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The Automotive Semiconductor Shortage - An Accident Waiting to Happen?

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Recently the news channels and financial press have been filled with stories and articles about automotive manufacturers around the world shutting down production lines due to shortages of semiconductors, the electronic marvels that power everything from your smartphone to the adaptive cruise control on your new car. Automotive executives and even government officials worldwide are scrambling to exert influence on the semiconductor supply chain including foundries like TSMC in Taiwan to ramp production and reassign priorities to avoid production gaps and idling hundreds of thousands of automotive workers.

Of course, the pandemic has contributed to supply chain disruptions and shortages in a multitude of industries and products including PPE, toilet paper, and even food items. There were certainly disruptions in the semiconductor supply chain back in first and second quarter of 2020, but most companies were back operating at or near their pre-COVID-19 levels within the third quarter. As the pandemic progressed and businesses and schools were forced to operate remotely, the industry experienced a surge in demand in the electronics required to enable more remote interactions, including PCs, smartphones, and communications infrastructure. Cloud providers like AWS, Microsoft Azure, and Google Cloud saw record growth in late 2020, further accelerating their investments in more server and communications hardware.

Automotive production line shutdowns also occurred because of the pandemic. Auto factories around the world were temporarily shuttered until safety protocols and secure worksites were implemented to keep factory workers healthy. The shutdowns led to a gap in supply to downstream dealer networks and consumers. Now with factory volumes restored and economic recovery picking up around the globe, auto manufacturers, their Tier 1 suppliers, and the entire automotive supply chain began ramping orders again for all the materials required to build automobiles. And that's where the big supply chain problems bit them.

Simply put, the current auto semiconductor shortage was an accident waiting to happen. For the past several decades, the automotive manufacturing industry has driven one of the leanest and most demanding supply chains in the world, especially for electronics. Just-in-time manufacturing works great in a steady state environment. As long as everyone's production lines up and down the industrial food-chain are running smoothly, automotive equipment manufacturers are able to output products with minimal inventory and disruption. As procurement executives in these companies were driven to more and more aggressive cost-reduction goals, they pushed their teams to reduce middlemen and any type of buffers that could add incremental cost. Unfortunately, with long lead-time items like semiconductors, the accompanying supply chain cannot react instantaneously. Especially when there is competition for fab, foundry, assembly, and test resources.

The extreme focus on cost optimization could and should have been balanced with a pragmatic view on the extreme cost of idled automotive production lines. To shut down production lines for \$80,000 vehicles due to a missing \$2 microprocessor or a \$5 flash memory was previously inconceivable but is happening all over the world today.

To minimize future shortages, automotive manufacturing companies can utilize the electronic components authorized channel to help them cushion supply fluctuations. There are highly effective methods of partnering with electronics distributors that can help avoid these astronomically expensive shutdowns that are occurring today. The past several decades have seen automotive electronics customers eschewing the channel. Automotive procurement teams have increasingly been demanding semiconductor suppliers do business with them directly without the perceived middleman of distribution. In addition to perceived cost benefits, automotive procurement teams often assume they will get better priority working directly with electronic components suppliers.

But most semiconductor suppliers are not set up to efficiently supply a business like automotive on a direct basis. With longer lead-times, higher minimum order quantities, limited finished goods inventory, and shorter financial terms, most semiconductor manufacturers are geared for selling extremely high volumes of fewer part types to their highest volume customers. But while over 100 million vehicles are normally sold annually, the mix of models and electronics across the automotive spectrum means most of their business is more of a high-mix, low-volume to semiconductor suppliers. Semiconductor operations teams are set up more toward shipping directly to a very narrow set of high-volume customers, that is, shipping 100s of millions of a narrow list of part numbers to someone like Apple for iPhone 12's, not 100s to 1000s of unique part numbers in smaller quantities of tens of thousands to automotive electronics manufacturers. Sometimes it can make sense for direct business from a semiconductor manufacturer when automotive companies standardize on a few components that are heavily utilized over the bulk of their product lines. But for most lower volume part numbers, distribution can be a better solution.

Products that have longer lead-times and large production lot sizes, like semiconductors, need distribution for efficient buffering between the manufacturers and end customers. Semiconductors have extremely long and complex production cycles that can range from 10 to 26 weeks. With the advent of fabless semiconductor companies and asset-lite production strategies, often a semiconductor company is reliant upon outside manufacturing partners and often subject to their partners' production queues and utilization constraints. Once a production cycle is begun, large quantities of the same product flow through a manufacturing line that pop out at the end in a burst. Again, distribution plays the role of matching a customer's demand for a steady flow of product to the long and bursty production cycles of semiconductor manufacturing.

The answer from the electronics industry for high-mix low-volume customers, supported for decades, is the Authorized Channel for electronics distribution. Supplier-authorized distributors are logistics experts that can aggregate volumes over many customers, efficiently holding and shipping inventory as needed to the broad electronics customer base. Distribution also offers many value-add services to automotive manufacturers such as special labeling, bar coding and packaging, corrective actions and failure analysis support, in-plant stores, VMI (vendor managed inventory), various inventory consignment programs, part programming services, PPAP (Production Part Approval Process) and supplier quality programs, just to name a few. The collaboration between authorized distributors and automotive manufacturers presents a wealth of opportunity.

It is important to note that not all automotive manufacturers demand solely direct business with semiconductor suppliers. In fact, electronics distribution was so important to the Japanese auto industry that auto manufacturers like Toyota even created their own distributors! Toyota Tsusho that is now part of Nexty Electronics is one such example. These captive distributors were also important to ensure genuine products and avoid counterfeits. Today this authenticity is assured when buyers stick to the Authorized Channel and utilize free resources like www.TrustedParts.com.

Distribution and an efficient channel are important to many industries. Many everyday businesses like food & beverage, and even automobiles themselves are well supported by a set of manufacturers efficiently feeding large product shipments to regional and local distributors that then ship in smaller and more regularly spaced quantities to their end customers and retailers. Those distributors can also provide a myriad of value-added service to the end customers.

While the pandemic and trade war actions have exacerbated the current shortages of semiconductors to the automotive industry, many of the current problems were avoidable. Future supply chain disruptions will undoubtedly occur. To minimize future supply chain disruptions, it is imperative that industries like automotive efficiently and effectively employ the resources and options available to them, and a huge, under-utilized resource available today is the authorized channel of electronics distribution.