

Connecticut Manufacturing Committee

PROGRAM REPORT

February 2018

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Manufacturing Committee Members

Co-Chairs:

- Dr. James P. Lombella, President, Asnuntuck Community College and Interim President Tunxis Community College
- Dr. Melissa K. Wlodarczyk Hickey, Reading/Literacy Director, Connecticut State Department of Education

Committee Members:

- Tracy A. Ariel, Director, Advanced Manufacturing & CT ECO programs Connecticut State Colleges and Universities
- Connecticut Department of Labor Designee - Todd G. Berch, Program Manager, CT Department of Labor, Office of Apprenticeship Training
- Andrea Comer, Vice President Workforce Strategies, CBIA Education & Workforce Partnership
- John Dague, K-12 STEAM Science and Technical Education Supervisor, Enfield Public Schools
- Chris DiPentima, President, Pegasus Manufacturing and Chair of ACM
- Rich Dupont, Executive Director of HCC Foundation/Director Manufacturing Technology
- Emma Durao, Guidance Counselor, East Granby Public Schools
- Chris Foster, Instructor in Manufacturing Technology Department, Asnuntuck Community College
- Frank Gulluni, Director of AMTC, Asnuntuck Community College
- Howard M. Jenkins, Jr., Manager of Engineering Programs, Electric Boat
- Dr. Christine Mahoney, Superintendent of Schools, East Granby Public Schools
- Dr. Louis Manzione, Dean of College of Engineering, Technology and Architecture at University of Hartford
- Connecticut Employment and Training Commissions (CETC) Designee - Kathy Marioni, Executive Director, CT Department of Labor, Office of Workforce Competitiveness
- Rob Michalik, Department of Economic & Community Development, Director of Legislative Affairs
- John Murphy, Connecticut Technical High School System (CTHSS) Manufacturing Consultant, Education Consultant for Manufacturing Technologies
- Paul Murphy, President, Mallory Industries
- Susan Palisano, Director, Education & Workforce Development, Connecticut Center for Advanced Technology
- Gillian Rondinone, Middle School Technical Education Teacher, East Hartford Public Schools
- Jamison Scott, Executive Vice President for Air Handling Systems
- Dr. Clifford E. Thermer, Assistant Vice President of Strategy and Business Development for Goodwin College
- Pam Tonello, Capital Workforce Partners
- Dr. Kelli-Marie Vallieres, President/CEO, Sound Manufacturing, Inc. President Eastern Advanced Manufacturing
- Margaret G. Van Cott, Executive Assistant to the President, Asnuntuck Community College
- Cyndi Zoldi, Executive Director at Smaller Manufacturers Association of Connecticut, Inc.

Connecticut Manufacturing Committee Meetings to Date

2016-17

October 13, 2016	Asnuntuck Community College	10:00 a.m.
October 26, 2016	CCAT Advanced Manufacturing Center	8:00 a.m.
November 16, 2016	Asnuntuck Community College	10:00 a.m.
December 1, 2016	Department of Labor	8:00 a.m.
December 16, 2016	A.I. Prince Technical High School	8:00 a.m.
January 9, 2017	Asnuntuck Community College	8:00 a.m.
March 17, 2017	Connecticut Center for Advanced Technology	8:30 a.m.
April 26, 2017	Connecticut State Colleges and Universities Board of Regents	8:30 a.m.
June 9, 2017	Connecticut State Colleges and Universities Board of Regents	8:30 a.m.
September 18, 2017	Connecticut State Colleges and Universities Board of Regents	8:30 a.m.
November 13, 2017	Connecticut State Colleges and Universities Board of Regents	8:30 a.m.
January 31, 2018	Connecticut State Colleges and Universities Board of Regents	2:00 p.m.

Full Statutory Charge

Section 10-21j(c) of the Connecticut General Statutes

Sec. 10-21j. Committee to coordinate education re careers in manufacturing. (a) The Commissioner of Education, in collaboration with the Board of Regents for Higher Education, shall establish a committee to coordinate the education of middle school and high school students about careers in manufacturing. Such committee shall include, but not be limited to, (1) representatives from the Department of Economic and Community Development, the Labor Department, the Connecticut Center for Advanced Technology, the technical high school system, the advanced manufacturing centers at the regional community-technical colleges, independent institutions of higher education in the state that offer training in the field of manufacturing, the Connecticut Employment and Training Commission, manufacturing companies and employee organizations that represent manufacturing workers, and (2) middle and high school teachers and guidance counselors.

(b) On or before January 1, 2017, and on or before August first annually thereafter, the committee established pursuant to subsection (a) of this section shall compile a catalog of programs at public and independent institutions of higher education in the state that offer training in the field of manufacturing. Such catalog shall include for each program: (1) The degree, certification, license or credential awarded upon completion; (2) the period of time and requirements for completion; (3) the enrollment process; and (4) the cost of attendance. The commissioner shall make such catalog available on the Internet web site of the Department of Education and distribute such catalog to each local and regional board of education.

(c) On or before February 1, 2017, and annually thereafter, the committee established pursuant to subsection (a) of this section shall report, in accordance with the provisions of section 11-4a, to the joint standing committees of the General Assembly having cognizance of matters relating to commerce and higher education and workforce development an analysis of whether current programs available to Connecticut students are meeting workforce needs. The committee shall consult with members of the manufacturing industry when producing such report.

Connecticut Manufacturing Committee Summary of Charges and Deadlines

- 1) **On or before January 1, 2017** – The Committee shall post catalog on the Connecticut State Department of Education (CSDE) website and distribute link to each local and regional board of education.
- 2) **On or before February 1, 2017** – The Committee shall submit a final report to the Higher Education and Employment Advancement Committee and the Commerce Committee of the General Assembly.
- 3) The Committee shall develop and administer a program to introduce middle school and high school students, parents, guidance counselors to careers in manufacturing.
- 4) The Committee shall create a best practices guide to help local and regional boards of education to incorporate relationships with manufacturing in their middle school and high school curricula.
 - 1) The committee is charged with:
 - A. Compiling a catalog of programs at public and independent institutions of higher education in the state that offer training in the field of manufacturing. Such catalog shall include for each program: (1) the degree, certification, license or credential awarded upon completion; (2) the period of time and requirements for completion; (3) the enrollment process; and (4) the cost of attendance.
 - B. Creating an analysis of whether current programs available to Connecticut students are meeting workforce needs.
 - C. Developing and administering a program to introduce middle school and high school students, parents, guidance counselors to careers in manufacturing. Such program may include, but is not limited to, hands-on learning opportunities, posters, videos, pamphlets and social media and other technology to describe and promote modern manufacturing and the programs included in the catalog.
 - D. Developing a best practices guide to help local and regional boards of education to incorporate relationships with manufacturing in their middle school and high school curricula.

Summary of the Connecticut Manufacturing Committee Work to Date

The Connecticut Manufacturing Committee (Committee) was created by an act of the Connecticut General Assembly on June 3, 2016, and was charged with two immediate tasks: creating and posting a catalog of programs at public and independent institutions of higher education in the state that offer training in the field of manufacturing by January 1, 2017, and reporting to the joint standing committees of the General Assembly having cognizance of matters relating to commerce and higher education and workforce development an analysis of whether current programs available to Connecticut students are meeting workforce needs by February 1, 2017.

There are robust manufacturing programs currently available to high school students and high school graduates across Connecticut as evidenced by the information gathered by the Committee. The 2017 Catalog of Programs at Public and Independent Institutions of Higher Education (Appendix A) outlines the quality Connecticut higher education manufacturing experiences available to students and can assist high school students in making future programmatic choices. The analysis conducted by the Committee of whether current programs available to Connecticut students are meeting workforce needs surfaced numerous findings and conclusions including the report from manufacturers that the manufacturing training programs available to Connecticut students are providing students with entry level and basic skills that are meeting their needs. Additionally, Connecticut technical high school system (CTHSS) received high marks from manufacturers regarding the readiness of these CTHSS graduates for the manufacturing workplace.

The Committee will continue its statutory work, as outlined in Section 10-21j(c) of the Connecticut General Statutes, focusing on developing and administering a program to introduce middle school and high school students, parents, and guidance counselors to careers in manufacturing as well as creating a best practices guide to help local and regional boards of education to incorporate relationships with manufacturing in their middle school and high school curricula. The Committee plans to explore the high school/higher education manufacturing partnerships and early college opportunity programs currently available to Connecticut high school students and will use this work as examples of best practices to incorporate into the remaining charges.

Catalog of Programs at Public and Independent Institutions of Higher Education

The Committee was charged with creating and posting a catalog of programs at public and independent institutions of higher education in the state that offer training in the field of manufacturing. The legislation also directs the Commissioner of Education to make the catalog available on the website of the CSDE and distribute such catalog to each local and regional board of education.

As stated in the legislation, “such catalog shall include for each program: (1) The degree,

certification, license or credential awarded upon completion; (2) the period of time and requirements for completion; (3) the enrollment process; and (4) the cost of attendance.” Based on feedback from the field of manufacturing and from Committee members, the Committee added the following three columns to the catalog: financial assistance available to those who qualify (e.g., PELL, SNAP, WIOA Grants, Scholarships, etc.), apprenticeship internship link/opportunity and contact information.

An updated [Catalog of Programs at Public and Independent Institutions](#) was obtained by the Committee from the Connecticut State Colleges and Universities and posted to the dedicated [Manufacturing Committee Web page](#).

Analysis of Current Programs

The Committee was also charged with reporting to the joint standing committees of the General Assembly having cognizance of matters relating to commerce and higher education and workforce development an analysis of whether current programs available to Connecticut students are meeting workforce needs.

Design of the Analysis

The purpose of this analysis was to examine the reports of manufacturers on whether current programs available to Connecticut students are meeting the needs of the workforce. To assist in this investigation, and to triangulate the data, multiple data sources were utilized. The Committee read and analyzed recent survey data and findings from the Connecticut Board of Regents for Higher Education Advanced Manufacturing Technology Centers Industry Skills Need Report (Connecticut Center for Advanced Technology, 2014), the 2016 Survey of Northwest Connecticut Businesses (Connecticut Business and Industry Association and the Northwest Chamber of Commerce, 2016) and the 2014 Survey of Connecticut Manufacturing Workforce Needs (Connecticut Business and Industry Association, 2014). Additionally, the Committee developed and disseminated questions to expand upon these data and to further inform the Committee’s analysis.

Summary of the Connecticut Board of Regents for Higher Education Advanced Manufacturing Technology Centers Industry Skills Need Report

In February 2014, under contract with the Connecticut State College and Universities Board of Regents for Higher Education, the Connecticut Center for Advanced Technology (CCAT) conducted an industry survey regarding employee skill requirements among a broad range of Connecticut manufacturers to identify local and regional training needs. Survey questions addressed skills in metalworking, machine and software experience, safety, process and maintenance, and were aligned with industry-validated training curricula and assessments. Skill sets were also cross-walked with the community college’s manufacturing curricula to illustrate alignment of statewide employer needs with certificate training programs.

Overall, responses indicated that manufacturers had a greater need for intermediate level technical skills versus the entry level skills community college certificate programs provided. Manufacturers also indicated a high need for all safety-related skills. Based on a crosswalk with the existing certificate program curriculum, only three out of the eight survey topic areas in

safety were currently being addressed to any significant degree. Like safety, quality and measurement skills are a high priority for manufacturers. Requirements provided by respondents reflect specific skills that may not be able to be taught as part of an introductory curriculum. Skills in work flow and production, while not as greatly desired as those related to safety, quality, and measurement were still considered important for a significant number of manufacturers. In a review of the alignment of these topics to the curriculum, a number of these skills were not being taught.

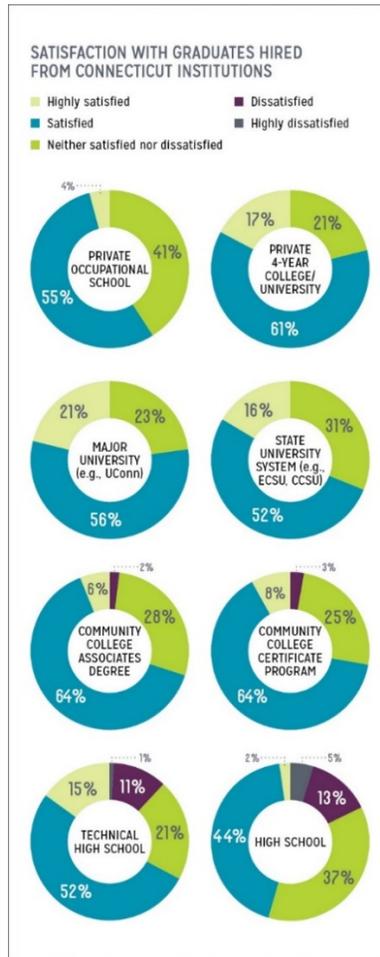
Respondents clearly indicated a need for customized training for both prospective and incumbent workers that is directly related to the specialization of their manufacturing processes and products, with most believing that standard program curricula cannot necessarily meet all the regional and/or subsector-based needs. This further supports a model that relies on apprenticeships and on-the-job training as being essential to the development of the skilled workforce required to support the state's manufacturing base.

Summary of the Findings of the 2014 Survey of Connecticut Manufacturing Workforce Needs

Connecticut Business and Industry Association's survey (2014) specifically surveyed manufacturers in Connecticut to gather their perceptions regarding their hiring expectations and their workforce challenges. According to the 2014 Survey of Connecticut Manufacturing Workforce Needs, the majority of Connecticut manufacturers:

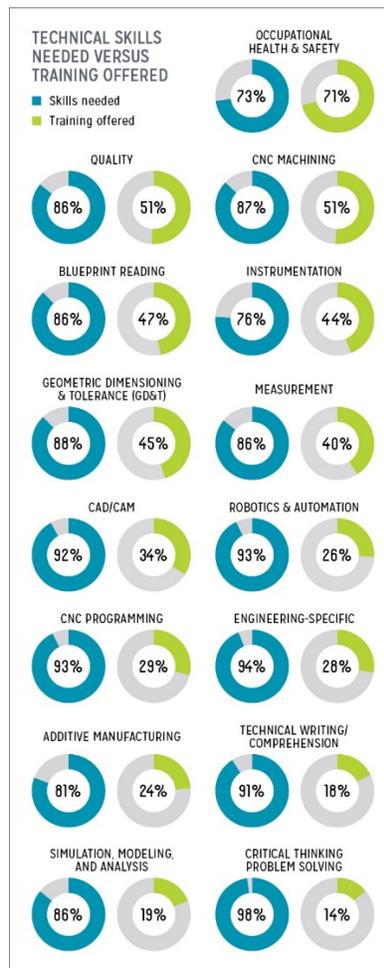
- are highly satisfied or satisfied with graduates of the Connecticut technical high school system (CTHSS);
 - reported increased satisfaction with high school graduates from both traditional and technical high schools over the years;
 - hire graduates from schools and colleges within the state (99% from Connecticut technical high schools);
 - reported greater satisfaction with graduates who have attained higher levels of education as well as more technical training relevant to manufacturing;
 - slightly valued students who have completed certificate programs at the state's community colleges above those who have earned associates degrees;
 - viewed graduates of Connecticut's major universities and private colleges as qualified job candidates; and
 - were satisfied or highly satisfied with graduates of Eastern Connecticut State University, Central Connecticut State University, and other schools in the state's university system.
- (p. 8)

Table 1: Satisfaction with Graduates Hired from Connecticut Institutions (Connecticut Business and Industry Association, 2014, p. 7)



According to the 2014 Survey of Connecticut Manufacturing Workforce Needs, Connecticut manufacturers reported the following skills as being most important skills related to their companies' competitiveness: critical thinking and problem solving, engineering, robotics and automation, CNC programming CAD/CAM and technical writing/comprehension (p. 6).

Table 2: Technical Skills Needed Versus Training Offered (Connecticut Business and Industry Association, 2014, p. 5)



CBIA (2014) gathered recommendations from manufacturers regarding ways in which educational institutions could address the problem of skill deficits seen in recent hires. These recommendations included:

- emphasizing basic employability skills, student internships;
- providing better technical training and career development; and
- offering more rigorous preparation in reading, writing, and math. (p. 7)

Summary of the Findings of the 2016 Survey of Northwest Connecticut Businesses

Although the Connecticut Business and Industry Association and the Northwest Chamber of Commerce (2016) did not specifically survey manufacturers, they did survey a wide range of businesses including manufacturers. These data indicate applicants are not perceived as being well-prepared in meeting the needs of the workforce.

Summary of the Findings of the Committee’s 2016 Survey Questions

To add to the findings of the 2016 Survey of Northwest Connecticut Businesses (Connecticut Business and Industry Association and the Northwest Chamber of Commerce, 2016) and the

2014 Survey of Connecticut Manufacturing Workforce Needs (Connecticut Business and Industry Association, 2014) and deepen the analysis of whether current programs available to Connecticut students are meeting workforce needs, the Manufacturing Committee developed the following questions:

- In what ways, if at all, have current manufacturing training programs available to Connecticut students met the needs of the employers?
- What has been especially effective?
- What could be more effective (e.g., apprenticeships)?
- Do you have any ideas for how manufacturing trainings programs available to Connecticut students could be more helpful in supporting your workforce needs?

Data collection. Using these questions, the Committee gathered responses from individual members of the manufacturing industry representing a range of manufacturing organizations distributed across Connecticut including:

- Greater Waterbury area - Smaller Manufacturers Association of CT;
- Greater New Haven Region and beyond - New Haven Manufacturers Association;
- Central Connecticut and beyond - Connecticut Tooling & Machining Association;
- Eastern portion of the state - Eastern Advanced Manufacturing Alliance;
- North Central portion of the state and beyond- Aerospace Components Manufacturers; and
- City of Bristol and all of Connecticut- New England Spring & Metal-stamping Association.

Characteristics of participants. 31 members of the manufacturing industry responded to the questions disseminated by the Committee. At the time of the analysis, 64.5% (n = 20/31) were presidents/owners; 6.5% were vice presidents (n = 2/31); 6.5% were sales managers (2/31); 6.5% were human resource directors (2/31); and 16% were other (e.g., a director of quality assurance, a design engineer, a representative from Aero Gear, a representative from the ACM Workforce Team and an AMC advisory board member).

Findings. Four questions explored the reports of manufacturers on whether current programs available to Connecticut students are meeting the needs of the workforce. Data were interpreted and analyzed to derive the following themes found within the reports of the manufacturers:

1. Manufacturers reported manufacturing training programs available to Connecticut students are providing students with entry level and basic skills that are meeting the needs of employers.
2. Manufacturers reported satisfaction with their Connecticut technical high school graduate hires.
3. Manufacturers reported students are entering the workforce with stronger interpersonal and communication skills.
4. Manufacturers reported partnerships with elementary schools, middle schools, high schools, and higher education programs as being beneficial and/or having the potential of being beneficial.
5. Manufacturers reported the need for training in modern facilities that includes experiences with traditional machines as well as updated technologies.
6. Manufacturers reported the need for apprenticeships, internships, and externships starting

in high school and continuing post-graduation including funding, support, and increased opportunities.

7. Manufacturers reported the need for promoting manufacturing to stakeholders including students, parents, guidance counselors, and superintendents.

Conclusions

The following conclusions were derived from the data provided by the Connecticut Board of Regents for Higher Education Advanced Manufacturing Technology Centers Industry Skills Need Report (2014), the 2014 Survey of Connecticut Manufacturing Workforce Needs (Connecticut Business and Industry Association, 2014), the 2016 Survey of Northwest Connecticut Businesses (Connecticut Business and Industry Association and the Northwest Chamber of Commerce, 2016) and the Connecticut Manufacturing Committee's 2016 Survey Questions:

- **Conclusion 1.0:** Manufacturers reported greater satisfaction regarding whether current programs available to Connecticut students are meeting the needs of the workforce. Manufacturers were less inclined to agree that applicants have all of the prerequisite employability skills and/or customized skills necessary to succeed in this field. For example, manufacturers would like manufacturing programs to offer experiences with traditional machines as well as updated technologies.
- **Conclusion 2.0:** Manufacturers reported the need for students in Connecticut manufacturing training programs to have increased opportunities for work-related experiences prior to employment (e.g., internships, pre-apprenticeships, apprenticeships, and externships).
- **Conclusion 3.0:** Manufacturers reported the need for developing manufacturing as a career in the public school systems, advocating for manufacturing careers and promoting manufacturing to community stakeholders.

Summary of Assuring Connecticut's Success: Tomorrow's Framework Connecticut Technical High School System 2015-16 Annual Report

In accordance with Section 10-95h(b)(2) of the Connecticut General Statutes, the superintendent of the Connecticut technical high school system (CTHSS) shall submit a report to the joint standing committees of the General Assembly having cognizance of matters relating to education, higher education and employment advancement and labor.

As manufacturers consistently commented across the surveys utilized in this analysis on their positive experiences with technical high school graduates, the Connecticut Manufacturing Committee included a summary of applicable statistics found in the CTHSS 2015-16 report entitled: *Tomorrow's Framework Connecticut Technical High School System 2015-16 Annual Report*. CTHSS report:

- continued successful partnerships with manufacturers, including General Dynamics Electric Boat and Eastern Advanced Manufacturing Alliance (p. 19);
- 80% of CTHSS' students taking college preparatory academic curriculum with rigorous Career and Technical Education met College and Career readiness goals versus only 63% of those taking the same academic core without Career and Technical Education (p. 11);

- 64.5% of the CTHSS's students met or exceeded the district performance benchmark for the Workplace Employability Skills Assessment (p. 11);
- 189 precision machining seniors graduated in 2016 (p. 16) ; and
- majority of the CTHSS's manufacturing students stay in Connecticut and attend college through their employers (p. 16).

Educational Success Compact

The Educational Success Compact was formed to address Special Act 14-19 – An act concerning a plan for career readiness and manufacturing apprenticeship preparation programs at the CTHSS. The Connecticut State Colleges and Universities created the Educational Success Compact with the CTHSS to support the creation of educational and career pathways for traditional high school students and the adult learners. Recognizing the need to 1) increase capacity of training space 2) increase the utilization of available machinery; and 3) machine shops that are not being used by the CT Technical High Schools after 3 p.m., an agreement was established between the Systems to offer college-level manufacturing related courses and certificate programs at the CTHSS facilities. The following is a list of the partnerships that have been established to offer advanced manufacturing training:

- H.H. Ellis Technical High and Quinebaug Valley Community College;
- Windham Technical High School and Quinebaug Valley Community College;
- Platt Technical High School and Housatonic Community College;
- Henry Abbott Technical High School and Naugatuck Valley Community College;
- W. F. Kaynor Technical High School and Naugatuck Valley Community College;
- Howell Cheney Technical High School and Manchester Community College;
- H. C. Wilcox Technical High School and Middlesex Community College; and
- Ella T. Grasso Technical High School and Three Rivers Community College.

Next Steps for the Committee

The purpose of the Connecticut Manufacturing Committee Program Report is to analyze whether current programs available to Connecticut students are meeting the needs of the workforce. The Connecticut Manufacturing Committee (Committee) consulted with members of the manufacturing industry and CBIA when producing this report. The findings and conclusions of this report support the remaining charges of the Committee and offer the Committee valuable insight. The Committee will continue its statutory work, as outlined in Section 10-21j(c) of the Connecticut General Statutes, focusing on developing and administering a program to introduce middle school and high school students, parents, and guidance counselors to careers in manufacturing as well as creating a best practices guide to help local and regional boards of education to incorporate relationships with manufacturing in their middle school and high school curricula.

In June 2017, to begin the development of the Manufacturing Careers Introductory Program Resources and Guidelines to Incorporate Manufacturing Relationships in Middle and High Schools, the Committee divided into two work groups. The Careers in Manufacturing

Introductory Program work group began to identify and vet resources that would introduce middle school and high school students, parents, and guidance counselors to careers in manufacturing. The Best Practices/Manufacturing Relationships work group began to identify and vet resources to guide local and regional boards of education in the incorporation of relationships with manufacturing in their middle school and high school curricula.

In preparing these guidelines, the Committee will continue to explore the high school/higher education manufacturing partnerships and early college opportunity programs currently available to Connecticut high school students and use this work as examples of best practice.

There is still information left to gather, perspectives to solicit, and ideas to discuss before the committee will be in a position to develop and administer the Manufacturing Careers Introductory Program Resources and Guidelines to Incorporate Manufacturing Relationships in Middle and High Schools. In an effort to highlight best practices in Connecticut, the Committee has included unique examples of current partnerships with middle schools and high schools such as the College Connections Program and the 5th year model at Asnuntuck Community College (Appendix C).

This committee will continue to conduct itself in a collaborative manner and will look to students, teachers, parents, administrators, manufacturing employers, various stakeholders and both state and national experts in the area of manufacturing to assist with our charges.

References

Ariel, T. (June, 2015). *Connecticut State Colleges and Universities Advanced Manufacturing Technology Centers Update Reporting Period: September 5, 2014 – June 1, 2015*. Connecticut State Colleges and Universities.

Assuring Connecticut's Success: Tomorrow's Framework Connecticut Technical High School System 2015-16 Annual Report (CTHSS).

Connecticut Business and Industry Association and the Northwest Chamber of Commerce. (2016). 2016 Survey of Northwest Connecticut Businesses. Retrieved from <https://www.cbia.com/resources/economy/reports-surveys/2016-survey-nw-connecticut-businesses/>

Connecticut Business and Industry Association. (2014). 2014 Survey of Connecticut Manufacturing Workforce Needs. Retrieved from <https://www.cbia.com/resources/economy/reports-surveys/2014-survey-of-connecticut-manufacturing-workforce-needs/>

Connecticut Center for Advanced Technology (CCAT). Connecticut Board of Regents for Higher Education Advanced Manufacturing Technology Centers Industry Skills Need Report. (February 28, 2014).

Appendices

Appendix A

Catalog of Programs at Public and Independent Institutions (revised 9/17)

Committee for Education of Middle School and High School about Careers in Manufacturing

“CECM”

Co-Chairs: James P. Lombella, Asnuntuck Community College and Melissa K. Hickey, State of CT. Dept. of Education

Members: Todd Berch, CT Department of Labor, John Dague, Enfield High School, Chris DePentima, Pegasus Manufacturing, Rich Dupont, Director of HCC Foundation, Emma Durao, East Granby School, Chris Foster, Asnuntuck Community College, Frank Gulluni, Asnuntuck Community College, Christine Mahoney, Superintendent of East Granby Schools, Louis Manzione-University of Hartford, Kathy Marioni, CT Department of Labor, Rob Michalik, Department of Economic and Community Development, John Murphy, CTHSS Manufacturing Consultant, Paul Murphy, Mallory Industries, Susan Palisano, Education and Workforce Development, Gillian Rondinone, East Hartford Middle School, Robert Segal, Aerospace, Clifford Thermer, Goodwin College, Pamela Tonello, Capital Workforce Partners, and Margaret Van Cott, Asnuntuck Community College

Institution Name	Program Name	Credential: Certificate, licensure or Degree	Length of Program	Cost of Attendance (before any financial assistance)	Financial Assistance Available to those who Qualify (Yes or No) (PELL, SNAP, WIOA Grants, Scholarships, etc.)	Enrollment Process (i.e. monthly, 3x a year, continuous, etc.)	Apprenticeship Internship Link/ Opportunity (Yes or No)	Contact Information
Asnuntuck Community College	Advanced Machine Technology with CNC	Advanced Manufacturing Machine Technology	Two Semester Certificate <hr/> Four Semester Associate	\$7500 <hr/> \$14,441	Yes, majority of students qualify for one or more: PELL, SNAP, WIOA Grants, and Scholarships.	Complete Admissions Application and contact Paul Felici	Yes, Internship	Paul Felici (860) 253-3189 or pfelici@asnuntuck.edu

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	Advanced Welding Technology with Fabrication	Advanced Manufacturing Welding Technology	Two Semester Certificate _____ Four Semester Associate	\$7500 \$14,441	Yes, majority of students qualify for one or more: PELL, SNAP, WIOA Grants, and Scholarships.	Complete Admissions Application and contact Paul Felici	Yes, Internship	Paul Felici (860) 253-3189 or pfelici@asnuntuck.edu
Asnuntuck Community College	Advanced Manufacturing Electronics Systems and Controllers	Manufacturing Electronics Systems and Controllers	Two Semester Certificate _____ Four Semester Associate	\$7500 \$14,441	Yes, majority of students qualify for one or more: PELL, SNAP, WIOA Grants, and Scholarships.	Complete Admissions Application and contact Paul Felici	No	Paul Felici (860) 253-3189 or pfelici@asnuntuck.edu
	Advanced Manufacturing Electro-Mechanical Maintenance	Tech Studies: Electro-Mechanical Maintenance Technology Option	One Semester Certificate _____ Five Semester Associate	\$3500 \$17,691	Yes, majority of students qualify for one or more: PELL, SNAP, WIOA Grants, and Scholarships.	Complete Admissions Application and contact Paul Felici	Yes, Internship	Paul Felici (860) 253-3189 or pfelici@asnuntuck.edu
Central Connecticut State University	Manufacturing Engineering Technology	Bachelor of Science	8 semester	\$38,964	Yes	Complete Admission Process	Yes	School of Engineering Science and Technology 860-832-1800
	Manufacturing Management	Bachelor of Science	8 semester	\$38,964	Yes	Complete Admission Process	Yes	School of Engineering Science and Technology 860-832-1800
	Robotics and Mechatronics Engineering Technology	Bachelor of Science	8 semester	\$38,964	Yes	Complete Admission Process	Yes	School of Engineering Science and Technology

								860-832-1800
	Technology Management	Bachelor of Science	8 semester/part of the 2+2 COT pathway	\$38,964	Yes	Complete Admission Process	Yes	School of Engineering Science and Technology 860-832-1800
Gateway Community College	CNC Operator Certificate	Manufacturing Non-Credit Certificate	15 Weeks	\$1158	Yes	Complete Registration	Yes, Internship	Merilee Roussat (203) 285-2128 or mroussat@gatewayct.edu
	AutoCAD 2015 with AutoCAD 3D	Manufacturing Non-credit Certificate	Two Semester Certificate	\$3295	No	Complete Registration	No	Merilee Roussat (203) 285-2128 or mroussat@gatewayct.edu
	Manufacturing Engineering Technology	Associate in Science Degree	4 Semester Degree	\$11,330	Yes	College Application-semester registration	Yes, Internship	Eric Flynn (203.285.2371); eflynn@gatewayct.edu
	Quality Control Certificate	Certificate	2 Semester certificate	\$2,670	Yes	College Application-Semester registration	No	Eric Flynn (203.285.2371); eflynn@gatewayct.edu
Goodwin College	Certified Production Technician (CPT)	MSSC Credential	One Semester (6 cr)	\$6,090*	Yes* 40% scholarship for MFG students; Pell	Complete student enrollment	No	Chip Thermer (860) 913-2087
	Certified Logistics Technician (CLT)	MSSC Credential	One semester (3 cr)	\$2,820*	Yes* 40% scholarship for MFG	Complete student enrollment	No	Chip Thermer (860) 913-2087

					students; Pell; WIOA			
	Certificate: Basic CNC Production	MSSC Credential	One Semester (18 cr)	\$11,275*	Yes* 40% scholarship for MFG students; Pell, WIOA; SNAP	Complete student enrollment	No	Dr. Len Walsh (860) 913-2285
	Certificate: Manufacturing & Production	MSSC Credential	One Semester (18 cr)	\$11,500*	Yes* 40% scholarship for MFG students; Pell, WIOA; SNAP	Complete student enrollment	No	Chip Thermer (860) 913- 2087
	Certificate: Manufacturing & Logistics	MSSC Credential	One Semester (18 cr)	\$11,375*	Yes* 40% scholarship for MFG students; Pell; WIOA; SNAP	Complete student enrollment	No	Dr. Len Walsh (860) 913-2285
	Certificate: Quality & Manufacturing Inspections	MSSC Credential	One Semester (18 cr)	\$10,925*	Yes* 40% scholarship for MFG students; Pell	Complete student enrollment	No	Dr. Al Pucino (860) 913-2089
Goodwin College	Certificate: CNC Machining	MSSC Credential	Two Semesters (30 cr)	\$22,150*	Yes* 40% scholarship for MFG students; Pell	Complete student enrollment	Yes	Dr. Len Walsh (860) 913-2285
	CNC Machining, Metrology & Manufacturing Technology	Certificate	22.5 weeks (37 cr)	\$7,700	Yes* Pell, grants, scholarships	Complete student enrollment - open	No	Dr. Len Walsh (860) 913-2285
	AS CNC Machining	MSSC Credential	Four Semesters (60 cr)	\$42,550*	Yes* 40% scholarship for MFG students; Pell	Complete student enrollment	Yes, Apprenticeship & Internship	Dr. Len Walsh (860) 913-2285

	AS Quality Management Systems	MSSC Credential	Four Semesters (60 cr)	\$41,525*	Yes* 40% scholarship for MFG students; Pell	Complete student enrollment	Yes, Apprenticeship & Internship	Dr. Al Pucino (860) 913-2089
	AS Supply Chain & Logistics Management	MSSC Credential	Four Semesters (60 cr)	\$41,975*	Yes* 40% scholarship for MFG students	Complete student enrollment	Yes, Internship	Dr. Len Walsh (860) 913-2285
	BS Manufacturing Management	MSSC Credential	Eight Semesters (60 cr)	\$82,625*	Yes* 40% scholarship for MFG students	Complete student enrollment	Yes, Internship	Dr. Al Pucino (860) 913-2089
Housatonic Community College	Advanced Manufacturing Machine Technology with CNC	Advanced Manufacturing Machine Technology	Two Semester Certificate	\$7,800	Yes	Complete Admissions Application and contact Kimberly Wood	Yes, Internship and pathway to Apprenticeship	Kimberly Wood (203) 332-5098 or KWood@Housatonic.edu
Manchester Community College	Precision Manufacturing Program	Precision Manufacturing Certificate Program – All credit certificate program	24 Weeks - Three (8) week sessions - 38 Credits	\$7800.00 (Credit-Extension Classes, In-state tuition and Fees)	Yes	Complete Admissions Application and contact Dave Russell	Yes – Internship and Pathway to Apprenticeship	Dave Russell, (860) 512-2635, DRussell@mcc.comnet.edu
	Manufacturing Engineering Technology	Manufacturing Engineering Technology, A.S.	4 Semester Associate (60 credits)	\$8,672 (General Fund, In-state tuition and Fees)	Yes	Complete Admissions Application and contact Mehrdād Fäézi.	No	Mehrdād Fäézi, mfaezi@manchestercc.edu , 860-512-2729

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		Technology Studies, A.S. – Lean Manufacturing Option	4 Semester Associate (67 credits)	\$9,655 (General Fund, In-state tuition and Fees)	Yes	Complete Admissions Application and contact Mehrdäd Fäézi.	No	Mehrdäd Fäézi, mfaezi@manchestercc.edu , 860-512-2729
		Lean Manufacturing Certificate Program	2 Semester Certificate (6 credits)	\$1,115 (General Fund, In-state tuition and Fees)	Yes	Complete Admissions Application and contact Mehrdäd Fäézi.	No	Mehrdäd Fäézi, mfaezi@manchestercc.edu , 860-512-2729
Middlesex Community College	Manufacturing Machine Technology	Manufacturing Machine Technology Certificate	Two Semester Certificate (35-36 credits)	\$5,306 (In-state tuition and Fees)	Yes, students may qualify for PELL, SNAP, WIOA, TAA Grants, and Scholarships	Complete Admissions Application and contact Hubert Godin	Yes, Internship and Apprenticeship with companies	Hubert Godin (860) 343-5776 or hgodin@mxc.c.edu
	Technology Studies: Manufacturing Machine Technology Option	A.S. – Technology Studies: Manufacturing Machine Technology Option	Four Semester Associate (67-69 credits)	\$10,612 (In-state tuition and Fees)	Yes, students may qualify for PELL, SNAP, WIOA, TAA Grants, and Scholarships	Complete Admissions Application and contact Hubert Godin	Yes, Internship and Apprenticeship with companies	Hubert Godin (860) 343-5776 or hgodin@mxc.c.edu
	Technology Studies: Manufacturing Engineering Technology Pathway	A.S. – Technology Studies: Manufacturing Technology Pathway	Four Semester Associate (66 credits)	\$10,612 (In-state tuition and Fees)	Yes, students may qualify for PELL, SNAP, WIOA, TAA Grants, and Scholarships	Complete Admissions Application and contact Hubert Godin	Yes, Internship and Apprenticeship with companies	Hubert Godin (860) 343-5776 or hgodin@mxc.c.edu
Naugatuck Valley	Advanced Manufacturing Technology	Advanced	Two Semester Certificate	\$7,500	Yes	Complete Admissions Application	Yes	Deirdre D’Amore

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Community College Waterbury Campus		Manufacturing Machine Technology				and contact Deirdre D'Amore	Internship	203-575-8014 or ddamore@nv.edu
Naugatuck Valley Community College Danbury Program Abbott Tech High School	Advanced Manufacturing Technology	Advanced Manufacturing Machine Technology	Four Semester Certificate	\$7,500	Yes	Complete Admissions Application and contact Ken Ordway	Yes Apprenticeship	Ken Ordway 203-770-4210 or kordway@nv.edu
Northwestern Community College	Manufacturing Technology Program	Technology Studies: Industrial Technology Option - Manufacturing Pathway; Up to 10 national certifications (NIMS, CSWA, IPC J-STD)	Four semester Associate Degree Program (67 credits)	\$8752 (In-state tuition and fees)	Yes	Complete Admissions Application and contact Sharon Gusky or Tara Jo Holmberg	Yes, Apprenticeship and Internship	Sharon Gusky 860-738-6395 or sgusky@nwcc.edu Tara Jo Holmberg 860-738-6363 or tholmberg@nwcc.edu
Quinebaug Community College	Advanced Machine Technology with CNC	Advanced Manufacturing Machine Technology	Two Semester Certificate	\$6000	Yes	Complete Admissions Application contact Jodi Clark 860-932-4128	Yes Paid Internships, Pre Apprenticeship and Apprenticeships	Jodi Clark 860-932-4128 jjclark1@qvcc.edu or Sandy Gould 860-932-4178

							with approved companies	sgould@qvcc.edu
Quinebaug Community College	Advanced Manufacturing Mechatronics Automation Technician	Mechatronics Automation Technician Certificate	Two Semester Certificate	\$5800	Yes	Complete Admissions Application contact Jodi Clark 860-932-4128	Yes Paid Internships, Pre Apprenticeship and Apprenticeships with approved companies	Jodi Clark 860-932-4128 jclark1@qvcc.edu or Sandy Gould 860-932-4178 sgould@qvcc.edu
Quinebaug Community College	Lean Manufacturing & Supply Chain	Lean Manufacturing & Supply Chain Certificate	2 class 6 credits	\$1200	Yes	Complete Admissions Application contact Jodi Clark 860-932-4128		Jodi Clark 860-932-4128 jclark1@qvcc.edu or Sandy Gould 860-932-4178 sgould@qvcc.edu
Quinebaug Community College	Technology Studies	Technology Studies Associate Degree	4 Semesters	\$12,000	Yes	Complete Admissions Application contact Jodi Clark 860-932-4128		Jodi Clark 860-932-4128 jclark1@qvcc.edu or Sandy Gould 860-932-4178 sgould@qvcc.edu
University of Hartford	Mechanical Engineering with Manufacturing Concentration	BSME	4 years	Regular tuition with discounts	Yes	Rolling admission with application	Yes, Internship	Dr. Chittaranjan Sahay sahay@hartford.edu
	Mechanical Engineering- Manufacturing Engineering Specialization	M.Eng.	2 years after B.S. degree	\$25,455 paid graduate assistantships available	Yes	Rolling admissions with application	Yes, company-advised research available	Dr. Chittaranjan Sahay sahay@hartford.edu

	Certificate in Manufacturing Metrology	Certificate	12 credits/ 1 year	\$9,420	Yes	Rolling admissions with application	Yes, company-advised research available	Dr. Chittaranjan Sahay sahay@hartford.edu
Worcester Polytechnic Institute	Manufacturing Engineering	Masters or PhD	Part-time or Full-time 2 years for each program	\$1,408 per credit	Yes, loans	On line application	No	Professor Richard Sisson sisson@wpi.edu

Appendix B

Connecticut Manufacturing Committee 2016 Survey Response Summary

In what ways, if at all, have current manufacturing training programs available to Connecticut students met the needs of the employers?

- The Manufacturing Training Programs have met the needs of employers by providing the necessary entry level/basic skills to students which employers look for in the initial hiring process.
- Students are coming to manufacturers with a higher level of confidence and diversity regarding their communication efforts and hands on skills which makes them more attractive to the employer concerning the hiring process.
- Participating companies have an easier pathway to finding new talent by working with the school system and various programs.
- Most of the programs are inviting industry in to speak to students about opportunities in Mfg.
- Rejuvenating and energizing the effort to promote manufacturing as a career opportunity... Upgrade of facilities is huge here.
- Radial has sent existing employees to a number of courses at Gateway CC. We have hired several students out of the Technical High School system.
- Many may not know of all the programs available, but with that said, the Asnuntuck 10 month certificate program and internships have been a valuable asset. That has enabled our company to bring in an "entry level" employee who has some sound fundamental skill sets.
- Another benefit has been the funded externships, of which more support and promotion is needed, I think that the professors can bring real current practices back to the classroom.
- This has been hit or miss, again depending on the work ethic of the student it can be a success or a rapid failure. We've used training programs for manufacturing students from the community college and the WBL program for high school students.

What has been especially effective?

- For EDAC we have found the need to supplement the state training programs with our own in order to provide the numbers of new technicians for the future workforce.
- The combination of hiring from the technical High School and internal training.
- Vo-Tech High Schools, Magnet Schools and local community college manufacturing degree programs.
- Modernization of equipment and brightening the facilities.
- Stronger leadership helping to the schools to modernize and improve.
- Increasing the # of NIMS credentials are a plus. Very solid transferable credential.
- 10 month certificate program, internships, externships and apprenticeships
- For us, work based learning/work release from Kaynor followed by state eyelet tool maker apprenticeship.
- Motivated and engaged students that understand the reality of manufacturing work. Sometimes, I think we are trying so hard to sell this as a career to high school students that we sugar coat the reality of the career
- Soft Skills: Students who completing these training programs are providing the employers with higher levels of attention to detail.

What could be more effective (e.g., apprenticeships)?

- Current manufacturing training programs need to be stepped up to meet the skills gap and the shortage of skilled workers.
- Apprenticeship programs would help, along with a greater emphasis on the math, technology and sciences in our public education system.
- Sharing of best practices is imperative. Each program has areas they excel in. This needs to be shared with each program.
- A tax incentive for participating companies to allow them to share some employee time for teaching.
- Students lack soft skills and accountability. There has been improvement here but more could be done about basic interpersonal skills.
- Graduates that had some experience in CNC Swiss machining (a lathe where the work moves).
- More externships and funding for existing apprenticeship programs
- More of an emphasis on trade skills and manufacturing skills in high school and earlier on. Smaller more “hands on” classes.
- Allowing people in the apprentice program to test out on skills. If NIMS is the test vehicle, it should be available for free to employers in the state apprentice program.
- More emphasis on traditional/manual machining along with specialized training on new technologies i.e. additive manufacturing, composites, 5 axis CNC.
- More emphasis/training for continuous improvement
- Increase capacity. The number of students graduating doesn't meet the needs of industry.
- We would still have about 3 people enrolled in the State Apprentice program, however, we discontinued participation due to the requirement that we meet the prescribed wage scale. The State, at least in our opinion, should not have any stake in the wage scale.
- Public relations,
- Seeding grammar schools with hobby like modules,
- tech school teachers with appropriate modern, sophisticated experience,
- A university of manufacturing.
- Training in up to date electronic manufacturing
- I feel it would benefit students greatly to have more internships (unpaid) for the first year (Junior) and paid as a senior. That first year will give them an education in culture, work ethic expectations, and actual labor involved in the trade.
- The only relief to this is the direction of going back to teaching toolmaker skills, (something I have been advocating for well over 15 years). Now when the school system is ready to react...it might be too late.

Do you have any ideas for how manufacturing training programs available to Connecticut students could be more helpful in supporting your workforce needs?

- A tax incentive for participating companies to allow them to share some employee time for teaching.
- Provide a dual focus on “engineering directed” students as well as the skilled workforce necessary to run the equipment that we need to maintain manufacturing capability and expertise.
- There could be more effort from the programs to get the students into the supporting employers. Nothing is more effective than a tour and exposure.

- One area where this must be promoted further is with parents of Middle School children. They need to see some bright clean modern manufacturing facilities, so that they don't *discourage* their children from pursuing that track.
- Establish a state, federal and business funded Apprenticeship school. There was a model years ago in Massachusetts that was highly successful (I believe it was called MECHTECH)
- Much more marketing needs to be done to promote manufacturing and it needs to get to the parents, superintendents and guidance counselors.
- The restoration of the PTX (part-time Extension) program offering apprenticeships to post high school graduates who are currently employed. This program had also been effective for us.
- I would like to see the state offer extensive tuition reimbursement to students enrolled in manufacturing programs whether they are enrolled in two-year programs or four- year programs rather than have us pay for their tuition.
- Increase sharing of resources between comprehensive high schools, tech schools and the community colleges.
- A training program for guidance counselors to promote manufacturing,
- Identify early on a student's ability and aptitude for a career in manufacturing
- It might be beneficial to develop a *short rotational program* that would introduce students to a few companies in the areas, and get them inside shops to better understand what a shop environment is...
- Have committed, knowledgeable state administrators talk to us. Realize that manufacturing is not limited to machining.
- Prepare the students for the expected work ethic that is required to be successful in a manufacturing environment. Aside from technical skills, a successful transition from student to employee will include: attendance (be on time and be dependable), willing to work overtime (driven by customer demand), flexibility (willing to learn new skills) and attitude (respect for co-workers, mentors, and supervisors).
- Get back to teaching the basics, with minor exposure to the new technologies.
- Curriculum Involvement: Manufacturers to help with the curriculum to ensure accuracy regarding skill requirement. Many manufacturers share the same soft skill requirements, however, the actual hands on skill will differ for each manufacturer.

Appendix C

College Connections Program and the Fifth Year Model at Asnuntuck Community College.

College Connections Program

Asnuntuck's College Connections effort involves annually between 50 and 100 high school juniors and seniors who study daily on campus in advanced manufacturing coursework. The students travel from their high schools and are in Asnuntuck's classrooms and computer and manufacturing labs seven to eight hours each week throughout the school year. Students can earn between six and ten credits annually toward a certificate and an associate degree in advanced manufacturing technology. The program has been ongoing for ten years and has involved at least ten school systems in area communities around the college. To date, the college has served more than 600 high school students and has become integral to advanced manufacturing centers at both NVCC and HCC.

The primary objective is to provide high school students with opportunities to consider careers in the advanced manufacturing sector. The effort has proven to be invaluable to young people, their families, to school administrators and guidance counselors, the employer community, and the Connecticut economy. Typically, the participating school systems pay the annual tuition for the students. The local boards of education also supply bus transportation on a daily basis.

More and more of the participants in College Connections elect to transition after graduation to Asnuntuck and certificate and associate degree programs in advanced manufacturing technology. They become major candidates for private sector-sponsored scholarships that are valued highly by both the student and her/his family.

College Connections, together with 30 – 40 private sector-sponsored scholarships annually, has proven to be an invaluable asset to the area's aerospace industries, and, specifically, to the more than 110 member Aerospace Components Manufacturers that employ more than 7,000 women and men.

The Fifth Year Program

The Fifth Year program is designed primarily to seed the future advanced manufacturing technology workforce in Connecticut. It has two critical components: the first provides middle and early high school students (grades 6 through 10) with opportunities to participate in advanced manufacturing coursework delivered in the schools with leadership from Asnuntuck Community College Manufacturing Technology Center staff and the direct involvement of instructors at each school site. The program serves more than 1,000 youth annually and the goal is to increase the number of school districts to 10 or more with services to more than 3,000 girls and boys each year.

This technology-based learning environment for grades 6 through 10 sets the table nearly perfectly for the students to make educated choices in tenth grade about participation in phase two of the Fifth Year program. The student, beginning in the eleventh grade, takes academic and advanced manufacturing technology courses through Asnuntuck Community College that can accrue over two years to as many as 30 college credits.

For those who opt to pursue a career in advanced manufacturing technology, the Fifth Year starts officially after graduation from the four year high school effort and is developed so that the student can complete the additional academic and technology requirements in one calendar year and earn an associate in science degree in advanced manufacturing technology in one of the following disciplines: CNC machining, welding, electronics/electro-mechanical maintenance & repair, and, soon, additive manufacturing, layout and inspection, CAD/CAM, quality inspection, and metal fabrication.

Asnuntuck has developed an interesting mix of programs designed to provide young people with greater opportunity to succeed in our higher education system and to impact the long-term employment needs of the business community across the state of Connecticut.

College Connections and the Fifth Year models have proven to be invaluable assets for school districts, parents and educators, students, and workforce careers. Working together, schools, community colleges, local and state officials, parents, educators, and the employer community, we can ensure a viable workforce and continuous expansion of advanced manufacturing employment across Connecticut.