Spotlight on Advanced Manufacturing Workforce Development at SUNY Community Colleges

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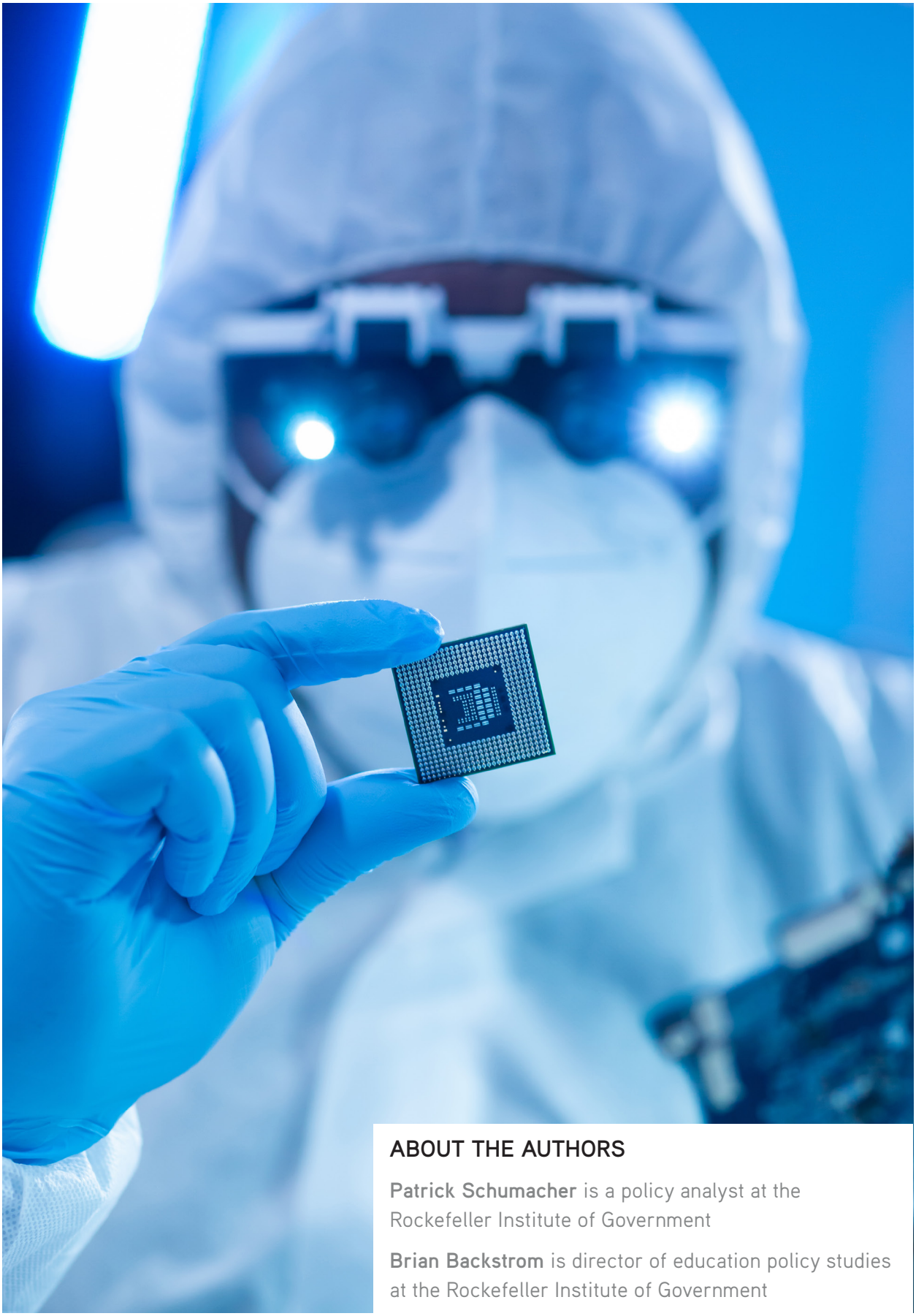

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Introduction

The integration of new technologies and techniques into manufacturing—including robotics, artificial intelligence, and data analytics—is helping to refine production processes and create new, cutting-edge products. Jobs in advanced manufacturing are among the highest paying, and private investment in the sector reaches into the billions of dollars.

Even so, companies across this sector have struggled to fill positions because of a lack of employees with the requisite skills.[1] Stepping up to meet this need, the State University of New York's (SUNY) community colleges are leading the way in developing advanced manufacturing workforce training programs that attract and help grow these companies, and the Empire State is witnessing a boom of economic activity as a result. Micron Technology is planning to spend $100 billion to build a facility in Onondaga County that will manufacture semiconductors[2] while partnering with SUNY Onondaga for workforce development programs.[3] Wolfspeed recently opened a $1 billion facility in Marcy for the manufacture of silicon carbide chips[4] and is collaborating with Mohawk Valley Community College for worker training and to grow an apprenticeship program.[5] Other advanced technology companies investing millions across New York include Siemens Gamesa, Regeneron, and others.[6, 7] This surge in activity is encouraging for students pursuing careers in advanced manufacturing, as opportunities in the field continue to expand.

SUNY community colleges are uniquely poised to train students for this sector and serve as engines of workforce development both locally and statewide, owing to their accessibility and affordability. Partnerships with advanced manufacturing companies are helping to develop curriculum, build training facilities, and provide scholarships that create direct pipelines to employment. These partnerships already have been transformative for thousands of students, and are generating enormous benefits for SUNY's community colleges, for area employers, and for numerous regions across the state. Interest and excitement around advanced manufacturing is playing out not just at SUNY community colleges, but in community college systems from one end of the country to the other. For example:

- In Maine, a $75.5 million grant supports short-term training across various fields, including manufacturing.[8]
- A $9.4 million award to 25 community colleges in Illinois will support education and training on the manufacture of electric vehicles.[9, 10]
- In Arizona, community colleges are offering training on semiconductors to a growing and diverse group of students, where persons from underrepresented groups now make up two-thirds of the enrollees in semiconductor programs in the Maricopa Community College System.[11]
- The California Apprenticeship Initiative's New and Innovative Grant Program provides million-dollar grants to community colleges to help create and expand apprenticeship opportunities in priority and emerging industries.[12]

Each of these advanced manufacturing workforce initiatives are unique, offering the chance for educational systems across the country to learn from each other. SUNY community colleges—with their strong private-sector partnerships and clear pathways to employment—can serve as a model for how to successfully train students in advanced manufacturing.

In May 2023, the Rockefeller Institute of Government assembled a meeting of state, local, and industry leaders to discuss the future of advanced manufacturing in New York State.[13] Now, this report showcases initiatives by SUNY community colleges to prepare students for careers in this growing field, based on interviews conducted between April and June 2024 with leadership at the colleges and representatives from their partner advanced manufacturing companies.

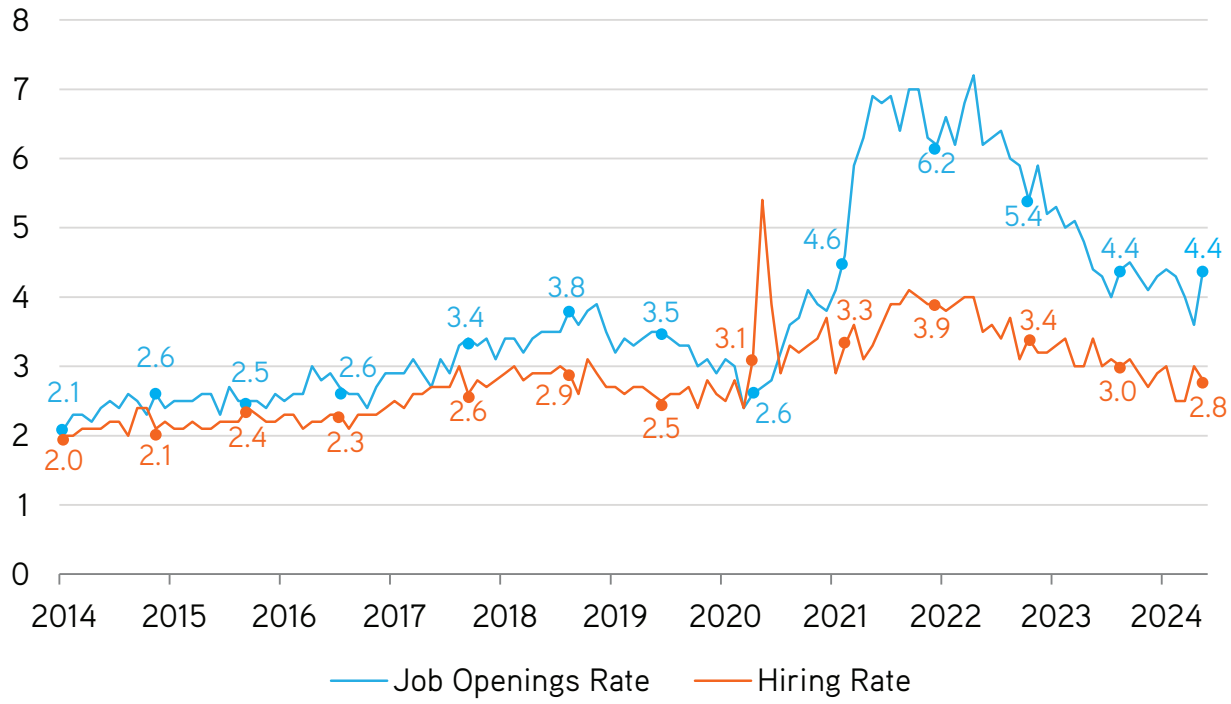
Evolution of Manufacturing in New York State

New York State has historically led the nation in manufacturing.[14] During the nineteenth and early twentieth centuries, millions of New Yorkers worked in the textile, garment, and machinery industries. Buffalo produced much of the country's steel, for example, and Rochester became famous for the manufacture of precision instruments and photographic equipment. But in the latter half of the twentieth century, along with the rest of the United States, New York saw a steep and steady decline in the number of manufacturing jobs. Fueled by the less-expensive manufacture of goods in other countries and increases in automation, many manufacturing hubs in the state faced economic crises: by one estimate, for example, employment in apparel manufacturing in New York City dropped by 64 percent, from 231,000 jobs in the 1960s to 84,000 jobs in the 1990s.[15]

Over the last couple of decades, however, New York has seen a resurgence in manufacturing, most of it driven by new technology. While traditional manufacturing relied heavily on manual labor and simple mechanization, modern manufacturing has been transformed by digital technologies and automation. The incorporation of new techniques and technologies has led to greater efficiency and flexibility in production processes—and given rise to the term "advanced manufacturing."[16] Products like semiconductors, pharmaceuticals, and aerospace components are now among the high-tech goods being produced in the state. Large investments by the federal government, New York State, and private companies have sparked and supported programs focused on developing these high-tech industries and their needed workforce.

Hiring for new positions in advanced manufacturing has not been able to keep up with the demand by companies, however. A 2021 study by Deloitte and the Manufacturing Institute found that more than two million manufacturing jobs could lay vacant by 2030 due to a lack of skilled workers to fill them.[17] According to national data from the Bureau of Labor Statistics, for every 1,000 positions in manufacturing in May 2024, there were 44 job openings with only 28 new hires made (see Figure 1).[18]

FIGURE 1. **US Manufacturing Job Openings vs. Hiring Rate, 2014 to 2024**



SOURCE: "Seasonally adjusted values for hiring and openings in Manufacturing," Job Openings and Labor Turnover Survey, Bureau of Labor Statistics, US Department of Labor, accessed July 23, 2024.

Opportunities Presented by Advanced Manufacturing Workforce Development Programs

Enrollment at SUNY community colleges declined by 34 percent over the 10-year period from 2012 to 2022, falling from 243,007 to 159,333.[19] This trend, exacerbated by relatively sharp declines during the COVID-19 pandemic, mirrors a national decline in enrollment at community colleges. The reasons for the decline are multifactorial but may stem from demographic shifts that have reduced the pool of traditional-aged college students or individuals opting for immediate employment rather than pursuing further education.[20] There are reasons for optimism, however: SUNY community colleges' Fall 2023 enrollment increased by nearly 2 percent to 162,228—the first year-over-year growth in a decade.[21] This increase has been spurred, in part, by the colleges' initiatives in workforce development for advanced manufacturing. As just one example, Hudson Valley Community College experienced a surge of new students in its welding and fabrication programs.[22]

Surely part of the allure for new students is that jobs in advanced manufacturing pay well. Data from the New York State Department of Labor show that the average annual salary in the manufacturing sector was $80,730 in 2023. The highest-paying subsectors were computer and electronic manufacturing ($118,293) and chemical manufacturing ($101,035) (see Table 1). Many programs at SUNY community colleges impart skills to students that are applicable across subsectors, including through training in automation, robotics, and programmable logic controllers (PLCs). Education in these areas gives students the technical foundation to work in a variety of high-paying jobs. In an interview with the Rockefeller Institute, one plant manager talked about the potential for upward mobility for students who train for jobs in advanced manufacturing industries: "These programs [in manufacturing at community colleges] are changing these people's lives and their family's lives.... these young folks are making more in the first year they work than both of their parents combined did for probably two or three years of work."

TABLE 1. **Average Wages in New York's Manufacturing Industries, Top 10 Subsectors, 2023**

Manufacturing Subsector	
Computer and Electronic Product Manufacturing	$118,293
Chemical Manufacturing	$101,035
Petroleum and Coal Products Manufacturing	$95,509
Electrical Equipment and Appliances	$92,871
Machinery Manufacturing	$86,514
Transportation Equipment Manufacturing	$85,643
Primary Metal Manufacturing	$84,914
New York State Average—Manufacturing	**$80,730**
Paper Manufacturing	$77,427
Nonmetallic Mineral Product Mfg	$76,833
Textile Mills	$76,335

SOURCE: "Quarterly Census of Employment and Wages," US Department of Labor, accessed July 29, 2024, https://dol.ny.gov/quarterly-census-employment-and-wages.

In addition to demand by students, workforce development programs in advanced manufacturing at community colleges also have been spurred by a groundswell of interest and investment from private companies. Leaders at each college interviewed by the Rockefeller Institute reported being approached by companies seeking to recruit new students or to upskill current employees. Businesses are asking SUNY's community colleges for training and education schedules that streamline the transition from academics to the job site, too, in an effort to fill immediate workforce needs. For example, in discussions with industry representatives, it became clear to leaders at Monroe Community College (MCC) that the traditional one- or two-year programs in manufacturing would not meet the current demand for skilled workers. Employers needed to fill gaps in workers trained in mechanical systems and automation, and in response, MCC developed an eight-week, for-credit micro-credential program, that provided intensive training in these areas over four full days of classes each week.

Commitments by New York Governor Kathy Hochul and SUNY Chancellor John B. King, Jr. to support initiatives such as these at New York's community colleges have been key to the growth of jobs in advanced manufacturing. Governor Hochul has provided financial backing from the state government, including to build manufacturing centers at the community colleges. In October 2023, for example, Governor Hochul and Chancellor King were on-site for the opening of a new Mechatronics Lab at Dutchess Community College. The governor described the lab as helping to "build 21st century workforce ready to meet the needs of 21st-century businesses in our state."[23] Moreover, the SUNY system under Chancellor King continues to invest in classroom space and equipment to support programs in advanced manufacturing.[24]

SPOTLIGHT | SUNY's Monroe Community College

SUNY's Monroe Community College (MCC) offers stackable credentials in Robotics and Automation that enable students to start by obtaining a micro-credential,(a) and then decide whether to continue to obtain a certificate(b) or an associate's degree.(c) This flexibility tailors MCC's offerings to both students and industry partners. Similarly, a one-year certificate in Mechatronics can stand alone or serve as the first half of the college's Applied Integrated Technology associate's degree.

These flexible pathway programs are supported by close partnerships with several companies in the Finger Lakes region that have donated equipment and provided input on the design of the curriculum. One important partnership is with L3Harris Technologies, Inc., a company that manufactures equipment for the aerospace and defense industries.

L3Harris has a need to quickly train workers to take up electromechanical-related jobs at its manufacturing site in Rochester. The company sponsors scholarships, employs enrolled students part-time, and participates in a curriculum-shaping advisory committee. L3Harris also sends current employees to the school to participate in MCC's training programs—part of the company's strategy toward continuously up-skilling its workforce.

MCC has established partnerships with several other industry leaders, too, such as FANUC Robotics, which has helped develop two new state-of-the-art centers for training in advanced manufacturing: the Forward Center, which opened in 2023, and the Applied Technology Center, which opened in 2024. The Forward Center alone aims to train 2,500 individuals over the coming three years.(d)

a) "Robotics and Automation," Monroe Community College, accessed October 3, 2024, https://www.monroecc.edu/etsdbs/MCCatPub.nsf/Microcredentials-Web/0B95E7A78F0EFD0185258AF5006FBC3F?OpenDocument&Catalog.

b) "Robotics and Automation Certificate Program," Monroe Community College, revised March 22, 2024, https://www.monroecc.edu/etsdbs/mccatwip.nsf/New+and+Revised+Programs+of+Study/26F4ECDEBED90DCA8525809D006A9082?OpenDocument.

c) "Industrial Automation Technology," Monroe Community College, revised July 26, 2018, https://www.monroecc.edu/etsdbs/mccatpub.nsf/hegis+codes/Industrial+Automation+Technology+(AAS+DEGREE)?OpenDocument.

d) Jacob, Smriti, "FWD Center at Downtown MCC Campus Opens," *Rochester Beacon*, May 23, 2022, https://rochesterbeacon.com/2022/05/23/fwd-center-at-downtown-mcc-campus-opens/.

Reaching and Enrolling Students

Applying for college can be daunting for prospective students, even so much so that they become discouraged from applying.[25] To address this, SUNY's community colleges are implementing creative strategies to reduce enrollment barriers for their high-demand advanced manufacturing workforce development programs. In an interview with the Rockefeller Institute, leaders at SUNY's Mohawk Valley Community College (MVCC) described how prospective students for courses in advanced manufacturing kick off the process by filling out a simple application form that requires only basic information. A navigator from MVCC's workforce development team then personally calls the applicant to collect whatever additional information is needed. The personal connection doesn't stop there: navigators then advise students when and where to show up for classes, and they soon start facilitating communication between students and potential employers. This facilitative arrangement at MVCC is similar to that at other SUNY community colleges, such as at Onondaga Community College where each student is assigned a navigator to help resolve issues and refer students to resources.

SUNY's community colleges also work to enroll underrepresented and nontraditional students in advanced manufacturing workforce development programs. In May 2023, SUNY Chancellor King noted: "We've got to make sure that as we experience this advanced manufacturing renaissance as a state, that it is a diverse community of New Yorkers who have the full benefit of this renaissance."[26] Historically, women and people of color have been unevenly represented in manufacturing and are particularly underrepresented in high-paying manufacturing jobs. The decline in manufacturing jobs over recent decades has also disproportionately impacted these groups.[27] The latest estimates from the Bureau of Labor Statistics show that while women make up 56.1 percent of the labor force, they occupy 29.2 percent of the jobs in manufacturing.[28] Similarly, African Americans constitute 13 percent of the labor force and hold 8.3 percent of the jobs in manufacturing.[29] With a specific focus on increasing diversity in these industries, SUNY Corning Community College places an emphasis on recruiting African American students to its Technical Pipeline Program, and SUNY Erie Community College offers a range of services to support nontraditional students.

SUNY community colleges are more broadly connecting advanced manufacturing workforce development programs to support nontraditional students, including people who do not immediately pursue higher education after high school and those who are managing other life responsibilities such as childcare and full-time employment. To reach nontraditional students, Onondaga Community College (OCC) creates a clear and accessible path into higher education, increasing the availability of coursework, building students' confidence with short-term programming, and "on-ramps and off-ramps" that enable students to pursue further education at their own pace. The program's structure, which is still focused on leading students to a two-year degree or even to a successful transfer to another institution for a four-year degree, helps address challenges nontraditional students often face in committing to and staying with a long-term program by providing multiple "penalty-free" entry and exit points.

Many advanced manufacturing workforce development programs at SUNY's community colleges also cover the cost of tuition or class materials for students, eliminating another significant barrier. MVCC's Free Fast Track program, initiated in response to the economic impact of the COVID-19 pandemic, is designed to help rapidly integrate students into the workforce. Funded in part by a $500,000 grant from Oneida County, the program offers free, intensive courses related to advanced manufacturing, each designed to be completed in 14 weeks or less. At SUNY's Clinton Community College, a grant enables the school to offset outside costs that students may incur while pursuing training, such as for childcare or transportation.

SPOTLIGHT | SUNY's Erie Community College

SUNY's Erie Community College collaborates with the Northland Workforce Training Center to offer a comprehensive mechatronics training program. Faculty from the college teach certificate courses at Northland over two semesters, and Northland provides wraparound support services to students at each stage of the program. Staff at Northland help prospective students gather documentation needed for the application, and once students are accepted help them apply for financial aid, obtain needed immunizations, and fulfill other requirements. If students do not qualify for traditional financial aid, Northland often uses private grants to cover tuition, books, tools, and other supplies, keeping costs low and increasing accessibility for students. Even an emergency fund is available to help students deal with unexpected financial crises, such as car repairs or potential evictions, providing up to $500 in grants that do not need to be repaid.

Each student in the program is assigned a "life coach," a staff mentor who helps students manage personal and academic responsibilities including such things as making secure transportation to the facility or finding childcare during classes. This approach of offering comprehensive support services at Erie Community College and Northland is credited with helping to enroll and graduate an increasingly diverse cohorts of students. Leaders at Northland estimate that now more than half of all students are people of color or women, citing that the program's completion rate is notably higher than the national average for community colleges, and that African American men, in particular, have a higher completion rate than similar programs.

Program Development

In the early 2010s, the leadership team at SUNY's Cayuga Community College hosted a consortium of industry leaders, faculty, and other community stakeholders to discuss the development of programs in advanced manufacturing. Participants explored how their particular resources and expertise could be used to help design, develop, and implement these programs. That collaboration culminated with the 2022 opening of the Advanced Manufacturing Institute (AMI) on the Fulton campus of SUNY Cayuga. The 7,800-square-foot AMI facility contains classrooms and equipment to train students in pneumatics, hydraulics, motors, and other advanced mechanics techniques.[30] A plant manager described AMI as "state-of-the-art" and a "game-changer" for developing skills in the region for the area's emerging advanced manufacturing industries.

Extensive engagement with industry and the community on advanced manufacturing workforce development initiatives is evident at many of SUNY's community colleges and often includes the colleges soliciting input on curriculum through formally established advisory boards. For example, representatives from Corning Inc., a maker of specialized glass and glass-based products, advise SUNY Corning on specialized workforce training programs, while representatives from Huhtamaki, a maker of food packaging, similarly advise Cayuga Community College. Companies partnering with SUNY's community colleges also host workshops for instructors and allow them to tour their facilities to explore and experience new manufacturing processes: faculty from Mohawk Valley Community College have shadowed industry technicians at Semikron Danfoss to inform the development of their school's workforce training curriculum.

Private-sector partners also frequently provide financial support and in-kind donations to SUNY's community colleges to help develop new training programs. Such contributions help build labs and provide equipment to mirror real-world conditions in manufacturing plants. For example, Lockheed Martin donated computer numerical control (CNC) machines to Onondaga Community College, while Micron has committed $5 million, partly in-kind, for building labs and purchasing equipment at the college. At Cayuga Community College, Huhtamaki and Novelis have donated control circuits, hydraulic kits, and other equipment.

Industry partners also frequently encourage their managers and other technical professionals to teach courses at SUNY's community colleges as adjunct faculty. Suffolk Community College makes it easier for these industry-sourced adjuncts to teach by creating evening classes for them after they (and many of their students) are done working at their day jobs. The colleges see this arrangement as a pipeline for permanent faculty, too. The director of the mechatronics program at SUNY Erie previously worked as an electrical engineer, and most other instructors there have spent 10 to 25 years working as electricians, engineers, or in other technical roles before transitioning to teaching. This experience helps teachers infuse real-world knowledge into coursework.

SPOTLIGHT | SUNY's Cayuga Community College

A 2013 Trade Adjustment Assistance Community College and Career Training (TAACCCT) grant from the New York State Department of Labor to Cayuga Community College spurred the development of training programs in advanced manufacturing. This funding was instrumental in the school's effort to align curricula with the needs of industry partners, leading to the development of four new concentrations within the mechanical technology degree and a one-year certificate program in advanced manufacturing.

The program development efforts sparked by the TAACCCT grant helped reveal a broad interest and need among manufacturers in Oswego County, where the college operates a branch campus in the city of Fulton. Local industry partners, particularly Novelis and Huhtamaki, expressed a need for students trained in industrial maintenance technology, automation, and controls. This demand led to the conceptualization and subsequent construction of the state-of-the-art Advanced Manufacturing Institute on the Fulton campus. The capital project was funded with a combination of SUNY matching funds, contributions from industry partners, county programs, and support from the community college's foundation. The majority of the funding came from Novelis and Huhtamaki, with key financing from the Oswego County Industrial Development Agency.

Training and Hands-On Learning

A major strength and draw of the workforce development programs at SUNY community colleges is their hands-on nature, with students directly interacting with the same tools and processes used by local advanced manufacturing industries. Research supports this approach, showing that hands-on experience improves students' motivation while helping them to understand the theoretical aspects of manufacturing.[31, 32] A plant manager involved in developing an interactive course at one of the community colleges told the Rockefeller Institute: "It's very much a moment where the students determine, you know, 'Hey, this is for me,' or that it's not. And both are good! The sooner someone can figure out what that spark is, is key." The list below provides a sample of the different types of hands-on training programs offered at SUNY community colleges.

- **Mechatronics**

  The Mechatronics Program offered at SUNY Erie is about 30 percent classroom learning (theory) and 70 percent lab learning (practical).[33] This core program in advanced manufacturing, which combines elements of mechanical engineering (such as thermodynamics) and electrical engineering (such as circuit design), is a key foundation for additional and specialized training. The course at SUNY Erie is taught over two semesters at the Northland Workforce Training Center.

- **Welding**

  Clinton Community College's Welding Academy is a workforce training leader in that specialty.[34] The Academy teaches the basics of "Metal Inert Gas" and "Flux Core Arc Welding." Mohawk Valley Community College, SUNY Schenectady, and others also offer courses in different types of welding. The classes at these community colleges use welding booths—enclosed areas that come with fire-resistant walls, welding curtains, and protective gear. Completion of these classes prepares students to sit for the New York State Department of Transportation's Welding Exam or to acquire certifications offered through the American Welding Society.

- **Automation and Control Systems**

  The median annual wage for robotic technicians in 2023 was $65,080, almost double the median annual wage for all workers nationally.[35] To prepare students for this career path, Monroe Community College offers a Robotics and Automation Certificate,[36] and the school is preparing to launch a new micro-credential program called Industrial Automation and Robotics. This coursework covers the use of programmable logic controllers (PLCs), human-machine interfaces (HMIs), and industrial control systems, all equipment used in advanced manufacturing. The coursework is popular among many area companies for upskilling their workers. Baldwin Richardson Foods, for example, sends multiple employees annually to MVCC for skills training in automation.

- **Optical Systems and Technologies**

  Optical components—lenses, mirrors, and lasers—play an increasingly important role in advanced manufacturing, especially for processes that require high precision and accuracy such as 3D printing and laser-guided cutting. Many companies in upstate New York, including Corning Inc., Optimax, and Sydor Optics, have helped to develop the Associate of Applied Science (AAS) degree in Optical Technology at Monroe Community College.[37] These companies provide funding, equipment, and adjunct instructors to support instruction toward this two-year degree. The program has received funding from both the public and private sectors, including a $5 million grant from the federal Department of Defense, grants from the New York State Department of Labor, and contributions from SUNY and partnering private companies.

SPOTLIGHT | SUNY's Clinton Community College

In 2015, the North Country Chamber of Commerce formed the North American Center of Excellence for Transportation Equipment, known as NAmTrans to support the region's 50 or so transportation industry manufacturers. And in partnership with NAmTrans, SUNY's Clinton Community College now offers an intensive welding course at no cost to participants. The training consists of 120 hours of instruction over three weeks. Students operate under a condensed schedule that mimics a shift at full-time employment (7:30 a.m. to 3:30 p.m.), and personal protective equipment is provided that students may keep after successful completion of the program and use as they continue on to employment.

This partnership grew out of initial conversations between NAmTrans and Alstom, a multinational company that builds railcars and similar rolling stock transportation equipment. Alstom had recently purchased Bombardier Transportation, which has a significant local presence in Plattsburgh, and needed trained welders. Rather than forming its own in-house training program, NAmTrans facilitated an agreement with Clinton Community College (CCC) for the development of needed programs and training facilities. CCC hosts the trainings, and Alstom in turn provides two employees to help teach the courses, donates some of the required equipment, and provides supplies. NAmTrans also involved Lincoln Electric, a well-known welding education organization, to help design the program curriculum. NAmTrans then secured a $285,000 grant from the Northern Border Regional Commission to cover the tuition cost of the program for any enrolling student. Funding from the Workforce Development Institute covers the cost of personal protection equipment for students. Finally, NAmTrans also involved New York State Empire State Development, which provides a $2,500 stipend for all students and covers the cost of wraparound support services such as transportation and childcare.

Pipelines to Employment

The success of advanced manufacturing workforce development programs at SUNY community colleges is evidenced by the real-world impact that these programs have had on students' lives. Personal success stories abound—consider these two from Mohawk Valley Community College:

- A student from the Fulton area completed an associate's degree in Mechanical Engineering Technology at MVCC, and program mentors there helped her obtain employment at its advanced manufacturing partner, Wolfspeed. At Wolfspeed, she was promoted twice and eventually became a tertiary-level supervisor, all within two years of her graduation from MVCC at the age of 19.
- Another student worked at Wolfspeed after completing the Mechatronics certificate program at MVCC, continuing her employment while she successfully pursued a bachelor's degree at SUNY Polytechnic Institute.

And this one from SUNY Erie:

- A student from western New York wasn't sure about his future direction but had heard of Northland Workforce Training Center and decided to explore the field of advanced manufacturing. He enrolled in the mechatronics program at SUNY Erie Community College and recounted how he quickly acquired competencies in the use of specialized industrial tools, including pneumatic and hydraulic systems. The student said: "You only have to dedicate yourself for a year, you get hands-on [training], and it's honestly just a load of fun."[38]

SUNY's community colleges support numerous and varied paths to employment in advanced manufacturing. Among the most impactful have been setting students up in internships and part-time work with industry partners. The aerospace and defense technology company, L3 Harris, provides part-time work and tuition scholarships to students at Monroe Community College while they take workforce development coursework, and many take advantage of the connections formed and become employees at L3 Harris after graduation. The Technical Pipeline Program at Corning Community College enables students in manufacturing program tracks to work at Corning, Inc., part-time during the school year and full-time during breaks, culminating in a job offer at the company after students complete their degree. At Erie Community College, students in the mechatronics program participate in regular "lunch-and-learn" sessions, where companies advertise jobs and often conduct on-the-spot interviews. It is not uncommon for students to field multiple job offers at these lunches, including from companies with strong local and national presence, such as General Motors, General Mills, and Tesla. All of these programs at SUNY's community colleges are growing—and are changing lives.

SUNY's technical workforce development programs have not only developed pathways to private-sector manufacturers but also to the public sector. In 2023, the US Navy's Submarine Industrial Base awarded Suffolk County Community College's (SCCC) Advanced Manufacturing and Workforce Development program $2 million over five years to recruit and train the next generation of workers needed to build and maintain its submarines.[39] This funding will provide full-tuition scholarships for 100 students per year, training 250 welders and 250 CNC machine operators. SCCC's new programs are envisioned to eventually support not only the Navy's submarine programs but also to help address the growing need for skilled workers in the defense manufacturing sector more broadly.

SPOTLIGHT | SUNY's Corning Community College

The Technician Pipeline Program (TPP) at Corning Community College began in 2008. Trained in advanced manufacturing skills and processes used at Corning, Inc., students are given a full-tuition scholarship and an annual stipend of $30,000. In return, students work at a Corning facility eight hours each week during the semester and full-time during school breaks while they earn their associate's degree. Students must also agree to work for Corning in a technical role for at least three years following completion of their degree. To increase the program's reach and flexibility, Corning Community College formed partnerships with Monroe County Community College and Broome Community College to allow TPP students to take qualified coursework at those institutions to complete their associate's degree.

The program has a high retention rate—more than 90 percent over 14 years—and there is a 100 percent placement rate for the 70 students who have completed the program (there has been only an occasional withdrawal). Finding the employment rewarding, many of these students have chosen to stay at Corning beyond their original five-year commitment.

Looking Ahead: Challenges and Growth

To date, SUNY's community colleges have largely relied on grants from federal and state agencies to initiate their advanced manufacturing workforce development programs. Grants typically cover the core costs of many programs, including purchasing training materials and supplies, providing personal protective equipment to students, constructing needed facilities, and obtaining specialized training equipment. To sustain these programs, of course, additional and ongoing funding is needed. In one interview, a leader at a community college talked about running out of initial grant money for a program and reflected on whether the college could continue it with a different stream of funding or if it would have to be discontinued.

Interviews with colleges and their private sector partners revealed another challenge in growing the specialized workforce development programs: the availability of instructors. In some cases, students have been eager to enroll in a particular program but there are not enough qualified teachers to meet the demand. Onondaga Community College and Suffolk Community College are among the many that offer flexible schedules and evening courses to attract industry-based professionals to serve as adjunct faculty. Cayuga Community College is working with Huhtamaki to develop training programs specifically to prepare current employees to become classroom and lab instructors. It is not as simple as inviting someone with the appropriate manufacturing technical skills to come and teach a class, however. A leader at Novelis, an aluminum-based manufacturer in Oswego County, explained that while many employees at his company are comfortable teaching employees at the plant, they are reluctant to take on more formal academic responsibilities, such as creating syllabi and curriculum paths, and

to do classroom or off-site instruction. Challenges lie not only in finding industry professionals with the right experience who are willing to transition into teaching roles or to take on additional work outside their full-time jobs, but also in finding or developing courses that are specially designed to prepare these new instructors.

Despite these challenges, several SUNY community colleges are further developing their advanced manufacturing workforce development programs, and a few are envisioning expansions. Cayuga Community College, for example, is working with industry partners to expand its Advanced Manufacturing Institute to create dozens more spots for students annually. Suffolk Community College is planning to allocate more space at several locations to accommodate its increasing inventory of training equipment. Other community colleges told the Rockefeller Institute that they are working to develop programs with stackable credentials that enable students to sequentially build up their qualifications. All of these proposed expansions will further position the colleges to lead in workforce development for advanced manufacturing.

SPOTLIGHT | **SUNY's Onondaga Community College**

Onondaga Community College (OCC) offers flexible pathways for electromechanical training, allowing students to pursue either a certificate or an Associate of Applied Science (AAS) technology degree. Students who complete the certificate program can enter the workforce immediately or, if desired, continue their education by enrolling in the AAS degree program. These options are popular among employers like National Grid and Lockheed Martin, which rely on the college to fill a high demand for skilled workers in this field, and can sponsor students with certificates to continue toward earning their two-year degree. These industry partners further contribute to the electromechanical program and similar programs at the school, by donating equipment (Lockheed Martin has donated CNC machines, for example).

Many of the instructors in advanced manufacturing workforce development programs at OCC are currently employed at an industry partner and others are recently retired. The structure and flexible schedule of the electromechanical program—three-hour evening classes held once or twice a week—has been successful in recruiting industry professionals to serve as adjunct professors. Leaders at OCC say that instructors like the idea of meeting students who will soon become their employees, too.

Conclusion

Partnerships between community colleges and the private sector help to bridge the "middle skills" gap by preparing students for positions that require more than a high school diploma but less than a bachelor's degree.[40] When effectively implemented, these collaborations benefit from the expertise and resources of employers, who can help shape curricula and offer opportunities for students to gain real-world experience. In return, the partnerships enable community colleges to fulfill their primary aim: setting students on a clear pathway to gainful employment. As the manufacturing industry in New York grows, there is continued work to be done in fostering the current partnerships and growing new ones. To this end, SUNY is actively supporting the community colleges to strengthen these connections, and New York State is investing in workforce development across its institutions.

The Empire State Development's Office of Strategic Workforce Development recently made a $933,000 grant to Rockland Community College that will sponsor a program to train students in the maintenance of industrial machinery.[41] A $500,000 grant was awarded to Hudson Valley Community College for its Offshore Wind Training Institute, supporting programs in welding and fabrication with a focus on preparing students with the skills to manufacture wind turbines.[42] At the four-year college level, Governor Hochul recently announced a $44 million investment in workforce development at SUNY Polytechnic Institute that will fund education related to semiconductors and robotics.[43] These investments across the SUNY system will strengthen the ability of community colleges to prepare students for careers in advanced manufacturing.

ENDNOTES

Endnotes

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