Manufacturing Skills for Connecticut:

Review of Precision Machining Technology at Vinal Technical High School

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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 Vinal Technical High School's Precision Machining Technology program. 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 Precision Machining Technology at Vinal Technical High School, one of the 13 programs selected for program review, 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*.

Overview of the CT Technical Education Career System

Among the schools that participated in the survey, two high schools in the Connecticut Technical Education and Career System (CTECS) were selected for site visits: Precision Machining Technology at Vinal Technical High School and Eli Whitney Technical High School (Eli Whitney). The CTECS is established and maintained by the Connecticut State Department of Education (CSDE) and advised by the CTECS board whose chairperson is appointed by the Governor.[2] The system serves approximately 11,200 full-time students in 17 diploma-granting technical high schools from 166 sending towns, offering 31 occupational careers within 12 career clusters. The system also governs one technical education center and two aviation maintenance programs located throughout the state, both of which serve adults[3].

According to 2019-2020 enrollment data from Edsight[4], the CTECS student body was 42.5% white, 40.0% Hispanic/Latino, and 11.8% Black or African American. Less than five percent (4.4%) of students identified as English learners (ELs), while 11.3% identified as students with disabilities. Additionally, 57.8% of students were eligible for free or reduced-price meals. The four-year graduation rate for Class of '18 CTECS students (across all schools) was 97.2%.

The CTECS model allows ninth graders to spend six months in an exploratory program, rotating through each trade or shop to determine which pathway to follow. By December of the ninth grade year, students choose their shop and all students are expected to commit to their pathway by October of their tenth grade year. Students spend 91 days in shop and 91 days in core academics. Students travel in cohorts, called cycles; students in Grades 9 and 12 travel to shop together while students in Grades 10 and 11 are in academic classes, and vice versa. There are 14 precision machine shops among the 17 CTECS high schools and they share one curriculum, which is based on NIMS credentials and the use of Tooling U[5], the hybrid learning management system and curriculum aligned with NIMS. Students apply to their school of choice, generally based on location-proximity. One stipulation may be if the closest school does not offer the trade they are able to apply/attend to the available location.

Currently, CTECS is developing an articulation agreement with the community college system in CT which will allow students to earn up to 11 college-level credits. Thus, upon high school graduation, students will have earned almost a semester's worth of the necessary credits towards an associate's degree.

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[2] CT Technical Education and Career System - CTECS Board
[3] CT Technical Education and Career System - About
[4] Edsight - Home
[5] Tooling U - Tooling U-SME: The Pinnacle of Manufacturing Training

Precision Machining Technology at Vinal Technical High School

Regional Information

Founded in 1962, Vinal Technical High School (Vinal Tech) is located in Middletown, CT within Middlesex County and is part of the CTECS district. Home to a strong manufacturing and aerospace community, many of the state's top tourist destinations and a beautiful landscape along the Connecticut River, the Middlesex region offers vibrant town centers, a strategic location, and access to major highways. Middlesex County is home to a robust network of manufacturers in the aerospace supply chain, and in other critical areas within the industry. Whelen Engineering, Jarvis Products Corporation, The Lee Company, Tower Laboratories, GKN Aerospace Services Structures, Pegasus Manufacturing, Aerocision, and many more are adding jobs and stepping up to the plate as corporate citizens[6]. Middlesex County is home to 299 manufacturing sector employers, with Workforce Alliance serving as the workforce investment board for this region[7]. Vinal Tech is part of CTECS and therefore, the school receives students from other towns[8]. Vinal Tech enrolls approximately 400 students in grades 9-12 from 27 towns.

District, School, and Program Overview

According to 2020-2021 enrollment data in Edsight[9], the Vinal Tech student body, comprised of 405 students, was majority white (67.6.5%), 19% Hispanic/Latino, and 6.6% Black or African American with a female to male ratio of about 3:7 (26% and 74% respectively). Less than two percent (1.7%) of students identified as English learners (ELs), while 19.3% are students with disabilities. Additionally, 47.2% of students were eligible for free or reduced-price meals. The four-year graduation rate for the Vinal Tech Class of '20 was 99%. As reported by National Student Clearinghouse, an average of 22% of students in the Vinal Tech class of 2019 enrolled in four-year institutions and 12% of Vinal Tech students enrolled in two-year institutions in the fall immediately after graduating from high school[10]. Others go directly into the workforce. Vinal Tech offers 12 technical programs, including precision machining.

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 the effort, the team had identified over

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[6] Choose Connecticut – Middlesex Region
[7] Connecticut Department of Labor – Employer List
[8] Vinal Technical High School – About Vinal Tech
[9] Edsight - Home
[10] National Student Clearinghouse – Aggregate report for Vinal High School

140 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)[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 K-12 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 a 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

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

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 Vinal Tech's Manufacturing for Industry program between June 10, 2021 and June 14, 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 provided an opportunity to gather 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 two technology education teachers
- An interview with the outgoing career and technical education department coordinator
- An interview with the incoming career and technical education department coordinator (current vice principal at another CTECS high school)
- A focus group with three students
- A focus group with three business partners

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

Vinal Tech works closely with their Career and Technical Education Advisory Committee (CTEAC) Advisory Board to maintain an up-to-date curriculum aligned to industry standards and needs, both regionally and nationally[15]. In addition, each program area has its own advisory board. Technology-related mathematics, reading, writing, vocabulary, machine trade print reading, and science are integrated throughout the curriculum. The manufacturing curriculum is aligned to the National Institute for Metalworking Skills (NIMS)[16] standards, providing students the opportunity to earn a NIMS credential through Tooling U[17].

Sequencing and Articulation

Vinal Tech's Precision Machining Program consists of four courses taken in the following sequential order: Exploratory Introduction to Precision Machining Technology, Intermediate Precision Machining Technology Practices and Principles, Precision Machining and Introduction to Computer Numerical Control (CNC), and CNC and Advanced Machine Operation. Students who meet course requirements and reach a certain level of proficiency are eligible for work-based learning (WBL) in their junior year. Vinal Tech has a partnership with Middlesex Community College (MxCC), a public community college located in Middletown, Connecticut. Students who successfully complete the program can receive college credits from MxCC.

Student Assessment

The Precision Machining program utilizes a variety of assessment types including both written and project-based assessments. The instructor described himself as "old school," citing that he is a big believer in the textbook. In his classes, he has students rotate reading aloud from the book and then discussing the theory as a class. There is ongoing formative assessment while students work on their projects in the shop, with opportunities for correction and improvement along the way. For NIMS certification, students complete their projects at school and have them inspected and verified by local businesses. External proctors come to the school to proctor the certification exams for the students. The instructor's goal is for all manufacturing students to receive a NIMS credential. Students can also earn an OSHA- 10 certificate, which is facilitated online through CareerSafe, OSHA 10-hour General Industry, in the tenth grade year.

Prepared and Effective Program Staff

Students and business partners described the lead instructor as central to the program. He has been the only instructor for 18 years until January 2021, when a new instructor was hired. During WestEd's site visit with Vinal Tech, the newly hired instructor was being trained for the position. The veteran instructor is a graduate of Vinal Tech and taught at J. M. Wright Technical School for

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[15] CT Technical Education Career System – Message from the Board
[16] NIMS - Home
[17] Tooling U-SME - Home

seven years before coming to Vinal Tech in 2003. The newer teacher graduated from Howell Cheney Technical High School and completed an apprenticeship at a tool and die shop. He has experience in wire electrical discharge machining (EDM) in the tool room and has provided support for metal stamping and injection molding.

Both teachers described the challenges in coming from the trade without teaching experience and suggested job shadowing as a pipeline for teachers to gain awareness and knowledge of what it is like to work in a school. The new teacher described transitioning to the classroom as a "big shock." The veteran teacher explained that there are opportunities for professional learning, both district-wide and trade focused, and that the district allows for shop teachers to participate in peer observation across the CTECS as well as to spend time at local businesses gaining experience on newer machines. One administrator wished there could be more time to connect with other teachers in the same pathway (e.g., having role-alike meetings to discuss curriculum, challenges, and promising practices).

Engaging Instruction

Students spoke highly of their instructor, sharing that he never gives them the answer and that he encourages discussion and problem solving instead. Students also noted his connections in the industry and ability to match students with WBL experiences, clearly a highlight of the program for the students. They cited the "ability to go out and do" as one of their favorite aspects of the program. Students, business partners, and the new instructor all spoke very highly of the lead instructor; it was clear that he is central to the program. The newer teacher said, "We need more people like 'him'; those people are the core of these programs, are hard to find, and they are going to retire. We need ways to sustain the program and replicate those kinds of people."

Access and Equity

Students are recruited to the program using printed materials, guidance activities, and family engagement evenings. Program administration begins recruitment as early as eighth grade to begin introducing students to the manufacturing program through information fairs. Several interview participants cited difficulty in being able to visit the middle schools to recruit and indicated that there was competition among non CTECS schools for the students, possibly resulting in resistance to educate students about CTECS as a potential pathway. In addition to the fall information fairs and general marketing material, the school has an open house in the spring. One administrator cited the CTECS as excelling in its ability to meet individual student needs, especially students with disabilities. Another noted the diversity of the student body among the 17 technical high schools.

Facilities, Equipment, Technology and Materials

Although the program is primarily funded by a combination of state, district, and federal sources, administration makes it a priority to apply for supplemental grants to secure funding for additional equipment and maintenance. Students have access to state-of-the art equipment and technology, including CNC mills which were funded by a $1 million grant in 2014, for hands-on work. The

primary instructor noted that the annual purchasing budget is not enough to keep the shops up to date. The newer teacher was "very impressed with the facility and what they have for students." As well, the instructor noted that the relationships with business partners are critical to securing new equipment; he noted that it takes "lots of networking."

Business and Community Partnerships

As described previously, program staff actively seek out and maintain partnerships through networking. The school meets with the CTECS Advisory Council twice a year, which can result in student WBL placements. However, the lead instructor indicated that his core three business partners are the ones who "bend over backwards" for him. Business partners trusted the lead teacher's judgment about the students he sent. One partner said, "anyone he sends me, I know has the skills to do the job." Another partner said that compared to their experiences with other programs, Vinal does a great job of vetting the applicants.

Student Career Development

Vinal Tech students have access to SkillsUSA[18] and teachers shared that students often go to the annual National Leadership and Skills Conference (NLSC), a showcase of career and technical education students. One Vinal Tech student placed third in the nation at CNC milling. As mentioned above, the lead teacher's goal is to have every Precision Machining student NIMS certified upon graduation. To this end, he ensures that the student projects meet NIMS standards, and he works to maintain strong relationships with business partners who inspect and verify the projects. One of the business partners lamented about young peoples' employment skills stating, "kids today; they can't get there on time and don't understand economics and 401Ks." He went on to explain that he did not feel this was unique to Vinal Tech students.

Career and Technical Student Organizations (CTSOs)

Other than SkillsUSA, teachers and students were not aware of additional student organization opportunities for Vinal Tech students. Similarly, business partners were not aware of student organizations. In addition, business partners interviewed believed student organizations were not critical to being competitive job applicants.

Work-based Learning

As with all CTECS schools, students spend 91 days in shop in Grades 9 and 10, and by Grade 11 students complete a WBL placement (e.g., internship, job shadowing, or pre-apprenticeship). The students in the site visit focus group were working in machine shops, one in a precision machine shop. Two of the three had employment secured after graduation, one at his WBL site. According to students and business partners, students graduate prepared to enter the profession.

[18] SkillsUSA - About

Data and Program Improvement

In its 2019-2022 Strategic Operating Plan, the CTECS identified five goals, each with a list of strategies and performance measures. The goal areas are: culture, climate, and instruction; industry alignment and collaboration; access and opportunities; systems of excellence; and human capital. Program performance measures include student assessment and performance data, stakeholder survey data, student events and new programming, increased staffing aimed at specific goals and increased WBL opportunities, to name a few. Each program area has a director who oversees all aspects of the program, including standards, curriculum, and certifications. Each school has autonomy over instruction and WBL placement; the school's instructor takes responsibility for these program components. Vinal Tech administrators and its long-time instructor meet regularly with industry partners and their advisory board to inform their program and its continuous improvement.

Final Reflections and Takeaways

Both Vinal Tech's strengths and challenges mirror the strengths and challenges of the larger CTECS. Teachers, administrators, and business partners all noted the diversity of career pathways as well as the experiential nature of the programs as strengths of CTECS. As with many of the schools interviewed in this study, Vinal Tech struggles to recruit and retain teaching talent. Participants suggested considering changes to teacher certification policy to recruit and retain more professionals with technical manufacturing expertise. Students talked about how making something tangible was a highlight of the program. When asked about the best part of Vinal Tech, one student said, "in a couple of hours, you can make something cool." Everyone interviewed cited the instructor as a core strength of the program, from his pedagogy to his connections in the field. Focus group participants and interviewees cited Vinal Tech as having a reputation for well prepared and qualified students and for its strong WBL relationships with industry partners that provide valuable worksite experiences.

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[19] 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**