

How a Community College Created a Talent Pipeline and Catalyzed Economic Development:

Danville Community College's *Retooling America* Program

Introduction

One of the most noteworthy results of Danville Community College's (DCC) *Retooling America* initiative is the contribution it is making to economic development and job creation in the region. Funds awarded by the U.S. Department of Labor through a Trade Adjustment Assistance Community College and Career Training (TAACCCT) grant in 2014 - helped DCC to increase capacity and strengthen capabilities of its legacy program in precision machining technology. In turn, this bolstered expansion of the talent pipeline DCC and others had already begun to develop in the Southside Virginia region. The comprehensive, industry-focused advanced manufacturing education and training DCC provides to a steadily increasing number of students is attracting foreign and domestic firms that are building new manufacturing facilities in the region.

This issue brief attempts to shed light on how Danville Community College and its partner, the Institute for Advanced Learning and Research (IALR)¹, mobilized leaders from workforce development, economic development, and education to catalyze economic development in the region. That this is occurring at all is noteworthy; that it is occurring in a primarily rural area in Southside Virginia—a region hard-hit by the demise of long-standing textile, tobacco, and furniture industries and where educational attainment is below the state average²—is significant. The lessons DCC offers for community colleges, especially those in similarly rural and semi-rural areas, are compelling.

¹The Institute for Advanced Learning and Research (IALR) serves as a regional catalyst for economic transformation. Core focus areas include research that provides a clear path to commercialization, advanced learning opportunities where education meets experience, and economic development through conferencing and a partnership with the Southern Virginia Regional Alliance. The IALR serves the counties of Patrick, Franklin, Henry, Pittsylvania, Halifax and Mecklenburg along with the cities of Martinsville and Danville, in Southside Virginia.

²"Educational Attainment in Danville, Virginia," Statistical Atlas, accessed September 12, 2017, <http://statisticalatlas.com/place/Virginia/Danville/Educational-Attainment>.

Program Overview

DCC has a long history of providing skilled workers to advanced manufacturing employers through its two-year diploma program in Precision Machining Technology (PMT). Through the *Retooling America* initiative, students and workers that complete or demonstrate competence in all of the modules in the PMT diploma program can enroll in the third-year Integrated Machining Technology (IMT) program to pursue an associate of applied science degree or a Career Studies Certificate in CNC Flow Cell Machining. The key element of the third-year IMT program is a capstone work flow cell experience, which provides a real-life shop floor manufacturing environment to demonstrate how all of the skills learned in the PMT program are integrated to contribute to a final product. DCC's programs offer many points of entry and exit, as well as opportunities to attain employment and to continue to earn stackable credentials.

The following sections highlight key factors contributing to the enhancement of DCC's ability to catalyze economic development through creation of a precision machining talent pipeline.

Raw Materials

The effort to create a precision machining talent pipeline was made possible by the confluence of several factors. The initiative would not likely have achieved the degree of development and success that it has to date if any one of them had been absent at the outset. Together, the following three factors provided the foundation with which to fashion a program and a strategy for economic development. They served as a platform upon which to layer the other components that were essential for development and implementation of the Retooling America initiative.

A Legacy Program

DCC's precision machining program has earned a solid reputation based on its ability to turn out skilled machinists, dating back to before 1946. That was the year when the Danville Military Institute became home to the off-campus engineering division of Virginia Polytechnic Institute and shared the campus with Danville Technical Institute, with whom it merged in 1966 to form DCC³.

³ "Facts: History and Development," Danville Community College, July 2016, accessed September 16, 2017, <http://www.dcc.vccs.edu/IR/ResearchFiles/Fast%20Facts%202016.pdf>.

Employer/Industry Need

Manufacturing enterprises are highly desired because they foster innovation and create wealth that circulates through a community⁴. However, not all communities are successful when it comes to attracting manufacturers.

According to a lead executive with Rolls Royce of North America, companies can build factories anywhere. What they need, however, is a skilled workforce, which is not available everywhere. Moreover, he noted that it is very difficult to create advanced manufacturing capability from scratch, so it made sense for an advanced manufacturer to connect with an educational institution that had a history of training students in precision machining.⁵

Shortly after Rolls Royce had opened its first advanced manufacturing facility outside of Richmond in May 2011, it announced plans to expand its Virginia manufacturing operations. When considering expansion possibilities, its primary concern was ensuring that it could get a skilled workforce for its advanced manufacturing facilities. To that end, it encouraged creation of a pipeline of workers skilled in applying the relevant technology, at the scale required, to meet its immediate and anticipated long-term workforce needs. This ultimately led to conversations with instructors at Danville Community College who were hearing of this need from other regional manufacturers as well.

A Habit of Responsiveness

DCC faculty and staff are well-known for gearing curriculum to industry needs as well as helping businesses to address production problems they encounter. For example, the Capstone IMT work-flow-cell program, at the heart of the college's TAACCCT grant activity, was created in response to feedback provided by employers that surfaced more needs and wants than could be addressed by continuous improvement of the existing PMT curriculum.

“The entire Dimensional Metrology course was developed around what they [employers] needed versus someone in academia saying this is what I'd like to teach.”

– DCC Program Administration Specialist

⁴ James Heskett, "Are factory jobs important to the economy?" in Working Knowledge: Business Research for Business Leaders Harvard Business School, March 28, 2012, accessed September 17, 2017, <http://hbswk.hbs.edu/item/are-factory-jobs-important-to-the-economy>.

⁵ Tom Loehr, comments made during a roundtable discussion of the *Retooling America* initiative, Danville Community College. June 7, 2017.

In addition, the Dimensional Metrology (DM) program was created, two years earlier than planned, when employers indicated a desire to hire students trained explicitly in the skills needed for quality inspection in an advanced manufacturing environment rather than assigning their best machinists to do that work, which had been the practice.

An employer that has worked with DCC for many years stated that on numerous occasions DCC had asked for his input on what he needed his employees to know and be able to do. He contrasted this with being told what the college had to offer. He further indicated that DCC has always been very accommodating in tailoring curriculum to enable students they hire to “hit the floor running.”

Forging Change

Conditions in Southside Virginia were ripe for creating a precision machining talent pipeline, but few initially recognized the extent of the opportunity. Building awareness of the need and development of a plan required crafting of a vision supported by data, persistent communication, advocacy and leadership, and contributions from multiple partners.

Creating a Vision

The need articulated by Rolls Royce resonated with representatives of the Commonwealth Center for Advanced Manufacturing (CCAM) and the Virginia Tobacco Commission (VTC) who asked for assistance in developing a workforce strategy for Southside Virginia, one of the areas hardest hit by the decline in tobacco production. This led to a study

conducted by the Boston Consulting Group (BCG). This study looked at the anticipated workforce needs of advanced manufacturers already in the region, estimated the number of skilled workers that would be needed, and examined existing capacity to supply a talent pipeline. BCG’s report identified the factors conducive to attracting manufacturers and concluded that many were already present in the region. The report also made clear what Rolls Royce, DCC, CCAM and others had already estimated to be of critical importance: for advanced manufacturing to thrive and new businesses to be attracted, the region needed to increase its capacity and capability to build and sustain an advanced manufacturing

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workforce pipeline, especially in medium-skilled occupations, such as traditional and CNC machinists, welders, and industrial maintenance mechanics.⁶

“The biggest challenge a company faces is finding the people. . . . Not graduate [-level] engineers; the difficulty is the machining and forge guys—the technicians with mid-level skills.”

– CCAM Director of Economic

DCC recognized that this presented a significant and challenging opportunity for the college and the region. Enhancing and expanding the college’s ability to provide high-quality education and training in precision machining could not only lead to local residents obtaining good-paying jobs; it could also help to draw businesses to the region attracted by the college’s programs.

Crafting a Plan and Building Awareness

The BCG report made clear that additional investments would be needed to create and sustain an advanced manufacturing pipeline. The VTC provided some funds, but not at the level needed to accomplish what was suggested in the report. Funding was not the only need. Long-term, the number of students in DCC’s two-year Precision Machining Technology diploma program would not be sufficient to entice new businesses to the region. More students would be needed in the pipeline and, with that, increased education and training capacity—i.e., facilities and equipment investments.

With the release of BCG’s report in January 2013, an informal working group led by DCC’s Director of Advanced Manufacturing began to strategize ways to expand training facilities and equipment and increase student and parent interest in advanced manufacturing as a career. This also called for ongoing support and involvement from employers. Multiple one-on-one and small-group conversations and meetings were held until potential partners came to understand and support the initiative. College-related and civic functions, community sporting events, and other social engagements became opportunities for discussing the possibilities with local public and private sector officials, whose support was also needed. Those who supported the initiative were recruited to help inform others. Outreach and advocacy efforts continued to garner support so that additional elements of the pipeline could be put in place.

⁶ The Boston Consulting Group, *Developing an Advanced Manufacturing Workforce for Virginia’s Tobacco Region: Key Findings and Recommendations* (Boston, MA: The Boston Consulting Group, January 2013).

Generating Student Interest

As part of its efforts to attract students, DCC worked to change the often unfavorable perceptions that students and their parents have of advanced manufacturing as a potential career choice. To generate better understanding of advanced manufacturing, DCC invited K-12 students and their families to tour the training facilities and see what an advanced manufacturing environment is like. In addition, DCC held day-long “Concept to Creation” workshops where students experienced the process of taking a product from design to manufacture.

It was also deemed important to provide the newly energized students with opportunities they could take advantage of while they were still in high school, as well as increase enrollment in the pipeline. When the BCG report came out, the then-director of career and technical education of the Pittsylvania County Career and Technical High School recognized the opportunity this presented to her students. She was one of the early supporters of the idea and has played a key role throughout. Working with DCC, and aided by VTC and other grant funds, she facilitated launch of the first dual-enrollment precision machining program that enables high school juniors and seniors from her district to complete the first year of the diploma PMT program by the time they graduate.

Acting Collaboratively

The continuing collaboration of many contributes to the development and growth of the *Retooling America* initiative. From the onset, the IALR has been an integral partner, working with DCC to write the grant for TAACCCT funds that DCC submitted to the US Department of Labor, as well as by reaching out to employers, economic developers, educators, and local officials to generate enthusiasm and build support. In addition, the Gene Haas Center that houses the Integrated Machining Technology program is located in space made available by the IALR.

“Our company had a need and the program addressed it. I am supportive [of the program] because I am going to have another need.”

– Representative of BWX Technologies

The local economic developer joined the effort after attending a presentation at Pittsylvania County Career and Technical High School where he was also quick to recognize the value that expanding the precision machining talent pipeline would add to business-attraction efforts. His efforts helped to generate a \$1.6 million economic development grant from local

officials to apply toward creation of a second dual enrollment precision machining program, this one at Danville's George Washington High School. Employer contributions are and have been significant and substantial, including an endowment for student scholarships, cutting-edge technology, equipment, and raw materials. Several employers donate staff time to work with students and conduct training on equipment used in the IMT lab. Employers sometimes bring in machining problems for students to figure out or projects to work on, such as developing prototypes of products from specifications. All employer contributions are voluntary. When asked if they felt an obligation to support the precision machining program, one employer responded: "It is not an obligation, because we are not forced to do it. This program creates desire [to contribute]!"

Products of the Effort

Manufacturer Investment in the Region

DCC and its partners continue their efforts to expand capacity and develop new workers, but their efforts are bearing fruit. Two manufacturers have already begun operation in the region and a third announced in September 2017 its intent to do so. Their combined investments in the region exceed \$25 million and are expected to create at least 135 new jobs over the next three years, with more jobs anticipated over time. Other manufacturers interested in locating in the region continue to visit the DCC classrooms keen to learn about the DCC approach.

Skilled, Well-Paid Workers

PMT and IMT students are graduating, some with multiple job offers, and enter the workforce earning wages of \$40,000 or more per year to start. The successes achieved to date contribute to additional student enrollments, further enhance business-attraction efforts, and elicit support from additional partners and employers.

"It is not an obligation [to support the program] because we are not forced to do it. This program creates desire!"

– Representative of Rolls Royce

Continued Employer Engagement

The success and growth of the *Retooling America* initiative continues to bring forth additional contributions from employers of staff time, tools, machinery, materials, student project ideas, and scholarship funding. A number of employers bring production problems and designs for students to work on, while others demonstrate the confidence they have in DCC's precision machining training capabilities by bringing groups of their employees to the campus for incumbent worker training.

In addition, employers contribute to DCC's reputation and standing as an education and training provider. For example, Haas Automation, Inc., a leading manufacturer of precision machining tools and equipment, designated DCC as one of five HTEC (Haas Technical Education Center) Teacher Training centers. DCC's HTEC programs for high school, technical/community college, and university instructors were enrolled to capacity during summer 2017. In addition, Haas invited DCC to host the National HTEC conference in 2018.

Preparing for Tomorrow

Increasing Pipeline Capacity

Discussions are underway to add one additional high school dual-enrollment program to feed into the precision machining talent pipeline. In addition, an agreement was reached with Patrick Henry Community College (PHCC) to offer the first year of the two-year PMT diploma program on its campus in southwest Virginia, with students engaging in the second year of that program on the DCC campus. When the three high school dual-enrollment programs and the PHCC program are fully in place within the next 12 to 18 months, DCC anticipates that the precision machining talent pipeline will have capacity to enroll up to 330 students annually, with up to one hundred or more exiting the pipeline and entering employment each year with either a PMT Diploma, IMT associates degree, a certificate in dimensional metrology, or a certificate in CNC machining technology. In addition, DCC is expanding short-term specialized instruction for incumbent workers, veterans, and adult learners seeking entry-level manufacturing employment.

DCC's partners explained that this regional system will give the area a considerable advantage when trying to attract new businesses. Typically it takes 18-24 months to build a manufacturing facility and begin production. The dual-enrollment programs give the college and economic developers the ability to estimate the numbers of skilled individuals coming out of the pipeline up to five years ahead, which will inspire confidence in businesses considering the region for expansion.

“Rapid-Launch” Space

DCC and its economic development partners came to understand that developing workforce talent was necessary, but not entirely sufficient, to be fully competitive in attracting manufacturers of significant size to the region. They learned that making start-up, rapid-launch space available would enable a company to start manufacturing and shipping product while its own factory is being built, offering an additional economic development advantage.

To that end, the Institute for Advanced Learning and Research (IALR) facility in Danville, where the capstone work flow cell is housed, made two bays available with space suitable for small-scale production. DCC and the IALR joined forces and are seeking \$25-million to construct The Center for Manufacturing Advancement (CMA) which includes a factory optimization facility and additional rapid-launch space. The new facility will also include a certified metrology lab, space for materials storage, and other supports.

Manufacturing 4.0 Curricula

DCC is also working with employers in the region to develop a program to train students for the next major development in advanced manufacturing—cloud-based automation machining (also known as the Connected Enterprise , or Manufacturing 4.0)—that requires skills involving cyber security, robotics, and automated measuring machines. According to a European-based economic developer working with CCAM, the next need is a technician able to work in this connected enterprise environment, and DCC intends to be in the forefront of the effort to develop curricula and train students for those jobs. Such programming would further enhance its ability to help attract and keep advanced manufacturers in the region.

Conclusion

The *Retooling America* program continues to evolve as the TAACCCT grant-funded period comes to an end in 2018, but the combined efforts of DCC and its partners have already changed the regional landscape and revealed the potential for a stronger economic future.

It is important to note that DCC's success was not achieved overnight and involved years of work on the part of a number of the college's advanced manufacturing faculty and staff alongside employers, economic developers, educators, and public officials. Perhaps most important is the confidence that employers have in DCC's desire and ability to prepare their workforces with the knowledge and skills needed to be competitive. DCC has earned employer confidence by continually seeking their input and developing, modifying, and upgrading its precision machining technology programs based upon what employers tell them that they need.

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For more information about Danville Community College's Advanced Manufacturing programs, visit www.machiningindanville.com.



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