

# Petrochemical Workforce Development

**Engaging Millennials in the Petrochemical Work Force:  
Pathways to the Future**



## Key Contributors to this Report:

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## Introduction

The Millennial generation, comprised of those born in the United States between 1976 and 2001, is big. According to the US Census Bureau, Millennials comprise the largest living generation with a population of nearly 80 million, easily eclipsing the Baby Boom generation's 50 million. Millennials 18-34 years old currently make up about 24% of the population.

In 2014, 36% of the US workforce were Millennials, according to the US Bureau of Labor Statistics. By 2020, nearly half (46%) of all US workers will be Millennials.

"The sheer volume of Millennials combined with the relative lack of Gen Xers (1965-1980) and the increasing retirement of Baby Boomers (1946-1965) means that employers will be facing leadership gaps. And they will be looking to Millennials to fill those gaps," said Jessica Brack, Executive and General Manager at 2U, Inc

"Millennials are unlike preceding generations. They view the world differently and have redefined the meaning of success, personally and professionally. In some cases, this has led to misunderstanding among the different generations co-existing in today's workplace. Increasingly, however, business leaders are realizing this generation's unique competencies and perspective, and employers are looking for ways to harness their strengths," Brack said.

The Petrochemical industry is relying on the huge pool of Millennial talent to meet its current and future need for employees in all job categories. Relatedly, supporting construction companies and others must find amongst Millennials the engineers and crafts people to bolster their ranks.

Petrochemical construction employs on average 258,000 people in the US. Despite the slump in oil value, this figure is expected to grow considerably as more and more companies turn to shale gas.

More than 120 petrochemical facilities are expected to be built or renovated and begin operation in the US in the coming years, according to Petrochemical Update. There are 10 large Petrochemical and LNG projects currently underway in the nine-county Houston metro area, accounting for \$25 billion in construction; another six smaller projects add another \$1.7 billion; and another 10 projects have no announced cost. This approximately amounts to \$30 billion in on-going construction, according to data compiled by Bauer College.

There are expected to be 19,000 new annual openings in high-demand middle-skill occupations through 2017. Online job postings indicate a strong need for short-term solutions to ensure these industries can find enough qualified middle-skill workers now.

With so great a need for employees in the petrochemical and construction industries, companies are looking for ways to more effectively engage Millennials for industry careers. To many employers, particularly those from prior generations who are tasked with meeting human resource goals, Millennials can seem quite enigmatic. This paper examines Millennials, and offers a few suggestions from knowledgeable sources about pathways industry can follow to achieve their recruitment goals.

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## Who are these people?

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To older generations, Millennials are somewhat difficult to comprehend. Negative stereotypes of young people living at home with their parents, glued to their smart phones, conducting their lives via social media are common in our culture. Many involved in Workforce development say the stereotypes are off base.

"Today's youth have a lot going for them," said Stephen Cabano, President of Pathfinder LLC. "They communicate differently and probably more efficiently. We need to figure out how to capture and harness this communications proficiency." In contrast to prior generations, Millennials see life in more circular, optimistic terms, said Brack. "For them, life is more like London's Eye—the city's giant Ferris wheel—there are multiple opportunities to stop along the way, with great views they can instantly snap with their camera phones, post to Facebook, and add a status update, all before the next stop.

Millennials, Brack said, have grown up with technology. "They use social media applications like they were born to it because they were. They are tech-savvy multi-taskers because that is all they have ever known. They do not view managers as content experts (like their predecessors) because they know where to find multiple versions of the information. Instead, they view managers more as coaches and mentors."

Brack adds that thanks to technology, "(Millennials) are aware of their own vast numbers and their impact on the environment. This generation is socially conscious and expects their employers to act in socially conscious ways."

And, according to a report from the Department of Pathology at Johns Hopkins University, "Boomers may have a tendency not to question or challenge authority or the status quo. This may cause confusion and resentment among Millennials who have been taught to speak up."

## Reaching out to Millennials

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Employers seeking to interest Millennials in their industry and entice them to come to work for them need to embrace new ways of communicating that go beyond Career Day and newspaper advertisements.

"Those who engage Millennials successfully find ways to separate their message from the rest of the noise that is reaching the Millennial audience, said Nicholas D'Antonio, Program Manager at the Manufacturing Institute, an arm of the National Association of Manufacturers. "We don't necessarily want to get into a media competition with everything else that is out there because it is difficult to get the message right and we are not likely to be the focus of a Millennial's attention."

Jamie Van Voorhis, Senior Manager for Workforce Development at Jacobs Engineering Group agrees.

"The first thing we have to do is find ways to reach them," Van Voorhis said. "The ways to reach Millennials are different than from previous generations. We have to engage in social media and create mobile-friendly sites. Data indicates that nearly 90% of Millennial job seekers use a mobile device to find work. Two out of three use social media such as Linked In, Facebook, and others. At Jacobs, we recognize unique ways are needed to reach Millennials. We tweet, we text, we post on Facebook and Linked In. We are very active in all the social media arenas to keep our name out there. We need to not only present the job opportunities, but also to emphasize the company culture to showcase why this organization and this position will help them achieve their goals."

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Crafts people and engineers can be approached using the same technology, Van Voorhis said. "The venues where they look for opportunities are the same, the message will vary. A 25-year-old is a 25-year-old and they are going to use the same tools."

## The Image Problem

"Engineering construction in the Petrochemical industry has been called a 3-D business," Cabano said. "The three D's are Dirty, Dangerous, and Divorce. Divorce is in there because of all the travelling required by many to work on projects that were historically international in nature. This has changed because of the domestic shale activity. The industry is still dangerous by nature but not nearly as perilous as it used to be. There have been substantial improvements related to safety in the petrochemical engineering/construction industry. The consciousness on safety has really improved the business. However, the industry needs to do a better job of presenting itself to the public in order to change perceptions of the business. There are excellent high-paying, long-lasting jobs in both engineering and construction."

"One of the major obstacles we are facing within the Petrochemical industry for contractors and sites is image," said Roger Blackburn, Executive Account Manager for Infinity Construction Services. "This industry has advanced and we are no longer the look so often portrayed of a dirty job. Our jobs have moved with the age and there is more technology that ever. Millennials are technical and with that in mind we must rebuild the image. We need to create a new image for the industry that encourages Millennials to get involved. The collaborative efforts of our region (Economic Alliance, East Harris County Manufacturing Association, Independent School District and colleges) are now using those that are of the Millennial's age in our presentations to students and those that are looking for new careers and opportunities."

"Millennials already in the industry need to get before those of their age to share with them what their career path has brought in value to their life," Blackburn said. "They can (show Millennials) how their education path, their career path, and even the money they make resulted from the choices they made."

"The construction industry has an image problem," said Van Voorhis. "The perception is not the reality. The general perception is that the industry is low skill, low wage, no growth and unsafe. The reality is exactly the opposite: high skill, high wage, tremendous growth opportunities and extraordinarily safe."

"Our data shows that Millennials do not have a bias toward the petrochemical, construction or manufacturing industries," said D'Antonio. "We have a challenge because those who are influencers of a child's or student's career path, such as a parent, teacher or guidance counselor, have a negative bias toward an industry. It is their biases that we need to address."

"We also need to realize that the message we are delivering about industry is stale and that the person delivering the message is the wrong messenger," D'Antonio said. "We need to stop sending older gentlemen to represent an industry when we are trying to reach the Millennial population. The message is not hitting home and the messenger is being tuned out. The way we overcome this is by taking our most recent hires or early career younger employees and having them act as ambassadors or representatives for our industry to the population we are trying to reach. If we are able to more closely align the messenger with the audience, the message will hit more closely to home and we will create a natural connection between the messenger and the message receiver."

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## Building the Future through Training

Implementing a technology assisted, consistent training strategy may make it easier to employ Millennials, other generations and minorities who are excluded by their inexperience and access to continued learning. Is it enough?

"It takes more than technology assisted or strategic training," said Blackburn. "This will help, but to continue to gain in involving Millennials in a career in the Petrochemical industry, we need a collaborative effort. Up into the 1980's, we had craft training of some degree in the High School levels. Only recently are we seeing this return. House Bill 5 was recently passed by the Texas Legislature and it has opened up new opportunities for students that may not look for a four year degree and allow them to be educated in a way that directs them toward a career that provides excellent money and offers them a great future."

"For us to get the craft people we need, there must be a collaborative effort between owner companies, contractors, Independent School Districts and colleges to provide Millennials, particularly minorities in the Millennial generation, with opportunities to learn craft skills that can provide a bright future for them," Blackburn said. "No longer is this an idea, it is now a reality in the Texas Gulf Coast area. Our collaborative efforts are seeing our community colleges filled to capacity and students making a choice of a career within the industry. While we have much ground to cover, as there is still a great need and a huge shortage in the skilled workforce, the effort has brought groups together with a single focus."

Cabano said there are many ways today to train people across generations, and particularly within minority groups, for employment in the construction industry. "We have web-based learning, in-class instruction, web conferencing, mentoring programs and many ways that trainees can learn at their own pace," he said. "An important component of project management learning however is understanding the role of leadership, teams and working with others, which does not lend itself very well to self-paced learning."

"We are very strong proponents of providing capital project teams with training on the overall project execution plan and all it entails such as the contracting strategy and how the team will be organized," said Cabano. "Funding for training is a big issue for most companies. Here, this type of training can be included in the capital project budget and build around the project specifics and the project team."

In Louisiana, currently a hot bed of petrochemical expansion activity, Van Voorhis said Jacobs works with Associated Builders and Contractors (ABC) who have a very robust high school partnership outreach program. "We have adopted five high schools in which we provide some materials and consumables and also provide guest lectures," Van Voorhis said. "We work very closely with other high schools and collaborate with a number of community and technical college programs as well. We have to stay connected to the future workforce and share information about our industry in the proper light. The industry needs to continue to collaborate in bringing a more unified message to the next generation."

Once a student or employment prospect becomes interested in an industry, there are ways to help this person become more employable, said D'Antonio. "Some of our certification partners have developed successful ways to automate and virtualize their training so that it becomes more accessible to those we are trying to reach," he said. "One example is an organization called CareerSafe that has developed a virtual curriculum that allows students to earn their OSHA 10 card in any high school classroom. The online curriculum provides students with an accelerated path to an OSHA 10 card and a tangible certificate they can walk away with. Virtual curriculums have also been implemented for more advanced training. Being able to virtualize and automate training increases the number of individuals who can take advantage of it and provides the training in an environment the student is comfortable using."

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According to D'Antonio, an excellent example of an organization that incorporates technology in its training programs is the American Welding Society which has put together a virtual welding unit in collaboration with Lincoln Electric. "For high school students who want to prepare for a career in welding, it is a very close experience to what it is like to weld in the real world," he said. "It is great for exposing students to welding as well as preparing them for other training in the welding sphere."

Since Lone Star College - North Harris opened in 1973, it has offered certificate and associate degree programs in machining, welding, engineering design graphics, and more, said Stephen Head, Chancellor of the Lone Star College System. "Over the past several years we have conducted extensive labor market research and held advisory council meetings to help us develop and modify an extensive array of programs to add Pipefitting, process technology, diesel technology, truck driving and others," he said.

"Our largest investment has been in planning and designing the five large technology centers funded in part by the 2014 bond approved by taxpayers," said Head. "In 2013 we opened our 72,000 square foot Energy and Manufacturing Technology Center with its 18 technical labs and 6 classrooms. These new centers will add additional training centers in the areas of Oil & Gas Upstream, Oil & Gas Downstream, Truck Driving, Global Logistics, HVAC, Electrical, and Computer Technology. The Houston Airport System is funding a 40,000 square feet training center at IAH so that we can train for commercial construction."

## Best Practices for Engaging Millennials

"One of our leading best practices for engaging Millennials is the Young Manufacturers Academy, where a simulated manufacturing process is put into a five to ten day summer camp-type setting," D'Antonio said. "Students get to open up a manufacturing company in a simulated sense, produce a widget, and sell it. The idea is to let students experience the entire manufacturing process. If we can put students into a structured setting that simulates manufacturing, we are providing the best place that we can to create personal experiences for them."

Blackburn believes that personal contact is one of the best ways to engage Millennials. "We need to implement more of what I call Meet, Greet and Explain," he said. "We live in a world where individuals are becoming increasingly isolated. As an industry, we need to make personal contact with those of the Millennial generation and showcase our businesses and the employment opportunities the industry has to offer. We are a technology driven business. We are not just wrench turners, we are professional craft individuals. We need to show Millennials the technological tools in use today. Their ability to grasp technological concepts and quickly learn how to put tech tools to use is a huge plus for the new generation of industrial workers."

For Millennials and other students, what they are learning (and when) is as important as how they are learning it, Cabano said. "One of my current crusades is prompting universities to provide STEM (Science, Technology, Engineering and Math) students with some type of knowledge program that encourages interest in the engineering/construction industry earlier in their schooling," he said. "Students interested in engineering also need to be exposed to project work while they are still in college. Engineering graduates typically spend their first year or two with their new employer learning the basics of project engineering. If they had been exposed to this in college, then the employer could instead train the new hire in company specific procedures/issues. To carry this initiative even further, I would like to see more programs promoting the engineering and construction industry to high school and junior high students."

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"The problem is that education and industry do not talk to each other. The industry complains that we get good engineers but they still need to be educated about project work. Graduates should at least know some basic best practices for project work if they want to get into the petrochemical engineering/construction industry. What the universities are struggling with is the difficulty in changing curriculum. Some of the bigger universities in the US shockingly have said that they do not need to change their curriculum and that if they had to respond to every industry need they would have a constant revolving door. I believe it is their role to provide an education that is marketable to the industries they serve. Smaller colleges seem to be a bit more flexible."

Cabano adds that some type of recognition/certification process is needed from the industry, such as the Construction Industry Institute, to indicate that a graduate has completed some course work in project management, construction planning or similar area. He suggests this should be a collaborative effort between education and industry. "Some industry groups such as the Engineering Construction Contracting Association are trying to make this collaboration happen," he said.

## Wearable Tech for the Technically Savvy

Rapid advances in technology are bringing changes to petrochemical construction sites as companies adopt a variety of devices that improve productivity and work effectiveness.

"New tools available for construction work include heads-up displays on hard hats," Cabano said. "A visor on the hard hat displays a 3D drawing of what needs to be done. Numerous studies have shown that 3D drawings allow workers to complete work faster and more correctly."

James Benham, CEO of JBKnowledge, is a leader in the field of technology solutions for the construction industry. Benham said wearable technologies fall into three categories: visual, sensory and tactile.

"Virtual reality headsets are changing the way builders interact with project plans," he said. "Oculus Rift VR headsets, for example, combined with applications such as our SmartReality VR, allow users to put on a headset and essentially 'leave' the real world. The headsets are fully immersive and interactive if combined with a sensor like the Leap Motion controller, which is redefining the notion of a job site walk through. In fact, the actual job site is not even needed in early stage project review.

Benham is excited about a product announced to arrive in 2016 from Microsoft called HoloLens. "It not only displays data for the wearer to feel completely immersed in the visualization but a 3D scanner collects data and interacts with the visualization, shaping the virtual world of construction as the user interacts with it," he said.

Benham also reports that researchers are working on a safety vest for highway workers that alert them of moving objects approaching and can also adjust the volume of alerts based on the noise already in the construction site. "Vests of the future could also be able to monitor a worker's condition like a health tracker, checking body temperature, perspiration, heart rate, etc." Benham adds that other wearable devices, such as exoskeletons that help perform physical actions, are on the way.

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## Conclusion

US Department of Labor Statistics data suggests that 75% of the US workforce will consist of Millennials by 2030. It is obvious to many observers that the Petrochemical and construction industries must rapidly engage this talented generation to secure a workforce consisting of both new employees and replacements for retirees.

"It is estimated by that in the US there will be 2.7 million retirees in the construction trades over the next 5 years or so," said Blackburn. "At the same time, there will be an additional 700,000 jobs created thanks in large part to the shale gas boom. The net result is that we will need about 1.4 million skilled people to enter the construction work force. Furthermore, the people who will be retiring are our most skilled and experienced workers (above numbers are gathered from: Bureau of Labor Statistics, Delotte Analysis, Miken Institute of Economic Planning Institute, the US Department of Commerce, and Bureau of Economic Analysis)."

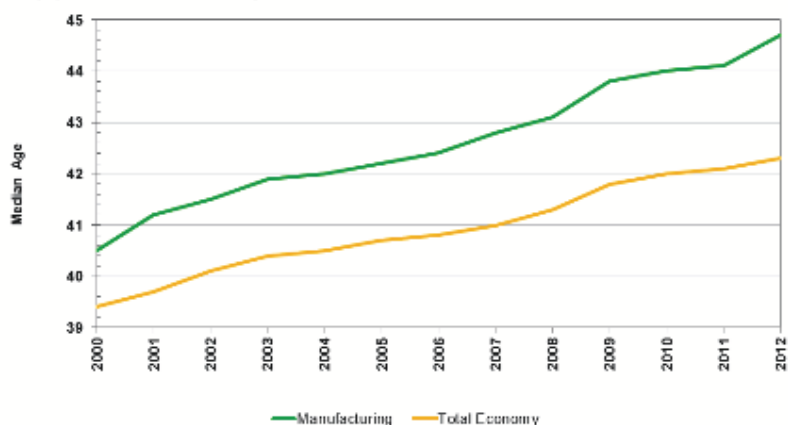
To meet current and future workforce needs, changes are being made to how businesses operate.

A 2014 study by the Brookings Institute reported that the look and feel of work will undergo a dramatic makeover under the Millennial generation. "Businesses' usual tricks of keeping employees happy and productive simply will not fly by the year 2025," the authors write. "The desire on the part of Millennials for their daily work to reflect and be part of their societal concerns will make it impossible for corporate chief-tains to motivate Millennial employees simply by extolling profits, or return on investment for their shareholders, or even employee salaries."

"The nearly 80 million Millennials who are about to enter or who are already in the workforce will fundamentally change how business is conducted in the future," Brack said. "Human Resources practices and policies designed to attract, develop and retain this vast cohort must change to reflect this generation's work—and life—expectations."

Will industry be up to the challenge? It has to be. There is no other choice. In the words of an anonymous writer: One generation plants the tree; another gets the shade.

**The Age Gap Between the Manufacturing and the Non-Farm Workforces Widens**  
(Updated October 2013)



Source(s): U.S. Bureau of Labor Statistics, Current Population Survey

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