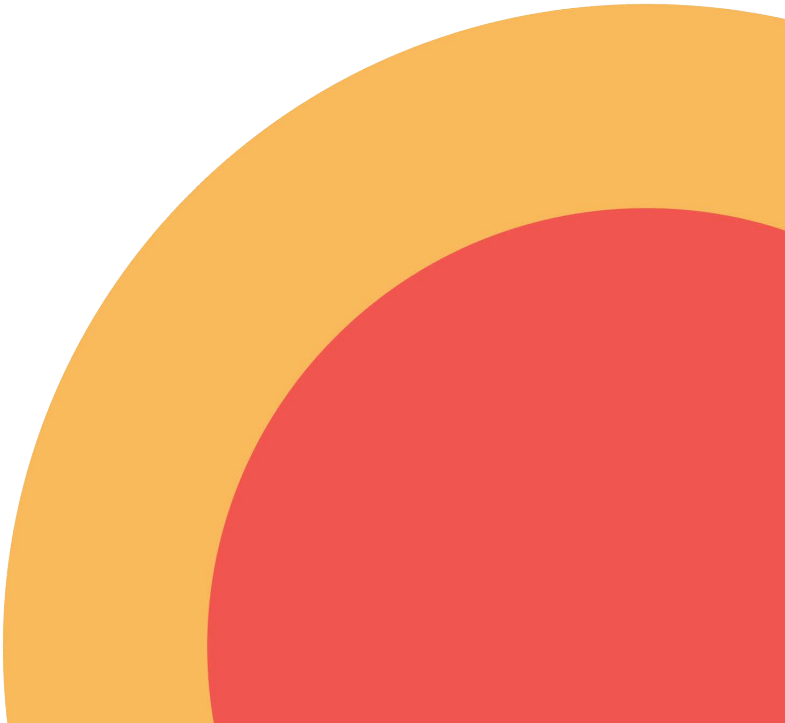
Manufacturing Skills for Connecticut:

Review of Tourtellotte Memorial High School's Manufacturing 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 Tourtellotte Memorial High School's Manufacturing 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 Tourtellotte Memorial High School's Manufacturing 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 May 2021.

[1] Project description adapted from ReadyCT's Manufacturing Skills for Connecticut webpage and *Manufacturing Skills for Connecticut Project Abstract*.

Tourtellotte Memorial High School's Manufacturing Pathway Overview

Regional Information

Tourtellotte Memorial High School[2] is located in Windham County in the town of North Grosvenordale, in the upper northeastern part of Connecticut. Tourtelotte is part of the Thompson School District. Known as Connecticut's "quiet corner," and quintessentially New England in its authentic appearance and feel, the Windham region's advanced manufacturing sector is anything but quiet. The area is home to many companies that produce products for both the naval defense and aerospace industries[3]. Eastern Connecticut manufacturing jobs grew four times as fast as the rest of the state between 2015 and 2019. Two-thirds of all statewide manufacturing job growth during that period took place in the eastern region's 41 communities, ranging from Lyme to Stonington in the south to Union and Thompson in the north[4]. With the Eastern Workforce Investment Board (EWIB) serving as the Workforce Investment Board for the town of Thompson, Windham County is home to 176 manufacturing sector employers[5]. Regional manufacturing employers include Connecticut Tool and Manufacturing, FritoLay, Micro Precision, Nathan Airchime, Prysmian Group, Spirol, Unfi, United Abrasives, Westminster Tool, and Whitcraft[6]. According to the most recent U.S. Census Bureau statistics, Thompson has an estimated population of 9,379, a median household income of $80,125, with 6.4 % of persons living in poverty[7].

District, School, and Program Overview

Tourtellotte Memorial High School (TMHS) is a public high school that serves students in grades nine through 12. It is one of the three schools that make up Thompson School District. Thompson is one of 33 Alliance Districts in CT; these are school districts with among the lowest Accountability Index measures in the state[8]. According to data in Edsight[9], 995 students were enrolled at schools within the Thompson School District during the 2019-20 school year. The student body was majority white (90.4%) and male (54.6%). The district reported that 17.5% of its enrollees identified as students with disabilities. Additionally, 47.6% of students were eligible for free or reduced-price meals. The district did not report the percentage of English learners due to small counts. The four-year graduation rate for Thompson School District's Class of 2020 was 85.4%. As reported by National Student Clearinghouse, and considering Tourtellotte Memorial

[2] Thompson Public Schools - Tourtellotte Memorial High School
[3] CT.gov - Windham Region
[4] CBIA - Eastern Connecticut Leads State in Manufacturing Job Growth
[5] Connecticut Department of Labor - Employer List
[6] CT.gov - Windham Region
[7] United States Census Bureau - QuickFacts
[8] CT.gov - Alliance Districts
[9] Edsight - Home

High School's graduating Classes of 2012 through 2019, an average of 40.25% of students enrolled in four-year institutions and 20.4% of students enrolled in two-year institutions in the fall immediately after high school.

TMHS's Manufacturing Pathway started in the 2015-16 school year and is primarily funded by federal grant funds made available by the Strengthening Career and Technical Education for the 21st Century Act (Perkins V). The program is intended to begin in the ninth grade, (with some students taking classes starting in eighth grade) and consists of the following three courses:

- Computer-Aided Design (CAD): SolidWorks
- Introduction to Engineering Drawing
- Manufacturing Math

TMHS has a partnership with Quinebaug Valley Community College (QVCC), a public community college located in Danielson, CT, which allows for students to earn up to eight credits if they successfully complete the three manufacturing pathway courses. Additionally, the school is part of the Eastern Connecticut Workforce Investment Board's (EWIB) Youth Manufacturing Pipeline Initiative (YMPI) program and thus, offers the YMPI program to students in 12th grade which offers manufacturing skills training to high school students[10]. EWIB's YMPI program runs in 15 Eastern Connecticut high schools and provides each respective school with resources, training frameworks, and industry connections with the goal of addressing hiring needs of local manufacturers. Students who successfully complete the YMPI course can receive up to an additional seven college credits from QVCC and are eligible for workforce placement through this partnership between TMHS and EWIB.

Program Inventory Review

ReadyCT and WestEd worked together throughout fall 2020 to develop a comprehensive statewide inventory of Connecticut-based 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. 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.

[10] Eastern Connecticut Workforce Investment Board - Eastern CT Manufacturing Pipeline

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)[11], the Society of Manufacturing Engineers (SME) and SME Education Foundation[12], the National Association of Manufacturers (NAM)[13], and the U.S. Department of Labor, Employment and Training Administration[14]. 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

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.

[11] Association for Career & Technical Education (ACTE) - 12 Elements of a High-quality CTE Program of Study.
[12] Society of Manufacturing Engineers (SME) & SME Education Foundation - Four Pillars of Manufacturing Knowledge.
[13] National Association of Manufacturers (NAM) - NAM-endorsed Skills Certification System.
[14] United States Department of Labor, Employment and Training Administration - Advanced Manufacturing Competency Model.

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 Tourtellotte Memorial High School's Manufacturing Pathway on May 28, 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 a business partner and program coordinator
- A focus group with the superintendent, principal, and program coordinator
- A focus group with five students
- A focus group with six teachers

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

TMHS designed its manufacturing curriculum with guidance from two key partners, QVCC and EWIB. The three core pathway courses (i.e. CAD: SolidWorks, Introduction to Engineering Drawing, and Manufacturing Math) mirror the courses offered at QVCC. In addition to college credits, students can earn an Advanced Manufacturing Certificate upon successful completion of the pathway. Currently, the courses utilize OSHA-10, a workplace safety and health training, and

Tooling U-SME[15], a learning management system software focused on the manufacturing industry. The program content is reviewed regularly by school leadership, instructors, industry partners, workforce boards, students, families, and community service providers. According to the survey filled out prior to the virtual activities, National Institute for Metalworking Skills (NIMS)[16] certification opportunities would be available to students in the coming academic year (2021-22).

Sequencing and Articulation

Currently, there is no specific order for the courses offered in TMHS' Manufacturing Pathway. Focus group participants suggested that creating a course sequence could be helpful in future years and would benefit students by allowing the courses to build upon one another. The high school principal played an instrumental role in making connections with the individual in charge of the manufacturing program at QVCC; this relationship helped establish the articulation agreement and allowed TMHS to add more college credit-bearing courses to the curriculum. Program staff reported that one challenge they experienced was the limited availability of articulated courses as they are dependent on QVCC's offerings.

Student Assessment

Students are often assessed via project-based learning in the classroom. There is a combination of paper tests and project assessments offered at the school. Program administration reported that during COVID-19, it has been increasingly difficult to assess students via project-based learning as students have not always been physically in the classroom. This led to the need to adapt the assessment structure during the past school year away from project based learning and toward traditional assessments during the virtual setting.

Prepared and Effective Program Staff

The program is staffed by one primary, full-time and one-part time Technology Education (Tech Ed) teacher. Program administration reported that there is active collaboration between the Tech Ed instructors and the rest of TMHS teachers. Additionally, the primary Tech Ed instructor regularly collaborates with an educator at another school in the area offering similar courses to students.

The Tech Ed instructors participate in multiple types of professional development funded by the Perkins V grant and state sponsorship. These opportunities have included state-wide conferences, NIMS training, and a project-based learning program offered through Buck Institute for Education PBLWORKS[17] which focuses on building the capacity of teachers to design and facilitate quality project-based learning.

[15] Tooling U-SME - Home
[16] NIMS - Home
[17] PBLWORKS - Home

There have also been challenges surrounding educator requirements for the manufacturing courses. Some teachers have been previously qualified to teach QVCC courses, however when QVCC undergoes accreditation review and changes programs, it also changes the instructor requirements. This has resulted in the expiration of some teachers' qualifications to teach the QVCC course; consequently, the course cannot be offered for college credit.

Engaging Instruction

Students in the classroom are taught through project-based learning so students could get hands-on experiences. Students shared that this was one of the best aspects of the program. They were able to see their own projects come together after a lot of hard work. Examples of the projects created by students include giant board game tables and arcade cabinets where students are able to program electronic panels. Students shared that this was a great feeling to see a project come to life in the classroom and were engaged and invested in the outcome of their projects.

Access and Equity

TMHS has a formalized process for placing students into its various career pathways. Ninth grade students participate in an exploratory rotation schedule to learn more about each of the pathway programs. Next, the school's counselors administer an interest inventory to assist the students in determining potential career directions and which pathways would be beneficial to explore further. Students also can begin taking some courses beginning in eighth grade to get them interested in a particular pathway prior to entering high school. Once students enter the pathway in 10th grade, there is limited flexibility in moving between them.

When working to recruit students into the Manufacturing Pathway, the student leadership team will go to the middle school to make presentations and do small group activities. TMHS's student leadership team includes class officers from each grade, two Board of Education Liaison representatives, and representation from every major school organization (FBLA, Music, Diversity, NHS etc.). Additionally there are a number of at-large positions students can be elected to and are. Allotment of at-large representatives is configured to ensure fair representation of each class. This allows current students to answer prospective students' questions and provide feedback on the program. Program administration reported that they attempt to host these recruitment events at least three times a year. Ideally, and if pandemic restrictions are eased, there will be an open house in fall 2021 to further educate incoming students on the pathway options.

Staff at the school shared that when supporting English learners or students with disabilities, the supports were offered throughout the building. Students can go to the library media center for after-school help as well as get one-on-one support from teachers as needed. Staff shared that special education and student support department staff are exceptional in following the modifications outlined in 504 plans or Individualized Education Plans (IEPs)[18]. Some teachers

[18] U.S. Department of Education - A Guide to the Individualized Education Program

indicated that they pair students who are struggling with stronger students to encourage peer-led learning.

Facilities, Equipment, Technology, and Materials

Using funding provided through Perkins V (both state formula grants and competitive discretionary grants), TMHS was able to purchase several new pieces of equipment during 2020. There are many different types of equipment and technology available in the manufacturing lab to meet the needs of a variety of student projects. For metalworking, there are several different types of drills, saws, and CNC machines. For fabrication, there is a sheet metal machine, a sheet metal shear, and multiple welders. Woodworking materials include various types of saws, a sander, a laser cutter, and a CNC router. Finally, plastics manufacturing includes the use of three 3D printers. A comprehensive facilities list is included in Appendix D.

Business and Community Partnerships

The program has established several business and community partnerships. In addition to the employer support garnered via their EWIB affiliation, TMHS currently has a formal relationship with the Connecticut Marine Trades Association, a network of top marine-related professionals serving the recreational boating community. TMHS also has an active alumni association that provides mentorship and networking opportunities for current students. Program administration reported that they plan on leaning on these partnerships to further develop work-based learning opportunities.

The school also has a relationship with NC3T[19], an organization which is helping TMHS develop all its pathway programs. The relationship was initiated by TMHS and supported by competitive grant funds. The role of NC3T is to work with the school to determine local industry needs, create a plan, and then assist with implementing the plan.

Student Career Development

There are currently no employability skills courses being offered as part of the Manufacturing Pathway curriculum. However, at TMHS, there is an accounting class offered to students. Additionally, the school coordinates events that focus on career development. For example, TMHS hosts an alumni career day where former students return to share their career experiences and participate in mock interviews with current students. This fair is one portion of the alumni career day. TMHS's alumni association is an active partner in these events.

Career and Technical Student Organizations (CTSOs)

Currently, there are no Career and Technical Student Organizations (CTSOs) specific to manufacturing at TMHS. Program administration reported that there were plans to incorporate additional CTSOs during the 2020-21 academic year, but these plans were ultimately delayed due

[19] National Center for College and Career Transitions - Home

to the COVID-19 pandemic. According to the survey filled out prior to the site visit, the CTSOs currently available at TMHS are Technology Student Association and Future Business Leaders of America.

Work-based Learning

Work-based learning is another program aspect that was put on hold due to restrictions caused by the COVID-19 pandemic. Project administration reported that a job shadowing program and work study program will be implemented in the upcoming 2021-22 academic year and will allow students to gain real-world experience. Administration would like to make work-based learning a graduation requirement and offer students a variety of options, including half-day, full-day, and summer-time opportunities, to accommodate students' schedules.

Data and Program Improvement

Data currently being collected follows the requirements stipulated by Perkins V and includes basic demographic information such as number of students in the program, total students in the population, percentage of free and reduced-price lunch eligible students, etc. Program administration also reported that academic attainment data will be gathered in upcoming academic years.

TMHS' participation with NC3T and Pathways development is an essential portion of its continuous improvement efforts. By solidifying the pathways it will ensure students better understand and take advantage of pathway courses, industry recognized certificates, and work based learning opportunities that are available to them. TMHS currently uses multiple measures of success including: the number of students earning QVCC college credit, the number of students earning YMPI and other certifications, and the number of students participating in work based learning placements. TMHS also participates in a Perkins Consortium run by EASTCONN, the local RESC. In completing the local needs assessment required by Perkins V, members reviewed TMHS' manufacturing standards. TMHS is currently working to develop advisory committees for each pathway offered. The partnership with EWIB is an outstanding source for connecting the school with EWIB's more than seventy member manufacturers.

Final Reflections and Takeaways

Overall, the manufacturing pathway at TMHS still appears to be in the early stages which were impacted by the COVID-19 pandemic. There is a plan to move forward with job shadowing and additional course offerings in the coming 2021-22 academic year as school returns to a greater sense of normalcy. Students in the Manufacturing Pathway expressed that they really enjoyed the opportunities for hands-on learning and developing tangible products that are usable. Ideally, students will be able to participate in job shadowing opportunities in the near future, so they are able to get experience in the field. The primary Tech Ed Teacher serves as the main driver in moving this work forward by playing a large role in grant writing to provide funding for the pathway as well as working to develop the program in its entirety.

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 Bunnel 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

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 School[20] Windsor School District, Windsor, CT

[20] 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**

Appendix E: Manufacturing Lab Facilities List

Tourtellotte Memorial High School Manufacturing Lab Facilities List

Metal Working:

- (3) Grizzly 10" x 22" Metal Turning Lathe with DRO
    - Purchased in 2020 with Perkins and Perkins Supplemental funding.
- (2) Grizzly G0759 Mill – Drill with DRO
    - Purchased in 2020 with Perkins and Perkins Supplemental funding.
- Grizzly 7" x 12" Horizontal Band saw
    - Purchased in 2020 with Perkins Supplemental funding.
- Grizzly 14" Vertical Band saw
    - Purchased in 2000 with State Manufacturing Education Grant.
- (2) Rockwell 10" Drill Press
- Sherline 8" CNC lathe
    - Purchased in 2020 with Perkins Supplemental funding.
- Pocket CNC V2-10Bdl. 5 Axis Machining Center
    - Purchased in 2020 with Perkins Supplemental funding.

Fabrication:

- Grizzly 30" 3 in 1 Sheet Metal Machine
    - Purchased in 2020 with Perkins Supplemental funding.
- PEXTO 36" Sheet Metal Shear
- PEXTO 24" Sheet Metal Box and Pan Brake
- Miller #185 Mig Welder
- Miller TIG and ARC Welder

Wood Working:

- SawStop 10" Table saw with 36" cut capacity, overarm guard
    - Purchased in 2020 with Perkins Supplemental funding.
- Grizzly 20" 5HP wood planer.
    - Purchased in 2020 with Perkins and Perkins Supplemental funding.
- Power-Matic 8" Jointer
- Dewalt 10" Sliding Miter Saw
- Rockwell 18" Woodworking Band Saw
- RIKON 6" x 48" Belt Sander
- 60 Watt 12" x 24" Laser Cutter – Engraver
- Shop Bot 48" x 96" CNC Router
    - Purchased in 2018 with Perkins Supplemental funding.

Plastics Manufacturing:

- (2) Afinia 10” x 10” x 10” 3D Printers
    - Purchased with Perkins funding.
- Afinia 5” x 5” 3D Printer
    - Purchased with Perkins funding.