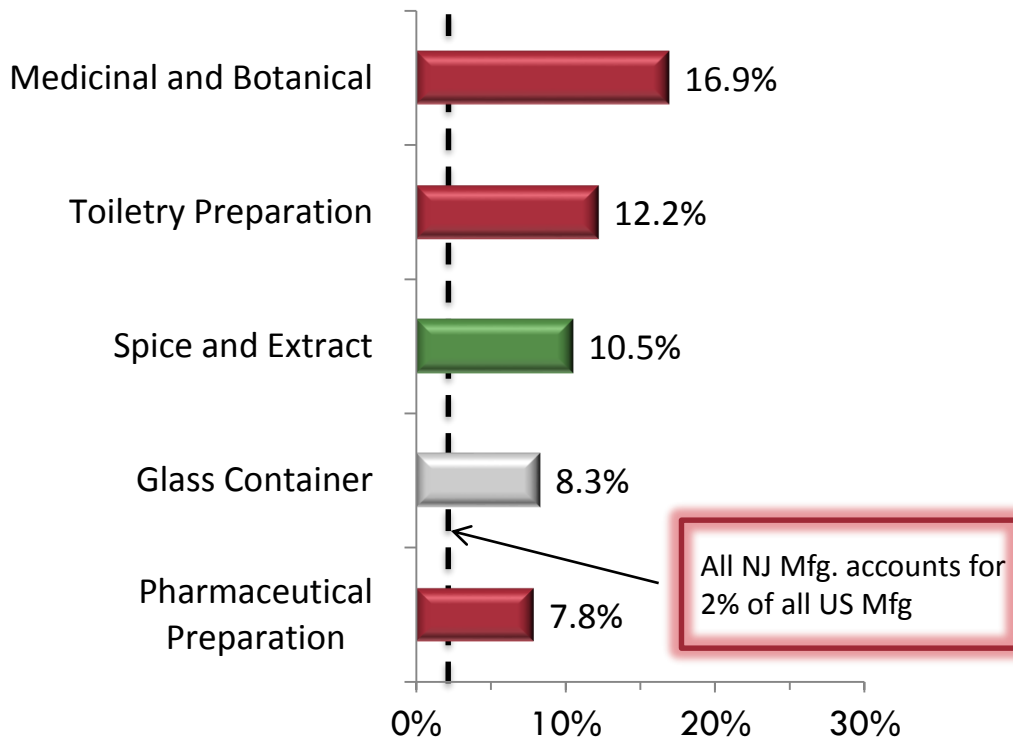
The remaining 16 percent of advanced manufacturing employment is comprised of a group of industries producing goods such as glass and glass products, electrical equipment, transportation equipment, and medical instruments and devices

Employment Distribution of Advanced Manufacturing
New Jersey: 2016



These industries each employ a disproportionately high number of people in New Jersey and are among the manufacturing industries that define the state in 2016

New Jersey Employment as a Percentage of the nation: 2016



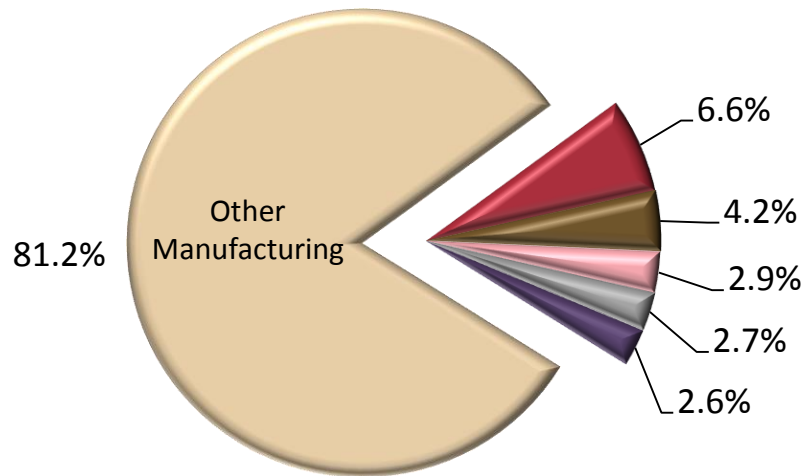
Chemical manufacturing in New Jersey, where three of the five industries on this list are classified, accounts for 5.4 percent of chemical manufacturing employment in the nation

Overall, New Jersey employed 2 percent of all advanced manufacturing in the nation

Each of these five industries pays an average annual wage greater than the statewide average of \$62,420

The five largest manufacturing industries make up nearly 19 percent of all manufacturing employment in the state in 2016

Percentage of Industry's Employment
of All Manufacturing
New Jersey, 2016



- Pharmaceutical Preparation
- Commercial Printing
- Surgical Appliance and Supplies
- Toiletry Preparation
- Search, Detection & Navigation Instruments

Pharmaceutical preparation accounts for 6.6 percent of all manufacturing jobs in New Jersey, but less than 2 percent of all manufacturing jobs nationally

Among these five largest manufacturing industries, only commercial printing is not classified as advanced

Each of these industries earns a substantial average annual wage, ranging from \$58,600 for commercial printing to \$156,400 for pharmaceutical preparation

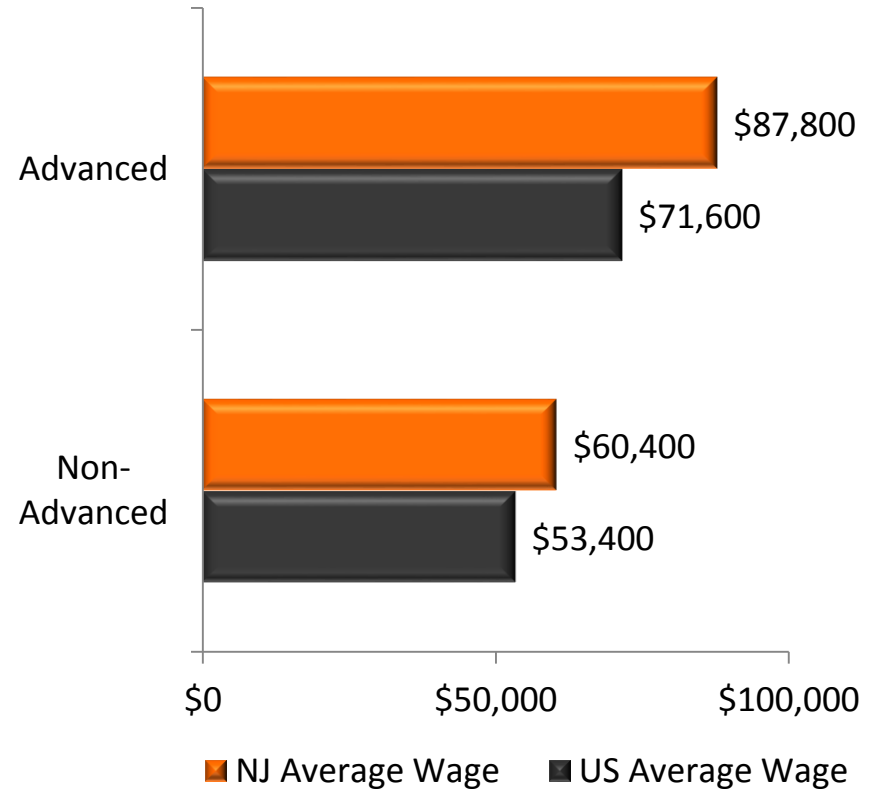
Annual average wages in New Jersey in 2016 among advanced manufacturing industries are about 45 percent more than those non-advanced manufacturing industries

From 2011 to 2016, annual average wages in New Jersey in advanced manufacturing have increased 1.0 percent per year compared to only 1.3 percent per year for non-advanced

Annual average wages paid are 23 percent higher in New Jersey in 2016 than the nation among advanced manufacturing industries

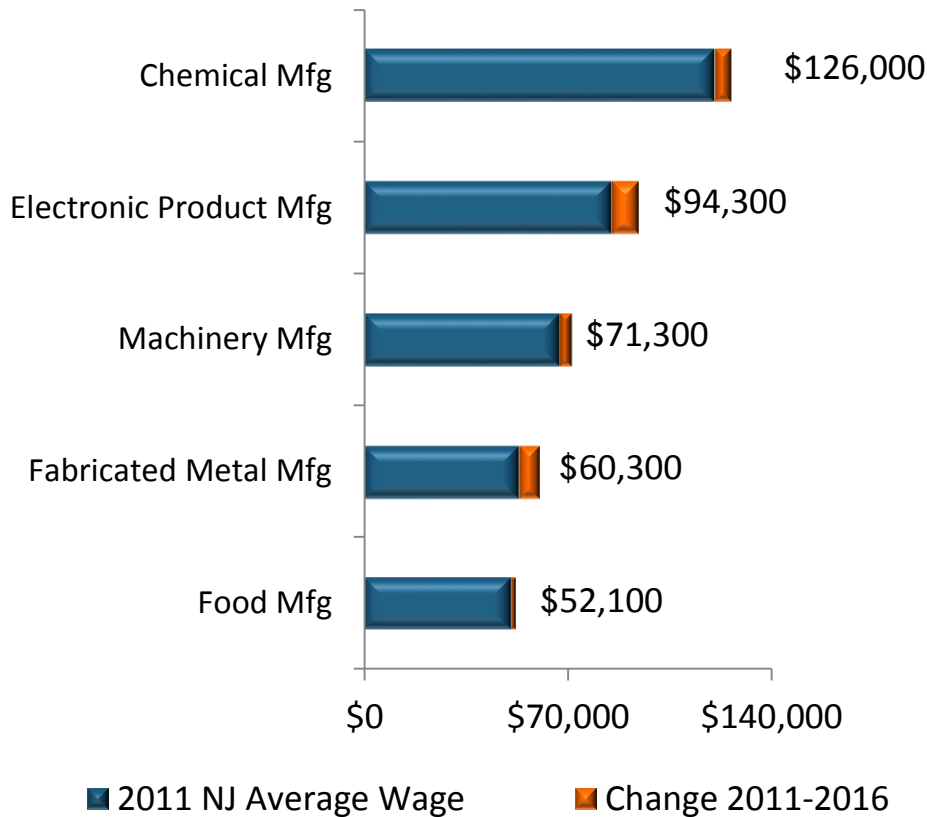
One of the higher paying industry clusters in New Jersey, the advanced manufacturing industry earns about 41 percent more than the state average of \$62,400 in 2016

Comparison of Annual Average Wages Among Advanced and Non-advanced Manufacturing: New Jersey & United States, 2016



Annual average wages in New Jersey among the five main components of advanced manufacturing have averaged 0.6 percent annual growth from 2011 to 2016

Annual Average Wage of Major Components of Advanced Manufacturing New Jersey, 2016



The chemical manufacturing industry earned nearly twice as much as the private sector state average in 2016, and averaged annual increases of 0.9 percent from 2011 to 2016

The higher annual average wages paid in both chemical and computer and electronic product manufacturing are reflective of the greater composition of jobs requiring higher educational levels

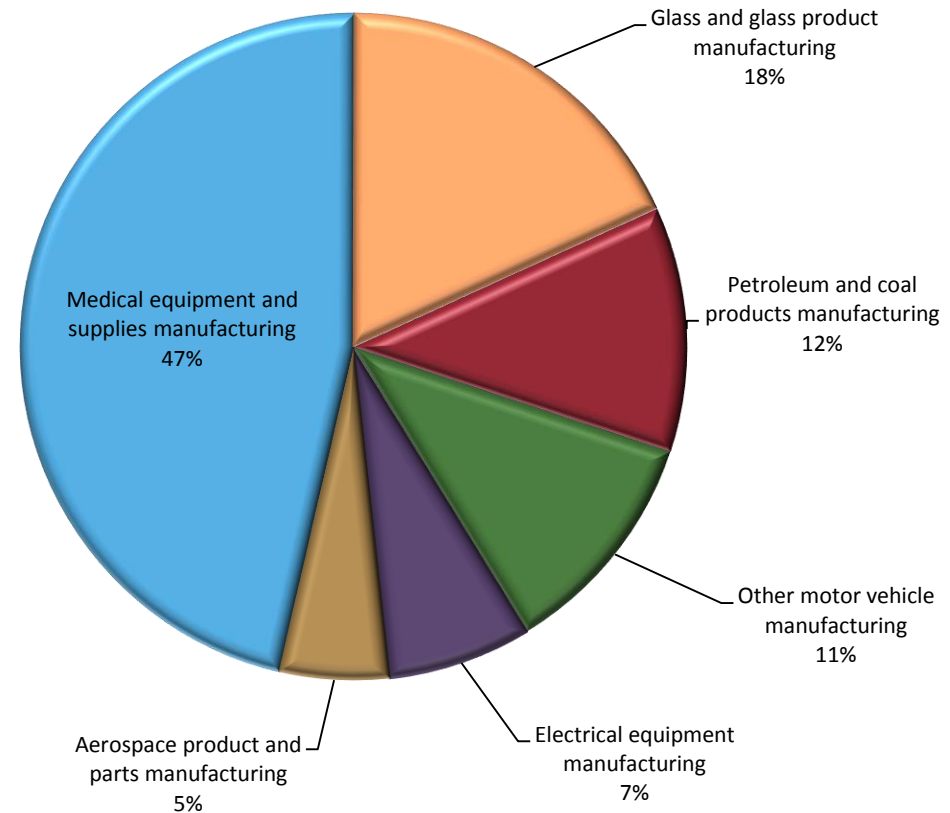
The skill requirements at machinery and fabricated metal product manufacturing establishments are increasing quickly, and wages should reflect that over time

These detailed industries make up the roughly 25,520 workers employed in the “other” advanced manufacturing component

Breakdown of Employment of “Other” Advanced Manufacturing
New Jersey, 2016

Nearly half of these “other” workers are employed in the medical equipment and supplies manufacturing industry, which tends to have very high annual average wages and are primarily located in northeast New Jersey

Glass and glass product manufacturing is a vital industry in New Jersey unique mainly to its southern counties



Employment in advanced manufacturing is highly concentrated in New Jersey's most populous counties and along the Interstate 95 corridor...

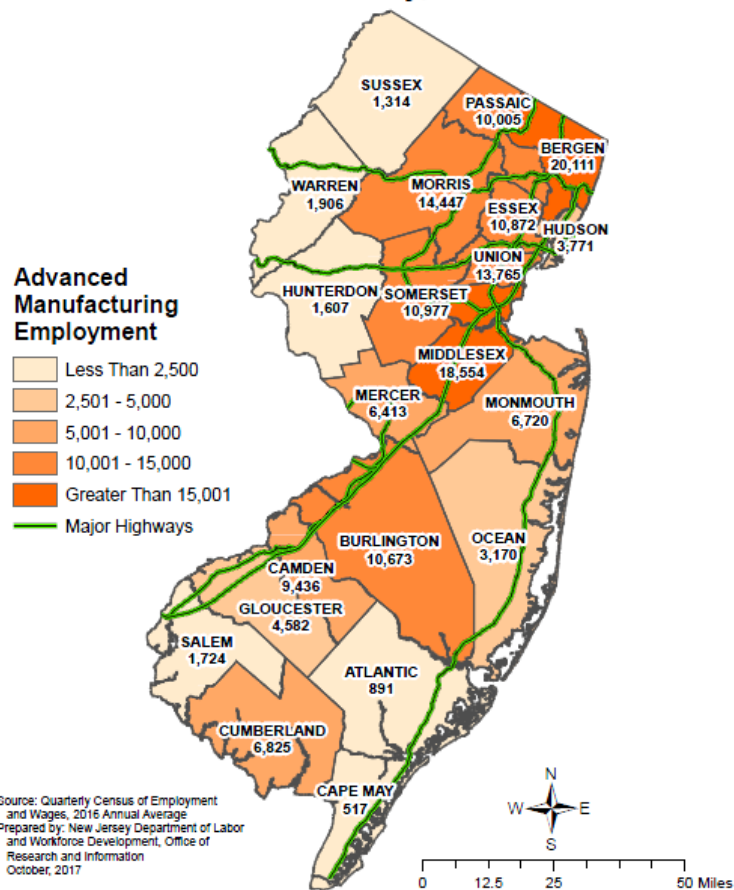
New Jersey offers unique business advantages including:

-geographic proximity to roughly 40 percent of the US population, or around 100 million potential consumers

-highly educated and very diverse workforce

-extensive transportation network in place to carry goods by land, air, and sea

**Advanced Manufacturing Employment
New Jersey, 2016**



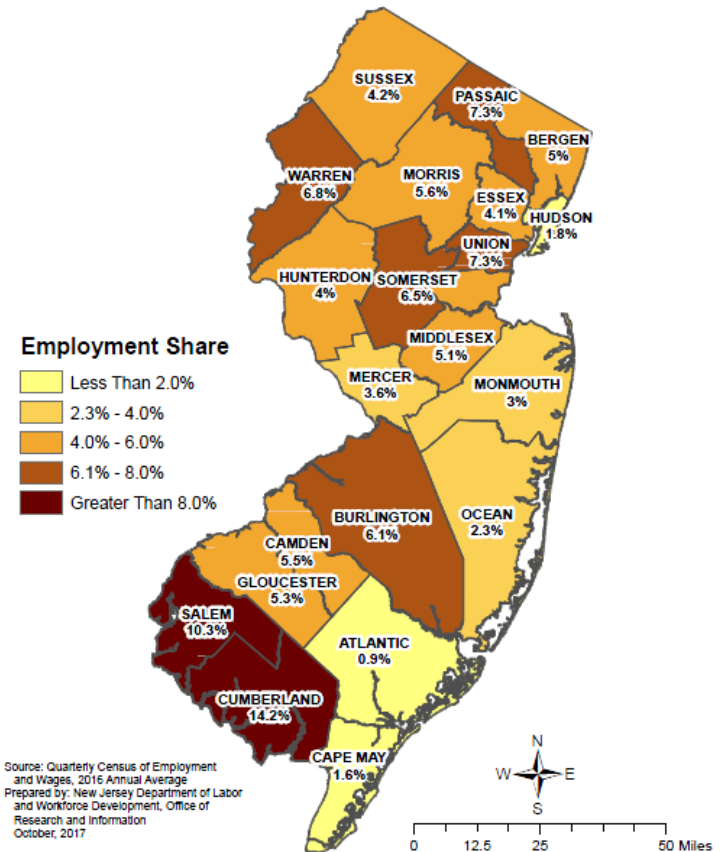
...however, advanced manufacturing in New Jersey's more sparsely populated counties make up a larger percentage of total private sector employment

Cumberland and Salem Counties have the largest shares of advanced manufacturing of total employment, each exceeding 10 percent

Bergen, Morris, Middlesex, and Somerset Counties have a large a diverse mix of advanced manufacturing industries

In the coastal counties of Ocean, Atlantic, and Cape May, less than 2 percent of private sector employment is classified as advanced manufacturing

*Advanced Manufacturing Employment as a Share of Total Private Employment
New Jersey, 2016*

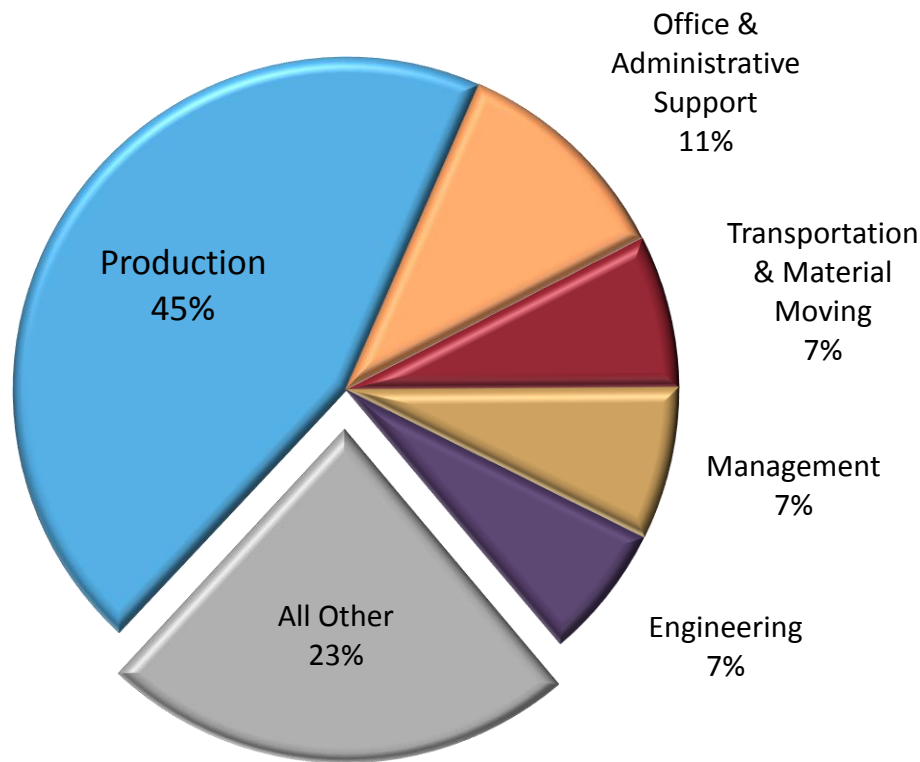


OCCUPATIONAL ANALYSIS



Greater than 75 percent of all advanced manufacturing jobs are classified into these five groups

Breakdown of Major Occupational Groups within
Advanced Manufacturing Industry:
New Jersey, 2016



Nearly half of advanced manufacturing workers are directly involved with production

Roughly 13 percent of workers are classified in STEM occupations

The “other” 23 percent of advanced manufacturing occupations primarily consists of business, sales and other profession and service occupations

Eleven of the top occupations found in advanced manufacturing are classified as **production** workers

Occupation	2016 Employment	Share of Industry	2016 Average Salary	Minimum Educational Requirements
Total, All Advanced Manufacturing Occupations	157,990	100.0%	\$56,040	
Top 20 Occupations	62,820	39.8%	\$45,320	
Packaging and Filling Machine Operators	7,430	4.7%	\$29,090	High school diploma or equivalent
Supervisors of Production Workers	5,360	3.4%	\$67,900	High school diploma or equivalent
Inspectors, Testers, Sorters, Samplers, and Weighers	4,830	3.1%	\$40,280	High school diploma or equivalent
Packers and Packagers, Hand	3,710	2.3%	\$23,260	No formal educational credential
Chemists	3,240	2.1%	\$87,490	Bachelor's degree
Wholesale Sales Representatives	3,060	1.9%	\$77,130	High school diploma or equivalent
Chemical Equipment Operators	3,040	1.9%	\$51,090	High school diploma or equivalent
Electrical and Electronic Equipment Assemblers	2,920	1.8%	\$33,840	High school diploma or equivalent
Shipping, Receiving, and Traffic Clerks	2,890	1.8%	\$35,690	High school diploma or equivalent
Industrial Machinery Mechanics	2,890	1.8%	\$56,450	High school diploma or equivalent
Mixing and Blending Machine Operators	2,870	1.8%	\$44,340	High school diploma or equivalent
Machinists	2,660	1.7%	\$49,390	High school diploma or equivalent
Laborers and Freight and Stock	2,570	1.6%	\$29,000	No formal educational credential
Computer-Controlled Machine Tool Operators	2,560	1.6%	\$44,660	High school diploma or equivalent
Food Batchmakers	2,470	1.6%	\$33,340	High school diploma or equivalent
Extruding, Forming, and Compacting Machine Operators	2,190	1.4%	\$35,450	High school diploma or equivalent
Welders, Cutters, Solderers, and Brazers	2,160	1.4%	\$47,310	High school diploma or equivalent
Office Clerks, General	2,110	1.3%	\$34,900	High school diploma or equivalent
Customer Service Representatives	1,970	1.2%	\$39,570	High school diploma or equivalent
Bookkeeping, Accounting, and Auditing Clerks	1,890	1.2%	\$44,960	Some college, no degree

Many of the occupations found in advanced manufacturing have moderate to high education/training requirements for entry

Total Number of Employment in Advanced Manufacturing by Minimum Education Requirement New Jersey, 2016

Minimum Education Requirement	2016 Employment	% of Total
Total, Advanced Manufacturing	157,990	100.0%
Total High Requirements	31,400	19.9%
Doctoral or professional degree	600	0.4%
Master's degree	90	0.1%
Bachelor's degree	30,710	19.4%
Total Moderate Requirements	7,200	4.6%
Associate's degree	3,940	2.5%
Postsecondary nondegree award	1,140	0.7%
Some college, no degree	2,120	1.3%
Total Low Requirements	102,480	64.9%
High school diploma or equivalent	82,530	52.2%
No formal educational credential	19,950	12.6%
Education unavailable	16,910	10.7%

Scientists and engineers primarily account for the roughly 19 percent of the occupations found in advanced manufacturing that require at least an bachelor's degree for entry

Although the majority of employment in advanced manufacturing may not require postsecondary education for entry, the tradesmen and production workers that comprise this group often have many years of experience, and may have completed an apprenticeship or extensive on-the-job training program

SUBSECTOR DETAILS



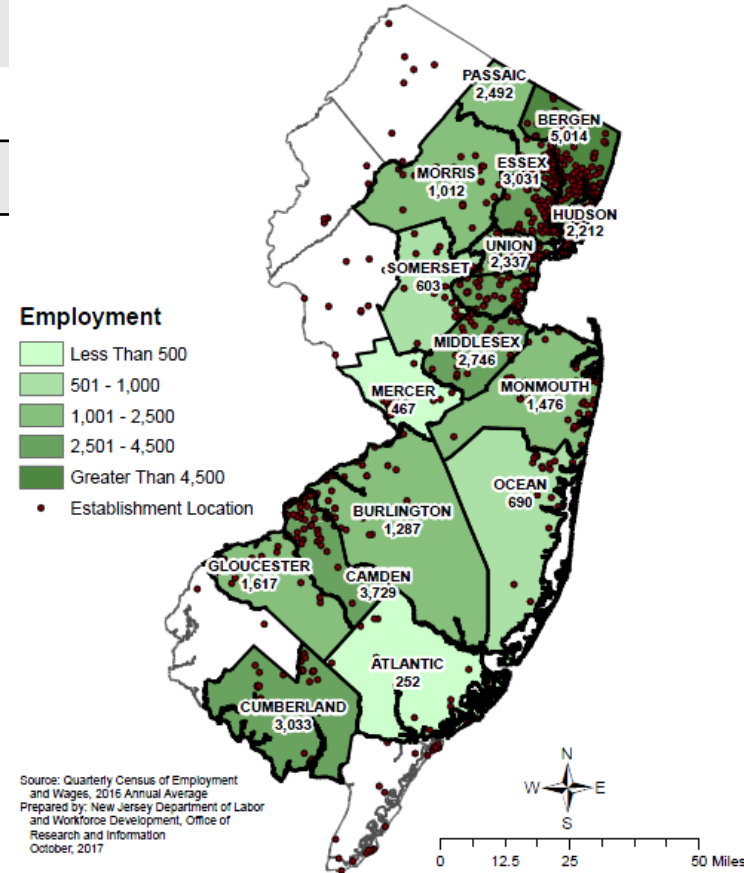
Food Manufacturing

	Establishments	Employment	Employment Per Establishment
2011	993	30,014	30
2016	1,134	33,346	29
Change	141	3,332	-1

The food manufacturing industry has exhibited steady growth in New Jersey from 2011 through 2016, both in terms of employment and the total number of establishments.

Commercial and retail bakeries, in particular, have shown solid growth over these five years, and have accounted for a large portion of the rise in both employment and establishments.

Food Manufacturing Employment and Establishment Locations New Jersey, 2016

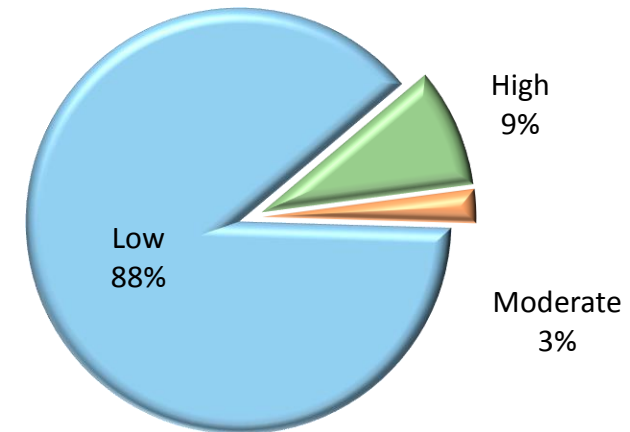


Food Manufacturing

Top Ten Occupations in Food Manufacturing

Occupation	2016 Employment	Education Requirement	2016 Average Salary
Packaging and Filling Machine Operators	3,420	High school diploma or equivalent	\$29,090
Food Batchmakers	2,470	High school diploma or equivalent	\$33,340
Bakers	1,880	No formal educational credential	\$29,420
Packers and Packers, Hand	1,520	No formal educational credential	\$23,260
Industrial Machinery Mechanics	960	High school diploma or equivalent	\$56,450
Shipping, Receiving, and Traffic Clerks	800	High school diploma or equivalent	\$35,690
Laborers of Freight and Stock	710	No formal educational credential	\$29,000
Inspectors, Testers, Sorters, Samplers, and Weighers	690	High school diploma or equivalent	\$40,280
Food Cooking Machine Operators	660	High school diploma or equivalent	\$29,170
Wholesale Sales Representatives	650	High school diploma or equivalent	\$77,130

Minimum Educational Requirements



While roughly five out of every six jobs in food manufacturing require no more than a high school education, there are increasing demands for food safety certifications

Chemical Manufacturing

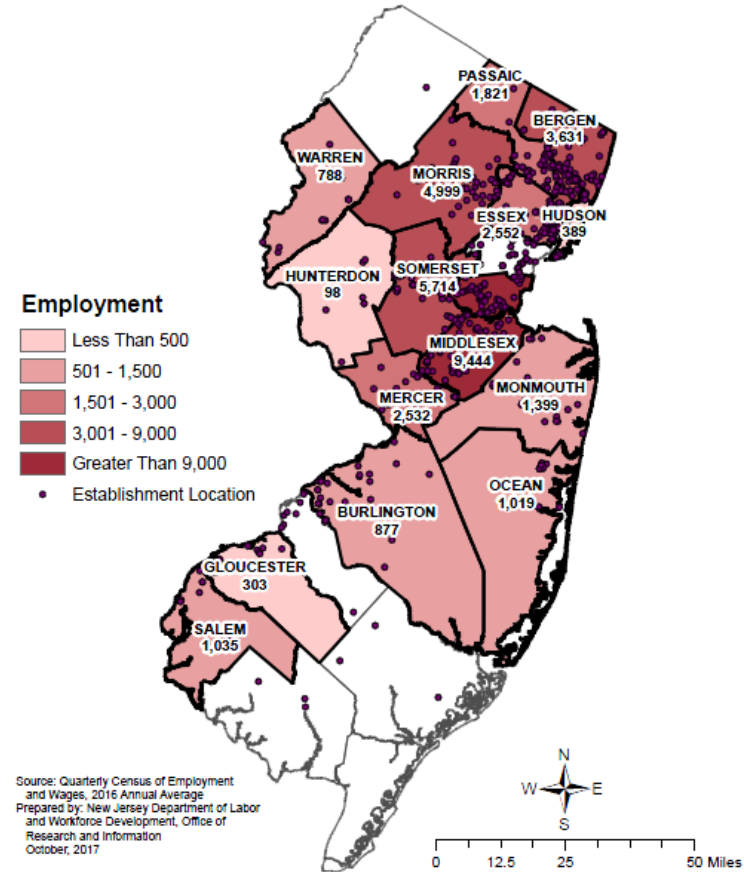
	Establishments	Employment	Employment Per Establishment
2011	871	52,735	61
2016	828	43,813	53
Change	-43	-8,922	-8

Chemical manufacturing declined from 2011-2016 both in the absolute number of establishments and also in the average employment per unit

Some well-known employers vital to New Jersey's economy include:

- Johnson & Johnson
- Squibb
- Schering
- Firmenich
- Smith Kline Beecham
- Bayer
- Novartis
- L'Oreal
- Merck
- Pfizer

Chemical Manufacturing Employment and Establishment Locations New Jersey, 2016

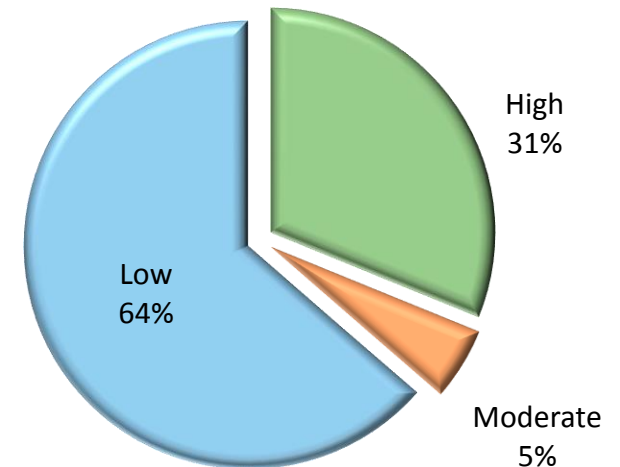


Chemical Manufacturing

Top Ten Occupations in Chemical Manufacturing

Occupation	2016 Employment	Education Requirement	2016 Average Salary
Packaging and Filling Machine Operators	3,580	High school diploma or equivalent	\$29,090
Chemists	3,100	Bachelor's degree	\$87,490
Chemical Equipment Operators	2,610	High school diploma or equivalent	\$51,090
Mixing and Blending Machine Operators	2,420	High school diploma or equivalent	\$44,340
Inspectors, Testers, Sorters, Samplers, and Weighers	1,770	High school diploma or equivalent	\$40,280
Extruding, Forming, Pressing, and Compacting Machine Operators	1,710	High school diploma or equivalent	\$35,450
Chemical Technicians	1,090	Associate's degree	\$67,030
Industrial Machinery Mechanics	1,070	High school diploma or equivalent	\$56,450
Laborers of Freight and Stock	1,050	No formal educational credential	\$29,000
Wholesale Sales Representatives	820	High school diploma or equivalent	\$77,130

Minimum Educational Requirements



Nearly half of all **chemists** in the state work for companies classified in chemical manufacturing

Computer and Electronic Product Manufacturing

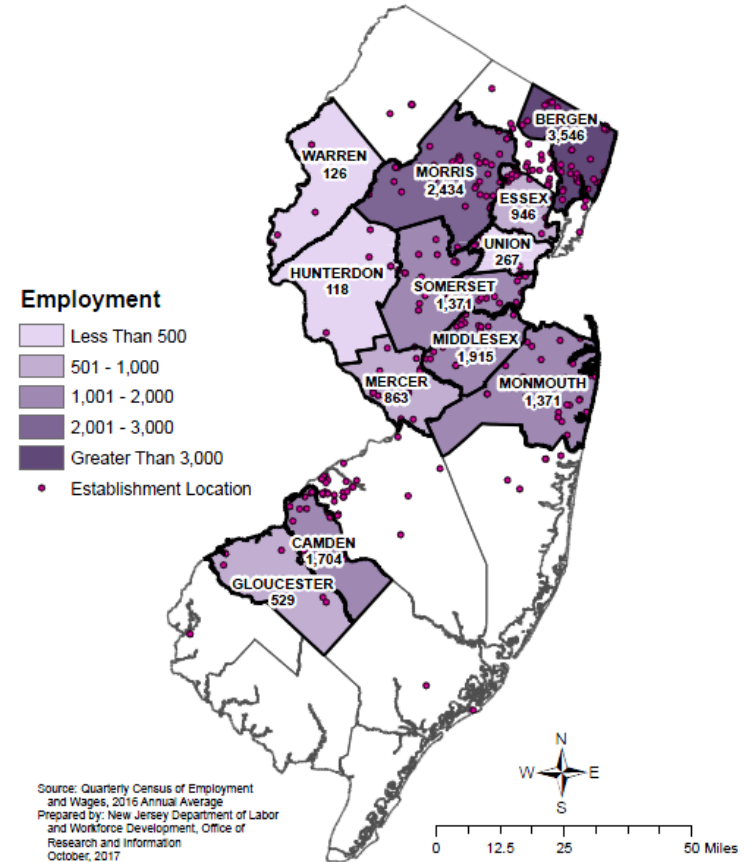
	Establishments	Employment	Employment Per Establishment
2011	745	26,185	35
2016	704	22,865	32
Change	-41	-3,320	-3

Most establishments are largely clustered in Northern New Jersey and Camden areas of the state

Some well-known employers vital to New Jersey's economy include:

- L-3 Communications
- Lockheed Martin
- Crestron Electronics
- Exelis
- Siemens
- Datascope
- Kulite Semiconductor
- Honeywell
- Anadigics
- Trumpf

*Computer & Electronic Product Manufacturing
Employment and Establishment Locations
New Jersey, 2016*

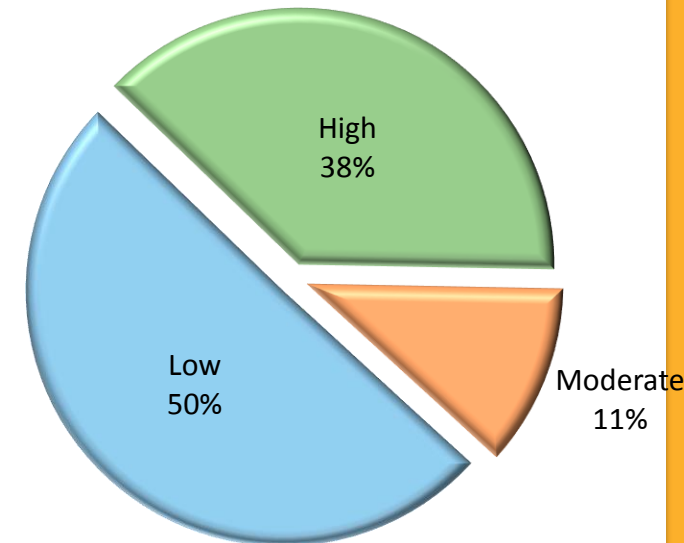


Computer and Electronic Product Manufacturing

Top Ten Occupations in Computer and Electronic Product Manufacturing

Occupation	2016 Employment	Education Requirement	2016 Average Salary
Electrical and Electronic Equipment Assemblers	2,330	High school diploma or equivalent	\$33,840
Electrical and Electronics Engineering Technicians	890	Associate's degree	\$66,200
Inspectors, Testers, Sorters, Samplers, and Weighers	770	High school diploma or equivalent	\$40,280
Electromechanical Equipment Assemblers	690	High school diploma or equivalent	\$37,730
Electronics Engineers	690	Bachelor's degree	\$106,960
Team Assemblers	520	High school diploma or equivalent	\$27,760
Electrical Engineers	490	Bachelor's degree	\$106,110
Shipping, Receiving, and Traffic Clerks	390	High school diploma or equivalent	\$35,690
Semiconductor Processors	380	Associate's degree	\$42,680
Industrial Engineers	360	Bachelor's degree	\$94,630

Minimum Educational Requirements



Nearly 30 percent of all employment in this industry is classified among **STEM** occupations.

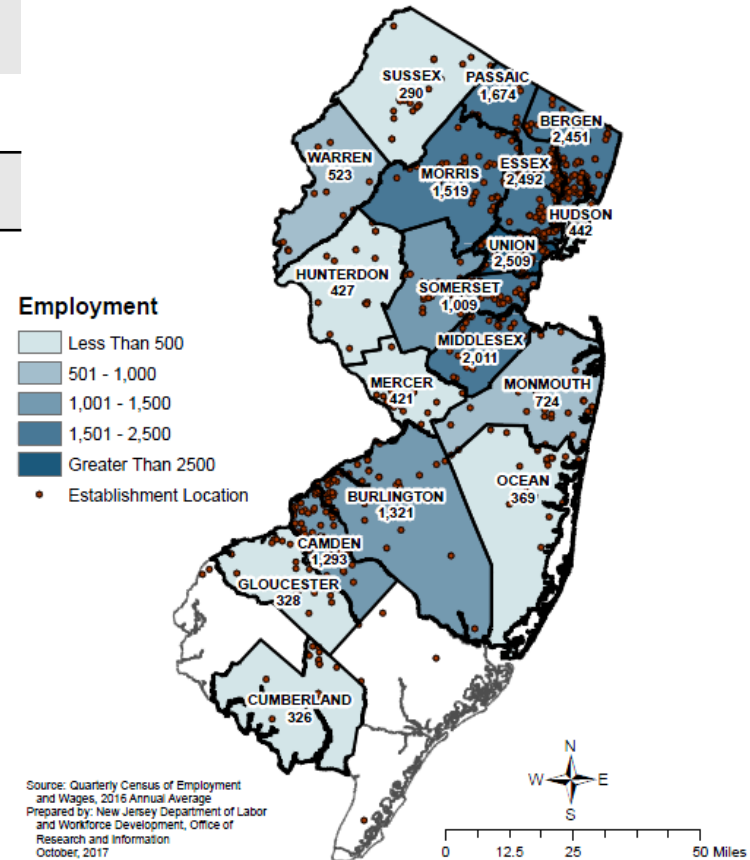
Fabricated Metal Product Manufacturing

	Establishments	Employment	Employment Per Establishment
2011	1,271	22,377	18
2016	1,153	20,387	18
Change	-118	-1,990	-1

Fabricated metal product manufacturing lost the most establishments from 2011-2016

Most of the establishments classified in this industry are smaller shops who predominantly operate in a support capacity to other types of manufacturers in the state and region

Fabricated Metal Manufacturing Employment and Establishment Locations New Jersey, 2016

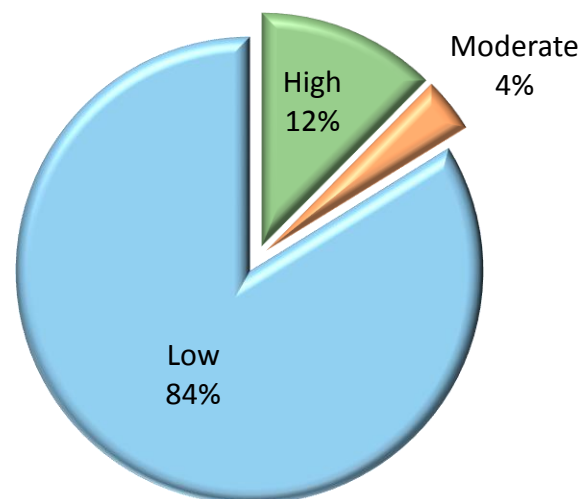


Fabricated Metal Product Manufacturing

Top Ten Occupations in Fabricated Metal Manufacturing

Occupation	2016 Employment	Education Requirement	2016 Average Salary
Cutting, Punching, and Press Machine Operators	1,470	High school diploma or equivalent	\$33,730
Welders, Cutters, Solderers, and Brazers	1,380	High school diploma or equivalent	\$47,310
Computer-Controlled Machine Tool Operators	1,330	High school diploma or equivalent	\$44,660
Machinists	1,210	High school diploma or equivalent	\$49,390
Inspectors, Testers, Sorters, Samplers, and Weighers	550	High school diploma or equivalent	\$40,280
Shipping, Receiving, and Traffic Clerks	470	High school diploma or equivalent	\$35,690
Coating, Painting, and Spraying Machine Operators	440	High school diploma or equivalent	\$38,130
Wholesale Sales Representatives	430	High school diploma or equivalent	\$77,130
Sheet Metal Workers	410	High school diploma or equivalent	\$63,380
Grinding, Lapping, Polishing, and Buffing Machine Tool Operators	350	High school diploma or equivalent	\$32,450

Minimum Educational Requirements



Although each of the occupations on this list require only a high school education, most require a great amount of skill and experience to excel



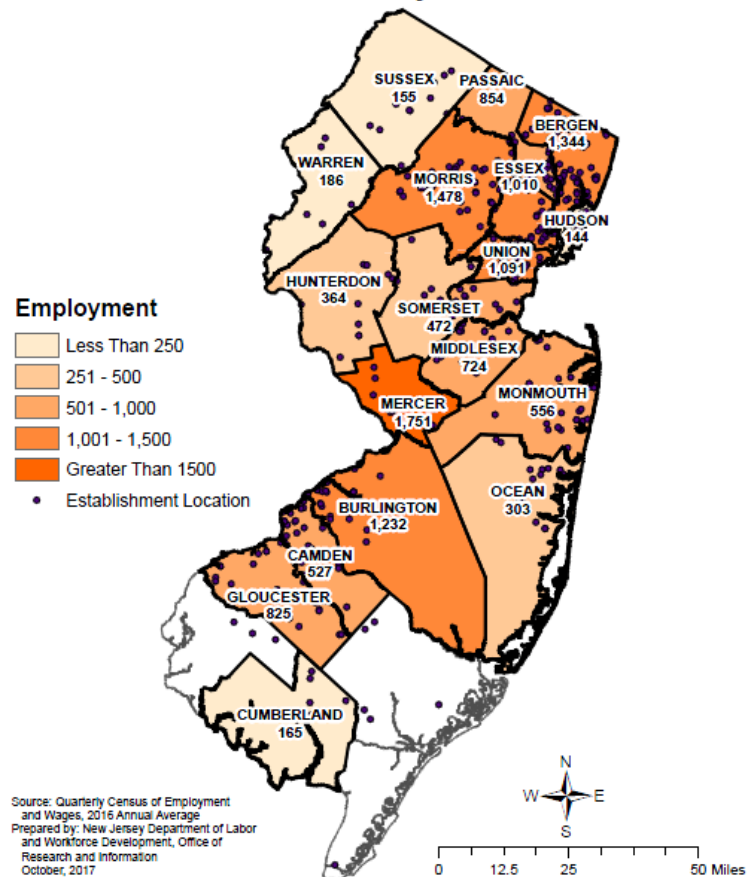
Machinery Manufacturing

	Establishments	Employment	Employment Per Establishment
2011	783	14,038	18
2016	697	13,539	19
Change	-86	-499	1

While the number of establishments dropped at the fastest rate among the five major components, employment decreased only slightly from 2011-2016

Similar to primary metal fabrication, many of the establishments in this component are relatively small and dispersed throughout the state, have less popularity or name recognition, and more commonly serve their local area instead of a broader market

Machinery Manufacturing Employment and Establishment Locations New Jersey, 2016

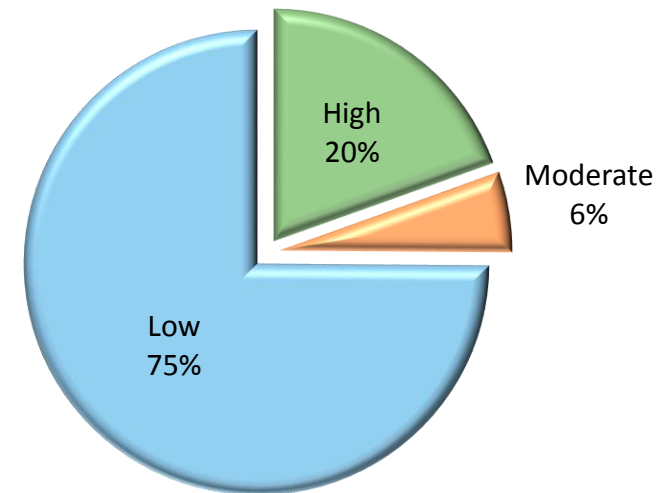


Machinery Manufacturing

Top Ten Occupations in Machinery Manufacturing

Occupation	2016 Employment	Education Requirement	2016 Average Salary
Machinists	980	High school diploma or equivalent	\$49,390
Electromechanical Equipment Assemblers	560	High school diploma or equivalent	\$37,730
Team Assemblers	530	High school diploma or equivalent	\$27,760
Wholesale Sales Representatives	480	High school diploma or equivalent	\$77,130
Computer-Controlled Machine Tool Operators	440	High school diploma or equivalent	\$44,660
Welders, Cutters, Solderers, and Brazers	430	High school diploma or equivalent	\$47,310
Mechanical Engineers	410	Bachelor's degree	\$93,570
Tool and Die Makers	330	High school diploma or equivalent	\$56,380
Shipping, Receiving, and Traffic Clerks	260	High school diploma or equivalent	\$35,690
Inspectors, Testers, Sorters, Samplers, and Weighers	250	High school diploma or equivalent	\$40,280

Minimum Educational Requirements



Many of the occupations on this list have low *minimum* educational and training requirements for entry, but are filled by workers with vast levels of experience

DEMOGRAPHIC PROFILE



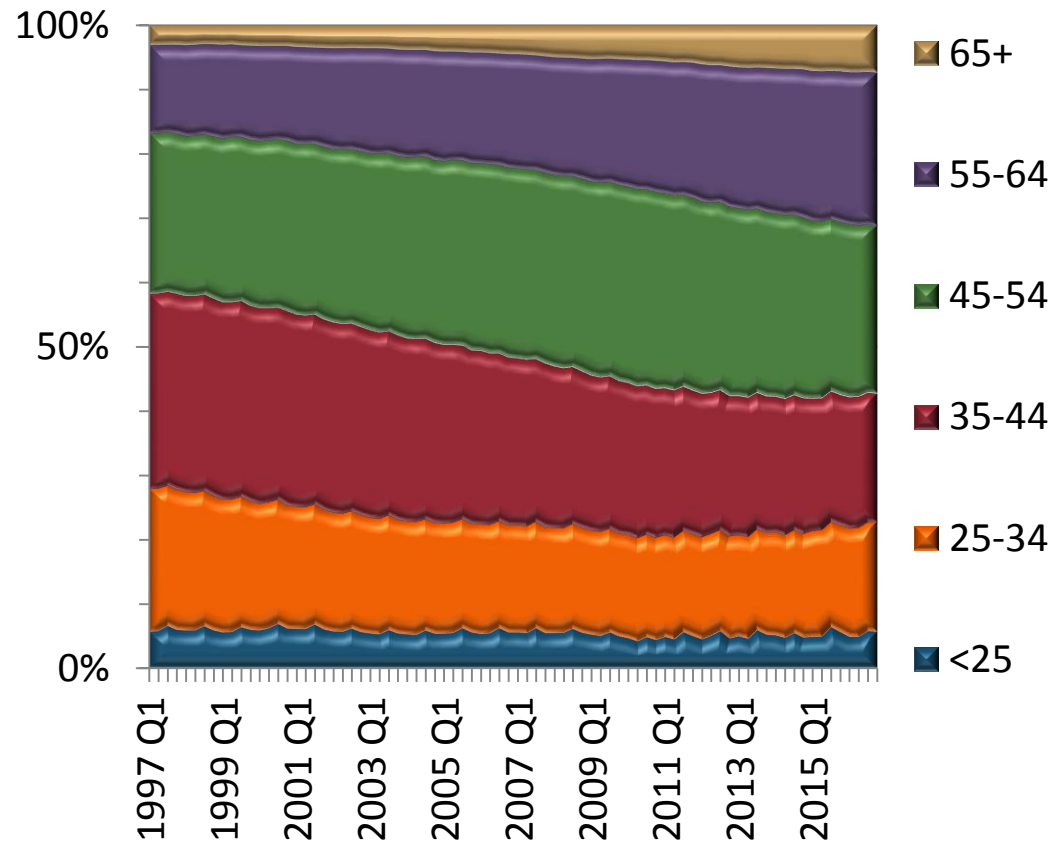
Data shows a steady and gradual change toward an older workforce in nearly every age cohort

The workforce aged 65 and older has doubled its share of total employment from 3 percent to over 7 percent from 1997 to 2016

Although there are nearly 25,000 fewer workers in the 45-54 and 55-64 cohorts, their share of the workforce has increased from 39 percent in 1997 to 50 percent in 2016

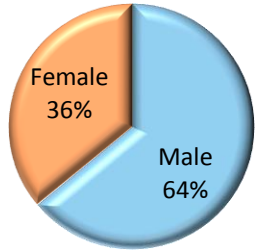
Employment for those younger than age 34 has decreased by more than half and now accounts for only 22 percent of the total workforce

Breakdown of Workforce by Age
New Jersey: 1997-2016

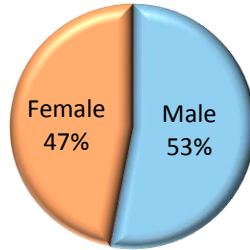


Gender, racial, and ethnic profile of New Jersey residents working in advanced manufacturing industries

Advanced Manufacturing



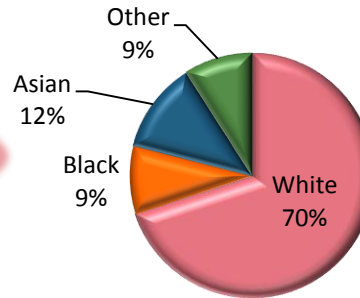
All Industries



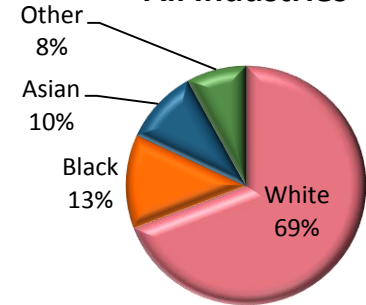
The advanced manufacturing workforce is predominantly male

The Asian population makes up a larger portion of the advanced manufacturing workforce than the overall economy

Advanced Manufacturing

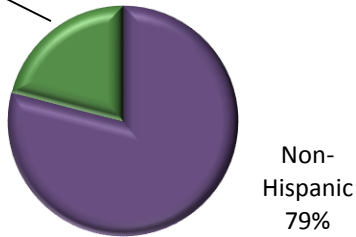


All Industries



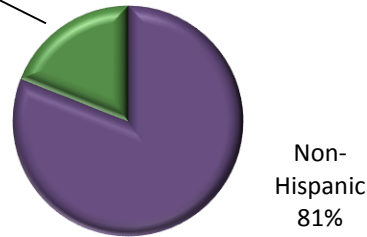
The Hispanic population is slightly less among advanced manufacturing industries

Advanced Manufacturing



Advanced Manufacturing

All Industries



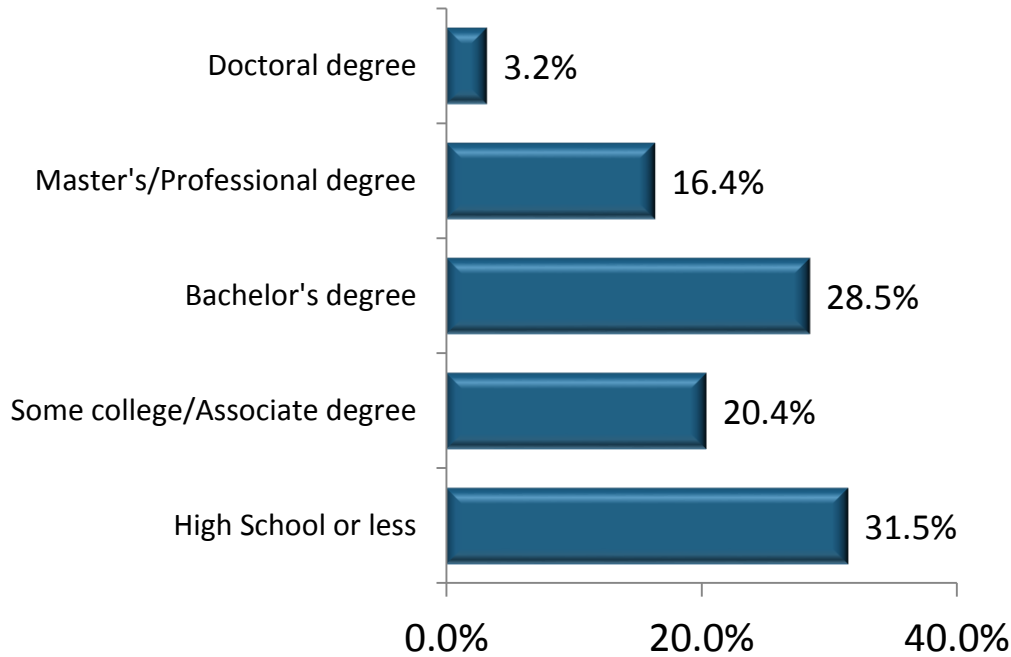
All Industries

Self-reported educational attainment and average wage of NJ residents in the advanced manufacturing workforce

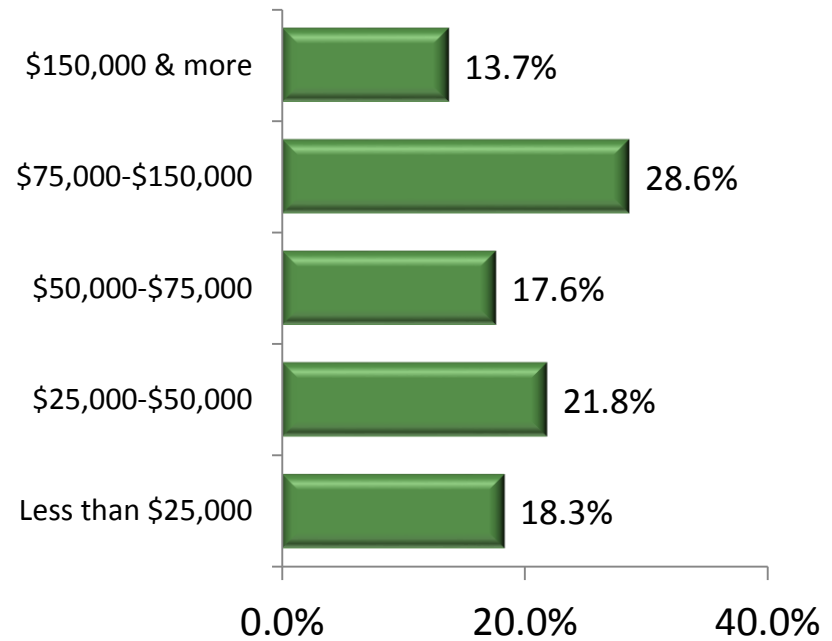
Nearly 50 percent of the workforce reported that they have earned at least a bachelor's degree, and...

...nearly 60 percent of the workforce claimed to have earned wages above \$50,000

Education Level



Average Wage

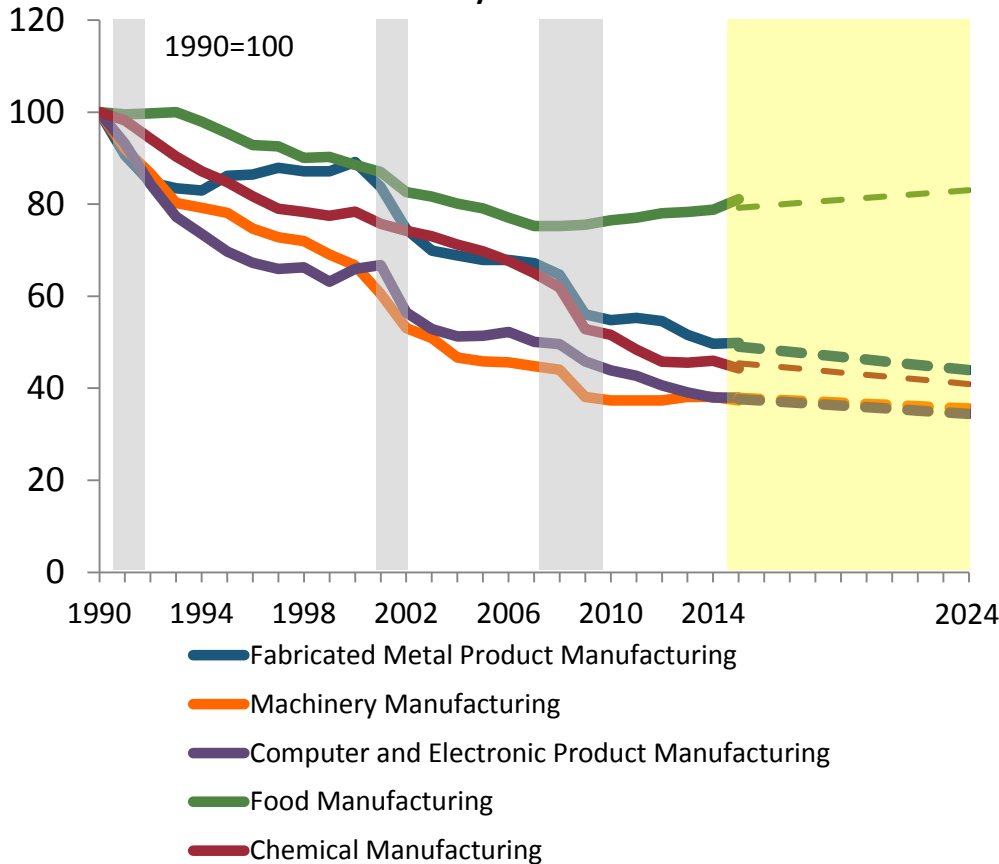


OUTLOOK



The employment losses experienced by the five major components of advanced manufacturing are projected to stabilize

Indices of Actual and Projected Employment of Four Major Components of Advanced Manufacturing
New Jersey: 1990-2024



Each of the five components have experienced fairly deep losses overall, with recessionary periods being particularly acute

Food manufacturing has retained the greatest portion of its employment since 1990, losing just over 20 percent of its jobs

Yellow area denotes projected period from 2014-2024

Shaded areas indicate recessionary periods as determined by the National Bureau of Economic Research

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