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## *A Gender Crisis of* **CONFIDENCE**

WHAT KEEPS MORE WOMEN  
OUT OF THE INDUSTRY? p22





# A Gender Crisis of CONFIDENCE



Getting more women in manufacturing solves the skills gap problem. That solution is hindered by perception issues on all sides.

**K**aren Panetta is confident she knows why there aren't more women in manufacturing. The issue is confidence, both for the women themselves and for the companies looking to fill a massive skills gap in the industry.

Panetta is founder of the international Nerd Girls program, an IEEE fellow and dean of Graduate Engineering at Tufts University in Medford, Mass. She argues that women in engineering fall into two camps: those who have a "just watch me" attitude when someone suggests they're not capable (she counts herself in this camp), and those who lack self-assurance.

"I have students who graduate with straight As and they still don't think they're smart," said Panetta.

The idea that female engineering graduates would choose alternative careers is disconcerting, said Panetta. "I get students who say, 'I did a summer internship and this guy from his Ivy League school said I would be better in marketing, so I'm going to switch.' I found that when somebody gave women negative feedback, they took it to heart—as if these people actually cared about them and could see inside their soul and know what their capabilities were."

In the United States, women earn more than half of all college degrees and hold more than half of all managerial

and professional positions. But while women make up about 47% of the labor force, they make up only 29% of the manufacturing workforce, said AJ Jorgenson, vice president of Strategic Program Engagement at the Manufacturing Institute, the education and workforce partner of the National Association of Manufacturers in Washington, D.C.

The labor shortage pervades all stages of manufacturing—from engineering to skilled production. In fact, Deloitte forecasts show that the U.S. can brace for an estimated two-million-worker shortfall over the next decade, and industry executives report that six out of 10 positions are currently unfilled due to a manufacturing skills gap.



Karen Panetta, IEEE fellow and dean of Graduate Education, Tufts School of Engineering



AJ Jorgenson, vice president of Strategic Program Engagement, The Manufacturing Institute

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”

These numbers show that women are making inroads, but that industry hasn't done enough to embrace women, said Jorgenson. "What we figured out around 2010—maybe a bit earlier—is that the gender gap in manufacturing is so large that, if you can increase the number of women in the manufacturing industry by 10%, you can close the overall skills gap by 50%.\*"

Those numbers are complicated by the impact of the global COVID-19 pandemic. Across all industries, unemployment rates rose sharply among all major worker groups; the rate was

13% for men, and 15.5% for women, according to the U.S. Bureau of Labor Statistics. Moreover, analysts say the COVID-19 outbreak has substantial implications for gender parity, not the least of which is wiping out any job gains women have made in the past decade.

The manufacturing industry, which saw employment drop by 1.3 million in April alone, would do well to do its part in stemming the damage. The unplanned setback from the pandemic threatens the fragile gains made in female workforce participation and calls to attention the need to tap into an underutilized pool of female labor resources.

#### PERCEPTION MANAGEMENT

Motivated to arm manufacturers with insights about Americans' current and future perceptions about the industry, the Manufacturing Institute and Deloitte undertook a study to glean the U.S. public perception of the manufacturing industry relative to other industries. It found that even though the vast majority of Americans view U.S. manufacturing as vital to maintaining the economic prosperity, they do not have a positive perception of current manufacturing jobs.

Fewer than three in 10 Americans surveyed were likely to encourage their children to pursue a manufacturing career. Yet, respondents were overwhelmingly optimistic about future prospects for manufacturing, citing that manufacturing jobs of the future will require high-tech skills and will be clean and safe, as well as more innovative.

The perception issue remains the industry's top barrier in all populations, said Jorgenson, who runs the Manufacturing Institute's women's initiative, as well as its diversity and inclusion programs. If asked to draw a picture of manufacturing, many people would think of dark and dirty work in the 1940s and 1950s, said Jorgenson. "That's exactly what we're trying to fight against; we're trying to engage Americans at all ages and skills levels and show them what modern manufacturing really is," she said.

#### THE LEAKY PIPELINE

Chandra Brown, CEO of MxD, the Chicago-based digital manufacturing institute, understands as well as anyone the need to change those perceptions for all workers, and particularly for women.

#### DO THE MATH\*

- If you increase the number of women in manufacturing by 10%, you close the skills gap by 50%
- 12.85M manufacturers × 29% women equals more than 3.7M women manufacturers currently
- 3.7M × 10% increase would be 370,000
- The average skills gap is about 500,000 (fluctuates monthly)
- 370,000/500,000 equals 74% (50% is very conservative)

Source: Manufacturing Institute



“We’re trying not to have another leaky pipeline issue in the advanced manufacturing jobs that are materializing in the factory of the future,” said the former deputy assistant secretary for manufacturing in the U.S. Department of Commerce under President Obama.

In Brown’s view, women aren’t able to visualize themselves in this type of environment. MxD, a testbed for new manufacturing and cybersecurity technology, has developed a taxonomy of 257 future digital roles and the skillsets needed. Manufacturing is going to be very different in future and Brown points out what that future might look like: “Women may be cyber-programming from a

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Chandra Brown, CEO, MxD USA

remote place, as opposed to being on the shop floor.”

The pipeline issue will persist if we’re not employing a big segment of over half the working population, said Brown.

“How are we doing flexibility for women with children? How are we putting policies in place that make it easier and don’t single them out?” said Brown. “I’m a big believer that you can have maternity leave, but you also need paternity leave. Both parents should be able to go for the same amount of time.”

**IMPOSTER SYNDROME**

Similarly, women take less risks in the workplace, notes Madiha Kotb, former president of American Society of Mechanical Engineers (ASME) board of directors. She explained that women hold back from taking chances, and often double-check they are ready before applying for a promotion or venturing to unknown territory. But by doing so, women miss opportunities. “Opportunities do not wait!” she affirms.

A growing body of evidence confirms the damaging effects of a confidence gap, sometimes referred to as “imposter syndrome.” A McKinsey report found that men are often hired or promoted based on their potential, and women for their experience and track record. Another study conducted by McKinsey and LeanIn.Org (founded by Facebook COO Sheryl Sandberg) found that for every 100 men promoted or hired into a role as a first-time manager, only 72 women were promoted or hired. No matter the causes that contribute to gender disparity, it stands to reason that women would be less inclined to apply for jobs for which they assume they did not meet the qualifications.

While the research hasn’t been remedy-directed, some recommend countering gender-based bias with HR policy changes, training and awareness programs. And companies are becoming receptive to prioritizing women, said Panetta.

“  
OPPORTUNITIES DO NOT WAIT!”



Madiha Kotb, director, Madiko Consulting; former president, ASME Board of Directors

“They will be upfront about saying that diversity and inclusion are No. 1 on their list, but the truth is, they *have* to say that. But when you dig deeper, you have to ask: What are you doing that makes your company so diverse and inclusive?” she said. “They might say, ‘We write a check to this organization to help young women learn to code.’ But what are they doing internally?”

Even when women are hired into technology roles, they tend to leave within five years, said Panetta. “There’s a problem if companies cannot retain women, and usually that comes about because of policies.”

**PRACTICE WHAT YOU PREACH**

Panetta believes women should never shy away from promoting their own successes. But bringing about change

requires ongoing commitment to breaking barriers, said Panetta. The courage of her convictions is palpable—she was the first female electrical engineer to be given tenure in the Electrical and Computer Engineering Department at Tufts School of Engineering; she served as the worldwide director for IEEE Women in Engineering (2007-2009); and was awarded the Presidential Award for Science and Engineering Education and Mentoring from President Obama (2011).

Through the Nerd Girls program, Panetta has conducted engineering outreach activities with more than 85,000 children, parents and educators to help break down stereotypes and stigmas. She says, “True mentors never say, ‘no.’ They say, ‘This is the way you want to do this and here’s what you need to do it. Here’s how to get help.’”

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**DEFINING SUCCESS**

In addition to bolstering confidence, mentors and sponsors are crucial to filling the gap of power imbalance, culture change and leadership development.

A mentor is somebody you know, who can answer questions and gives guidance or support, explained the Manufacturing Institute’s Jorgenson. “The sponsor is somebody who walks into a room and says, ‘Jane Smith is

amazing. You should hire her.’ And it’s putting their own reputation on the line for women. That’s very, very important in all industries, but more so in manufacturing.”

“  
WE NEED GOOD MEN TO CONSTANTLY BE ADVOCATING FOR WOMEN. WE NEED TO DEMAND MORE REPRESENTATIVE AND DIVERSE BOARDS. WOMEN CAN’T BE TOKENS.”

Since women make up only about 30% of the manufacturing workforce, they cannot affect the imbalance without the support of the other 70%. Here’s why: “We need men to not only support, but also to engage,” explained Jorgenson. “That can be a very difficult thing. Men don’t want to step on toes, so they’re not actually in the arena. So, how do you engage in support? One of the easiest ways to do that is to be a sponsor.”

**THE CULTURAL SHIFT**

Even if the internal procedures are in place, there also needs to be a cultural shift to achieve a work/life balance. There will be a greater need for manufacturers to recognize how women in the plant in whatever capacity will change responsibility for married partners and also require single parents to have their needs met as well.

At a national scale, success will be measured on two other criteria, suggested Jorgenson. The first is pay, because people can measure their salaries and benefits. The second is creating challenging and interesting work, where

people understand the broader implications and impact of what they do. “We’re currently seeing this right now during the pandemic as people are seeing their companies step up and go from making automobiles to ventilators,” Jorgenson noted.

How can the industry make gains? “When you know you have pipeline issues you must intentionally and specifically reach out and show women the path,” Brown said. “And we need good men to constantly be advocating for women. We need to demand more representative and diverse boards. Women can’t be tokens.” *md*



# MIND THE GAP: VOICES FROM THE INDUSTRY

We've talked about more women in manufacturing for a long time, but are we making any definable progress? *Machine Design* asked some of the most interesting women in our networks to tell us: What has that progress looked like? How are we measuring it? Are companies becoming more receptive to prioritizing roles for women? And what are the continuing barriers to success? Here's what they had to say.

“ I was most definitely not the top student in my engineering class and I often felt like an imposter or incapable of succeeding as an engineer in the working world. It was certainly a continuous struggle for confidence, but there was also this part of me that secretly liked the challenge of doing something that internally I told myself I was no good at. It was like this weird civil war going on inside of my brain where I was saying 'Man, I'm horrible at this and everyone knows it!' and the other half arguing 'Keep doing it...you can't stop or else you will prove them right.’ ”  
**Meg Butts, engineering manager, Castle & Key Distillery**



**Ashley Busquets, simulation engineer, FD-Groups America**

“ I think companies are recognizing that we all, women and men, have different roles than we had just 20 years ago. I'm seeing more acknowledgement that healthy, happy, productive employees have a balanced life. Employees also have support to deal with important family events and issues. ”

**Claire Ramspeck, managing director, Standards, ASME**



**Beth Onderdonk, director of sales, North America and Canada, Des-Case**

“ Oftentimes I see people get in their own way. We can all be very critical of ourselves and we like to perfect our craft before climbing the ladder. Women and men need to have confidence in their skills and abilities and take chances. If we wait for perfection the opportunity will likely be gone. ”

“ The biggest mentor that I owe a great deal of gratitude is Monika Ivatysynova—the founder and director of Maha Fluid Power Research Center. Not only did she share her depth of knowledge but also her determination to always continue improving while not simply contributing, but leading the industry in innovation. ”



“ Twenty years ago, I saw women staying within the industry, but going out on their own because they weren't having the progress that they wanted in their career...I've also seen women change jobs because they weren't given opportunities. They weren't finding the opportunities where they felt they were making a difference. ”



**Heather Goldberg, VP - Fluid Power team leader, GRS Recruiting**

“ There are very few women that are on the frontlines in the fluid power world. It is an industry that requires hard hats and steel-toe boots. Women don't often see themselves in a role where they are out looking at applications in an oil field or under a machine. The women that are in fluid power do very well because they bring a different perspective. ”



**Lauralyn McDaniel, industry events manager, ASME**



**Lynn Braunschweig, project manager, Maxon Motor Aerospace Unit**

“ I did enjoy playing with Barbies and Legos, but 3D puzzles were my passion. In high school I completed a career assessment that suggested I either become a lawyer or an engineer. As I didn't want to argue in court every day (at the time I thought that's what lawyers did), I decided to study mechanical engineering. ”

“ One thing I noticed in my classroom for years is that, if I have female students, they're usually getting the good grades, but they're also the ones that come to me during office hours and say, 'I'm not sure if I can make it in mechanical. I say, 'What are you talking about? You are already making it.' They say, 'Yeah, but it's hard.' And also, 'I want to help people and I'm not sure that this is the major for me.' They start to look at it in terms of whether it appeals to their sense of humanity. They often tell me, 'I want to do something that helps people.' I think you can help people, but it's not obvious to them because of how we're teaching it—you know, gas turbines and automobiles and airplanes. We could really shift...There are aspects of mechanical engineering that are about helping society and being a better human. ”  
**Zubeida Ounaies, professor and associate head for administration, Department of Mechanical Engineering, Penn State University**