



### Chips Still Shaky in Japan Two Weeks Later

It is difficult to assess the impact of the March 11 earthquake in Japan on the semiconductor industry, even two weeks after it happened. The situation continues to evolve as Objective Analysis gets better information from the chip vendors and as the chain reactions at the affected nuclear power plants play out. Vendors are always hesitant to reveal too much about their operations, certainly from sketchy reports, lest customers and financiers take unwarranted negative actions and competitors take advantage.

The issues fall into many categories from people and infrastructure that affect the industry and economy of all of Japan, from physical factory damage and raw material shortages for chip-makers, to the downstream impact on all electronic equipment.

The people of Japan are understandably shaken by both the earthquake and tsunami damage, and as a close-knit nation everyone knew someone from the affected region and worked to help there. This pushes the priority on business and commerce down the stack a notch. Nonetheless, we have reports of many dedicated semiconductor employees returning quickly to their places of business after securing their homes. Meantime, the increasing threat of radioactive emissions from stressed nuclear power plants has many people scrambling to get to the far end of the island.

The disrupted electricity, water, and transportation systems are certainly going to take some time to get back on track. There are only so many spare parts lying around with which to fix things. Even far away from the earthquake zone, rolling electrical blackouts, scheduled or not, are hampering normal life. Semiconductor manufacturing requires consistent, high-quality electricity, and disruptions in water and power may continue to affect semiconductor and end-equipment manufacturers even far from the earthquake area for some time to come.

#### When the Chips Are Down

Looking more specifically at semiconductor manufacturing, most of the production in Japan is for Japan-based chip vendors like Toshiba, Sony, Elpida, and Renesas, and the chips are more likely to be sold domestically - within Japan - to electronic equipment OEMs. But foreign companies also have fabs and utilize back-end assembly in Japan. The map distributed in Objective Analysis' March 11, 2011 [Alert](#) shows the location, operators, and product categories of the significant semiconductor manufacturing facilities in Japan in relation to the epicenter of the 8.9 (later raised to a 9.0 Richter-scale rating) earthquake.

Reports coming to Objective Analysis indicate that most of the facilities across the country are operational but some have real problems. Renesas has six or seven facilities, many around Sendai, which have been hard hit or at least shut down while a full evaluation was being made. Renesas formed over the last few years as a conglomeration of the former Hitachi, Mitsubishi, and NEC semiconductor operations, and is now the world's largest producer of microcontrollers.

Texas Instruments reports that one of its fabs sustained physical damage that will put it out of operation or at least limit it for 3 to 6 months. The precision equipment in any of these fabs is nearly built to-spec and not likely to be quickly replaced. And re-certifying a repaired or completely different production line takes quite a bit of time and includes getting key customers to validate the qual.

Perhaps more than other industries, semiconductor vendors are close to their customers and continuously play a careful balancing act, managing inventory to optimize supply of raw materials, cost of materials, fab utilization, test time, alternative production lines, forecast demand, and sudden up-ticks in customer demand. Nobody wants a \$35,000 car to be parked on a production line waiting for a shipment of \$5.00 microcontrollers that are programmed properly or a hit Christmas toy to be out of stock until after the new year.

Of the \$300B of semiconductor chips sold last year, nearly \$50B were sold to or within Japan. But nearly 25% of the world's semiconductor production capacity is in Japan when you look at total square inches of silicon processed, so this is a vital region to the global industry. Additionally, over 60% of the silicon wafers that are the starting point for making a semiconductor chip are made in Japan, and these are sold all over the world.

### **Electronic Equipment Industries Affected**

Perhaps the largest industries impacted by diminished supply of semiconductors out of Japan are automotive and consumer electronics, industries with major anchors in Japan.

Most of the automobile plants in Japan are currently shut down, though those could probably be turned back on once the people can be rounded up. But the supply of microcontrollers, and analog and sensor products to the automakers and of all chips the variety of chips to the vast consumer electronics industry based in Japan could put a real dent in production if these components can't be produced for a period of time.

Products like microcontrollers and DSPs can't simply be swapped out for another chip, whether from the same vendor or another. The programs aren't easily transferable between processors, and even changing other chips like analog may introduce cost, quality, or reliability issues not originally anticipated.

Automotive OEMs have inventory and the occasional back-up plan for supply chain difficulties but when a facility is taken out by something like an earthquake or lack of electricity, all the screaming in the world at the vendor isn't going to fix the problem since the root cause is largely out of the vendor's control.

### **Japan is Needed in the Game**

There may be a zero-sum market out there, so European and American automakers may be able to serve the market for cars, and Korea or China may get a boost in serving the consumer electronics market. But it's better for everyone if the shift in

market suppliers is due to much better products being offered rather than temporary elimination of competition due to natural disaster and tragedy. The electronics industry has thrived for decades on dramatic innovation and continuous improvement, and has enhanced life for mankind by doing so. All the best players need to be in the game for that to continue.

So it is hoped that Japan's semiconductor manufacturing, as well as the Japanese people, can get back on their feet quickly, and keep the world watching TV, playing video games, and driving to work - as we like to do.

Unfortunately, it is hard to see that this earthquake is going to help Japan (or any other region) to pull out of its economic woes, some of which have been dragging on for nearly a decade.

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