

Manufacturing Skills for
Connecticut:

Review of Bristol Public Schools' Manufacturing Production Pathway

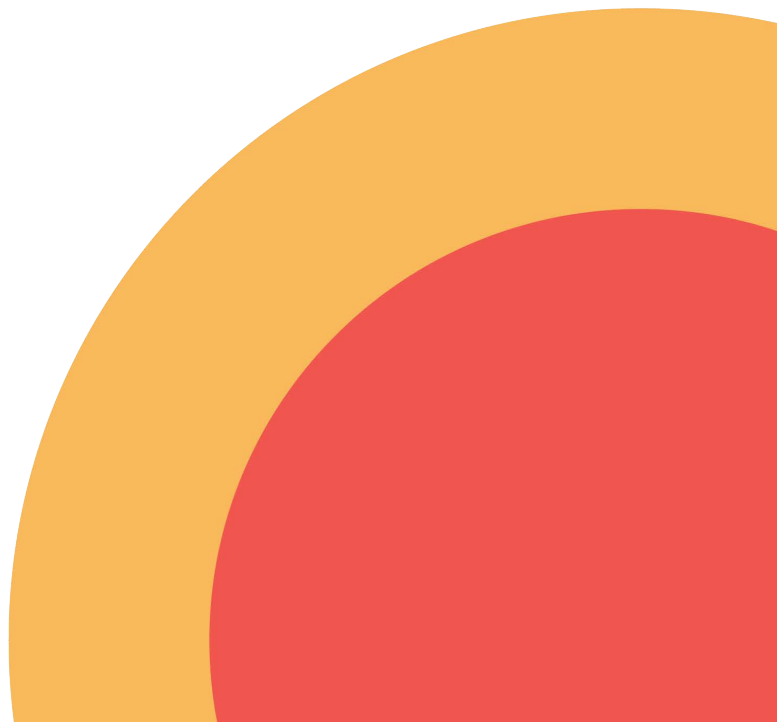


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Background

This program review report includes observations and key takeaways from data collected as part of the Manufacturing Skills for Connecticut (MSforCT) project and is specific to Bristol Public Schools' Manufacturing Production Pathway. The report summarizes information gathered by WestEd between November 2020 and July 2021 through document reviews, surveys, and virtual site visits.

Manufacturing Skills for Connecticut Project Description ¹

Throughout Connecticut, significant gaps exist in the state's manufacturing workforce development system, most notably the dearth of comprehensive education, recruitment, and well-developed career pathways that, collectively, serve to connect industry to education. To address these issues [CONNSTEP](#), in partnership with [ReadyCT](#), the [Connecticut Business & Industry Association \(CBIA\)](#), and the Connecticut Manufacturers' Collaborative (CMC), designed the MSforCT project. The CMC includes all the major regional and statewide manufacturing member organizations across Connecticut, representing over 1200 manufacturing companies with tens of thousands of employees throughout all of Connecticut.

Funded through a grant from the U.S. Department of Commerce National Institute of Standards and Technology (NIST), the MSforCT project (2020-22) aimed to increase and improve career pathways to advanced manufacturing within the K-12 school system. To better understand which programs and models are most effective, remove the silos in which promising programs are operating, and share best practices, the project proposed to:

- complete a comprehensive inventory and analysis of manufacturing career pathway programs and initiatives across K-12 schools/districts;
- conduct program reviews of a subset of programs; and
- build a web-based repository of effective career pathway programs and key criteria for the creation of new programs. This interactive website will also serve as an online community of practice accessible to school districts, business associations, students and families, postsecondary institutions, and other stakeholders.

CONNSTEP contracted with [WestEd](#), a nonprofit educational research, development, and service organization, to conduct the comprehensive inventory and program review. This report summarizes only a portion of the data collected during the overall project period. Specifically, this report focuses on Bristol Public Schools' Manufacturing Production Pathway, one of the 13 programs selected for program reviews, and includes information collected via a state-wide online survey conducted in January 2021 and a virtual site visit conducted in June 2021.

¹ Project description adapted from [ReadyCT's Manufacturing Skills for Connecticut webpage](#) and [Manufacturing Skills for Connecticut Project Abstract](#)

Bristol Public Schools' Manufacturing Production Pathway

Regional Information

Bristol Eastern High School and Bristol Central High School are located in the central part of Connecticut, west of Interstate 91, within Hartford County. This region offers a culture of business development, with internationally known companies in various sectors including insurance and financial services, aerospace, manufacturing, healthcare, and more. Top-tier educational institutions include UCONN, Trinity College, University of Hartford, Central Connecticut State University (CCSU), and University of St. Joseph². Hartford County is home to 1,603 manufacturing sector employers³, with Capital Workforce Partners (CWP) serving as the workforce investment board for the City of Bristol. Some of Bristol's largest private manufacturing employers are Associated Spring, Bauer Aerospace, ClarkDietrich Building Systems, Covanta, Eastern Plastics, Firestone Building Products, Otis Elevator, and Theis Steel⁴. Zippia rated Arthur G Russell Co., Rowley Spring & Stamping, and Classic Coil the three best manufacturing companies to work for in Bristol in 2019⁵. According to the most recent U.S. Census Bureau statistics, Bristol has an estimated population of 59,947, a median household income of \$67,505, with 10.5% of persons living in poverty⁶.

District, School, and Program Overview

Bristol Public Schools' Manufacturing Production Pathway is an advanced manufacturing program hosted at two schools within the Bristol School District; Bristol Central High School and Bristol Eastern High School. Both schools serve students in grades 9-12. According to 2019-2020 data in Edsight⁷, 7,976 students were enrolled at 37 schools and programs within the Bristol School District during the 2019-20 school year. The student body is 51.1% male and 53.7% white. Of the students in the district, 5.3% of students identify as English learners, 53.9% qualify for free or reduced meals, and 20.4% identify as students with disabilities. Approximately 48% of students attend four-year institutions and 16% attend two-year institutions from Bristol Central High School in the fall immediately following high school. Forty-two percent of students attend four-year institutions and 13% attend two-year institutions from Bristol Eastern High School in the fall immediately following high school. Bristol is one of 33 Alliance Districts in CT; these are school districts with among the lowest Accountability Index measures in the state⁸.

² Choose Connecticut - [Hartford Region](#)

³ Connecticut Department of Labor - [Employer List](#)

⁴ Bristol Connecticut - [History of Bristol's Development](#)

⁵ Zippia - [3 Best Manufacturing Companies to Work for in Bristol, CT](#)

⁶ United States Census Bureau - [QuickFacts](#)

⁷ Edsight - [Home](#)

⁸ CT.gov - [Alliance Districts](#)

The Manufacturing Production Pathway began development in 2019 through a partnership with the National Center for College and Career Transitions (NC3T)⁹ so the program is still in the beginning stages and continuing to grow. Currently a four-course program, Bristol works with Tunxis Community College (TCC) to offer students opportunities to gain college level credits during high school. The same program takes place at both high schools in the district with similar curriculum, but the schedule differs between the two schools.

Program Inventory Review

ReadyCT and WestEd worked together throughout fall 2020 to develop a comprehensive statewide inventory of K-12 Advanced Manufacturing Programs. To identify existing programs, WestEd used Google Forms and consulted with ReadyCT, the Connecticut State Department of Education (CSDE), and industry partners. At the end of this effort, the team had identified over 140 programs related to advanced manufacturing programs. A list of all programs identified can be found in Appendix A.

Survey and Site Selection Overview

WestEd researchers developed and disseminated an online survey to capture basic program data and inform the selection of programs to be reviewed.

Survey Development

The project team utilized several sources to develop a rubric to define high-quality, high-impact programs, including the Association for Career & Technical Education (ACTE)¹⁰, the Society of Manufacturing Engineers (SME) and SME Education Foundation¹¹, the National Association of Manufacturers (NAM)¹², and the U.S. Department of Labor, Employment and Training Administration¹³. Survey questions were then developed to mirror the rubric and focused on five broad categories:

- Curriculum Standards and Competencies
- Business and Community Partnerships
- Career Development Offerings
- Sequencing and Articulation
- Access and Equity

⁹ National Center for College and Career Transitions - [Home](#)

¹⁰ Association for Career & Technical Education (ACTE) - [12 Elements of a High-quality CTE Program of Study](#).

¹¹ Society of Manufacturing Engineers (SME) & SME Education Foundation - [Four Pillars of Manufacturing Knowledge](#).

¹² National Association of Manufacturers (NAM) - [NAM-endorsed Skills Certification System](#).

¹³ U.S. Department of Labor, Employment and Training Administration - [Advanced Manufacturing Competency Model](#).

Survey Dissemination

WestEd administered an online survey to manufacturing programs from February 3, 2021 through March 12, 2021. A total of 47 schools responded providing information on 51 programs, representing a 33% response rate. A list of all survey respondents can be found in Appendix B.

Site Selection

The project team used a combination of survey responses, site demographics, and industry recommendations to identify the manufacturing programs that would be invited to participate in a program review of high-quality, high-impact manufacturing programs. Using the rubric created (see Appendix D) during the survey development phase, WestEd researchers scored and ranked each completed survey. A higher survey score indicated that, based on the rubric, the program was more closely aligned with elements of a high-quality, high-impact program. However, it is also important to note the limitations of this approach to identifying high-quality, high-impact programs. The primary limitations are that the programs were chosen among only a sample of manufacturing programs that completed the survey; not all surveys provided complete responses; and surveys were completed by respondents playing diverse roles with differing levels of programmatic knowledge. Thus, the sample from which the team identified high-quality, high-impact programs is limited by self-selection and the self-reported nature of the data source. It is possible that other manufacturing programs not responding to the survey are indeed high-quality and/or the programs chosen among the survey respondents provided incomplete or inaccurate information.

In addition to survey rankings, the research team considered ReadyCT's input as it further analyzed the program list. To ensure that the sample included variation, the project team considered region, urban-rural classification, and socioeconomic and diversity indexes to select a list of finalists that were eligible to participate in the program review. Finally, stakeholder feedback was incorporated into the project team's finalist list. The goal was to identify a group of sites that consisted of both programs of interest to the CMC and programs that were willing and able to participate in the evaluation. The final list of programs selected for review can be found in Appendix C.

Visit Overview

WestEd researchers conducted focus groups and interviews with stakeholders from Bristol Public Schools' Manufacturing Production Pathway on June 3, 2021. Due to the ongoing coronavirus pandemic and travel restrictions, the activities were held virtually using an online video conferencing system. The purpose of the focus groups and interviews was to gather information on program characteristics and activities to supplement data captured via the survey. Additionally, the focus groups and interviews gathered information from key stakeholders about program strengths and challenges and solicited recommendations. The focus groups and interviews were tailored to stakeholders' roles as outlined below.

- A focus group with the two high school principals, three teachers representing both Bristol Central High School and Bristol Eastern High School, and one department chair from Bristol Eastern High School
- A focus group with nine students, representing both Bristol Central High School and Bristol Eastern High School
- A focus group with the superintendent, the secondary STEM supervisor, the executive director of communications, community partnerships, and strategic planning, and a representative from a local business partner

Program Review Results

The sections below synthesize information gathered through the program’s documents, survey response, and virtual site visit. The results are organized by the framework that most influenced the site selection rubric—the 12 areas of high-quality Career and Technical Education (CTE) that were developed by the Association for Career & Technical Education (ACTE).

Summary by 12 Areas of High-Quality CTE

Standards-aligned and Integrated Curriculum

The manufacturing production pathway at Bristol is still in its infancy, after only having begun in 2019. Currently, there are four different courses that students can take: Automation and Robotics, Computer-Aided Design (CAD) and Solid Modeling, Tools and Materials, and Manufacturing Design. These courses total to two credits, with each individual course counting as half of a credit. Currently, the first three courses are offered to students anytime from grades 9-12 while Manufacturing Design requires students to be in grade 10 and up. Students who participate in the Manufacturing Design class are also eligible for their MasterCam Certification, conferred by MasterCam through the course. The Mastercam certification is a set of tests that measure an individual’s ability to: work with the Mastercam software, overcome issues in today’s shops, and produce finished parts¹⁴. The educators at both Bristol high schools coordinate among themselves to ensure that the curriculum is consistent between the two high schools, although the course offerings in a given semester or year may differ depending on student enrollment and interest in the courses. The staff would like to add National Institute for Metalworking Skills (NIMS) standards to their curriculum and attended a training as the first step. Students expressed an interest in computer numerical control (CNC) certifications opportunities as well.

Sequencing and Articulation

Bristol Public Schools has relationships with several local colleges and universities including the University of Connecticut, Tunxis Community College (TCC), Central Connecticut State University, and Western Connecticut State University. Each institution offers expertise in different courses being designed for students in the high school in various pathways. Bristol’s

¹⁴ eMastercam – [Welcome to eMastercam](#)

partnership with TCC is largely based on their manufacturing program. In addition to taking courses to achieve their MasterCam Certification, students are also able to achieve college credit at TCC for other courses. To achieve this credit, students must complete Introduction to CAD as well as CAD and Solid Modeling. After completing both of those classes, students are eligible to receive three college level credits. The faculty teaching these courses are designated as adjunct through TCC, and the syllabus at the high school is aligned with the college to ensure it meets college level expectations.

Students work with their school counselors to enroll in manufacturing classes and are encouraged to learn more about the course offerings from the manufacturing teachers.

Student Assessment

Assessments in the manufacturing program are primarily project based with few formal written assessments included. The teachers across the two schools have worked to create a coordinated system with a uniform grading policy focused on specific aspects of a student's work including work ethic and quality. Students are given the opportunity to demonstrate their learning through project work, therefore, allowing assessments to align with learning in the classroom.

While the focus is on project-based assessments, there are some written assessments. For the courses being offered for college credit, TCC provides specific tests and quizzes for students. Additional written assessments include pre- and post-tests designed to show student growth after completing the course. For the Automation and Robotics class, this consists of a 40-50 question assessment that is co-designed by several teachers. Teachers also use the results to measure student progress and solicit feedback on areas of improvement in teaching and instruction.

Prepared and Effective Program Staff

All three teachers in the CTE department have their Connecticut 047 certification, the general K-12 technical education certification, and have regular opportunities to refresh their MasterCam Certification. Additionally, instructors who teach courses for TCC credit are considered adjunct faculty members.

Teachers have received professional development through The Strengthening Career and Technical Education for the 21st Century Act (Perkins V¹⁵) funding. Last summer, teachers were offered a placement/internship at a manufacturing company. Open to teachers on an annual basis, this opportunity allowed teachers to get to know the equipment and the "ins and outs" of the manufacturing company. To participate, teachers work with the STEM supervisor who coordinated the funding and timesheets. Due to COVID-19 restrictions, no teachers participated during 2020-21. Teachers apply what they learn at the employer host site to revise their course curriculum. In addition, the Perkins funding allows teachers to participate in professional learning provided by the ACTE. Teachers also shared that they have received Project Lead The Way

¹⁵ Perkins Collaborative Resource Network - [Perkins V](#)

(PLTW) training which allows them to teach courses within the PLTW curriculum. PLTW works to transform the teaching experience and empower students through a high school engineering pathway¹⁶.

Engaging Instruction

Teachers shared that there is a combination of methods of teaching in their classes; they feel it is important that they build the foundation of the material first and spend time introducing material and providing demonstrations to students. From there, the learning becomes more hands-on where students have the opportunity to work on projects. Other times, the entire class is composed of a lab day where students are primarily working on their projects and assignments with discussion throughout. Manufacturing courses are capped at 20 students to allow for project-based learning design and adequate spacing of students throughout the room.

For students with an Individualized Education Program¹⁷ (IEP), there is a paraeducator available to join the classroom when needed. Paraeducators work with students individually and support student work on the machines. Bristol partnered with an English learner (EL) consultant who was brought in specifically to provide coaching to all the CTE teachers in the district through a series of four sessions. Afterwards, there were individualized coaching sessions where teachers recorded their classes and received feedback on how to better support students.

Access and Equity

Students shared that they had heard about the manufacturing pathway and courses through students who had previously taken the courses as well as from teachers, school counselors, and through course lists. They also shared that school counselors emphasized how these classes could be helpful in pursuing their future careers. One student shared s/he was interested in pursuing engineering after graduation and felt that these courses would allow for a hands-on learning experience. Another shared the robotics class and club provided him/her with a better understanding of the components of computer programming and inspired an interest in cybersecurity. If students are struggling in a course, they can stay after school and receive additional support from teachers.

Facilities, Equipment, Technology and Materials

Bristol offers a variety of equipment and materials for students to work with during class. Students taking manufacturing classes have access to equipment such as a CNC router, band saws, sanding tools, and 3D printers in addition to computers. These computers have programs such as OnShape or Autodesk Revit to program machines or use for digital architecture. Students can use these machines to do projects during class such as making pens and baskets. They also expressed an interest in having more opportunity to work with the CNC machines specifically and learn how to code a machine.

¹⁶ Project Lead The Way - [About Us](#)

¹⁷ Understood - [What is an IEP?](#)

Business and Community Partnerships

Bristol Public Schools began working with NC3T in 2019 to develop the Manufacturing Production Pathway. NC3T has offered trainings in pathway development to administration. This work is instrumental in guiding the growth of the pathway. The district has a close partnership with DaCruz manufacturing. While this relationship is primarily focused on placing adult learners in jobs, they also participate in the Bristol Technical Advisory Council. This council is part of the district's Perkins V funding and provides speakers to help the council gain a better understanding of the current workforce needs in the community.

Administration shared that they are continuing to develop relationships with local businesses and expand these relationships to allow students the opportunity to have work-based experiences. Administration is also focused on having a diverse range of partnerships to include a variety of types of manufacturing. The administrators hope to show business partners that investing in the program while students are in high school can benefit their companies in the future.

Student Career Development

Beginning in sixth grade, students create a student portfolio through Google that allows them to begin their career exploration. Each year, students meet with their school counselors to discuss different goals and complete a career interest inventory to help students choose courses. A system called Chronicle is used to track student development through these pathways and ensure that courses are purposeful in supporting a student's pathway.

The school's business department offers courses to help students gain employability skills such as business writing. These courses guide students through the hiring process and orient them to what is expected after being hired. Within the manufacturing courses, several teachers include a career component in their classes such as how to create a resume. This is done both to support students as they apply for internships as well as to develop workforce readiness skills.

Career and Technical Student Organizations (CTSOs)

Currently, the school does offer some career and technical student organizations (CTSOs) to students. A Technology Student Association (TSA) robotics club is run by a member of the faculty on Thursdays after school and has been in place for a few years. Students work as a team to develop code and participate in competitions. Students in this club designed pens that they then sold to the senior class. Teachers across the two high schools are working to create extracurricular opportunities for students to collaboratively problem solve in addition to the opportunity to compete.

Students also shared that they would like to see a club for the C-PEP¹⁸ program at their schools. C-PEP is a pre-engineering program that provides students the opportunity to complete a specific project and compete against other schools at the end of the year. Through this program, students

¹⁸ C-PEP - [Home](#)

are given a challenge and a kit where they can design something, such as a car or an egg drop, with the materials they receive.

Work-based Learning

The work-based learning part of the program is still in the initial pilot stage. Currently, there are 12 students enrolled in the initial rollout. These students take Introduction to Cooperative Work Experience (CWE) to develop the required employability skills. After completing this course, students participate in an audit to determine their interest before they are placed in a work environment. Currently, this placement process is challenging as most students are not of age to be on the floor at the manufacturing companies. Therefore, the administration is looking for additional student placement opportunities that allow students to gain employability skills at a younger age.

Students shared that there have been opportunities for internships offered in the district and through local businesses; e.g., an IT internship available through the school that involved gathering student laptops and cleaning them of information. Additionally, teachers communicate regularly with local businesses to learn about opportunities for students.



Data and Program Improvement

As part of the Perkins funding, the district is required to collect specific data. Bristol has a data consultant who worked with the district to build a Bristol Database which houses information such as demographics relative to the different pathways courses and is restricted to administrative access. Demographic data includes gender, race, homelessness, special education, and EL status. Teachers can also access the Bristol database to see data on their current students including standardized assessment data. The program developed for Perkins identifies the number of students who are enrolled in each pathway offered at Bristol. Additional data is collected regarding the number of students who participate in at least one manufacturing course during an academic year and how many students go on to take a second course. This information is broken down by demographic.

The district has a data team which discusses enrollment and monitors course grades and attendance. The team tracks what is popular among students to help determine future course offerings. This year, Perkins V funding also required an in-depth needs assessment where the district monitored enrollment of students with disabilities and students learning English as well as their rates of success and retention.

Final Reflections and Takeaways

The Bristol Public Schools' Manufacturing Production Pathway is still in the early stages of development. There are several areas of growth that have been identified such as continuing to build out the CWE opportunities, increasing partnerships with local businesses, and further developing the pathway course offerings. There is a strong commitment from both administration



and staff at the school to provide CTE courses to students and expose them to potential career opportunities upon graduation from high school and to provide the support they need to get there.

Appendix A: Inventory of CT K-12 Advanced Manufacturing Programs, by District

Ansonia School District

Ansonia High School, Ansonia, CT

Berlin School District

Berlin High School, Berlin, CT

Bolton School District

Bolton High School, Bolton, CT

Bridgeport School District

Bassick High School, Bridgeport, CT

Bridgeport Regional Vocational Aquaculture School, Bridgeport, CT

Central High School, Bridgeport, CT

Fairchild Wheeler Interdistrict Multi-Magnet High School, Bridgeport, CT

Kolbe Cathedral High School, Bridgeport, CT

Warren Harding High School, Bridgeport, CT

Bristol School District

Bristol Central High School, Bristol, CT

Bristol Eastern High School, Bristol, CT

Brookfield School District

Brookfield High School, Brookfield, CT

Capitol Region Education Council

Academy of Aerospace and Engineering, Windsor, CT

Cheshire School District

Cheshire High School, Cheshire, CT

Clinton School District

The Morgan School, Clinton, CT

Colchester School District

Bacon Academy, Colchester, CT

Connecticut Technical Education and Career System (CTECS)

A. I. Prince Technical High School, Hartford, CT

Bristol Technical Education Center, Bristol, CT

Bullard-Havens Technical High School, Bridgeport, CT

E. C. Goodwin Technical High School, New Britain, CT

Eli Whitney Technical High School, Hamden, CT

Ella T. Grasso/Southeastern Technical High, Groton, CT

Emmett O'Brien Technical High School, Ansonia, CT

H. C. Wilcox Technical High School, Meriden, CT

Harvard H. Ellis Technical High School, Danielson, CT

Henry Abbott Technical High School, Danbury, CT

Howell Cheney Technical High School, Manchester, CT

J.M. Wright Technical High School, Stamford, CT

Norwich Technical High School, Norwich, CT
Oliver Wolcott Technical High School, Torrington, CT
Platt Technical High School, Milford, CT
Vinal Technical High School, Middletown, CT
W. F. Kaynor Technical High School, Waterbury, CT
Windham Technical High School, Windham, CT

Coventry School District

Coventry High School, Coventry, CT

Cromwell School District

Cromwell High School, Cromwell, CT

Danbury School District

Danbury High School, Danbury, CT

Darien School District

Darien High School, Darien, CT

Derby School District

Derby High School, Derby, CT

East Granby School District

East Granby High School, East Granby, CT

East Haddam School District

Nathan Hale-Ray High School, Moodus, CT

East Hartford School District

East Hartford High School, East Hartford, CT
Synergy Alternative High School, East Hartford, CT
Woodland School, East Hartford, CT

East Haven School District

East Haven High School, East Haven, CT

East Lyme School District

East Lyme High School, East Lyme, CT

Eastern Connecticut Regional Educational Service Center (EASTCONN)

Quinebaug Middle College, Danielson, CT

Ellington School District

Ellington High School, Ellington, CT

Enfield School District

Enfield High School, Enfield, CT

Fairfield School District

Fairfield Ludlowe High School, Fairfield, CT
Fairfield Warde High School, Fairfield, CT

Farmington School District

Farmington High School, Farmington, CT

Glastonbury School District

Glastonbury High School, Glastonbury, CT

Granby School District

Granby Memorial High School, Granby, CT

Greenwich School District

Greenwich High School, Greenwich, CT

Griswold School District

Griswold High School, Griswold, CT

Groton School District

Robert E. Fitch High School, Groton, CT

Guilford School District

Guilford High School, Guilford, CT

Hamden School District

Hamden High School, Hamden, CT

Hartford School District

Hartford Public High School, Engineering & Green Technology Pathway, Hartford, CT
Pathways Academy of Technology & Design, East Hartford, CT

Killingly School District

Killingly High School, Killingly, CT

LEARN

Connecticut River Academy, East Hartford, CT

Lebanon School District

Lyman Memorial High School, Lebanon, CT

Ledyard School District

Ledyard High School, Ledyard, CT

Madison School District

Daniel Hand High School, Madison, CT

Manchester School District

Manchester High School, Manchester, CT

Meriden School District

Francis T. Maloney High School, Meriden, CT
Orville H. Platt High School, Meriden, CT

Middletown School District

Middletown High School, Middletown, CT

Milford School District

Joseph A. Foran High School, Milford, CT
The Academy, Milford, CT

Milford School District

Jonathan Law High School, Milford, CT

Monroe School District

Masuk High School, Monroe, CT

Montville School District

Montville High School, Oakdale, CT

New Britain School District

New Britain High School, New Britain, CT

New Canaan School District

New Canaan High School, New Canaan, CT

New Haven School District

Metropolitan Business Academy, New Haven, CT
Riverside Education Academy, New Haven, CT

New Haven School District

Engineering - Science University Magnet School, West Haven, CT
Wilbur Cross High School, New Haven, CT

New London School District

New London High School, New London, CT

Newtown School District

Newtown High School, Sandy Hook, CT

North Stonington School District

Wheeler High School, North Stonington, CT

Norwich Free Academy

Norwich Free Academy, Norwich, CT

Old Saybrook School District

Old Saybrook High School, Old Saybrook, CT

Plainfield School District

Plainfield High School, Plainfield, CT

Plainville School District

Plainville High School, Plainville, CT

Plymouth School District

Terryville High School, Terryville, CT

Portland School District

Portland High School, Portland, CT

Regional School District 1

Housatonic Valley Regional High School, Falls Village, CT

Regional School District 4

Valley Regional High School, Deep River, CT

Regional School District 5

Amity Regional High School, Woodbridge, CT

Regional School District 7

Northwestern Regional High School, Winsted, CT

Regional School District 8

RHAM High School, Hebron, CT

Regional School District 10

Lewis S. Mills High School, Burlington, CT

Regional School District 12

Shepaug Valley School, Washington, CT

Regional School District 15

Pomperaug High School, Southbury, CT

Regional School District 16

Woodland Regional High School, Beacon Falls, CT

Regional School District 17

Haddam-Killingworth High School, Higganum, CT

Regional School District 18

Lyme-Old Lyme High School, Old Lyme, CT

Regional School District 19

E. O. Smith High School, Storrs, CT

Rocky Hill School District

Rocky Hill High School, Rocky Hill, CT

Seymour School District

Seymour High School, Seymour, CT

Shelton School District

Shelton High School, Shelton, CT

Simsbury School District

Simsbury High School, Simsbury, CT

Somers School District

Somers High School, Somers, CT

South Windsor School District

South Windsor High School, South Windsor, CT

Southington School District

Southington High School, Southington, CT

Stafford School District

Stafford High School, Stafford Springs, CT

Stamford School District

The Academy of Information Technology, Stamford, CT

Stonington School District

Stonington High School, Stonington, CT

Stratford School District

Frank Scott Bunnell High School, Stratford, CT

Stratford School District

Stratford High School, Stratford, CT

Suffield School District

Suffield High School, Suffield, CT

Thomaston School District

Thomaston High School, Thomaston, CT

Thompson School District

Tourtellotte Memorial High School, North Grosvenordale, CT

Torrington School District

Torrington High School, Torrington, CT

Trumbull School District

Trumbull High School, Trumbull, CT

Unified School District #1

State of Connecticut Department of Correction, Wethersfield, CT

Vernon School District

Rockville High School, Vernon, CT

Wallingford School District

Lyman Hall High School, Wallingford, CT

Mark T. Sheehan High School, Wallingford, CT

Waterbury School District

Waterbury Career Academy, Waterbury, CT

Waterbury School District

Crosby High School, Waterbury, CT

John F. Kennedy High School, Waterbury, CT

Wilby High School, Waterbury, CT

Waterford School District

Waterford High School, Waterford, CT

Watertown School District

Watertown High School, Watertown, CT

West Hartford Public Schools

Conard High School, West Hartford, CT

William H. Hall High School, West Hartford, CT

West Haven School District

West Haven High School, West Haven, CT

Westbrook School District

Westbrook High School, Westbrook, CT

Wethersfield School District

Wethersfield High School, Wethersfield, CT

Windham School District

Windham High School, Windham, CT

Windsor School District

Windsor High School, Windsor, CT

Windsor Locks School District

Windsor Locks High School, Windsor Locks, CT

Wolcott School District

Wolcott High School, Wolcott, CT

Woodstock Academy

The Woodstock Academy, Woodstock, CT

Appendix B: CT Advanced Manufacturing Program Survey Respondents, by District

Ansonia School District

Ansonia High School, Ansonia, CT

Bridgeport School District

Bassick High School, Bridgeport, CT

Bristol School District

Bristol Central High School, Bristol, CT

Bristol Eastern High School, Bristol, CT

Cheshire School District

Cheshire High School, Cheshire, CT

Colchester School District

Bacon Academy, Colchester, CT

Connecticut Technical Education and Career System (CTECS)

Bristol Technical Education Center, Bristol, CT

Bullard-Havens Technical High School, Bridgeport, CT

Eli Whitney Technical High School, Hamden, CT

H. C. Wilcox Technical High School, Meriden, CT

Harvard H. Ellis Technical High School, Danielson, CT

Platt Technical High School, Milford, CT

Vinal Technical High School, Middletown, CT

W. F. Kaynor Technical High School, Waterbury, CT

Coventry School District

Coventry High School, Coventry, CT

East Granby School District

East Granby High School, East Granby, CT

East Haddam School District

Nathan Hale-Ray High School, Moodus, CT

East Hartford School District

East Hartford High School, East Hartford, CT

East Haven School District

East Haven High School, East Haven, CT

Eastern Connecticut Regional Educational Service Center (EASTCONN)

Quinebaug Middle College, Danielson, CT

Glastonbury School District

Glastonbury High School, Glastonbury, CT

Griswold School District

Griswold High School, Griswold, CT

Hamden School District

Hamden High School, Hamden, CT

Hartford School District

HPHS Academy of Engineering & Green Technology, Hartford, CT

LEARN

Connecticut River Academy, East Hartford, CT

Lebanon School District

Lyman Memorial High School, Lebanon, CT

Madison School District

Daniel Hand High School, Madison, CT

Manchester School District

Manchester High School, Manchester, CT

New Britain School District

New Britain High School, New Britain, CT

Plainfield School District

Plainfield High School, Plainfield, CT

Plainville School District

Plainville High School, Plainville, CT

Regional School District 16

Woodland Regional High School, Beacon Falls, CT

Regional School District 8

RHAM High School, Hebron, CT

Rocky Hill School District

Rocky Hill High School, Rocky Hill, CT

South Windsor School District

South Windsor High School, South Windsor, CT

Stonington School District

Stonington High School, Stonington, CT

Suffield School District

Suffield High School, Suffield, CT

Thomaston School District

Thomaston High School, Thomaston, CT

Thompson School District

Tourtellotte Memorial High School, North Grosvenordale, CT

Torrington School District

Torrington High School, Torrington, CT

Unified School District #1

State of Connecticut Department of Correction, Wethersfield, CT

Wallingford School District

Lyman Hall High School, Wallingford, CT

Waterbury School District

Waterbury Career Academy, Waterbury, CT

West Hartford Public Schools

Conard High School, West Hartford, CT

William H. Hall High School, West Hartford, CT

Windham School District

Windham High School, Windham, CT

Windsor School District

Windsor High School, Windsor, CT

Appendix C: Final List of CT Programs Selected for Review

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| Bacon Academy Manufacturing at Bacon Academy Colchester School District, Colchester, CT |
| Bristol Manufacturing Production Pathway at Bristol Central & Bristol Eastern High Schools Bristol School District, Bristol, CT |
| Early College Advanced Manufacturing Program at Connecticut River Academy LEARN Regional Education Service Center, East Hartford, CT |
| Precision Machining Technology at Eli Whitney Technical High School Connecticut Technical Education and Career System (CTECS), Hamden, CT |
| Hamden Engineering Careers Academy at Hamden High School Hamden School District, Hamden, CT |
| Intro to Manufacturing at Lyman Hall High School Wallingford School District, Wallingford, CT |
| Manchester Public Schools Manufacturing Program at Manchester High School Manchester School District, Manchester, CT |
| Academy of Manufacturing, Engineering & Technology (MET) at New Britain High School New Britain School District, New Britain, CT |
| Manufacturing for Industry: YMPI with EWIB at RHAM High School Regional School District 8, Hebron, CT |
| Manufacturing Pathway at Tourtellotte Memorial High School Thompson School District, North Grosvenordale, CT |
| Precision Machining Technology at Vinal Technical High School Connecticut Technical Education and Career System (CTECS), Middletown, CT |
| Manufacturing Academy at Waterbury Career Academy Waterbury School District, Waterbury, CT |
| Career and Technical Education at Windsor High School¹⁹ Windsor School District, Windsor, CT |

¹⁹ Windsor High School declined to participate in the program review.

Appendix D: Scoring Rubric

| Category Name | Full Question | Response Required to Receive Point | Related High-quality CTE Program Element | Element-Weighted Score | Non-Weighted Score |
|---------------------------------|--|------------------------------------|--|------------------------|--------------------|
| Identified Student Populations | Has your program identified student populations in your vicinity that are typically underserved educationally or underemployed due to educational, economic or other barriers? | Yes | Access and Equity | 0.3333333333 | 1 |
| Identified Root Causes | Has your program identified the root causes of identified gaps in participation and performance of these student groups? | Yes | Access and Equity | 0.3333333333 | 1 |
| Orgs to Support Access & Equity | Has your program utilized any organizations and/or resources to support your efforts related to access and equity? | Yes | Access and Equity | 0.3333333333 | 1 |
| Business Partnerships | Is your program involved in any business partnerships? | Yes | Business and Community Partnerships | 0.5 | 1 |
| Community Partnerships | Is your program involved in any community partnerships (i.e., partnerships with nonprofit organizations, public agencies, and/or government offices)? | Yes | Business and Community Partnerships | 0.5 | 1 |

| Category Name | Full Question | Response Required to Receive Point | Related High-quality CTE Program Element | Element-Weighted Score | Non-Weighted Score |
|------------------------|---|------------------------------------|--|------------------------|--------------------|
| CTSOs | Has your school established one or more Career and Technical Student Organizations (CTSOs)? | Yes | Career and Technical Student Organizations (CTSOs) | 1 | 1 |
| Age: > 5 Years | Calculated age using starting year provided | > 5 Years | Data and Program Improvement | 0.5 | 1 |
| Program Data | Please describe the types of data the program collects and how data are used. | Response Provided | Data and Program Improvement | 0.5 | 1 |
| Specialized Facilities | Please describe any specialized facilities, equipment, technology, and/or materials available to program participants. Please provide any relevant website links or documentation. | Response Provided | Facilities, Equipment, Technology and Materials | 1 | 1 |
| Staff PD | Do program staff have opportunities to participate in professional learning activities specific to advanced manufacturing? | Yes | Prepared and Effective Program Staff | 1 | 1 |
| Sequenced Courses | Does the program structure require students to take courses in a SEQUENCE (e.g., Advanced Manufacturing Technology I, Advanced Manufacturing Technology II, Advanced Manufacturing Technology III, etc.)? | Yes | Sequencing and Articulation | 0.3333333333 | 1 |

| Category Name | Full Question | Response Required to Receive Point | Related High-quality CTE Program Element | Element-Weighted Score | Non-Weighted Score |
|--|---|------------------------------------|---|------------------------|--------------------|
| Credentials | Which of the following industry-recognized credentials does your program offer? | At least 1 selected | Sequencing and Articulation | 0.3333333333 | 1 |
| Credit that Articulates | Which of the following opportunities to earn credit that articulates to the next level of education does your program offer? | At least 1 selected | Sequencing and Articulation | 0.3333333333 | 1 |
| Industry-Recognized Standards & Competencies | Does your program's curriculum incorporate industry-recognized technical standards and competencies (e.g., NIMS, AWS, MSSC, etc.)? | Yes | Standards-aligned and Integrated Curriculum | 0.25 | 1 |
| Employability Skill Standards | Does your program's curriculum incorporate employability skill standards, such as problem solving, critical thinking, teamwork, communications, interview skills, and workplace etiquette, that help students succeed in the workplace? | Yes | Standards-aligned and Integrated Curriculum | 0.25 | 1 |
| Publicly Available Standards | Are program standards publicly available and accessible? | Yes | Standards-aligned and Integrated Curriculum | 0.25 | 1 |
| Curriculum Reviewed Regularly | Is the program's curriculum reviewed regularly? | Yes | Standards-aligned and Integrated Curriculum | 0.25 | 1 |

| Category Name | Full Question | Response Required to Receive Point | Related High-quality CTE Program Element | Element-Weighted Score | Non-Weighted Score |
|------------------------------|---|------------------------------------|--|------------------------|--------------------|
| Career Development | Which of the following career development opportunities does your program offer? | At least 1 selected | Student Career Development | 1 | 1 |
| Work-based Learning | Which of the following work-based learning opportunities does your program offer? | At least 1 selected | Work-based Learning | 1 | 1 |
| Total Possible Score: | | | | 10 | 19 |