

Program Design Guide for the Auto & Advanced Mobility Industry



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**Department of
Education &
Workforce**

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Executive Summary

In June of 2023 the Governor's Office of Workforce Transformation (OWT) released Ohio's Auto and Advanced Mobility Workforce Sector Partnership Strategy¹. The strategy detailed the expected job surge of the auto and advanced mobility sector, gave background as to how the strategy was formed, and detailed Ohio's response into four pillars. The goal is to upskill Ohio's workforce and help meet the demands of the auto and advanced mobility industry. The four pillars are:

1. Establish Ohio's statewide auto and advanced mobility workforce sector partnership with regional implementation.
2. Drive auto and advanced mobility industry desirability and career awareness.
3. Broaden the auto and advanced mobility workforce talent pool.
4. Scale education and training to meet auto and advanced mobility demand.

Each of the four pillars has associated initiatives and actions. The Department of Education and Workforce (DEW) is leading the work for two of the initiatives included in the fourth pillar. The two initiatives are:

1. Align and share stackable auto and advanced mobility-relevant manufacturing curricula and credentials statewide.
2. Develop and provide upskilling for all career levels and at all entry points.

The Department, in addition to many ongoing projects, has created this program design guide to assist districts in preparing students for the high-skill, high-wage jobs of today. The program design guide includes:

- Background on Ohio's Auto and Advanced Mobility Workforce Strategy expected job growth and the state's plan.
- Examples of programs of study aligned to the occupations of the auto and advanced mobility industry using current department career technical education pathway courses.
- Industry-Recognized Credential start-up kits to help districts identify the auto and advanced mobility relevant industry credentials that can assist in preparing students.

While much of the work surrounding this auto and advanced mobility job surge is ongoing, this program design guide serves as the first step in the Department's assistance to help districts prepare for these future jobs today.

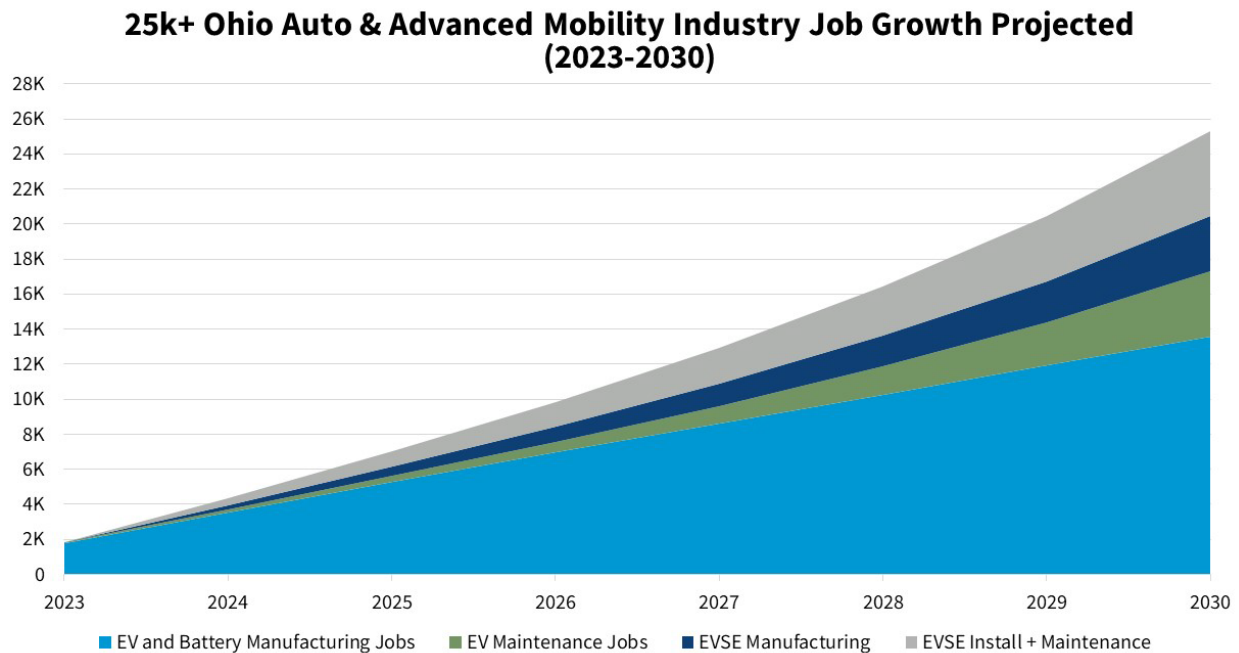
¹ [Ohio's Auto and Advanced Mobility Workforce Strategy](#)

Auto and Advanced Mobility Job Demand

The auto and advanced mobility transition has arrived. With the expected increase in auto and advanced mobility adoption, and projected dominance of the transportation sector, electrification will redefine supply chains, advanced manufacturing, and mobility – and do so faster and more systematically than previously anticipated. By 2032, electric vehicles (EV) will overtake internal combustion engines as the primary modes of transport for new car sales.

ANTICIPATED JOB GROWTH

Ohio is anticipating nearly a 30% increase in demand in the current automotive manufacturing sector workforce. The increase will require our industrial and academic sectors to fully recalibrate learning pathways, scale training and skilling opportunities, and increase this new workforce to power advanced manufacturing’s future.



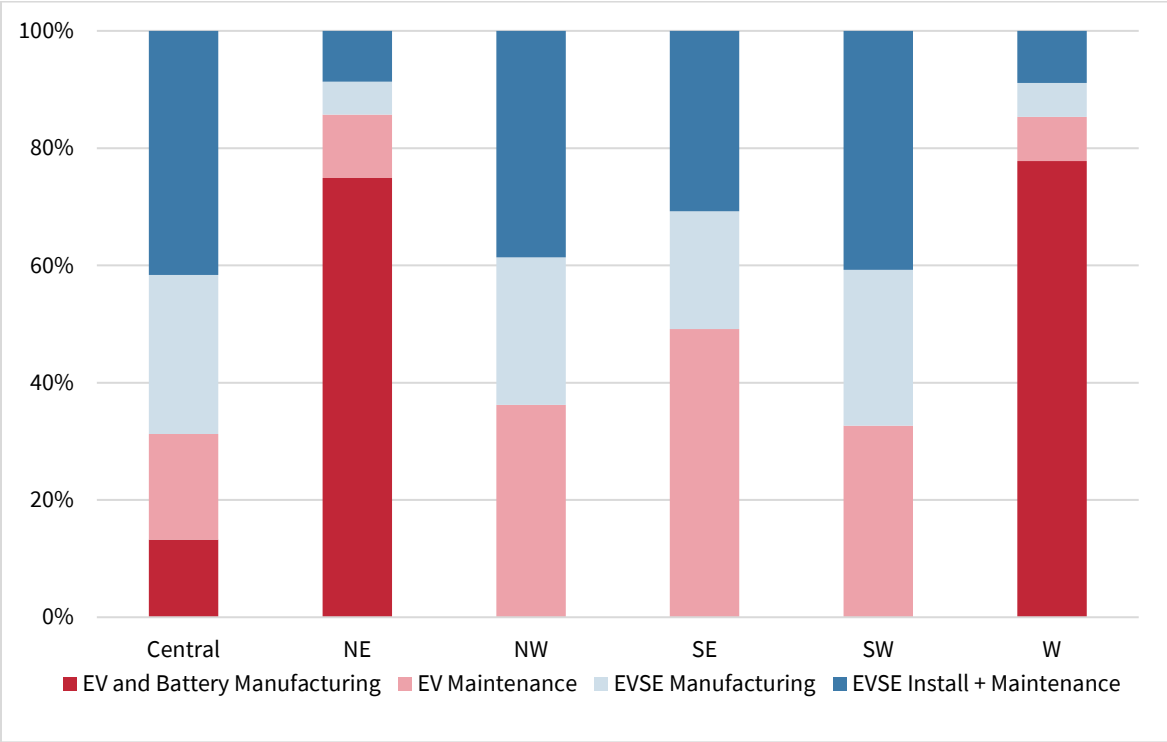
OHIO’S STRATEGY

The Governor’s Office of Workforce Transformation (OWT) and the Ohio Manufacturer’s Association (OMA) convened a broad group of stakeholders in the Winter of 2023 to align on strategies and actions to meet this moment of significant job growth from the auto and advanced mobility value chain. This will include all parts of the electrification of transportation from battery manufacturing to charging station installation. This group of stakeholders spanned across 70+ organizations including industry, government, community, education, training, and workforce development companies, organizations, coalitions, and institutions. During those meetings, they worked to create Ohio’s Auto and Advanced Mobility Workforce Strategy, which outlines the state’s planned response for the impending job surge.

Ohio is pursuing an integrated strategy to bolster its auto and advanced mobility workforce. This strategy captures the auto and advanced mobility economy’s potential and complements other advanced manufacturing growth, such as in semiconductor, aerospace, and solar, across Ohio’s diverse economic base. The strategy is centered on four key pillars to bolster workforce and enable jobseekers to be on the leading edge of the new auto and advanced mobility economy:

1. Establish Ohio’s statewide auto and advanced mobility workforce sector partnership with regional implementation.
2. Drive auto and advanced mobility industry desirability and career awareness.
3. Broaden the auto and advanced mobility workforce talent pool.
4. Scale education and training to meet auto and advanced mobility demand.

Job Growth by Sub-Industry
Distribution of Auto and Advanced Mobility-related Jobs per Region



Auto and Advanced Mobility Career Pathway Programs of Study

Ohio's career-technical education programs offer high quality educational experiences that help students find their career passion. Students acquire real-world skills through classroom learning, hands-on labs, student organizations and work-based learning with local businesses. In pathways and programs, students have unique opportunities to grow themselves as leaders, contribute to their communities, and be part of Ohio's economic development.

Each of Ohio's career fields offers multiple courses and pathways leading to a wide range of career options. Beginning as early as middle school, these courses equip students with knowledge and tools to succeed in high school, college, and career.

The programs of study examples provide the building blocks to design, develop, and implement career pathways to prepare students for a career in the auto and advanced mobility industry. However, the programs of study do not represent all the training or education students may need to enter an auto and mobility industry career. Additional education, training, or certifications may be necessary for employment and advancement, but these models provide students with the foundation to start a career with multiple options.

Using the current department career field technical content standards, pathways, and courses, a district can begin to design, develop, and implement programs of study aligning to auto and advanced mobility occupations.

Career Awareness and Exploration

High quality career awareness efforts will allow schools and districts to maximize student access to pathways and will increase student persistence through pathways into good jobs. [Ohio's Career Connections Framework](#) outlines opportunities that can benefit students from career awareness activities in grades K-5 through career planning that can occur in high school. DriveOhio (an initiative of the Ohio Department of Transportation) has specifically [developed resources for career exploration](#) related to emerging auto and advanced mobility career pathways. Reach out to the Career Connections team at careerconnections@education.ohio.gov to learn more or find support for career awareness and exploration.

ENGINEERING & MANUFACTURING

Auto and Advanced Mobility Engineering and Design*	
Robotics Pathway Courses: <ul style="list-style-type: none"> • Pre-Engineering Technologies • Engineering Design • Engineering Principles • Robotics • Engineering Logic • Industrial Robotics • Engineering Capstone 	Auto and Advanced Mobility Specific Job Titles: <ul style="list-style-type: none"> • Process Engineer • Robotics Engineer • Automation Controls Engineer • Mechanical Engineer • Electrical Engineer <p><i>*Advanced education needed</i></p>

Auto and Advanced Mobility Industrial Maintenance	
Engineering and Science Technologies Pathway Courses: <ul style="list-style-type: none"> • Manufacturing Operations • Digital Electronics • Mechanisms and Drives • AC/DC Electronic Circuits • Machine Tools • Hydraulics and Pneumatics 	Auto and Advanced Mobility -Specific Job Titles: <ul style="list-style-type: none"> • Equipment Maintenance Technician • Electrical Maintenance Technician • Machine Mechanic • Manufacturing Engineer

Auto and Advanced Mobility Production and Manufacturing	
Manufacturing Operations Pathway Courses: <ul style="list-style-type: none"> • Manufacturing Operations • Computer Integrated Manufacturing • Machine Tools • Principles of Manufacturing • Hydraulics and Pneumatics • Manufacturing Capstone 	Auto and Advanced Mobility -Specific Job Titles: <ul style="list-style-type: none"> • Production Worker • Production Associates • Production Technician • Production Engineer

CONSTRUCTION TECHNOLOGIES

Auto and Advanced Mobility Electricians	
Mechanical, Electrical, and Plumbing Pathway Courses: <ul style="list-style-type: none"> • Mechanical, Electrical and Plumbing Systems • Construction Electrical Systems • Resident Electrical Systems • Commercial and Industrial Construction Electrical Systems • Alternative Power Generation Systems • Powerline/Hi-Voltage Power Transmission • Construction Capstone 	Auto and Advanced Mobility -Specific Job Titles: <ul style="list-style-type: none"> • EVSE Installer • EVSE Technician • EVSE Operator • EV Product Fabricators <p><i>*Electric Vehicle Supply Equipment (EVSE)</i></p>

TRANSPORTATION SYSTEMS

Auto and Advanced Mobility Automotive Service Technician	
<p>Ground Transportation Pathway Courses:</p> <ul style="list-style-type: none"> • Hydraulics and Pneumatics • Ground Transportation: <ul style="list-style-type: none"> ○ Maintenance ○ Electrical-Electronics ○ HVAC • Collision: <ul style="list-style-type: none"> ○ Electrical and Mechanical Systems ○ Structural Inspection & Repair ○ Nonstructural Inspection & Repair ○ Painting and Refinishing • Automotive: <ul style="list-style-type: none"> ○ Braking Systems ○ Steering and Suspension Systems • Transportation Capstone 	<p>Auto and Advanced Mobility -Specific Job Titles:</p> <ul style="list-style-type: none"> • Automotive Service Technician • Automotive Service Mechanic

Auto and Advanced Mobility Aviation Service Technician	
<p>Air Transportation Pathway Courses:</p> <ul style="list-style-type: none"> • Aviation Maintenance General • Aviation Structure and Design • Aviation Air Frame System and Components • Aviation Powerplant Theory and Maintenance • Aviation Powerplant Systems and Components • Aviation Unmanned Aircraft Systems • Transportation Capstone 	<p>Auto and Advanced Mobility -Specific Job Titles:</p> <ul style="list-style-type: none"> • Aircraft Mechanic • Aircraft Service Technician • Avionics Technician • Aircraft Powerplant Technician • Small Unmanned Aircraft Pilot

Credential Start-up Kits

ENGINEERING AUTO AND ADVANCED MOBILITY PATHWAY TOOLKIT

To help connect students with career-focused learning and experiences, the Department has created credentialing pathways that can be implemented within traditional schools. The Engineering Auto and Advanced Mobility credentialing pathway provides an opportunity for students to prepare themselves for a career after graduation by offering the student hands-on experience, industry knowledge and training, while also meeting graduation requirements along the way.

CREDENTIAL PATHWAY TO 12 POINTS (WITH POINT VALUES & EMIS CODE)

- Fanuc- Certified Robot Operator 4 points (CQ01)
 - Fanuc- Handling Tool Operation and Programming 4 points (CM13)
 - Fanuc- Electrical Maintenance with R-30iB controller 6 points (CQ03)
- * Innovative Workforce Incentive Program (IWIP) credential

HOW TO EARN

Courses can be offered independently or in a series to complete a CTE-26 pathway.

JOBS & WAGES

These credentials have been identified as being auto and advanced mobility hireable credentials that could lead to employment in the many new auto and advanced mobility fields that are being created in Ohio.

MATERIAL & STAFFING NEEDS & COST:

For purchase of a Fanuc robotic arm ranges depending on size, beginning at \$30,000 and up to \$100,000. Some schools have formed partnerships with their CTPD to borrow equipment.

CREDENTIAL REIMBURSEMENT OPTION

Reimbursement is available through EMIS for examination cost when a student passes the credentialing exam – [please visit the webpage for more details.](#)

BEST PRACTICES

North Union Local Schools and Dublin City Schools currently provide Fanuc credentialing to their students.

MANUFACTURING AUTO AND ADVANCED MOBILITY PATHWAY TOOLKIT

To help connect students with career-focused learning and experiences, the Department has created credentialing pathways that can be implemented within traditional schools. The Manufacturing auto and advanced mobility credentialing pathway provides an opportunity for students to prepare themselves for a career after graduation by offering the student hands-on experience, industry knowledge and training, while also meeting graduation requirements along the way. The information in the toolkit provides schools with the specific pathway, resources for how to implement the pathway, and connection to experts in the field for Manufacturing credentials.

CREDENTIAL PATHWAY TO 12 POINTS (WITH POINT VALUES & EMIS CODE)

- Certified Industry 4.0 Associates I: Basic Operations CQ 83: 3 credits
- Certified Industry 4.0 Associates II: Advanced Operations CQ 84: 3 credits
- Certified Industry 4.0 Associates III: Robot Systems Operations CQ 85: 3 credits
- Certified Industry 4.0 Associates IV: Network and Data Analysis CQ 86: 3 credits

HOW TO EARN

The courses are a mixture of online and hands-on training. Materials must be purchased to complete these credentials.

JOBS & WAGES

These credentials have been identified as being auto and advanced mobility hireable credentials that could lead to employment in the many new AAM fields that are being created in Ohio.

MATERIAL & STAFFING NEEDS & COST

You do not need to be certified to teach this course; however, training is available and recommended. Educators complete training through a train the trainer model. Material costs for equipment are estimated at around \$250,000.

CREDENTIAL REIMBURSEMENT OPTION

Reimbursement is available through EMIS for the cost of the test when student passes credentialing exam – [please visit the webpage for more details](#).

BEST PRACTICES

Schools that have successfully implemented these pathways include Southwest Schools and Brookfield Local Schools.