



Narrowing the Skills Gap to Ensure the Future of Manufacturing: **Boeing and CTE**

By Nadine Rosendin & Anne Gielczyk



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anufacturing has long been the backbone of the United States economy, and as such, the implications of a widening skills gap are economically significant. Every job in manufacturing creates another 2.5 new jobs in local goods and services; and for every dollar invested in manufacturing another \$1.37 in additional value is created in other sectors (Giffi, McNelly, Dollar, Carrick, Drew, & Gangula, 2015). But due to retirements and economic expansion, researchers at Deloitte and The Manufacturing Institute estimate a need for 3.5 million manufacturing jobs in the next decade, at least two million of which will go unfilled (Giffi et al., 2015) because of an insufficient supply of skilled workers.

Schools and industry that work together to teach and build students' technical skills have a critical role to play in narrowing the skills gap. Manufacturers like Boeing are taking the challenge head-on. With a focus on inspiring students and helping them to prepare for the future, the aerospace company is reaching out to students as early as elementary school, building an awareness, and sharing the exciting world of 21st century aerospace and advanced manufacturing. Boeing soars into its second century manufacturing commercial airplanes, and defense, space and

security systems with the understanding that its path forward is paved only if its potential workers are well prepared and available in response to the demand.

Aircraft pioneer William E. Boeing's first B&W Seaplane "Blue-bill" entered final assembly in early 1916. One hundred years later the company is producing commercial and military aircraft, satellites, weapons, electronic and defense systems, launch systems, advanced information and communication systems, and performance-based logistics and training. Today, Boeing employs approximately 142,000 employees worldwide with 117,000 in the United States, uniting the legacies of visionaries from McDonnell Douglas, North American Aviation, Hughes, Jeppesen and Stearman — each of which shared the creation of Boeing's mission to connect, protect, explore and inspire the world through aerospace innovation.

As the manufacturing industry experiences significant skill gaps, this is reality in nearly every sector across the country. In a podcast produced by MLives Media Group, "The Nocti Podcast Episode 1: The Skills Gap," Steve Sims, technical services manager at Haworth, explains how he is experiencing the same issues in his organization. Haworth, a leading office furniture manufacturer in the Midwest, is in need of electricians, machine repairmen

and pipefitters, and finding them increasingly scarce. In addition, while the use of robotics is on the rise, skilled workers will run them and will, more importantly, be required to fix those robots when they experience a malfunction. Without such individuals, downtime increases in production of parts needed to complete the product, creating costs that are eventually passed on to the consumer (“The Nocti Podcast,” 2017).

While the challenge of replacing the generation of workers who are retiring is certainly an issue around the skills gap, a cultural component also impacts companies like Boeing. Manufacturing work has long suffered from a reputation as dirty and unsafe, and many continue to believe little or no skill is required in order to perform these jobs. “In a poll conducted by the Foundation of Fabricators & Manufacturers Association (Giffi, Rodriguez & Mondal, 2017), 52 percent of all teenagers said they have no interest in a manufacturing career. In the 2017 ‘U.S. Public Opinions on Manufacturing’ study conducted by The Manufacturing Institute and Deloitte, Gen Y respondents (ages 19–33 years) ranked manufacturing as their least preferred career destination. In addition, only a third of respondents indicated they would encourage their children to pursue a career in manufacturing” (Giffi, McNelly, Dollar, Carrick, Drew & Gangula, 2015, p. 17).

Many students do not perceive skilled trades as viable career options; moreover, many of them are encouraged to enter college and pursue a four-year degree. Now more than ever, career and technical education (CTE) must bring parents into the conversation, to enlighten them about the options for their children in a modern manufacturing facility and on the wage scale for skilled workers versus someone coming out of college. An element of the discussion should be the financial aspect of college loan debt contrasted with the cost of training for a skilled trade and the free public education available to students while in high school.

The Manufacturing Workforce Initiative was started by Boeing in 2015 to keep pace with industry-wide attrition and its own specific production needs. Sponsored by then Boeing Commercial

Airplanes President and CEO Ray Conner, the Initiative was tasked to evaluate the company’s current manufacturing pipeline approach, examine end-to-end processes with all system owners, and drive the workforce pipeline development for manufacturing jobs. At the 2017 Washington Association for Career and Technical Education (WA-ACTE) summer conference held in Spokane, Washington, Conner stated in his keynote speech that we “owe it to our young people to equip them for a very different world of manufacturing. It will take a strong and committed partnership of education, business and government” to make that happen. Conner urged the audience to understand the importance of manufacturing, and not only in the state of Washington. “Having a strong manufacturing base is a key element of global competitiveness, and its impact on the economy is magnified tenfold, because each manufacturing job generates so many additional jobs” (Conner, 2017).

For its part, Boeing has partnered with more than 29 high schools and skill centers, as well as 24 community and technical colleges in the state of Washington to align company manufacturing requirements with academic curricula. The number of partnerships is continuing to grow as the need increases. As a result, Boeing and partners have developed an industry-approved manufacturing curriculum for high school skill centers and technical education programs. Core Plus is a two-year, standardized high school manufacturing curriculum recognized by the state of Washington to prepare high school graduates for an entry-level career in manufacturing, with the understanding that “personal responsibility, material science, applied math and hands-on technical skills are cornerstones for success in a wide range of highly rewarding industrial careers. Core Plus teachers help their students learn these skills through acquisition of prioritized knowledge, skills and abilities (KSAs) validated by industrial businesses engaged in advanced manufacturing, maritime trades, construction and agricultural support services” (Core Plus, 2016). ‘Core’ skills are those required by all sectors. ‘Plus’ content refers to skills

specific to a single sector. Instruction occurs through classes in topics that include metal fabricating, machining, composites, construction and principles of manufacturing or engineering.

Equally significant is the partnership between Boeing and Nocti Business Solutions (NBS). Boeing has collaborated with NBS to develop pre-employment assessments for many skills including the mechanic, technician and mechatronics job roles. These assessments measure the skills a person possesses prior to hire, which will assist the employer with job placement and training. NBS assessments are currently administered by Boeing hiring managers for the mechanic and technician job roles. Boeing is also utilizing a mechatronics assessment that is hosted by NBS but developed by Automotive Technical Education Collaborative (AMTEC). AMTEC, which was established by a consortium of community colleges and automakers, offers curriculum and assessments to standardize training across manufacturing. The mechatronics assessment used for this role at Boeing will be administered by community and technical college partners and NBS.

In addition to specific curriculum and assessment development and engagement with academic partners, outreach efforts continue to be an important part of Boeing’s strategy to connect and inform the future workforce about today’s advanced manufacturing opportunities. One successful outreach event took place in October 2017 at the company’s Everett and Renton, Washington facilities. Boeing’s support of Manufacturing Day, celebrated annually by the National Association of Manufacturers, included tours for ninth- and 10th-grade students of 737 and 747/767/777/787 factories, as well as hands-on experiences in their Skills Process Centers. Michelle Burreson, senior manager of workforce development and the Manufacturing Workforce Initiative program manager, commented, “We are committed to being continually engaged with our community and for the manufacturing industry as a whole to excite and inspire the next generation of manufacturing employees.”



Instructor Brian Wilson helps to develop a skilled manufacturing workforce.

Boeing's talent development investments in the state and nationally have realized educational benefits well beyond preparing pathways for Boeing's future workforce. When asked about Boeing's contribution, Eleni Papadakis, Washington's state CTE director and executive director of the state's Workforce Training and Education Coordinating Board, had this to say: "Boeing's partnership has been a boon to rebuilding and reinvesting in our manufacturing talent pipeline development system. Our small and mid-sized manufacturers just don't have the resources to develop and test new curricula or engage in skill standards development, let alone share equipment or other resources with public programs on a consistent basis. Boeing's curricular resources have provided a valuable baseline on which to build programs that support all manufacturing subsectors across the state, at the high school and postsecondary levels."

When students and parents are made more aware of the variety of careers offered by state-of-the-art manufacturing companies and the technical skills they require, and with the development of new career pathways and curricula such as Core Plus, companies like Boeing are better equipped to close the skills gap — and the future becomes bright again for manufacturing careers. ■

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