Detroit Regional Chamber

Mobility Sector Analysis

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Lightcast

About

Lightcast is the world's leading authority on job skills, workforce talent, and labor market dynamics, providing expertise that empowers businesses, education providers, and governments to find the skills and talent they need and enabling workers to unlock new career opportunities. Headquartered in Boston, Massachusetts, and Moscow, Idaho, Lightcast is active in more than 30 countries and has offices in the United Kingdom, Italy, New Zealand, and India. The company is backed by global private equity leader KKR.

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Acknowledgements

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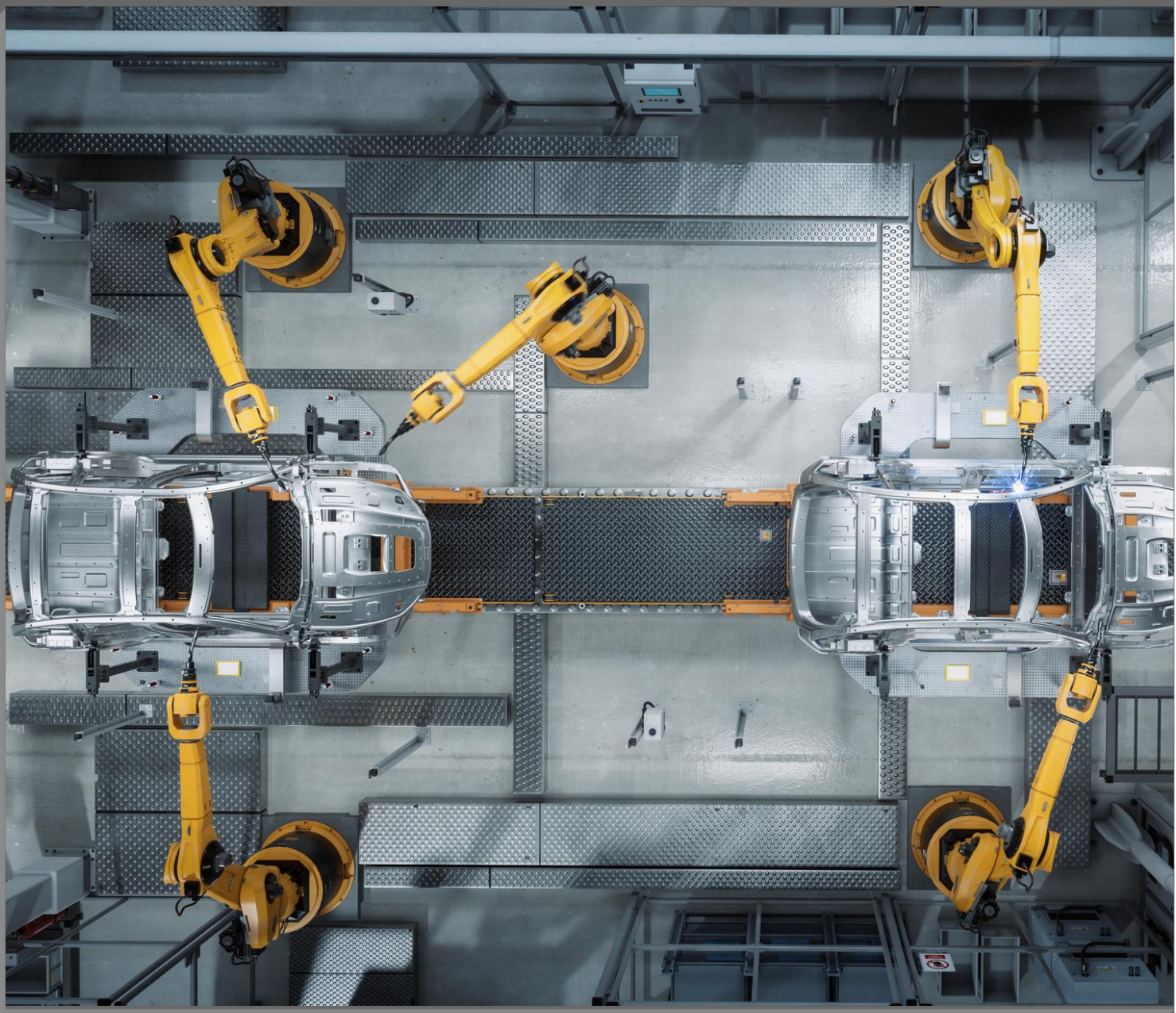
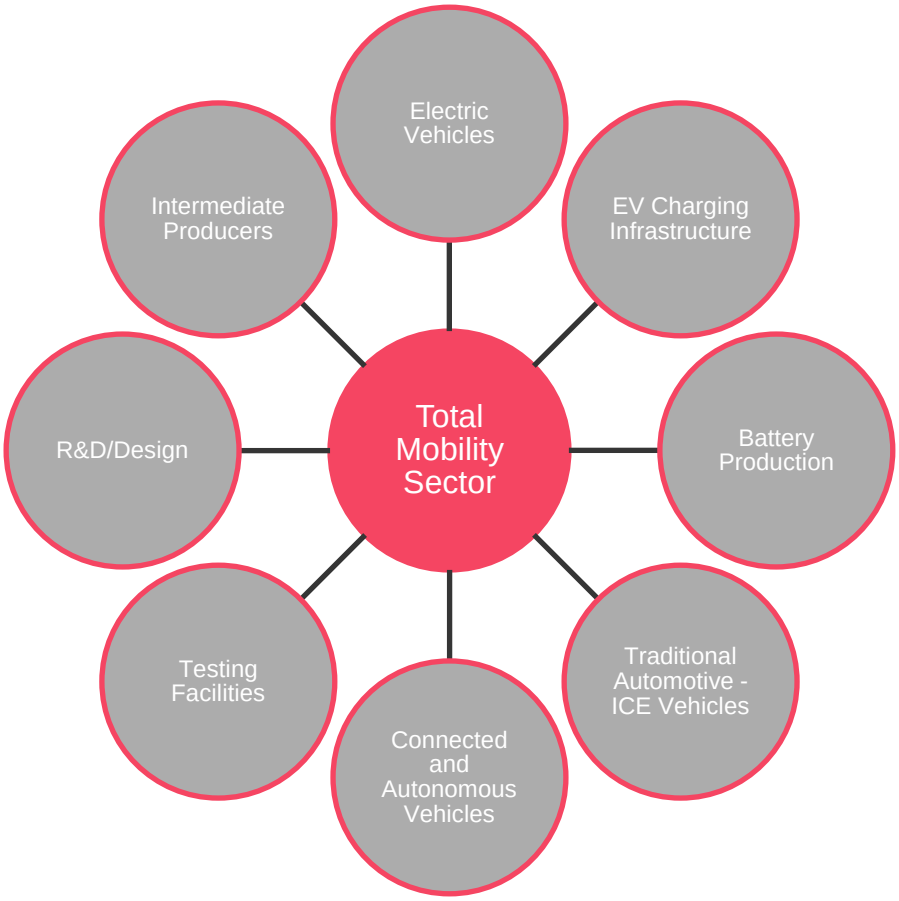


With the Detroit region's rich history in the automotive industry and the skills of those working within it, the region is well-positioned to define the contemporary Mobility sector as it did for the Automotive industry in the last century. To do so, it will be imperative that the Detroit region's workers continue to develop the skills that emerging technologies require, and that the region's economic and workforce development, education, and employer stakeholders align around how best to continue to track and develop those skills.

The Lightcast team worked with the Detroit Regional Chamber to develop a custom definition of the Mobility sector, characterized by the specific skills used in areas and used by employers in traditional "Automotive" definitions, as well as skills and employers in emerging subsectors such as electric vehicles and autonomous vehicles and relevant supply chain and support industries.

Mobility Sector Definition



A majority of the data in this report focuses on the total Mobility sector (inclusive of the traditional automotive sector as well as the emerging areas), as well as some key data points for each subsector. Additionally, Lightcast has developed an online Mobility sector portal which provides supplementary data on the workforce needs of each subsector and key occupations. Stakeholders can use the portal to further explore occupations, skills, wages and more.

Key Insights and Recommendations

- As the sector continues to shift from traditional internal combustion engine vehicles to electric and autonomous vehicles, software and computer occupations and related technical skills are becoming increasingly important. The skills data in this report can be leveraged to both incorporate these emerging skills into existing programming, as well as to create new programming to meet rapidly emerging industry needs.
- The Mobility sector employs workers at all levels - from those that only require a high school diploma to those that require a Bachelor's degree or above, from production to engineering, from quality to IT and data. While engineering occupations are in high demand, there are also many great entry-level occupations that are in-demand and pay a living wage. Detroit stakeholders can continue to promote these good entry-level Mobility jobs to students and new entrants to the workforce, as well as to those individuals already working in identied feeder occupations who may be able to move into these better-paying occupations with minimal upskilling/reskilling.
- Within the Mobility sector as a whole, the share of Black/African American workers is higher than their relative share in the region, but when looking at specific occupations within the sector, we see that these workers are more concentrated in the lower-paying occupations. Women, Black/African American and Hispanic/Latino populations all tend to be underrepresented in the higher-paying occupations within the Mobility sector, compared to their relative share within the broader economy. Outreach and recruitment efforts targeted to these subgroups may help to diversify the higher-earning talent pool and engage new sources of talent. Employers and community colleges alike should consider what the current barriers are to engaging these groups in the sector.
- For those occupations that typically require a Bachelor's degree, the underlying skills required should be examined to identify whether that degree requirement is necessary, or if it serves as an unnecessary barrier to hiring capable, (if un-degreed) workers. While certain degrees and credentials may appropriately define certain positions, there may also be occupations where employers can consider focusing on skills in lieu of a degree. Some combination of transferable skills, targeted skill development, and short-term certificates or certifications may enable more Detroit region residents to become qualified for these jobs in fewer than four years and at lower cost, thus increasing the availability of talent for these jobs, unlocking a more diverse and representative talent pool, as well as widen the opportunity landscape for regional workers.
- The region has a higher concentration of workers with Vehicle Repair and Maintenance skills, along with a number of engineering-related skills than the US average. These skill strengths can be used in economic development efforts to market to businesses looking to relocate or expand and further build upon and diversify the region's existing Mobility cluster.

The data and observations in this report should be used as a shared fact base for the regional community colleges to understand employer demand within the Mobility sector. This data, in combination with the education program data from the Center for Automotive Research (CAR), will enable aligned decision-making, more efficient resource allocation, and efforts whose value is greater than the sum of its parts.

Introduction

THE DETROIT REGION has a long and storied history in the Mobility sector, emblematic of American industrial might and innovation, global competition and interconnectedness, evolution of consumer preference, and the promise and challenges presented by rapid automation. As industrial cycles continue to accelerate, lines between production and innovation blur and both companies and workers strive to keep pace with new technology revolutions. The Detroit region once again is organizing to create a future building on its prior industrial innovations in learning and working to ensure that the next phase is one characterized by quality opportunity that rivals that of prior eras and is more equitable than prior generations could have imagined.

Achieving this vision requires an approach that is at once focused and far-reaching. The Detroit area is fortunate to have developed a collection of education and training providers that reaches every corner of the region. The distributed nature of the region's Community Colleges allows its institutions to engage such a diverse current and potential workforce, and also presents difficulty in coordinating and aligning messaging, instruction, learner support, and the ability to serve not just individual learners and employers but also the broader innovation community designing, producing, and supplying for the Mobility sector.

The Detroit Regional Chamber serves as the force to knit together these diverse and distributed assets, ensuring that this confederation of assets is truly greater than the sum of its parts, able to prepare the region's large and diverse workforce, developing the skills that the Mobility sector requires. With strong coordination across such a formidable network, the Detroit Regional Chamber and its Community College partners have the infrastructure, the means, and the will to create a truly regional education and training infrastructure worthy of the breadth and depth of region's Mobility sector and the opportunity it stands to generate. Such a formidable infrastructure, however, is only as powerful as its intelligence allows.

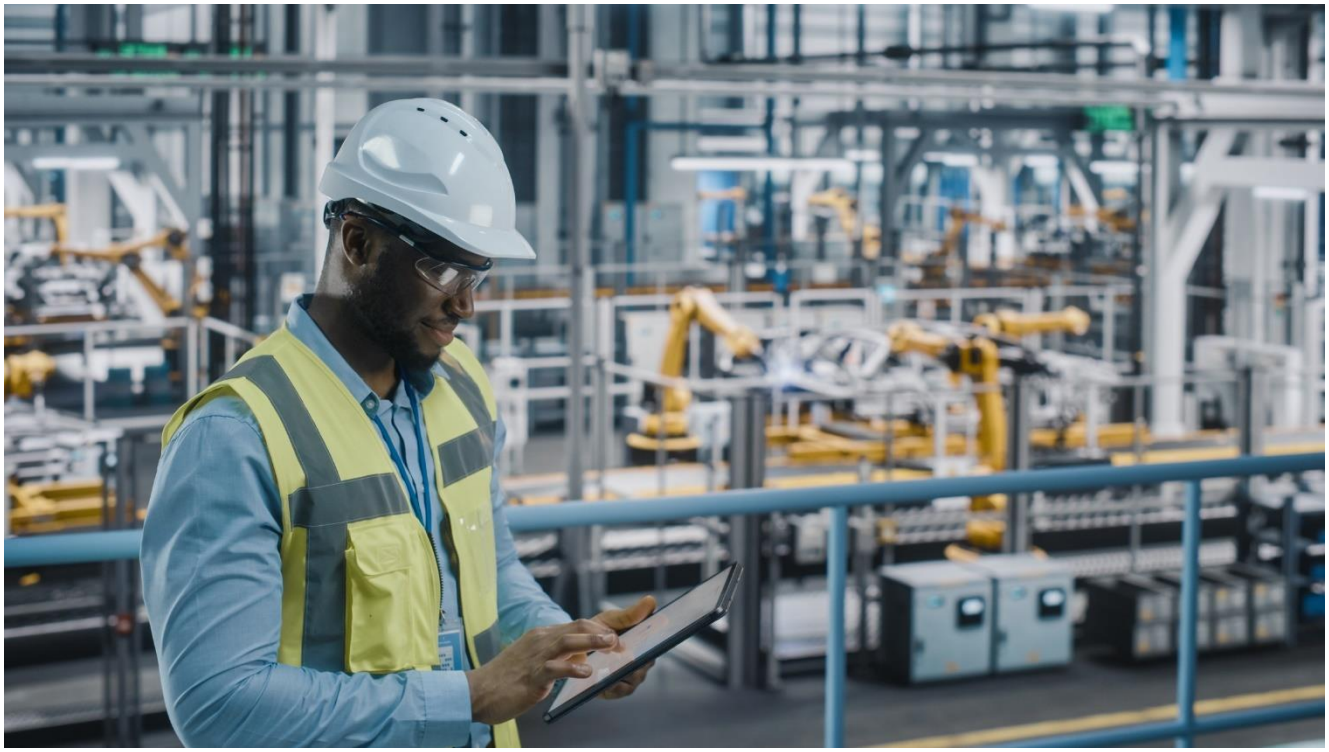
A shared dataset will provide a shared view and common understanding of the opportunity landscape available to Detroit area residents, enable the diverse collection of education and training stakeholders to address the range of skills and workforce needs, avoid unnecessary redundancy and unhelpful competition, and allow the instructional capabilities to be deployed in a way that is comprehensive, efficient, and specific to the opportunities of the Mobility sector.

This report shows labor market information and job posting data for the Mobility sector in the five-county area in Detroit that the regional community colleges serve.

The Detroit Regional Partnership retained Lightcast to conduct a thorough analysis of the Mobility sector in the Detroit region, offering a consistent dataset of labor market information and employer demand data to underpin how the region understands this sector, and in turn inform the type, volume, and nature of investments in education, workforce development, work-based learning, and credentialing.

The Detroit-Warren-Dearborn metropolitan statistical area (MSA) is the largest MSA in the state and among the largest 15 MSAs in the country. The Detroit Region, for the purposes of this study, includes the five counties served by the regional community colleges listed below:

- Macomb County – Macomb Community College
- Monroe County – Monroe County Community College
- Oakland County – Oakland Community College
- Washtenaw County – Washtenaw Community College
- Wayne County – Henry Ford College, Schoolcraft College, Wayne County Community College



Mobility Industry Intelligence

THE MOBILITY SECTOR for the purposes of this study is widely defined. It includes the manufacturing of vehicles as well as the upstream and downstream activities related to vehicle manufacturing. While labor market data from government sources can provide a basic, traditional understanding of the industry as it may have existed in the 20th century and trends over time, this data often lags which makes it challenging to capture emerging trends in the ever-changing Mobility sector no longer confined to just vehicles. To that end, Lightcast's approach and analysis combines both traditional labor market information, as well as real-time job postings data to obtain the most complete picture and understand employer demand for occupations and skills within the Mobility sector, which now includes electric vehicles, autonomous vehicles and the research, technology and supply chain surrounding these new areas.

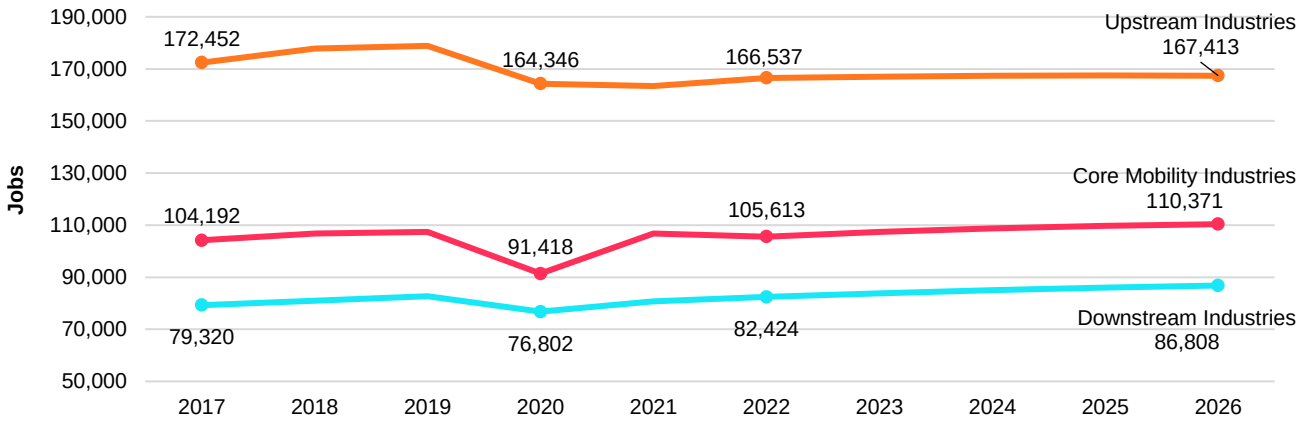
We start first by examining traditional labor market data using a group of North American Industry Classification System (NAICS) codes defined as the Mobility sector (see appendix for full list). These NAICS codes were grouped into three categories:

- Core Mobility Sector (e.g., motor vehicle manufacturing, motor vehicle parts manufacturing, etc.)
- Upstream industries - suppliers (e.g., machine shops, navgiational instrument manufacturing, etc.)
- Downstream industries (e.g., automobile repair and maintenance, automotive parts stores, etc.)

Note that job postings data found in later sections of the report provides additional flexibility in defining industry sectors outside of the confines of the NAICS code structure.

Across all core, upstream and downstream industries, the Mobility sector employs over 354,000 people in the five-county Detroit region. Figure 1 shows the past and projected job change among the three categories. All of these areas saw a decrease in jobs from 2019 to 2020, potentially due to impacts of the pandemic. While jobs within upstream industries are projected to decline slightly, jobs in the core mobility industries and downstream industries are projected to increase through 2026.

Figure 1: Historical and Projected Job Growth in the Mobility Sector in Detroit

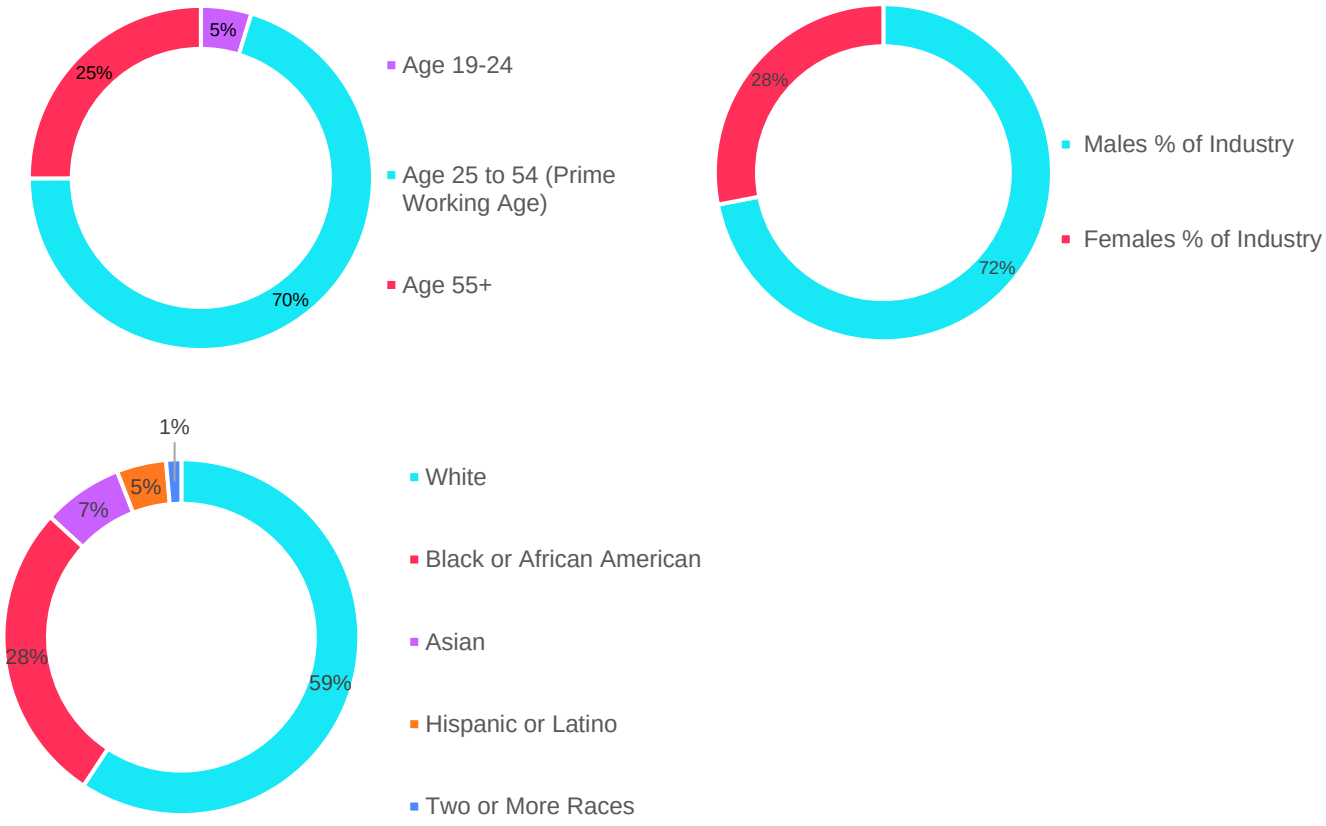


Core Mobility Industries

The core industries (indicated by the purple line in Figure 1) employ over 105,000 people in the five-county region. In total, these subsectors have seen a 2% job growth from 2017 to 2021 and are projected to grow by 5% from 2021 to 2026. Compared to the national average, the core mobility industry sees high average earnings in the Detroit region of $94,558, which is about $20,000 more than the average earnings across all sectors in the region.

While the sector has a smaller percentage of workers in the 19 to 24 age range, it has a larger percentage of workers in the prime working age (25 to 54 years). On average, the industry tends to be underrepresented by women (28% compared to 48% across all industries) and overrepresented by Black/African American workers (28% compared to 16% across all industries).

Figure 2: Worker Demographics in Core Mobility NAICS



A majority of workers (78%) in the core mobility sector are in jobs that require a high school diploma, most of which are production occupations. However, growing the Mobility sector will require more than just production workers and this will be explored further in subsequent sections. Table 1 highlights the top occupations that make up the current core mobility industry as of 2021 by number of jobs. Combined, these occupations represent nearly 65% of all jobs in the industry.

Table 1: Core Mobility Industries – Top Occupations in Detroit Region

SOC	Description	Employed in Industry Group	% of Total Jobs in Industry Group	Projected Job Change (2021-2026)	Median Hourly Earnings	Typical Entry-Level Education
51-2098	Miscellaneous Assemblers & Fabricators	35,690	33.4%	1%	$18.66	High school diploma
51-4031	Cutting, Punching, & Press Machine Setters, Operators, & Tenders, Metal & Plastic	6,850	6.4%	-3%	$22.15	High school diploma
51-2031	Engine & Other Machine Assemblers	4,674	4.4%	-7%	$22.69	High school diploma
17-2112	Industrial Engineers	4,522	4.2%	11%	$41.38	Bachelor's degree
17-2141	Mechanical Engineers	3,449	3.2%	8%	$47.03	Bachelor's degree
51-1011	First-Line Supervisors of Production & Operating Workers	3,432	3.2%	4%	$30.44	High school diploma
51-9061	Inspectors, Testers, Sorters, Samplers, & Weighers	3,269	3.1%	-6%	$18.26	High school diploma
49-9041	Industrial Machinery Mechanics	2,597	2.4%	15%	$28.87	High school diploma
53-7062	Laborers & Freight, Stock, & Material Movers, Hand	2,421	2.3%	4%	$15.32	No formal educational credential

The Mobility sector includes a range of opportunities accessible to workers without a bachelor's degree, and those opportunities tend to pay far better than other sub-BA occupations. Table 2 highlights the top occupations currently in the core mobility industry that typically require education beyond a high school diploma but less than a bachelor's degree. Several of these occupations are projected to grow over the next five years and all of them see wages between $20 and $30 per hour. The regional community colleges should be well-positioned to train workers in programs relevant to these positions and open opportunities for a wider range of Detroit-area residents to have family-sustaining jobs.

Table 2: Core Mobility Industries – Top Occupations Accessible to Workers with Less than a Bachelor's degree in Detroit Region

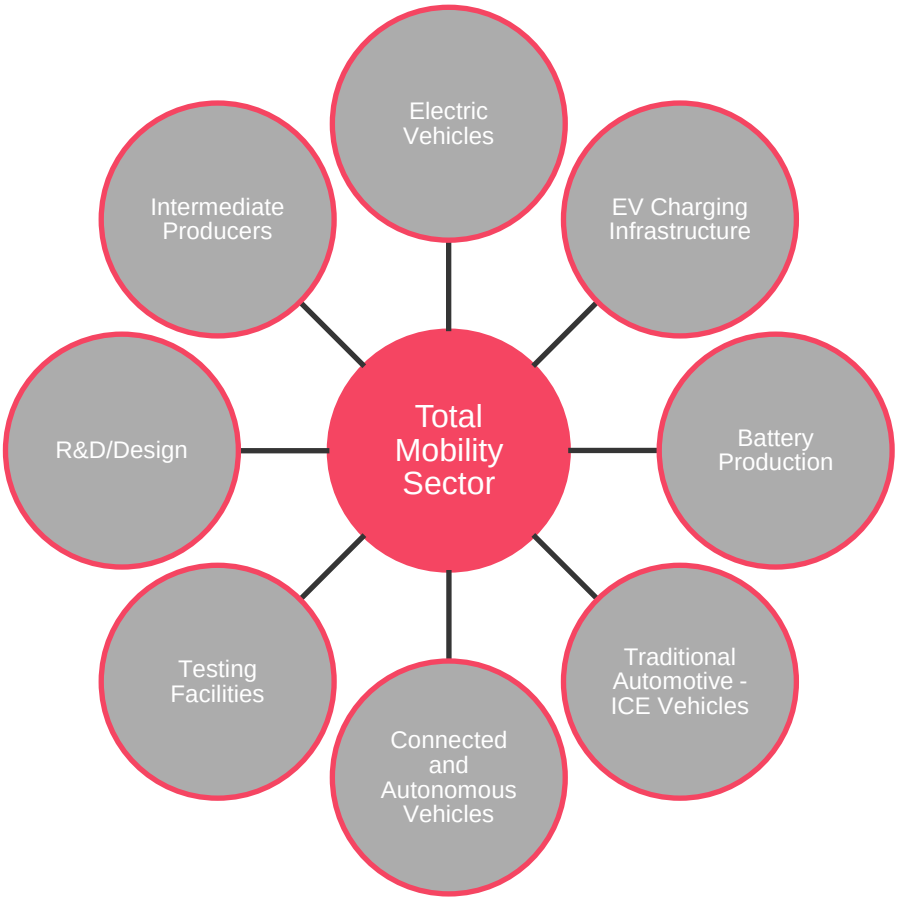
SOC	Description	Employed in Industry Group	% of Total Jobs in Industry Group	Projected Job Change (2021-2026)	Median Hourly Earnings	Typical Entry-Level Education
51-4111	Tool & Die Makers	2,418	2.3%	-2%	$30.71	Postsecondary nondegree award
17-3026	Industrial Engineering Technologists & Technicians	955	0.9%	3%	$29.05	Associate's degree
17-3027	Mechanical Engineering Technologists & Technicians	561	0.5%	1%	$29.73	Associate's degree
43-3031	Bookkeeping, Accounting, & Auditing Clerks	228	0.2%	-4%	$22.51	Some college, no degree
49-3023	Automotive Service Technicians & Mechanics	224	0.2%	3%	$21.34	Postsecondary nondegree award
53-3032	Heavy & Tractor-Trailer Truck Drivers	187	0.2%	5%	$23.60	Postsecondary nondegree award
15-1232	Computer User Support Specialists	146	0.1%	0%	$23.30	Some college, no degree
51-9162	Computer Numerically Controlled Tool Programmers	129	0.1%	10%	$29.16	Postsecondary nondegree award
17-3013	Mechanical Drafters	100	0.1%	-4%	$29.84	Associate's degree

Employer Intelligence – Job Postings

Job postings data provides additional flexibility in defining industry subsectors outside of the confines of the NAICS code structure, which is extremely beneficial for a sector like Mobility where new industry subsectors, occupations and skills are emerging as the sector changes and evolves. In order to use a unifying system between traditional labor market data and job postings data, a majority of this analysis leverages Standard Occupational Classification (SOC) codes; however, we are also able to analyze skills to gain a more granular view of the sector and its workforce needs than the SOC framework allows.

The Lightcast team worked with the Detroit Regional Chamber to develop a custom definition of the Mobility sector, characterized by the specific skills used in areas and used by employers in traditional "Automotive" definitions, as well as skills and employers in emerging subsectors such as electric vehicles and autonomous vehicles and relevant supply chain and support industries. While a majority of the data in this report focuses on the total Mobility sector (inclusive of the traditional automotive sector as well as the emerging areas), some key data points are provided for each subsector in this report and the accompanying Mobility sector portal and dashboard provide an opportunity for stakeholders to further explore the needs of each subsector.

Mobility Sector Definition



Mobility Sector Employer Demand

207,845
Job Postings (2019-2022)

4,098
Employers Hiring

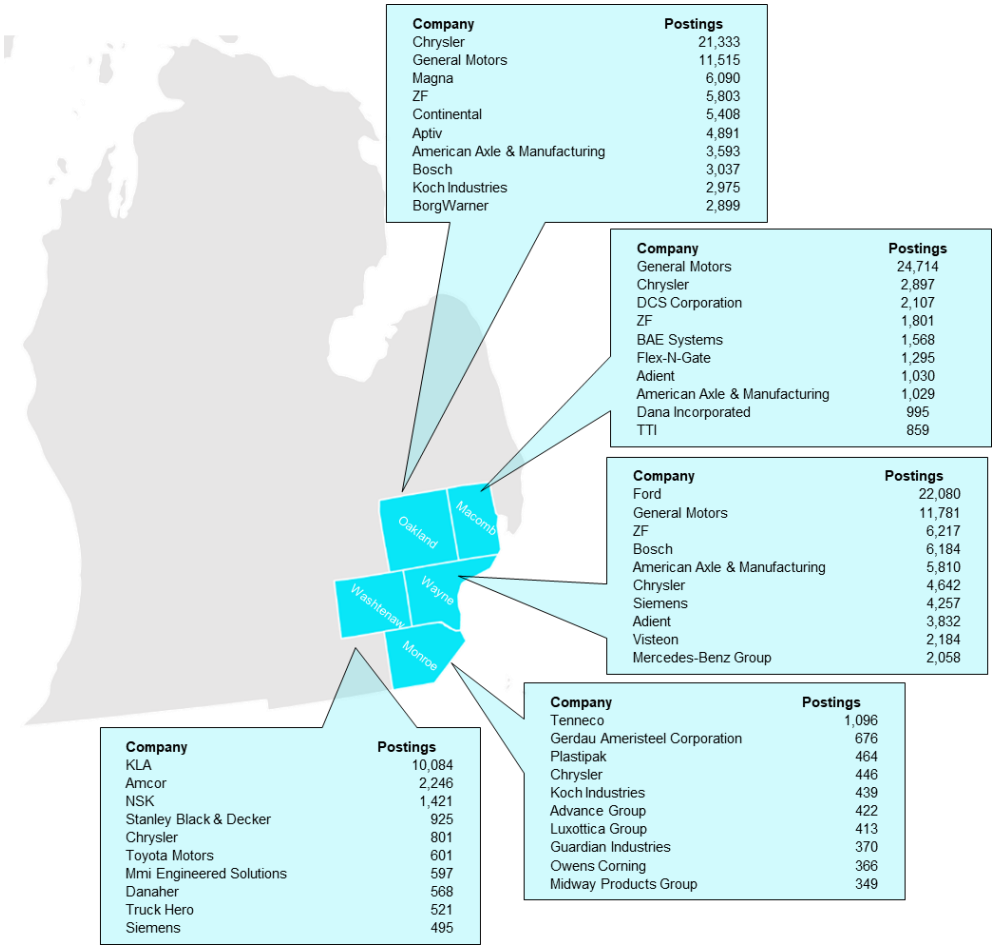
$50,377
Average Advertised Salary

34%
Percent Entry-Level Jobs

Across the total Mobility sector, including the subsectors defined on the previous page, there were over 200,000 job postings in the five-county region between 2019 and 2022, from over 4,000 employers. Among these job postings, about 34% are considered to be entry-level jobs. Entry-level, for the purposes of this analysis, is defined as those jobs that typically require less than a bachelor's degree and less than two years of experience. Entry-level versus Bachelor's level occupations are analyzed further in later sections of this report.

Key Employers

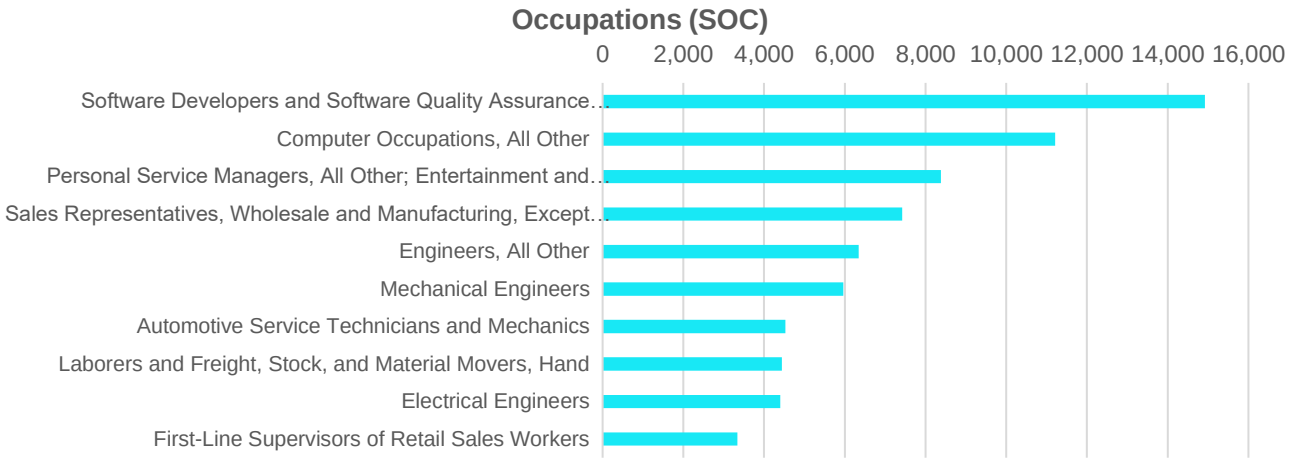
Based on the definition of the Mobility sector described above, the following map (right) shows the top Mobility companies posting within each of the five counties covered by the local community college districts. It should be noted that these lists represent companies by number of job postings in the Mobility sector and may not align with the largest Mobility companies in terms of employment size. It will be important for the Chamber and for each community college to understand the landscape of employers in their region and to conduct outreach, build relationships, and further explore training needs.



Top Occupations and Skills

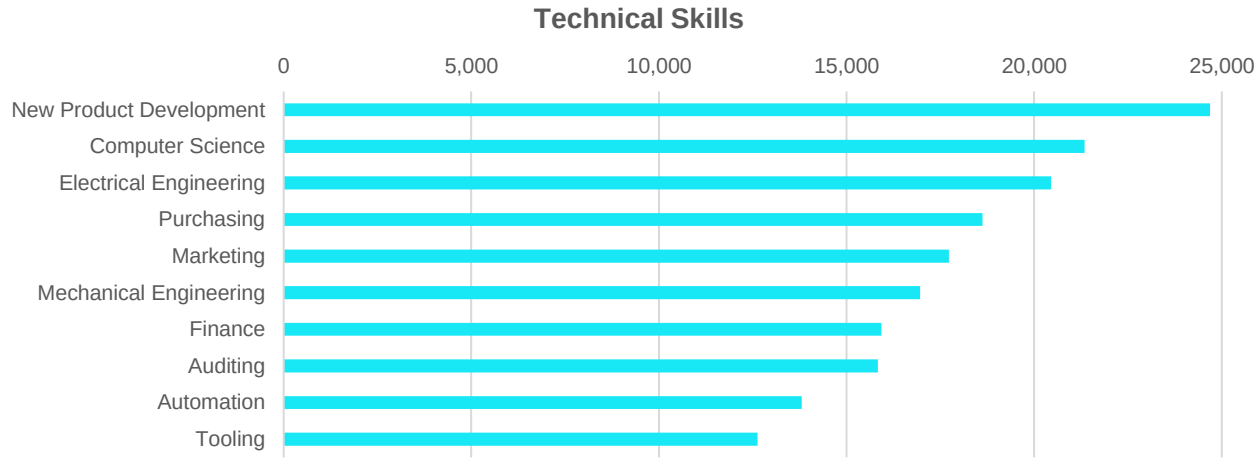
Between 2019 and 2022, there were nearly 15,000 job postings for Software Developers and Software Quality Assurance Analysts and Testers and over 10,000 postings for Computer Occupations, All Other, from Mobility sector companies. Other key occupations needed in Detroit's Mobility sector include management, sales, engineering, service technicians and general laborers. While this provides a bird's-eye view of the total Mobility sector in the region, the subsector highlights starting on page 25 and the accompanying data portal provide additional insights into the differing workforce needs of each Mobility subsector.

Figure 3: Top Occupations Posted (2019-2022)



Among all of the job postings in the Mobility sector, the top requested skills include several common skills, such as Initiative and Leadership; Communication; and Critical Thinking and Problem Solving. These are skills that are prevalent across job postings in many different industries, occupations, and titles, and are not specifically unique to the Mobility sector. Figure 4 below looks at the technical skills most requested in the Mobility sector at a more granular level. New Product Development, Computer Science and Electrical Engineering skills showed up among more than 20,000 Mobility sector job postings in the region between 2019 and 2022, and these skills are important to nearly every Mobility subsector as well.

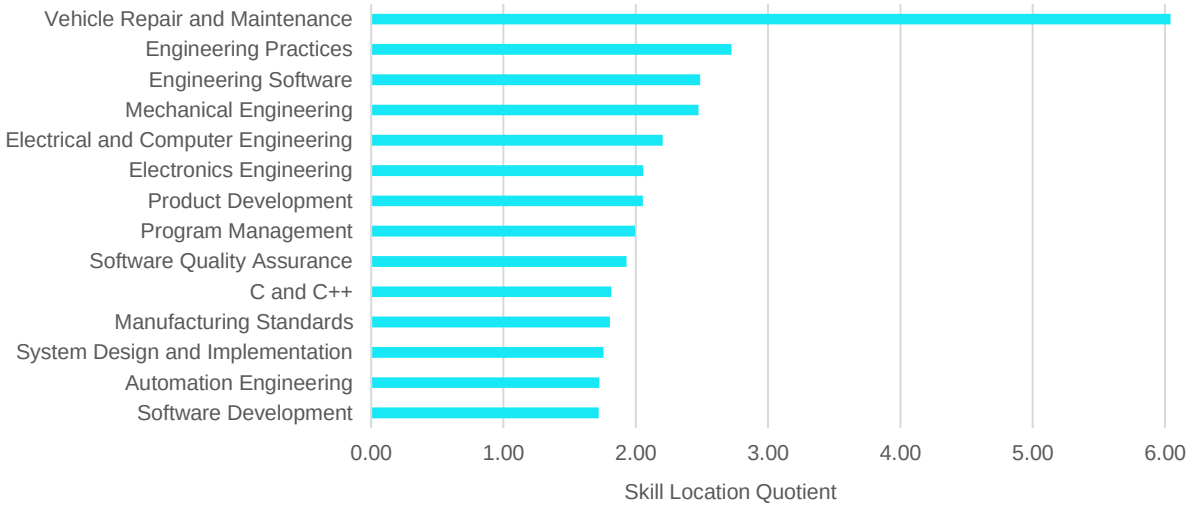
Figure 4: Top Posted Technical Skills in the Mobility Sector (2019-2022)



Skill Strengths

With the Detroit region's rich history in the automotive industry, there is an abundance of skills that are already present in the regional economy and can be leveraged to support future growth in the Mobility sector. By building on these skills strengths of current workers in the automotive sector and other similar sectors, the industry can quickly get workers up to speed as the needs of the Mobility sector continue to evolve. The skills presented in Figure 5 are those that have significant local demand in the Mobility sector and are more highly concentrated in the Detroit region than the U.S. average. The skill location quotient (LQ) compares the distribution of demand within this sector nationally against the distribution of demand locally and the most highly concentrated skill strengths are presented in the graph. The Detroit region is very strong in Vehicle Repair and Maintenance, along with a number of engineering-related skills.

Figure 5: Mobility Skill Strengths in the Detroit Region



Roles and Requirements

Lightcast collaborated with the Detroit Regional Chamber, the local community colleges, and several employer stakeholders to select key occupations of focus for this analysis. Occupations were selected based on a number of factors, including projected growth, wages and employer demand in the Detroit region's Mobility sector. Understanding that the Mobility sector is in need of jobs at all levels, this analysis focuses on both entry-level jobs and Bachelor's level jobs. This will allow local community colleges to understand employer demand and requirements for good jobs that they are well-equipped to train for, as well as potentially lowering time-to-degree and developing training onramps for typical bachelor's degree level occupations to help workers gain the skills they need in the most efficient and effective manner. It can also be used in discussions with employers to understand current education and experience requirements and where unnecessary barriers may exist. While certain degrees and credentials may be a pertinent requirement for certain positions, employers can and should understand the underlying skills required for a position and consider a skills-based hiring approach.

Key Entry-Level Occupations

The 19 Mobility occupations selected below show opportunity for workers coming out of community college programs, as they are in high demand and pay a living wage. Entry-level, for the purposes of this analysis, is defined as those jobs that typically require less than a bachelor's degree and less than two years of experience. Wages for most of these occupations are over $20 per hour and upwards of $35 to $40 per hour, and they are all experiencing high demand.

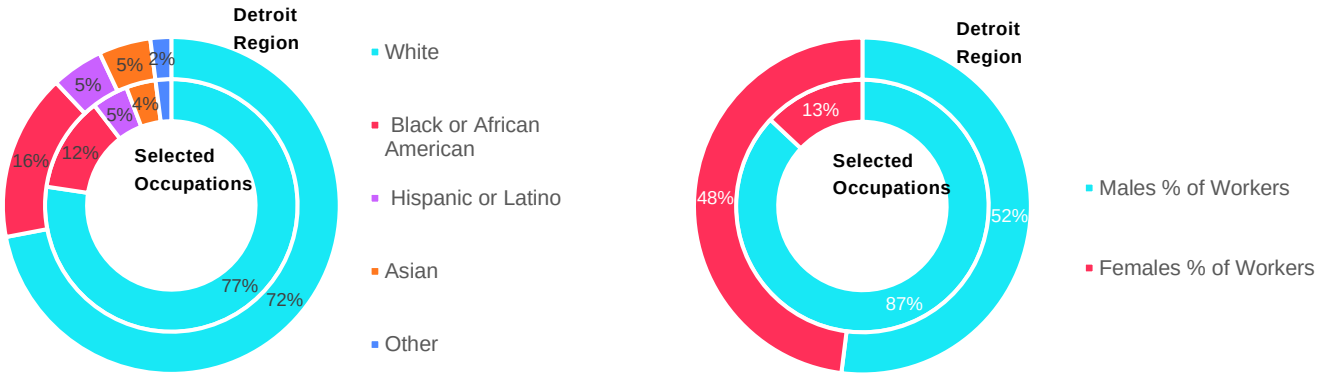
Table 3: Selected Entry-Level Mobility Occupations and Employment, Growth, Wages and Job Postings

SOC	Entry-Level Occupations	Employed in Industry Group	Projected Job Change (2021-2026)	Median Hourly Earnings	Total Job Postings
51-1011	First-Line Supervisors of Production and Operating Workers	3,432	4%	$30.44	2,586
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	3,269	-6%	$18.26	1,744
49-9041	Industrial Machinery Mechanics	2,597	15%	$28.87	263
51-4111	Tool and Die Makers	2,418	-2%	$30.71	748
51-4041	Machinists	1,908	2%	$23.77	571
47-2111	Electricians	1,358	8%	$35.51	423
51-9161	Computer Numerically Controlled Tool Operators	1,022	-3%	$20.97	1,102
49-9071	Maintenance and Repair Workers, General	955	3%	$18.94	3,009
17-3026	Industrial Engineering Technologists and Technicians	955	3%	$29.05	3,209
17-3027	Mechanical Engineering Technologists and Technicians	561	1%	$29.73	233
49-9044	Millwrights	500	11%	$36.37	81
49-1011	First-Line Supervisors of Mechanics, Installers, and Repairers	325	5%	$37.22	1,330
49-3023	Automotive Service Technicians and Mechanics	224	3%	$21.34	4,520
15-1232	Computer User Support Specialists	146	0%	$23.30	2,023
53-1047	First-Line Supervisors of Transportation and Material Moving Workers, Except Aircraft Cargo Handling Supervisors	137	3%	$25.10	461
51-9162	Computer Numerically Controlled Tool Programmers	129	10%	$29.16	293
17-3024	Electro-Mechanical and Mechatronics Technologists and Technicians	98	-2%	$24.38	672
17-3029	Engineering Technologists and Technicians, Except Drafters, All Other	89	-2%	$35.42	884
17-3023	Electrical and Electronic Engineering Technologists and Technicians	73	13%	$30.77	1,155

Demographics

Compared to regional averages, the selected entry-level occupations generally have an underrepresentation of women and Black workers. While Black/African American workers are highly represented in the sector at large, the overrepresentation of these workers tends to be in lower-paying occupations, so there is an opportunity to further engage women and Black workers in these select good jobs in the industry.

Figure 6: Worker Demographics in Select Entry-Level Occupations



Women make up less than 10% of regional workers in Detroit in the following entry-level occupations:

- Automotive Service Technicians and Mechanics
- Millwrights
- Tool and Die Makers
- Electricians
- Industrial Machinery Mechanics
- Maintenance and Repair Workers, General
- Machinists
- First-Line Supervisors of Mechanics, Installers, and Repairers
- Computer Numerically Controlled Tool Programmers
- Computer Numerically Controlled Tool Operators

Women and Black and African American workers are underrepresented among many entry-level Mobility occupations that are considered to be good jobs.

Hispanic workers are well-represented among Automotive Service Technicians and Mechanics; and Inspectors, Testers, Sorters, Samplers, and Weighers, but tend to be underrepresented among the other select entry-level occupations. Black workers are well-represented in First-Line Supervisors of Transportation and Material Moving Workers, Except Aircraft Cargo Handling Supervisors and Inspectors, Testers, Sorters, Samplers, and Weighers, but again, underrepresented in other selected entry-level occupations. Full demographic data can be found in the Appendix.

Skills and Certifications

Among the selected entry-level occupations, Table 4 shows the top technical and common skills requested by employers, as well as the top certifications. While these occupations don't typically require an advanced degree, there are several important certifications that community colleges can help train for, such as Automotive Service Excellence Certification, Six Sigma and Forklift Operation. While many Automotive Service Excellence Certification job postings are in dealerships and service stations, large automotive manufacturers in the region are also looking for this skill for in-house technicians, engineers, and maintenance workers.

Skills data can be leveraged in program and curriculum review and development. While common skills tend to represent soft skills widely needed by employers, technical skills can provide insights into the type of technology and equipment that employers in the Mobility sector are using. Looking at the Mobility sector with a wide lens, these top skills show up in less than 5% of postings, so the specific subsector analyses can provide additional detail and insights into skills needed within the different areas of Mobility. There are several technical skills that cut across multiple entry-level occupations (at least 5 of the 19 occupations) that can be considered transferrable skills and these skills are bolded in the table below.

Table 4: Top Skills and Certifications In-Demand Across Select Entry-Level Occupations

TECHNICAL SKILLS	% OF POSTINGS
Machinery	5%
Machining	4%
Tooling	4%
Preventive Maintenance	3%
Automotive Services	3%
Hydraulics	3%
Hand Tools	3%
Micrometer	3%
Field Service Management	2%
Lathes	2%

COMMON SKILLS	% OF POSTINGS
Communications	15%
Troubleshooting	11%
Problem Solving	10%
Management	9%
Operations	9%
Customer Service	6%
Valid Driver's License	6%
Leadership	5%
Detail Oriented	4%
Lifting Ability	3%

CERTIFICATIONS	% OF POSTINGS
Automotive Service Excellence (ASE) Certification	25%
Six Sigma Green Belt	11%
Forklift Certification	8%
Commercial Driver's License (CDL)	4%
Certified Business Manager	4%
CompTIA A+	4%
Six Sigma Black Belt	2%
HVAC Certification	2%
Microsoft Certified Professional	2%
American Society For Quality (ASQ) Certified	2%

Education and Training

The seven community colleges in the Detroit region collaborating on this initiative offer a range of instructional options relevant to the Mobility sector including both associate's level programs and certificate programs. The Center for Automotive Research (CAR) is working with the Detroit Regional Chamber and the community colleges to understand the landscape of these programs. The employer demand data in this report should be leveraged in conjunction with the supply-side program level data from CAR to understand where there may be gaps and/or overlap in programming for the Mobility sector in the region. The skills data provided in this report and the accompanying data portal, can help ensure existing and new programming addresses the skills indicated by the region's Mobility employers and is tailored to the current and projected workforce needs of the Mobility sector.

Key Bachelor's Level Occupations

The 12 occupations selected below show opportunity within the Mobility sector for workers Bachelor's degree, as they are in high demand and pay wages well over the regional average. This section aims to understand the typical skill requirements among these occupations. While some of these roles – such as the various Engineers – by definition are available only to those who have completed a four-year technical program, others may be attainable through non-traditional means. Some combination of transferable skills, targeted skill development, and short-term certificates or certifications may enable more Detroit residents to become qualified for these jobs in fewer than four years, thus increasing the availability of talent for these jobs, as well as widen the opportunity landscape for regional workers.

Table 5: Selected Bachelor's Level Mobility Occupations and Employment, Growth, Wages and Job Postings

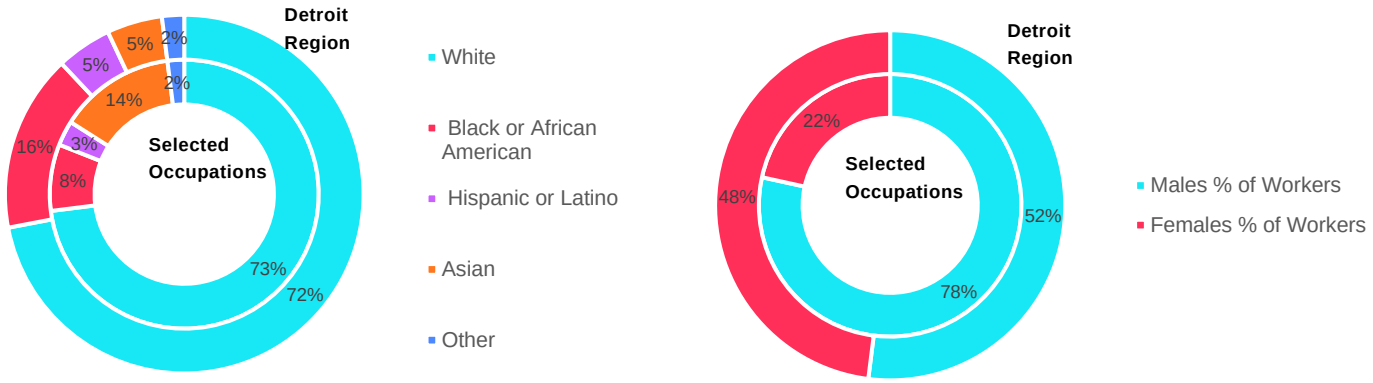
SOC	Occupations	Employed in Industry Group	Projected Job Change (2021-2026)	Median Hourly Earnings	Total Job Postings
17-2112	Industrial Engineers	4,522	11%	$41.38	6,801
17-2141	Mechanical Engineers	3,449	8%	$47.03	5,937
11-3051	Industrial Production Managers	1,872	4%	$52.52	1,675
11-9041	Architectural and Engineering Managers	761	3%	$64.11	2,497
13-1028	Buyers and Purchasing Agents	683	-1%	$32.93	3,265
13-1081	Logisticians	655	18%	$38.74	1,782
17-2071	Electrical Engineers	286	4%	$47.94	4,387
17-2199	Engineers, All Other	245	6%	$47.92	2,087
15-1252	Software Developers	242	13%	$48.43	14,804
11-9199	Managers, All Other	217	9%	$33.61	5,892
27-1021	Commercial and Industrial Designers	154	2%	$47.33	2,070
15-1211	Computer Systems Analysts	120	4%	$47.49	1,978

Demographics

Compared to regional averages, the selected occupations that require a bachelor's degree generally have an underrepresentation of women, Hispanic, and Black workers. Compared to the demographics of the entry-level Mobility occupations, we see higher representation of Asian and Women workers in these Bachelor's level occupations, but even lower representation of Black/African American and Hispanic workers.

While women make up about 48% of the regional workforce, they only make up about 22% of the selected bachelor's level occupations needed for the Mobility sector. Hispanic workers and Black workers are underrepresented among nearly all selected Bachelor's level occupations, with the exception of Managers, All Other and Logisticians, respectively. Asian workers represent 5% of all workers in Detroit and are well-represented among these selected bachelor's level Mobility occupations. Across many of these occupations, they represent over 10% of workers. Full demographic data can be found in the Appendix.

Figure 7: Worker Demographics in Select Bachelor's Level Occupations



Skills and Certifications

Among the selected Bachelor's level occupations, Table 6 shows the top technical and common skills requested by employers, as well as certifications. While many of the common skills overlap with those seen in entry-level positions, the technical skills required for these higher skill/education roles include engineering, software, and new product development-related skills. There may be an opportunity for these skills to be taught in shorter form than a four-year degree. Several of these technical skills cut across multiple occupations (at least 5 of the 12 occupations) and can be considered transferrable skills. These skills are bolded in the table below.

Over 10% of job postings for these Bachelor's level occupations are looking for a Master of Business Administration, various Six Sigma certifications, and project management certifications.

Table 6: Top Skills and Certifications In-Demand Across Select Bachelor's Level Occupations

TECHNICAL SKILLS	% OF POSTINGS
Electrical Engineering	8%
Computer Science	7%
Mechanical Engineering	6%
New Product Development	6%
Software Engineering	5%
Software Development	4%
Purchasing	4%
C++ (Programming Language)	4%
Agile Methodology	3%
C (Programming Language)	3%

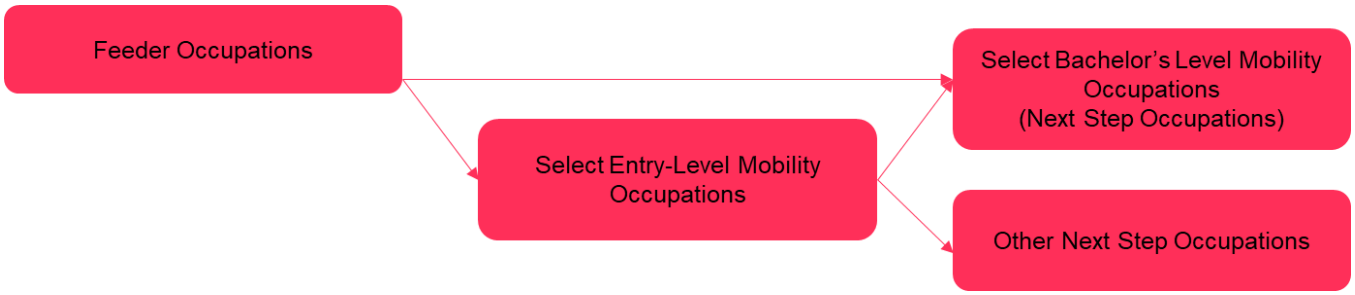
COMMON SKILLS	% OF POSTINGS
Communications	18%
Management	13%
Problem Solving	13%
Leadership	10%
Planning	6%
Writing	5%
Operations	4%
Interpersonal Communications	4%
Microsoft Office	4%
Microsoft Excel	4%

CERTIFICATIONS	% OF POSTINGS
Master Of Business Administration (MBA)	21%
Six Sigma Green Belt	15%
Six Sigma Black Belt	13%
Project Management Professional Certification	10%
Certified Quality Engineer	6%
American Society For Quality (ASQ) Certified	4%
Secret Clearance	3%
Six Sigma Certification	2%
Certified In Production And Inventory Management	2%
Quality Certification	1%

Promising Pathways

While it is important to work with young people to embark upon a learning pathway that leads to high-quality Mobility sector jobs, the fastest and most efficient route to a properly skilled workforce in the Mobility sector is to draw on workers with similar skill sets, and to further develop Mobility-specific skills. For each of the select occupations identified in the previous section, the accompanying Mobility sector portal identifies several lower-wage, occupations whose skills lend themselves to Mobility roles ("Feeder" occupations), and several occupations into which those Mobility roles can advance ("Next Step" occupations). The graphic below shows the relationship between these occupations and transitions.

Employers should look to these feeder occupations to fill key roles with minimal upskilling or reskilling required. Reskilling can be accomplished through various means, such as on-the-job training, in-house training programs, apprenticeships, or external lab or classroom professional development courses. Next step occupations represent an upward opportunity for a worker in a select entry-level occupation within the Mobility sector.



Common Feeder Occupations into Select Entry-Level Mobility Sector Occupations

The list of occupations below represents the feeder occupations from which the Mobility sector can draw workers, where there is high skill similarity to multiple of the select entry-level Mobility occupations and where there is a significant pool of workers (over 500 workers in the region). Workers in these occupations are good primary targets for employers, as they are well-positioned to move into key entry-level Mobility occupations with minimal upskilling/reskilling. Many of these occupations can be found within other manufacturing industries, as well as transportation and warehousing industries.

- Miscellaneous Assemblers and Fabricators
- Engine and Other Machine Assemblers
- Multiple Machine Tool Setters, Operators, and Tenders, Metal and Plastic
- Electrical, Electronic, and Electromechanical Assemblers, Except Coil Winders, Tapers, and Finishers
- Helpers--Production Workers
- Installation, Maintenance, and Repair Workers, All Other

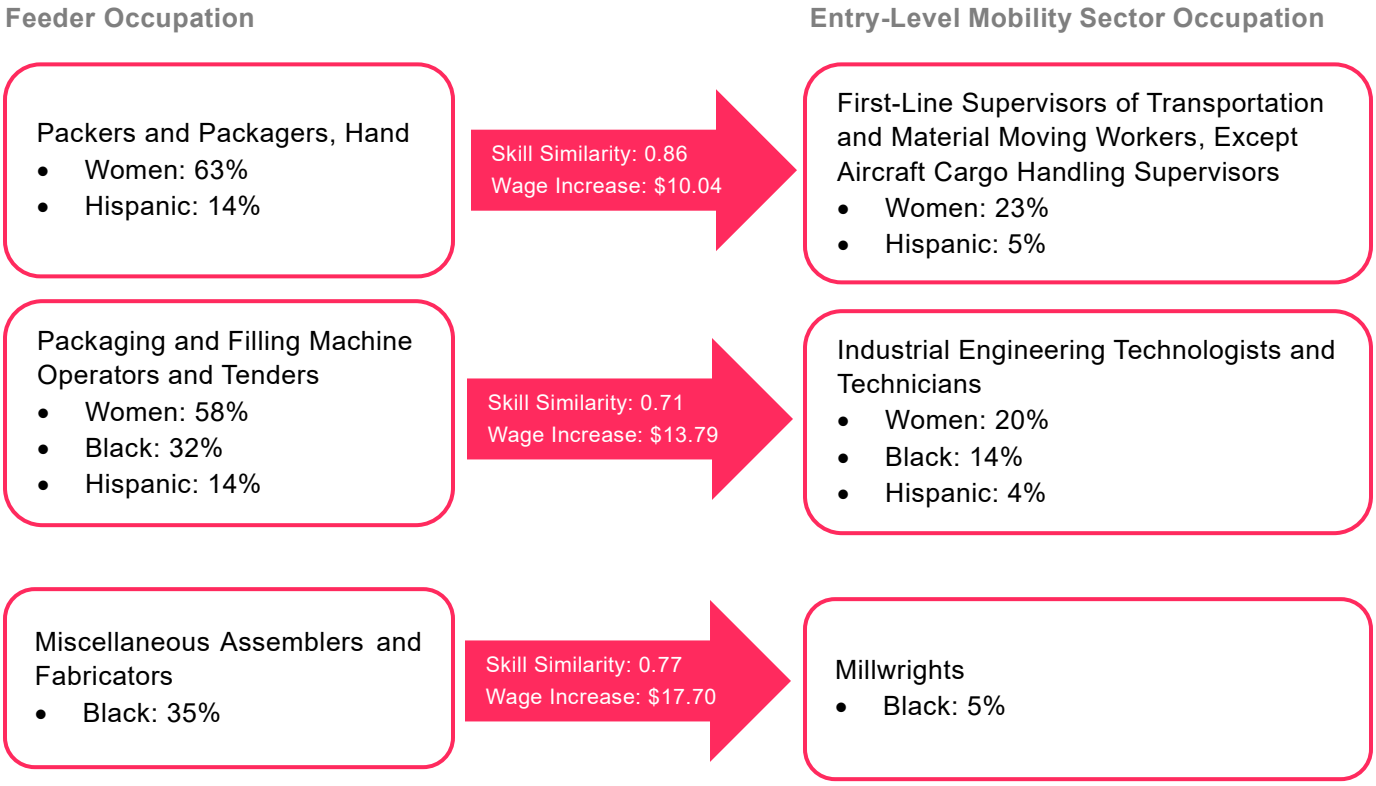
- Mixing and Blending Machine Setters, Operators, and Tenders
- Woodworking Machine Setters, Operators, and Tenders, Except Sawing
- Welding, Soldering, and Brazing Machine Setters, Operators, and Tenders

These feeder occupations have skills that are important to many next step and more advanced occupations. For example, there are about 53,000 Miscellaneous Assemblers and Fabricators in the Detroit region and these workers are well-positioned to move into five of the select entry-level Mobility occupations, including Electrical and Electronic Engineering Technologists and Technicians; Industrial Engineering Technologists and Technicians; and Mechanical Engineering Technologists and Technicians. These pathways can also be leveraged for equity building, as they represent an opportunity to move women and people of color from occupations where they are overrepresented to where they are underrepresented.

Equity-Building Transitions into Entry-Level Mobility Occupations

Figure 8 shows several equity-building opportunities to move women and people of color from lower-paying occupations where they are overrepresented to higher-paying occupations where they are underrepresented. One example where women, Hispanic and Black workers are all overrepresented is in the occupation Packaging and Filling Machine Operators and Tenders. This occupation has a high skill similarity to Industrial Engineering Technologists and Technicians, where all three of these demographic groups are underrepresented among the occupation at large. This transition represents an opportunity for workers to make this upward transition with minimal upskilling and realize a $10/hour wage increase as they advance.

Figure 8: Transition Examples from Feeder Occupations to Select Entry-Level Mobility Occupations

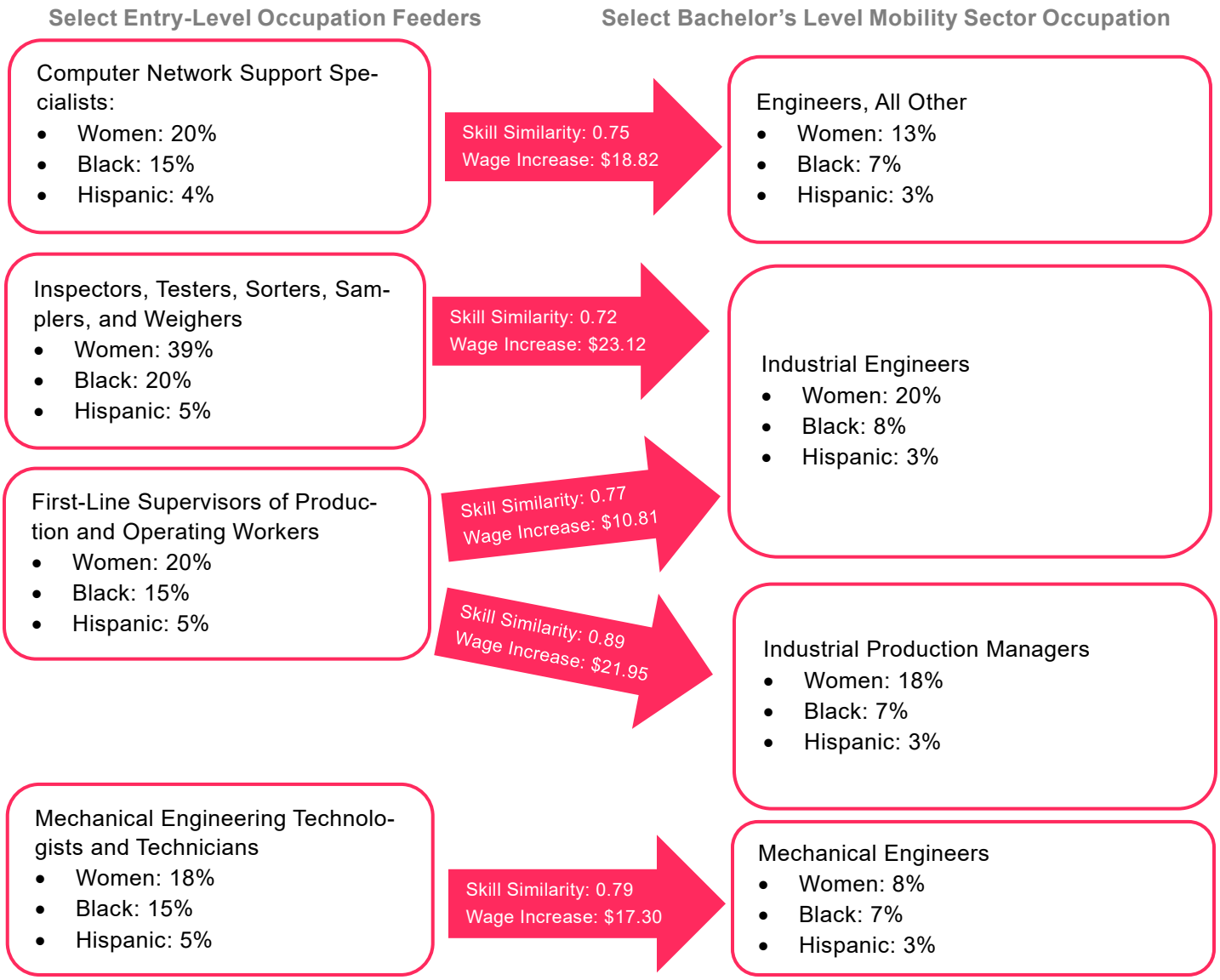


Equity-Building Transitions from Entry-Level Mobility Occupations to Bachelor's Level Mobility Occupations

For each of the select Bachelor's-level Mobility occupations, the accompanying Mobility portal identifies several feeder occupations that represent an opportunity to move a worker from a lower-paying, skills-similar job into one of these critical Mobility sector jobs.

While some feeder occupations come from outside of the Mobility sector, the following are examples from select entry-level occupations to select Bachelor's level occupations within the Mobility sector. Each of these transitions have high skill similarity, lead to a wage increase of over $10/hour and present a more diverse talent pool found in the feeder occupations than currently exist in the Bachelor's level occupation. There may be opportunities for employers to look within their existing workforce to upskill and fill these roles in lieu of finding, recruiting, and hiring someone with a Bachelor's degree.

Figure 9: Transition Examples from Select Entry-Level Occupations to Select Bachelor's Level Occupations



Subsector Highlights

While a majority of the data in this report focuses on the total Mobility sector (inclusive of the traditional automotive sector as well as the emerging areas), some key data points are provided for each subsector on the following pages. This section is intended to highlight the key similarities and differences between the subsectors, as well as preview the types of data that can be found in the accompanying online Mobility sector portal. The portal provides an opportunity for stakeholders to further explore the needs of each subsector, including both entry-level and Bachelor's level jobs that are in demand and associated skills needed. Each subsector page contains job postings data from 2019 to 2022. Definitions used to create each subsector can be found in the Appendix.

Key Subsector Insights:

- Companies such as General Motors, Ford, Chrysler, and others cross multiple subsectors, as they have job postings and opportunities related to several areas within the Mobility sector. For example, a traditional automotive company may be starting to work on electric vehicles or autonomous vehicles or both.
- All subsectors (except for the two subsectors that do not have enough data) have an average advertised salary of over $50,000. The highest average advertised salaries are in the Battery Production and Autonomous Vehicle subsectors.
- When looking at the percentage of job postings that are entry-level (require less than two years of experience and less than a Bachelor's degree), those subsectors that are most accessible to entry-level workers are Intermediate Producers; Research and Development; and Traditional Internal Combustion Engine Vehicles.
- The most in-demand occupations across all of the subsectors include Software Developers, Computer Occupations and several types of engineers. While most of these are occupations that require a Bachelor's degree, in the portal users can filter to only entry-level job postings and better understand employer needs for occupations at that level.
- New Product Development shows up as a top three requested skill among five of the eight subsectors. Electrical Engineering and Computer Science are also skills that typically show up in the top three requested skills.
- Automation, while lower in the list of top skills, falls in the top 10 skills requested by employers in the Traditional Internal Combustion Engine Vehicles; Intermediate Producers; Research and Development; and Testing Facilities subsectors.
- While there are many skills that overlap, each subsector has a set of unique skills that can help community colleges develop and tailor programming. For example, the third most requested skill for Autonomous Vehicles is Advanced Driver Assistance Systems and the top requested skill for the Battery Production subsector is Battery Technology.

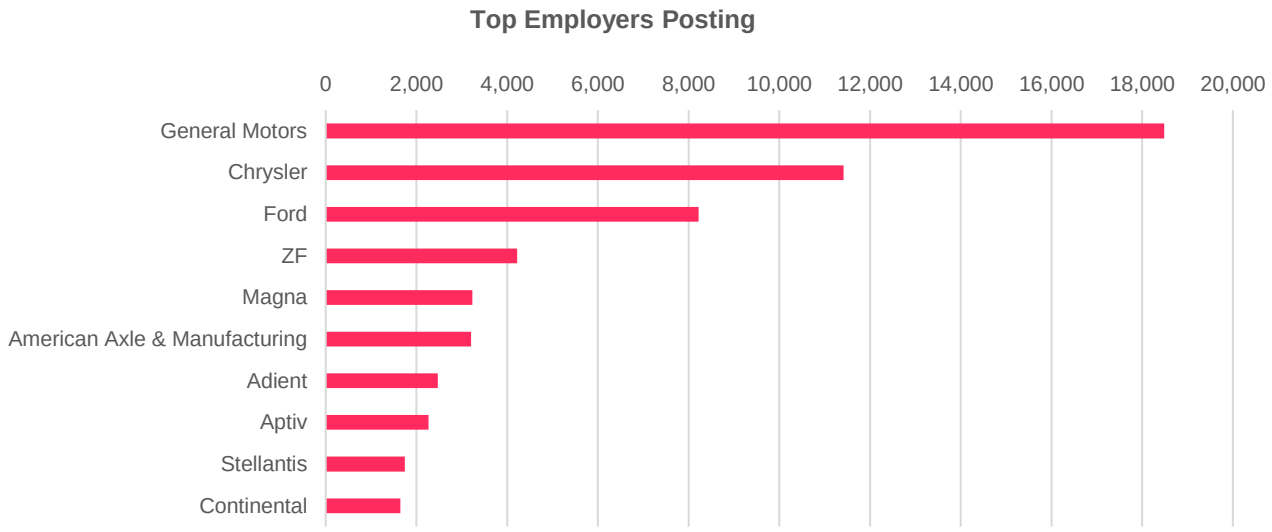
Traditional Internal Combustion Engine Vehicles

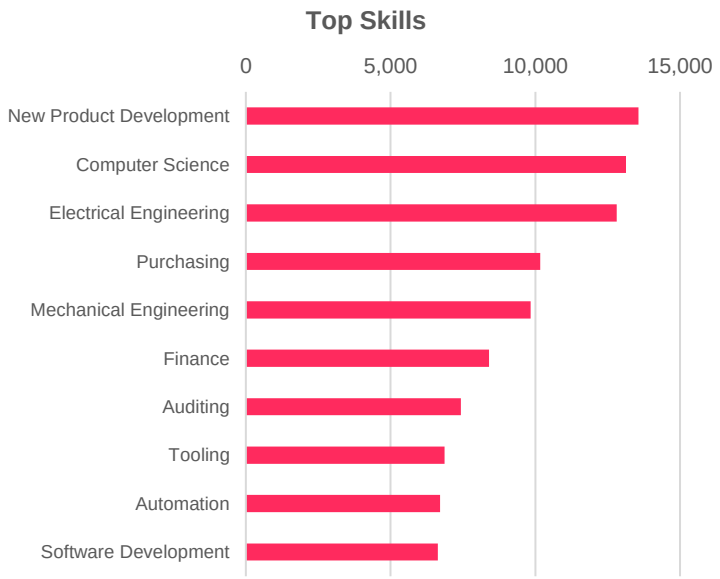
84,842
Job Postings (2019-2022)

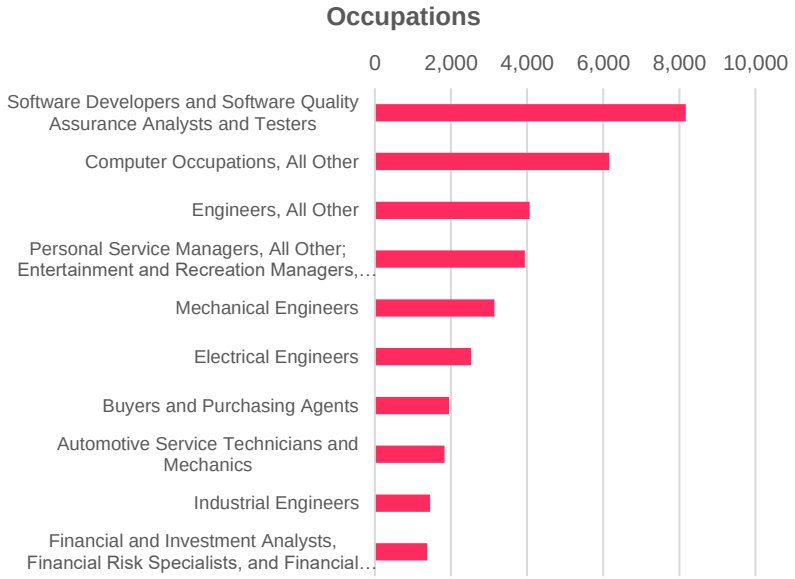
418
Employers Hiring

$51,377
Average Advertised Salary

23%
Percent Entry-Level Jobs







Electric Vehicles

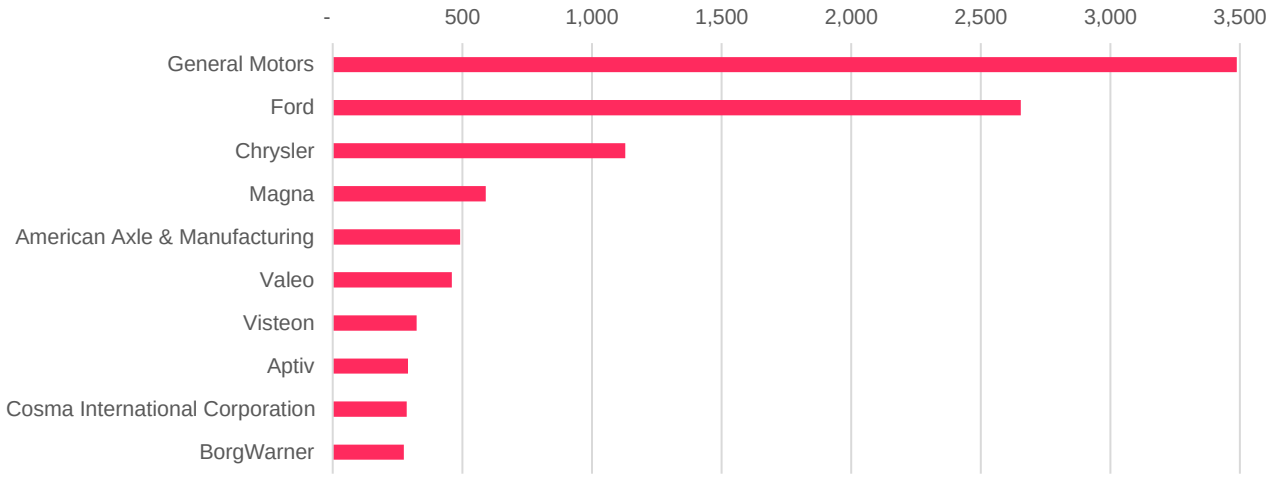
12,908
Job Postings (2019-2022)

97
Employers Hiring

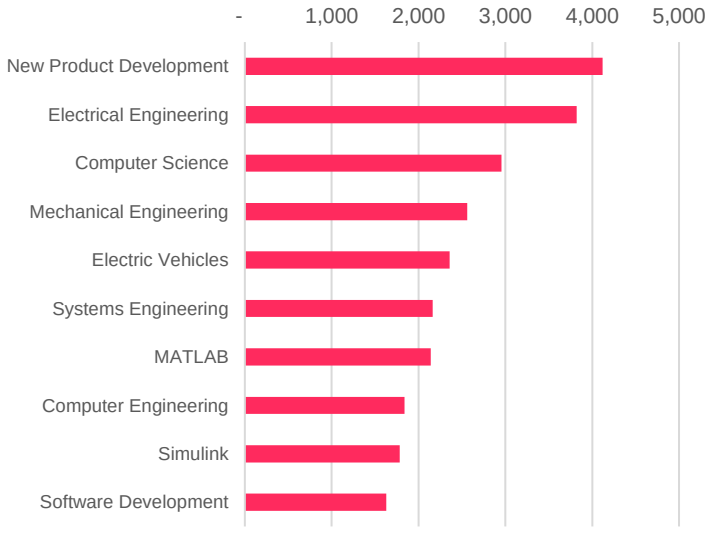
$55,891
Average Advertised Salary

13%
Percent Entry-Level Jobs

Top Employers Posting



Top Skills



Occupations

Autonomous Vehicles

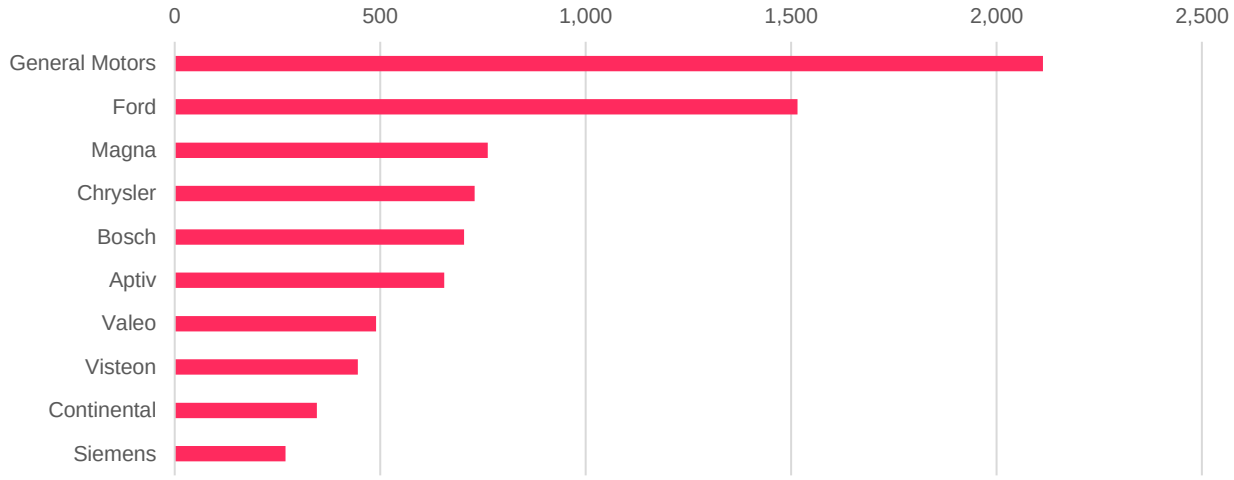
11,339
Job Postings (2019-2022)

406
Employers Hiring

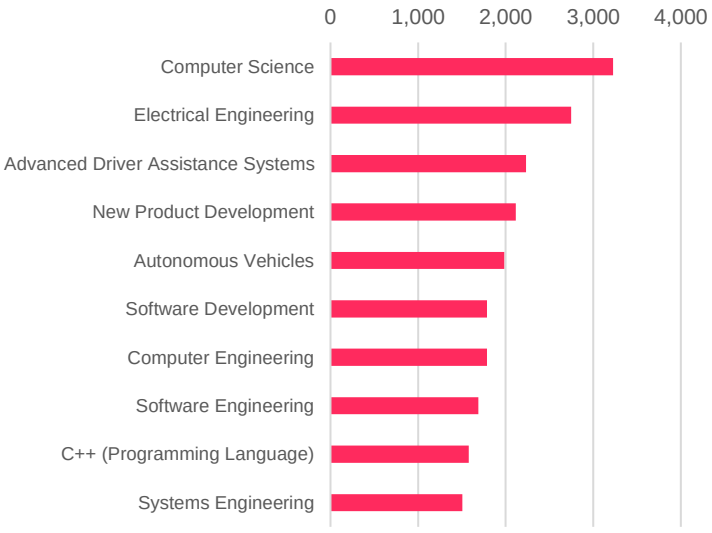
$63,978
Average Advertised Salary

15%
Percent Entry-Level Jobs

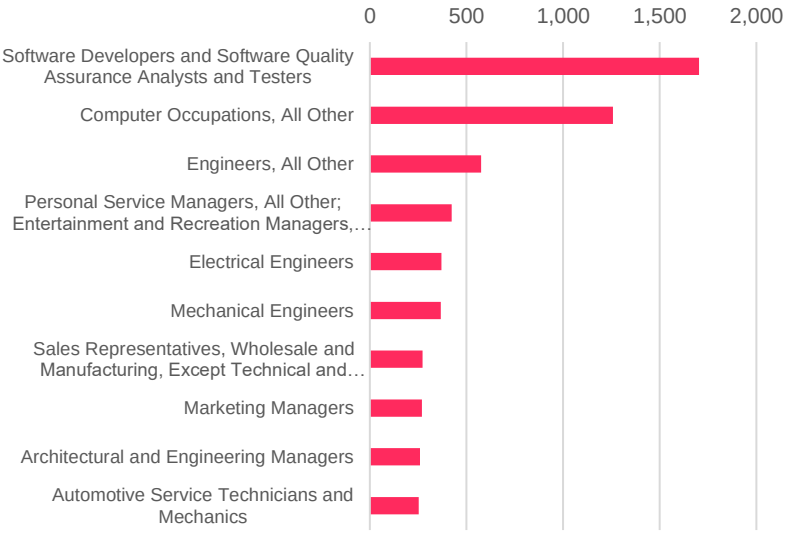
Top Employers Posting



Top Skills



Occupations



Intermediate Producers

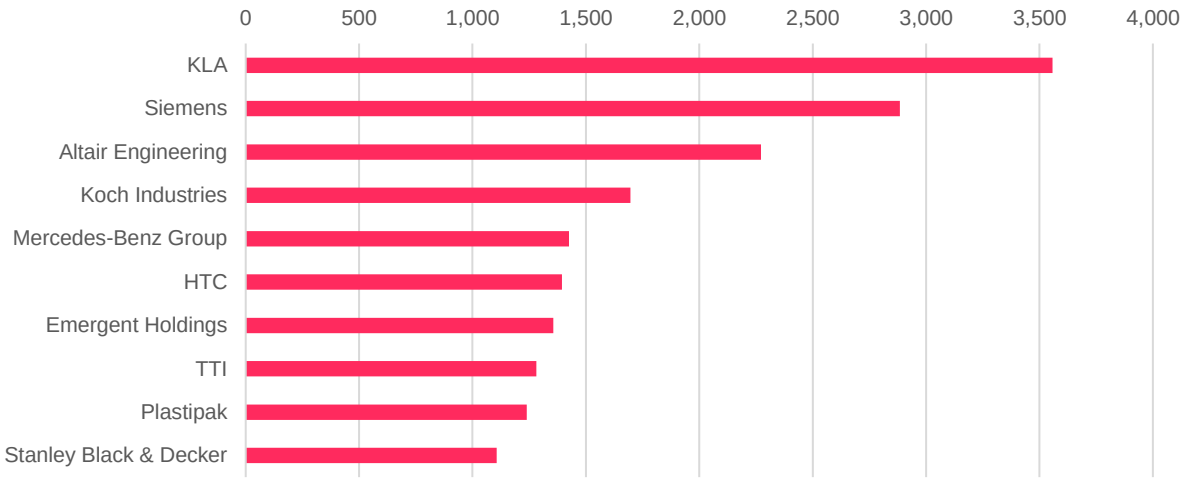
99,246
Job Postings (2019-2022)

3,620
Employers Hiring

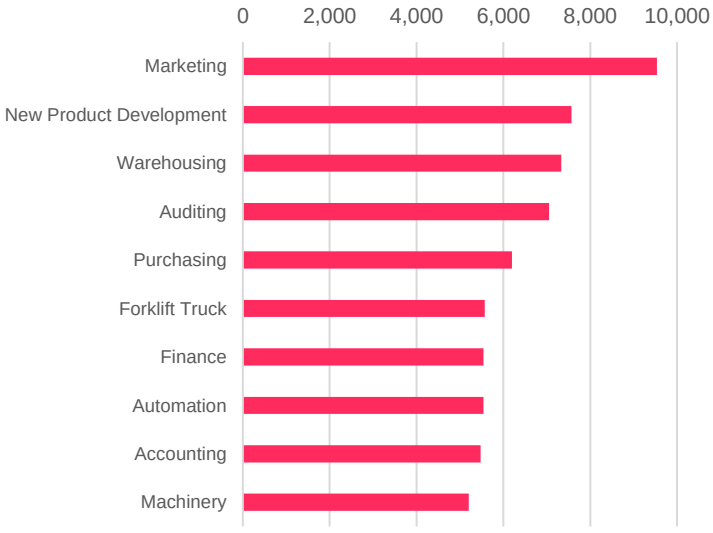
$49,614
Average Advertised Salary

45%
Percent Entry-Level Jobs

Top Employers Posting



Top Skills



Occupations

Battery Production

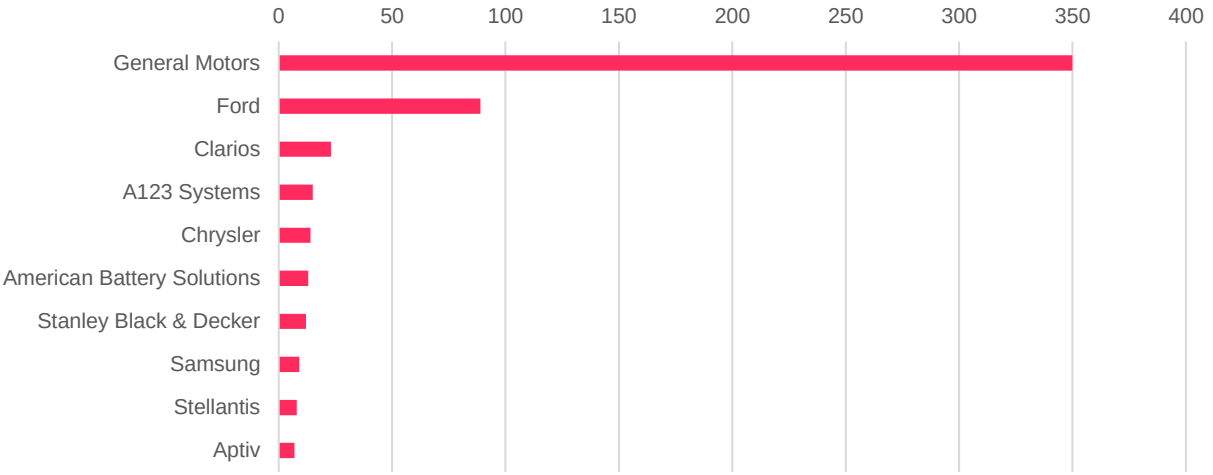
642
Job Postings (2019-2022)

48
Employers Hiring

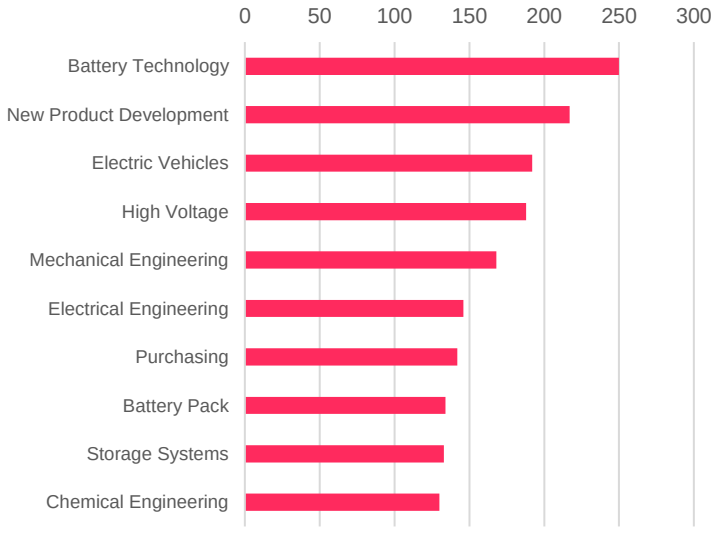
$70,400
Average Advertised Salary

8%
Percent Entry-Level Jobs

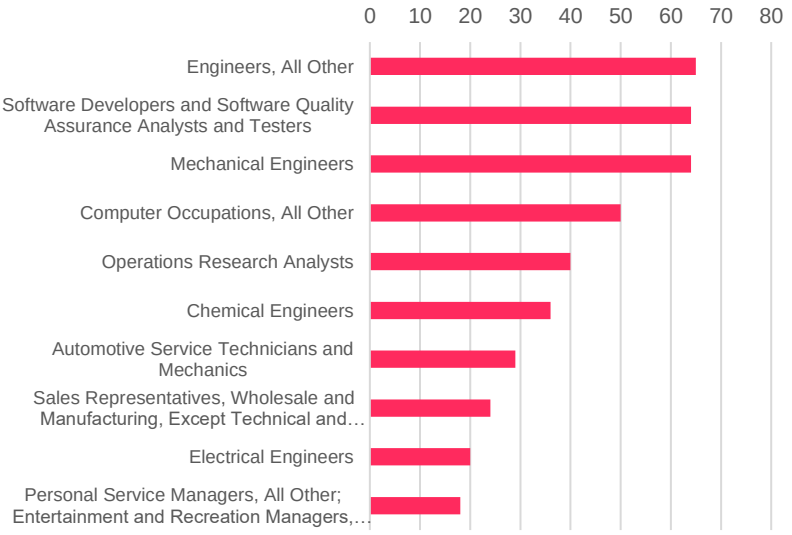
Top Employers Posting



Top Skills



Occupations



EV Charging Stations

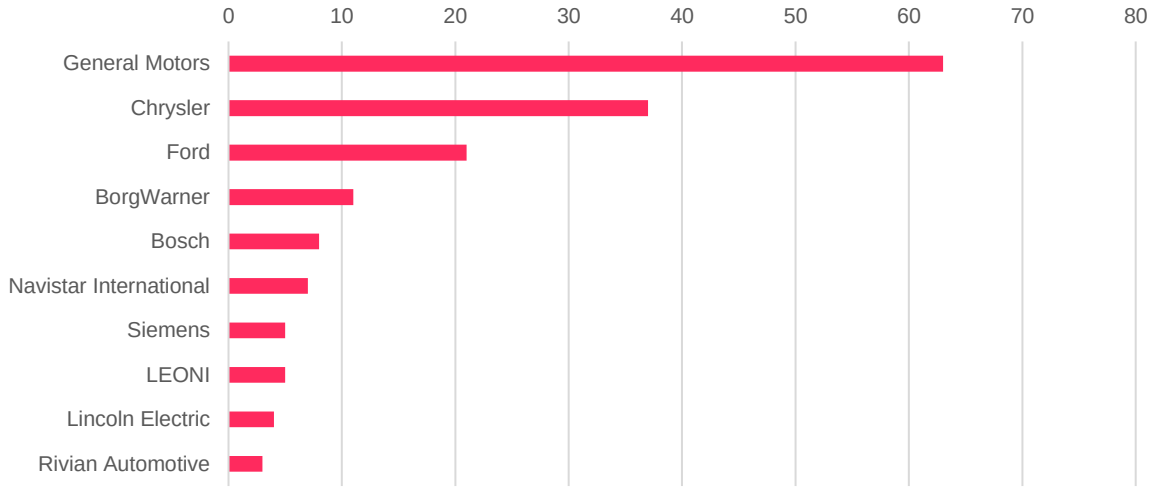
183
Job Postings (2019-2022)

25
Employers Hiring

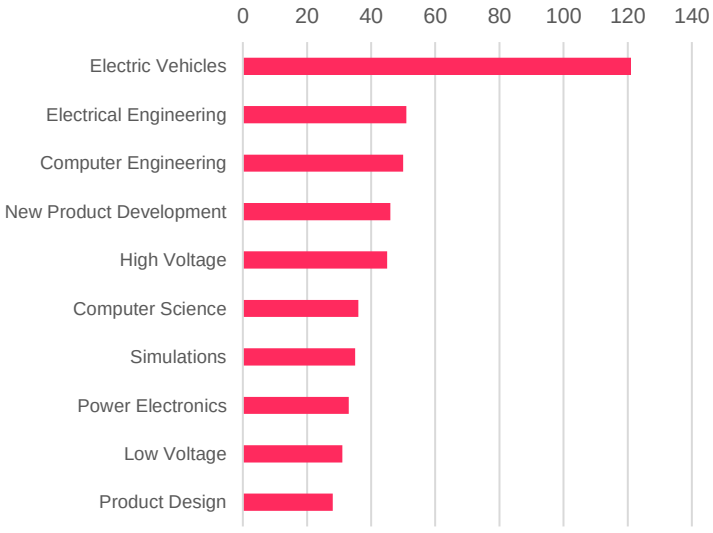
N/A
Average Advertised Salary

8%
Percent Entry-Level Jobs

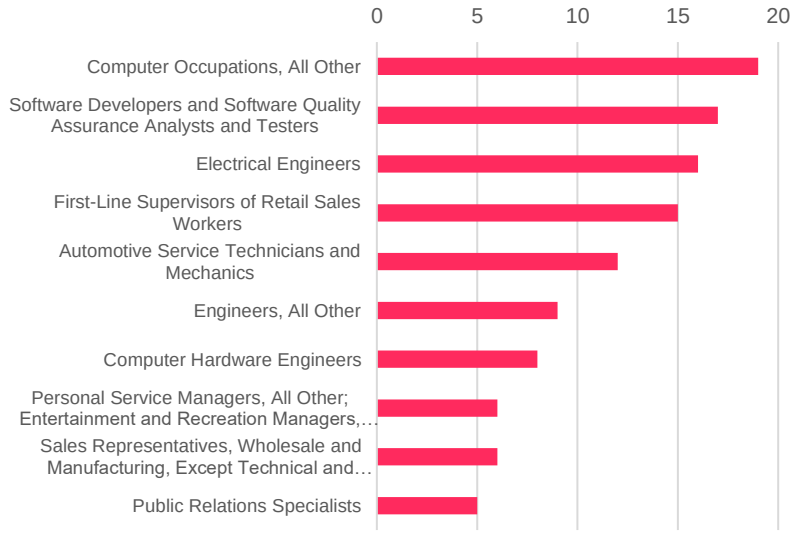
Top Employers Posting



Top Skills



Occupations



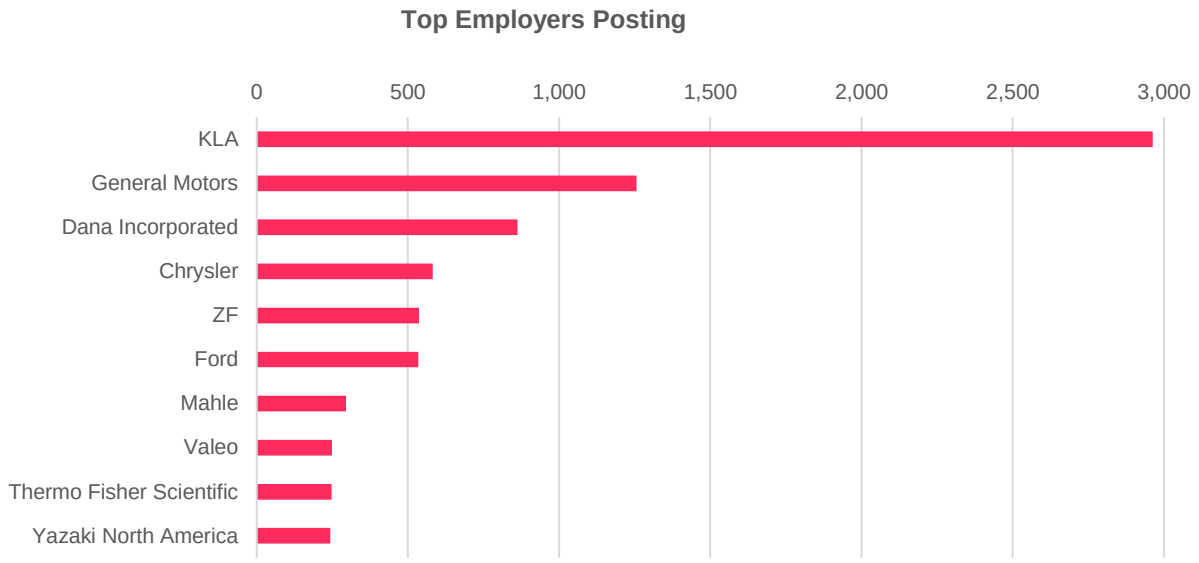
Research and Development

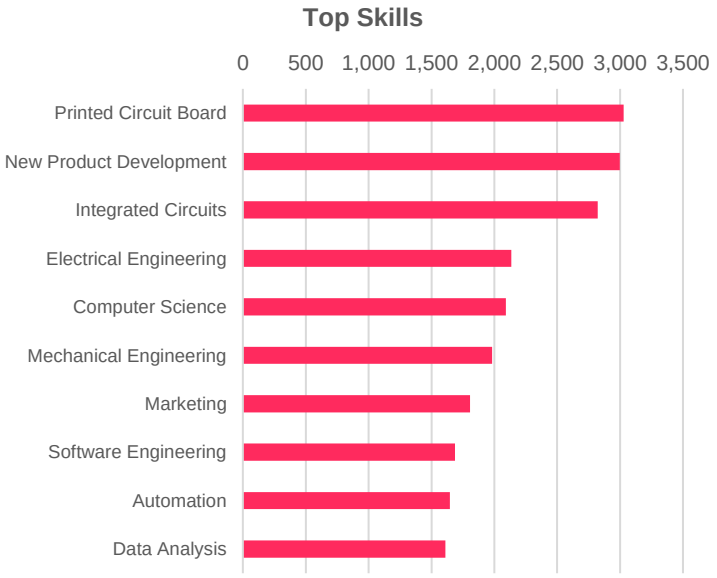
17,174
Job Postings (2019-2022)

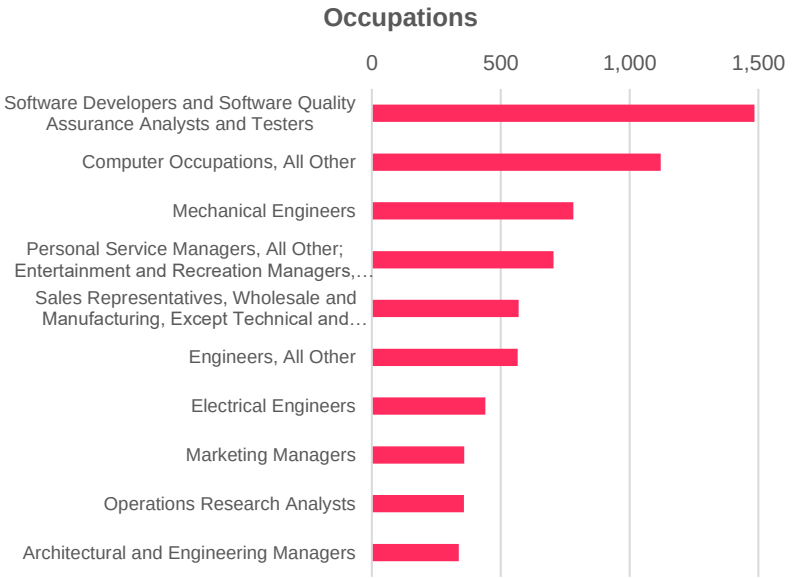
829
Employers Hiring

$61,220
Average Advertised Salary

27%
Percent Entry-Level Jobs







Testing Facilities

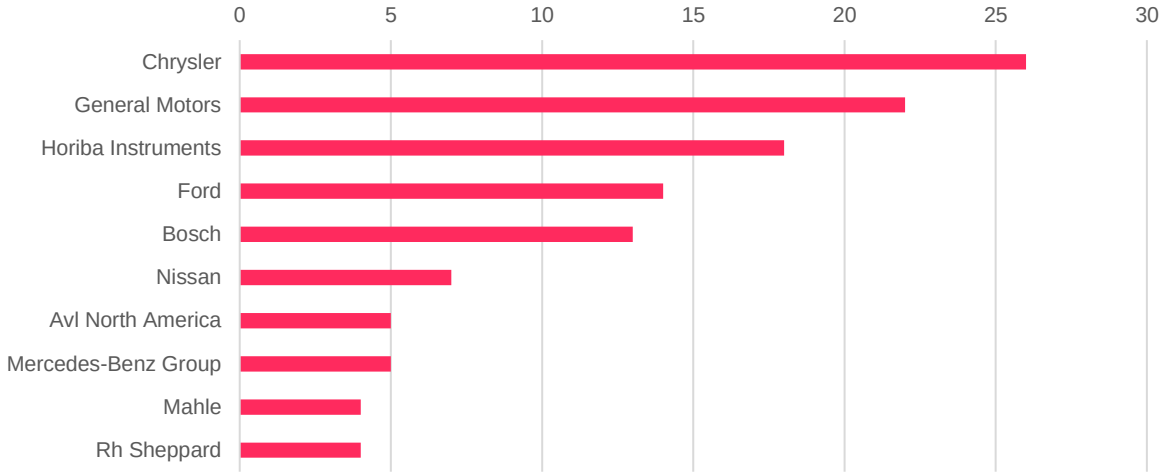
155
Job Postings (2019-2022)

31
Employers Hiring

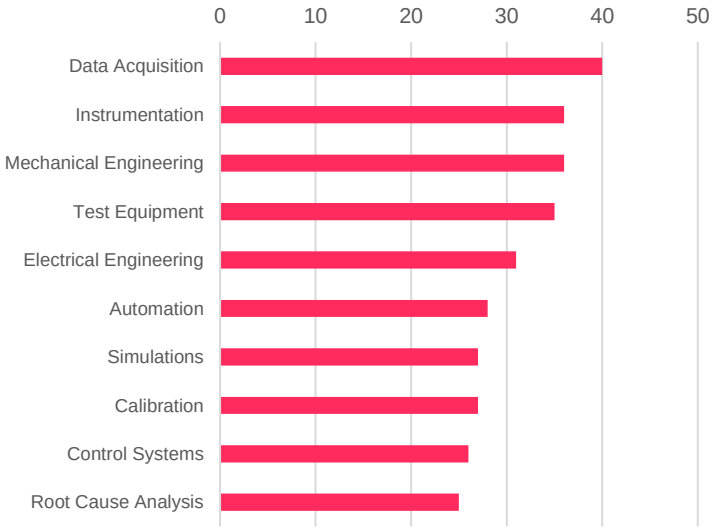
N/A
Average Advertised Salary

14%
Percent Entry-Level Jobs

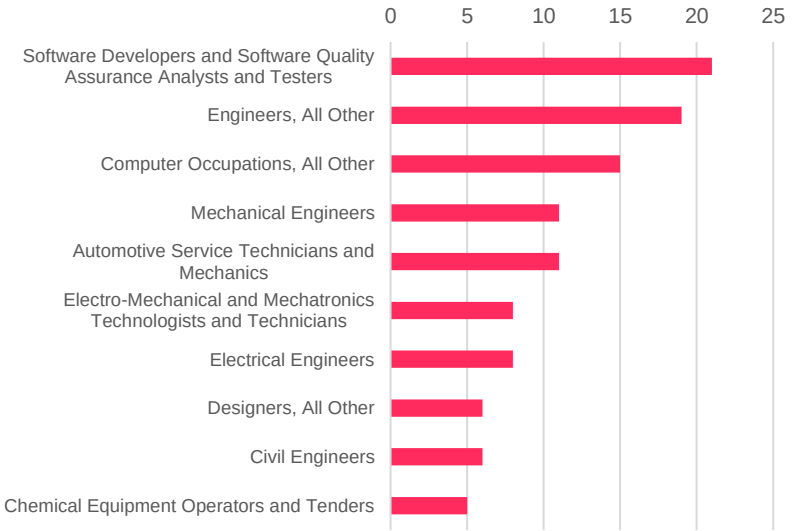
Top Employers Posting



Top Skills



Occupations



Conclusion

This report and the accompanying online Mobility portal assess the current and future workforce needs of the Mobility sector in the Detroit region. With the Detroit region's rich history in the automotive industry and the skills of those working within it, the region is well-positioned to define the contemporary Mobility sector as it did for the Automotive industry in the last century. To do so, it will be imperative that the Detroit region's workers continue to develop the skills that emerging technologies require, and that the region's economic and workforce development, education, and employer stakeholders align around how best to continue to track and develop those skills.

The data and observations in this report should be used as a shared fact base for the regional community colleges to understand employer demand within the Mobility sector. This data, in combination with the supply-side education program data from the Center for Automotive Research, will enable aligned decision-making, more efficient resource allocation, and efforts whose value is greater than the sum of its parts.

Appendices

Appendix A: Mobility Sector NAICS Definition

Core Mobility Industries

NAICS	Description	2017 Jobs in Detroit Region	2021 Jobs in Detroit Region	2017-2021 % Jobs Change	2021-2026 % Jobs Change
3361	Motor Vehicle Manufacturing	30,717	34,499	12%	9%
3362	Motor Vehicle Body and Trailer Manufacturing	2,976	2,751	(8%)	(13%)
3363	Motor Vehicle Parts Manufacturing	70,559	69,613	(1%)	(2%)

Upstream Industries

NAICS	Description	2017 Jobs in Detroit Region	2021 Jobs in Detroit Region	2017-2021 % Jobs Change	2021-2026 % Jobs Change
3252	Resin, Synthetic Rubber, and Artificial and Synthetic Fibers and Filaments Manufacturing	1,738	1,650	(5%)	(1%)
3255	Paint, Coating, and Adhesive Manufacturing	3,273	2,933	(10%)	(4%)
3261	Plastics Product Manufacturing	11,788	10,170	(14%)	(12%)
3262	Rubber Product Manufacturing	1,359	1,032	(24%)	(6%)
3272	Glass and Glass Product Manufacturing	897	823	(8%)	(8%)
3279	Other Nonmetallic Mineral Product Manufacturing	822	724	(12%)	(7%)
3311	Iron and Steel Mills and Ferroalloy Manufacturing	4,551	2,782	(39%)	(46%)
3312	Steel Product Manufacturing from Purchased Steel	1,072	1,042	(3%)	3%
3313	Alumina and Aluminum Production and Processing	607	522	(14%)	14%
3314	Nonferrous Metal (except Aluminum) Production and Processing	125	176	41%	(10%)
3315	Foundries	628	722	15%	18%
3321	Forging and Stamping	2,508	2,049	(18%)	(19%)
3323	Architectural and Structural Metals Manufacturing	4,146	3,998	(4%)	(3%)
3327	Machine Shops; Turned Product; and Screw, Nut, and Bolt Manufacturing	13,051	10,135	(22%)	(15%)
3328	Coating, Engraving, Heat Treating, and Allied Activities	7,125	5,941	(17%)	(14%)

3329	Other Fabricated Metal Product Manufacturing	3,752	3,413	(9%)	(10%)
3334	Ventilation, Heating, Air-Conditioning, and Commercial Refrigeration Equipment Manufacturing	693	714	3%	2%
3336	Engine, Turbine, and Power Transmission Equipment Manufacturing	3,617	3,898	8%	3%
3339	Other General Purpose Machinery Manufacturing	6,707	6,575	(2%)	(0%)
3344	Semiconductor and Other Electronic Component Manufacturing	2,409	2,342	(3%)	(6%)
3345	Navigational, Measuring, Electromedical, and Control Instruments Manufacturing	3,637	3,456	(5%)	(2%)
3359	Other Electrical Equipment and Component Manufacturing	1,221	1,289	6%	15%
4233	Lumber and Other Construction Materials Merchant Wholesalers	2,166	1,840	(15%)	(8%)
4234	Professional and Commercial Equipment and Supplies Merchant Wholesalers	7,626	8,093	6%	(4%)
4235	Metal and Mineral (except Petroleum) Merchant Wholesalers	3,536	3,123	(12%)	(16%)
4236	Household Appliances and Electrical and Electronic Goods Merchant Wholesalers	5,989	6,112	2%	(3%)
4238	Machinery, Equipment, and Supplies Merchant Wholesalers	12,361	11,212	(9%)	(7%)
4239	Miscellaneous Durable Goods Merchant Wholesalers	3,130	3,116	(0%)	(9%)
5511	Management of Companies and Enterprises	47,410	48,387	2%	1%

Downstream Industries

NAICS	Description	2017 Jobs in Detroit Region	2021 Jobs in Detroit Region	2017-2021 % Jobs Change	2021-2026 % Jobs Change
3331	Agriculture, Construction, and Mining Machinery Manufacturing	135	205	52%	30%
4231	Motor Vehicle and Motor Vehicle Parts and Supplies Merchant Wholesalers	13,521	13,525	0.0%	0.3%
4411	Automobile Dealers	20,272	18,884	(7%)	(2%)
4413	Automotive Parts, Accessories, and Tire Stores	7,280	6,951	(5%)	(1%)
4841	General Freight Trucking	18,238	20,669	13%	8%
8111	Automotive Repair and Maintenance	14,240	13,872	(3%)	(2%)

Appendix B: Mobility Sector Custom Subsector Definitions

Job postings data provides additional flexibility in defining industry subsectors outside of the confines of the NAICS code structure, which is extremely beneficial for a sector like Mobility where new industry subsectors, occupations and skills are emerging as the sector changes. Below are the keywords and searches used within the job postings data to define each of the Mobility subsectors. All job postings are searched within the five-county Detroit region, and within the predetermined NAICS codes listed in Appendix A.

- **Total Mobility Sector:** Job postings of the core mobility manufacturing, downstream, and upstream industry NAICS codes, OR the Detroit Mobility Producers provided by Detroit Mobility Chamber.
- **Electric Vehicles:** Job postings containing key words/phrases “electric vehicle”, “emobility”, “edrive”, “electrif(ication)”, OR “EV” and NOT “dealer”, “service center”, “showroom”, “galler(y)”.
- **EV Charging Infrastructure:** Job postings containing key words/phrases “ EV charg(e)”, “electric vehicle charg(e)”, “electric charge”.
- **Battery Production:** Job postings containing key words/phrases “battery”, “batter tech(nology)”, “battery cell manufactur(ing)”.
- **Traditional Combustion Engine (ICE) Vehicle Manufacturing:** Job postings within core mobility manufacturing industries, but DO NOT contain key words/phrases “electric vehicle”, “emobility”, “edrive”, “EV”, “dealer”, ”service center”, “showroom”, “galler(y)”.
- **Autonomous Vehicle Manufacturing:** Job postings containing key words/phrases “autonomous”, “self driving”, “self-driving”.
- **Testing Facilities:** Job postings containing key words/phrases “test facility” AND “car”, “automotive”, “vehicle”.
- **R&D + Design:** Job postings containing key words/phrases “r&d”, “research and development”, “r and d”, “research & development”.
- **Intermediate Producers:** Job postings within the upstream and downstream industry NAICS codes.
- **Detroit Mobility Producers:** Job postings by companies provided by the Detroit Mobility Chamber as key mobility companies known and located in the Detroit region.

Appendix C: Demographic Data for Select Entry-Level Occupations

		Age			Gender		Race/Ethnicity				
SOC	Entry-Level Occupations	% Below Age 25	% Prime Working Age (25-54)	% Age 55+	% Males	% Females	% White	% Black/African American	% Hispanic	% Asian	% Two of More Races
15-1232	Computer User Support Specialists	9%	74%	17%	73%	27%	71%	14%	4%	9%	2%
17-3023	Electrical and Electronic Engineering Technologists and Technicians	7%	64%	29%	83%	17%	73%	13%	5%	7%	2%
17-3024	Electro-Mechanical and Mechatronics Technologists and Technicians	7%	65%	28%	81%	19%	73%	13%	4%	7%	2%
17-3026	Industrial Engineering Technologists and Technicians	6%	66%	28%	80%	20%	71%	14%	4%	8%	2%
17-3027	Mechanical Engineering Technologists and Technicians	7%	65%	28%	81%	19%	71%	15%	5%	8%	2%
17-3029	Engineering Technologists and Technicians, Except Drafters, All Other	8%	66%	26%	82%	18%	72%	14%	5%	8%	2%
47-2111	Electricians	8%	68%	23%	97%	3%	85%	8%	4%	1%	2%
49-1011	First-Line Supervisors of Mechanics, Installers, and Repairers	2%	66%	32%	94%	6%	85%	9%	3%	1%	2%
49-3023	Automotive Service Technicians and Mechanics	12%	66%	22%	98%	2%	80%	7%	8%	2%	2%
49-9041	Industrial Machinery Mechanics	4%	64%	32%	97%	3%	81%	11%	4%	2%	1%
49-9044	Millwrights	3%	62%	35%	98%	2%	92%	5%	1%	1%	1%
49-9071	Maintenance and Repair Workers, General	6%	62%	33%	96%	4%	76%	14%	5%	2%	2%
51-1011	First-Line Supervisors of Production and Operating Workers	2%	69%	29%	80%	20%	75%	15%	5%	4%	1%
51-4041	Machinists	5%	60%	35%	95%	5%	84%	8%	3%	4%	1%
51-4111	Tool and Die Makers	2%	51%	47%	98%	2%	91%	5%	2%	2%	1%
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	7%	64%	29%	62%	38%	67%	19%	6%	7%	1%
51-9161	Computer Numerically Controlled Tool Operators	6%	69%	25%	91%	9%	82%	9%	4%	4%	1%
51-9162	Computer Numerically Controlled Tool Programmers	6%	69%	25%	92%	8%	83%	8%	3%	4%	1%
53-1047	First-Line Supervisors of Transportation and Material Moving Workers, Except Aircraft Cargo Handling Supervisors	5%	70%	25%	77%	23%	72%	19%	5%	2%	2%

Appendix D: Demographic Data for Select Bachelor's Level Occupations

		Age			Gender		Race/Ethnicity				
SOC	Entry-Level Occupations	% Below Age 25	% Prime Working Age (25-54)	% Age 55+	% Males	% Females	% White	% Black/African American	% Hispanic	% Asian	% Two of More Races
11-3051	Industrial Production Managers	1%	69%	31%	82%	18%	83%	7%	3%	5%	1%
11-9041	Architectural and Engineering Managers	0%	68%	32%	90%	10%	81%	5%	2%	10%	1%
11-9199	Managers, All Other	3%	64%	33%	70%	30%	78%	9%	6%	4%	3%
13-1028	Buyers and Purchasing Agents	4%	64%	32%	48%	52%	80%	11%	3%	4%	2%
13-1081	Logisticians	5%	75%	20%	66%	34%	63%	24%	4%	6%	3%
15-1211	Computer Systems Analysts	4%	74%	21%	63%	37%	67%	13%	3%	15%	2%
15-1252	Software Developers	5%	81%	15%	80%	20%	60%	6%	2%	30%	2%
17-2071	Electrical Engineers	4%	68%	28%	91%	9%	71%	8%	3%	16%	1%
17-2112	Industrial Engineers	4%	68%	28%	81%	19%	76%	8%	3%	12%	1%
17-2141	Mechanical Engineers	5%	70%	25%	92%	8%	78%	6%	3%	11%	1%
17-2199	Engineers, All Other	4%	67%	29%	87%	13%	75%	7%	3%	14%	2%
27-1021	Commercial and Industrial Designers	6%	71%	22%	60%	40%	78%	6%	4%	10%	2%

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