

News & Analysis

Taiwan Eyes Automotive Market

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Is this about EMS model in automotive?

TAIPEI – How could a tiny island nation with only one local car OEM possibly become the next hub for the global automotive industry?

Taiwan is nursing just such an expectation, with precedents to buoy its hopes. Today, Taiwan's industrial success is rooted in the PC and smartphone markets. So, the template for this small nation's transformation to automotive importance is already established.

Taiwan's ambitions, of course, seem like a pipe dream, according to assessments by automotive industry analysts and based on Taiwan's virtually non-existent role in the automotive market.

Mike Demler, senior analyst at The Linley Group, bluntly noted, "Honestly, I can't think of anything for which Taiwan is known in the automotive industry."

Ian Riches, director for the Automotive Electronics service at Strategy Analytics, agreed. "Taiwan is not a major player today in the automotive industry." In Riches' mind, "Taiwan's most globally established company in the automotive field is likely TSMC," a foundry behemoth for many automotive semiconductor vendors.

Phil Magney, founder and principal advisor for Vision Systems Intelligence, was a little more kind. "I know of some electronic components coming out of Taiwan for infotainment, lighting and some other areas." But he added, "I do not think they have enough experience to build the integrated safety systems and meet the stringent functional safety requirements."

Admittedly, Taiwan is at a very early learning stage in the automotive market. Paul Chou, secretary general of Taiwan Telematics Industry Association, however, isn't discouraged.



Taipei International Auto Parts & Accessories Show this year has attracted 1,080 exhibitors (Source: Taitra)

During an interview at Taipei Ampa, the International Auto Parts and Accessories Trade show this week, Chou recalled the birth of PCs. "The PC industry then was very fragmented," he said, "and things were very chaotic" -- just like the auto industry today, on the cusp of rolling out highly automated vehicles.

In the PC world, once Microsoft's Bill Gates began pushing Windows and Intel's Andy Grove promoted the X86 processor architecture, efforts to build PCs coalesced around the Wintel platform. Then, Taiwan hatched its plot for the PC market -- perhaps faster than any other nation.

In the following five years, startups sprang up all over Taiwan, many of them engaged in developing and putting together everything from I/O, motherboards to mouse, keyboards and everything else that goes into a PC, explained Chou.

Taiwan created a solid ODM business for the PC industry. Now it commands 90 percent of global notebook PC production. Taiwan also became a key supplier of quality components for the PC market, and later did it again with the smartphone market, noted Chou.

Big acquisitions like Intel's buying Mobileye and Qualcomm taking over NXP/Freescale underscore the consolidation and partnerships emerging and accelerating in automotive. Chou believes it's time for Taiwan to replicate a successful business model — which worked in the information and communications technology industry — in the auto sector.

Chou told a group of reporters: "Taiwan won't be absent from the coming autonomous driving market."

Taiwan's automotive play

But how, really, do Taiwan's aspirational goals match reality? What automotive-related products does Taiwan make today?

Chou pegged Taiwan's automotive-related business output to be about \$19.5 billion in 2016. Of this, \$6.5 billion comes from domestic car production, \$6.95 billion is contributed by parts and components manufacturers, and \$6.07 billion from vehicle electronics.

Next page: [Apple-Foxxcon model to emerge in automotive?](#)

Taiwan already has a sizable business in automotive parts and components. But Taiwan has only one carmaker developing, designing and building a complete car. That car OEM is Hua-chuang Automobile Information Technical Center Co., known as Haitec. Taiwan makes only 440,000 cars a year, all consumed in Taiwan.

As the global automotive industry anticipates a sharp rise in the electronic content in vehicles, Chou foresees Taiwan boosting its share of this business. Besides the electrification of vehicles, everything from in-vehicle infotainment systems to vehicle intelligence (ADAS) and connectivity are contributing to this trend. Chou estimates the proportion of electronics output could easily reach 40 to 50 percent per vehicle.

Automotive Day

The groundswell of interest in the vehicle electronics market was palpable at Synopsys' first "Automotive Day" held Thursday (April 20) in Hsinchu. Synopsys brought a large team of automotive experts to Taiwan for the event, illustrating its interest in this growing opportunity here. Some 350 chip designers -- eager to design automotive SoCs -- packed the conference room.

Aart de Geus, Synopsys chairman and co-CEO, pointed to a few notable advantages that Taiwan can exploit to ease its entry into automotive electronics. First, "Taiwan is sitting right next to China, where a growing number of EV companies are starting up from scratch -- with no prior automotive experience or expertise," he said.

Second, Taiwan is known for “its entrepreneurial spirit” and a strong government commitment to “setting up national goals.” That’s how Taiwan succeeded in creating from scratch its now booming semiconductor foundry business.

Pointing out that a car is increasingly becoming “a collection of subsystems,” De Geus said he believes there’s an historic opportunity for Taiwanese startups to flex their entrepreneurial muscle.



Synopsys Automotive Day in Hsinchu, Taiwan (Photo: Synopsys)

But De Geus cautioned against drawing a direct line from Taiwan’s previous success in the ICT sector to Taiwan’s automotive aspirations.

Taiwan won the PC market battle primarily through cost and efficiency, he observed. In the automotive industry -- especially with highly automated vehicles, “We are at a very different stage where technology development is still needed.” Taiwan must show it can contribute to technology innovation by moving up to embedded software, de Geus said.

Apple-Foxconn model to emerge in automotive?

But what if a new generation of cars — like smartphones — is dominated by platforms from a few goliaths like Google, Apple, and Uber? Doesn’t that mean all bets are off? More to the point, wouldn’t such tech companies’ entering the auto market favor the Taiwanese, who already know their way around the smartphone market and EMS (electronics manufacturing services) business?

Magney acknowledged, “Some have speculated that this is how the big tech companies may pursue automotive -- like Apple does smartphones.”

It’s tantalizing to imagine that an OEM/EMS relationship like Apple/Foxconn could eventually emerge in automotive. “But I do not see any evidence of this yet,” he said.

Next page: [Serving Tier Ones](#)

Magney doesn’t think there will be a major disruption in the supply chain. He said, “The big tech companies have been turning to traditional auto suppliers lately for their integration of safety critical systems or other challenging elements of building a vehicle.”

Asked about the biggest hurdle for Taiwan to becoming a major force in automotive systems, auto industry analysts agreed on one point: Taiwan needs to nail down safety critical components.

Strategy Analytics' Riches said, "Especially when it comes to safety-related automated driving features, the quality and reliability of solutions is paramount."

Magney added that Taiwan needs to build "the integration of safety critical components and strict functional safety practices." He added, "Sure, Taiwanese companies may move up the value chain and have the capacity to handle safety elements out of context (SEooC), but a complete system is another matter."

Serving Tier Ones

Taiwan could establish an automotive ecosystem that consists of a lot of Tier Two's serving Tier Ones, in addition to a few Tier Ones directly collaborating with car OEMs.

Chou cited Taiwanese vendors such as E-Lead Electronics, RoyalTek Company, Whetron Electronics Co., Mobiletron, eTron and Photic Electronics Co., already moving into the ADAS market.

Leveraging their "ability to move fast," Taiwan's entrepreneurs could experiment, make mistakes, quickly learn and design news subsystems, observed Synopsys' De Geus. In the highly automated driving platform, where technology development still remains fluid, Taiwan's entrepreneurs may have the ideal temperament to quickly design the subsystems Tier Ones can use.



Paul Chou, secretary general of Taiwan Telematics Industry Association (Photo: EE Times)

Chou made an emphatic case for why Taiwan is fit for building a new ecosystem for the highly automated driving vehicle industry by listing three key factors: 1) Taiwan's already making key quality components for the ICT industry, applicable to automotive, 2) Taiwan is a small island that can be a "one-day supply ecosystem" for module vendors, and 3) Taiwan's strength in the semiconductor industry is based on foundries with expertise in both materials and biochemistry.

Robert Li, Synopsys country manager, said components that Taiwanese vendors already make — like Ethernet, surveillance cameras and SSD controllers — have high potential in the vehicle electronics market.

Chou believes Taiwan's size plays an important role. "Taiwan is a small island that stretches out for less than 120 miles." If module vendors need to put things together very quickly, it takes "only three to four days" for them to proceed from pre-production to mass

production, he said. This worked in the ICT industry and it will benefit Tier Ones serving car OEMs, Chou observed.

Next page: [Taiwan's national infrastructure](#)

Taiwan's national infrastructure

Taiwan only started to build motorways 40 years ago. It was 20 years ago when Taiwan launched high-speed rail systems.

The Taiwan government today is committed to smarter vehicles and smarter transportation infrastructure. Its mission also includes helping its domestic industry start a smarter vehicle ecosystem.

About 10 years ago, the Taiwanese government, on the advice of Taiwan Telematics Industry Association, launched a major campaign to equip trucks, coaches, public busses and taxis with "common standard telematics." Such a unit consists of connectivity to the cellular networks, GPS, cameras and Driver Vehicle Recorder (DVR) designed to deal with surprises on the road.



Taxi in Hsinchu, equipped with Taiwan's common standard telematics unit (Photo: EE Times)

Aided by the government subsidies, Taiwan has thrust itself into the forefront of the "Connected Car" movement. The unit cost of such a telematics equipment is \$1,300, and the government pays half of it (\$650), if bus operators satisfy criteria set by the authority, explained Chou. Today, roughly 90 percent of buses operating in Taiwan feature such a connected telematics unit.

Difficult journey ahead

The Linley Group's Demler observed the entree into automotive for Taiwanese semiconductor manufacturers would be in In-vehicle infotainment. "That's a natural extension of the media processors companies like MediaTek produce." There are also Taiwanese semiconductor companies producing camera sensors, MCUs, and other components to address the auto electronics market.

Noting that most automotive semiconductor content consists of discrete components and low-resolution MCUs, Demler said, "There is not much of a technical barrier."

"But if you're talking about ADAS, moving up to anything above passive systems (such as blind-spot cameras) requires more sophisticated processor technology. We haven't seen anything like that from Taiwanese processor manufacturers," Demler added.

This is where companies like Synopsys might step in. “Employing licensable cores (as they have for smartphone processors), there’s nothing stopping a Taiwanese company from developing ADAS chips,” Demler said. “The biggest challenge is developing the software stack, but they could work with some of the ADAS software startups to build such a solution.”

For smartphone chip designers to get into the automotive market, there’s a lot more to learn, though.

Next page: [Mindset issues](#)

De Geus said, “First you need to learn to document everything you do” to meet safety standards and verify chips.

Moreover, to build a car that tests itself, the chip must be designed to diagnose its own errors. “The chip has to say, bring me to a shop,” De Geus explained.

Even for experienced automotive chip designers, a difficult journey lies ahead, said the Synopsys chairman. “You are no longer designing a chip on the 65nm process node. As you bring in digital intelligence to your SoCs, you need to use advanced tools and learn to design chips on FinFET,” he explained.



Aart de Geus

Mindset issues

Then, there is the mindset issue, according to Cheng-Foo Chen, general manager of advanced engineering division at Haitec, Taiwan’s lone car OEM.

Typically, the gestation period from getting an automotive chip designed into a car to mass production of cars is a few years. Smartphone chip designers need to get used to the much longer design cycle in the automotive market. A management team who values quick quarterly results must learn patience. “I’ve seen too often a new IC design team -- geared up for the automotive market -- give up,” said Haitec’s Chen.

To succeed in automotive, Taiwanese companies will need to expand from their current infotainment and aftermarket focus into safety-related areas, Strategy Analytics’ Riches noted.

“This could be challenging to achieve with global OEMs,” he said.

Especially with only one car OEM and virtually no Tier Ones in the domestic market, this seems downright quixotic. However, Riches added, “It will likely prove easier with the growing number of small and start-up OEMs that are not playing by traditional automotive industry rules.”

Watch, especially for new EV OEMs springing up in China.

— Junko Yoshida, Chief International Correspondent, [EE Times](#) 