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A Japanese Plant Struggles to Produce a Critical Auto Part

By ANDREW POLLACK and STEVE LOHR APRIL 27, 2011

HITACHINAKA, Japan — A modern car is a computer on wheels. The window openers, the dashboard navigation maps, the fuel injectors — these and many other operations are controlled by some of the 100 or so electronic systems in a typical car.

No wonder the magnitude 9.0 earthquake that knocked out one of the world's leading automotive computer-chip factories struck such a severe and lasting blow to the global auto industry.

Since the March 11 earthquake, the lack of chips from this plant is a big reason automobile production has slowed to half its normal rate in Japan, and is at a crawl in some factories in the United States and elsewhere.

And plant officials here on Wednesday acknowledged that this critical link in the supply chain would be restored only gradually, despite the round-the-clock efforts of an army of workers to repair the cracked walls, collapsed ceilings and out-of-kilter equipment caused by the quake.

The factory here, 70 miles northeast of Tokyo, belongs to Renesas Electronics, which supplies about 40 percent of the world market for those crucial chips, known as automobile microcontrollers.

If it were the PC industry, customers by now might have found alternative suppliers for their standardized chips. But because of the way the automobile industry has evolved in the digital era, microcontrollers are usually customized for each car model.

That makes it difficult for automakers to quickly switch suppliers. And it has left manufacturers desperate for Renesas to resume production as soon as possible.

“We have an important role and responsibility,” Tetsuya Tsurumaru, senior vice president in charge of manufacturing at Renesas, said on Wednesday, during the first plant tour for reporters since the disaster. “We are aware of this and are doing our best to restore the supply chain as soon as possible.”

Mr. Tsurumaru said the company hoped to restart microcontroller production on June 15, about a month earlier than previously estimated. But output will initially be only 10 percent of capacity, he said, declining to predict when Renesas would resume full production.

To help meet demand, the company is shifting some production from the factory here to another Renesas factory in Japan not damaged by the quake. It is also farming out some manufacturing of automobile controllers to GlobalFoundries, a contract manufacturer in Singapore that has produced microcontrollers in the past. But shortages are expected to persist for months.

“Let’s show Renesas’s inner strength and unite our hearts to restart in June,” read banners hung from the buildings here. “Customers from all over the world are waiting.”

Thus exhorted, workers have repaired the factory’s ceiling, as well as a crucial air filtering system intended to keep out dust particles that can ruin the microscopic circuitry of the chips.

Test production has begun. Workers in white suits with facemasks and hoods worked in the clean room to repair and realign sophisticated machines that must be precise to billionths of a meter. But red lights next to most pieces of equipment indicated they were not in operation.

To be sure, Renesas is not the only parts supplier knocked out by the earthquake and, in some cases, by the tsunami that followed.

Toyota said recently that it faced shortages of 150 critical parts, not only electronic controllers but also rubber parts and paint additives. The company, Japan's biggest automobile manufacturer, said it would not be able to resume full production until the end of this year.

Still, as a sign of how crucial this plant is, Japanese automakers, auto parts companies and other customers have sent as many as 2,500 workers to help repair the factory, called the Naka plant.

Automobile companies are not the only ones dependent on Renesas. For instance, Ricoh, maker of copiers and office equipment, gets some customized chips from Renesas. Ricoh executives say the Naka factory is their biggest concern among parts suppliers.

But microcontrollers, which are called mi-con in Japan (pronounced my-kone), are extremely important in automobiles because they act as the brains of electronic control systems.

A reason for the industry's heavy reliance on Renesas is that it is the product of mergers involving three Japanese semiconductor companies. Hitachi and Mitsubishi Electric merged their semiconductor operations in 2003 to form Renesas Technology. Then, last April, Renesas Technology merged with NEC Electronics, the former semiconductor division of NEC, to form the current company, Renesas Electronics.

While different automakers once had their preferred electronics suppliers, after the merger everyone ended up buying chips from the same company, said Koji Endo, an automobile analyst at Advanced Research Japan, an equity research firm.

Renesas has emerged as one of the largest semiconductor companies in the world, with net sales of 1.06 trillion yen (about $13 billion), in the fiscal year that ended March 2010. (Partly because of the weak economy, its net loss that year was 137.8 billion yen, or $1.69 billion.)

While publicly traded, the company, which is based in Tokyo, is 90 percent owned by NEC, Hitachi and Mitsubishi Electric.

The Naka factory once belonged to Hitachi and is in a region where the electronics giant was founded as a motor manufacturer in 1910.

In automobile microcontrollers, Renesas's main competitors include Freescale Semiconductor and STMicroelectronics.

Automotive microcontrollers are mainly bespoke chips, with many different hardware designs and different types of software tailored for each design. That is partly a legacy of the auto industry tradition of each company designing and building vehicles to its own specifications. The automotive electronics industry is much the same, with many competing designs.

"These microcontrollers are different in small but important ways," said Tom Starnes, an analyst at Objective Analysis, a technology research firm. "That makes it very difficult to switch to alternate suppliers, at least not quickly." Switching could take six months or more, analysts say.

A particular challenge is the highly customized software that provides instructions for the various chips. From automaker to automaker, "there's no software compatibility at all," said Tomoaki Nakamura, who once oversaw automotive electronics for Hitachi and is now vice president for research at IDC Japan, a market research firm.

The lack of technical standards is in marked contrast to the way the personal computer industry evolved — with its standard formats for disk storage, memory chips, microprocessors and a dominant operating system in Microsoft's Windows, although Apple's Macintosh operating system is gaining a bit of ground lately.

In recent years big automakers in the United States, Europe and Japan have formed consortiums to try standardizing some of their technology. The two main groups, AutoSAR and the Genivi Alliance, focus on software and electronics standards for drive train, information and entertainment systems.

Analysts say the crisis in Japan could accelerate progress on these standards-setting efforts, while prompting some automakers to reduce their dependence on Renesas.

"In the long term, automakers will probably spread their bets more to other major suppliers," said Egil Juliussen, an auto electronics analyst at IHS iSuppli, a research firm. "And there will be more reason to push the industry standardization efforts, now that automakers have seen what can happen when a key supplier goes down."

Correction: April 29, 2011

Because of an editing error, a picture caption with the continuation of an article on Thursday about Renesas Electronics' Naka factory in Japan misstated, in some editions, that factory's contribution to global supplies of a certain automotive computer chip. Renesas as a company supplies about 40 percent of the world market for that chip; that is not the amount supplied by its Naka factory.

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