

New Jersey's Advanced Manufacturing Industry Cluster

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New Jersey Department of Labor & Workforce Development
Office of Research & Information
Bureau of Labor Market Information
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STATE OF NEW JERSEY
DEPARTMENT OF LABOR AND
WORKFORCE DEVELOPMENT



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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 \$33.1 billion to the Gross Domestic Product in 2014, or about 6.6 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 \$61,980 in 2015
- Advanced manufacturing establishment employers paid nearly \$13.5 billion in total wages in 2015, or about 6.5 percent of all wages paid

Overview

There were over 5,100 establishments in New Jersey that employed nearly 157,000 people in the advanced manufacturing cluster in 2015. 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 54 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 205 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 205 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 205 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 205 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 205 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 |



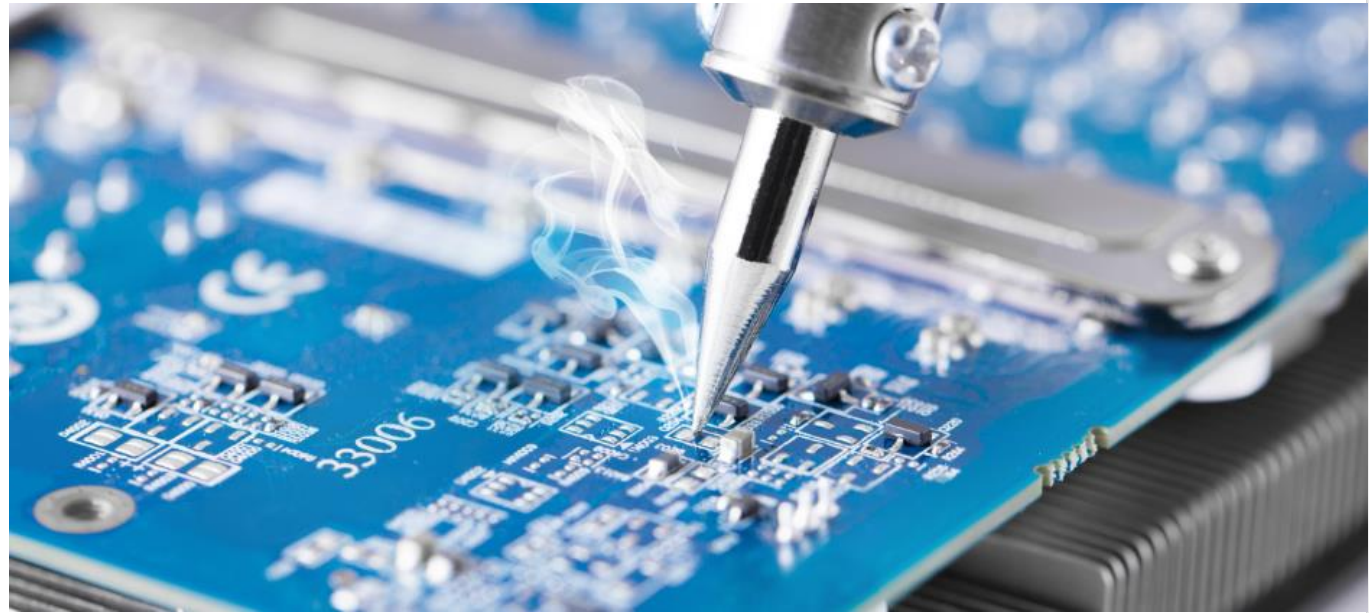
The complete list of 205 detailed NAICS industries classified as advanced manufacturing, continued...

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



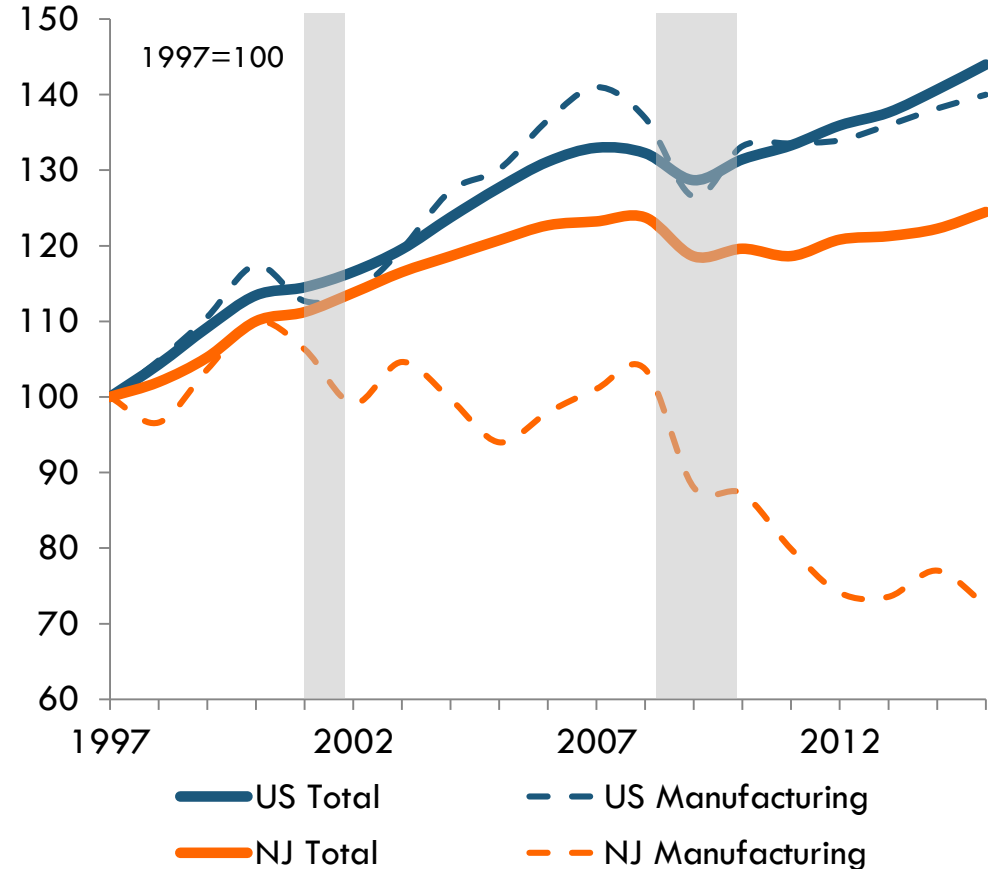
GDP growth in New Jersey has averaged 1.2 percent per year from 1997 to 2015, and now exceeds half of a trillion dollars

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 0.3 percent per year from 1997 through 2008, but tumbled to decline by an annual average of 5 percent from 2008 through 2015

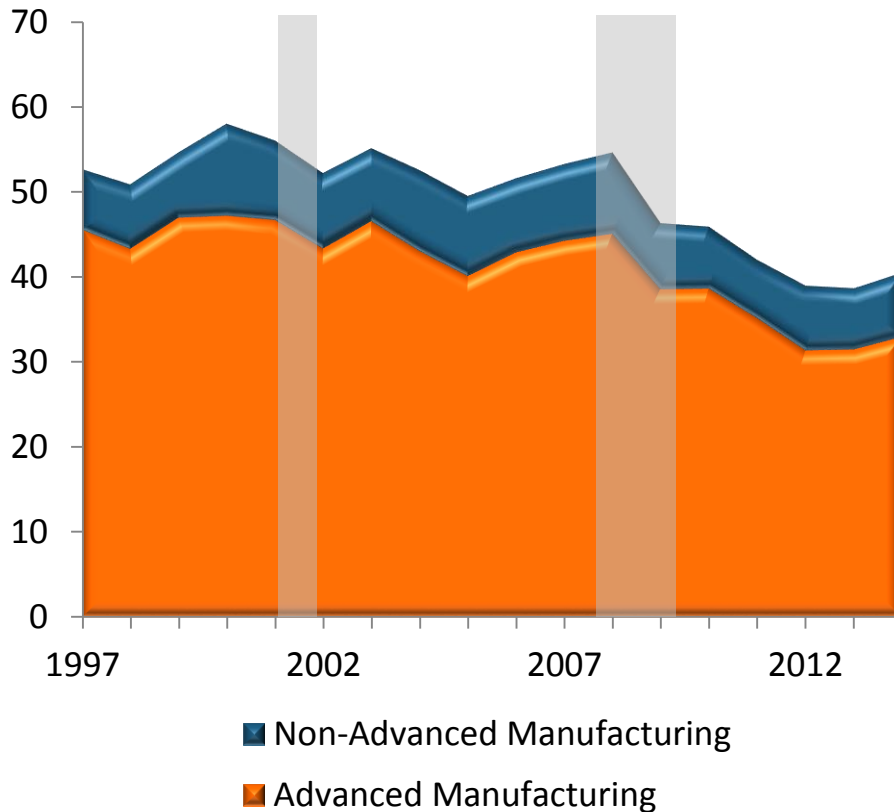
Gross Domestic Product Index (Chained 2009 Dollars)
New Jersey & United States: 1997-2015



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

Roughly 82 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: 1997-2014



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

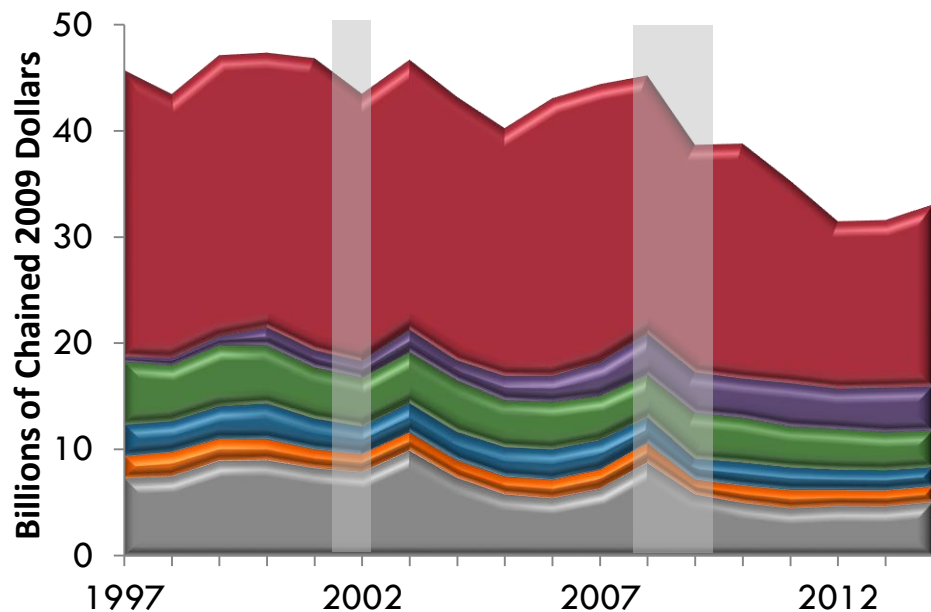
Total manufacturing GDP in New Jersey exceeded \$50 billion consistently from 1997 through 2008, averaging 0.3 percent annual growth

GDP in statewide advanced manufacturing industries were essentially unchanged from 1997-2008, but declined by an average of 5.1 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: 1997-2014



Chemical manufacturing accounted for 59 percent of advanced manufacturing GDP in 1997, but only 52 percent in 2014

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 2014

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

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

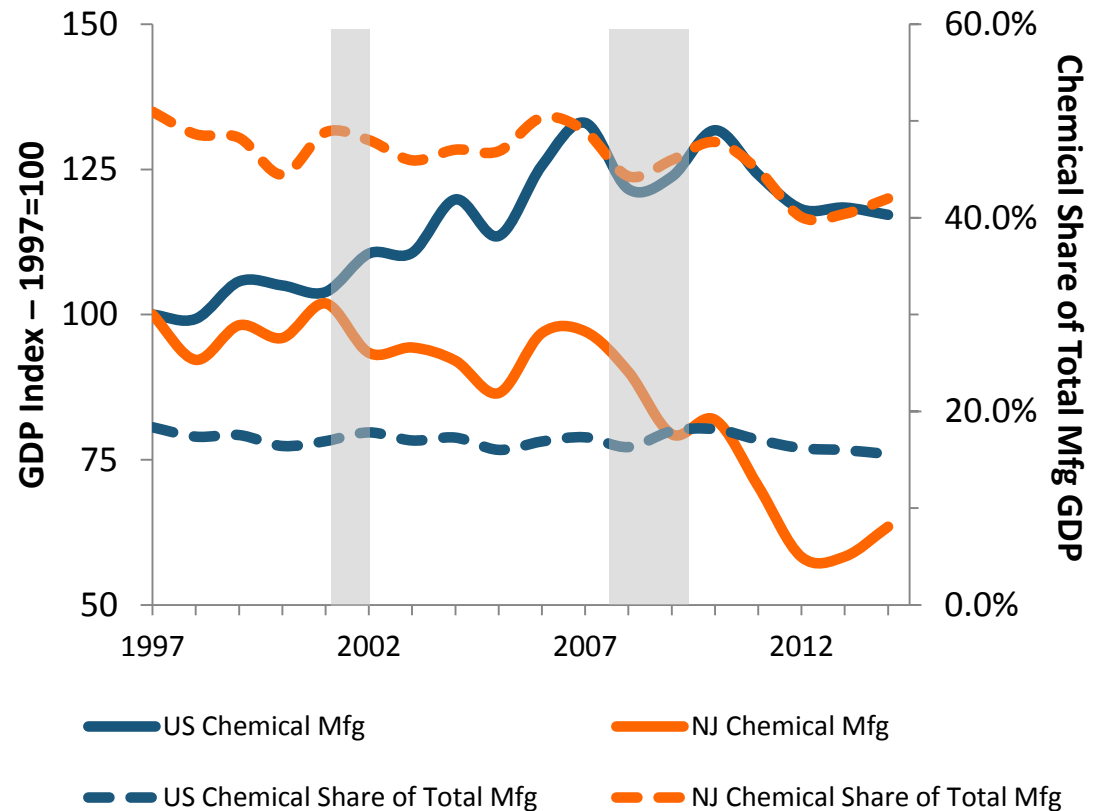
Chemical manufacturing accounts for nearly half of New Jersey's manufacturing GDP, which makes the rate of decline alarming

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 nearly 3 percent per year while New Jersey declined slightly

From 2007-2014, New Jersey experienced deep losses in GDP of 5.9 percent per year while the nation declined by only 1.8 percent

Measures of GDP for Chemical Manufacturing
New Jersey & United States: 1997-2014



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

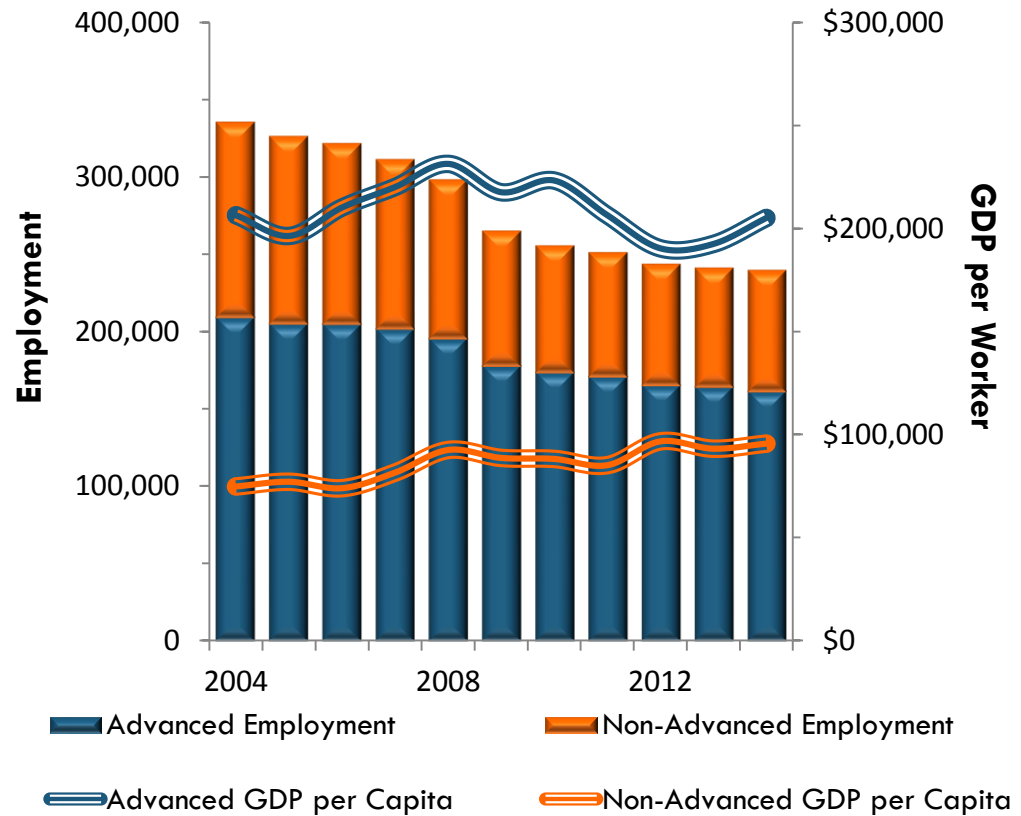
The decline in manufacturing employment has not had a negative effect on productivity by worker

While manufacturing employment in New Jersey has been trending downward for some time, 2008 and 2009 were particularly difficult as more than 46,000 jobs were lost during these recessionary years

GDP output per worker, calculated as total manufacturing GDP divided by manufacturing employment, has remained very strong, especially among advanced manufacturing industries

This measure of output per worker has ranged around \$200,000 for advanced manufacturing industries, and is more than double the output per worker among non-advanced manufacturing industries

Employment and GDP per Capita by Manufacturing Segment
New Jersey: 2004-2014

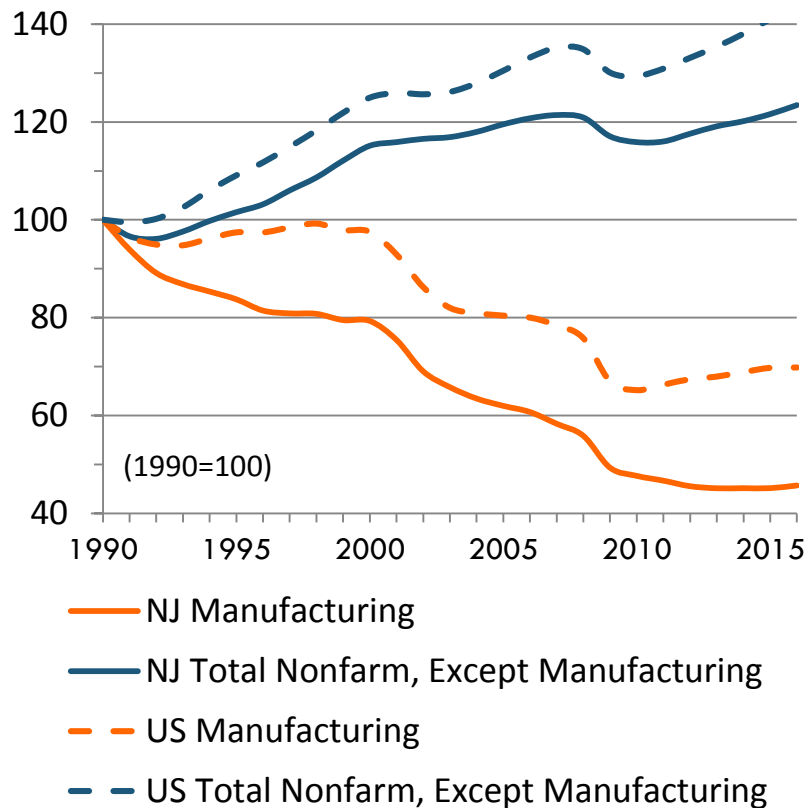


INDUSTRY ANALYSIS



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

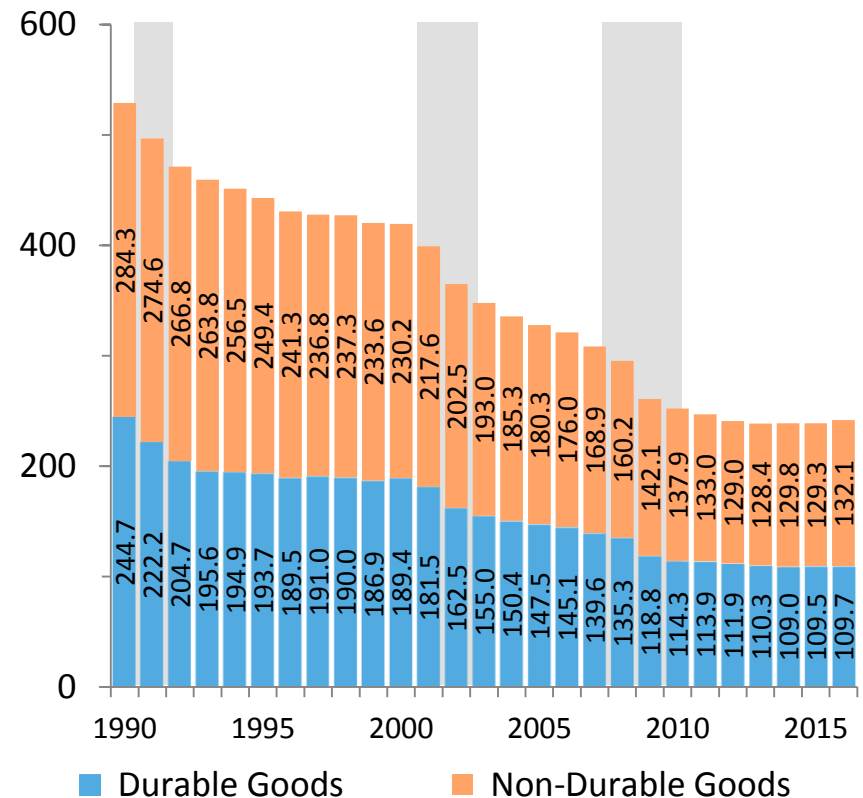
Nationally, manufacturing's share of total employment has declined from 16.2 percent in 1990 to 8.6 percent in 2016

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

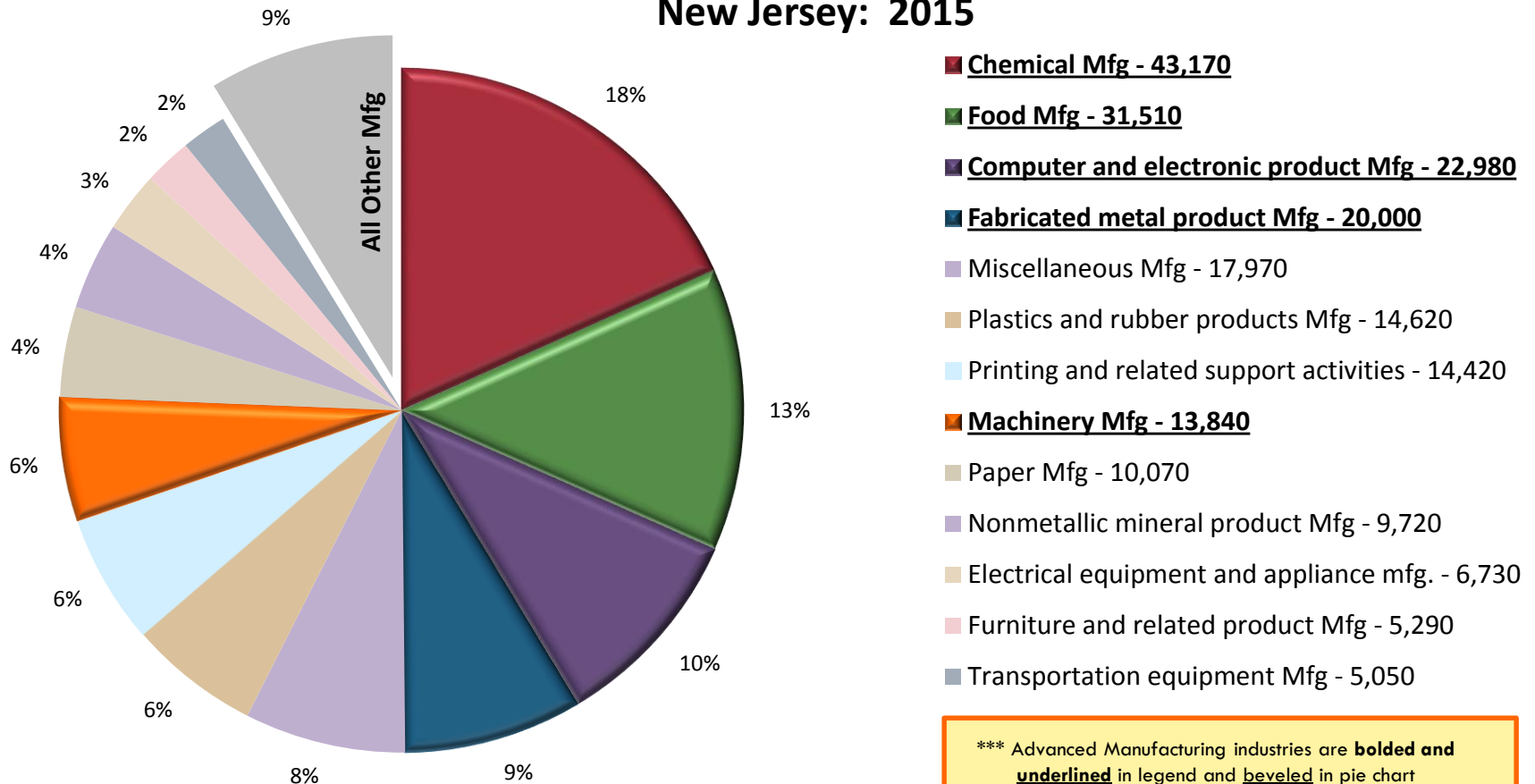
Gray area denotes U.S. economic recession as defined by the National Bureau of Economic Research (NBER)

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

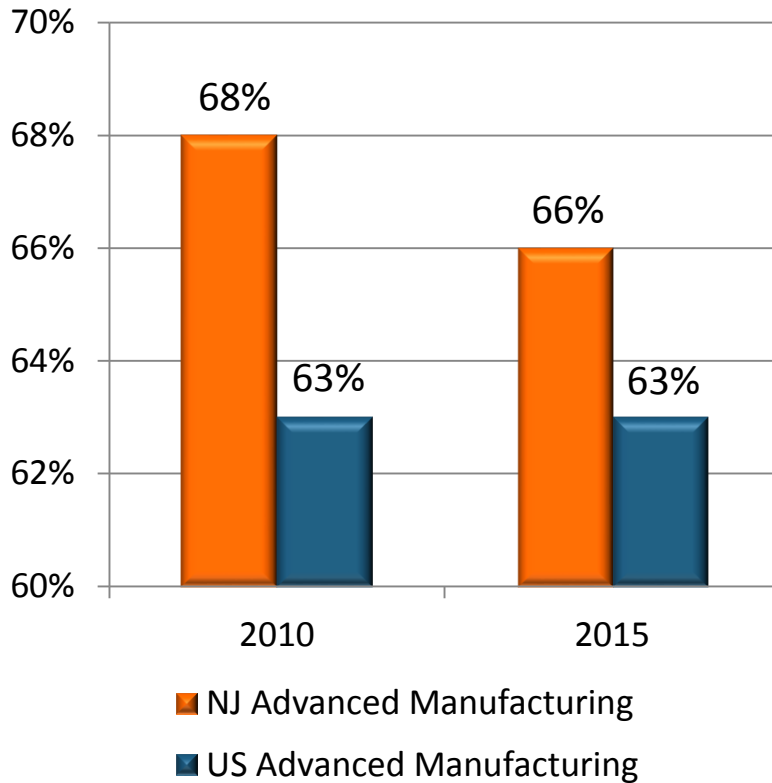
All Manufacturing Industries as a Percentage of Total Manufacturing in New Jersey: 2015



*** Advanced Manufacturing industries are **bolded and underlined** in legend and beveled in pie chart

The New Jersey Department of Labor and Workforce Development has classified 196 out of 342 NAICS-based manufacturing industries as advanced

Percentage of Manufacturing Employment
Classified as Advanced
New Jersey and United States: 2010 & 2015



Employment in advanced manufacturing industries declined at a faster rate than non-advanced industries in New Jersey from 2010 to 2015, averaging a 2 percent loss per year

In 2015, there were nearly 156,800 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 2015 versus only 63 percent nationwide

The five major components of advanced manufacturing accounted for nearly 84 percent of its employment in New Jersey in 2015

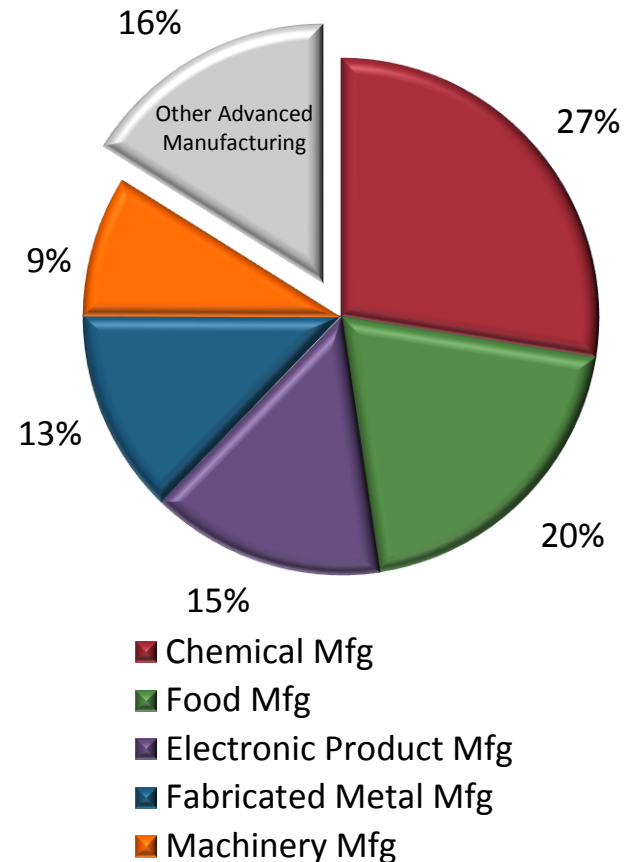
Chemical manufacturing, which includes pharmaceuticals and medicine, employed nearly 43,200 in 2015, which is about 18 percent of all manufacturing in the state

Food manufacturing is the second largest segment and employed more than 31,500 in 2015

Computer and electronic product and fabricated metal product manufacturing together employed nearly 43,000 in 2015

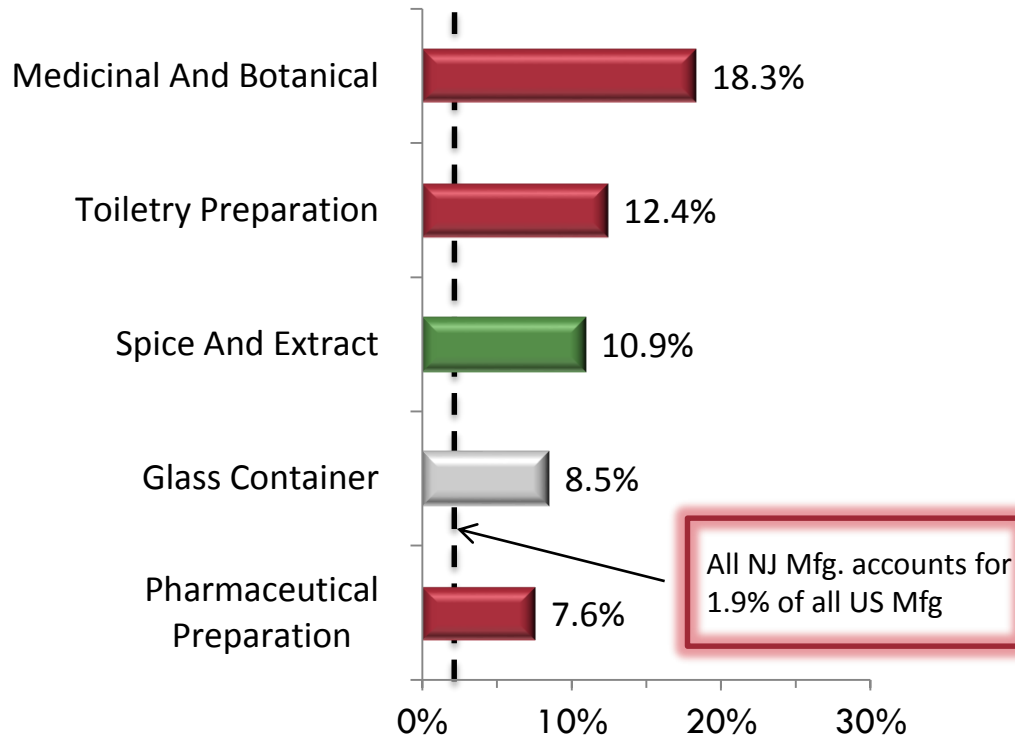
The remaining 16 percent of advanced manufacturing employment is comprised of a group of industries producing goods such as glass and glass products, electrical equipment, transportation equipment, and medical instruments and devices

Employment Distribution of Advanced Manufacturing
New Jersey: 2015



These industries each employ a disproportionately high number of people in New Jersey and are among the manufacturing industries that define the state in 2015

New Jersey Employment as a Percentage of the nation: 2015



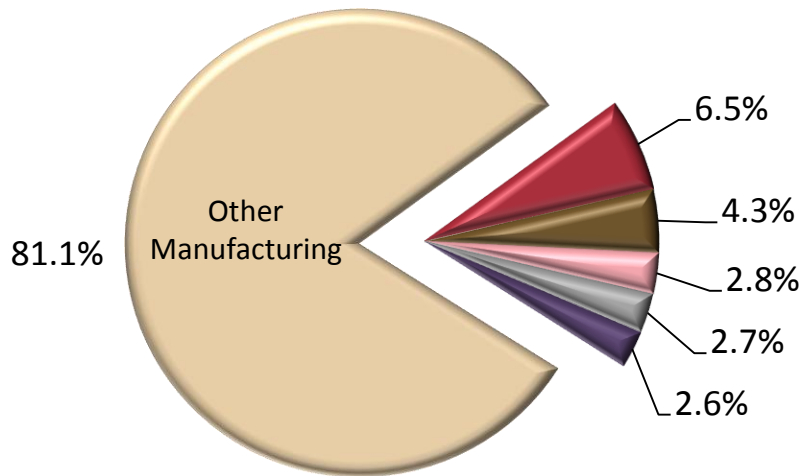
Chemical manufacturing in New Jersey, where three of the five industries on this list are classified, accounts for 5.4 percent of chemical manufacturing employment in the nation

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

Glass container manufacturing is the only industry that does not pay an average wage higher than the statewide average of \$61,980

The five largest manufacturing industries make up nearly 19 percent of all manufacturing employment in the state in 2015

Percentage of Industry's Employment
of All Manufacturing
New Jersey, 2015



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

Pharmaceutical preparation accounts for 6.5 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 \$58,800 for commercial printing to \$146,800 for pharmaceutical preparation

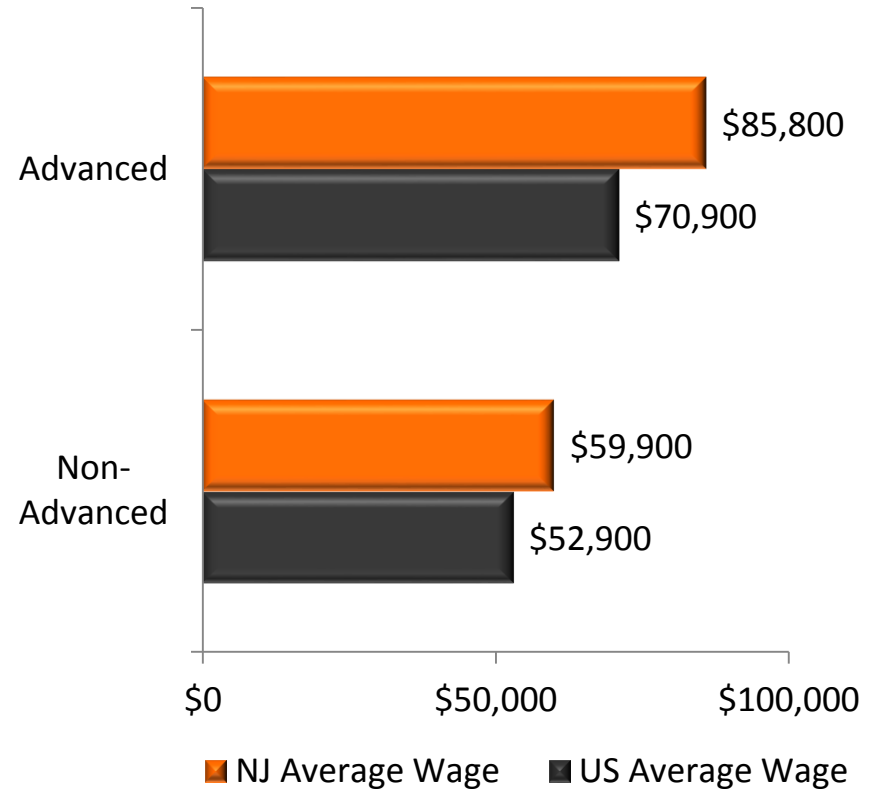
Annual average wages in New Jersey in 2015 among advanced manufacturing industries are about 43 percent more than those non-advanced manufacturing industries

From 2010 to 2015, annual average wages in New Jersey in advanced manufacturing have increased 0.6 percent per year compared to only 1.7 percent per year for non-advanced

Annual average wages paid are 21 percent higher in New Jersey in 2015 than the nation among advanced manufacturing industries

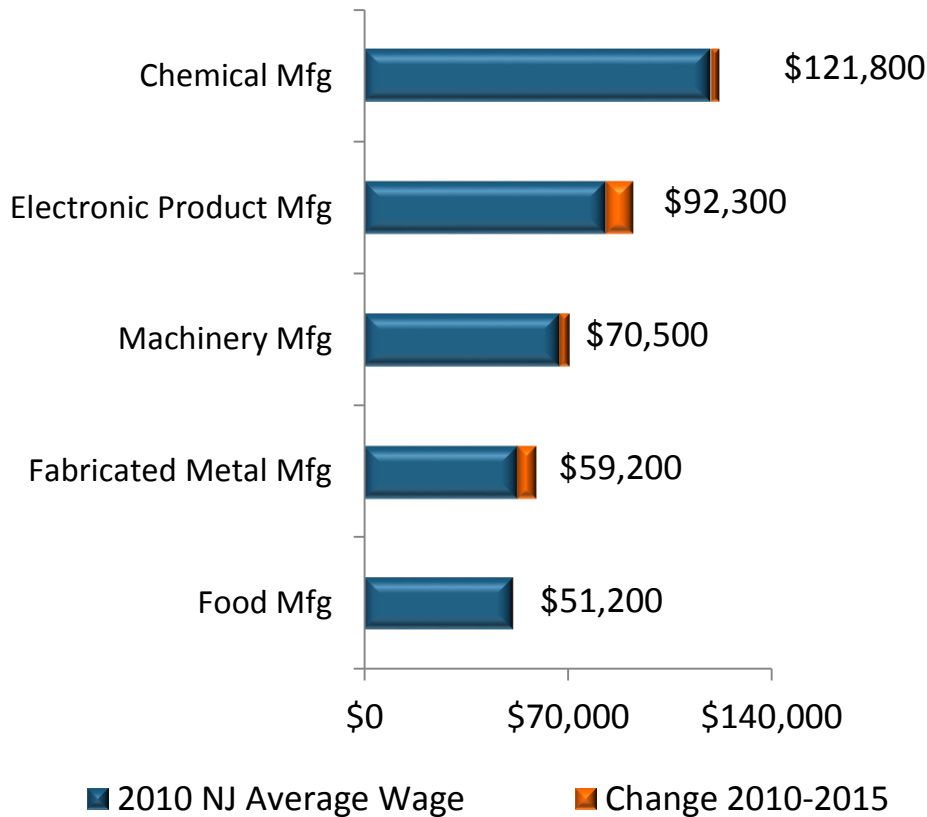
One of the higher paying industry clusters in New Jersey, the advanced manufacturing industry earns about 38 percent more than the state average of \$61,980 in 2015

Comparison of Annual Average Wages Among Advanced and Non-advanced Manufacturing: New Jersey & United States, 2015



Annual average wages in New Jersey among the five main components of advanced manufacturing have averaged 0.2 percent annual growth from 2010 to 2015

Annual Average Wage of Major Components of Advanced Manufacturing New Jersey, 2015



The chemical manufacturing industry earned nearly twice as much as the private sector state average in 2015, and averaged annual increases of 0.5 percent from 2010 to 2015

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

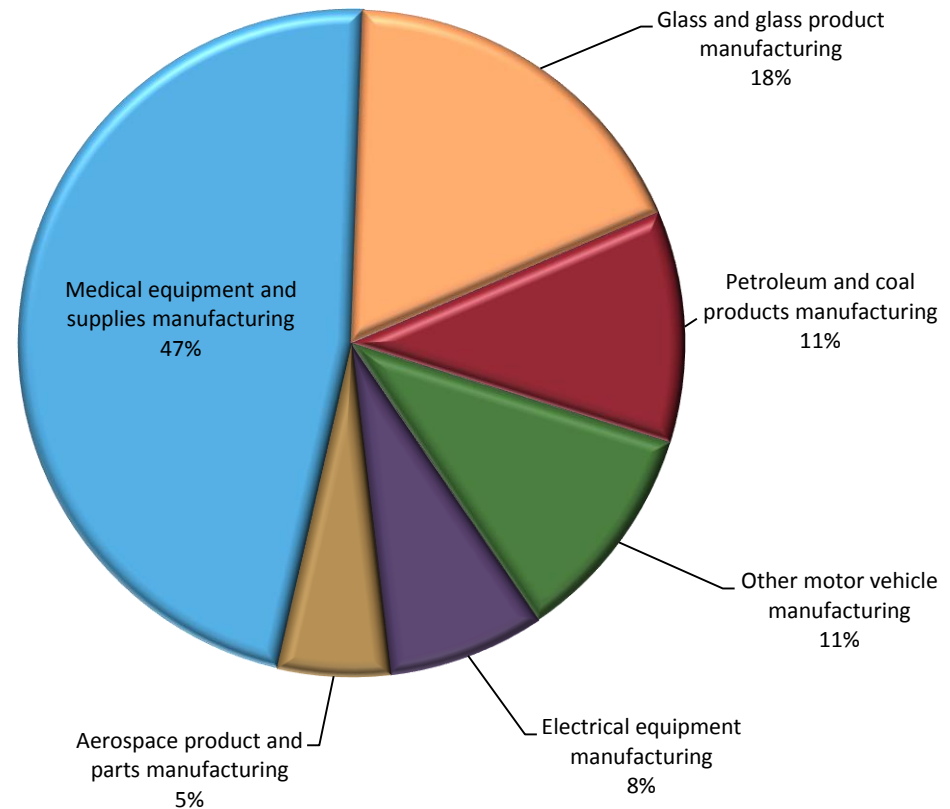
The skill requirements at machinery and fabricated metal product manufacturing establishments are increasing quickly, and wages should reflect that over time

These detailed industries make up the roughly 25,300 workers employed in the “other” advanced manufacturing component

Breakdown of Employment of “Other” Advanced Manufacturing
New Jersey, 2015

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...

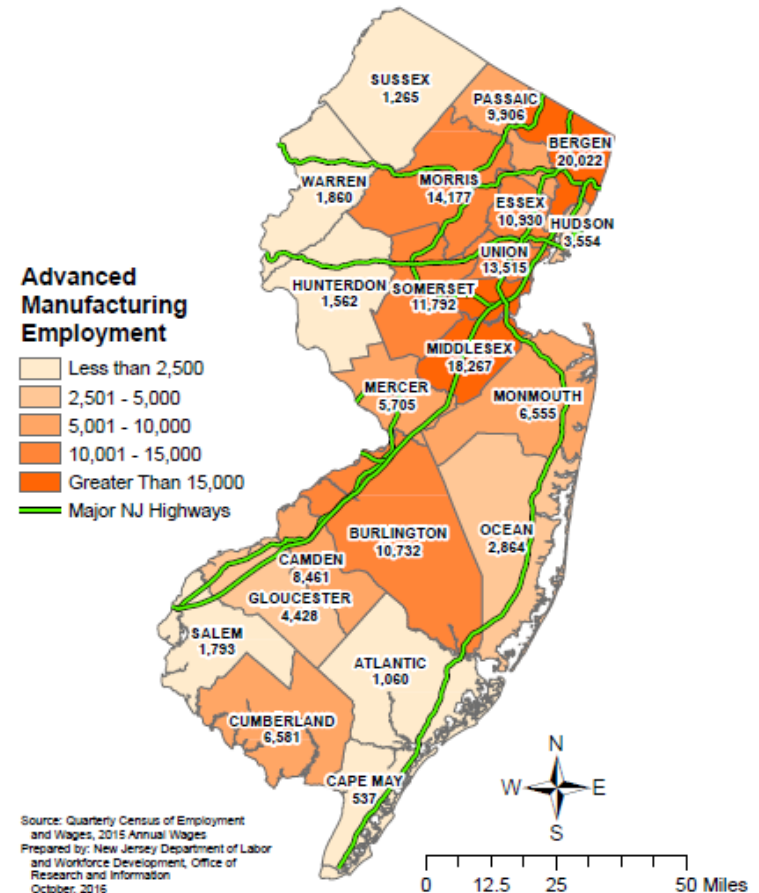
New Jersey offers unique business advantages including:

-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, 2015**



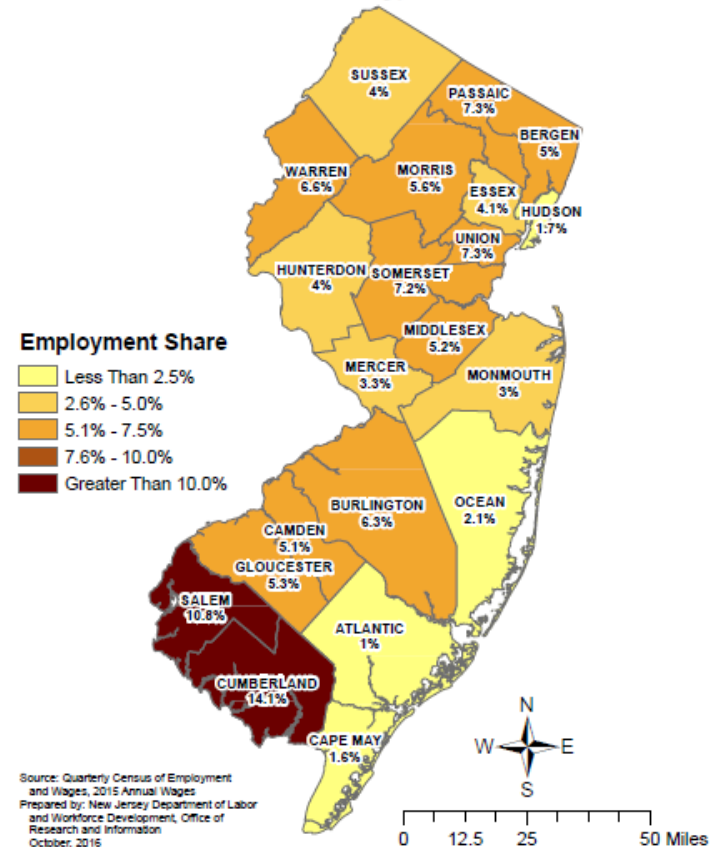
...however, advanced manufacturing in New Jersey's more sparsely populated counties make up a larger percentage of total private sector employment

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 2.5 percent of private sector employment is classified as advanced manufacturing

**Advanced Manufacturing Employment as a Share of Total Private Employment
New Jersey, 2015**

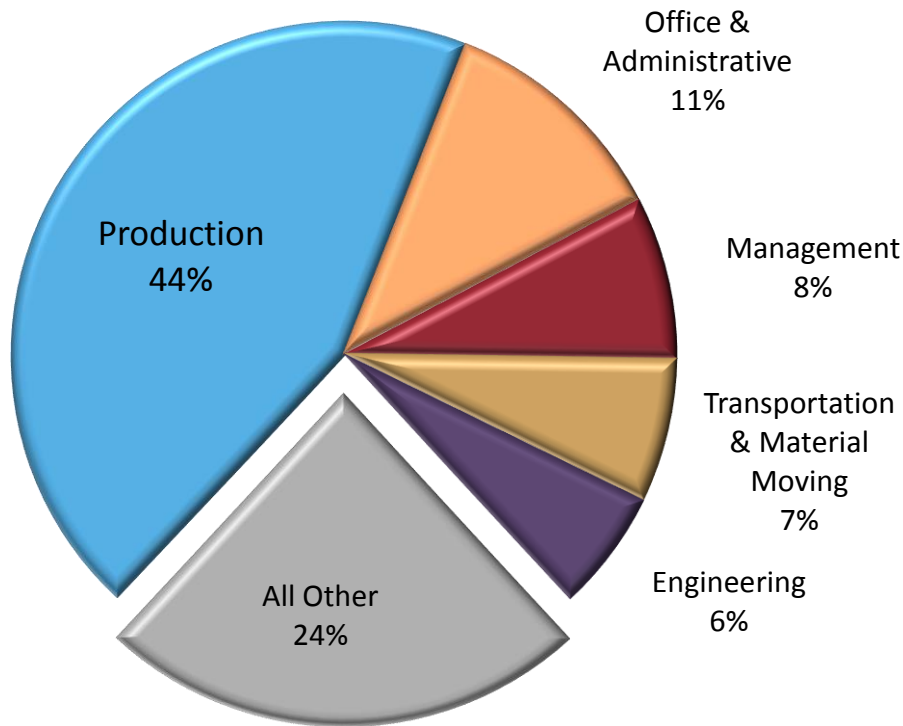


OCCUPATIONAL ANALYSIS



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, 2015



More than 40 percent of advanced manufacturing workers are directly involved with production

Roughly 11 percent of workers are classified in STEM occupations

The “other” 24 percent of advanced manufacturing occupations primarily consists of business, sales and other profession and service occupations

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

| Occupation | 2015 Employment | Share of Industry | 2015 Average Salary | Minimum Education Requirements |
|--|-----------------|-------------------|---------------------|-----------------------------------|
| Total, All Advanced Manufacturing Occupations | 156,800 | 100.0% | \$54,950 | |
| Top 20 Occupations | 62,250 | 39.7% | \$43,030 | |
| Packaging and Filling Machine Operators | 7,530 | 4.8% | \$28,520 | High school diploma or equivalent |
| Supervisors of Production Workers | 5,350 | 3.4% | \$65,160 | High school diploma or equivalent |
| Inspectors, Testers, Sorters, Samplers, and Weighers | 5,120 | 3.3% | \$37,990 | High school diploma or equivalent |
| Packers and Packagers, Hand | 3,790 | 2.4% | \$22,290 | Less than high school |
| Shipping, Receiving, and Traffic Clerks | 3,150 | 2.0% | \$35,410 | High school diploma or equivalent |
| Mixing and Blending Machine Operators | 3,130 | 2.0% | \$41,990 | High school diploma or equivalent |
| Electrical and Electronic Equipment Assemblers | 2,950 | 1.9% | \$33,170 | High school diploma or equivalent |
| Chemical Equipment Operators | 2,870 | 1.8% | \$49,180 | High school diploma or equivalent |
| Extruding, Forming, Pressing, and Compacting Machine Operators | 2,740 | 1.7% | \$35,760 | High school diploma or equivalent |
| Chemists | 2,730 | 1.7% | \$83,650 | Bachelor's degree |
| Industrial Machinery Mechanics | 2,680 | 1.7% | \$54,970 | High school diploma or equivalent |
| Machinists | 2,620 | 1.7% | \$50,470 | High school diploma or equivalent |
| Wholesale Sales Representatives | 2,620 | 1.7% | \$76,420 | High school diploma or equivalent |
| Food Batchmakers | 2,530 | 1.6% | \$30,690 | High school diploma or equivalent |
| Computer-Controlled Machine Tool Operators | 2,260 | 1.4% | \$43,930 | High school diploma or equivalent |
| Customer Service Representatives | 2,220 | 1.4% | \$39,120 | High school diploma or equivalent |
| Office Clerks, General | 2,160 | 1.4% | \$34,100 | High school diploma or equivalent |
| Laborers of Freight and Stock, Hand | 2,030 | 1.3% | \$27,870 | Less than high school |
| Electromechanical Equipment Assemblers | 1,910 | 1.2% | \$35,770 | High school diploma or equivalent |
| Welders, Cutters, Solderers, and Brazers | 1,840 | 1.2% | \$46,270 | High school diploma or equivalent |

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, 2015

| Minimum Education Requirement | 2015 Employment | % of Total |
|--------------------------------------|-----------------|---------------|
| Total, Advanced Manufacturing | 156,800 | 100.0% |
| Total High Requirements | 38,970 | 24.9% |
| Doctoral or professional degree | 350 | 0.2% |
| Master's degree | 100 | 0.1% |
| Bachelor's degree | 33,690 | 21.5% |
| Associate's degree | 4,820 | 3.1% |
| Total Moderate Requirements | 3,290 | 2.1% |
| Postsecondary non-degree award | 1,030 | 0.7% |
| Some college, no degree | 2,250 | 1.4% |
| Total Low Requirements | 109,300 | 69.7% |
| High school diploma or equivalent | 89,010 | 56.8% |
| Less than high school | 20,280 | 12.9% |
| Education unavailable | 5,250 | 3.3% |

Scientists and engineers primarily account for the roughly 38 percent of the occupations found in advanced manufacturing that require at least an associate'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



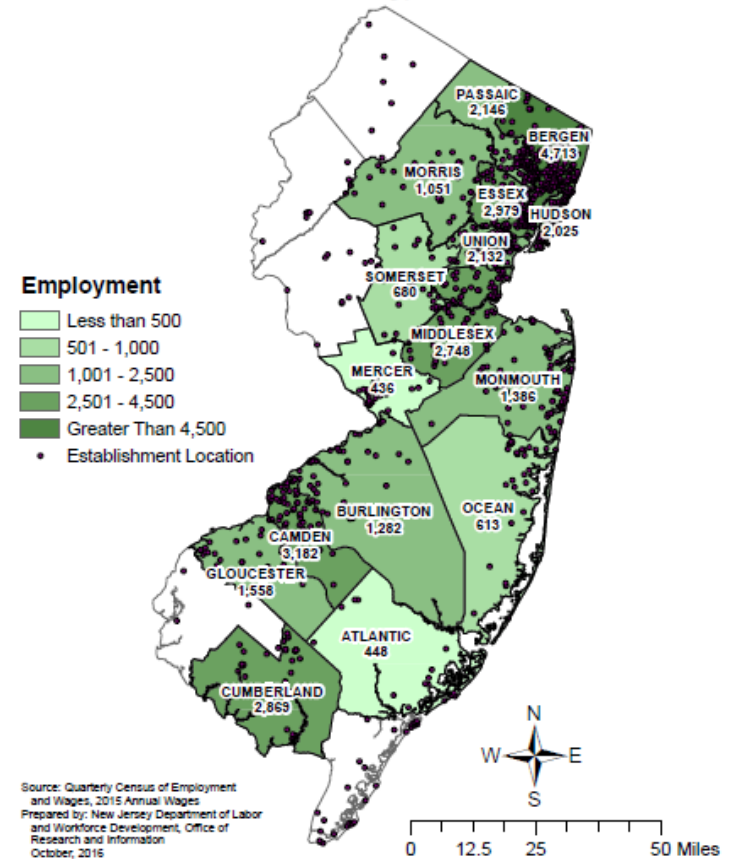
Food Manufacturing

| | Establishments | Employment | Employment Per Establishment |
|--------|----------------|------------|------------------------------|
| 2010 | 976 | 29,588 | 30 |
| 2015 | 1,101 | 31,508 | 29 |
| Change | 125 | 1,920 | -1 |

The food manufacturing industry has exhibited steady growth in New Jersey from 2010 through 2015, 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, 2015

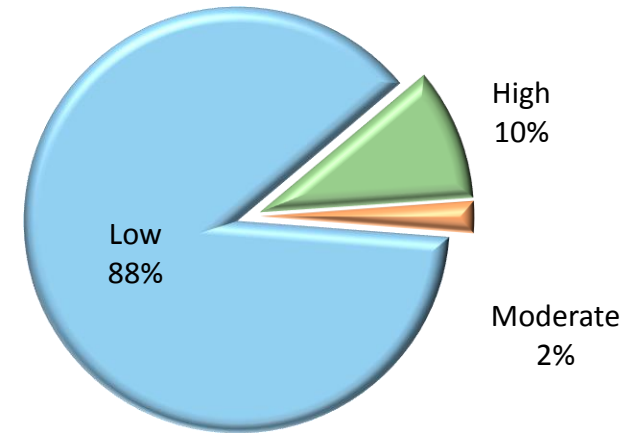


Food Manufacturing

Top Ten Occupations in Food Manufacturing

| Occupation | 2015 Employment | Education Requirement | 2015 Average Salary |
|---|-----------------|-----------------------------------|---------------------|
| Packaging and Filling Machine Operators | 3,030 | High school diploma or equivalent | \$28,520 |
| Food Batchmakers | 2,530 | High school diploma or equivalent | \$30,690 |
| Packers and Packagers, Hand | 1,790 | Less than high school | \$22,290 |
| Bakers | 1,580 | Less than high school | \$27,770 |
| Supervisors of Production Workers | 910 | High school diploma or equivalent | \$65,160 |
| Industrial Machinery Mechanics | 870 | High school diploma or equivalent | \$54,970 |
| Industrial Truck and Tractor Operators | 810 | Less than high school | \$35,520 |
| Wholesale Sales Representatives | 690 | High school diploma or equivalent | \$76,420 |
| Food Cooking Machine Operators | 680 | High school diploma or equivalent | \$27,140 |
| Shipping, Receiving, and Traffic Clerks | 630 | High school diploma or equivalent | \$35,410 |

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

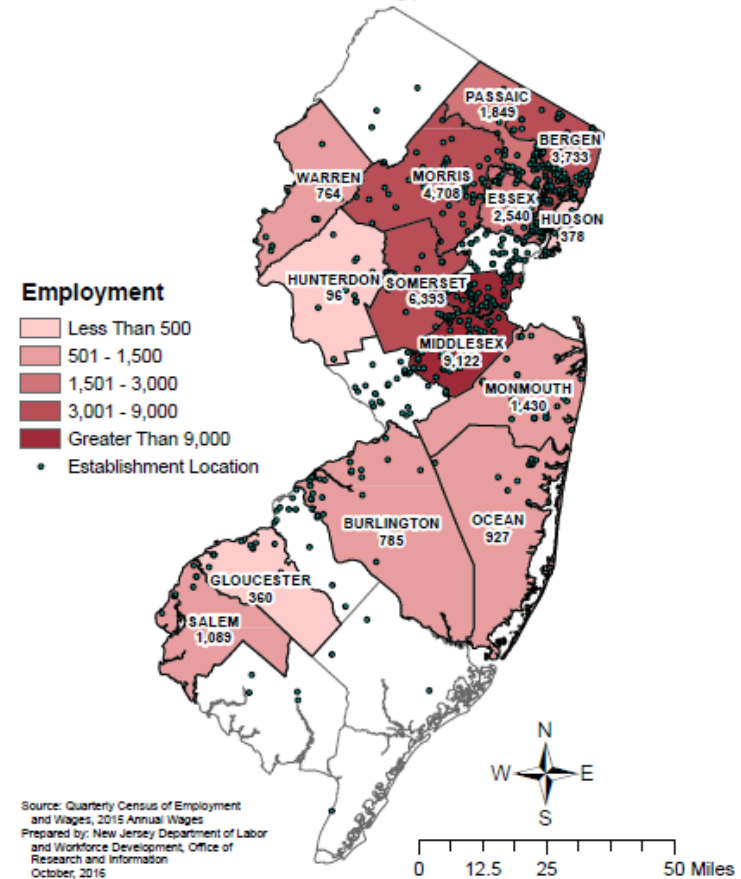
| | Establishments | Employment | Employment Per Establishment |
|--------|----------------|------------|------------------------------|
| 2010 | 913 | 56,022 | 61 |
| 2015 | 815 | 43,173 | 53 |
| Change | -98 | -12,849 | -8 |

Chemical manufacturing declined from 2010-2015 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, 2015

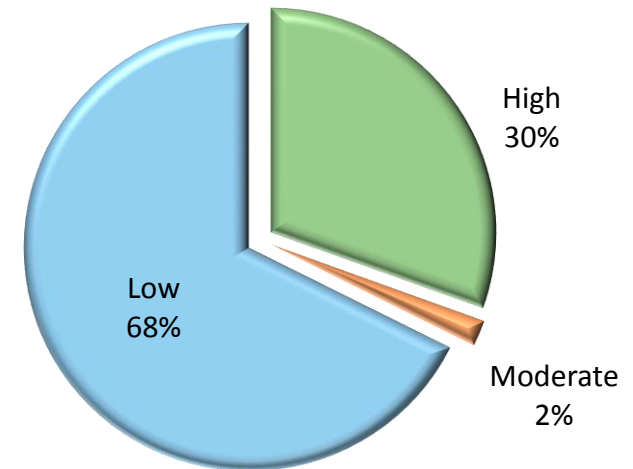


Chemical Manufacturing

Top Ten Occupations in Chemical Manufacturing

| Occupation | 2015 Employment | Education Requirement | 2015 Average Salary |
|--|-----------------|-----------------------------------|---------------------|
| Packaging and Filling Machine Operators | 4,270 | High school diploma or equivalent | \$28,520 |
| Chemists | 2,580 | Bachelor's degree | \$83,650 |
| Mixing and Blending Machine Operators | 2,420 | High school diploma or equivalent | \$41,990 |
| Chemical Equipment Operators | 2,320 | High school diploma or equivalent | \$49,180 |
| Inspectors, Testers, Sorters, Samplers, and Weighers | 1,980 | High school diploma or equivalent | \$37,990 |
| Extruding, Forming, Pressing, and Compacting Machine Operators | 1,960 | High school diploma or equivalent | \$35,760 |
| Supervisors of Production Workers | 1,960 | High school diploma or equivalent | \$65,160 |
| Chemical Technicians | 1,350 | Associate's degree | \$67,180 |
| Industrial Machinery Mechanics | 1,040 | High school diploma or equivalent | \$54,970 |
| Maintenance and Repair Workers | 920 | High school diploma or equivalent | \$43,680 |

Minimum Educational Requirements



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

Computer and Electronic Product Manufacturing

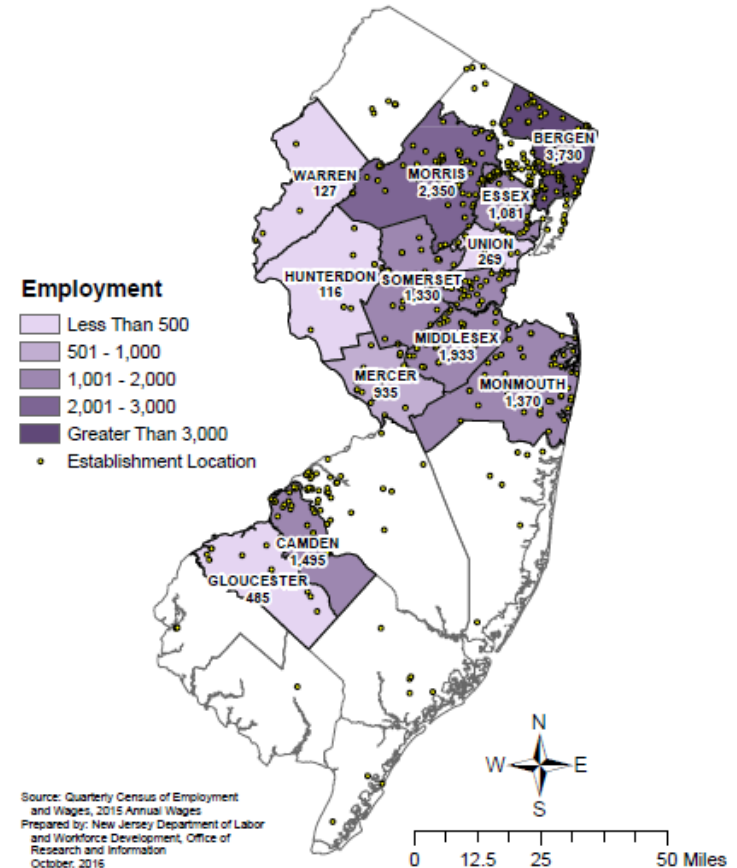
| | Establishments | Employment | Employment Per Establishment |
|--------|----------------|------------|------------------------------|
| 2010 | 771 | 26,806 | 35 |
| 2015 | 690 | 22,978 | 33 |
| Change | -81 | -3,828 | -2 |

Among the four components, computer and electronic product manufacturing have the fewest number of establishments in New Jersey

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, 2015*

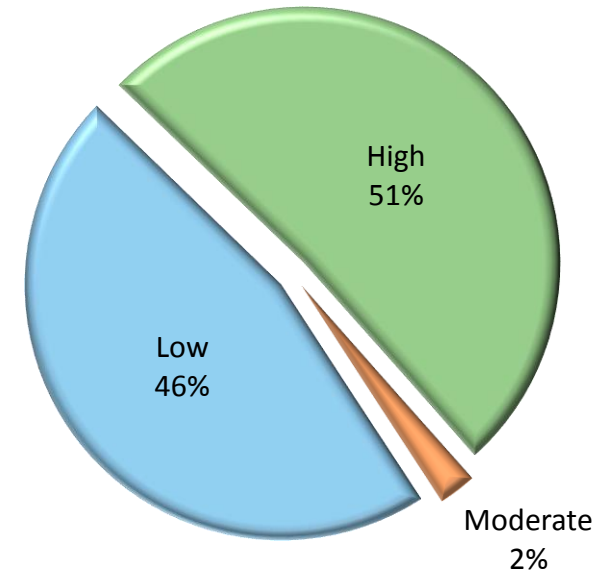


Computer and Electronic Product Manufacturing

Top Ten Occupations in Computer and Electronic Product Manufacturing

| Occupation | 2015 Employment | Education Requirement | 2015 Average Salary |
|--|-----------------|-----------------------------------|---------------------|
| Electrical and Electronic Equipment Assemblers | 1,980 | High school diploma or equivalent | \$33,170 |
| Electronics Engineers | 940 | Bachelor's degree | \$106,260 |
| Electromechanical Equipment Assemblers | 890 | High school diploma or equivalent | \$35,770 |
| Mechanical Engineers | 870 | Bachelor's degree | \$91,360 |
| Electrical and Electronics Engineering Technicians | 740 | Associate's degree | \$61,540 |
| Inspectors, Testers, Sorters, Samplers, and Weighers | 720 | High school diploma or equivalent | \$37,990 |
| Software Developers, Applications | 630 | Bachelor's degree | \$99,320 |
| Systems Software Developers | 550 | Bachelor's degree | \$114,220 |
| Supervisors of Production Workers | 530 | High school diploma or equivalent | \$65,160 |
| Electrical Engineers | 470 | Bachelor's degree | \$102,480 |

Minimum Educational Requirements



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

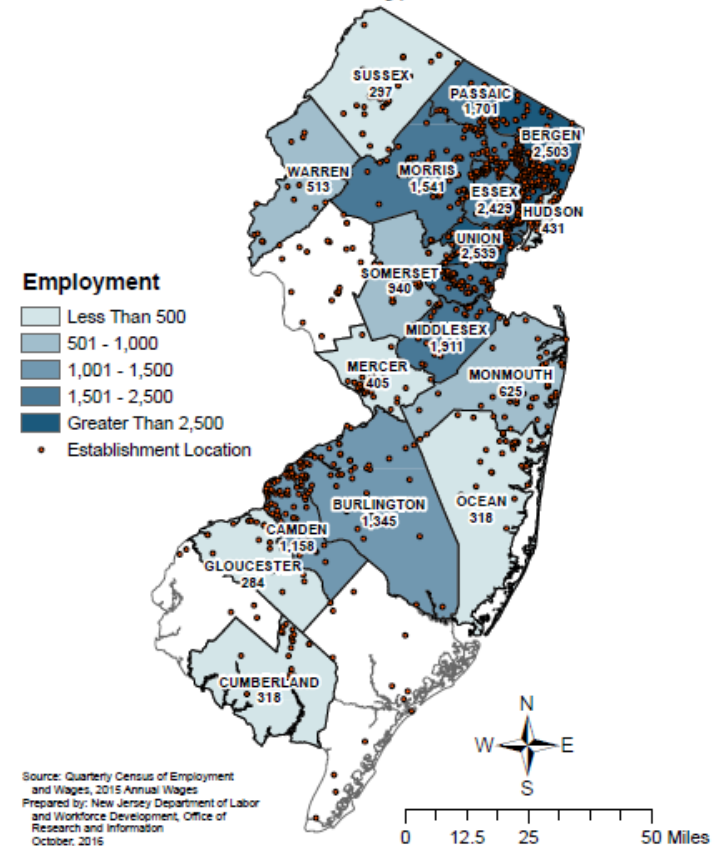
Fabricated Metal Product Manufacturing

| | Establishments | Employment | Employment Per Establishment |
|--------|----------------|------------|------------------------------|
| 2010 | 1,313 | 22,199 | 17 |
| 2015 | 1,139 | 20,002 | 18 |
| Change | -174 | -2,197 | 1 |

Fabricated metal product manufacturing lost the most establishments from 2010-2015

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, 2015*

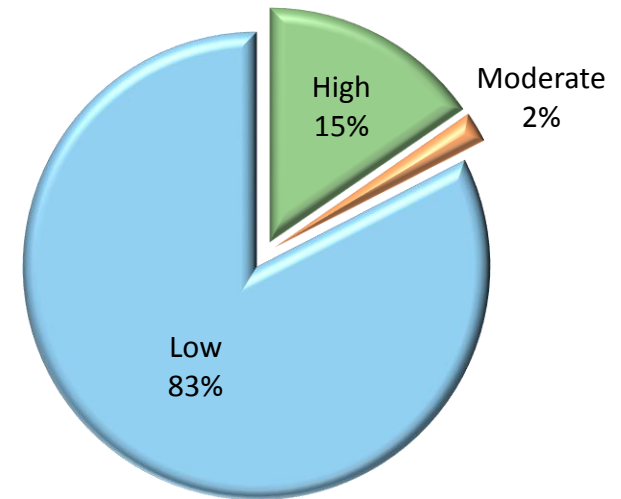


Fabricated Metal Product Manufacturing

Top Ten Occupations in Fabricated Metal Manufacturing

| Occupation | 2015 Employment | Education Requirement | 2015 Average Salary |
|--|-----------------|-----------------------------------|---------------------|
| Machinists | 1,310 | High school diploma or equivalent | \$50,470 |
| Computer-Controlled Machine Tool Operators | 1,160 | High school diploma or equivalent | \$43,930 |
| Cutting, Punching, and Press Machine Operators | 1,090 | High school diploma or equivalent | \$33,060 |
| Welders, Cutters, Solderers, and Brazers | 1,070 | High school diploma or equivalent | \$46,270 |
| Supervisors of Production Workers | 690 | High school diploma or equivalent | \$65,160 |
| Inspectors, Testers, Sorters, Samplers, and Weighers | 610 | High school diploma or equivalent | \$37,990 |
| Coating, Painting, and Spraying Machine Operators | 490 | High school diploma or equivalent | \$35,270 |
| Tool and Die Makers | 440 | High school diploma or equivalent | \$56,730 |
| Structural Metal Fabricators and Fitters | 390 | High school diploma or equivalent | \$44,120 |
| Multiple Machine Tool Operators | 370 | High school diploma or equivalent | \$35,030 |

Minimum Educational Requirements



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

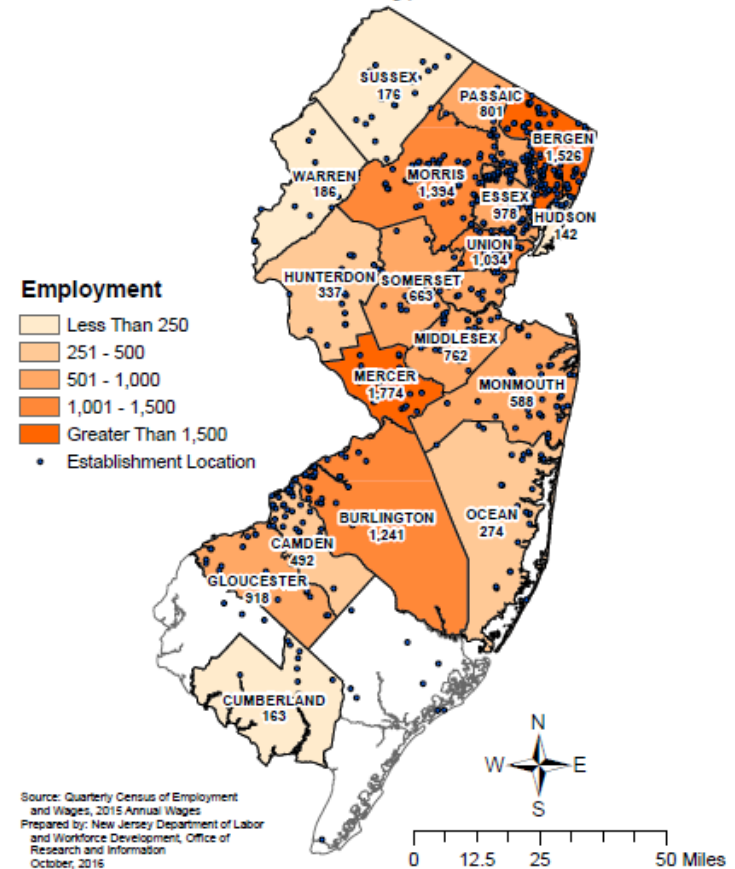
Machinery Manufacturing

| | Establishments | Employment | Employment Per Establishment |
|--------|----------------|------------|------------------------------|
| 2010 | 826 | 13,889 | 17 |
| 2015 | 690 | 13,834 | 20 |
| Change | -136 | -55 | 3 |

While the number of establishments dropped at the fastest rate among the five major components, employment decreased only slightly from 2010-2015

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, 2015

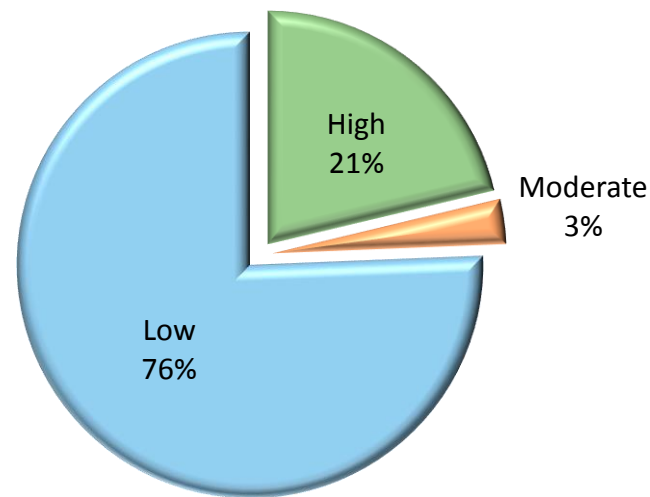


Machinery Manufacturing

Top Ten Occupations in Machinery Manufacturing

| Occupation | 2015 Employment | Education Requirement | 2015 Average Salary |
|--|-----------------|-----------------------------------|---------------------|
| Machinists | 840 | High school diploma or equivalent | \$50,470 |
| Electromechanical Equipment Assemblers | 740 | High school diploma or equivalent | \$35,770 |
| Welders, Cutters, Solderers, and Brazers | 570 | High school diploma or equivalent | \$46,270 |
| Electrical and Electronic Equipment Assemblers | 470 | High school diploma or equivalent | \$33,170 |
| Inspectors, Testers, Sorters, Samplers, and Weighers | 460 | High school diploma or equivalent | \$37,990 |
| Computer-Controlled Machine Tool Operators | 440 | High school diploma or equivalent | \$43,930 |
| Supervisors of Production Workers | 360 | High school diploma or equivalent | \$65,160 |
| Multiple Machine Tool Operators | 350 | High school diploma or equivalent | \$35,030 |
| Mechanical Engineers | 330 | Bachelor's degree | \$91,360 |
| Tool and Die Makers | 330 | High school diploma or equivalent | \$56,730 |

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



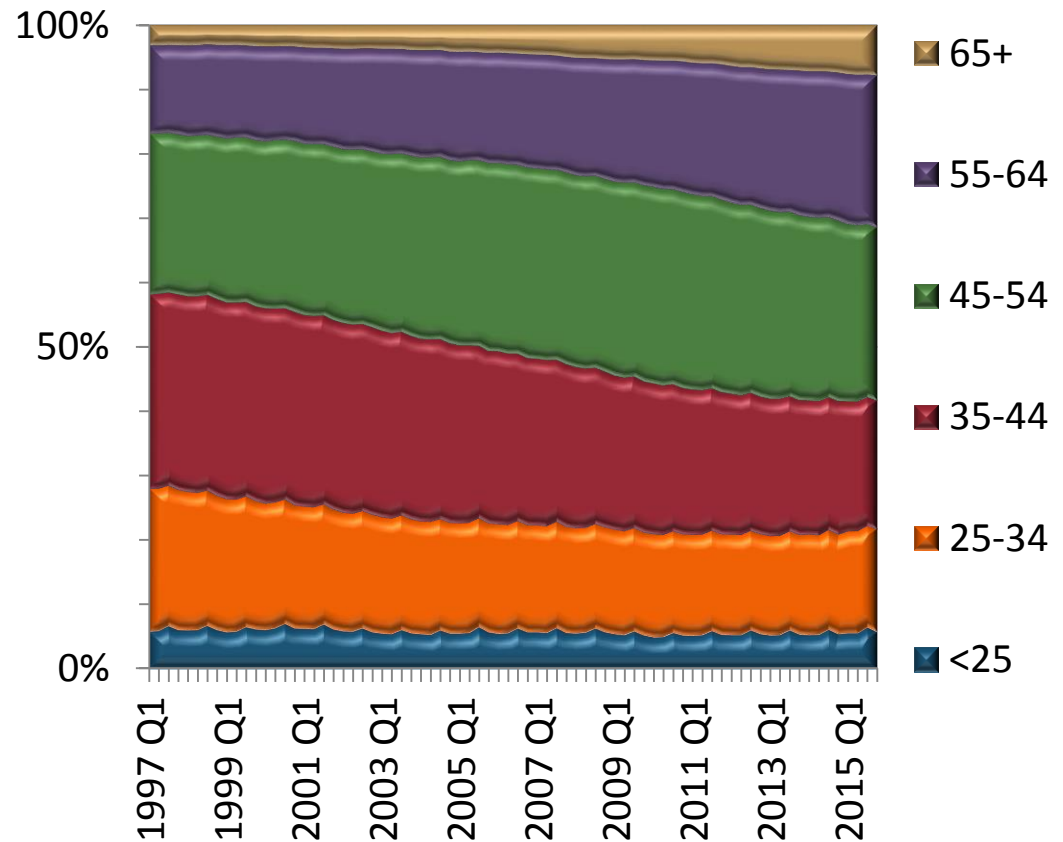
Data shows a steady and gradual change toward an older workforce in nearly every age cohort

The workforce aged 65 and older has doubled its share of total employment from 3 percent to nearly 8 percent from 1997 to 2015

Although there are more than 20,000 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 2015

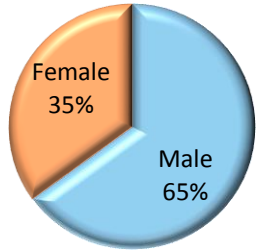
Employment for those younger than age 34 has decreased by more than half and now accounts for only 21 percent of the total workforce

Breakdown of Workforce by Age
New Jersey: 1997-2015

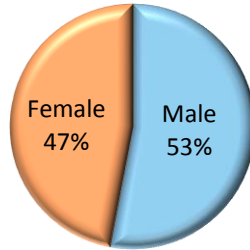


Gender, racial, and ethnic profile of New Jersey residents working in advanced manufacturing industries

Advanced Manufacturing



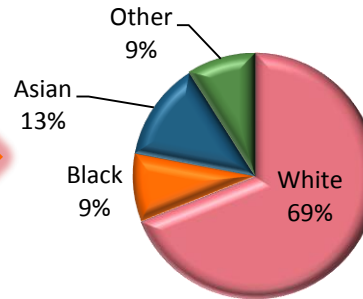
All Industries



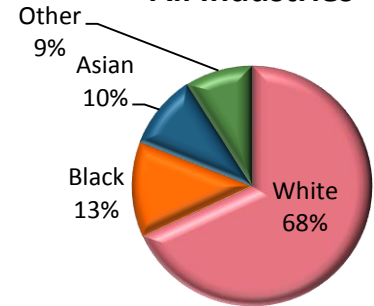
The advanced manufacturing workforce is predominantly male

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

Advanced Manufacturing

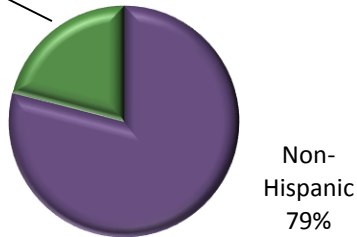


All Industries



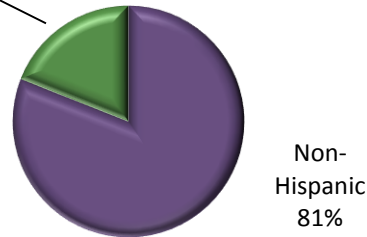
The Hispanic population is slightly less among advanced manufacturing industries

Advanced Manufacturing



Advanced Manufacturing

All Industries



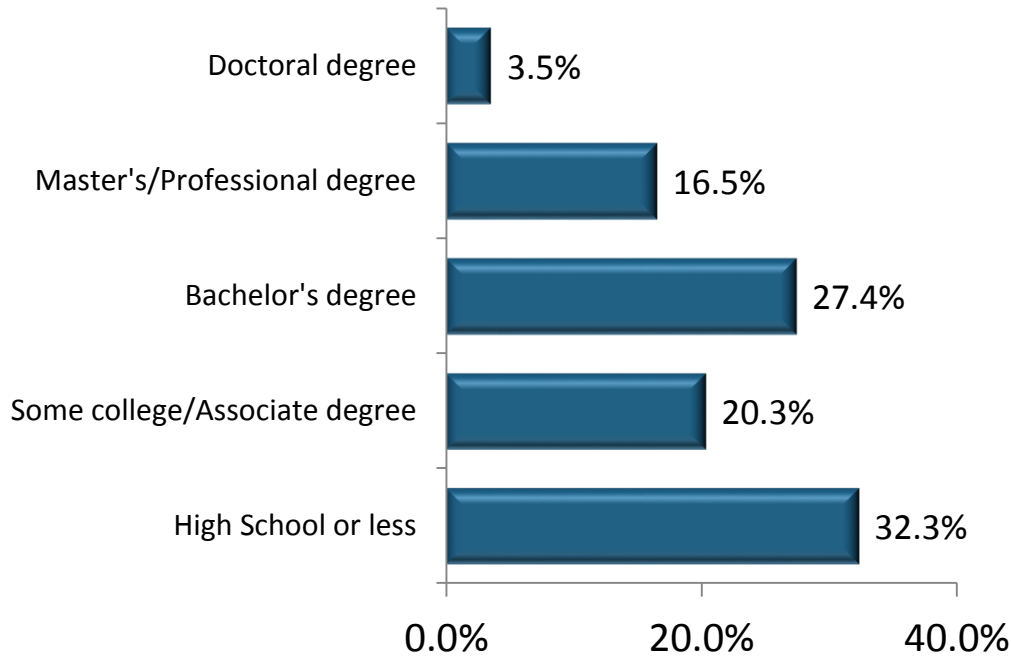
All Industries

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

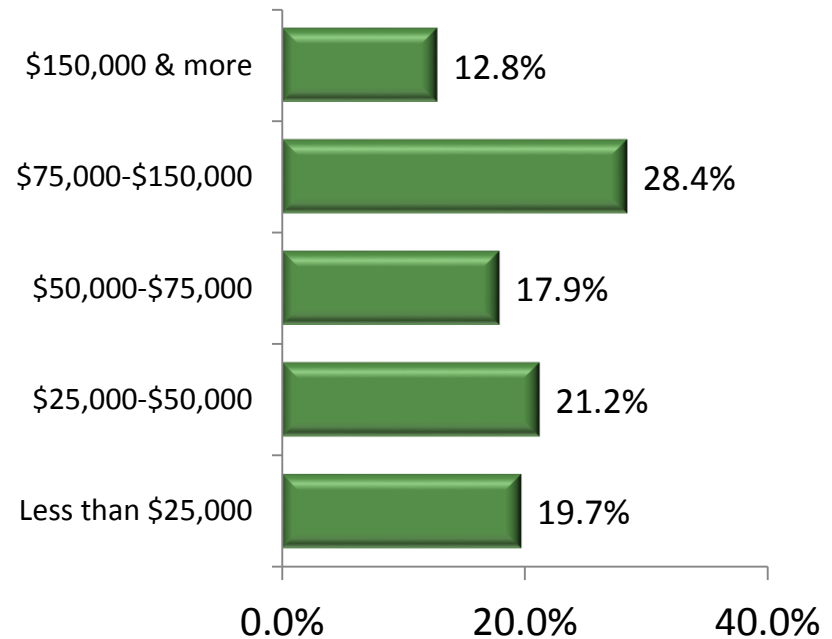
Nearly 50 percent of the workforce reported that they have earned at least a bachelor's degree, and...

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

Education Level



Average Wage

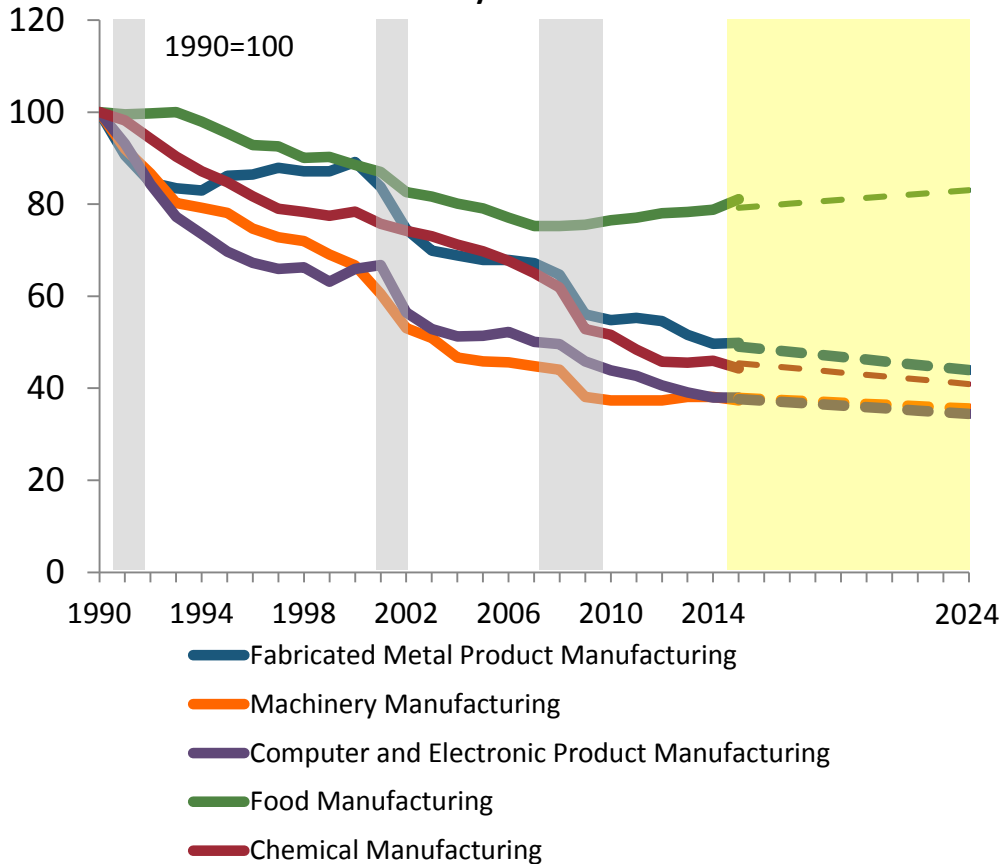


OUTLOOK



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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