A close-up of a person working on a diesel machine



# Labor Market Analysis of Skills Related to Diesel Technology in Massachusetts

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## Overview and Key Findings

### Programs

Five Chapter 74 programs of study are currently offered within the Transportation Cluster:

* Automotive Collision
* Automotive Technician
* Power Equipment Technology
* Diesel Technology
* Marine Service Technology

One additional program, Aviation Maintenance, is being piloted as of this writing.

Each of these programs maps to at least one target occupation, and each occupation is employed by multiple industries. This analysis uses labor market data from the Massachusetts Department of Economic Research to provide perspective on both the industries (the employers) and the career paths that are available to our graduates.

### Industries

In public labor market data systems, industries are types of employers defined by their primary output. There is not a direct relationship between industries and occupations, although the United States Bureau of Labor Statistics publishes an employment matrix that estimates the share of a given industry’s workforce that consists of each occupational category.

Four distinct industries are profiled in this analysis: *The Transportation and Warehousing Industry* (NAICS 48-49)*, Air Transportation* (NAICS 481), *Automotive Repair and Maintenance* (NAICS 8111), and *The Process, Physical Distribution, and Logistics Consulting Services Industry* (NAICS 541614) *,* and Industries are organized in general categories under a two-digit code, and the industry category is then subdivided into three-digit codes, then four-digit codes and so on down to six digits to represent industries in as much detail as possible. *Automotive Repair and Maintenance* is a four-digit industry category and a component of the larger *Repair and* *Maintenance* category (NAICS 811). *Air Transportation* (NAICS 481) is a three-digit level industry and a component of the larger *Transportation and Warehousing* industry (NAICS 48-49).

#### The Transportation and Warehousing Industry (NAICS 48-49)

The *Transportation and Warehousing* sector includes industries providing transportation of passengers and cargo, warehousing and storage for goods, scenic and sightseeing transportation, and support activities related to modes of transportation. Establishments in these industries use transportation equipment or transportation-related facilities as a productive asset. The type of equipment depends on the mode of transportation. The modes of transportation are air, rail, water, road, and pipeline.

The Transportation and Warehousing sector distinguishes three basic types of activities: subsectors for each mode of transportation, a subsector for warehousing and storage, and a subsector for establishments providing support activities for transportation. In addition, there are subsectors for establishments that provide passenger transportation for scenic and sightseeing purposes, postal services, and courier services.

##### Air Transportation

Industries in the Air Transportation subsector provide air transportation of passengers and/or cargo using aircraft, such as airplanes, helicopters, and spacecraft. The subsector distinguishes scheduled from nonscheduled air transportation. Scheduled air carriers fly regular routes on regular schedules and operate even if flights are only partially loaded. Nonscheduled carriers often operate during nonpeak time slots at busy airports. These establishments have more flexibility with respect to choice of airport, hours of operation, load factors, and similar operational characteristics. Nonscheduled carriers provide chartered air transportation of passengers, cargo, or specialty flying services. Specialty flying services establishments use general purpose aircraft to provide a variety of specialized flying services.

#### The Automotive Repair and Maintenance Industry (NAICS 8111)

The industry should be understood as the employers in the Commonwealth who are primarily engaged in providing repair and maintenance services for automotive vehicles, such as passenger cars, trucks, vans, and all trailers. Establishments in this industry group employ mechanics with specialized technical skills to diagnose and repair the mechanical and electrical systems for automotive vehicles, repair automotive interiors, and paint or repair automotive exteriors.

#### The Process, Physical Distribution, and Logistics Consulting Services Industry (NAICS 541614)

This U.S. industry comprises establishments primarily engaged in providing operating advice and assistance to businesses and other organizations in: (1) manufacturing operations improvement; (2) productivity improvement; (3) production planning and control; (4) quality assurance and quality control; (5) inventory management; (6) distribution networks; (7) warehouse use, operations, and utilization; (8) transportation and shipment of goods and materials; and (9) materials management and handling.

### Occupations

In public data systems, occupations are a set of tasks regularly performed by one individual on an employer’s payroll. In this analysis, occupations related to these programsare profiled in a career pathway framework as we seek to provide strategic value in the development and administration of Transportation curriculum and the construction of compelling and instructive narrative that will introduce students to the rapidly evolving world of Transportation in the 21st Century.

Each program maps to at least one particular occupation and at least one industry-recognized credential. The table that follows identifies each target occupation and the occupation family (from the United States Bureau of Labor Statistics) in which that occupation is found. Also included is the career cluster (from Advance CTE and used as the taxonomy for CTE programs). Within every cluster are from one to eight pathways, and those are included for each occupation, as well.

#### Transportation Cluster Programs and Related Occupations and Credentials

##### Programs

* Automotive Collision
  + Target Occupations
    - Automotive Body and Related Repairers
    - Automotive Service Technicians and Mechanics
  + Occupation Family: Installation, Maintenance and Repair
  + Career Cluster: Transportation, Distribution and Logistics
  + Career Pathway: Facility and Mobile Equipment Maintenance
  + Industry-Recognized Credential: ASE - Entry-Level Credentials
* Automotive Technician
  + Target Occupation
    - Automotive Body and Related Repairers
    - Automotive Service Technicians and Mechanics
  + Occupation Family: Installation, Maintenance and Repair
  + Career Cluster: Transportation, Distribution and Logistics
  + Career Pathway: Facility and Mobile Equipment Maintenance
  + Industry-Recognized Credential: ASE - Entry-Level Credentials
* Power Equipment Technology
  + Target Occupations
    - Outdoor Power Equipment Mechanics
    - Motorboat Mechanics
    - Motorcycle Mechanics
  + Occupation Family: Installation, Maintenance and Repair
  + Career Cluster: Transportation, Distribution and Logistics
  + Career Pathway: Facility and Mobile Equipment Maintenance
  + Industry-Recognized Credential: EETC - Power Equipment Master Technician
* Diesel Technology
  + Target Occupation: Bus and Truck Mechanics and Diesel Engine Specialists
  + Occupation Family: Installation, Maintenance and Repair
  + Career Cluster: Transportation, Distribution and Logistics
  + Career Pathway: Facility and Mobile Equipment Maintenance
  + Industry-Recognized Credential: ASE - Entry-Level Credentials
* Marine Service Technology
  + Target Occupation: Motorboat Mechanics
  + Occupation Family: Installation, Maintenance and Repair
  + Career Cluster: Transportation, Distribution and Logistics
  + Career Pathway: Facility and Mobile Equipment Maintenance
  + Industry-Recognized Credential
    - American Boat/Yacht Council
    - AMTECH
      * AMTECH certifications: Mercury Marine Certification
    - American Boat Builders/Repairers Assn
      * ABBRA certifications: Marine Diesel, Service Manager and Fiberglass Repair

### Key Findings

A detailed analysis of the Programs of study, related industries, and related occupations led to several key conclusions:

1. **The importance of the Transportation and Warehousing industry to the Massachusetts economy**

In labor market data systems, the Transportation and Warehousing industry is further divided into eleven subcategories, of which seven are significant components of the Commonwealth’s economy and labor market: Air Transportation, Ground and Transit Transportation, Scenic and Sightseeing Transportation, Support Actvities for Air Transportation, Truck Transportation, Warehousing and Storage, and Couriers and Messengers.

1. **The Emerging Demand for Logistics as both an occupation and a skill**

Inverse Staffing Patterns show that 11.0% (a plurality) of Logistician jobs are employed in the Management of Companies and Enterprises industry. Second is Civilian Federal Government. Management, Scientific and Technical Consulting Services is third at 8.2%. Navigational, Measuring, Electromedical and Control Instruments Manufacturing is fourth at 4.8% and Computer Systems Design and Related Services accounts for 4.7%.

The labor market demand for skills in logistics and supply chain management justifies consideration of a Logistics and Supply Chain Management Program that would map to careers in logistics and supply chain management.

1. **Career Outlooks for the target occupations**

More than 106,000 people in Massachusetts are employed in Installation, Maintenance and Repair occupations. That number is projected to grow by more than 6,000 in the coming decade.

1. **Trends in the profiled industries**

Automotive Repair and Maintenance employers has recovered from its pandemic-era losses and is at roughly its 2019 high of 19,561 jobs.

1. **Air Transportation is a rapidly growing field with high wages and broad career opportunities**

Employment in the Air Transportation industry has grown by more than 58% over the last ten years, and offers wages above the state average.

1. **The importance of a driver’s license**

A valid driver's license is by far the most mentioned qualification for careers in this field, making it not only a value to the individual on a personal level, but also as a career-related asset.

## The Automotive Repair and Maintenance Industry

### The Automotive Repair and Maintenance Industry in Labor Market Data Systems

In public labor market data systems, the Automotive Repair and Maintenance Industry (NAICS 811) is a component of the Other Services (NAICS 81) sector. It comprises employers whose primary line of business is providing repair and maintenance services for automotive vehicles, such as passenger cars, trucks, vans, and all trailers. The category is then further parsed into four-, five-, and ultimately six-digit level categories, and the Massachusetts Department of Economic Research produces employment and wage estimates for each.

#### Other Industry Categories

81 Other Services

811 Repair and Maintenance

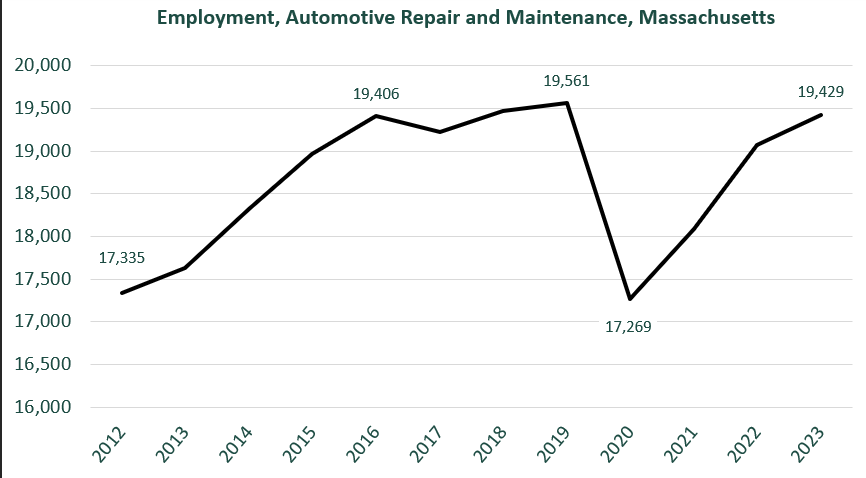
* 8111 Automotive Repair and Maintenance
  + 81111 Automotive Mechanical and Electrical Repair and Maintenance
    - 811111 General Automotive Repair
    - 811114 Specialized Auto Repair
  + 81112 Automotive Body, Paint, Interior and Glass Repair
    - 811121 Automotive Body, Paint and Interior Repair and Maintenance
    - 811122 Automotive Glass Replacement Shops
  + 81119 Other Automotive Repair and Maintenance
    - 811191 Automotive Oil Change and Lubrication Shops
    - 811192 Car Washes
    - 811198 All Other Automotive Repair and Maintenance
* 8112 Electronic and Precision Equipment Repair and Maintenance
* 8113 Commercial and Industrial Machinery and Equipment Repair and Maintenance
* 8114 Personal and Household Goods Repair and Maintenance

### Employment Trends

More than 19,000 people are employed at 3,931 payrolled locations in the Automotive Repair and Maintenance industry (NAICS 8111) in Massachusetts. Employment in this sector had been on a significant upward trend prior to the COVID-19 pandemic when it shed more than 2,000 jobs (13.3% of all jobs) between 2019 and 2020. As of the second quarter of 2023, employment is approaching pre-pandemic levels, but remains slightly lower.

#### Table 1: Average Annual Employment, Auto Repair and Maintenance Industries, 2014-2023

|  |  |
| --- | --- |
| Year | Jobs |
| 2014 | 18,319 |
| 2015 | 18,963 |
| 2016 | 19,406 |
| 2017 | 19,221 |
| 2018 | 19,471 |
| 2019 | 19,561 |
| 2020 | 17,269 |
| 2021 | 18,092 |
| 2022 | 19,067 |
| 2023 | 19,429 |



When we break down the growth of the Automotive Repair and Maintenance industry, we see that the largest growth of employment has been in the All Other Automotive Repair and Maintenance sector (NAICS 31212), which has added more than 2,800 jobs over that span. Growth as a percentage of total employment has also been fastest in the All Other Automotive Repair and Maintenance sector (260.3%).

#### Tables 2 and 3: Employment Change, Automotive Repair/Maintenance Industries, Massachusetts, 2014-2023

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Industry | 2014 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 |
| General Automotive Repair | 6,954 | 7,393 | 7,539 | 6,876 | 7,251 | 7,436 | 7,594 |
| Automotive Body, Paint, and Interior Repair and Maintenance | 5,833 | 6,303 | 6,376 | 5,605 | 5,745 | 5,946 | 6,021 |
| Automotive Oil Change and Lubrication Shops | 992 | 1,103 | 1,123 | 1,005 | 1,076 | 1,200 | 1,239 |
| All Other Automotive Repair and Maintenance | 226 | 347 | 402 | 347 | 426 | 724 | 814 |

|  |  |  |
| --- | --- | --- |
| Industry | 2014-2023 Change | 2014-2023 % Change |
| General Automotive Repair | 640 | 9.2% |
| Automotive Body, Paint, and Interior Repair and Maintenance | 189 | 3.2% |
| Automotive Oil Change and Lubrication Shops | 247 | 24.9% |
| All Other Automotive Repair and Maintenance | 588 | 260.3% |

## The Pathways

### Facility and Mobile Equipment Maintenance Occupations and Pathways

This section looks at the target occupation categories. It will also consider advancement opportunities in related careers that are not directly related to the program of study, but that illustrate opportunities that may be available to workers in these occupations with additional education and experience.

#### Table 4: Target Occupations, Massachusetts

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Occupation | 2023 Jobs | Turnover Rate | 2014 - 2023 Change | 2014 - 2023 % Change | Median Annual Earnings |
| Automotive Body and Related Repairers | 2,805 | 45% | -536 | -16% | $60,382 |
| Automotive Service Technicians and Mechanics | 13,830 | 46% | -309 | -2% | $47,819 |
| Outdoor Power Equipment Mechanics | 425 | 66% | (115) | (21%) | $55,432 |
| Bus and Truck Mechanics and Diesel Engine Specialists | 3,790 | 43% | (498) | (12%) | $65,229 |
| Motorboat Mechanics | 814 | 66% | 147 | 22% | $62,254 |
| Motorcycle Mechanics | 133 | 53% | (7) | (5%) | $50,918 |

While careers in these two occupations are certainly viable in their own rights, they also can serve as entry points to progressively more sophisticated and better-paying roles.

#### Table 5: Related Career Pathways

##### Job Zone Two Occupations

|  |  |  |  |
| --- | --- | --- | --- |
| Occupation | 2023 Jobs | Typical Education Requirement | Median Annual Earnings |
| Automotive Body and Related Repairers | 2,764 | High school | $60,382 |
| Automotive Glass Installers and Repairers | 272 | High school | $49,150 |
| Recreational Vehicle Service Technicians | 125 | High school | $49,171 |
| Tire Repairers and Changers | 1,247 | High school | $35,131 |
| Rail Car Repairers | 220 | High school | $79,396 |
| Aircraft Service Attendants | 929 | High school | $42,143 |
| Automotive and Watercraft Service Attendants | 2,024 | None | $35,006 |
| Bicycle Repairers | 560 | High school | $42,910 |
| Cleaners of Vehicles and Equipment | 4,105 | None | $37,066 |
| Gas Compressor and Gas Pumping Station Operators | 41 | High school | $64,466 |
| Heavy and Tractor-Trailer Truck Drivers | 32,413 | Nondegree award | $58,968 |
| Industrial Truck and Tractor Operators | 7,042 | None | $46,488 |
| Light Truck Drivers | 19,144 | High school | $44,824 |
| Rail-Track Laying and Maintenance Equipment Operators | 278 | High school | $77,834 |
| Recreational Vehicle Service Technicians | 421 | High school | $59,051 |

##### Job Zone Three Occupations

|  |  |  |  |
| --- | --- | --- | --- |
| Occupation | 2023 Jobs | Typical Education Requirement | Median Annual Earnings |
| Aircraft Mechanics and Service Technicians | 1,472 | Nondegree award | $78,707 |
| Automotive Service Technicians and Mechanics | 13,631 | Nondegree award | $47,819 |
| Avionics Technicians | 77 | Associate's | $82,410 |
| Bicycle Repairers | 560 | High school | $42,910 |
| Bus and Truck Mechanics and Diesel Engine Specialists | 3,790 | High school | $65,229 |
| Electrical and Electronics Repairers, Commercial and Industrial Equipment | 885 | Nondegree award | $78,354 |
| Electronic Equipment Installers and Repairers, Motor Vehicles | 105 | High school | $47,632 |
| Farm Equipment Mechanics and Service Technicians | 214 | High school diploma | $51,172 |
| Industrial Machinery Mechanics | 5,866 | High school | $67,475 |
| Mobile Heavy Equipment Mechanics, Except Engines | 2,546 | High school | $75,462 |
| Motorboat Mechanics and Service Technicians | 743 | High school | $62,878 |
| Motorcycle Mechanics | 101 | Nondegree award | $46,238 |
| Outdoor Power Equipment and Other Small Engine Mechanics | 425 | High school | $55,432 |
| Signal and Track Switch Repairers | 87 | High school | $93,704 |

## Occupation Profiles and Job Postings

### O\*Net Occupation Profile - Bus and Truck Mechanics and Diesel Engine Specialists

The United States Department of Labor, Employment and Training Administration created and regularly updates more than 800 occupational profiles with characteristics like skills, educational requirements and daily tasks, based on the inputs of industry experts and people who are employed in the occupations.

#### Description

Diagnose, adjust, repair, or overhaul buses and trucks, or maintain and repair any type of diesel engines. Includes mechanics working primarily with automobile or marine diesel engines.

#### Top Skills

* Repairing machines or systems using the needed tools.
* Determining causes of operating errors and deciding what to do about it.
* Watching gauges, dials, or other indicators to make sure a machine is working properly.
* Performing routine maintenance on equipment and determining when and what kind of maintenance is needed.
* Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions, or approaches to problems.
* Conducting tests and inspections of products, services, or processes to evaluate quality or performance.
* Determining the kind of tools and equipment needed to do a job.
* Considering the relative costs and benefits of potential actions to choose the most appropriate one.
* Talking to others to convey information effectively.
* Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.
* Identifying complex problems and reviewing related information to develop and evaluate options and implement solutions.
* Monitoring/assessing performance of yourself, other individuals, or organizations to make improvements or take corrective action.
* Controlling operations of equipment or systems.
* Managing one's own time and the time of others.

#### Top Daily Tasks

* Select tools, equipment, or technologies for use in operations or projects.
* Inspect mechanical components of vehicles to identify problems.
* Operate cranes, hoists, or other moving or lifting equipment.
* Adjust vehicle components according to specifications.
* Test mechanical equipment to ensure proper functioning.
* Lubricate equipment to allow proper functioning.
* Service vehicles to maintain functionality.
* Adjust equipment to ensure optimal performance.
* Observe equipment in operation to detect potential problems.
* Repair non-engine automotive or vehicle components.
* Operate transportation equipment to demonstrate function or malfunction.
* Rewire electrical or electronic systems.
* Troubleshoot equipment or systems operation problems.
* Repair defective engines or engine components.
* Dismantle heavy equipment or machinery.
* Measure distances or dimensions.
* Service green vehicles to make repairs or maintain good working order.
* Measure equipment outputs.
* Monitor resources.
* Rebuild parts or components.
* Replace worn, damaged, or defective mechanical parts.
* Install vehicle parts or accessories.
* Repair tires.
* Align equipment or machinery.
* Grind parts to required dimensions.

#### Additional Information

##### National Associations

* American Bus Association
* Association of Diesel Specialists
* International Association of Machinists and Aerospace Workers
* SkillsUSA

##### Accreditation, Certification, & Unions

* Accrediting Commission of Career Schools and Colleges
* Amalgamated Transit Union
* ASE Education Foundation
* International Brotherhood of Teamsters
* International Union of Operating Engineers
* National Institute for Automotive Service Excellence
* Transport Workers Union of America AFL-CIO

#### Job Postings - Bus and Truck Mechanics and Diesel Engine Specialists

P2C uses a third-party system that aggregates data from job postings to provide perspective on the skills and qualifications employers are prioritizing in their advertisements for these occupations.

* After controlling for multiple postings that likely referenced the same single opening, over the last year, we identified 2,216 unique job postings for Aircraft Surface, Structure, Rigging and Systems Assemblers in Massachusetts.
* We identified 313 unique employers who posted openings online.

##### Top Employers Advertising:

* Hirschbach
* Waste Management
* Ryder
* Penske Automotive Group
* Goulet Trucking Ltd.
* Penske Logistics
* Cox Automotive
* Milton CAT
* Performance Food Group
* United Road
* Republic Services
* Clean Harbors
* Casella Waste Systems
* Waste Connections
* XPO Logistics

##### Top Job Titles:

* Diesel Mechanics
* Diesel Mechanic Technicians
* Diesel Technicians
* General Automotive Technicians
* Fleet Mechanics
* Mobile Diesel Mechanics
* Diesel Technicians/Mechanics
* Mobile Diesel Technicians
* Lead Diesel Mechanics
* Trailer Mechanics
* Trailer Technicians
* Field Mechanics
* Master Diesel Fleet Technicians
* Shop Technicians
* Shop Technicians/Diesel Mechanics

##### Top Qualifications:

* Valid Driver's License
* Commercial Driver's License (CDL)
* Automotive Service Excellence (ASE) Certification
* CDL Class A License
* HVAC Certification
* ASE Medium-Heavy Truck Certification
* Air Brake Certification
* CDL Class B License
* Cardiopulmonary Resuscitation (CPR) Certification
* ASE Advanced Engine Performance Certification
* Hoisting License
* 10-Hour OSHA General Industry Card
* First Aid Certification
* DOT Certification
* Tanker And Hazmat Combo X Endorsement

##### Top Skills:

* Diesel Engines
* Mechanics
* Preventative Maintenance
* Hydraulics
* Suspension
* Electrical Systems
* Brakes
* Vehicle Maintenance
* Vehicle Inspection
* Hand Tools