FEATURE

China has an army of robots on its side in the tariff war

An assembly line at the Zeekr electric car assembly plant in Ningbo, on March 31.
PHOTO: QILAI SHEN/THE NEW YORK TIMES

Keith Bradsher

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NINGBO, China – China's secret weapon in the trade war is an army of factory robots, powered by artificial intelligence (AI), that have revolutionised manufacturing.

Factories are being automated across China at a breakneck pace. With engineers and electricians tending to fleets of robots, these operations are bringing down the cost of manufacturing while improving quality.

As a result, China's factories will be able to keep the price of many of its exports lower, giving it an advantage in fighting the trade war and US President Donald Trump's high tariffs. China is also facing new trade barriers by the European Union and developing countries ranging from Brazil and India to Turkey and Thailand.

Factories are now more automated in China than in the US, Germany or Japan. China

has more factory robots for every 10,000 manufacturing workers than any other country except South Korea or Singapore, according to the International Federation of Robotics.

China's automation drive has been guided by government directives and backed with huge investment. And as robots replace workers, automation positions China to continue to dominate mass production even as its labour force ages and becomes less willing to take industrial jobs.

Mr He Liang, founder and chief executive of Yunmu Intelligent Manufacturing, one of China's top producers of humanoid robots, said the country was striving next to turn robotics into an entire new sector of business.

"The expectation for humanoid robots is to create another electric car industry," he said. "So from this perspective, it is a national strategy."

Robots are replacing workers not just in car factories but even in China's many thousands of back-alley workshops.

Mr Elon Li's curbside workshop in Guangzhou, the commercial hub of south-eastern China, has 11 workers who cut and weld metal to make inexpensive ovens and barbecue equipment. He is now preparing to pay US$40,000 (S$52,580) to a Chinese company for a robotic arm with a camera. The device uses AI to observe how a worker welds the sides of an oven, and then duplicates the action with minimal human intervention.

Just four years ago, the same system was available only from foreign robot companies and cost nearly US$140,000. "Before, I never would have imagined investing in automation," Mr Li said, adding that a human employee "can only work for eight hours a day, but a machine can work 24 hours".

Bigger companies are betting far more on automation.

In Ningbo, a huge factory for Zeekr, a Chinese electric carmaker, had 500 robots when it opened four years ago. Now there are 820, and many more are planned.

Cheerfully trilling Kenny G tunes to warn any people of their approach, robot carts haul aluminium ingots to an automated lift, which lifts the blocks of metal to a furnace at the top of a 12m-tall Chinese-made machine. Once molten, the aluminium is cast into the shapes of various car body panels and other components. More robot carts, and the occasional human driving a forklift, take the components to a warehouse.

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Yet more robots take the panels to the assembly line, where hundreds of robotic arms, working in teams of up to 16, do a complex dance to weld them together into car bodies. The welding area is a so-called dark factory, meaning that the robots can operate without workers and with the lights off.

China's factories still employ legions of workers. Even with the automation, they are needed to check quality and install some parts that require manual dexterity, like wiring harnesses. There are things cameras and computers cannot do on their own. Before cars are painted, workers still run gloved hands over them and sand smooth any tiny imperfections.

Yet some of the later steps of quality control are also being automated with the help of AI.

Near the end of Zeekr's assembly line, a dozen high-resolution cameras take photos of each car. Computers compare the images to an extensive database of correctly assembled cars and alert factory staff if a discrepancy is found. The task takes seconds to complete.

"Most of our colleagues' jobs involve sitting in front of a computer monitor," said Zeekr worker Pinky Wu.

Car factories in the United States also use automation, but much of the equipment comes from China. Most of the world's car assembly plants built in the past 20 years were in China, and an automation industry grew up around them.

Chinese companies also bought overseas suppliers of advanced robotics, like Kuka of Germany, and moved much of their operations to China. When Volkswagen opened an electric car factory a year ago in Hefei, it had only one robot from Germany and 1,074 robots made in Shanghai.

China's rapid advance in factory robotics has been propelled from the top down. Beijing's "Made in China 2025" initiative, which began a decade ago, set out 10 industries in which the country sought to be globally competitive. Robotics was one of them.

In a show of the automation push, the Beijing municipal government held a half-marathon on April 19 for 12,000 runners and 21 humanoid robots. Only six robots finished the race, and the fastest of them took nearly three times as long as the fastest runners. But the event helped draw attention to robots.

In March, Premier Li Qiang, China's second-highest official, said in his annual report to the legislature that the country's plans this year would include an effort to "vigorously develop" intelligent robots. The country's top economic planning agency announced a US$137 billion national venture capital fund for robotics, AI and other advanced technologies.

China's government-controlled banks have increased lending to industrial borrowers over the past four years by a staggering US$1.9 trillion. That has paid for the construction of factories as well as the replacement of equipment at existing ones.

The country's universities produce about 350,000 mechanical engineering graduates per year, as well as electricians, welders and other trained technicians.

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By comparison, American universities graduate about 45,000 mechanical engineers each year.

Mr Jonathan Hurst, the chief robot officer and a co-founder of Agility Robotics, a leading American robot manufacturer, said finding skilled employees had been one of his biggest challenges. As a graduate student in the Robotics Institute at Carnegie Mellon University in Pittsburgh, Mr Hurst said, he was one of two mechanical engineers.

China's rapid embrace of automation worries some of the country's workers.

Mr Geng Yuanjie, 27, drives a forklift at the Zeekr factory, where he has worked for the past two years. He said there were considerably fewer robots at the Volkswagen factory where he previously worked. Surrounded now by robots, he has few co-workers to talk to during his 12-hour shifts.

"I can feel the trend towards automation," Mr Geng said as he watched a robot cart pull a rack of car parts past his forklift. He said that his high school education might not be enough for him to qualify for classes in programming robots, and that he worried he might lose his job someday to a robot.

"It is not just my concern – everyone worries about it," Mr Geng said. NYTIMES

- Li You contributed research.