



Growing California's Electric Bus Manufacturing Workforce:

How an Employer and a
Union Built a High Road
Training Pathway

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About

About the California Labor Federation

The California Labor Federation promotes the creation of high road partnerships that include labor, employers and other community stakeholders in delivering training pathways into high-quality jobs and careers. In collaboration with the AFL-CIO Working for America Institute, WED supports the scale of high road manufacturing apprenticeships in California.

A strategy to encourage the growth of these programs is to produce case studies of successful manufacturing registered apprenticeships that demonstrate high road practices.

calaborfed.org/workforce-and-economic-development-wed



About High Road Alliance

High Road Alliance (HRA) works to expand the availability of training programs that open doors to equitable, inclusive employment opportunities and career advancement. Through partnership development, planning, research, technical assistance and facilitation of peer learning, HRA promotes the growth of pre-apprenticeship and registered apprenticeship programs that lead to high road employment, offer livable wages and benefits, and contribute to a sustainable economy and shared economic prosperity.

highroadalliance.org



About Working for America Institute

The AFL-CIO Working for America Institute (WAI) is a nonprofit, 501(c)(3) national workforce intermediary organization that assists unions, employers, workforce intermediary partnerships, the workforce system and community organizations by advocating for and providing employment and training related services that help to create, expand and retain high-quality jobs. WAI is committed to supporting and expanding labor-management partnerships to improve the well-being of workers, the success of employers and the growth of thriving communities.

workingforamerica.org



About Partnership for Advanced Manufacturing Apprenticeship



Partnership for Advanced Manufacturing Apprenticeship (PAMA) assists in the creation of customized registered apprenticeship programs. Advanced manufacturing companies face complex workforce challenges in a competitive global marketplace. Registered Apprenticeship is a proven solution to recruit and build a world-class manufacturing workforce.

workingforamerica.org/partnership-advanced-manufacturing-apprenticeship

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The Build Your Dreams (BYD)-Sheet Metal, Air, Rail and Transportation Workers (SMART) apprenticeship is the first Industrial Manufacturing Technician (IMT) registered apprenticeship program in California and the first electric bus manufacturing apprenticeship program in the country. This case study describes the program's history and documents lessons learned by its employer, labor, education and community partners. The case study captures key elements of the program model that could inform future joint union-management apprenticeship and pre-apprenticeship programs in industry sectors that are key to equitable and sustainable economic growth.

Introduction

The threats posed by climate change create urgent need for the United States to transition our economies for a clean energy future.

Following historic investments from the Biden administration into the key sectors of manufacturing and infrastructure, within this dual climate and economic challenge lies an immense opportunity to build a skilled workforce with good jobs. Labor unions can seize this opportunity and shape it.

This case study offers a how-to guide to build a sustainable, highly skilled workforce to answer this historic moment of need and investment through high road workforce programs created by labor-management partnerships.

What is a high road program?

A workforce training partnership that answers economic need at the cutting edge of growing industries while centering workers through good, sustainable jobs.

This case study offers the direct experiences of instructors, businesses, union members and apprentices who participated in the Sheet Metal, Air, Rail and Transportation Workers (SMART) apprenticeship program with manufacturing company Build Your Dreams (BYD)—the first electric bus manufacturing apprenticeship program in the country.



The report describes how collaboration between union, community members, business management, educational institutions and national stakeholders created a successful, comprehensive and accessible workforce training program with accreditation and a career on the other side.

This successful labor-management partnership, based in California's Antelope Valley, offers a model for the entire country of how to catalyze collaboration among many stakeholders to create jobs that meet the sustainability needs of today and tomorrow.

California's commitment to climate resilience is reflected in major policy initiatives such as Innovative Clean Transit (ICT), which sets a statewide goal for public transit agencies to transition to 100% zero-emission bus fleets by 2040. Full implementation of the regulation will have universal benefits in terms of reduced greenhouse gas emissions, improved air quality and a shift away from fossil fuel dependence. It also will have major implications for the state's skilled workforce, as electric bus manufacturers secure public contracts to produce the 12,000 zero-emission buses needed statewide. A national study estimates that the shift to all-electric vehicles could create more than 150,000 jobs in the United States by 2030.¹ With few existing workers experienced in this industry, new strategies are needed to train Californians to build the vehicles of the future.

BYD is one of several companies addressing the ICT 2040 mandate through its electric bus manufacturing plant in Lancaster, California. Lancaster, located in the Antelope Valley of the western Mojave Desert, about 70 miles north of downtown Los Angeles, has a 60-year history of producing aircraft, cars, and military and commercial equipment, and once set the goal of becoming the nation's first net-zero municipality. Nevertheless, BYD struggled initially to hire a production team and ensure quality product at its Lancaster facility, as local workers lacked skills needed for electric bus manufacturing. In 2017, BYD signed a community benefits agreement with SMART Local 105, and together they began

¹ Barrett, J. and Bivens, J. (2021) *The stakes for workers in how policymakers manage the coming shift to all-electric vehicles*. Economic Policy Institute. Available online at: <https://www.epi.org/publication/ev-policy-workers/>.

taking steps to create the Industrial Manufacturing Technician (IMT) registered apprenticeship program. The program, now training its fifth cohort of IMT apprentices and its second cohort of pre-apprentices, has yielded benefits for BYD, the union, workers, the Antelope Valley community and the state. The collaborative BYD-SMART IMT apprenticeship, the first of its kind in California, presents a replicable model for worker training and advancement.

The goal of this case study of the BYD-SMART apprenticeship program is to document its training model, the history of its emergence, and the lessons that can be derived from the challenges it overcame and its successes. The case study draws upon the stories of many program partners: BYD staff

members in human resources and communications; SMART Local 105's apprenticeship administrator, instructor, and current and former trustees; the dean of career technical education at Antelope Valley College (AVC); a Jobs to Move America (JMA) organizer; the director of Advancing Communities Together (ACT); multiple staff members of the Worker Education and Resource Center (WERC); and several current and former apprentices. The case study is intended to encourage the growth of new manufacturing apprenticeship and pre-apprenticeship programs that similarly respond to industry, worker and climate resilience needs.

USEFUL TERMS

Registered apprenticeship is an industry-driven training strategy whereby workers obtain classroom instruction, on-the-job training and a portable, industry-recognized credential while receiving progressive wage increases as skills are mastered. In California, registered apprenticeships are approved and validated by the U.S. Department of Labor and/or the state Division of Apprenticeship Standards.

Related supplemental instruction (RSI), one of the elements of a registered apprenticeship program, is an organized and systematic form of instruction designed to provide the apprentice with knowledge including the theoretical and technical subjects related and supplemental to the skill(s) involved.

On-the-job training (OJT), one of the elements of a registered apprenticeship program, is training provided by an employer to a paid employee while engaged in productive work. OJT provides knowledge or skills essential to the full and adequate performance of the job.

Registered pre-apprenticeship prepares individuals to enter and succeed in one or more registered apprenticeship programs. Pre-apprenticeships couple industry-based training with classroom instruction. In California, a registered pre-apprenticeship must be formally associated with at least one registered apprenticeship program sponsor and approved and validated by the state Division of Apprenticeship Standards.

The Industrial Manufacturing Technician (IMT) apprenticeship is a nationally recognized apprenticeship registered with the U.S. Department of Labor that trains front-line manufacturing production workers in skills identified by local

sponsors. The IMT is based on the Manufacturing Skill Standards Council (MSSC) Certified Production Technician (CPT) curriculum and can be customized to meet the demands of specific industries, workplaces and apprentices. The IMT content serves as a foundation for career ladder programs to prepare apprentices for more skilled occupations such as maintenance technicians.

The High Road Training Partnership (H RTP) initiative of the California Workforce Development Board and the California Labor and Workforce Development Agency aims to increase access to high road jobs for underserved populations and create pathways for job growth for incumbents already employed with high road employers. H RTP has funded more than 50 industry-driven, worker-focused training programs statewide, including the BYD-SMART pre-apprenticeship.²

A labor-management partnership is a collaborative arrangement between an employer (“management”) and a union or unions (“labor”) representing the employer’s employees. Goals of the partnership may be to foster better communication and improved relationships, address workplace issues negatively affecting organizational effectiveness, or fulfill the objectives of collective bargaining and community benefits agreements.

A community benefits agreement is a legally enforceable agreement signed by a developer or other company and community groups that defines specific community benefits that the developer agrees to provide.³ The benefits can address a range of issues such as affordable housing, community amenities, funding for job training and diversity hiring.

² See <https://cwdb.ca.gov/wp-content/uploads/sites/43/2021/04/2021.H RTP .BYD SMART ACCESSIBLE.pdf?emrc=c79884>.

³ Gross, J., LeRoy, G., and Janis-Aparicio, M. (2005). *Community Benefits Agreements: Making Development Projects Accountable*. Good Jobs First and the California Partnership for Working Families.

The BYD-SMART Apprenticeship Program

Through the BYD-SMART apprenticeship program, workers who have been employed at the plant for one year or more have a structured pathway to advancement. Apprentices complete 264 hours of coursework delivered by AVC and 2,736 hours of on-the-job training. The apprenticeship follows the IMT curriculum, which was developed in 2012 through a U.S. Department of Labor (DOL) grant by the Wisconsin Regional Training Partnership/Building Industry Group and Skilled Trades Employment Program (WRTP/BIG STEP) in partnership with the AFL-CIO Working for America Institute (WAI), as an innovative apprenticeship pilot program for production and entry-level manufacturing workers.

Over the 18 months of the apprenticeship, workers demonstrate competencies in equipment operation and maintenance, safety, inspection, quality control, inventory, continuous improvement and industry trends. Apprentice wages start at \$16 per hour and increase as competency benchmarks are achieved. The program is registered with the DOL and the California Department of Industrial Relations (DIR), and graduates receive DOL and DIR apprenticeship completion certificates, an AVC IMT program completion certificate and an Occupational Safety and Health Administration (OSHA) 10-hour certificate.

The BYD-SMART pre-apprenticeship, launched in 2022, creates an accessible entry point for diverse community members to enter employment with BYD. The pre-apprenticeship is an eight-week, 24- to 30-hour per week commitment. It includes a 32-hour, hands-on hard skills practicum at the BYD plant, as well as classroom instruction, a worker panel discussion and a BYD facility tour. Participants gain basic competencies in electric bus manufacturing tools and procedures, safety and professionalism. Through partnerships with nonprofit agencies ACT and WERC, each pre-apprenticeship participant

**Apprentices complete
264 hours of
coursework delivered
by AVC and 2,736 hours
of on-the-job training.**

is assigned a case manager to support them in addressing any barriers to program completion and hire. Individuals who successfully complete the pre-apprenticeship are placed on a priority hiring list for entry-level positions at the plant, and should they apply for and enter employment at BYD, they bypass the required one year of tenured employment and are granted direct entry into the IMT apprenticeship.

The BYD-SMART program facilitates job mobility within a diverse local workforce, creating a middle step on the manufacturing career ladder between entry-level production workers and more highly skilled roles. Both the pre-apprenticeship and apprenticeship training programs help BYD and SMART to achieve a commitment made in a 2017 community benefits agreement negotiated between the company and the union that benchmarks a goal of 40% of the BYD workforce being comprised of historically excluded workers, including people of color, women, veterans and formerly incarcerated community members. Training is the key to these workers' access to high-quality, union jobs at BYD, and to their contributions to the production of the high-quality electric buses our nation requires.

History of the BYD-SMART Apprenticeship

BYD's new electric bus manufacturing plant in Lancaster faced a variety of initial challenges. Through a process of collaborative problem-solving, the company and the union arrived at solutions that ensured high-quality production outcomes and opened doors to meaningful, well-paid manufacturing careers for local community members.

Several factors contributed to a sense of urgency in this problem-solving process. First, BYD needed to quickly ramp up hiring of over 500 front-line production workers, but few local community members had experience related to electric bus manufacturing. Initial recruitment efforts didn't reach targets, and some new hires struggled to learn on the job, then left for other opportunities. When the BYD workers unionized, the community benefits agreement included a commitment to local hiring that could only be fulfilled with a comprehensive workforce development strategy, and apprenticeship emerged through dialogue as a possible solution. "The way to get that cohort [of new workers] up to speed," a BYD spokesperson said, "other than through on-the-job training, was apprenticeship."

Along with the training program itself, BYD and SMART established a labor-management board to oversee candidate recruitment and screening so that qualified applicants understood the opportunities of BYD employment and SMART membership and could be guided and trained to enter suitable positions with clear paths to advancement.

As a BYD representative explained, "We thought it was important to have our union and our young employees be partners with us as we grow. The best way was through the pre-apprenticeship and apprenticeship programs that we operate."

The first contract negotiated by BYD and SMART included a training trust fund, which dedicated a

- **2019**
BYD-SMART joint apprenticeship program launched
- **2021**
Graduated first two classes of IMT apprentices
- **2022**
H RTP grant funds supported the launch of the BYD-SMART pre-apprenticeship program.

few cents on every dollar of wages to support worker upskilling—an early win-win-win for the company, the union and the workers. A Joint Apprenticeship and Training Committee composed of SMART and BYD representatives was established with the help of WAI. Then the work began to develop an apprenticeship, a training model with a long history in the U.S. unionized building trades but little application to date in the manufacturing industry.

"We got more involved in the apprenticeship design and development because we discovered it's more helpful for employer and employee if we have a training program designed with direct benefits to the employee's work," said a BYD human resources representative, "so they learn skills they can apply directly, then apply for higher-compensation positions with those skills."

Early in the process, BYD and SMART reps attended a WAI Manufacturing Apprenticeship Accelerator in



Cleveland to learn more about the IMT and hosted a site visit by a WAI adviser. The BYD-SMART joint apprenticeship program launched in 2019 and graduated its first two classes of IMT apprentices in August 2021.

As the BYD-SMART partnership evolved, the company and the union overcame differences to establish an adaptive and sustainable structure for training design and delivery. They participated in shared planning and program development and took common ownership of program results. Along with the apprenticeship program's education provider partner, AVC, they learned from early program implementation and adjusted to address the needs of the business and its workers. Today, the BYD-SMART apprenticeship is recognized by the California Workforce Development Board as a High Road Training Partnership (H RTP), a model for collaborative delivery of industry-driven, worker-centered and community-benefiting training programs. (See Useful Terms above.)

In 2022, H RTP grant funds supported the launch of the BYD-SMART pre-apprenticeship program. Advancing Communities Together (ACT)—an affiliate of the DOL's YouthBuild program, as well as a public charter school, community housing development organization and California licensed contractor—took the lead on curriculum development, drawing from the construction sector's Multi-Craft Core Curriculum (MC3) and the IMT. ACT designed a comprehensive program to foster the successful entry of young people of color into manufacturing, including leadership development and wraparound support services. The Worker Education and Resource Center (WERC), a Los Angeles-based nonprofit organization experienced with running high road training programs, collaborated with ACT, BYD and SMART to secure H RTP funding and recruit and train a first cohort of pre-apprentices.

Results to Date of the BYD-SMART Apprenticeship

With four apprenticeship cohorts and three pre-apprenticeship cohorts having completed training, the investment of time and resources in the BYD-SMART apprenticeship is yielding results. Since its inception, the BYD-SMART apprenticeship has enrolled 144 apprentices, 63 of whom completed the 18-month program and attained state and federal apprenticeship certifications (with 18 poised to graduate in January 2025). The pre-apprenticeship program has enrolled 45 participants, 38 (84%) of whom graduated and three of whom were hired by BYD. New-hire apprentices start at \$16 per hour, all apprentices receive raises along wage scales, and graduates earn between \$19 and \$26 per hour as journey-level workers in a variety of roles, including production supervisor and management roles. Job retention has been strong: 60% of apprentice graduates have now been with the company for five years or more.

The apprenticeship program has also shown success in increasing the diversity of BYD's production workforce. The initial four apprenticeship cohorts included 33 people of color, 12 women, three veterans and six with prior history of incarceration. The first three pre-apprenticeship cohorts enrolled an even more diverse group, with 89% people of color and 26% women. BYD has now exceeded its community benefits agreement goal, with 70% of its workforce composed of people from communities historically underrepresented in manufacturing.

The program has resulted in measurable outcomes for the company. SMART and JMA's advocacy for equitable recruitment, training and wage increases helped to establish a pipeline for the hiring of new workers and the upskilling and professionalization of those already on the shop floor. As a result, BYD has seen overall increases in worker productivity and product quality, and they have recruited program

graduates for supervision and management positions. Of significance to the company and to California, BYD is on track to meet its electric bus production goals and to compete for further procurement opportunities.

Union workers and community members also reap the benefits of the apprenticeship. Apprentices and recent graduates say the apprenticeship helped them to expand their knowledge, learn new skills, earn more money, boost their resumes, gain confidence, and advance to supervisory or other leadership positions. People who once took two or three jobs to meet their household needs—or who were previously homeless—now are in careers they can depend on until retirement. As the JMA representative described, reflecting on the outcomes of the community benefits agreement they helped negotiate and the apprenticeship, “Some workers were able to get a journeyman card without ever being a high school graduate. They never thought they'd be at a place in their career where they'd be able to take these skills anywhere; instead, they've chosen to build their careers within the company.”

Now SMART members are spreading the word about the training benefits of union membership and the opportunities for meaningful careers in the electric bus manufacturing industry, growing the unionized manufacturing workforce in California. Although data is not available on broader community impacts of the apprenticeship program, BYD representatives point to lower unemployment rates in Lancaster since the plant opened (6.7% in September 2023, down from 10.9% in 2013, according to the California Employment Development Department), as well as reduced homelessness and crime.

Future Directions for the BYD-SMART Apprenticeship

Work will be ongoing to adapt and expand the BYD-SMART apprenticeship program. This could take many forms, depending on partners' priorities

and the opportunities that present themselves in the years to come. Some possible future directions for the apprenticeship program include:

- Adapt training content to award additional industry-recognized certifications, such as those offered by the American Welding Society.
- Meet BYD's shifting training needs through integration of additional BYD training into the apprenticeship program structure.
- Make training more accessible and convenient for apprentices through the use of BYD classrooms.
- Increase the number of apprentices through the addition of instructors and overlapping cohorts, aiming to enroll the large majority of BYD production workers.
- Broaden community partnerships and leverage additional resources and expertise to support pre-apprenticeship and apprenticeship applicants who do not yet possess a high school diploma or equivalency, need additional English language instruction or require accommodations for disabilities.
- Develop additional tiers on the BYD training pathway and wage structure beyond the IMT, offering further opportunities to apprenticeship graduates.
- Promote the IMT apprenticeship as the gold standard in manufacturing training in California, tied to state procurement policies' diversity and inclusion requirements.

Key Takeaways from the BYD-SMART Apprenticeship Program

Much can be learned from the early experiences of BYD, SMART and their high road training partners. These have potential implications for California's electric vehicle industry, the broader manufacturing sector and other industries. They also may inform the development and direction of other High Road Training Partnerships (HRTPs) and workforce development initiatives in California and across the country. The lessons learned to date suggest some best practices, as explored below.

Understand the importance of labor-management partnerships, and actively support the vital role that unions play in these partnerships and the formation and implementation of registered apprenticeship programs

The experiences of SMART, BYD and their high road training collaborators offer valuable insights on the critical role of labor-management partnerships and the full participation of union representatives. These insights have the potential to reshape the landscape of California's electric vehicle industry, the wider manufacturing sector and various other industries. Furthermore, they can serve as a model for the development and implementation of HRTPs and workforce development initiatives both in California and across the nation.

Strong collective bargaining agreements are the foundation for labor-management partnerships. Through collective bargaining, unions such as SMART Local 105—in collaboration with labor advocates such as JMA—provide a collective voice for workers to set the terms and conditions of employment; secure better wages, benefits and working conditions; and ensure the inclusion of training, apprenticeship and upgrading opportunities. JMA and SMART worked together to bring the voice of workers to the negotiation of an initial

agreement with BYD. As the representative of workers at BYD, SMART Local 105 played a critical role in designing and implementing the labor-management partnership and apprenticeship programs grounded in the collective bargaining agreement.

Build a strong labor-management relationship

At the heart of the apprenticeship program is the relationship that formed over time between the employer and the union. As BYD faced pressure to hire its workforce and to project a positive image of its community benefits, SMART Local 105 received the support of JMA and a coalition of union advocates to organize the electric bus workers and, with the workers' decision to unionize, represent them in contract negotiations. BYD became one of only two electric bus manufacturers with a unionized workforce in California, and the 2017 community benefits agreement committed the labor-management partnership to common training and diversity goals.

“Once we did get a contract,” a SMART Local 105 representative said, “that labor-management relationship and that trust still had to be built up. Things didn't happen magically....Negotiation was needed to arrive at what worked for the company and for us, for the company to stay here and do business and for the workers to have a great career.”

A challenge particular to the BYD-SMART relationship was the lack of familiarity with unions and apprenticeship on the part of the company, and with electric bus manufacturing in what had traditionally been a building trades union. Early in negotiations, SMART Local 105 made the case for the role it could play in attracting community members to BYD employment, setting standards for screening and hiring of qualified workers, and including workers' voices in ensuring job quality and

productivity. BYD embraced the importance of training, and apprenticeship emerged as a priority strategy to achieve the goals of the community benefits agreement. As the BYD human resources representative stated, "Training is critical for our employees, and it's not easy to have effective training programs. We needed pertinent content, strong delivery and good attendance. And we needed to attract participants, to let them see the benefits before they start."

Embed community engagement as an integral part of labor-management training partnerships

The labor-management training partnership has consistently focused on informing communities of color, low-income communities and individuals with barriers to employment about the apprenticeship opportunity. In 2020, recognizing the need to increase the number and diversity of apprenticeship-ready workers (particularly in light of the community benefits agreement), BYD and SMART began collaboration with ACT and subsequently with WERC to develop the pre-apprenticeship program. ACT and WERC played valuable intermediary roles in the growing partnership. To develop the pre-apprenticeship curriculum, ACT visited a successful IMT program in Seattle and WERC staff members walked the shop floor and spoke with supervisors to identify specific skill needs. The pre-apprenticeship partners tailored a case management approach so that pre-apprentices could receive the wraparound support they needed to succeed in training and to get by financially until hired. SMART and ACT led the process to register the pre-apprenticeship with the California Department of Apprenticeship Standards, and WERC applied for and was awarded an H RTP grant, securing resources for the collaborative design and delivery of the pre-apprenticeship.

Seek value-added partnerships with community colleges that implement student-centered learning

When SMART Local 105 began searching for a local education agency for the new apprenticeship, they

Current and former BYD-SMART apprentices, on the apprenticeship opportunity:

"I had been at the company for six years. I wanted to improve my life skills and continue working with the company. I had tried to go for [a higher position], and they asked me questions I couldn't answer because I didn't have the knowledge. Now, suddenly, in this class we're learning about the dimensions, how to use the metric system....I didn't have the knowledge of that, and now that I learn, it's like, 'Wow, if I'd have known...'"

"The hard thing is you work eight or 10 hours and then come to class. But you put it in your goals, and you want to learn. You come to the class because you know it's going to be something good in your life."

"I saw how everyone [in the apprenticeship program] was going further with the company. Some were becoming supervisors. That's what motivated me; they gained more knowledge, more skills, more leadership. I wanted to see that for myself as well."

"Being that I was an aerospace worker and now I'm at an age looking toward retirement, my goal is to become a supervisor....There are a lot of opportunities for me."

"The apprenticeship gives me more confidence that this is where I'm at, this is my career. I'm actually starting to claim my career, my lifelong career."

were pointed toward the local community college, Antelope Valley College (AVC). AVC had never offered apprenticeship education, but they had partnered successfully with a local employer on an aircraft maintenance certificate program. Out of initial conversations with the college emerged an enduring collaborative relationship that continues to benefit workers and the company. Key learnings here included:

- **Engage leadership:** The college president saw the value in employer-led, worker-centered training and championed the program development process, engaging the dean and faculty in steps needed to build a relationship with SMART and BYD, develop or adapt a curriculum, and achieve approvals necessary to launch the program.
- **Award college credit:** AVC and SMART discussed whether the apprenticeship classes should award credit or be offered through the college's noncredit or not-for-credit (fee-based) programs. Credit courses require an extensive curriculum approval process, but the union emphasized the value of its members gaining college experience and a head start toward future educational goals. With the union's encouragement, faculty members and SMART representatives embarked upon rigorous curriculum development and packaged an apprenticeship program proposal that was ultimately approved as for-credit by the college district leadership.
- **Find qualified instructors:** Finding the right qualified instructor to teach the program was an initial challenge. The college had no similar courses in its catalog. In addition to adapting the IMT curriculum, AVC was asked to integrate content specifically about union membership and electric bus manufacturing. Fortunately, the college was able to qualify a new adjunct instructor based on prior industry experience. This BYD supervisor and union trainer completed a hiring panel and background check and began teaching night courses, with support from AVC to refine his classroom teaching skills. More recently, an apprenticeship graduate was recruited to complete instructor training and Manufacturing Skill Standards Council (MSSC) certification, and he will assume a full-time teaching role next year.
- **Ensure access:** Another challenge was determining the location of the apprenticeship classes. The BYD manufacturing plant had classroom spaces, but the apprenticeship training idea was new and after-hours access wasn't approved right away. Classes began at the AVC Palmdale campus, in what the new instructor described as "a state-of-the-art building, just beautiful." The location entailed travel for the apprentices, but it exposed them to the college environment and equipment in a career education facility.
- **Facilitate applications and registration:** AVC's application and registration process posed a potential barrier to apprentices, some of whom had never attended postsecondary education and had limited computer literacy. In response, AVC arranged a special session in the campus computer lab, where staff members walked the new apprentices through the college's online application process. Because students needed computer skills to access some curriculum resources, the session included an overview of computer basics. The AVC lead explained, "We haven't offered [the apprentices] a separate computer class on the side. They've come up to speed quickly.... They are in manufacturing, so they're used to picking up new skills."

Implement and customize the flexible IMT registered apprenticeship program

When BYD and SMART agreed to establish an apprenticeship program for the company's entry-level production workers, they realized that no off-the-shelf model existed in electric bus manufacturing. They would have to build something that met their needs. "When first starting this program, we were working off a blank canvas," a SMART Local 105 trustee said. "We were reaching out to any and all resources we could."

To explore possible models, BYD and SMART staff members visited a model program in Cleveland. They initially considered creating multiple apprenticeship programs for different BYD departments. Then, through connections to the AFL-CIO Working for America Institute, they learned about the Industrial Manufacturing Technician (IMT) program—a customizable template for training in the cross-cutting skills needed across production roles. The IMT apprenticeship was already registered with the DOL, built upon established standards and curriculum in manufacturing, and awarded industry-recognized credentials. Adopting the IMT as its foundation, the BYD-SMART program became the first IMT program in California and the first electric bus manufacturing apprenticeship in the country.

The IMT program's 264 hours of related supplemental instruction (RSI) use four modules of the MSSC Certified Production Technician (CPT) curriculum, which earns apprentices the nationally recognized CPT certificate. Apprentices complete courses in industrial math, industrial communications, manufacturing technology systems and processes, and industrial blueprint reading, and they earn required safety certificates in OSHA 10 and first aid/CPR. They also receive content on interpersonal skills, lean manufacturing and problem-solving. An additional 79 hours of RSI can be customized to meet a company's specific skill needs.

BYD embraced the IMT curriculum due to both its industry-standard quality and its adaptability to company needs. "We have very high standards about safety and the use of certain tools," BYD's human resources specialist explained. "Technical training reinforces what we need on the floor, for example, following instructions, reading process cards, passing quality inspections and complying with OSHA [safety] rules. The training reinforces all those concepts."

Responding to these needs, the partnership among BYD's human resources team, SMART staff members, AVC, and experienced production workers

and supervisors such as the new instructor was key to adapting the IMT and designing a curriculum that would yield results for the company and its employees.

Once the IMT model had been selected by BYD and SMART, AVC took the important steps of securing approvals to deliver the curriculum and award college credit.

"Our task initially was to take the curriculum from MSSC that they wanted to use, chunk it up into three semesters' worth of courses and put that through our review process on campus," the AVC dean said.

The existing curriculum eliminated the need to adapt existing courses or create new ones; nevertheless, AVC faculty members participated in an extensive vetting and design process, in partnership with BYD and SMART, to prepare the new program proposal. The curriculum approval process took a year, during which the union was recruiting its first cohort of apprentices.

The BYD-SMART apprenticeship has broken new ground in California with the introduction of the IMT. The JMA representative involved in the project expressed that "it's exciting to bring [the IMT] to a state that invests in keeping its manufacturing workforce buzzing. We want to see that credential adopted as the gold standard for the manufacturing industry here in California."

Customize IMT on-the-job training to align with specific company and apprentice needs

In the IMT apprenticeship, on-the-job training (OJT) follows a Job Book,⁴ customizable to the company, that details required competencies and guides each apprentice's mentor (also a SMART member) to demonstrate skills, observe and provide feedback to the apprentice, and sign off when an apprentice shows mastery of each competency. Because the IMT apprenticeship uses a hybrid model, which mandates

⁴ See https://www.imtapprenticeship.org/system/files/imt_job-book_final_020917.pdf.



each apprentice to complete time and competency requirements for each work process, the IMT Job Book provides a uniform structure for apprentice-mentor interactions and documentation of progress toward completion. The IMT competencies include protecting self and others from accidents and injuries; interpreting production specifications; setting up, inspecting, adjusting, operating and maintaining production equipment; producing quality product and inspecting work; conducting inventory; and knowing current industry trends.

BYD worked closely with SMART and AVC to align on-the-job learning at the plant with the college's technical classroom instruction. Work processes in the registered apprenticeship standards aligned with the competencies in the Job Book, which was used as a checklist to document each apprentice's competencies gained at the worksite. The new apprenticeship instructor, in his daytime role as production supervisor, observed apprentices on the job and took lessons from the OJT context to inform

classroom instruction.

Apprentices expressed appreciation for the blend of hands-on and classroom learning that the IMT apprenticeship offers. One recent apprenticeship graduate explained, "You're not just working; you're really studying. When you're at work, you're busy doing a variety of things and don't have a chance to get new knowledge. In class, you get your questions answered, and it gives you more time to think about the actual solutions. It helps to sit, study and gather your thoughts."

In the future, the program hopes to dedicate a BYD bus to training, to optimize chances for apprentices to apply classroom knowledge to hands-on scenarios.

Use apprenticeship and labor-management partnerships to expand workforce diversity and equity

Make a clear and joint commitment to workforce

diversity and equity: BYD and SMART began their apprenticeship journey with a clear commitment to address workforce diversity through training pathways, while assuring BYD's capacity to produce the high-quality electric buses needed in California. The first apprenticeship cohort was small, though, and mostly male. The labor-management relationship and the community benefits agreement were new, and the best ways to achieve recruitment and diversity goals were still unclear. Left to chance, the partners realized, the training program might not reach apprentices reflective of the community's demographics.

Recognize the important role of the union and its members in increasing workforce diversity: Following the first apprenticeship graduation, union messaging and word of mouth among members became a powerful tool to inform more BYD workers about the training opportunity. "After the first cohort graduated, we [asked] them to spread the word and tell fellow workers," a SMART Local 105 trustee said. An apprentice explained, "We heard from the union on the job. At first I tried to get in, then decided not to. Then I heard from others that you learn a lot. Now that I'm in, I see that you learn at every step." One apprentice who learned about the program through her union representative said she thought more could be done by BYD itself to make the opportunity widely known.

Create pre-apprenticeship programs to support diverse career pipelines

Partners soon recognized that more was needed to invite in a diverse BYD workforce and that a pre-apprenticeship could be a solution. A WERC staff member described how the pre-apprenticeship opened the door to BYD employment for more community members:

We were able to target folks not well represented in the manufacturing world. If they were to apply to the job right away, it might be intimidating. They might feel they don't have the skills, the knowledge, or that in the field there are not a lot of women. The pre-apprenticeship gives the opportunity to learn more about the job, as

Frank Girardot, senior director of communications for BYD North America, on the win-win of the BYD-SMART apprenticeship program:

What's happening in the U.S. is exciting. We're in a revolution that's an electrification revolution, not unlike in the 19th century. Companies need workers and will really benefit from doing an apprenticeship program like we do. It will establish them in the community, make the community better, and in turn make the company better and sustain its presence.

We're a company headquartered in China, so there are obstacles we face in the U.S....There's that stigma with having a Chinese headquarters. We thought it was important to have our union and our young employees be partners with us as we grow. The best way is through the pre-apprenticeship and apprenticeship programs that we operate. It's not just like an appendage; it's important because we want our team to be successful, to grow with us, and we want our community to benefit from the wages and job security our employees have.

The role of a large manufacturing company in a community can't be understated. When the company plays a role in the community's life, it benefits everybody. It's not just good for the company, and what we've learned is what's good for the community is good for the company. It's counterintuitive and goes against everything people think about a large corporation, but we care that we're able to make a difference. It's important to everybody on the management team here how we're able to make a difference in individual lives.

opposed to...being thrown into the job. They're able to go through the steps with guidance, so after they gain knowledge and experience, they can make the decision about something they never would have thought would have been for them.

The pre-apprenticeship promises to play an important role in future apprentice recruitment. A lesson learned from the pilot cohort—which transitioned only three participants to jobs at BYD—is that coordination with the company's hiring timeline is critical so that graduates move directly from the pre-apprenticeship into paid employment rather than seek other opportunities. Coordination with AVC's semester schedule is also key so that pre-apprenticeship graduates can enter apprenticeship instruction right away. Also, recruitment and enrollment of pre-apprentices must involve careful vetting per BYD's hiring eligibility criteria so that all pre-apprentices are able and prepared to enter the workforce. Strengthening communication and feedback channels between BYD and training and service provider partners will help to ensure that the pre-apprenticeship functions optimally and graduates apprenticeship-ready workers.

Address the needs of English language learners

Another contributor to an inclusive apprenticeship program has been adaptation to meet the needs of English language learners, who make up an estimated 80% of the current production workforce. The initial apprenticeship instructor, who is bilingual, took a very individualized approach to supporting these learners. He used Spanish/English MSSC curriculum when appropriate, invited apprentices to ask questions about terminology they didn't understand on the shop floor and guided students to help each other when language needs arose. "It's a lot of work to teach bilingually," he said. "It takes patience and is more individualized. I say to every student, 'We're all going to finish at the same time, even if we start at different levels, by working as a team.'"

Asked about his experience with the program, one

Spanish-speaking apprentice said he would welcome opportunities to further improve his English skills through dedicated classes, possibly linked to the apprenticeship and contextualized with language used on the shop floor. To expand opportunities for English language learners, ACT hopes to integrate Spanish language or supplementary English-as-a-second-language instruction into the pre-apprenticeship.

Ensure a strong focus on apprentice retention

Apprentices in the first cohorts dropped out of classes for a variety of reasons, including medical emergencies, scheduling around a second job, housing insecurity and child care needs. When designing the pre-apprenticeship, SMART, ACT and WERC recognized that participants faced various barriers to program entry and completion, and that those who were not yet earning income as BYD employees could face even greater financial difficulties than apprentices. As the pre-apprenticeship service provider partners, ACT and WERC established referral networks with partner organizations in the Antelope Valley and provided individualized assistance to trainees in need, improving their chances of successful completion. This approach to wraparound support services to improve participant retention could in the future be scaled to also benefit apprentices.

One contributor to job retention among BYD workers is a growing awareness that apprenticeship is about investing in one's career as a professional in the manufacturing industry. SMART's leadership in developing the apprenticeship as a pathway to worker advancement and commitment to mentoring apprentices on the shop floor have contributed to worker morale and professional growth, ultimately benefiting BYD and strengthening its workforce.

A SMART trustee and Joint Apprenticeship and Training Committee member said, "As far as the employees go, [BYD has] come to realize that what we're doing is providing a career, not just a job. We continue to instill that at BYD, [the union is] training

Cathy Hart, former dean, Palmdale Center and Extended Learning, Antelope Valley College (AVC), on the challenge and the imperative of launching the college's first registered apprenticeship program:

AVC wants to be a partner to industry, to meet their employment needs. One of our major industries is aerospace, and we've built customized programs for them. We would like to see more manufacturing companies like BYD in the region, so we know we have to always say yes.

BYD and SMART had approached [the college] about starting an apprenticeship program with AVC as the local education agency....Would I take on this project? I said I don't know anything about apprenticeships, but I'll figure it out. I started to do my research, and it evolved....Now we have a good relationship, a good partnership, with open dialogue.

Nothing is impossible. I figured if we could be creative and think outside the box, it's not impossible....You always need to get to yes. At least try it.

so that they don't have a high turnover rate, so that they can sustain their current workforce.”

Apprentices and pre-apprentices have embraced this commitment to growing their skills in manufacturing, even in the face of personal challenges. As one apprentice stated, “I always go back to thinking how it's going to benefit me and what my goals are. The more knowledge and skills I have, the more valuable it will be. That's what helps me to overcome the obstacles.”

An ongoing retention challenge for BYD is the competition that exists to recruit skilled manufacturing workers in the Antelope Valley. Indeed, some BYD employees, including apprenticeship graduates, have left BYD to work for other industrial manufacturers in the region. From the outset of contract and community benefits negotiations, the union has stood up as an advocate for higher wages for BYD workers and for wage progression tied to training completion. In fact, the development of apprenticeship program standards provided a structure for labor-management conversations about wage parity.

“It took a while and a lot of advocacy for [BYD] to recognize that they were systematically training workers for other competitors, who were snatching them up for higher wages,” a SMART Local 105 representative said. “It took some side agreements that [the union] advocated for, because the wage increases were not high enough.”

In the future, a more widespread culture of advancement at BYD and across the manufacturing industry could help to ensure a robust pipeline of qualified workers and incentives to remain and grow with a company over one's career.

Conclusion: Implications for Workforce Development in Manufacturing

The BYD-SMART apprenticeship program provides an example of a successful high road training program and a replicable training model. Although each employment setting is unique, the key elements of this program may be adopted widely in the electric bus manufacturing industry, and more broadly in the manufacturing

industry, where apprenticeship has yet to be widely used. The program model could be replicated across industries in which collaborative, labor-management-led training holds promise for the development of the future workforce. Key programmatic elements to be considered for future replication include:

- Embrace of the High Road Training Partnership essential elements: industry-led (employers and labor) problem-solving, partnership as a priority, worker voice and training solutions.
- Formal labor-management partnership responsible for apprenticeship design and oversight through its Joint Apprenticeship and Training Committee.
- Positive role for the union as an effective partner with the employer to address recruitment and retention challenges.
- Commitment to diversity outcomes, which may be formalized through a community benefits agreement.
- Local education agency role fulfilled by a local community college.
- Intermediary partnerships to facilitate connections between the apprenticeship program and community organizations and resources.
- In manufacturing settings, adaptation of the flexible Industrial Manufacturing Technician (IMT) apprenticeship program model and curriculum to meet the needs of specific employers.
- Pre-apprenticeship linked to registered apprenticeship to grow the pipeline of prepared candidates from local communities.
- Wraparound support services integrated with training recruitment and delivery.
- State and federal registration of apprenticeship program standards.

SMART and BYD celebrate the benefits that the IMT apprenticeship program has yielded for electric bus production workers in Lancaster. They invite others to apply these lessons learned from the

program to expand its impact on workers, businesses, communities, the economy and the climate resiliency of our state.

For additional information or technical assistance in developing a registered apprenticeship program, please contact:

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