



---

## Motor & Equipment Manufacturers Association

### Comments to

### U.S. Department of Commerce

### Bureau of Industry and Security, Office of Technology Evaluation

### RE: Risks in the Semiconductor Manufacturing and Advanced Packaging Supply Chain

Docket No. BIS-2021-0011; RIN 0694-XC073

April 5, 2021

---

The Motor & Equipment Manufacturers Association (MEMA) submits the following comments regarding the Bureau of Industry and Security (BIS) Notice and Request for Public Comments on the Risks in the Semiconductor Manufacturing and Advanced Packaging Supply Chain.<sup>1</sup>

#### Introduction

MEMA represents more than 1,000 companies that manufacture original equipment (OE) and aftermarket motor vehicle parts, components, systems, and materials for use in passenger vehicles and commercial trucks.<sup>2</sup> U.S. motor vehicle parts manufacturers provide more than 907,000 direct jobs, making it the nation's largest employer of manufacturing jobs with a presence in all 50 states. Direct, indirect, and induced vehicle supplier employment accounts for over 4.8 million U.S. jobs. Moreover, vehicle suppliers contribute 2.5 percent of U.S. GDP. The average U.S. wage for direct vehicle supplier jobs reached \$80,300 – exceeding the average of all U.S. manufacturing sectors.<sup>3</sup>

Across the entire range of new vehicle innovation – from automated to zero-emission technologies – vehicle suppliers are leading the way. Vehicle suppliers conceive, design, and manufacture the OE components and technologies that make up two-thirds of the value in every vehicle. Additionally, vehicle suppliers also manufacture aftermarket parts and materials for the maintenance and repair of 290 million vehicles on the road.

#### Impacts of Current Semiconductor Shortage on Vehicle Suppliers

Since the beginning of 2021, the U.S. vehicle industry has faced an acute shortage of semiconductor chips as well as a shortage of the motor vehicle grade wafers from which they are produced. Semiconductors are used in a wide variety of vehicle components to perform critical functions – such as, vehicle control, active and passive safety systems, emissions, and driver information. The manufacture of these electronic components relies on the semiconductor industry that, in turn, depends on the silicon wafer foundry industry. The recent shortage of automotive

---

<sup>1</sup> 86 Fed. Reg. at 14308.

<sup>2</sup> MEMA represents its member companies through its four divisions: Automotive Aftermarket Suppliers Association (AASA); Heavy Duty Manufacturers Association (HDMA); MERA - The Association for Sustainable Manufacturing; and Original Equipment Suppliers Association (OESA).

<sup>3</sup> [U.S. Labor and Economic Impact of Vehicle Supplier Industry](#), MEMA and IHS Markit. February 2021.

semiconductors was triggered, in part, during the second quarter 2020 pandemic shutdown, which prompted silicon wafer foundries to reallocate production from the automotive sector to the consumer product sector.

However, as motor vehicle production grew sharply in the second half of 2020, motor vehicle grade wafer capacity could not keep up with demand. As of April 2021, many U.S. motor vehicle plants have idled and/or curtailed production due to the shortage of these key components. These shortages are expected to persist in 2021 because it takes up to five months for foundries to retool, reallocate, or expand production. Recent events – such as a semiconductor fab fire in Japan, shipping and port delays, and natural disasters – have further exacerbated the problem. Due to this shortage, the industry is anticipating an overall decline in motor vehicle production for the first three quarters of 2021 with adverse employment impacts, both for vehicle manufacturers and vehicle parts manufacturers.

There are lessons to be learned from the current motor vehicle crisis for the overall long term supply chain discussion.

First, it is a warning that combined demand for semiconductors from all major technology sectors – motor vehicles, personal consumer devices, gaming systems, and large-scale computers – will only continue to accelerate. Motor vehicle chip use will probably increase faster than other sectors. “Automotive semiconductor sales were about \$40 billion in 2019. But four trends – autonomy, electrification, connectivity, and mobility as a service (MaaS) – will raise the semiconductor content of cars by as much as ten-fold. This, we estimate, could raise automotive semiconductor sales to as much as \$200 billion by 2040. This figure includes only “onboard” chips, not those needed for the infrastructure (e.g., chargers, cloud computing) to support advanced autos, which will drive semiconductor demand, too.”<sup>4</sup> Currently, the motor vehicle sector requires only about 5 percent of advanced wafers used semiconductor production and purchases about 8-10 percent of semiconductors. If anything, these demands are expected to increase more substantially over the next 15 years as more advanced vehicle systems and technologies to reach zero emission and electric vehicle production objectives that are being put in place by the Biden Administration.

Second, the current crisis reinforces the need to build a more robust and steady global supply chain of motor vehicle grade semiconductors to have on hand to manufacture an adequate supply of components to support production of light passenger vehicles, heavy commercial trucks, and off-road agricultural and mining equipment as these technologies advance. In addition, increasingly more sophisticated chips will be needed over time as our sector moves up the technology curve, and there is a greater need for microcontrollers and other advanced technologies.

### **Longer Term Policies to Encourage U.S. Semiconductor and Wafer Manufacturing**

The U.S. semiconductor policy objective should be first and foremost to increase and diversify the global supply of all grades of semiconductor chips. Increasing the size of the pie benefits all key tech industrial sectors, including motor vehicles and parts. Diversification means more grants to encourage more U.S. wafer and semiconductor chip production, which also strengthens the North American region and enhances the USMCA.

While the U.S. retains the ability to design the most advanced chips that are so important for our national competitive position, other nations are gaining design expertise. The U.S. is reasonably

---

<sup>4</sup> [“Automotive Semiconductors: The New ICE Age,”](#) by Scott Jones, KPMG, November 25, 2019.

strong in final semiconductor chip production, producing 12 percent of chips globally. Yet, in 1990 the U.S. production figure was 37 percent. Moving forward the U.S. must retain the ability to advance incrementally the design of previous generations of chips critical for motor vehicle sensors and components and concentrate technology to manufacture the smallest, most advanced wafers that are cut into chips. Right now, a U.S. company is still working on perfecting 7 nanometer (nm) chips while U.S. allies have widespread 5 nm production and are constructing plants for 3 nm chips.

There are three major regions of global production of key manufacturing and technology goods – North America, Europe, and China. Europe has robust industrial funding policies since World War II. China has its massively government funded “Made in China 2025” policy program, which has identified semiconductor research, development, and production as a key national policy objective.<sup>5</sup> With the cost of new semiconductor plants ranging anywhere from \$4 billion to \$20 billion, some government assistance as provided by the “Creating Helpful Incentives to Produce Semiconductors for America Act” (CHIPS Act) is necessary for the U.S. to compete globally.<sup>6</sup>

Yet, we can never forget the edge that the creativity, ingenuity, and entrepreneurial spirit that is inherent in the U.S. technology and manufacturing sectors. The U.S. is among the world leaders in semiconductor design and engineering; passage of the CHIPS Act simply enables us to build on that success. For these reasons, MEMA strongly supports the CHIPS Act. However, the legislation must include appropriate motor vehicle chip production incentives.

During consideration of the CHIPS Act, policymakers should focus on the following:

- Increasing U.S. based production. If CHIPS Act funding encourages companies (like TSMC from Taiwan, Samsung from Korea, or other companies from these or other allies), to source some of their best wafers in the U.S. that would be an important contribution to increased global capacity and diversification of supply.
- Incentivizing chip manufacturers to produce chips and wafer components for the motor vehicle sector. Currently, the vehicle sector needs mostly 200 mm semiconductor chips that are manufactured with mature, but still vital technology, for our sector, 5G networks and other critical functions. Companies making semiconductor chips get a better economic return on the state-of-the-art 300 mm chips for consumer goods, and a few motor vehicle components such as microcontrollers. The CHIPS Act must incentivize chip manufacturers to produce 300 mm and 200 mm chips and the wafer components for the vehicle sector.
- Growing and stabilizing U.S. employment and access of necessary components for the U.S. Department of Defense (DoD). The semiconductor sector, which has 209,000 direct jobs,<sup>7</sup> is dwarfed by the motor vehicle parts sector.<sup>8</sup> Both sectors need to thrive. These two sectors in turn support the DoD fleet vehicles as well as combat and land transportation vehicles that provide support to combat vehicles. Direct DoD impacts, along with broader jobs and industrial base impacts of the motor vehicle and parts sector, are both critical to our national security.

---

<sup>5</sup> [“Semiconductors and the U.S.-China Innovation Race,”](#) Special Report by FP Analytics, Foreign Policy Magazine, February 16, 2021.

<sup>6</sup> [“Want a New Factory to Make Car Chips? That’ll Be \\$4 Billion, Please,”](#) Anjani Trivedi, Bloomberg, February 21, 2021

<sup>7</sup> [Number of semiconductor manufacturing jobs in U.S. 2009-2019,](#) Thomas Aslop, Statista, May 26, 2020.

<sup>8</sup> [U.S. Labor and Economic Impact of Vehicle Supplier Industry,](#) MEMA and IHS Markit. February 2021.

Therefore, any U.S government supply chain incentives for research, development, and production must apply to the semiconductor needs of both the semiconductor and motor vehicle parts manufacturing sectors. A requirement that a portion of CHIPS grants go to companies that commit to building fabs that have the capacity to manufacturing motor vehicle grade semiconductor production would encourage balanced U.S. chip production.

### **MEMA Responses to Particular Elements of the BIS Notice**

*(i) Critical and essential goods and materials underlying the semiconductor manufacturing and advanced packaging supply chain*

Production capacity for both silicon and silicon carbide chips are important to the motor vehicle industry. In fact, silicon carbide chips may be the most important to the future of the motor vehicle sector because they withstand higher temperatures, voltage, and frequency than traditional silicon chips. These types of chips may be well-suited for vehicle components and systems that are exposed to harsh operational conditions and extreme temperature fluctuations, especially for vehicle safety and emissions control applications. This silicon carbon technology may drive vehicle industry progress in the next decade. Therefore, support and incentives from the U.S. government as part of the CHIPS Act research and development efforts would be important to the motor vehicle and parts sector.

In addition, the U.S. must develop sourcing for Alloy 42, which is comprised of nickel, iron, manganese, and cobalt alloy, and has favorable thermal characteristics. These are the primary ingredients in lead frames, which is the thin layer of metal from electric terminals on the semiconductor surface to large scale circuitry on automotive and other electronic devices.

*(ii) Manufacturing and other capabilities necessary to produce semiconductors, including electronic design automation software and advanced integrated circuit packaging techniques and capabilities*

The motor vehicle sector in the U.S. would be helped by greater capacity in the electronic software design areas, manufacturing process improvements for semiconductor chips that go into motor vehicles as well as the wafer technology and manufacturing capacity that is used to comprise these chips. Having design and manufacturing strength all three areas should be a national and a regional North American objective as the U.S. competes with allies in Asia and the EU and engages in more adversarial competitors in China.

*(iii) The availability of the key skill sets and personnel necessary to sustain a competitive U.S. semiconductor ecosystem, including the domestic education and manufacturing workforce skills needed for semiconductor manufacturing; the skills gaps therein, and any opportunities to meet future workforce needs*

The motor vehicle parts sector has a skills gap and workforce shortage that keeps thousands of available positions unfilled. That could become more acute if the semiconductor shortage forces significant numbers of U.S. parts plants to suspend production. When production ramps up again, larger numbers of workers will be needed quickly, and both shortages and training news might increase. Broad application of federal, state, and local worker training and skills development is important to combat the current situation and longer-term challenges.

The U.S. also needs additional engineer capability and incentives for engineering and technology graduates from universities. Our nation needs to engage with federal agencies to upgrade training

opportunities for our current workforce and restore key college visa and H1B and L visa capacity after college. The Trump Administration suspension of these visas expired on March 31. Now quotas must be gradually expanded, and red tape streamlined to make progress in this key area of U.S. competitiveness for our sector and more broadly.

More broadly, motor vehicle parts suppliers rely on a strong technical workforce, particularly in the wake of the transformation of vehicle technology and mobility. For the supplier industry to continue to innovate and remain competitive, companies need the right workers with the right skills at the right time. Workforce development and training is a necessary tool to provide workers the right skills to satisfy employment needs. The hiring and retention of skilled workers is a key challenge. According to a recent study, “Over the next decade, nearly 3.5 million manufacturing jobs likely need to be filled. The skills gap is expected to result in 2 million of those jobs going unfilled.”<sup>9</sup>

The industry’s workforce needs are evolving with the push to vehicle electrification and automation. In response to these changing needs, worker training programs must also evolve to continue providing U.S. workers with the necessary skills to manufacture and maintain new technologies. The industry will require a diverse workforce with occupations across many industries with varying levels of education, training, and experience. Most of these occupations will require specialized training or work experience. Throughout the country, the supplier industry plays an important role by participating in a variety of state, local, and regional workforce-related endeavors to acquire talent and enhance employee training.

- (iv) *Risks or contingencies that may disrupt the semiconductor supply chain (including defense, intelligence, cyber, homeland security, health, climate, environmental, natural, market, economic, geopolitical, human-rights or forced labor risks)*

About 52 percent of the 10 nm wafers that comprise the most advanced 200 mm and 300 mm semiconductor chips are contracted from a single company, TSMC from Taiwan.<sup>10</sup> TSMC is planning to diversify its production and has announced new plants planned for the United States and Japan. However, it takes at least three years for new fabs to come online. So, this trend of diversification of supply to allies in East Asia and Europe is important to encourage. Additional production in the U.S. also would be helpful, to alleviate current potential adverse national security implications.

The U.S. vehicle industry relies on both its global suppliers and its local domestic component manufacturers to be viable with as little disruption and as much predictability as possible. The vehicle supply chain, their customers, and the jobs they support are highly interdependent. Even small changes to the supply chain can generate big consequences. Recent examples of broad risks to the supply chain include the March fire at the Renesas motor vehicle semiconductor plant in Japan, which had been expanding automotive chip production (specifically, the company produces one-third of the global automotive microcontroller supply);<sup>11</sup> the Texas winter storms resulting in widespread power outages impacting Infineon and NSP semiconductor fabs as well as various motor vehicle grade resin facilities; and, the broader woes of West Coast port slowdowns and the recent Suez Canal blockage. These examples all show a need for more U.S./North American and decentralized supply chain including those for chip production. Additional fabs in the U.S. will

---

<sup>9</sup> “The Skills Gap in U.S. Manufacturing 2015 and Beyond,” Deloitte and The Manufacturing Institute, 2015.

<sup>10</sup> [“Semiconductors and the U.S.-China Innovation Race,”](#) Special Report by FP Analytics, Foreign Policy Magazine, February 16, 2021.

<sup>11</sup> [“Renesas says normal production at fire-hit chip plant to take 100-120 days,”](#) by Eimi Yamamitsu, Reuters, March 30, 2021.

create more flexibility to adjust to national security tensions, overall trade disruptions and of course natural disasters.

*(vii) Policy recommendations or suggested executive, legislative, regulatory changes, or actions to ensure a resilient supply chain for semiconductors (e.g., reshoring, nearshoring, or developing domestic suppliers, cooperation with allies to identify or develop alternative supply chains, building redundancy into supply chains, ways to address risks due to vulnerabilities in digital products or climate change)*

MEMA has encouraged the Biden Administration to continue to urge key production countries and companies with silicon wafer foundries to ramp-up production of automotive grade wafers by either expanding production capacity by a short-term rebalancing of a modest portion of current wafer supply. In addition, MEMA supports the administration's efforts to press key allied users of chips to abide by fair use allocation of chips.

As noted above, longer term, MEMA supports measures to increase U.S. production of semiconductor chips as well as balanced demand allocation of chip production to all sectors, including motor vehicles and parts. MEMA supports full federal funding of a slightly revised version of the CHIPS Act provisions in National Defense Authorization Act, which authorized programs to promote semiconductor manufacturing and research in the United States. MEMA believes that the CHIPS Act must be tweaked to help alleviate any repeat of the current automotive chip shortages.

The Congress also needs to pass, and the Administration implement, broader R&D funding provisions from President Biden's "Build Back Better" proposal. An extension of the current law providing full and immediate deductibility of R&D into 2022 and beyond is also critical to industry. Both are real additional incentives to increased domestic semiconductor manufacturing as well as high-tech U.S. parts manufacturing.

## **Conclusion**

MEMA is grateful that the Biden Administration is trying to understand the whole semiconductor supply chain and provide incentives for increased U.S. R&D, design, and production of semiconductors. MEMA urges the administration to focus on incentives to correct the U.S. shortcomings in wafer fab design and production and to increase production and overall global market share of motor vehicle and overall U.S. chip production. Increasing and diversified supplies of chips around the globe, including in the U.S., are vital to U.S. motor vehicle parts manufacturers.

Specific motor vehicle chip production incentives are also necessary. MEMA members do not want a repeat of the 2021 adverse impacts of the current motor vehicle semiconductor shortages on U.S. vehicle production with its negative economic and employment consequences. The motor vehicle specific incentives that we described will ensure MEMA support of the CHIPS Act and make it more likely that MEMA members can support other administration semiconductor supply chain initiatives. MEMA applauds the CHIPS Act provisions as a positive grants-based approach. We urge that other proposed semiconductor supply chain initiatives follow that incentive-based approach of either grants or tax credits.

MEMA appreciates the opportunity to provide the Department of Commerce with comments on its notice related to semiconductors. For any additional information or questions, please contact Bill Frymoyer, vice president of public policy at [bfrymoyer@mema.org](mailto:bfrymoyer@mema.org).