

Opinion

The surprising reason few Americans are getting chips jobs now

April 30, 2024 More than **2 years ago**

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This essay was reported by columnist Heather Long, “Marketplace” radio host Kai Ryssdal and “Marketplace” producer Maria Hollenhorst. A three-part radio series is airing on “Marketplace” this week. Listen [here](#).

PHOENIX — Giant factories are rising up in the desert all around this city. It’s ground zero for President Biden’s massive bet that he can bring back to America one of the 21st century’s most important manufacturing jobs: making semiconductor chips. Congress approved \$53 billion in funding, and the White House has just announced preliminary agreements to give billions in grants to corporations such as Intel, TSMC and Micron. Now comes the greatest challenge of all: finding enough workers to make it a reality.

Already, the companies have struggled to hire enough construction workers, especially welders and pipe fitters. Factory openings are being delayed until 2025 or later. And the industry needs up to 70,000 new workers to run the fabrication plants, known as “fabs.” These are not your grandparents’ manufacturing jobs. Many will be engineers and computer scientists. About 28,000 will be technicians who don’t need a four-year degree but do need specialized skills. Think of them as *digital* tool belt jobs: Technicians program the machines that churn out the tiny chips that are so critical to smartphones, cars and missiles.

We came to Phoenix with a simple question: Is this possible? Can America grow its own talent pipeline, or will foreign workers need to fill the jobs? We left fairly optimistic. Yes, the United States can rebuild its chip industry — for a substantial cost. There’s a reason the country made 37 percent of the world’s semiconductors in 1990 and makes only 10 percent now. It is far cheaper to build a fab and staff it in Asia. Already, TSMC is making headlines for bringing over Taiwanese workers, causing friction with Americans. This contains a threat: If U.S. workers aren’t made ready, more foreign workers will come.

To prepare enough Americans to run the industry, the United States has to rapidly expand community college training, high school vocational programs and apprenticeships. This might sound easy. It’s not. Even in Arizona, a lot of people have never heard of the semiconductor industry. Recruiting students to enroll is a challenge. Finding experienced technicians to teach courses is hard. And then there’s the most surprising roadblock of all: This is an industry with cycles of boom and bust. Right now business is slow, and some companies are doing layoffs.

Brad Ailor has been warning his students at Maricopa Community Colleges that it “could take several months” to get hired. “There have been several iterations of layoffs during my time at Intel,” he said. “That’s just the nature of the semiconductor business.”

The community college slowdown

In late March, we visited Ailor’s class, the first in a 10-day training program designed to get students entry-level jobs. This class was all female — part of a push to bring more women and people of color into the industry. As the students introduced themselves, it was clear that many saw this as their pathway to the middle class. Several women were getting out of abusive relationships. Many were trying to leave low-paying jobs at convenience stores and delivery services and in education.

“This could change my life,” said Danelle Makofske, 45, who is going through a difficult divorce. “I came for a new start to be able to be independent for myself and my son.”



⚙ Options

This Quick Start program has been heralded as a national model since it launched in 2022 with a visit from first lady Jill Biden. The \$291 tuition is covered for Arizona residents who pass the final test (as almost all do). Students become familiar with basic tools, processes and the “lean mind-set” of constantly finding efficiencies. They also put on the white “bunny suits” that must be worn for the eight-hour shifts to keep the fabs immaculate.

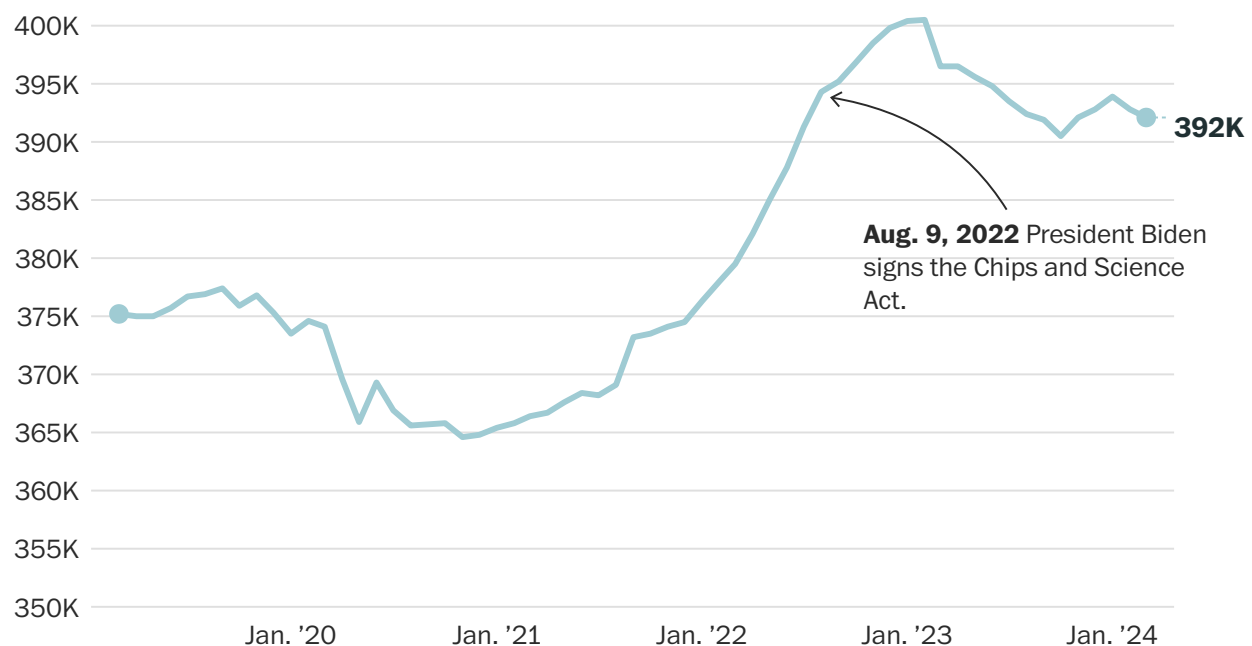
The excitement was tangible that first night. But when we checked back a month later, only one student in the March cohort had secured a job in the industry. Hardly any companies came to a recent career fair for students.

“It was kind of disappointing,” said Gabriella Medina, 28, who needs a job to support her 10-month-old daughter. “There isn’t really much hiring as of right now.”

At some point, the industry will no doubt have an explosion of jobs. But students can’t wait forever. Medina gets by delivering food for DoorDash, and she’s applying for jobs in other industries. She used to be a pharmacy technician, but a friend who works at Intel convinced her the pay would be higher and the worksite cleaner at a chip fab. President Biden has boasted that workers such as Medina can make six figures, but most entry-level jobs in fabs she is hearing about pay \$20 to \$25 an hour, or about \$50,000 a year.

Chip manufacturing jobs surged as Congress passed \$53 billion in funding, but hiring has stalled recently

Employment in semiconductor and other electronic component manufacturing



The hiring drop-off is undermining training. The college has sharply scaled back its offerings. Last academic year, Maricopa educated over 600 students in Quick Start. That has fallen to 370 for this academic year. No courses are being offered this summer. The website now tells applicants to check back in August.

How much training is needed?

In April, when we spoke with Patrick Gelsinger, Intel's chief executive, we asked how he would advise people eager to get in the industry. He immediately said they should get more training, adding, "It's a year of community college kind of work." We found something closer to the mark at a local career and technical-education high school (what many in America grew up calling "vo-tech" schools).

Western Maricopa Education Center, a public high school in west Phoenix, has started offering an "Energy & Manufacturing Systems" course. Students spend two years learning to build and use pumps, valves, hydraulics, electrical wiring, industrial computers and robots. The students we met talked about "flow loops" (the way liquid runs through pipes) with the ease that most teenagers discuss Taylor Swift songs.

"I'm a 17-year-old who can program a computer that moves a robotic arm on an assembly line," said Jacob Allen. "I've recommended this to all my friends."

Allen thought he would be a welder like his father, but he found he enjoyed advanced manufacturing's blend of hands-on work with programming. Allen and his classmates are getting a lot of interest from semiconductor company recruiters for jobs and apprenticeships that start at about \$25 an hour. It helps that they leave high school with more than 10 industry certifications.

The biggest challenge for West-MEC is to get the word out to more young people. Most American kids don't grow up dreaming of working on semiconductors. When teens walk into the high-tech lab at West-MEC, with its robotic arms and massive machines, there's often an aha moment. This is what happened to Allen. But many people never bother to check it out. West-MEC's health-care courses have long waiting lists. Its advanced manufacturing program has just 44 juniors and 33 seniors, though the school is building a second high-tech lab facility that is slated to open in 2026. Companies have been eager to donate training equipment.

"Every school district should be looking at this thinking: How can we do something similar?" said Bruce Wilson, a West-MEC teacher who spent most of his career at factories making Pepsi, Gatorade and other products. "America should have never stopped doing this."

The ideal model is 'earn while you learn'

What became clear to us in Phoenix is that the ideal training model in the semiconductor industry is apprenticeships. We saw how effective "earn while you learn" can be when we visited Arizona's construction trade unions.

We could barely find a parking spot when we pulled into the Arizona Pipe Trades Apprenticeship training center. More than 1,000 apprentices are there now — almost double the number in 2022. Demand is soaring for pipe and drain systems at the semiconductor fabs and the high-rise condos, hospitals, and other businesses riding this growth wave. People eagerly sign up for the apprenticeship when they hear what they'll be paid.

“From Day 1, you earn \$21.41 an hour and put away money for retirement and health care,” said Travis Laird, a former math teacher who helps run the training center. “There’s no tuition here. You finish this program debt free. We’re drawing people from all over the country.”

The pipe trades have a five-year apprenticeship, with annual pay raises. After graduation, a journeyman earns \$46 an hour plus benefits. Higinio Ramirez III, a former grocery store worker who started the apprenticeship at age 42, told us, “I wish I had found it earlier.”

The scene was similar at the SMART Local 359 training center for sheet metal workers, where 400 people are in apprenticeships, up from 100 a few years ago. These are the workers who construct the air conditioning systems, including the complex filtration for the fabs. They typically work for six to eight weeks and then train for one.

“When I was in high school, everyone preached college. That’s not for everybody,” said Leticia “Letty” Bejarano, 28, who makes almost \$25 an hour plus benefits as a third-year apprentice. She was inspired to try welding by the character Letty Ortiz in the “Fast & Furious” franchise. She uses Instagram and TikTok to get the word out on this career path.

Local 359 purchased the building next door in an effort to educate even more people. The holdup is waiting for federal funding to arrive. The White House has announced about \$30 billion in federal grants this year to help build the fabs. Some of that funding is earmarked for worker training. But these are initial agreements with the companies. There are a lot more details — and milestones — to work through, including developing more worker training, before the money is released.

What's needed now is time. It will take years for enough Americans to be trained for construction roles and factory jobs. The chip industry has the potential to be life-changing for those who can get into it. Many construction workers are already experiencing the uplift. In TSMC's parking lot we saw license plates from Utah, Colorado, California, Texas and even New Hampshire. People are coming here for the hefty payday — and the chance to work on something game-changing.

Every company should be doing apprenticeships. This is starting to happen; TSMC has just launched one in Arizona, for example. But there's a long way to go, especially on integrating hands-on work with a recognized community college or credential-granting institution. A national push would be ideal. The newly formed National Semiconductor Technology Center should partner with the National Science Foundation, the nonprofit SEMI Foundation and major companies to come up with standardized credentials for technician roles.

Before leaving Phoenix, we stopped by a strip mall about 15 minutes from where TSMC is building three huge fabs. Local Asian American developers bought the place in 2023 with plans to open an Asian grocery store, an event space, and the largest Chinese and Taiwanese restaurants around. They foresee more workers coming from Asia to operate the fabs.

“We know there will be a lot of Taiwanese engineers, together with Asian population growth in this area,” said Zongfu Li, president of Lichi Investment and a former Intel engineer who’s been in the area for nearly 20 years. “This should be called Silicon Valley because it’s actually a valley, and we truly have a lot of silicon.”

It’s a reminder that if America can’t supply enough homegrown talent, it will come from elsewhere.
