

The global automotive industry is on the cusp of a new era of competition that is expected to force established manufacturers and new players within the industry to fundamentally rethink their business models. Success or failure is likely to be determined by two key technologies: energy source and artificial intelligence (AI) chips.

First, energy. Whether looked at from the perspective of environmental factors, green energy or efficiency, electric vehicles are to become mainstream during the 21st century. Whether they are to be built around hydrogen fuel cells or use rechargeable or swappable battery cells as their primary source of propulsion is impossible to say for certain, although history tells us that the most advanced technology might not be the one that enters common use.

Whichever power source eventually becomes the universally adopted standard, one thing is certain: Next-generation AI silicon chips will be an integral component of future electric vehicles' automated driving systems.

An increasing number of vehicles manufactured today have AI smarts hardwired into many of their systems — 360 degree crash proximity collision prevention systems, tire pressure sensors, power detection and GPS navigation all make use of AI silicon chips.

As the development of autonomous vehicles continues, even more demand for vehicle-specific AI chips is to be generated.

Irrespective of local market factors such as regional safety regulations, climate differences in various regions of the globe or a requirement to provide support for nearly 20 years of the chip's in-service life, high-end automotive AI chips are to be intimately bound to the production of tomorrow's autonomous vehicles.

Moreover, differences between manufacturers and markets mean that demand for application-specific integrated circuit chips is expected to only increase.

Using the chip sector as leverage

Written by San Gee 葛

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The world's major suppliers of automotive chips are Infineon Technologies, STMicroelectronics NV and NXP Semiconductors NV.

Partly due to seasonal factors and partly due to the COVID-19 pandemic, there is a massive demand for automotive industry-related electronic products. This has caused serious shortages of automotive chips, and many automobile factories are facing shutdowns as they wait for chips.

The problem is occurring within auto manufacturing hubs from Germany to China, and needs to be resolved quickly.

The severity of the situation motivated German Minister of Economic Affairs and Energy Peter Altmaier to write a letter to his Taiwanese counterpart, Minister of Economic Affairs Wang Mei-hua (王美花), requesting that Taiwan help Germany resolve its chip shortage.

In addition, officials from the US Department of State have held a videoconference with Taiwan's Ministry of Economic Affairs and representatives from Taiwan Semiconductor Manufacturing Co, in which the US asked Taiwan to prioritize chip shipments for US vehicle manufacturers.

With demand far outstripping supply, the shortage in automotive chips could be just a short-term phenomenon. If Taiwanese chipmakers can adjust production capacity, and at the same time obtain an understanding with original design manufacturing chip contractors, the chronic shortage could perhaps be resolved in the short term.

However, as the global automotive industry continues to develop and become increasingly competitive, the shortage could become a long-term problem, with chip demand persistently high. There could even be a situation where competition becomes more intense the more advanced the chips are.

If this came to pass, it would provide a huge opportunity for Taiwanese chipmakers, but also create immense pressure — pressure to fulfill the competing demands of different industries,

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pressure from different automotive makers and pressure from governments around the world.

With chip manufacturing capacity already maxed out, profits would not necessarily increase by much. Swamped with demand and struggling to cope, Taiwan's chipmakers would have difficult decisions to make about whose orders to fulfill and whose to decline, offending the ones they have to reject.

When dealing with the situation, Taiwanese officials should remain cognizant of impending threats on the horizon. After all, Taiwanese companies have a monopoly on the production of high-end silicon chips. This will inevitably trigger jealousy and resentment in some quarters, impacting trade and international relations.

Powerful countries might demand that Taiwanese chipmakers relocate factories within their borders and agree to technology transfers. In the worst case scenario, trade retaliation or boycotts could spread to other domestic industries.

Taiwan is neither a big nor powerful country, but the nation's remarkable achievements in the field of chip fabrication will undoubtedly attract the envy of other nations. Some people have recently suggested that the government should leverage this national asset during negotiations for COVID-19 vaccines — chips for vaccines. It barely needs stating that such a move would be destructive and self-defeating.

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Translated by Edward Jones

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