



New Jersey's Advanced Manufacturing Cluster

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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 health care cluster and provide an outlook for employment into the future

New Jersey Advanced Manufacturing Highlights

- The advanced manufacturing industry cluster contributed over \$17 billion to the Gross Domestic Product in 2009, or about 3.6 percent of all output
- New Jersey employs the third most people in chemical manufacturing, the state's largest segment of advanced manufacturing, behind only California and Texas
- Nearly half of all manufacturing industry employment remaining in the state is classified as advanced
- Average wages paid in many advanced manufacturing industries are well above the statewide average of \$54,500
- Advanced manufacturing establishment employers paid more than \$11.6 billion in total wages in 2009, or about 6.8 percent of all wages paid

Overview

There are over 3,400 establishments in New Jersey that employ more than 127,000 people in the advanced manufacturing cluster. 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.

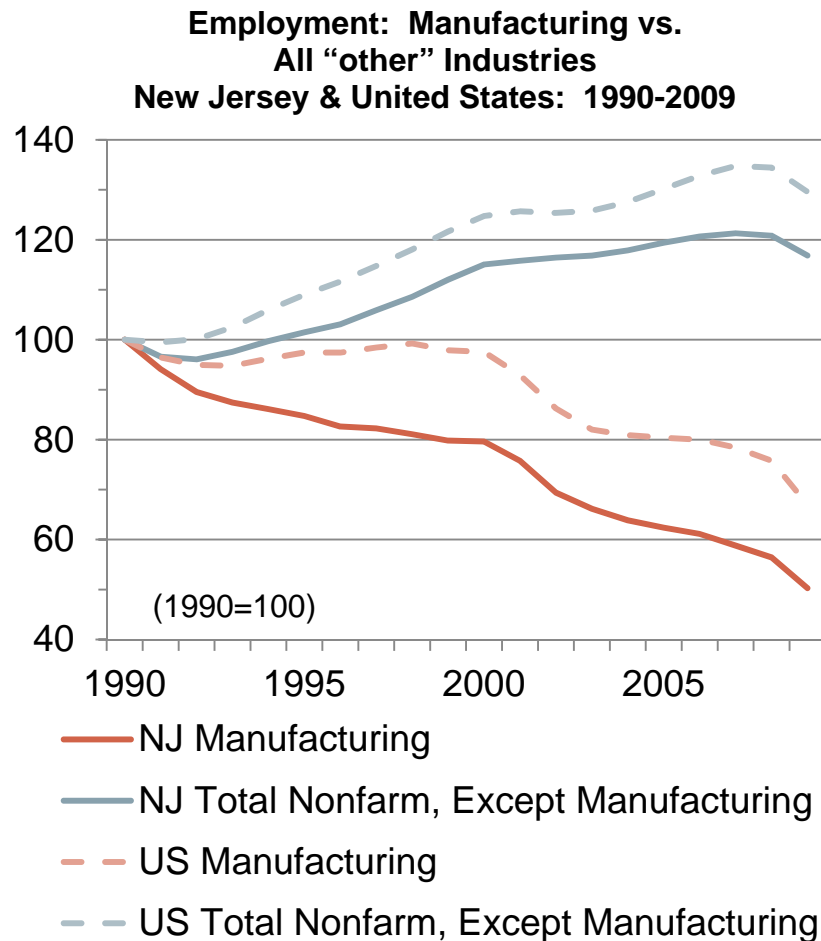
The occupational composition within advanced manufacturing industries is continuously changing as more technical skills are required to operate more advanced processes. The expectation of higher skills has resulted in many higher paying jobs, especially among chemical manufacturing firms.

The profile of the average worker is generally older than average and male. More than 50 percent of the workforce is aged 45 and older and males outnumber by nearly a two to one ratio. Racially, it is more diverse than average, especially among the Asian population.

Advanced Manufacturing

Industry Analysis

New Jersey has followed a similar employment trend as the nation, but has fared worse over the last 20 years



Manufacturing has lost over 263,000 jobs in New Jersey since 1990, a 3.6% annual decline, while the nation has declined at a 2.1 annual rate, shedding nearly 6 million jobs

The "other" non-agricultural industries posted a net gain of 523,000 jobs in New Jersey, while the United States added over 27 million

Since 1990, the manufacturing sector in New Jersey has failed to experience a year over year gain. Its best year was a 0.2 decline from 1999-2000

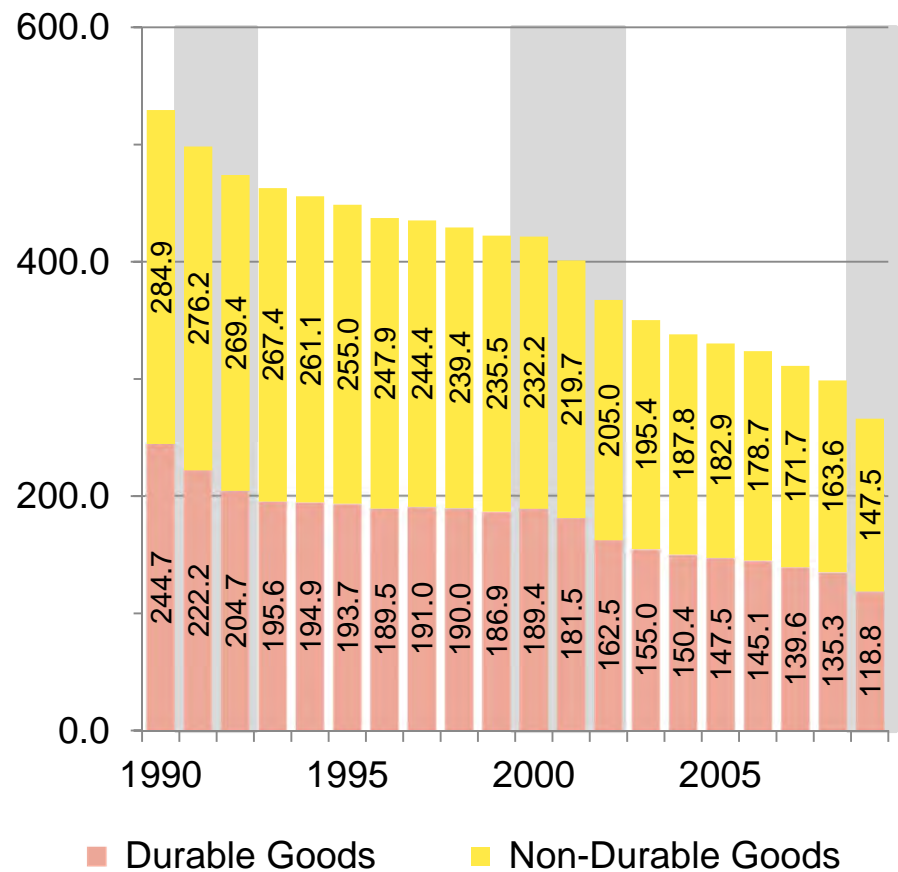
Manufacturing employment in New Jersey has declined from 14.6% of all jobs in 1990 to 6.8% in 2009

Nationally, manufacturing's share of total employment has declined from 16.2% in 1990 to 9.1% in 2009

Widespread and consistent losses among industries that manufacture both durable and non-durable goods have resulted in closely distributed annual average losses of 3.7 and 3.4 percent, respectively

Roughly half of the 263,000 manufacturing jobs lost in New Jersey over the past two decades were lost during recessionary years, when the average annual decline exceeded 6 percent

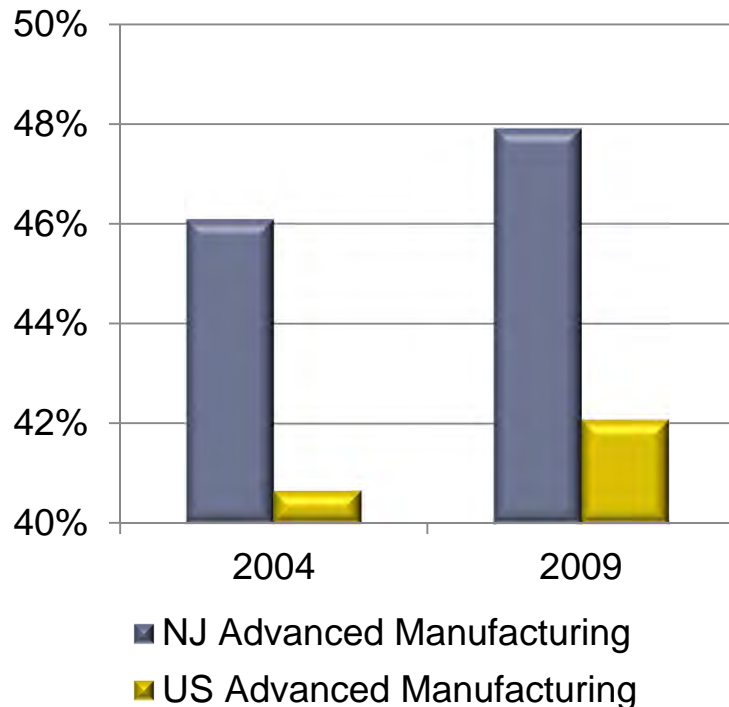
**Employment breakdown
Durable vs. Non-durable Goods
New Jersey: 1990-2009**



Source: New Jersey Department of Labor & Workforce Development, Current Employment Statistics

The New Jersey Department of Labor and Workforce Development has classified 162 out of 473 NAICS-based manufacturing industries as advanced

**Percentage of Manufacturing Employment Classified as Advanced
New Jersey and United States:
2004 & 2009**



Employment in advanced manufacturing industries declined at a lesser rate in New Jersey and the nation from 2004 to 2009, 3.8 and 3.1 percent, respectively, than its non-advanced counterpart (5.2 & 4.2 percent)

In 2009, there were more than 127,000 people employed in industries classified as advanced manufacturing in New Jersey

Nearly 48 percent of all manufacturing employment in New Jersey occurred in advanced industries in 2009 versus only 42 percent nationwide

The advanced manufacturing sector and its components with some examples of industries classified within them

Chemical Manufacturing

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

Computer and Electronic Product Manufacturing

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

Machinery Manufacturing

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

Transportation Equipment Manufacturing

- Motor vehicle body and trailer
- Motor vehicle parts
- Aerospace product and parts
- Ship and boat building

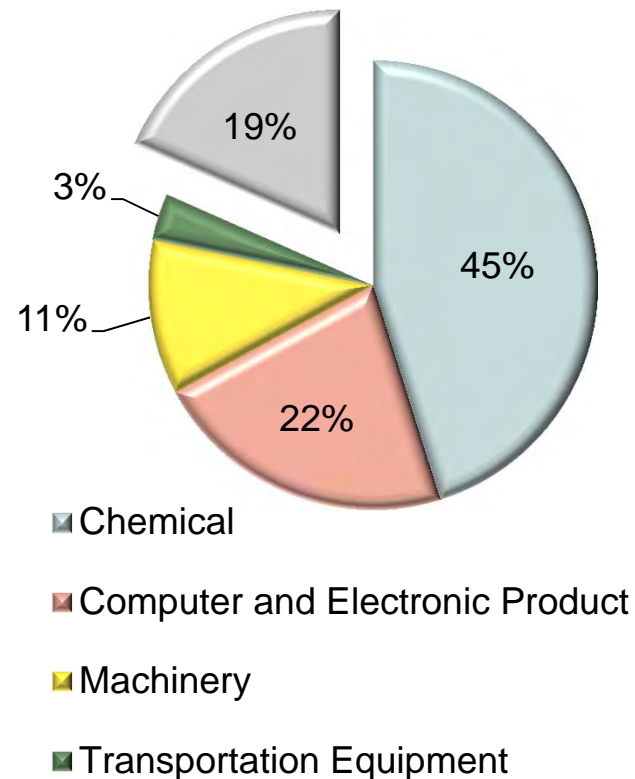
The four major components of advanced manufacturing account for over 80% of its workforce in New Jersey in 2009

Chemical manufacturing, which includes pharmaceuticals and medicine, employed over 57,000 in 2009, which is greater than 21 percent of all manufacturing in the state

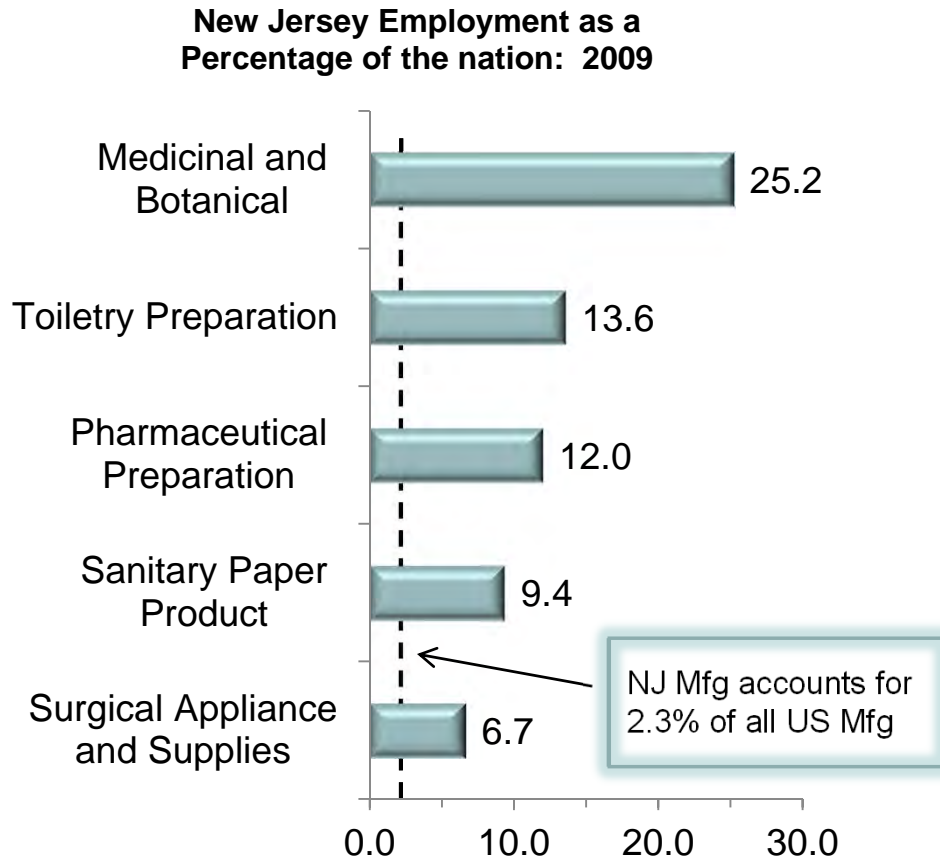
Computer and electronic product and machinery manufacturing together employed over 42,000 in 2009

The remaining 19 percent of advanced manufacturing employment is comprised of a group of industries producing goods such as glass and glass products, electrical equipment, and medical instruments and devices

**Employment Distribution of
Advanced Manufacturing
New Jersey: 2009**



These industries each employ a significant number of people in New Jersey and account for a large portion of industry employment in the nation



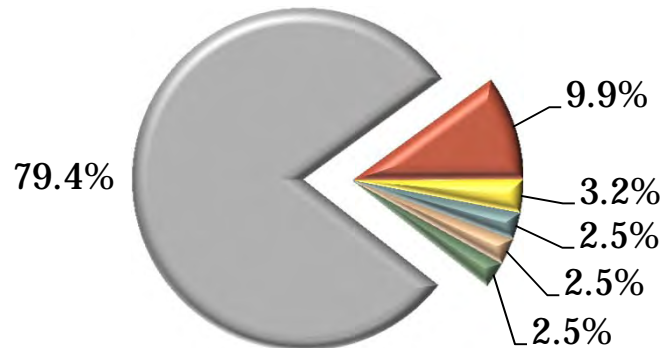
Chemical manufacturing in New Jersey, where the top three on this list are classified, accounts for over 7 percent chemical manufacturing employment in the nation

All but sanitary paper product manufacturing would be classified as advanced

Overall, New Jersey employed 2.7 percent of all advanced manufacturing in the nation

The five largest manufacturing industries make up over 20% of all manufacturing employment in the state

**Percentage of Industry's Employment
of All Manufacturing
New Jersey, 2009**



- Pharmaceutical Preparation
- Search, Detection, Navigation, Guidance, Aeronautical, and Nautical Systems and Instrument
- Toilet Preparation
- Commercial Lithographic Printing
- Surgical Appliance and Supplies

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

Among these five largest manufacturing industries, only commercial lithographic printing is not considered to be advanced

Each of these industries earns a substantial average annual wage, ranging from \$57,260 for commercial lithographic printing to \$131,110 for pharmaceutical preparation

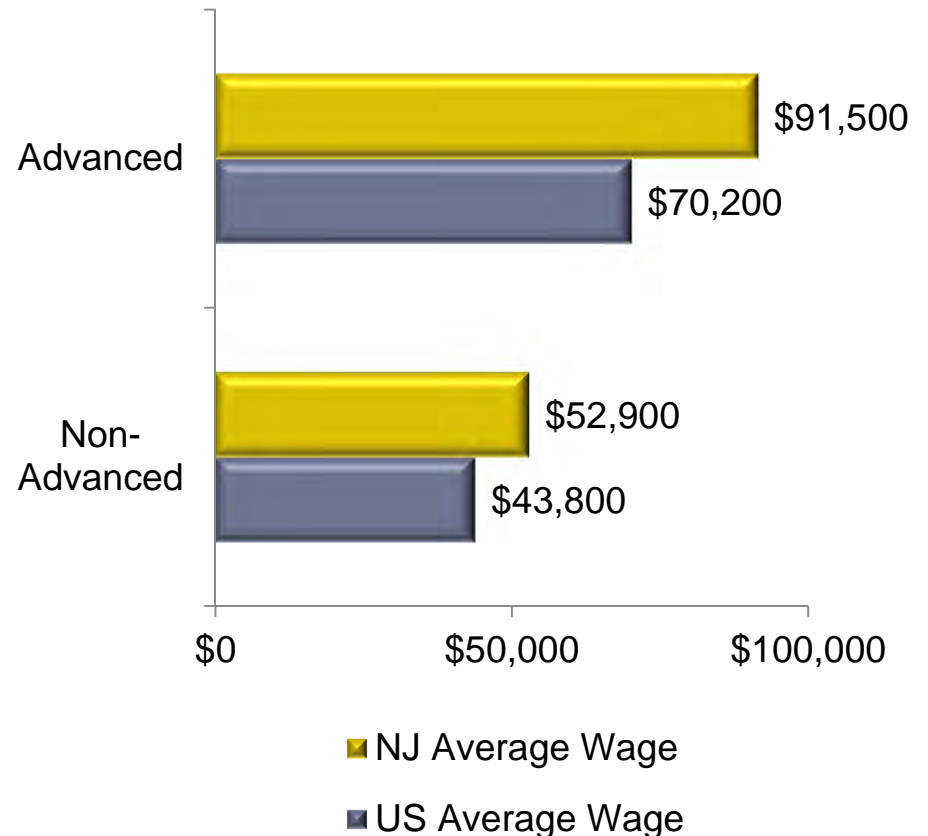
Average wages in New Jersey in 2009 among advanced manufacturing industries are about 73% more than those non-advanced manufacturing industries

From 2004 to 2009, average wages in New Jersey in advanced manufacturing have increased 4.4 percent per year compared to only 2.5 percent per year for non-advanced

Average wages paid are 30 percent higher in New Jersey in 2009 than the nation among advanced manufacturing industries, but only 15 percent higher for all industries combined

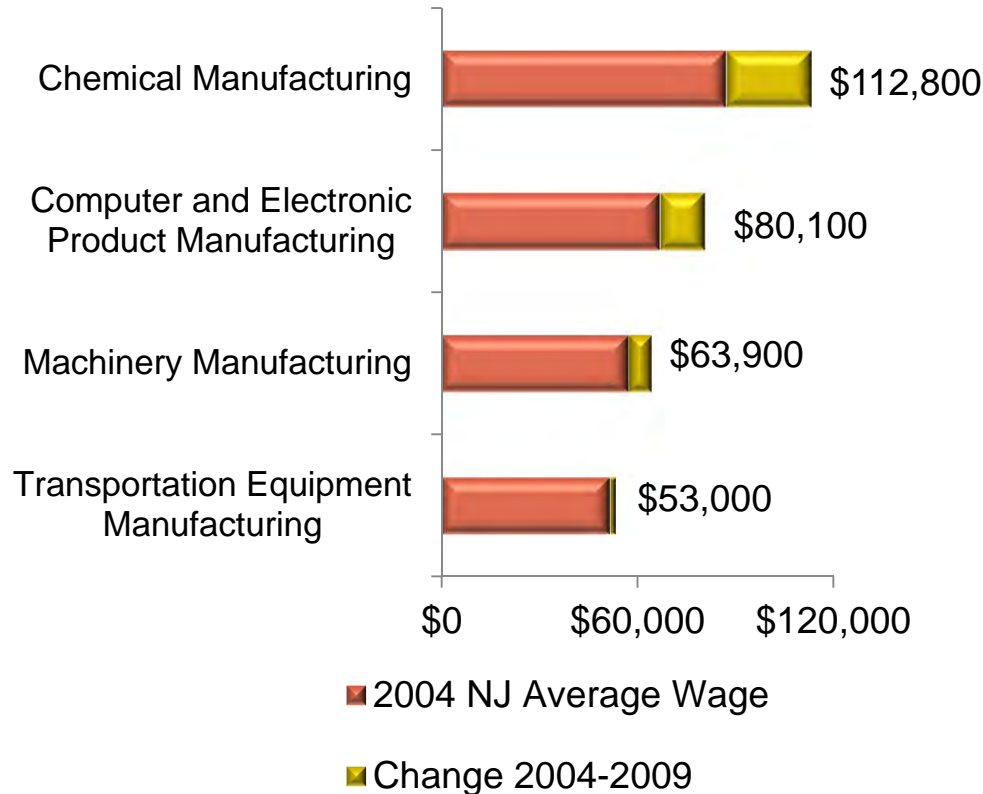
One of the highest paying industries in New Jersey, the advanced manufacturing industry earns about 67 percent more than the state average

Comparison of Average Wages Among Advanced and Non-advanced Manufacturing: New Jersey & United States, 2009



Average wages in New Jersey among the four main components of advanced manufacturing have averaged 4.6 annual growth from 2004 to 2009

**Average Wage of Major Components of Advanced Manufacturing
New Jersey, 2009**



All but transportation equipment manufacturing earns more than the state average of \$54,500 in 2009

The chemical manufacturing industry earns more than twice as much as the state average in 2009, and averaged annual increases of 5.4 percent from 2004 to 2009

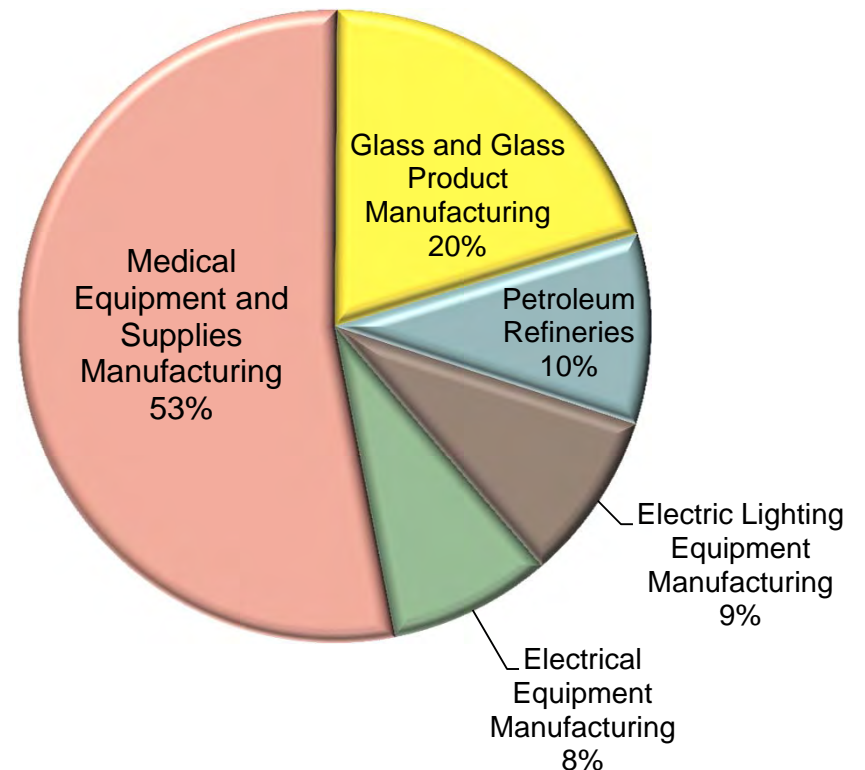
The higher average wages paid in both chemical and computer and electronic product manufacturing are reflective of the greater composition of jobs requiring higher educational levels

Five detailed industries make up the roughly 23,000 workers employed in the “other” advanced manufacturing component

More than half of these “other” workers are employed in the medical equipment and supplies manufacturing industry, and tend to have very high 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 and their optimal geological attributes

Breakdown of Employment of “Other” Advanced Manufacturing New Jersey, 2009

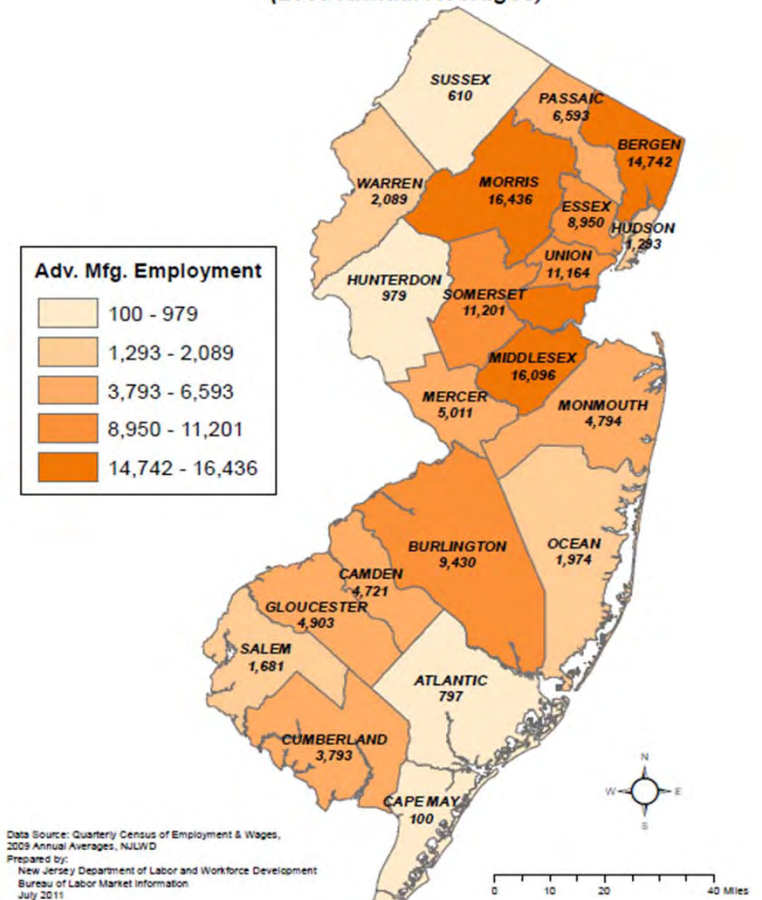


Employment in advanced manufacturing is highly concentrated in New Jersey's most populous counties and along the Interstate 95 corridor

New Jersey offers unique business advantages including:

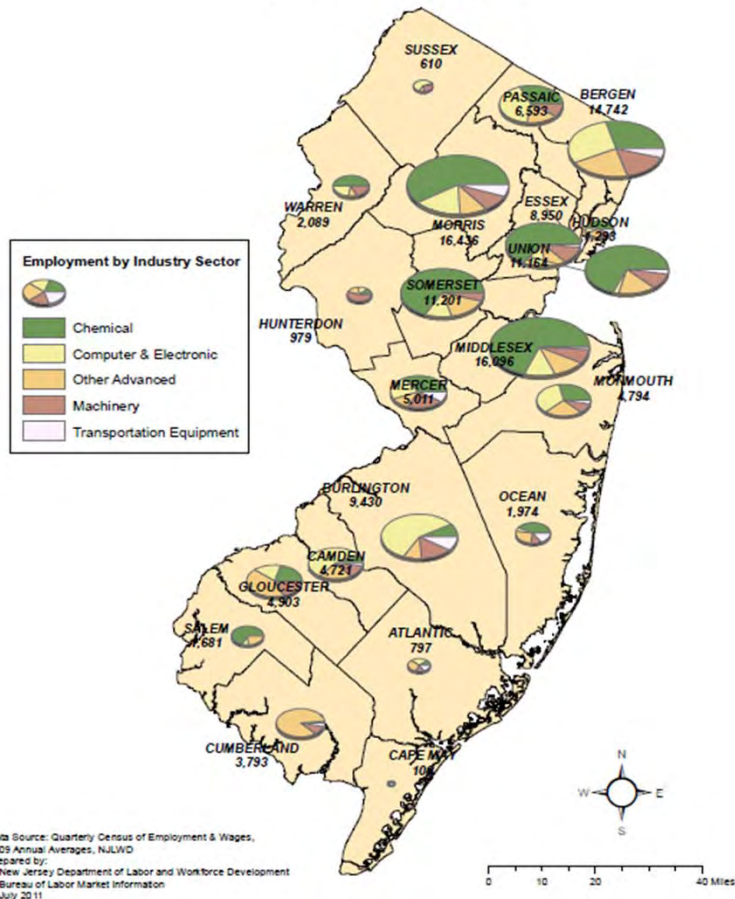
- geographic proximity to roughly 40 percent of the US population, or roughly 100 million potential consumers
- highly educated and very diverse workforce
- extensive transportation network in place to carry goods by land, air, and sea

**Advanced Manufacturing Employment
New Jersey Counties
(2009 Annual Averages)**



Industry components tend to group among one another within the advanced manufacturing cluster

**Advanced Manufacturing Employment by Industry Sector
New Jersey Counties
(2009 Annual Averages)**



Roughly 80 percent of all chemical manufacturing employment is found in these six counties in northeastern region of New Jersey:

- Bergen -Essex -Somerset
- Union -Morris -Middlesex

Nearly a third of all computer and electronic product manufacturing employment is found in southern counties of Camden and Burlington

Cumberland county is the glass center of New Jersey, employing nearly 75 percent of all glass product manufacturing workers in the state

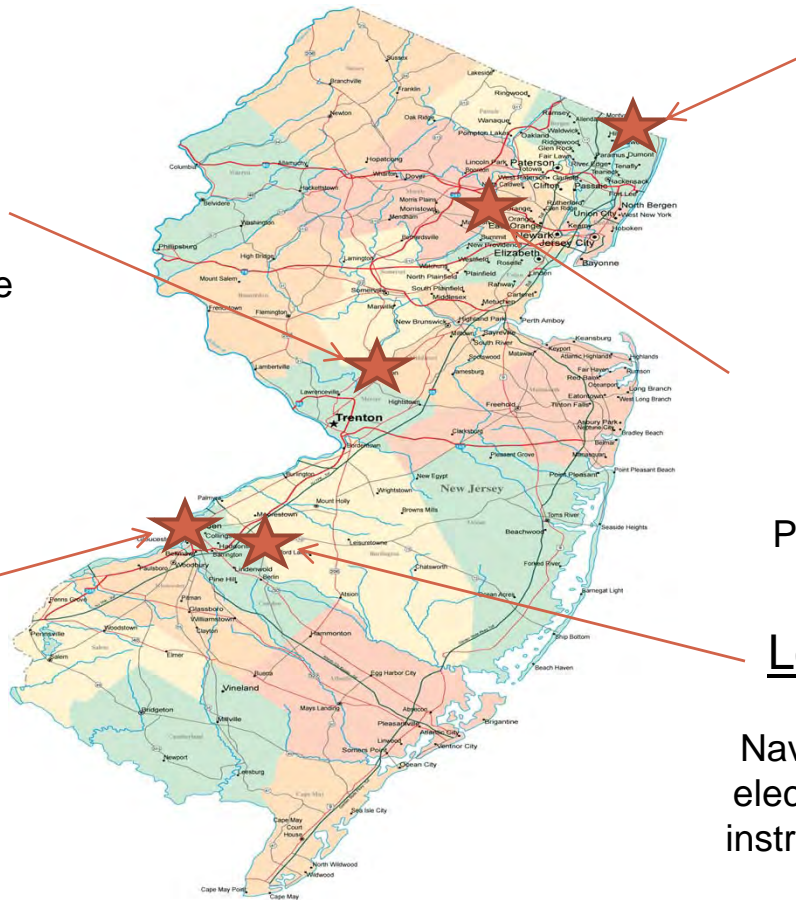
Many of New Jersey's most well known manufacturing companies are classified as advanced

Bristol-Myers Squibb

Princeton, NJ
Pharmaceutical and medicine manufacturing

L-3 Communications

Camden, NJ
Radio and television broadcasting and wireless communications equipment manufacturing



Crestron Electronics

Rockledge, NJ
Semiconductor and electronic component manufacturing

Novartis Pharmaceuticals

East Hanover, NJ
Pharmaceutical and medicine manufacturing

Lockheed Martin

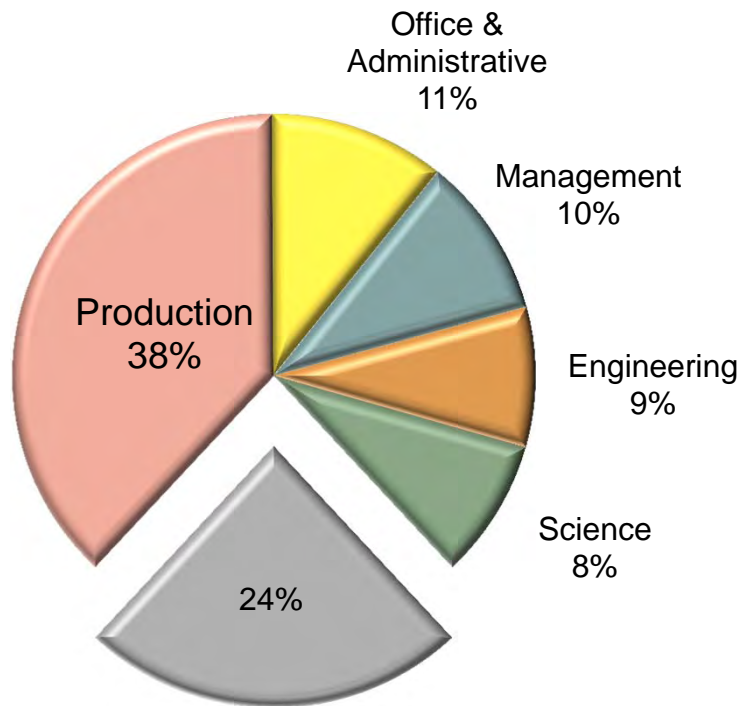
Moorestown, NJ
Navigational, measuring, electromedical and control instruments manufacturing

Advanced Manufacturing

Occupational Analysis

More than 75% of all advanced manufacturing jobs are classified into these five groups

Breakdown of Major Occupational Groups within Advanced Manufacturing Industry: New Jersey, 2009



Nearly two of every five workers is directly involved with production

Roughly one out of six workers contributes to research and development as part of the engineering and science groups

The “other” 24 percent of advanced manufacturing occupations primarily consists of business, computer, material moving, and sales occupations

This list shows the top 20 occupations by employment in advanced manufacturing

Occupation	2009 Employment	Share of Industry	Average Salary	Education/Training Requirements
Total, All Occupations	123,139	100.0%		
Top 20	52,784	42.9%	\$51,720	
Packaging and Filling Machine Operators and Tenders	5,694	4.6%	\$27,500	Short-term on-the-job training
First-Line Supervisors/Managers of Production and Operating Workers	4,347	3.5%	\$61,600	Work experience in a related occupation
Mixing and Blending Machine Setters, Operators, and Tenders	4,121	3.3%	\$33,690	Moderate-term on-the-job training
Inspectors, Testers, Sorters, Samplers, and Weighers	3,672	3.0%	\$35,980	Moderate-term on-the-job training
Electrical and Electronic Equipment Assemblers	3,598	2.9%	\$32,940	Short-term on-the-job training
Team Assemblers	3,322	2.7%	\$26,520	Moderate-term on-the-job training
Chemists	3,292	2.7%	\$76,690	Bachelor's degree
Electromechanical Equipment Assemblers	2,377	1.9%	\$31,840	Short-term on-the-job training
Wholesale Sales Representatives	2,182	1.8%	\$75,570	Work experience in a related occupation
Industrial Production Managers	2,081	1.7%	\$110,060	Work experience in a related occupation
Chemical Equipment Operators and Tenders	1,977	1.6%	\$42,320	Moderate-term on-the-job training
Packers and Packagers, Hand	1,958	1.6%	\$22,090	Short-term on-the-job training
Shipping, Receiving, and Traffic Clerks	1,903	1.5%	\$32,500	Short-term on-the-job training
Chemical Technicians	1,894	1.5%	\$46,680	Associate degree
Industrial Machinery Mechanics	1,878	1.5%	\$48,240	Long-term on-the-job training
Computer Software Engineers, Systems Software	1,852	1.5%	\$100,150	Bachelor's degree
Machinists	1,782	1.4%	\$43,230	Long-term on-the-job training
Industrial Engineers	1,668	1.4%	\$82,630	Bachelor's degree
Customer Service Representatives	1,608	1.3%	\$39,690	Moderate-term on-the-job training
General and Operations Managers	1,578	1.3%	\$173,570	Bachelor's or higher degree, plus work experience

Source: NJLWD, Occupational Employment Statistics Survey



Production occupations

Skills, Knowledge and Abilities most important to the top 20 occupations found in advanced manufacturing

Skills	Knowledge	Abilities
Active listening Critical thinking Speaking Reading comprehension Monitoring Judgment and decision making Complex problem solving Time management Coordination Writing	Production and processing Mathematics English language Mechanical Customer and personal service Administration and management Education and training Computers and electronics Engineering and technology Clerical	Oral comprehension Oral expression Problem sensitivity Near vision Written comprehension Information ordering Deductive reasoning Speech clarity Speech recognition Inductive reasoning

****In addition to industry specific SKAs, effective communication is key****

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/Training Requirement New Jersey, 2009

Education/Training Requirement	2009 Employment
Total, All Occupations	123,139
Total High Requirements	40,597
First professional degree	128
Doctoral degree	4,021
Master's degree	525
Bachelor's or higher degree, plus work experience	9,006
Bachelor's degree	21,536
Associate degree	5,381
Total Moderate Requirements	26,825
Postsecondary vocational training	3,209
Work experience in a related occupation	15,226
Long-term on-the-job training	8,390
Total Low Requirements	55,717
Moderate-term on-the-job training	31,031
Short-term on-the-job training	24,687

Scientists and engineers primarily account for the nearly one-third of the occupations found in advanced manufacturing that require at least an associate's degree for entry

Among the nearly 22% that have moderate requirements are many of the craftsmen, supervisors, and sales people

The remaining 45% of the workforce are employed mostly in production occupations that may have lower requirements for entry, but often require a great deal experience and skill

Advanced Manufacturing

Closer Look at Components

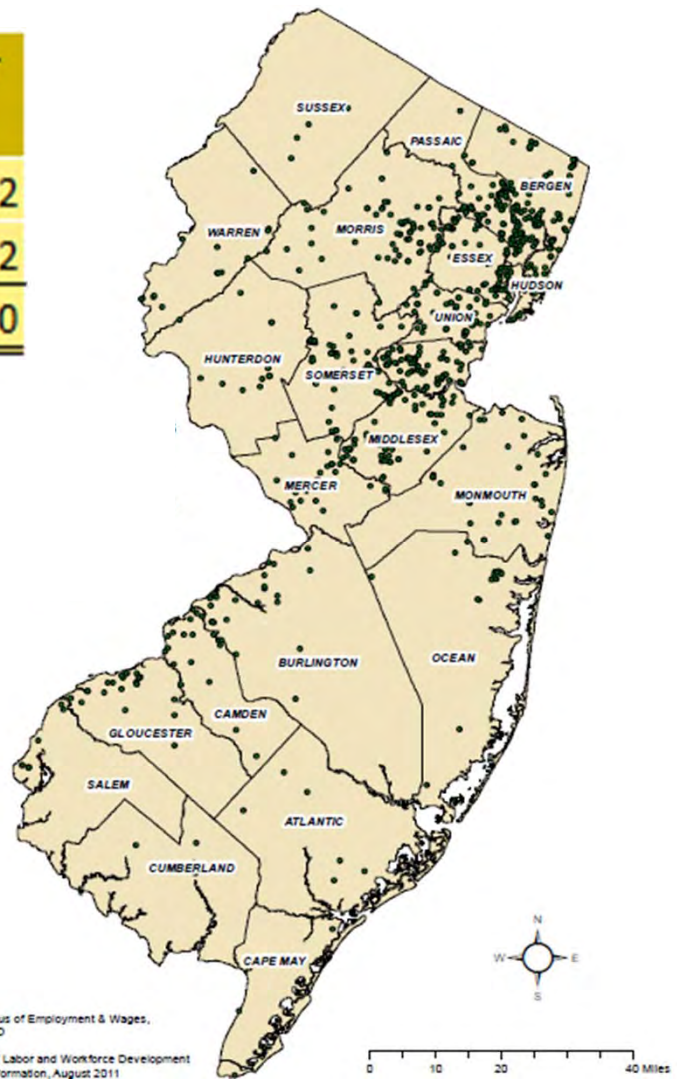
Chemical Manufacturing

	Establishments	Employment	Employment Per Establishment
2004	878	72,276	82
2009	921	57,384	62
Change	43	-14,892	-20

While employment has declined by an average of 4.5% per year, the number of establishments has actually increased by over 1.0% per year

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

- Johnson & Johnson
- Bristol-Myers Squibb
- Hoffman-La Roche
- Colgate Palmolive
- Smith Kline Beecham
- Sanofi-Aventis
- Novartis
- L'Oreal
- Merck
- Pfizer



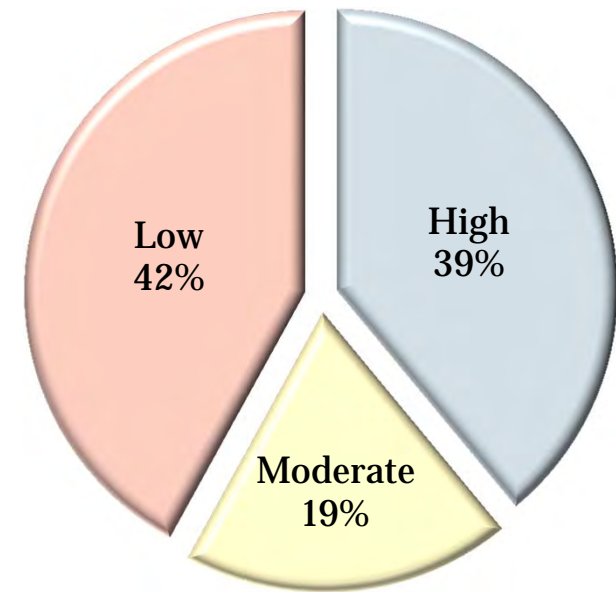
Data Source: Quarterly Census of Employment & Wages, 2010 Second Quarter, NJLWD
 Prepared by: New Jersey Department of Labor and Workforce Development
 Bureau of Labor Market Information, August 2011

Occupations requiring **high levels of education** for entry make up 39% of chemical manufacturing. Nearly 18% require a bachelor's degree and almost 7% of the workforce requires at doctorate degree.

Nearly 19% have **moderate education and training** requirements. Work experience in a related field is the most common among this group.

The remaining 42% of the workforce require only **moderate- or short-term on-the-job training**

Minimum Educational Requirements



Top Ten Occupations in Chemical Manufacturing

Occupation	Employment	Education/Training Requirement
Packaging and Filling Machine Operators and Tenders	5,580	Short-term on-the-job training
Mixing and Blending Machine Setters, Operators, and Tenders	4,047	Moderate-term on-the-job training
Chemists	3,248	Bachelor's degree
Chemical Equipment Operators and Tenders	1,974	Moderate-term on-the-job training
Chemical Technicians	1,888	Associate degree
First-Line Supervisors/Managers of Production and Operating Workers	1,766	Work experience in a related occupation
Biochemists and Biophysicists	1,537	Doctoral degree
Medical Scientists, Except Epidemiologists	1,391	Doctoral degree
Inspectors, Testers, Sorters, Samplers, and Weighers	1,304	Moderate-term on-the-job training
Industrial Machinery Mechanics	1,156	Long-term on-the-job training

Nearly 60% of all chemists and over 50% of all biochemists and biophysicists in the state work for companies classified in chemical manufacturing

Computer and Electronic Manufacturing

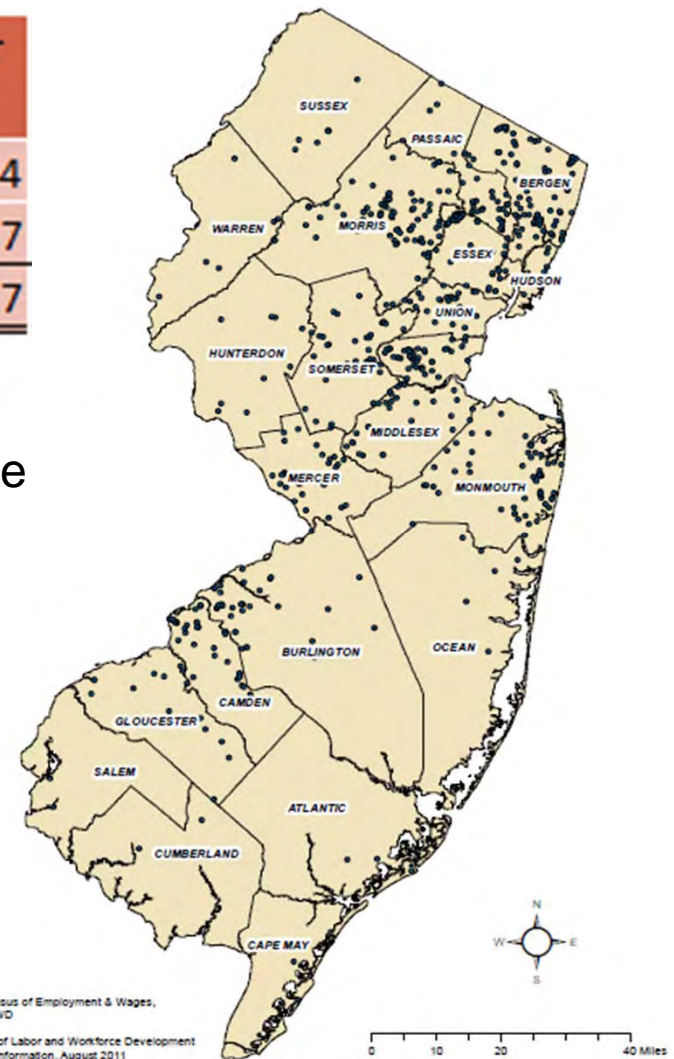
	Establishments	Employment	Employment Per Establishment
2004	714	31,128	44
2009	756	27,897	37
Change	42	-3,231	-7

Among the four components, employment has declined at the slowest rate (-2.2% per year) and the number of establishments has grown the fastest (1.1% per year)

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

- L-3 Communications
- Lockheed Martin
- Creston Electronics
- ITT Industries
- Smiths Detection
- Datascope
- BAE Systems
- Honeywell
- Anadigics
- Oticon

Source: NJLWD, Quarterly Census of Employment and Wages



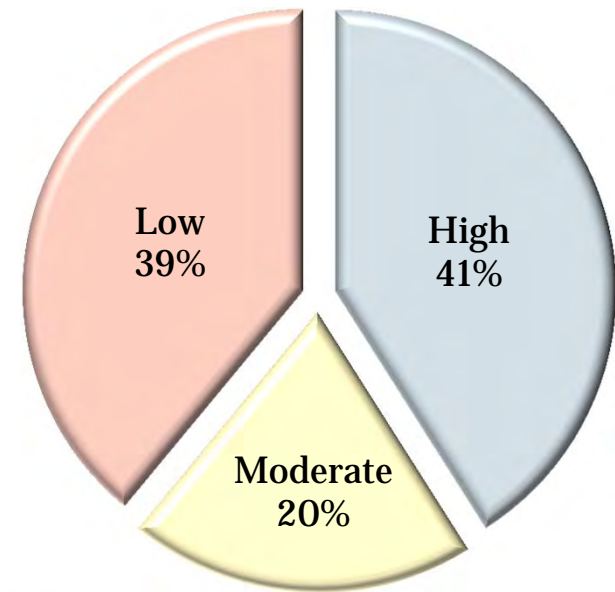
Data Source: Quarterly Census of Employment & Wages,
2010 Second Quarter, NJLWD
Prepared by:
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Occupations requiring **high levels of education** for entry make up 41% of computer and electronic product manufacturing. Nearly 35% require at least bachelor's degree.

Roughly 20% have **moderate education and training** requirements. Work experience in a related field is the most common among this group.

The remaining 39% of the workforce require only **moderate- or short-term** on-the-job training

Minimum Educational Requirements



Top Ten Occupations in Computer and Electric Product Manufacturing

Occupation	Employment	Education/Training Requirement
Electrical and Electronic Equipment Assemblers	2,404	Short-term on-the-job training
Computer Software Engineers, Systems Software	1,829	Bachelor's degree
Electromechanical Equipment Assemblers	1,220	Short-term on-the-job training
Inspectors, Testers, Sorters, Samplers, and Weighers	1,179	Moderate-term on-the-job training
Electronics Engineers, Except Computer	871	Bachelor's degree
Electrical and Electronic Engineering Technicians	837	Associate degree
Electrical Engineers	829	Bachelor's degree
First-Line Supervisors/Managers of Production and Operating Workers	744	Work experience in a related occupation
Mechanical Engineers	734	Bachelor's degree
Team Assemblers	734	Moderate-term on-the-job training

Source: NJLWD, Occupational Employment Statistics Survey

Engineering and production occupations account for more than half of all employment in this industry.

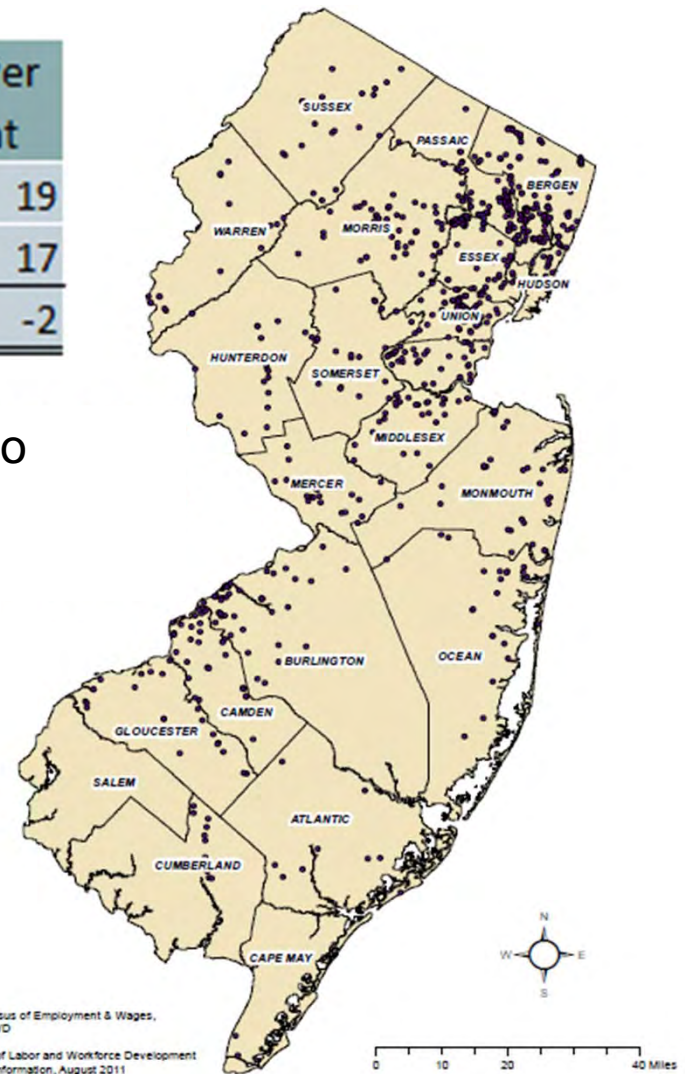
Machinery Manufacturing

	Establishments	Employment	Employment Per Establishment
2004	904	17,363	19
2009	843	14,203	17
Change	-61	-3,160	-2

Machinery manufacturing is the only component to lose establishments from 2004- 2009

Employment also declined an average of 3.9% per year

As a result, 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 locality instead of a broader market



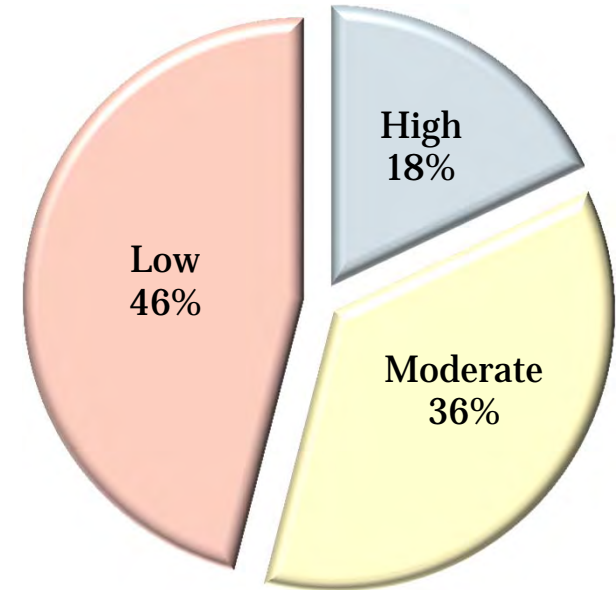
Data Source: Quarterly Census of Employment & Wages, 2010 Second Quarter, NJLWD
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Occupations requiring **high levels of education** for entry make up 18% of machinery manufacturing. Most of this group are classified as either engineering or computer occupations.

Nearly 36% have **moderate education and training** requirements. Work experience in a related field is the most common among this group.

The remaining 46% of the workforce require only **moderate- or short-term on-the-job training**

Minimum Educational Requirements



Top Ten Occupations in Machinery Manufacturing

Occupation	Employment	Education/Training Requirement
Machinists	1,217	Long-term on-the-job training
First-Line Supervisors/Managers of Production and Operating Workers	834	Work experience in a related occupation
Team Assemblers	595	Moderate-term on-the-job training
Sales Representatives, Wholesale and Manufacturing	594	Work experience in a related occupation
Electrical and Electronic Equipment Assemblers	476	Short-term on-the-job training
Computer-Controlled Machine Tool Operators, Metal and Plastic	426	Moderate-term on-the-job training
Engine and Other Machine Assemblers	415	Short-term on-the-job training
Welders, Cutters, Solderers, and Brazers	411	Postsecondary vocational training
Electromechanical Equipment Assemblers	408	Short-term on-the-job training
Mechanical Engineers	361	Bachelor's degree

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

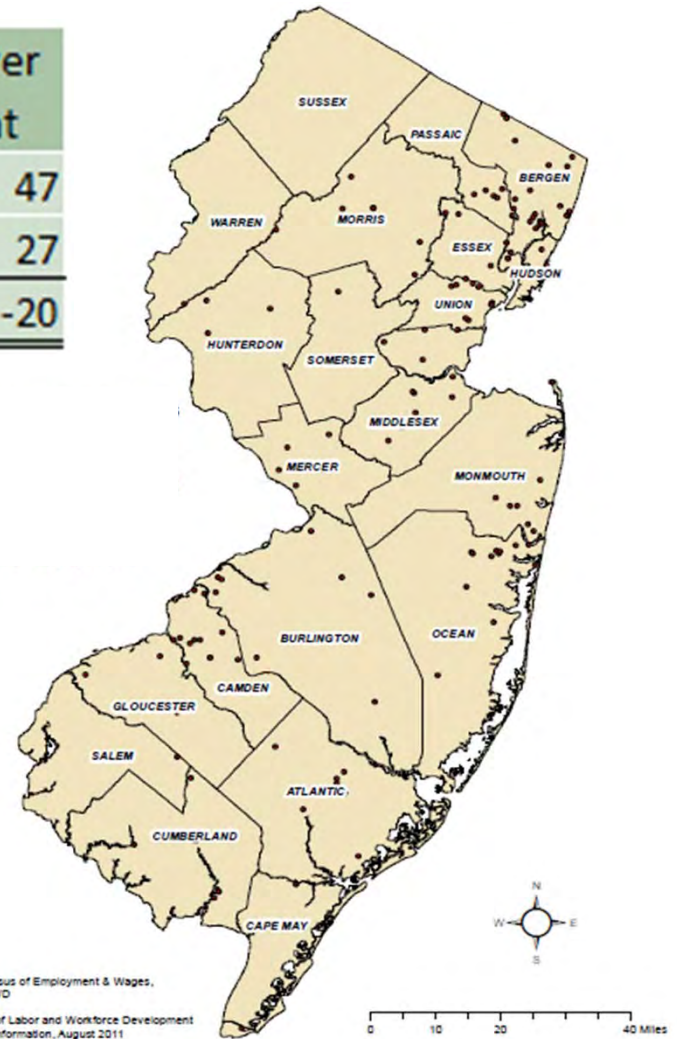
Transportation Equipment Manufacturing

	Establishments	Employment	Employment Per Establishment
2004	160	7,532	47
2009	160	4,265	27
Change	0	-3,267	-20

This is the smallest of the four main components, with only 160 establishments in New Jersey

Employment has been nearly halved from 2004-2009, averaging a decline of nearly 11% per year

The average workforce of the remaining establishments has shrunk dramatically, and its focus is primarily on aerospace and boat building rather than motor vehicles



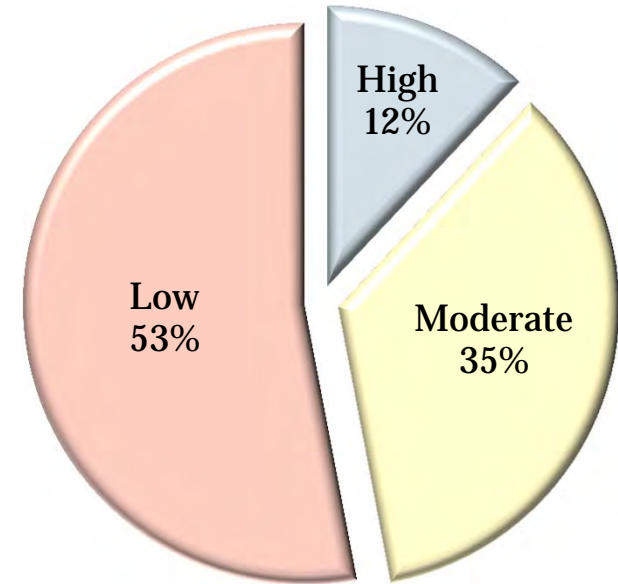
Data Source: Quarterly Census of Employment & Wages, 2010 Second Quarter, NJLWD
 Prepared by: New Jersey Department of Labor and Workforce Development, Bureau of Labor Market Information, August 2011

Occupations requiring **high levels of education** for entry make up 12% of transportation equipment manufacturing. Most of this group are classified as either engineering or management occupations.

Roughly 35% have **moderate education and training** requirements. Postsecondary vocational education is the most common among this group.

The remaining 53% of the workforce require only **moderate- or short-term on-the-job training**

Minimum Educational Requirements



Top Ten Occupations in Transportation Equipment Manufacturing

Occupation	Employment	Education/Training Requirement
Aircraft Mechanics and Service Technicians	478	Postsecondary vocational training
Team Assemblers	327	Moderate-term on-the-job training
Fiberglass Laminators and Fabricators	236	Moderate-term on-the-job training
First-Line Supervisors/Managers of Production and Operating Workers	150	Work experience in a related occupation
Engine and Other Machine Assemblers	132	Short-term on-the-job training
Welders, Cutters, Solderers, and Brazers	128	Postsecondary vocational training
Furnace, Kiln, Oven, Drier, and Kettle Operators and Tenders	114	Moderate-term on-the-job training
Carpenters	91	Long-term on-the-job training
Molding, Coremaking, and Casting Machine Setters, Metal and Plastic	77	Moderate-term on-the-job training
Electricians	76	Long-term on-the-job training

Source: NJLWD, Occupational Employment Statistics Survey

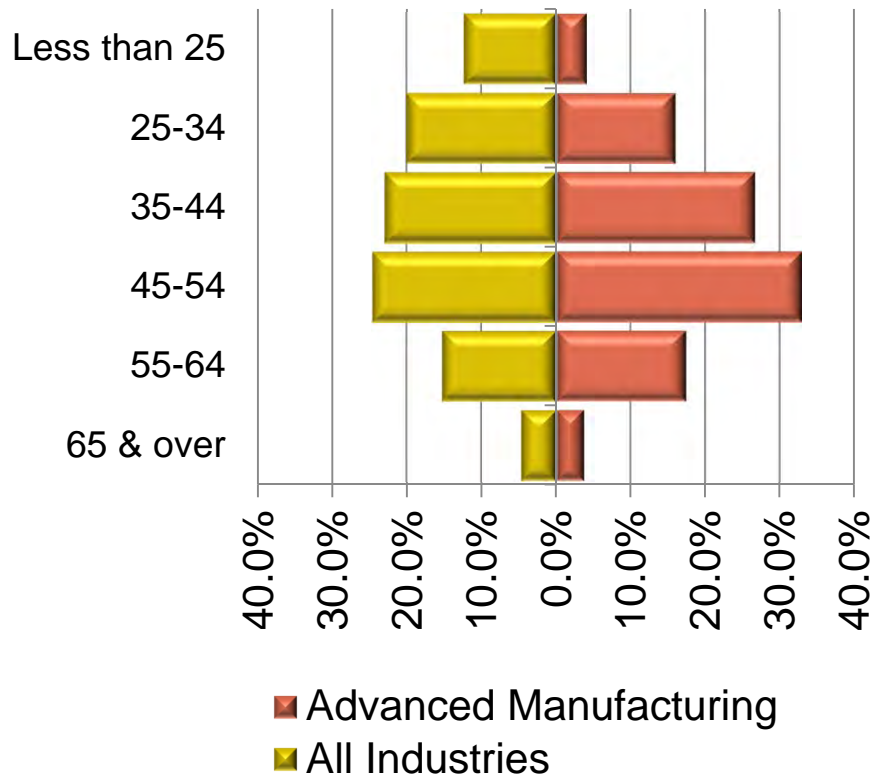
The transportation equipment manufacturing industry is the second largest employer of aircraft technicians in New Jersey. Accounting for nearly 20%

Advanced Manufacturing

Demographic profile

The age breakdown of people working in the advanced manufacturing industries differs significantly from the overall economy

**Age Breakdown of Workers in
Advanced Manufacturing Industry
New Jersey, 2009**



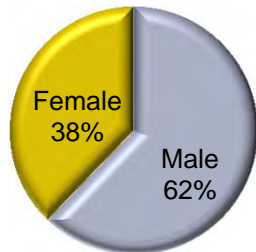
Advanced manufacturing's workforce is very middle-aged heavy, with nearly 60 percent of all workers compared to about 47 percent overall

Only 4 percent of the workforce is under 25 years of age compared to over 12 percent overall

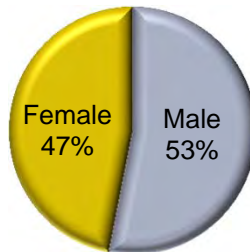
The 55 and over workforce is nearly equal, around 20 percent, for both advanced manufacturing and the overall economy

Gender, racial, and ethnic profile of New Jersey's health care work force

Advanced Manufacturing



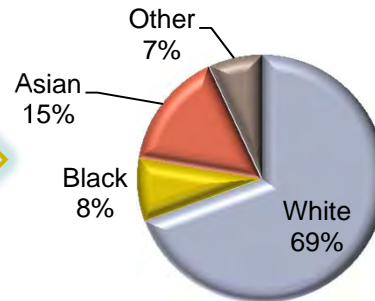
All Industries



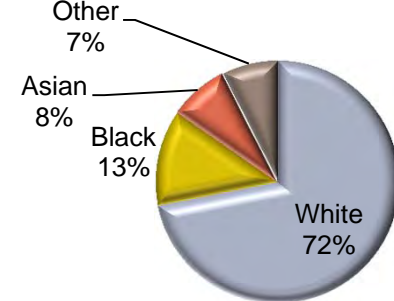
Advanced manufacturing's workforce consists of 9 percent more males than the overall economy

Racially, the workforce is more diversified, especially among the Asian population

Advanced Manufacturing

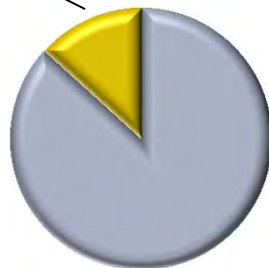


All Industries



The Hispanic population is slightly less among advanced manufacturing industries

Advanced Manufacturing



All Industries



Advanced Manufacturing

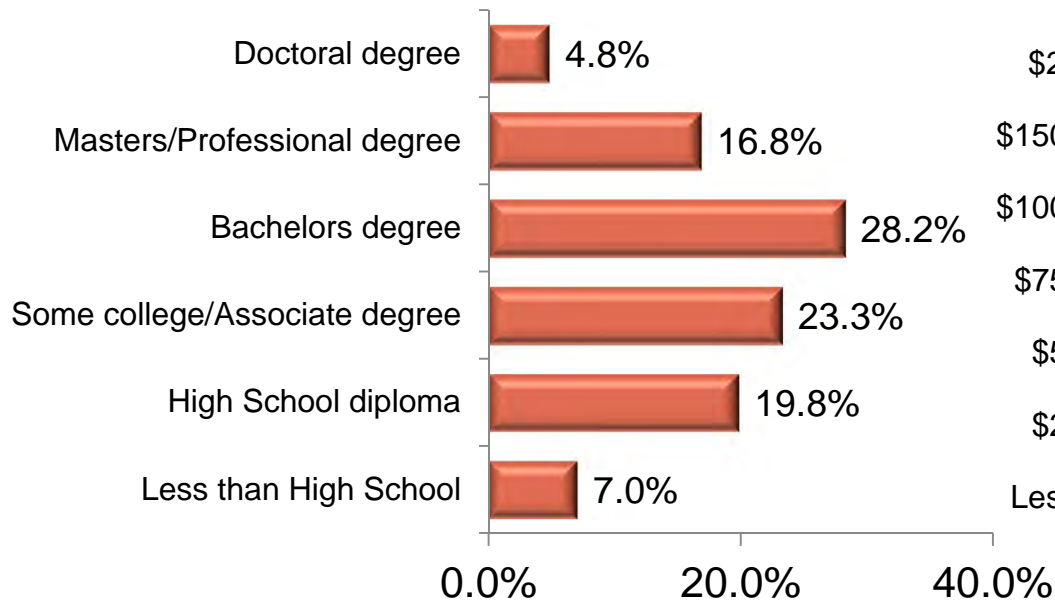
All Industries

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

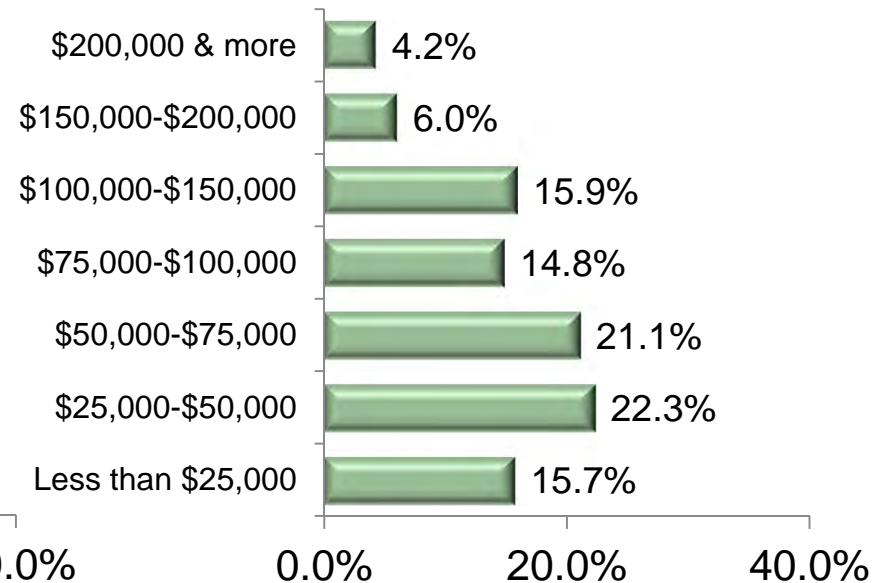
Nearly 50% of the workforce reported that they have earned at least a bachelor's degree, while...

...more than 60% of the workforce claimed to have earned wages above the state average of about \$50,000

Education Level



Average Wage

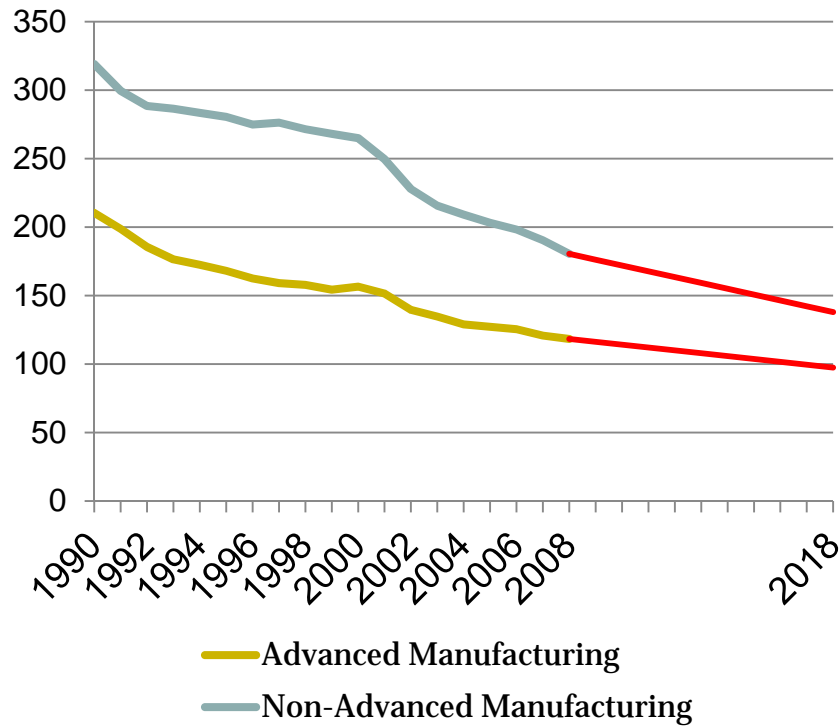


Advanced Manufacturing

Outlook

Manufacturing employment in New Jersey has been declining for decades, but the losses are projected to slow

Actual and Projected Employment in Advanced and Non-Advanced Manufacturing (thousands): New Jersey, 1990-2018



Manufacturing has shed over 263,000 jobs in New Jersey since 1990, a 3.6% annual decline

From 2008 through 2018, declines are projected to slow in advanced and non-advanced manufacturing industries to -1.9 and -2.6 percent per year, respectively

Despite these consistent employment declines, output (by GDP) had remained steady from 1997 to 2007

The recession that began in late 2007 had strong effects on advanced manufacturing, particularly the chemical manufacturing sub-sector, and GDP dropped nearly 25% over those two years

Contact Information

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