

CHIPS Act could make the US a semiconductor powerhouse

How might this new legislation, passed in August 2022, impact the US automotive market's prospects? By Elle Farrell-Kingsley



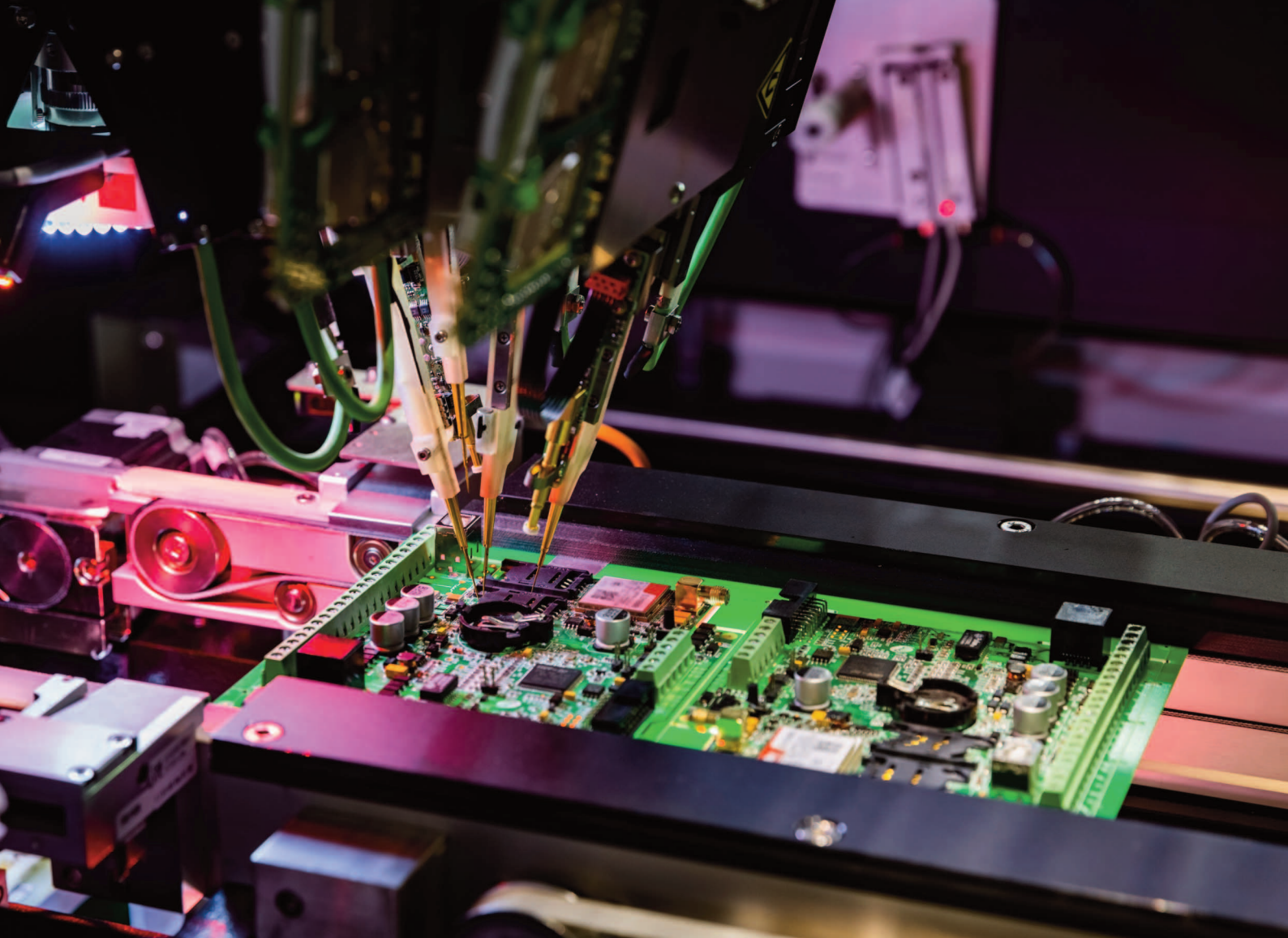
Modern vehicles are more reliant on semiconductors than ever before. Most vehicles come fitted with a number of chips to handle onboard functions, power infotainment systems, and monitor and perform driving functions, including advanced driver assistance systems (ADAS) and semi-autonomous operations.

Yet, a [semiconductor chip crisis](#) marred the global economy in 2020, causing price hikes and major supply chain disruptions across the automotive industry. The shortage cost the global auto industry roughly US\$210bn in lost revenue in 2021, according to market research firm AlixPartners. AutoForecast Solutions estimated that

the world lost 11.3 million units of chip production in 2021, creating a major impact on vehicle production. More recently, Russia's 2022 invasion of Ukraine has introduced further uncertainties to the semiconductor supply chain and automotive production. McKinsey reports that Ukraine supplied 25 to 35% of the world's purified neon gas, and Russia supplied 25 to 30% palladium, a rare metal used for semiconductors.

Chips as a commodity

Nevertheless, as demand for new vehicles featuring the latest technology increases, it's forecasted that the global semiconductor industry will increase manufacturing



capacity by 56% in the next decade, according to the Semiconductor Industry Association (SIA). At the moment, 75% of the world's chip manufacturing occurs in East Asia. Much of this production has been supported by government subsidies to keep production costs low.

Now, the US is preparing to rival East Asia with a greater share of semiconductor production through its own government subsidy; the CHIPS and Science Act passed on 9 August 2022. "The CHIPS Act is one of the few in recent history to get true bipartisan support, which says a lot," says Aron Solomon, Head of Strategy and Chief Legal Analyst at legal marketing agency Esquire Digital. "Essentially, we're trying to validate

semiconductor chips becoming like oil—a commodity that we desperately need and currently have to rely on others to supply."

This legislation could be crucial in establishing a secure domestic supply of semiconductors. Notably, US semiconductor manufacturing capacity has dropped from nearly 40% of global supply in 1990 to 12% today, according to PWC. This plunge is part of a wider decline in US manufacturing as services have outpaced goods. Paired with the impact of globalisation, the US now accounts for 84% of outsourcing deals globally, according to project management firm Team Stage, as other countries have become production powerhouses.



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Constructing enough factories could be challenging

The US\$208bn bill contains US\$52bn in subsidies for domestic chip manufacturers to help build future infrastructure and remedy the current chip shortage facing producers. This will generally be in the form of grants for both manufacturing and R&D. “The fact that so much of the money (close to US\$20bn) is being released in the first year shows how serious legislators are with this,” Solomon tells Automotive World. “That massive cash infusion could allow the US to play catch-up reasonably fast with chip production.”

Factory construction challenges

But even with the funding in place, Solomon believes there will be construction challenges ahead: “Semiconductor factories

aren’t the easiest to build. That was the case even before the post-pandemic labour shortages.”

One other key element of this development is the ecosystem surrounding the industry, says Richard Gardner, Chief Executive of tech regulator Modulus. “This is an opportunity to begin designing the labour force of tomorrow, cementing the nation as a long-term powerhouse in the semiconductor arena.”

However, he believes that the biggest challenge will be geopolitical ties. “For a period of ten years, companies accepting funding cannot expand operations in China or other countries deemed a threat to national security. That’s a significant commitment.” The

implication of accepting funding means that most recipients would need to fundamentally realign their business model, including an evaluation on whether it would need to require new investors or partners.

China's competition

The CHIPS and Science Act ultimately proposes to lower costs, create jobs, strengthen supply chains, and counter China. "This is what the act was supposed to do, but there is one major issue that will prevent this from becoming a reality—rare earth materials. Most of these chips have multiple rare earth materials involved in their manufacturing. Rare earths are 90% mined and refined in China. Therefore, no matter the grandiose vision this act puts forward, there really is no way to execute upon it unless we expand our mining operations for such materials here in the US," says Bob Bilbruck, Chief Executive of consulting firm Captjur.

He proposes that to achieve this vision would require expanding mining operations in mines such as The Mountain Pass Mine. The Mountain Pass Mine, owned by MP Materials, is an open-pit mine of rare-earth elements on the south flank of the Clark Mountain Range in California, 53 miles southwest of Las Vegas, Nevada. A US Geological Survey (USGS) revealed that the mine supplied 15.8% of the world's rare-earth production in 2020. "We all know this won't happen as the environmental lobby is too strong to allow this mine to expand, but for the CHIPS Act to succeed, that is exactly what must happen," he says.

"The idea that all vehicles will be electric in ten years and have chips to make them fully autonomous and efficient is a pipe dream," Bilbruck tells Automotive World. He also adds, "There are no plans to expand mining operations to provide the rare earth materials needed to build the chips needed for these vehicles. It's as if everyone forgot about this part of the equation for producing cars. Where we find ourselves in the US car manufacturing sector points to one thing—China's future dominance in the car industry."

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We can't be held hostage politically by any nation that can control our chip supply

However, this view is not agreed upon across the board, as Solomon highlights: "None of this means that it has to be a zero-sum game with China. There is no reason why the major chip producers there can't keep producing. The global demand for these chips isn't decreasing, and there's no forecast to suggest it will. Nonetheless, it is one more point of tension in increasingly strained China-US relations." Focusing on the US's future, Solomon concludes: "The reality is the CHIPS Act will ensure that with this domestic production, we can't be held hostage politically by any nation that can control our chip supply."